POLICY ISSUE
(Notation Vote)

May 29, 1997 SECY-97-110

FOR: The Commissioners

FROM: L. Joseph Callan
Executive Director for Operations

SUBJECT: STATUS REPORT ON IMPLEMENTATION OF DAM SAFETY PROGRAM

PURPOSE:

To provide the Commission with an update of the U.S. Nuclear Regulatory Commission's efforts on implementing the Agency's Dam Safety Program (DSP).

BACKGROUND:

In a memorandum dated October 4, 1979, President Carter asked that each Federal agency involved with dams adopt and implement the "Federal Guidelines on Dam Safety" (FGDS), as applicable. The memorandum also requested Department and Agency heads to submit a report to the Federal Emergency Management Agency (FEMA) by January 31, 1980. Consistent with the memorandum, NRC undertook efforts to implement the FGDS. However, because NRC did not have a formal Dam Safety Program Plan (DSPP), FEMA was critical of the NRC dam safety efforts. To address this concern, the staff prepared SECY-91-193, "Dam Safety Program Plan." SECY-91-193 outlined the various steps the NRC staff had taken since October 1979 and provided an NRC DSPP for Commission approval. Resources needed for the DSP were estimated to be approximately 1.0 full-time equivalent (FTE) per year, and $200,000 in contractor support. By memorandum dated July 30, 1991, the Commission approved the DSPP, and a copy was sent to FEMA on August 16, 1991. A copy of the approved DSPP is in Attachment 1.

SECY-91-193 also noted that NRC jurisdiction over dams at NRC-regulated facilities was limited to dams that were: 1) integral to the operation of the facility and radiologically safety related, or 2) associated with mill tailings impoundments. This excluded from NRC consideration those dams that may be on-site dams associated with, or attendant to a licensed facility, but not related to radiological safety. This categorization was based on an

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Office of the General Counsel (OGC) analysis that NRC regulatory authority would be confined to either dams with radiological hazards, or mill tailings dams where there was statutory authority. That analysis also stated that if no other Federal or State agency were regulating the non-radiological hazards of a dam associated with an NRC-regulated facility, an argument could be made for NRC authority over the non-radiological safety aspects, to avoid the creation of a regulatory gap. (There is express statutory authority to address non-radiological hazards with respect to uranium mill tailings impoundments.) Originally in NUREG-0965, "NRC Inventory of Dams," the staff identified 65 dams associated with NRC licensees. However, further analyses indicated that not all of these dams were radiologically safety-related (or that others were already regulated by another Federal agency viewed as having more responsibility than NRC for implementing the FGDS), and that only 34 could be regulated under NRC authority. Recent closures of several uranium mill tailings impoundments have further reduced that number to 19 dams now under NRC jurisdiction.

Since July 1991, the staff has undertaken a number of activities to work toward full implementation of the DSPP. On August 28, 1991, the NRC Dam Safety Officer met with FEMA personnel, including the Chairman of the Interagency Committee on Dam Safety (ICODS). The purpose of the meeting was to obtain from FEMA feedback on the DSPP. FEMA made no adverse comments on it. Having obtained input from FEMA, the staff then moved to implement the DSPP.

Consistent with the plan, the staff and the Federal Energy Regulatory Commission (FERC) developed a Memorandum of Understanding (MOU). The MOU provided for assistance from the FERC Office of Hydropower Licensing in inspecting those dams under NRC jurisdiction. Under this MOU, FERC has conducted inspections at 18 of the 19 NRC dams. Results from these inspections have not identified any significant problems with the dams. The staff, with assistance from FERC, currently plans to complete the inspection of the one remaining dam by the end of Fiscal Year (FY) 1997. However, because of budget reductions, the staff has been unable to achieve some of the other actions identified in the DSPP such as the development of a standard review plan (SRP). In accordance with recommendations presented in the FGDS, the staff also performed a detailed review and determined that none of the NRC dams posed a high or significant downstream hazard, since failure would not result in loss of life or significant property damage. Thus, consistent with the FGDS, the staff concluded that there was no need for the Emergency Action Plans (EAPs) anticipated in the DSPP.

A recent FEMA report, "National Dam Safety Program - 1994 and 1995," was critical of the NRC program. The report provides several recommendations for NRC to implement, including increased use of FERC, development of EAPs (notwithstanding the earlier NRC staff conclusion), and expanded involvement (increased level of effort) in the DSP. A copy of the report is provided as Attachment 2. Based on the FEMA report and the recent passage of the National Dam Safety Program Act (NDSPA), passed as Section 215 of the Water Resources Development Act (WRDA) of 1996 (Public Law 104-303), the staff decided that a reevaluation of the DSP was warranted.

To further clarify FEMA's concerns, staff met with FEMA on January 10, 1997. At this meeting, staff discussed the recent FEMA National Dam Safety Program recommendations and NRC plans for implementation of these recommendations. NRC staff identified plans to finish the first round of inspections (for dams included in the NRC inventory) by the end of FY97 and to discuss follow-up inspection frequency after the currently-scheduled inspections are completed. FEMA agreed that EAPs would not be necessary if NRC confirmed that none of the NRC dams was classified as a high- or significant-hazard dam. FEMA and NRC also discussed methods for determining responsibility for dams at certain sites not subject to NRC jurisdiction and not included in the NRC inventory. In addition, other recommendations were discussed, including expanded use of the FERC. NRC staff plans to follow-up on these recommendations.

DISCUSSION:

The NDSPA formalizes the direction President Carter provided in 1979 to encourage implementation of the FGDS. A copy of Section 215 of the WRDA is in Attachment 3. In general, the NDSPA does not impose any express new mandates for dam regulation on Federal agencies and does not supersede existing authorities of Federal agencies. Some questions remain open concerning FEMA's authority to impose new obligations. Even if it has the authority to impose new obligations, these new obligations would not supersede existing authorities. However, it is premature to address such questions until FEMA issues implementing regulations. Therefore, the staff has concluded that no new actions are required at this time in implementing the NRC DSP.

With respect to the FEMA criticism of the NRC program, as discussed above, the staff considers that it has adequately implemented the FGDS. Based on the staff analysis of downstream hazards at the 19 dams now under NRC jurisdiction, the staff concluded that there were no dams that could be considered a high hazard. High-hazard dams are those dams that, if breached, could result in substantial property damage or loss of life. Because only high-hazard dams are required to have EAPs, the staff, therefore, does not plan to develop EAPs. In addition, when FERC, under NRC direction, completes the inspection of the one remaining dam, it will have inspected all the dams over which NRC has regulatory authority. This effort will allow the staff to initially determine if all the NRC dams meet the FGDS under the current DSP. The staff plans to continue to use FERC to routinely inspect some dams each year, to help ensure continued compliance with FGDS. It is anticipated that this effort will cost approximately 50,000 dollars per year for between three to five inspections. In addition, the staff plans to continue to support ICODS at an annual cost of 10,000 dollars.

If the Commission decides to pursue any new work, such as the development of an SRP or preparation of EAPs, additional resources would be needed. The staff is currently revising its SRP for the review of reclamation designs at mill tailings impoundments. A chapter covering dam safety could be added to this SRP. The estimated resources for completing this additional work would be approximately 0.4 FTE (or about 100,000 dollars if a contractor were used).

If the Commission were to decide that EAPs should be completed for all NRC dams, this effort would take an additional 2.0 FTE spread over approximately two fiscal years. It should be noted that NRC regulations currently do not

require NRC licensees to prepare EAPs for dams. If the Commission decided to have licensees prepare EAPs and licensees chose not to, the staff would have enforcement capability regarding licensee EAP preparation only on uranium mill licensees, under Section 84a of the Atomic Energy Act of 1954, as amended. Successful implementation of an EAP program would require the promulgation of a rule requiring the development of EAPs by licensees. This rulemaking effort would need additional resources beyond those previously identified. However, the staff does not plan to undertake either of these two activities, unless directed by the Commission. Rather, the staff finds the current DSP sufficient for ensuring compliance with the FGDS and the WRDA.

RESOURCES:

In FY 1996, NMSS expended approximately 0.8 FTE on the DSP. In FY 1997 and FY 1998, NMSS had budgeted 0.2 FTE and 10,000 dollars. The staff has reprogrammed resources in FY 1997 and FY 1998 to support the DSP at approximately 1.0 FTE and 60,000 dollars. Activities that will be undertaken using the 1.0 FTE budgeted include: 1) continued interaction with FEMA on dam safety issues, and preparation of input to the bi-annual dam safety report; 2) coordination, participation in, and follow up of dam safety inspections conducted by FERC; 3) general contract management of the FERC contract; 4) continued participation in and support to ICODS; and 5) overall management and implementation of the agency's DSP. The 60,000 dollars of contractor support will be for the continued use of FERc to inspect 3 to 5 dams each year, and the 10,000-dollar membership fee for ICODS.

This reprogramming, along with the availability of resources for FY 1999 through FY 2001, is being addressed as part of the FY 1999 Internal Program/Budget Review Process. If the Commission directs the staff to pursue new work associated with the DSP, as presented in the "Discussion" section above (i.e., development of an SRP or preparation of EAPs for all NRC dams), additional resources would be required.

RECOMMENDATIONS:

Subject to Commission approval, the staff plans to continue with the current DSP, but with increased resources to support necessary staff efforts and expanded use of FERC for follow-up inspections to ensure compliance with FGDS.

COORDINATION:

The Office of the General Counsel has reviewed this paper and has no legal objection. The Office of the Chief Financial Officer has no objection to the resource estimates contained in this paper. The Office of the Chief Information Officer has also reviewed this paper and concurs.

L. Joseph Callan
Executive Director
for Operations

Attachments:
1. Approved DSPP
2. FEMA Report
3. WRDA Section 215

Commissioners' comments or consent should be provided directly to the Office of the Secretary by COB Monday, June 16, 1997.

Commission Staff Office comments, if any, should be submitted to the Commissioners NLT June 9, 1997, with an information copy to the Office of the Secretary. If the paper is of such a nature that it requires additional review and comment, the Commissioners and the Secretariat should be apprised of when comments may be expected.

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ATTACHMENT 1

APPROVED DSPP

U.S. NUCLEAR REGULATORY COMMISSION
DAM SAFETY PROGRAM PLAN
JULY 1991[1]

INTRODUCTION

This plan describes the manner in which the U.S. Nuclear Regulatory Commission will implement the "Federal Guidelines for Dam Safety" (Federal Guidelines), dated June 25, 1979, directed for implementation by the President of the United States on October 4, 1979. This plan defines the general methodology and mechanisms that will be used to fully initiate and maintain a Dam Safety Program consistent with the Federal Guidelines. Portions of the plan adopt existing NRC guidance documents, procedures, and approaches that conform with the Federal Guidelines. Once the plan is implemented, portions of the plan may need to be expanded where existing NRC policy is identified as not fully meeting the Federal Guidelines.

ORGANIZATION AND ADMINISTRATION

To meet the objective of ensuring that management and technical decisions during all project stages give proper recognition to safety considerations, it is necessary to have an organization and management philosophy that continuously strives to improve practices and procedures associated with the regulation of dam planning, engineering, construction, testing, inspection, operation, maintenance, re-evaluation, and emergency planning and procedures.

NRC will have a Dam Safety Officer (DSO), appointed by the Executive Director for Operations (EDO) and reporting to the Director, Office of Nuclear Material Safety and Safeguards, responsible for ensuring implementation of the Dam Safety Program, in conformance with the Federal Guidelines. The DSO will be responsible for developing guidance documents, procedures, training programs, and other aspects necessary for adequate program implementation. The individual Office Directors will be responsible for implementing the program by regulating their specific licensees. These responsibilities will be carried out through the efforts of Office Directors' representatives to the Dam Safety Advisory Group. The group's membership will consist of individuals from the affected NRC offices, and will include regional office representation where a significant need exists for coordination or implementation. Each office represented as a result of that office's responsibility for the regulation of licensees who design, construct, own, or operate dams shall have a manager, at least a branch chief, designated by the Office Director/Regional Administrator as the responsible manager, within that office, for implementation of the program. In addition, each office shall have a technical member on the Advisory Group, who is trained in one of the basic

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[1] Commission approval per Memorandum, dated July 30, 1991, Chilk to Taylor.

disciplines related to dam safety. The DSO will ensure that all necessary disciplines related to dam safety are represented on the Advisory Group. Additionally, the General Counsel shall designate a representative from that office to provide legal guidance to the DSO. The Advisory Group will meet together at least four times annually and meet with the EDO at least once annually. The charter for the NRC DSO is provided as Attachment A.

The execution of the details necessary to ensure compliance with the Federal Guidelines is expected to be carried out with the aid of the Federal Energy Regulatory Commission (FERC), through a Technical Assistance effort. A Memorandum of Agreement (MOA), between FERC and NRC, will provide for FERC assistance, through its Office of Hydropower Licensing, so that NRC can proceed to fully implement the Federal Guidelines.

Under such an agreement, NRC staff will provide the project management function by completing such activities as setting forth criteria and guidelines, defining candidate dams/impoundments for review, setting priorities for work activities and directing FERC activities, including coordination with NRC licensees. FERC will perform dam safety inspections and evaluations of dams identified by NRC to determine any areas of non-compliance. Additionally, FERC will perform consulting work, including criteria review and followup inspections. In general, FERC activities will be in accordance with the FERC program for the safety of water power projects, as modified in NRC criteria and guidance.

To execute this program, NRC staffing will generally consist of one individual in each affected NRC office being responsible for identifying the dams to be reviewed and for interfacing with the FERC personnel executing the detailed work. (In some cases, the review conducted may be only to determine whether a specific dam should be considered under the Federal Guidelines.) It is recommended that these NRC individuals also be the same individuals designated by each of the affected offices to serve as the technical representative to the Dam Safety Advisory Group. Based on the experience of FERC, one individual for each 5 to 10 dams appears to be a necessary resource level to fully execute a program on an annual basis, consistent with the Federal Guidelines. It is expected that the combined NRC and FERC resource needs should reflect a similar level.

NRC program-implementation personnel will use the Training Aids for Dam Safety (TADS) Program, initiated by the Interagency Committee on Dam Safety. This will consist of a study-training program directed by the NRC DSO. In addition, NRC personnel involved in program implementation will be encouraged to attend dam-safety training offered through other government agencies, professional groups, and universities.

The FERC personnel who may be involved in support of the NRC program implementation will be drawn from a staff that FERC believes is fully competent in the fields of hydrology, hydraulics, geology, and geotechnical and structural design, as well as in field inspections and investigations. Currently, training of FERC personnel combines the use of TADS, and courses by other Federal agencies, by professional organizations and universities, and by outside consultants, for agency use.

DAM INVENTORY AND HAZARD CLASSIFICATION

NRC has provided, in NUREG-0965, a basic inventory of dams associated with nuclear power plants and uranium mill-tailings dams. That information was current as of February 1, 1982; changes in the actual inventory have occurred mainly as a result of power plant cancellations and uranium mill closings. Dams or impoundments associated with the facilities used by various other NRC licensees were not addressed. Certain dams may constitute dams that should be considered under the Federal Guidelines either on the basis of dam height, impounded water volume, or potential significant downstream hazard. Attachment B provides the definition of the term "dam," based on the Federal Guidelines. The definitions of "hazard" and "hazard classifications" are also in Attachment B and reflect a composite of the definitions being used by the Federal Guidelines, FERC, and the Bureau of Reclamation of the Department of Interior.

Based on these definitions, it will be necessary for the NRC to query or inspect the various licensees, to ascertain whether a dam or impoundment exists, at their licensed utilization facilities, that is radiologically safety-related, and integral to the operation of the facility. In addition, it will be necessary to determine if any other dams exist for the facility or the process that are non-radiologically safety-related. The results of this effort and any subsequent followup will be used to update the NRC Dam Inventory to define those dams that should be considered under the Federal Guidelines and to define the responsible regulatory agency, if any. The initial information needed to determine whether a dam should be considered under the Federal Guidelines, as well as relevant information on the regulatory authority for the dam, if any, will be obtained from various licensees. This survey will be conducted over a period of time, on the bases of the type of facility and the type of license the licensees possess.

Once a list of radiologically safety-related dams and tailings dams that should be considered under the Federal Guidelines has been established, priority groupings of the facilities will be established, based on the currently available information. These groupings will be used as guidance in the scheduling of the reviews and inspections under the Federal Guidelines and the NRC Dam Safety Program. The priority assigned to a specific dam will be based on considering such items as the downstream hazard, age of the dam, type of dam, information on the design and designers, and past performance history, as well as any operational or inspection information. Owner information on State or local regulation of the dam may also be used in prioritization.

CRITERIA AND TECHNICAL GUIDANCE

Currently, NRC uses regulatory guides, standard review plans, and branch technical positions to provide the necessary detail to ensure that the existing regulations are met and that dams (radiologically safety-related) designated as seismic Category I or for use as retention systems for uranium mills are designed, constructed, inspected, and operated to the safety level expected by NRC. Included in these documents are guidance documents such as the following:

- Regulatory Guide 1.59, "Design Basis Floods for Nuclear Power Plants," Rev. 2, 8/77, with Errata published 7/30/80.

- Regulatory Guide 1.60, "Design Response Spectra for Seismic Design of Nuclear Power Plants," Rev. 1, 12/73.

- Regulatory Guide 1.127, "Inspection of Water-Control Structures Associated with Nuclear Power Plants," Rev. 1, March 1978.

- Regulatory Guide 3.11, "Design, Construction, and Inspection of Embankment Retention Systems for Uranium Mills," Rev. 2, 12/77.

- Regulatory Guide 3.11.1, "Operational Inspection and Surveillance of Embankment Retention Systems for Uranium Mill Tailings," Rev 1, 10/80.

These guidance documents will be evaluated for consistency with the Federal Guidelines, as well as with the supplemental technical guidance documents that have been published by Interagency Committee of Dam Safety (ICODS). The evaluation will address the design bases for the dam, the design, construction, testing, and inspection processes, as well as the operation, maintenance, and surveillance programs that must function during the life of the facility. The specific ICODS technical guidance to be used in evaluating current NRC guidance will consist of the following two documents:

- "Federal Guidelines for Selecting and Accommodating Inflow Design Floods for Dams," by ICODS, and published by FEMA (undated).

- "Federal Guidelines for Earthquake Analysis and Design of Dams," by ICODS and published by FEMA, as FEMA 65/March 1985.

Whenever instances of conflict are identified and the current NRC requirements or guidance documents are less restrictive than those of the Federal Guidelines. NRC will consider changing its requirements and/or guidance to be consistent with the Federal Guidelines. If the Federal Guidelines are not met and no changes are made, NRC will provide a justification for the lesser margin of safety.

If changes from current NRC regulatory requirements or guidance result from this process, the various NRC licensees will be appropriately notified and given a timetable for the implementation of the Dam Safety Program and any revisions thereto.

INSPECTION AND REHABILITATION

Once the criteria and guidelines have been clearly defined, or redefined, it will be necessary for NRC, as the regulator of radiologically safety-related dams and mill tailing dams, to conduct inspections of the licensees' dams, related programs, and actions taken by the licensees, as well as to review documents and data important to the safety of the dams. The inspection criteria, frequency, and scope of the inspections shall, as a minimum, meet the Federal Guidelines.

The frequency and scope of the inspections will be the resultant of those inspections conducted by the dam owners, combined with those of NRC, as the regulatory agency and those conducted by a State, if conducted under an acceptable dam-safety program. Recognition of State dam-safety programs as the regulatory control will only be made after a formal Memorandum of Understanding (MOU) has been executed between a specific State and NRC.

Where inspection findings and any subsequent analyses define inadequate margins of safety regarding dam failure, NRC will require the owner to undertake a rehabilitation program to upgrade the safety of the dam. The schedule for completion of such upgrades will stem from case-by-case review.

EMERGENCY ACTION PLANNING

All licensees with radiologically safety-related dams or mill tailings dams that are to be addressed under the Federal Guidelines and that are classified as significant- or high-hazard dams shall develop emergency action plans for them. The plans, as a minimum, shall conform with the Federal Guidelines and any other guidance NRC may provide.

NRC, in defining what is necessary for adequate emergency planning, will use the "Emergency Action Planning Guidelines" issued by ICODS in February 1985. To the extent possible, emergency action plans for dam safety will use elements of existing radiological emergency action plans that have been developed by the various licensees.

Emergency action-plan elements shall address: determination of the mode of failure of a dam; definition of the inundation zone, and classes of danger within the inundation zone; time available for response; notification methods and requirements; evacuation plans; availability of men and material for remedial actions; provisions for increased frequency of inspection/ observations; the consideration of various predefined action statements; and the necessary training of operation personnel.

REMEDIAL ACTION AND DAM FAILURES

NRC will maintain a data base of instances where remedial action was necessary, as well as any cases of operational incidents and dam failures. The DSO Will define the data necessary for inclusion in the data base, but as a minimum, the following information shall be available in the data base:

- Dam identification and location
- Dam owner and operator
- Date of occurrence
- Precursory events such as rainfall, seismic event, etc.
- Description of event
- Time scenario of event
- Actions taken
- Losses in terms of dollars, injuries, and deaths
- Cause of event
- Relationship of event to Dam Safety Program
- Future actions needed

INDEPENDENT REVIEWS AND MANAGEMENT REVIEWS

Under this program, independent reviews, at various stages in the life cycle of a dam, from inception to subsequent removal, will be necessary. By nature, the concept of the owner performing the major functions of, and addressing the elements of, a dam-safety program, with regulatory agency overview, will meet the goal of the Federal Guidelines. For existing dams, the Federal Guidelines prescribe formal inspections at intervals not to exceed five years. For this program, owners will have to have such reviews and inspections conducted by a team of qualified individuals, with a majority of the members being independent of the owner's organization.

The effectiveness of the NRC dam Safety Program in implementing the Federal Guidelines will be assessed by NRC management. Additionally, the EDO, in preparation for, or as a result of, the annual meeting with the Dam Safety Advisory Group, may conduct management reviews on the status of program implementation.

DAM-SAFETY PROGRAMS OF STATE AGENCIES

This program recognizes the existence of dam-safety programs under the jurisdiction of various States' designated agencies for State dam safety. It will be necessary for NRC to enter into a MOU with any State for a dam that has been incorporated into the NRC Dam Safety Program, if NRC is to accept the State's dam-safety program and actions taken under it. NRC will provide a basis for the acceptability of the State's program. In cases where a State is an NRC Agreement State, the necessary provisions for addressing dam safety can be incorporated into the agreement documents.

For those licensees whose license is for a utilization facility, it is necessary that the governing requirements for dam safety of a radiologically safety-related dam be those defined in this program. Section 274c(1) of the Atomic Energy Act, 42 U.S.C. 2021(c), prevents NRC from relinquishing any authority to a State for the regulation of the construction or operation of a utilization facility. Therefore, the regulatory framework of this program would govern. States could, however, after entering into a MOU with NRC, conduct such inspections and evaluations as defined in this program. In this situation, NRC would have to take any remedial or enforcement actions precipitated by a State inspection.

SPECIAL INITIATIVES ON DAM SAFETY

The DSO will be responsible for annual review, of and identification to the EDO of, any dam-safety areas that are part of this program, where special emphases or initiatives are necessary to improve dam safety.

Based on agency-wide priorities for resources and an evaluation of the relative needs in the total NRC programs and budget, the EDO will authorize any justified special initiatives in dam safety. The DSO will develop a schedule and plan for completion of any initiatives and report at least annually, to the EDO, on the Status of the efforts and the target completion date.

REVISIONS TO THIS PLAN

The DSO will be responsible for advising the EDO and the Commission on the need for revisions to this plan. Evaluation of the need for revision shall be conducted at intervals not to exceed two years and shall incorporate consideration of comments received from the Federal Emergency Management Administration (FEMA), on program implementation, based on the most recent biennial report by FEMA. There may be shorter times between revisions, if necessary.

Attachments:

A: Charter of NRC Dam Safety Officer
B: Definitions

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CHARTER - DAM SAFETY OFFICER

Revision 3, July 1991

BACKGROUND

The "Federal Guidelines for Dam Safety"[2] direct that each Federal Agency having responsibility for design, construction, operation, or regulation of dams establish a dam safety office or officer reporting directly to the head of the agency or the head's designated representative. The purpose of this charter is to identify the duties and responsibilities of the Nuclear Regulatory Commission Dam Safety Officer.

RESPONSIBILITY

The Dam Safety Officer is responsible for ensuring that the NRC, as a matter of policy and actual practice, makes every responsible and prudent effort to assure the safety of dams which are subject to NRC regulations. Generally, the duties of the Officer include:

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[2] "Federal Guidelines for Dam Safety," Federal coordinating Council for Science, Engineering and Technology, AD Hoc Interagency Commission on Dam Safety, Washington, DC 20500, June 25, 1979.

Charter Revisions

(1) Substantive Changes to July 11, 1980, Charter
(2) Substantive Changes to January 1983 Charter
(3) Minor Changes to October 1990 Charter

(1) development and implementation of an NRC Dam Safety Program Plan, addressing the relationship to the Federal Guidelines for Dam Safety;

(2) surveillance and evaluation of NRC practices related to dam safety concerning design and construction of new dams, operation, maintenance, and rehabilitation of existing dams, including emergency planning and procedures;

(3) recommending and coordinating implementation of improvements in these practices when evaluation reveals safety-related deficiencies; and

(4) advising the Executive Director for Operations (EDO) of significant needs and weaknesses of the NRC dam safety program, as necessary.

The recommendations and programs of the Dam Safety Officer shall be consistent with the regulatory nature of the NRC.

APPOINTMENT AND REPORTING

The Dam Safety Officer is appointed by the EDO at the recommendation of the Director, Office of Nuclear Material Safety and Safeguards (NMSS), and keeps the Director, NMSS, informed on routine matters of dam safety. The Officer also reports to the EDO periodically on program status and has direct access to the EDO on dam safety matters to the extent necessary to execute the responsibilities of the Dam Safety Officer.

FUNCTIONAL STATEMENT

The NRC Dam Safety Officer:

1. Requests each NRC office involved with dams to nominate a representative to a Dam Safety Advisory Group, as necessary, to coordinate dam safety matters between their respective offices and the Dam Safety Officer.
2. Serves as Chairperson for the Dam Safety Advisory Group.
3. Develops and implements a Dam Safety Program Plan to address the Federal Guidelines for Dam Safety.
4. Maintains an inventory of dams.
5. Coordinates research needs unique to NRC dam safety efforts.
6. Prepares progress reports, as necessary, advising the EDO on the status of the NRC dam safety efforts.
7. Revises this charter, as necessary, to plan for the future. The revision is to be coordinated with the budget call to insure the dam safety program is reflected, as required, in the budget.
8. Ensures that the activities identified in "Responsibility" are accomplished.
9. Serves as NRC contact on dam safety with the Federal Emergency Management Agency (FEMA).
10. Serves as the NRC representative on the Interagency Committee on Dam Safety (ICODS).

PROJECTED ACTION ITEMS

The Dam Safety Officer will:

1. Convene the Dam Safety Advisory Group as necessary to involve individual Offices in dam safety matters.

2. Encourage active communication among the Commission's staff responsible for dam safety on matters related to site investigation and design, construction, and operation and maintenance (including emergency action planning) for dams, and related research, as outlined in the Federal Guidelines for Dam Safety.

3. Keep a current account of the status of the NRC dam safety program as it relates to the Federal Guidelines for Dam Safety.

4. Prepare and present to the Commission an NRC Dam Safety Program Plan proposing an overall NRC policy with respect to NRC involvement in the regulation of dams.

5. Prepare and maintain a current NRC inventory of dams.

6. Develop a licensee reporting program and an internal communication program to insure the NRC is aware of incidents related to dam safety.

7. Develop a plan, including manpower and budget impacts, for the implementation of the Federal Guidelines for Dam Safety.

8. Coordinate the NRC dam safety program with other Federal agencies through participation in the ICODS.

9. Coordinate the NRC dam safety program with various states, as appropriate, and maintain contact with the Association of State Dam Safety Officials (ASDSO).

10. Report to FEMA as requested on a biennial basis to provide input for the FEMA biennial report to the President on the status of implementation of the Federal Guidelines on Dam Safety.

DEFINITIONS

July 1991

The Following definitions apply to the NRC Dam Safety Program.

DAM: A dam is any artificial barrier, including appurtenant works, which impounds or diverts water and meets any one of the three conditions provided below. This definition applies whether the dam has a permanent reservoir or is a detention dam for temporary storage of floodwaters or water associated with some industrial type activity that is used for cooling, a settlement or dewatering basin, or other processes within the facility.

A dam is considered by the NRC Dam Safety Program if it is:

(1) greater than or equal to 25 feet in height with a storage capacity greater than 15 acre-feet, or

(2) has a storage capacity greater than or equal to 50 acre-feet and is greater than 6 feet in height, or

(3) there is a potentially significant downstream hazard.

The height of a dam is the vertical distance measured from the natural bed of the stream or water course measured at the downstream toe of the barrier, or from the lowest elevation of the outside limit of the barrier if it is not across a stream channel or watercourse, to the maximum water storage elevation. The impounding capacity at maximum storage elevation includes storage of floodwaters above the normal full storage elevation of the facility.

DAM FAILURE: A dam failure is characterized by a catastrophic type of failure produced by the sudden, rapid, and uncontrolled release of impounded water. It is recognized that there are lesser degrees of failure and that any malfunction or abnormality outside the design assumptions and parameters which adversely affect a dam's primary function of impounding water is properly considered a failure. Such lesser degrees of failure can progressively lead to or heighten the risk of a catastrophic failure. They are, however, normally amendable to corrective action.

HAZARD: A hazard is present if there is a potential for loss of life or property damage downstream of a dam from floodwaters released at the dam or waters released by partial or complete failure of the dam or overtopping of the dam whether that results from flooding or rim slides into the reservoir. Hazards are classified with respect to their severity; however, hazard classification is not associated with the existing condition of a dam and its appurtenant structures or the anticipated performance or operation of a dam. Rather, hazard classification is a statement of potential adverse impact on human life, downstream property, or improvements from a large water flow or release from any cause. The hazard classification assigned to a dam is based on consideration of the effects of a dam failure during both normal and flood flow conditions. The cost of the dam, related facilities (e.g., pump stations, canals, pipelines, etc.), and the related project losses are not considered in downstream hazard classification. Also, the consequences of a rapid reservoir drawdown, due to a dam failure, on

persons upstream from the dam are not considered in downstream hazard classification. Only the direct effects of a flood on persons, property, or improvements downstream from the dam are considered.

Hazards are classified as follows:

DOWNSTREAM HAZARD CLASSIFICATION SYSTEM

Classification	Lives-in-Jeopardy	Economic Loss	Downstream Area Characterization
Low	0	Minimal	Rural, agricultural area with uninhabited structures, local roads, minor improvements, and no outstanding natural features that could be damaged.
Significant	1-6	Appreciable	Rural, agricultural area with scattered homes, small industry or employment sites traversed with secondary highways and minor railroads which if subjected to the hazard could cause the loss of, or interruption of public utilities. Area may contain natural features that may have minor impacts.
High	More than 6	Excessive	Urban area including residential, business, industry, agricultural, recreational and other centers of work and residence containing important public utilities, main highways, railroads and schools. Natural features may be heavily impacted.

LIVES-IN-JEOPARDY: Lives-in-jeopardy is defined as all individuals within the inundation boundaries who, if they took no action to evacuate, would be subject to dangers of varying extremes. The level of danger is based on the degree of protection afforded by the structure the person may be in, the size of the person, the depth of water flow, the velocity of

water flow, the time of year, time of day, and the season of the flooding. Whether the people are within the inundation area on a permanent basis vs. a temporary basis will also be a factor in determining lives in jeopardy.

ECONOMIC LOSS: Economic loss is that loss resulting from damage to residences, commercial buildings, industries, croplands, pasturelands, utilities, roads and highways, railroads, etc. Consideration should also be given to economic loss resulting from damage to outstanding natural resources within officially declared parks, preserves, wilderness areas, etc. Also, if a toxic or harmful substance is known to be present in significant quantities in the impoundment, the effect of its dispersion on downstream areas (with respect to economic loss only) should be considered in the downstream hazard classification.

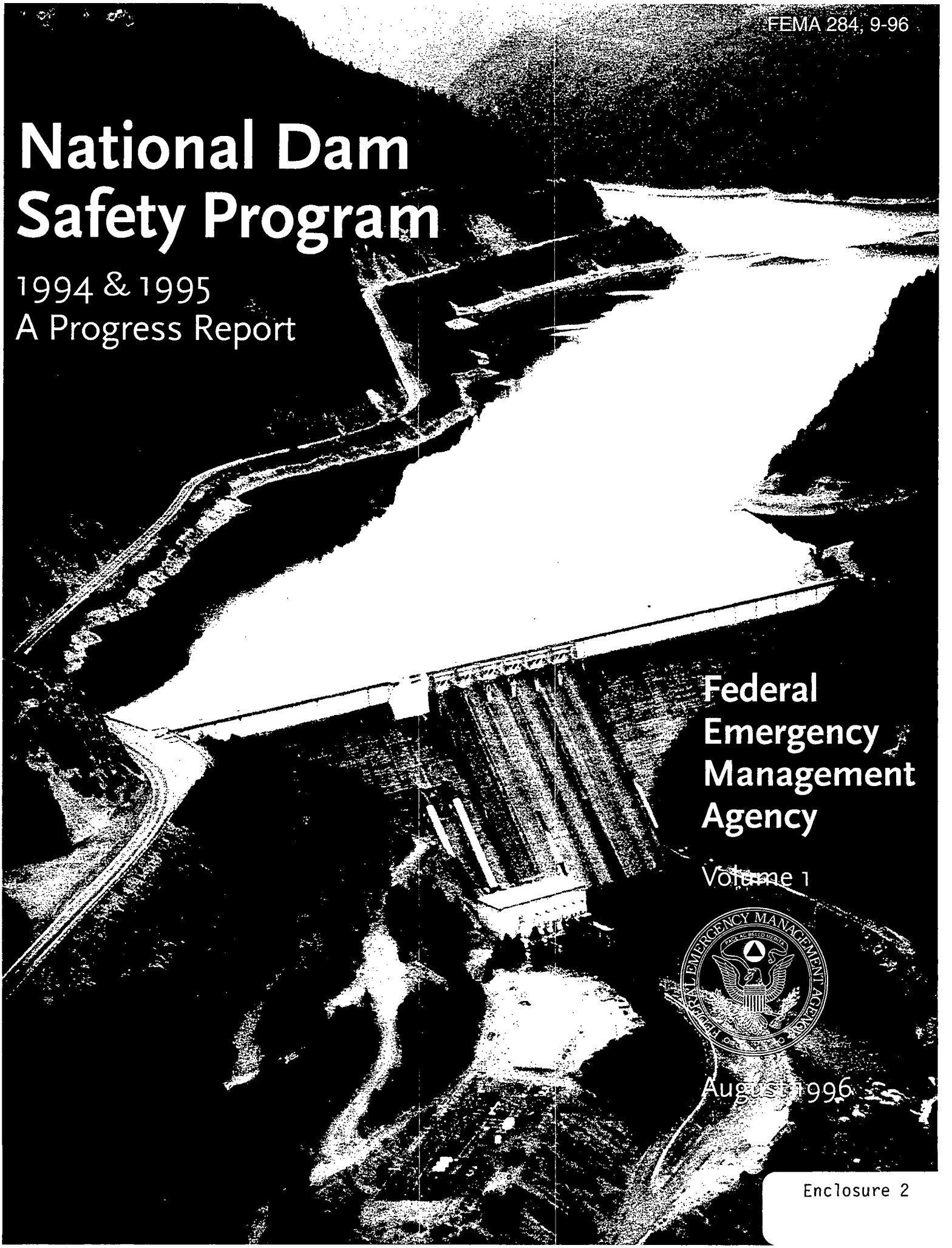
ATTACHMENT 2

FEMA REPORT

FEMA 284, 9-96

National Dam Safety Program

1994 & 1995
A Progress Report

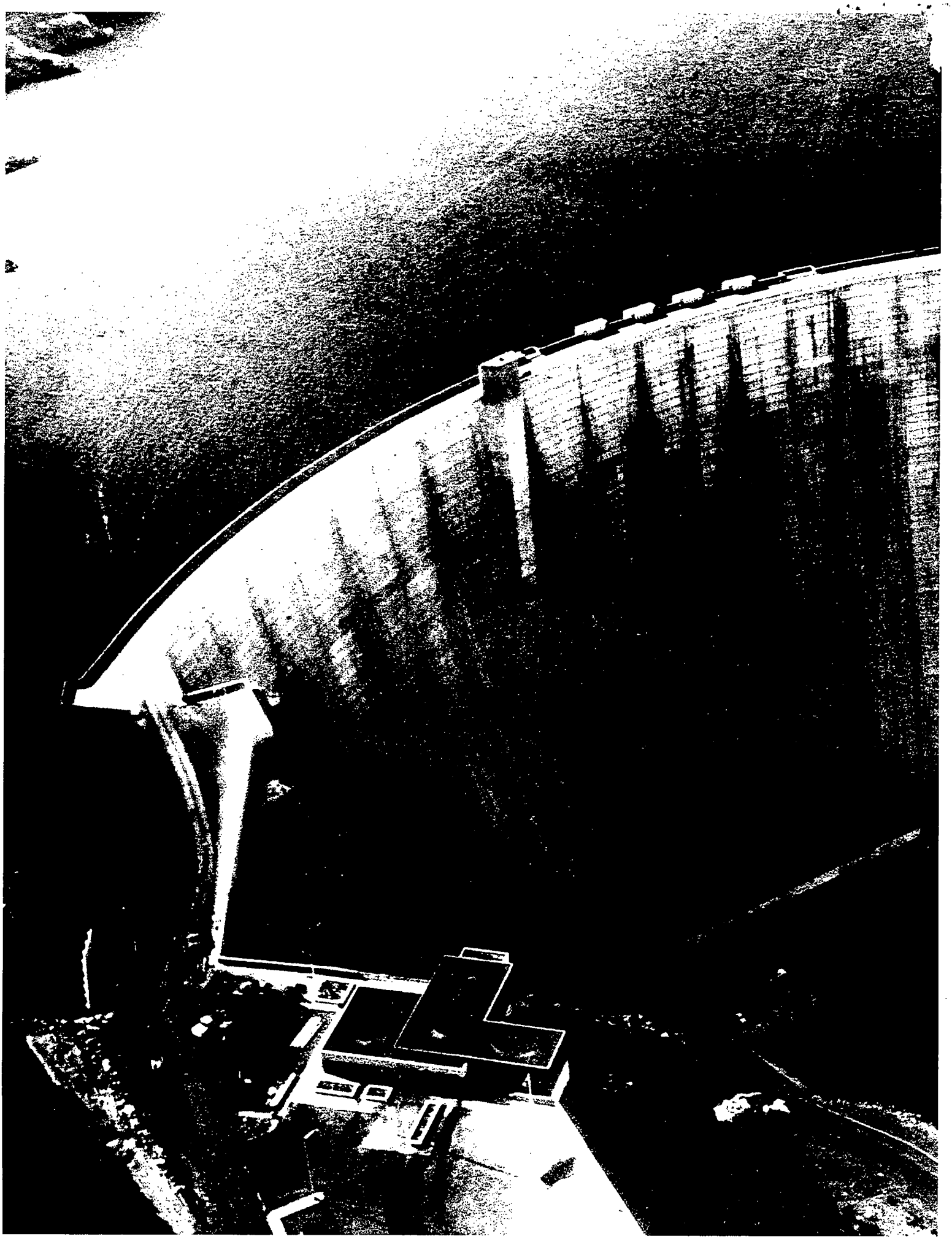


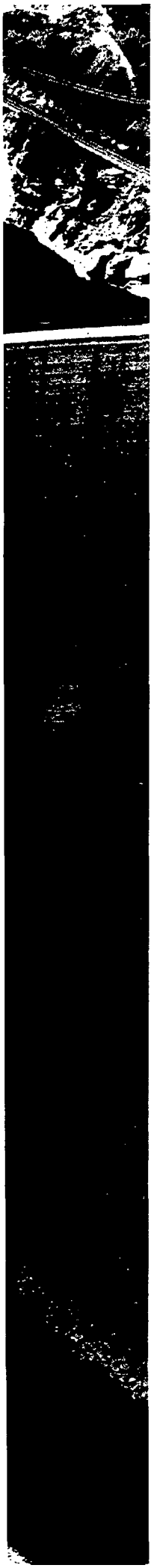
Federal Emergency Management Agency

Volume 1

August 1996

Enclosure 2





Executive Summary

SINCE 1980, A BIENNIAL REPORT ON DAM SAFETY has been sent to the President by the Director of the Federal Emergency Management Agency (FEMA). The biennial report is in response to the October 4, 1979 Presidential Memorandum, which directed the Federal agencies responsible for dams to adopt and implement the Federal Guidelines for Dam Safety (Guidelines). This is the ninth biennial report to the President.

The Guidelines are directed to agency managers (not technicians) for the purpose of ensuring that their dam safety programs include all essential elements for a comprehensive dam safety program. This report, similar to previous progress reports, is subject to information provided by the agencies in their submissions to FEMA; however, there is no reason to believe that the agencies have not been candid in the responses to almost all requested items of inquiry. Only one newly formed agency did not submit a report to FEMA.

A few agencies have made little progress in the implementation of the Guidelines. For agencies in this category which are struggling or doing poorly in implementation, the report recommendations identify for managers of departments and agencies those actions which should occur if they are to show constructive progress in the next reporting cycle.

It is encouraging to report that most agencies have adopted the Guidelines as policy, and have assumed the tasks needed to evaluate individual dams under their ownership or jurisdiction against both the Guidelines and a set of adequate technical standards. The agencies with dams as a primary function are doing better and better with their dam safety programs with each progress report. Almost all of the agencies with dams as a secondary function have adopted the Guidelines, and almost all report reasonable progress in implementing the various sections of the Guidelines and in conducting technical evaluations on individual dams. Although a few agencies linked their lack of accomplishments to reduced resources and focused on the "less," the really positive report is the many dam safety managers seeking to do viable, sustainable, improved, and more effective work using knowledge gained and the resources available in the broader arenas of their departments and all of Federal Government.

"It is encouraging to report that most agencies have adopted the Guidelines as policy."

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On the cover: Detroit Dam, Oregon; left: Yellowtale Dam, Montana.

The Role of the Federal Emergency Management Agency in Dam Safety

"As part of FEMA's renewed focus on risk reduction, the agency has established mitigation as the primary foundation for emergency management nationwide."

■

Right:
Glen Canyon Dam and Reservoir, Arizona.

THE FEDERAL EMERGENCY Management Agency (FEMA) provides leadership and support for a comprehensive, all-hazards emergency management program. As part of FEMA's renewed focus on risk reduction, the agency has established mitigation as the primary foundation for emergency management nationwide. Dams, buildings, homes, and schools that are built better will withstand hazards better. To the American public, this means less destruction, less loss of life, less personal and financial hardship, and less tragedy. This also means fewer dollars paid out for disasters to rebuild lives, homes, and businesses.

FEMA's role in national dam safety is unique. Although it neither owns dams nor has regulatory responsibility for dams, FEMA is responsible for coordinating all the activities of the National Dam Safety Program. As the lead agency, FEMA places a priority on coordinating Federal agency activities, encouraging and assisting states in implementing effective state programs, providing technical assistance, and promoting public awareness projects to increase public acceptance and support for dam safety activities. FEMA also leads the Interagency Committee on Dam Safety (ICODS), which consists of representatives from Federal departments and agencies who meet regularly and exclusively to examine dam safety at the national level and recommend mitigation policies that promulgate dam safety.

At this time, there is the greatest difference ever between the agencies in their accomplishments to implement the Federal Guidelines for Dam Safety (Guidelines). Dam safety programs are at, and will remain for some time, a critical juncture as the application of reduced resources continues across the Federal and State Governments.

Although most agencies continue to meet the demands needed for viable dam safety programs, a few agencies have made little progress in implementing the Guidelines. As coordinator of the National Dam Safety Program, FEMA will address with those agencies the failure to implement the Guidelines to a minimum level which defines the potential risks to public safety from high and significant hazard dams under the jurisdiction of those agencies. Despite funding reductions, enough time has passed for all agencies to have achieved well-defined and operating dam safety programs.

As the chair of ICODS, FEMA has the opportunity to facilitate the sharing of learning and specialized resources across agencies. To move specific dam safety programs to higher levels of sustainability, FEMA will lead ICODS to improve and formalize the sharing of agency training and research and evaluations in new processes and/or techniques. During the next reporting cycle, ICODS will sponsor a research conference in dam safety so that employees in agencies with dams as a secondary function, and personnel in program work removed from research, can learn of the accomplishments and training occurring across the broader (Federal, state, private owner, and university) dam safety industry. This will assist those agencies which desire success to accomplish effective and comprehensive dam safety programs.

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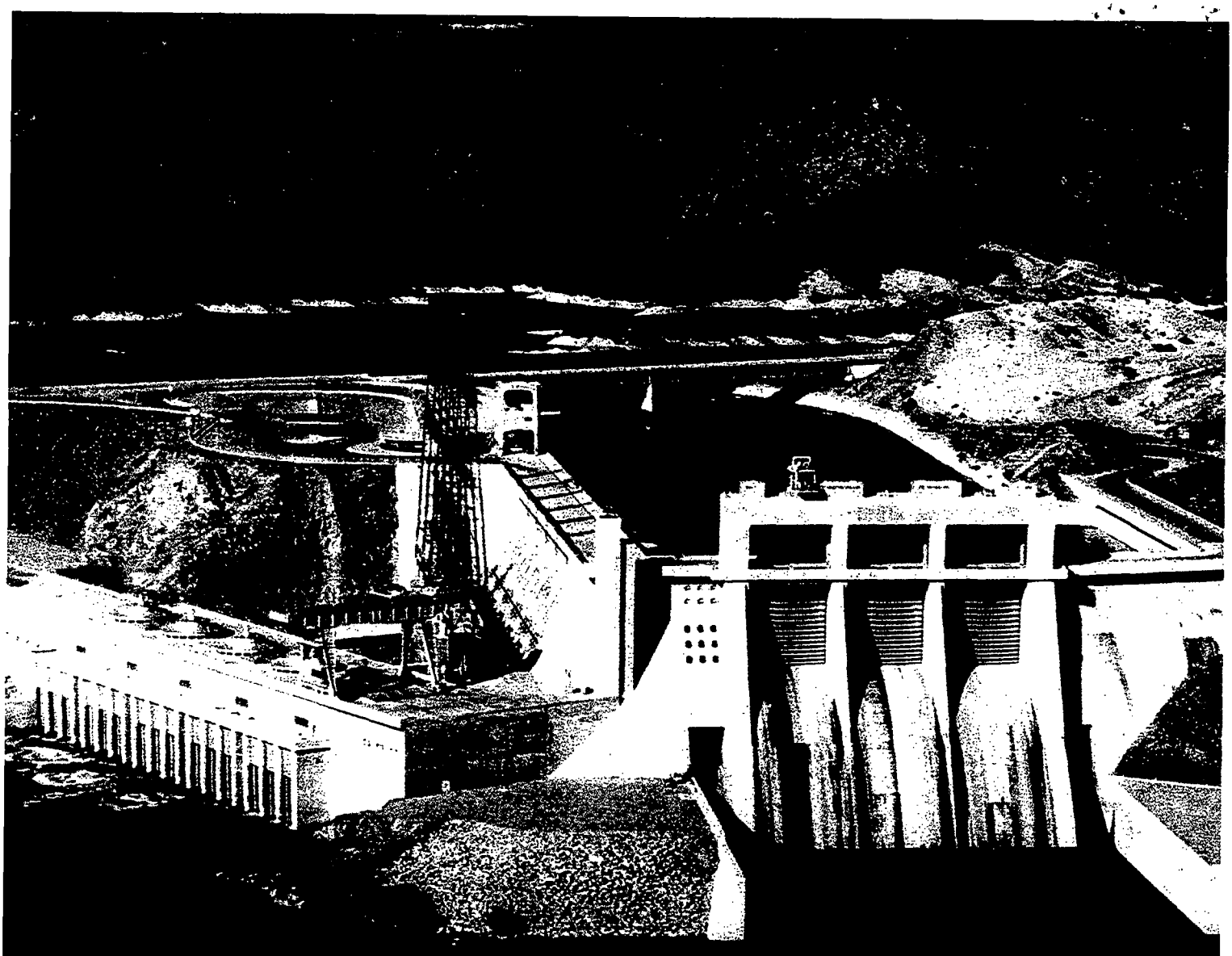


Mohave Valley Division,
Colorado River Front Work
and Levee System
Arizona–Nevada.

The Federal Role in Dam Safety

The Goals of the National Dam Safety Program

The goals of the Federal Emergency Management Agency (FEMA) National Dam Safety Program are to improve Federal dam safety by implementing the Federal Guidelines for Dam Safety (Guidelines) and to foster non-Federal dam safety by assisting the states to develop and implement their own effective programs. These goals are expressed in the dam safety doctrine.

> *Dams must be designed, built, operated, and maintained safe. Ensuring the safety of dams is not a passive activity. The responsibility for protecting lives and property never ends. New approaches and policies must be developed, implemented, and evaluated. New players must be continually recruited and drawn into the group of participants. New programs must be promoted; weak programs must be revitalized. Leadership, awareness, dedication, and action must be generated and repeatedly regenerated. Opportunities must not be overlooked.*

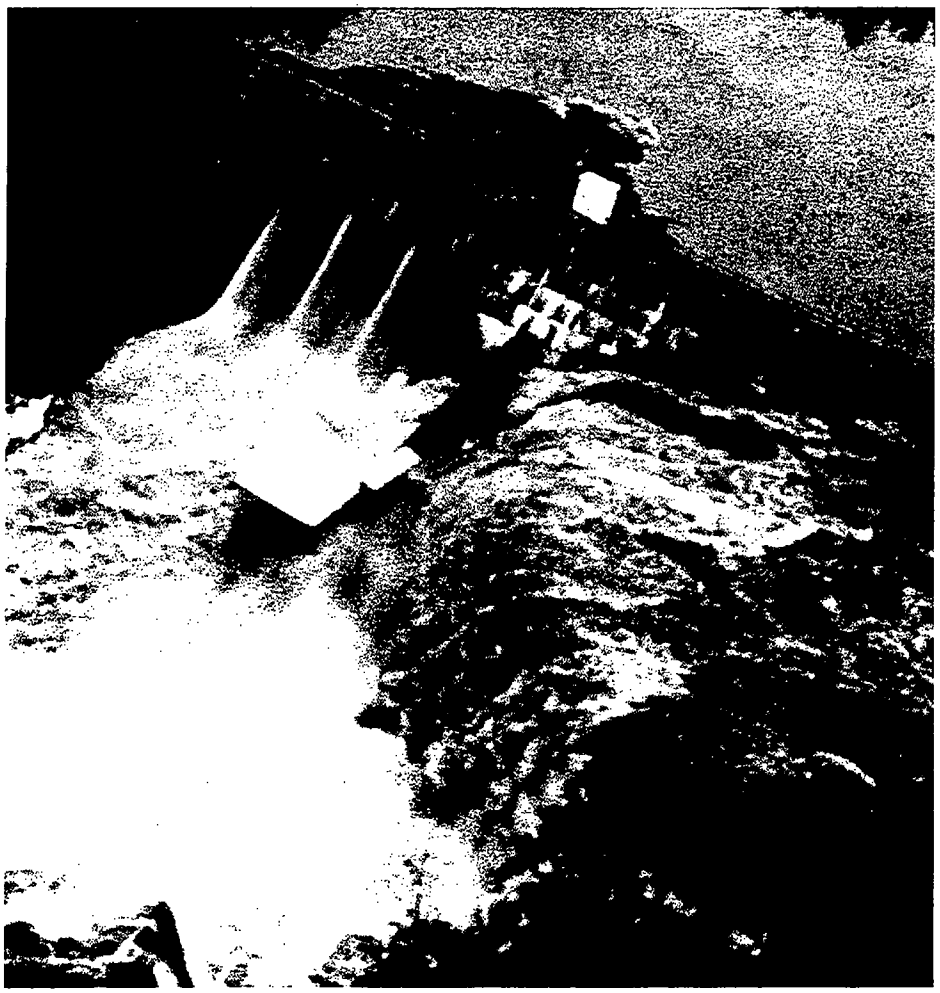
The dam safety doctrine reflects the goals of the newly-developed National Mitigation Strategy, a collaborative effort between FEMA, local, State and Federal governments, voluntary agencies, business and industry, and individual citizens. In response to the unacceptable loss of life and property from recent disasters, and the prospect of even greater, catastrophic loss in the future, the National Mitigation Strategy provides a conceptual framework to reduce these losses. One of the most important goals of the Strategy is to engender fundamental change in the general public's perception about hazard mitigation, and to demonstrate that mitigation is often the most cost-effective, and environmentally sound, approach to reducing losses. One of the components of the goal of the Strategy is to significantly reduce by the year 2010 the risk of loss of life, injuries, economic costs, and destruction of natural and cultural resources that result from natural hazards.

Historical Background

Dams serve many purposes including power generation, irrigation, flood control, recreation, and the retention of municipal and industrial water supplies. In this century, the rapid growth of the American economy and population caused a corresponding increase in the demand for water infrastructure projects. Legislation such as the Reclamation Act of 1902, the Tennessee Valley Authority Act of 1933, and the Flood Control Acts of 1936 and 1938 resulted in large numbers of government-built new dams. Moreover, many of the new dams were larger in size because of advances in construction technology, particularly in earth-moving equipment. Dam building in the United States peaked during the 30 years following World War II, when over one-half of the nation's total of 74,053 dams (as listed in the 1993-1994 National Inventory of Dams) were built.

In the event of a dam failure, the potential energy of the water stored behind even

a small dam is capable of causing great property damage and loss of life if there are people downstream. Several dam failures in the 1970's caused the nation to focus on inspecting and regulating these important structures.



In February 1972, a privately owned tailings dam in Buffalo Creek, West Virginia failed, devastating a 16-mile valley with 6,000 inhabitants. As a result of the failure, 125 people were killed and 3,000 were left homeless. In 1976, Teton Dam in Idaho failed, causing $1 billion in damage and leaving 14 dead. In November 1977, Kelly Barnes Dam in Georgia failed, killing 39 people, most of them college students.

Despite the strengthening of dam safety programs since the 1970's, dams continue to fail, causing millions of dollars worth of damage and occasional deaths. Most recently, in July 1994, severe flooding from Tropical Storm Alberto caused over 200 dam failures in Georgia. Nearly one-half of the deaths from the floods occurred when a series of unregulated earthen dams near Americus burst, sending deadly walls of water through the town and surrounding areas and drowning 15 people who were swept away in cars and off bridges and roads.

While it is recognized that nature cannot be controlled, the National Mitigation Strategy is a timely, comprehensive, and needed plan to control losses, such as those caused by dam failures, through sustained action to reduce long-term risk to human life and property.

Overview of Federal Initiatives in Dam Safety

In response to the Buffalo Creek disaster, Congress enacted the National Dam Inspection Act (Public Law 92-367) in 1972, which authorized the U.S. Army Corps of Engineers (Corps) to inventory and inspect all non-Federal dams. After the Teton Dam failure, President Carter issued a memorandum on April 23, 1977, directing a review of Federal dam safety activities by an *ad hoc* panel of recognized experts.

In June 1979, the *ad hoc* interagency committee on dam safety issued its report, which contained the first guidelines for Federal agency dam owners. In October of that same year, President Carter directed the Federal agencies to implement the guidelines recommended in that report, and to report their progress and submit recommendations

to the Director of a newly-formed agency, the Federal Emergency Management Agency.

FEMA was established by Executive Order 12148 in July 1979, in response to the need for unified, coordinated efforts for Federal assistance in national disasters. Since its inception, FEMA has been the leader in coordinating dam safety programs at the Federal and state levels.

Title XII of the Water Resources Development Act of 1986 (Public Law 99-662) was enacted to establish and maintain dam safety programs. Title XII, the Dam Safety Act of 1986, authorized funding for a research program to develop improved techniques for dam inspections, training for state dam safety inspectors, and the publishing of updates for the National Inventory of Dams. Although Title XII expired in 1994, efforts are underway to introduce the National Dam Safety Program Act. The legislation would amend Title XII as part of the reauthorization of the Water Resources Development Act.

The Role of the Interagency Committee on Dam Safety

President Carter's 1977 memorandum established an *ad hoc* interagency committee of dam safety experts to report on the state of Federal dam safety. When FEMA was established in 1979, the position of Dam Safety Project Officer was created. This person now serves as the Chair of the Interagency Committee on Dam Safety (ICODS), which was formally established in 1985.

ICODS is composed of representatives from all the Federal agencies that build, own, operate, or regulate dams. ICODS representatives from the different Federal agencies meet quarterly to plan and coordinate diverse dam safety activities. The Committee has several working groups of subcommittees, which examine issues in detail before bringing them before the full Committee. The subcommittees include the Subcommittee on Operations, whose focus is to formulate and plan projects of interest and importance to ICODS member agencies; the Subcommittee for Federal/Non-Federal Dam Safety Coordination, which examines training requirements and other issues common to Federal and state governments, including the definitions of hazard classifications; and the Subcommittee to Review/Update Federal Guidelines, which recently completed an update of the Guidelines that will make them consistent across agencies.

As a whole, ICODS examines dam safety at the national level, recommends policies that promulgate dam safety, and provides technical assistance to the states and the private sector. For example, ICODS coordinates Federal and non-Federal work in dam-related databases, such as the National Inventory of Dams, the Stanford University National Performance of Dams Program (NPDP), and the database maintained by the United States Committee on Large Dams (USCOLD). ICODS also conducts dam safety seminars. As of this report, two have been conducted: in 1993, the Earthquake Engineering Seminar No. 1, Liquefaction Susceptibility and Evaluation; and the Seepage/Piping and Remedial Measures Seminar held at the FEMA Special Facility in 1994. In FY 1996, ICODS will hold its third seminar in the series, Dam Breach Analysis and Maximum Precipitation, at FEMA's National Emergency Training Center.

Another recent and important effort of ICODS is the expert videotape series. The videotape series is designed to capture on

"FEMA has developed a National Mitigation Strategy to reduce the loss of life and property damage through eliminating or reducing the impacts of natural hazards."

■

Left:
Oriana Dam failure, Oregon, 1987.

"In areas where dams pose a high or significant downstream hazard, it is important to have an emergency plan to minimize destruction and loss of life."

■

Right:
John Day Dam, Oregon.

film the expertise of renowned experts in the engineering field. In FY 1995, ICODS completed the first in the series, a two-part videotape with Dr. Ralph Peck, *Seepage and Piping*. The second in the series is scheduled to begin production in FY 1996. ICODS also sponsors annual joint meetings with the Association of State Dam Safety Officials (ASDSO), both as a forum for the exchange of ideas and to ensure close, efficient relationships between the Federal Government and the states.

Federal Guidelines for Dam Safety

In response to the April 1977 Presidential directive, ICODS, with assistance from an independent panel of outside experts, developed the Guidelines based on a review of the procedures and criteria used by Federal agencies in the design, construction, operation, and regulation of dams.

The Guidelines encourage strict safety standards in the practices and procedures employed by Federal agencies or required of dam owners regulated by the Federal agencies. The Guidelines address management practices and procedures but do not attempt to establish technical standards. They provide the most complete and authoritative statement available of the desired management practices for promoting dam safety and the welfare of the public.

The following definition of a dam or project is included in the Guidelines.

> **Dam or Project.** *Any artificial barrier, including appurtenant works, which impounds or diverts water, and which (1) is twenty-five feet or more in height from the natural bed of the stream or watercourse measured at the downstream toe of the barrier or from the lowest elevation of the outside limit of the barrier if it is not across a stream channel or watercourse, to the maximum water storage elevation or (2) has an impounding capacity at maximum water storage elevation of fifty acre-feet or more. These guidelines do not apply to any such barrier which is not in excess of six feet in height regardless of storage capacity, or which has a storage capacity at maximum water storage elevation not in excess of fifteen acre-feet regardless of height. This lower size limitation should be waived if there is a potentially significant downstream hazard.*

The Guidelines apply with equal force whether the dam has a permanent reservoir or is a detention dam for temporary storage of floodwater. The impounding capacity at maximum water storage elevation includes storage of floodwater above the normal full storage elevation. In addition to conventional structures, this definition of "dam" specifically includes "tailings dams," embankments built by waste products disposal and retaining a disposal pond.

Members of the Interagency Committee on Dam Safety

Federal Emergency Management Agency
United States Department of Agriculture
Department of Defense
Department of Energy
Department of Interior
Federal Energy Regulatory Commission
International Boundary and Water Commission
Department of Labor
Nuclear Regulatory Commission
Tennessee Valley Authority

To supplement the Guidelines, ICODS developed and issued the following publications.

- **The Emergency Action Planning Guidelines for Dams**
- **The Federal Guidelines for Selecting and Accommodating Inflow Design Floods for Dams**
- **The Federal Guidelines for Earthquake Analysis and Design of Dams**

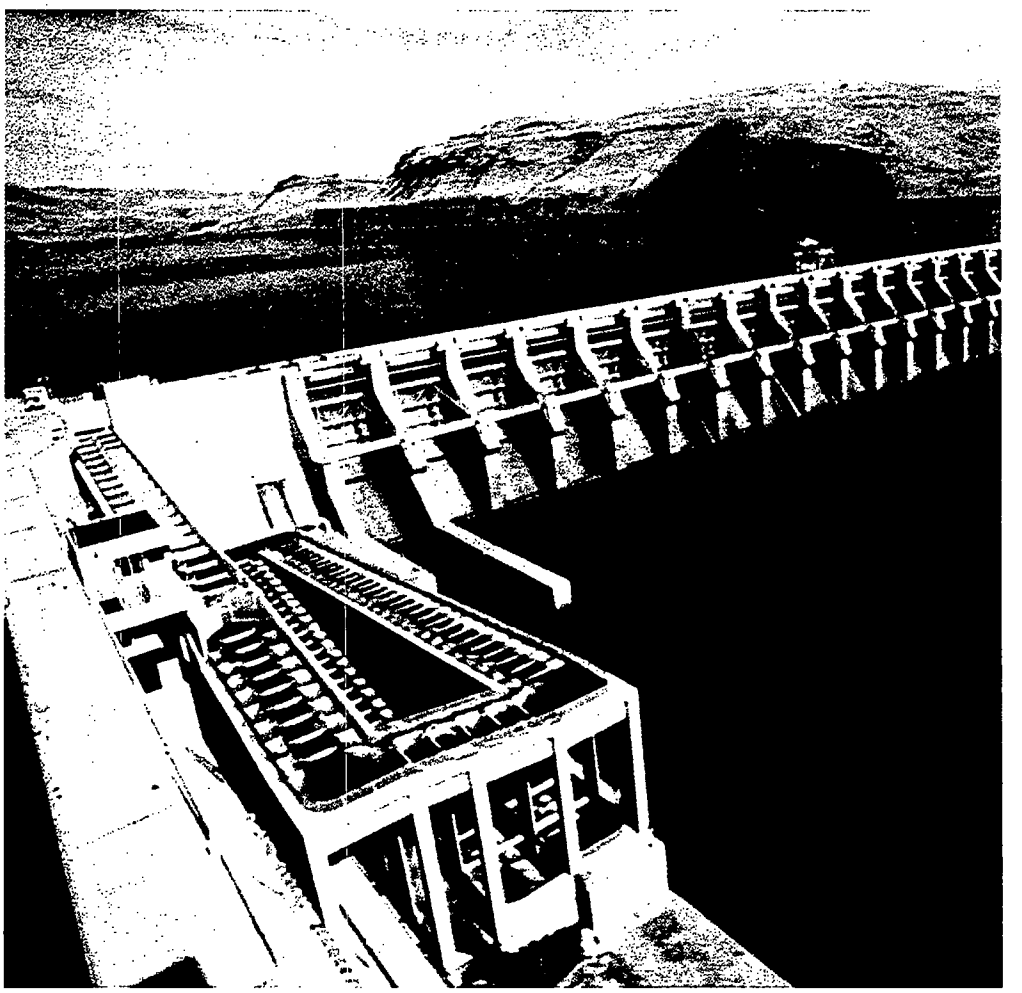
These publications, based on the most up-to-date research studies and experience available, provide authoritative statements on the state of the art for three important technical areas involving dam safety.

The ICODS Subcommittee to Review/Update the Federal Guidelines recently completed an update of all of the Guidelines to meet new dam safety challenges and to ensure consistency across agencies and users. A Glossary of Terms has been developed to assist users of the Guidelines.

National Inventory of Dams

The first national inventory of dams was initiated by the Corps in 1975, as mandated by the National Dam Inspection Act of 1972 (Public Law 92-367), and reported to Congress in 1982. Soon after, a National Research Council study recommended a regularly updated National Inventory of Dams as one of "ten imperative needs" in dam safety. In 1986, Congress authorized the Corps to maintain and periodically publish updated information on the inventory of dams. In 1989, a Memorandum of Agreement (MOA) was signed by the Corps and FEMA which provided FEMA with the responsibility for overseeing the maintenance and update of the inventory.

Using computers, the update methodology allows government agencies to electronically transfer information from their local inventory system to a central computer at



FEMA headquarters in Washington, D.C. The improvement of the data in the inventory database, and at the individual agency level, is an ongoing process. As the update process continues, on-site inspections and information shared among state, territory, and Federal agencies will continue to improve the reliability of the data, and better information will be available for decision-making at all levels. Today, 67 states, territories, and Federal agencies participate in the update process.

National Performance of Dams Program

The NPDP is the result of a Federal, state, and private sector partnership to create a national information resource on the performance of dams. The objectives of the NPDP are to retrieve, archive, and disseminate information on the performance of dams in the United States. The program requires the involvement of all dam engineering professionals—dam owners, regulators, consulting engineers, and researchers—each of whom serves a vital role in learning from dam incidents and implementing effective dam safety policies.

With the availability of this new comprehensive database on the performance of dams, a wide range of critical questions and issues can be addressed, including:

- *How many dam incidents occur in the United States/in each state?*
- *With the advancing age of the Nation's dams, will the workload of dam inspectors increase?*
- *Is the frequency of dam inspections appropriate?*
- *What are the public health and safety risks associated with dam operations?*
- *Do current standards for seismic and hydrologic design provide an adequate level of safety? Are they too conservative?*
- *What are the costs associated with spillway modifications? Seismic upgrades?*

The library at the Center on the Performance of Dams, located at Stanford University, serves as the national archive for the NPDP. Primary services provided by the library include receipt and archiving of information on dam incidents and the provision of resource services for dam engineers and other professionals.

Training in Emergency Action Planning

A robust dam safety program reduces, but does not eliminate, the chances of dam failure. In areas where dams pose a high or significant downstream hazard, it is important to have an emergency plan to minimize destruction and loss of life. Emergency Action Plans (EAP's) are important mitigation tools that have been steadily increasing in use since 1985, when ICODS issued the Emergency Action Planning Guidelines for Dams to supplement the Guidelines. As noted in the National Mitigation Strategy, "the Federal Energy Regulatory Commission has taken the lead and has been very successful in training hydropower dam owners to develop and exercise these plans. This approach has increased the number of states with adequate dam safety programs from 22 to 38 in the past 10 years."

In 1993, a MOA was signed between FEMA and FERC which enabled FERC to develop training on the development and testing of an EAP. The training course, which was pilot tested in 1994 and 1995, is designed for all dam owners and emergency preparedness agency personnel. Since the pilot course, FEMA has revised the materials to focus the training on the small dam owner and operator. Training sessions on how to develop an EAP are being scheduled.

Training Aids for Dam Safety

The 10 Federal agency members of ICODS have developed a Training Aids for Dam Safety (TADS) Program using an array of modern training materials, including videotapes, audiotapes, workbooks, and testing materials. The Program is organized in modular form according to subject and is designed to meet the dam safety training needs of the Federal, state, local, and private communities. Many Federal agencies use TADS extensively to train project personnel and in public awareness programs for local officials.

Of the 21 modules proposed, all have been completed. Additional TADS modules will be developed, including a module on tailings dams. There is now a group facilitator's guide, available at no cost to full program subscribers, on how to use TADS in a group setting, with a specific emphasis on the use of the inspections modules.

Coordination with the States

Three developments have been crucial to the formation of a unified approach to protecting U.S. citizens from the hazards of unsafe dams: the designation of FEMA as the coordinator of the effort to promote dam safety, the founding of ICODS, and the founding of ASDSO. Before these developments, dam safety efforts within the United States had not been fully coordinated. Each Federal agency responsible for dams was largely on its own in trying to determine appropriate dam safety standards and procedures. Each state dam safety agency was in a similar position.

Before the advent of FEMA, ICODS, and ASDSO, professional engineering organizations, such as the American Society of Civil Engineers and USCOLD, provided opportunities for the exchange of technical information on engineering for dams. However, the organizations did little to exchange information on techniques for, and management problems related to, the safety of existing dams. ASDSO and ICODS, with the aid of FEMA, are now providing authoritative models and standards to attain effective dam safety programs in the United States. •

"Emergency Action Plans are important mitigation tools that have been steadily increasing in use since 1985."

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Left:
Grand Coulee Dam, Colombia River Basin Project, Washington.

Federal Responsibility for Dam Safety

"...President Clinton's designation of mitigation as the cornerstone of the Federal multi-hazard emergency management system, further emphasizes the need for a National Dam Safety Program."

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Right:
Boulder Canyon Reclamation Project, Nevada.

Federal Policy

English common law, the basis for non-statutory law in the United States, holds that the collection of large amounts of water on one's land constitutes a hazardous activity, and that the collector operates at the risk of all subsequent occurrences related to this activity. Questions arise concerning the dam owner's liability for a failure when there is no apparent negligence on the owner's part, or when those who regulate, inspect, and evaluate dams are immune from liability. In specific cases of dam failure, the Federal Government may have a legal basis for defense against damage claims; however, the trend has been toward compensating the victims of such disasters. The determination of legal liability of the Federal Government is discussed more fully in the following documents.

- **Safety of Non-Federal Dams — A Review of the Federal Role**, FEMA 31, 1982
- **Safety of Dams — Flood and Earthquake Criteria**, National Academy Press, Washington, D.C., 1985
- **Safety of Existing Dams — Evaluation and Improvement**, National Academy Press, Washington, D.C., 1983

Since the enactment of Public Law 92-367 in 1972, which authorized the U.S. Army Corps of Engineers (Corps) to inventory and inspect non-Federal dams, the Federal Government's position concerning the importance of correcting safety deficiencies of Federal and non-Federal dams has been quite clear. Presidential involvement, including President Carter's October 1979 Memorandum and Executive Order 12148, President Reagan's letter to Senator Paul Laxalt regarding water development programs, and President Clinton's designation of mitigation as the cornerstone of the Federal multi-hazard emergency management system, further emphasizes the need for a National Dam Safety Program that enables Federal agencies to address dam safety problems expeditiously.

The Water Resources Development Act of 1986 is the most recent legislation to deal with dam safety. Title XII of this Act, the Dam Safety Act of 1986, authorized a program to distribute money to the states to help establish and maintain dam safety programs; a National Dam Safety Review board; a research program to develop improved techniques for dam inspection; training for state dam safety inspectors; and funds to maintain and periodically publish updated information on the inventory of dams.

The Dam Safety Act of 1986 expired in 1994, taking with it funding for the National Inventory of Dams, a program that has updated the inventory of non-Federal dams in the United States and has helped almost every state dam safety program upgrade its inventory system. Through the efforts of numerous dam safety proponents, dam safety funding for the Federal Emergency Management Agency (FEMA) was restored in 1992 by the Congress, and the Dam Safety Act was reauthorized through 1994. Efforts are now underway to introduce the National Dam Safety Program Act, which would amend the Dam Safety Act of 1986 as part of the reauthorization of the Water Resources Development Act of 1986.

In spite of this support and recognition, there is still no legislatively mandated National Dam Safety Program. Executive Order 12148 gives FEMA only coordinating authority in dam safety, which could be removed at any time. Statutory authority would strengthen

FEMA's leadership role, enabling it to discharge its dam safety responsibilities more effectively.

Federal Agency Responsibility

The U.S. Department of Agriculture (USDA) is involved extensively with dams as a permitter, owner, manager, planner, designer, constructor, financier, and grantor. After reorganization in 1994, there are six agencies within the USDA responsible for, or involved with, dams.

The Agricultural Research Service (ARS) is involved in dams through its research programs, including those in hydrology and hydraulics. Only one dam is large enough or of sufficient hazard potential to be included under the Federal Guidelines for Dam Safety (Guidelines).

The Farmers Home Administration (FmHA) and the Rural Electrification Administration (REA) were abolished in 1994 and their responsibilities transferred to the newly formed ***Farm Service Agency (FSA)***, the ***Rural Utilities Service (RUS)***, and the ***Rural Housing Service (RHS)***. The FSA and RHS provide loans and grants to individuals and groups. Neither has technical engineering expertise in dam safety, but work closely with the Natural Resources Conservation Service (NRCS). Less than 100 dams have been financed through former FmHA programs. The RUS provides loans and loan guarantees for dams for hydroelectric plants, thermal electric plants, and water and waste facilities, some of which involve dams. RUS does not design, build, own, or operate dams, and has only limited technical expertise. About 29 dams are financed through former REA programs.

The Forest Service (FS) owns about 1,000 dams and administers permits for over 2,000 additional dams, as defined by the Guidelines. Although the FS is directly responsible for dams as an owner, it does not have separate budgeting and funding accounts for dam activities. The FS also regulates dams operated by private agencies on FS-administered land. Although the owner designs, contracts, and operates these dams, the FS reviews and approves activities related to dam safety.

The Natural Resources Conservation Service has been involved with the design and construction of approximately 26,000 dams, as defined by the Guidelines, through its technical and financial assistance programs. The NRCS maintains a staff of engineers trained in all aspects of design, construction, operation, and maintenance of dams.

The Corps has some degree of responsibility or jurisdiction for five categories of dams: (1) dams planned, designed, constructed, and operated by the Corps; (2) dams designed and constructed by the Corps, but operated and maintained by others; (3) dams owned by other agencies in which flood control storage has been provided at Federal expense; (4) dams for which the Corps issues permits under its regulatory authority; and (5) dams that the Corps inventoried and inspected under the National Dam Inspection Act (Public Law 92-367) and Title XII of the Water Resources Development Act of 1986 (Public Law 99-662). The Corps is solely responsible for the safety of dams in category (1) and shares the responsibility for dams in category (2). The owners are responsible for the safety of dams in categories (3) and (4). The owners and state officials are responsible for the safety of dams in category (5).

The Army is responsible for dams that are either on Army installations, controlled by Army installations, or pose a significant or high downstream hazard to Army installations. The Army's dam inventory lists a total of 216 dams, including 33 high-hazard dams and 33 significant-hazard dams. **The Navy** is responsible for 16 candidate dams for safety inspection. **The Air Force** has dam safety responsibility for, and jurisdiction over, 32 low-hazard dams on Air Force bases in the continental U.S.

Federal Agencies with Dam Safety Responsibilities

United States Department of Agriculture
- Agricultural Research Service
- Farm Service Agency
- Forest Service
- Natural Resources Conservation Service
- Rural Housing Service
- Rural Utilities Service

Department of Defense
- Department of the Air Force
- Department of the Army
- Department of the Navy
- U.S. Army Corps of Engineers

Department of Energy

Department of the Interior
- Bureau of Indian Affairs
- Bureau of Land Management
- Bureau of Reclamation
- Fish and Wildlife Service
- National Park Service
- Office of Surface Mining Reclamation and Enforcement
- U.S. Bureau of Mines
- U.S. Geological Survey

Federal Energy Regulatory Commission

Department of State
- International Boundary and Water Commission

Department of Labor
- Mine Safety and Health Administration

Nuclear Regulatory Commission

Tennessee Valley Authority

"In spite of this support and recognition, there is still no legislatively mandated National Dam Safety Program."

■

Left:
Melvin Price Lock and Dam, St. Louis, Missouri.

"Statutory authority would strengthen FEMA's leadership role, enabling it to discharge its dam safety responsibilities more effectively."

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Right:
Willow Creek Dam, Oregon.

The Department of Energy (DOE) owns 23 water impoundment structures that are by definition dams under the Guidelines. The Alaska Power Administration operates two dams and the remainder are operated by DOE contractors.

The Department of the Interior (DOI) is responsible for the planning, design, construction, operation, maintenance, and regulation of 2,054 dams, as defined by the Guidelines. These Guidelines apply to eight DOI bureaus.

The Bureau of Reclamation (BOR) controls reservoirs throughout 17 Western States that are impounded by approximately 475 dams and dikes. BOR also provides an overview of dam safety programs and, when requested, technical assistance to other DOI bureaus.

The Bureau of Land Management (BLM) is responsible for BLM-owned dams on public lands that it administers. Approximately 917 dams have been identified and classified.

The Bureau of Indian Affairs (BIA) is responsible for the safety of those dams arising from its trust obligations in relation to the development of Indian water and related land resources. About 265 dams have been inventoried by BIA.

The Fish and Wildlife Service (FWS) owns and operates dams associated with the preservation and enhancement of fish and wildlife resources. Most of the dams in the FWS inventory were acquired through land purchases, while others were designed and constructed in-house. The FWS inventory includes 155 dams.

The U.S. Geological Survey (USGS) owns two small low-hazard dams which are assessed through normal operation and maintenance. No formal dam safety program is considered necessary.

The National Park Service (NPS) is responsible for approximately 389 dams within the National Park System and for monitoring 248 non-NPS-owned dams which lie within or near park boundaries, affecting activities within these parks. The NPS notifies non-NPS owners concerning the known safety condition of their dams and encourages them to take appropriate actions.

The Office of Surface Mining (OSM) regulates dams and impoundments associated with surface coal mining operations. The design, construction, and maintenance of dams at the mine site is the responsibility of the mining company.

The Bureau of Mines (BOM) is not responsible for the operation or maintenance of any dams. The BOM has been slated for termination and its activities transferred to other Federal agencies.

The Federal Energy Regulatory Commission (FERC) is authorized by Part I of the Federal Power Act to issue licenses for the construction, operation, and maintenance of dams, water conduits, reservoirs, powerhouses, transmission lines, or other project works necessary for the development of non-Federal hydroelectric projects located on navigable streams on public lands. As of October 1, 1995, there were 2,342 dams under FERC control.

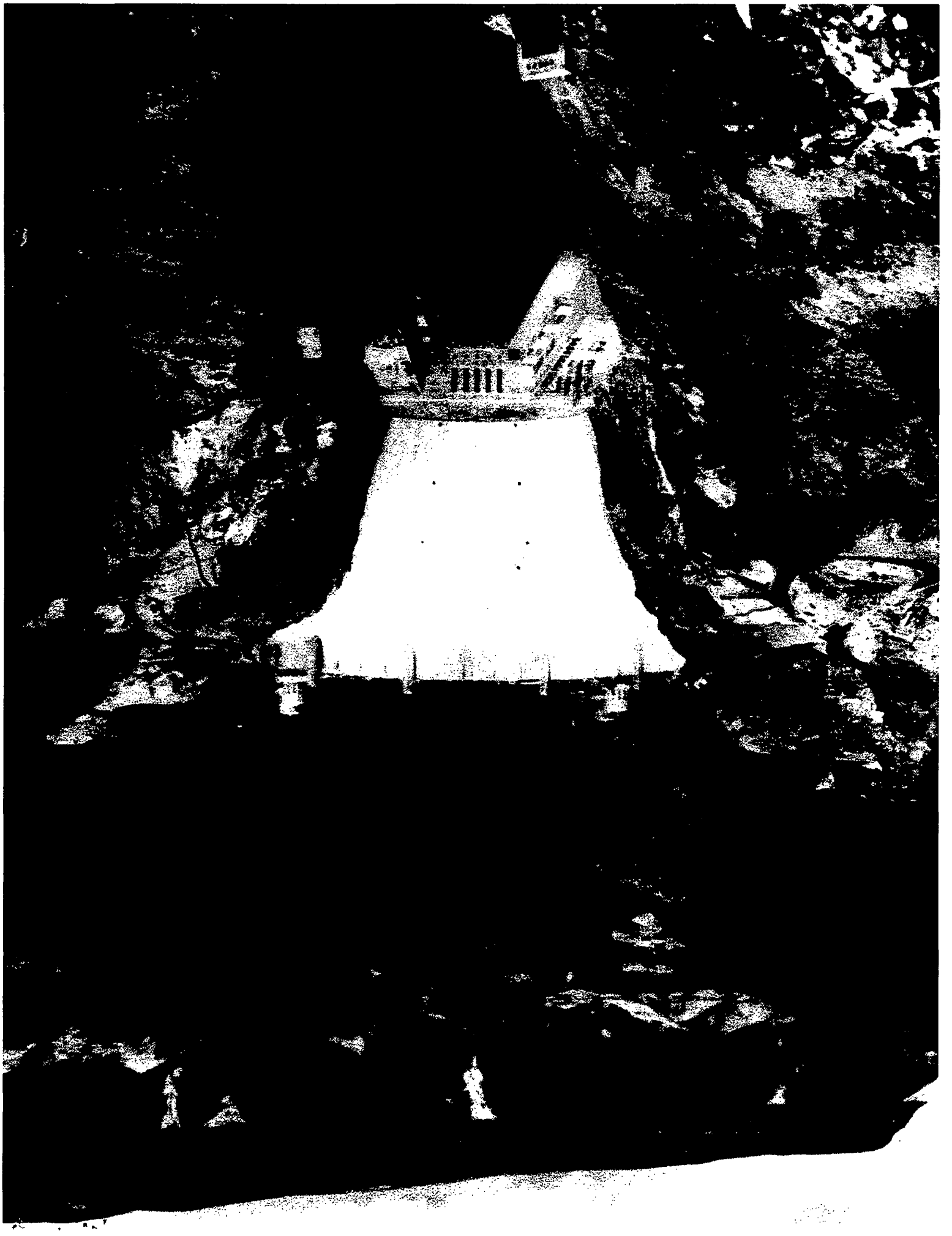
The Department of State's International Boundary and Water Commission (IBWC), which is composed of both U.S. and Mexican sections, is responsible for carrying out the provisions of a number of treaties between the United States and Mexico. Among its responsibilities, the IBWC has jurisdiction over two large international storage dams and four small diversion

dams on the Rio Grande and Colorado Rivers. In addition, the U.S. section of the IBWC is responsible for the maintenance of one (U.S.) domestic diversion dam and five (U.S.) domestic arroyo control dams. Although the dams under IBWC jurisdiction were exempt from inspection by the Corps because of their international character, the U.S. section is not exempt from the dam safety program.

The Mine Safety and Health Administration (MSHA) of the Department of Labor is responsible for upholding health and safety standards for safe design and construction of impoundments, retention dams, and tailings ponds that are part of coal and metal/nonmetal mines. MSHA's inventory includes 943 dams.

The U.S. Nuclear Regulatory Commission (NRC) is responsible for regulating the design, construction, and operation of nuclear plants and other uses of nuclear materials. The NRC inventory lists 19 dams.

The Tennessee Valley Authority (TVA) is authorized by the Tennessee Valley Authority Act of 1933 to approve plans for the construction, operation, and maintenance of all structures affecting navigation, flood control, or public lands or reservations in the Tennessee River system. In the past, the TVA constructed its dams with its own forces. TVA has complete responsibility for the planning, design, construction, operation, and maintenance of all of its dams. With one exception, these dams are all located in a single river basin which is operated and maintained for the unified development and regulation of the Tennessee River system. This system includes 54 dams. •



Analysis of Federal Agency Progress

Introduction

The October 4, 1979 Presidential memorandum that directed Federal agencies responsible for dams to adopt and implement the Federal Guidelines for Dam Safety (Guidelines) also directed the heads of these agencies to submit progress reports to the Director of the Federal Emergency Management Agency (FEMA). Since that initial report in 1980, the Director of FEMA has solicited follow-up progress reports from concerned agencies at 2-year intervals to be included in a biennial report to the President. This ninth report, derived from agency responses to FEMA's September 1995 request for reports, covers each agency's progress in the area of dam safety for Fiscal Year (FY) 1994 and 1995.

It should be noted that this assessment report is based almost entirely on the reports submitted by agencies and does not represent an independent investigation. The coverage for each agency in this report also represents a considerable condensation of agency reports. For a more complete understanding of an agency's program, consult the individual agency reports included in volume 2.

Assessment Criteria for Implementation of the Guidelines

For assessment purposes, FEMA supplies the agencies with a reporting format to ensure completeness and uniformity among the responses. Using the format, the agencies supply a brief description of dam safety responsibilities and jurisdiction, followed by a section on program actions since the last progress report. In this section, the agencies describe actions taken in response to the conclusions and recommendations of the previous report.

The central part of the reporting format focuses on an assessment of the different aspects of the Federal agency implementation of the Guidelines. The agencies describe their dam safety organization and staff, dam safety training, dam failures or incidents, the status of Emergency Action Plans (EAP's), and descriptions of any dam rehabilitations.

Highlights of FY 1994-95

Improvements

Significant progress has been accomplished by the Federal agencies toward full implementation of the Guidelines. The major dam-oriented agencies which have been working on implementation of the Guidelines since the late 1970's have had processes for full implementation in place for years. At this time, these agencies have all or most of the dams within their responsibility evaluated for deficiencies and have taken corrective actions; the remainder of the needed corrective actions are scheduled for accomplishment, as required appropriations are made available. In general, these agencies are evaluating their dam safety processes and efforts for possible improvements in future outcomes with reduced resources. Some interesting studies and research are in progress with regard to improving program decisions, knowledge bases, and overall effectiveness of dam safety. These items are discussed below.

"Significant progress has been made by the Federal agencies toward full implementation of the Federal Guidelines for Dam Safety."

Left:
Hoover Dam, Arizona-Nevada.

"The goal of many of the recommendations of this report is to assist agencies in reducing the risk to the public downstream of their dams."

Right:
Swan Lake Dam, Alaska.

Most of the agencies which consider dams as incidental to the primary purposes of their agency have by now established internal policies that incorporate the Guidelines, as adopted, and are beginning to make progress toward implementation. Some of these agencies have made excellent progress while some are in the early stages of implementation; almost all seem to be committed to the adoption of the Guidelines and to the activities needed to implement the evaluation and upgrading of deficient dams. The areas of emphasis in implementation vary between agencies, as does progress in implementation. This variance is even greater within an agency when its dam safety program priorities are assigned from decentralized offices. The goal of many of the recommendations of this report is to assist agencies in reducing the risk to the public downstream of their dams, without imposing on the agency unreasonable increases in cost allocations for dam safety activities.

Deficiencies

The greatest stress on safety of dam programs across most Federal agencies is the restructuring and downsizing across all agency functions. Most agency progress reports indicate that their restructuring effort is retaining a reasonably high priority for dam safety.

The agency within the United States Department of Agriculture (USDA) which had not adopted the Guidelines or accomplished the collection of some of the basic data required for defining a dam safety program was the Farmers Home Administration (FmHA). The USDA reorganization abolished the FmHA and transferred the retained functions to three new agencies. It is unclear how the dam safety recommendations from the previous Progress Report concerning dams that were the responsibility of FmHA have been addressed by these new agencies. This deficiency is discussed below.

One agency, the Nuclear Regulatory Commission (NRC), states that it has adopted the Guidelines. The NRC's report on activities accomplished, however, indicates little progress toward real implementation, and does not reflect a credible commitment to the systematic verification of conditions at dams and to the correction of deficiencies at the dams for which the NRC has regulatory responsibility. The program deficiencies also are addressed below.

Agency Responses to the Recommendations in the FY 92-93 Progress Report

Department of Agriculture

The previous Progress Report to the FmHA included two deficiencies: the agency's lack of progress in classifying dams by hazard and the agency's unwillingness to adopt the Guidelines. The reorganization of the USDA has abolished the FmHA and established their retained functions in three new agencies: the Farm Service Agency (FSA), the Rural Housing Service (RHS), and the Rural Utilities Service (RUS). No progress report was received from the FSA and the report from the RHS did not respond directly to either of the two recommendations. The RHS did state that "One... proposed revision encourages owners to conform with the technical guidance developed by ICODS." This is different from adopting and implementing the Guidelines.

Department of Defense

The U.S. Army Corps of Engineers (Corps) reported activities that accomplished the recommendations in the previous report with

respect to honoring appropriate interagency protocol. The Corps has met with the Army for improving the definition and scope of the Army's dam safety program. Assistance from the Corps to enhance dam safety program processes, documentation of activities, or reporting of progress has not been requested from the Navy or the Air Force.

The Navy response to this recommendation in this reporting period reflects a misunderstanding as to intent. The Navy did not identify any action taken in response to the recommendation in the FY 92-93 Progress Report. The Air Force report did not respond to the recommendation in the FY 92-93 Progress Report.

The recommendation in this report honors the FY 1994-1995 reporting claims of the Navy and the Air Force to possess good operation and maintenance capability for all important real property facilities. Only recommendations addressing dam specific requirements for public safety of human life are included in this report.

Department of the Interior

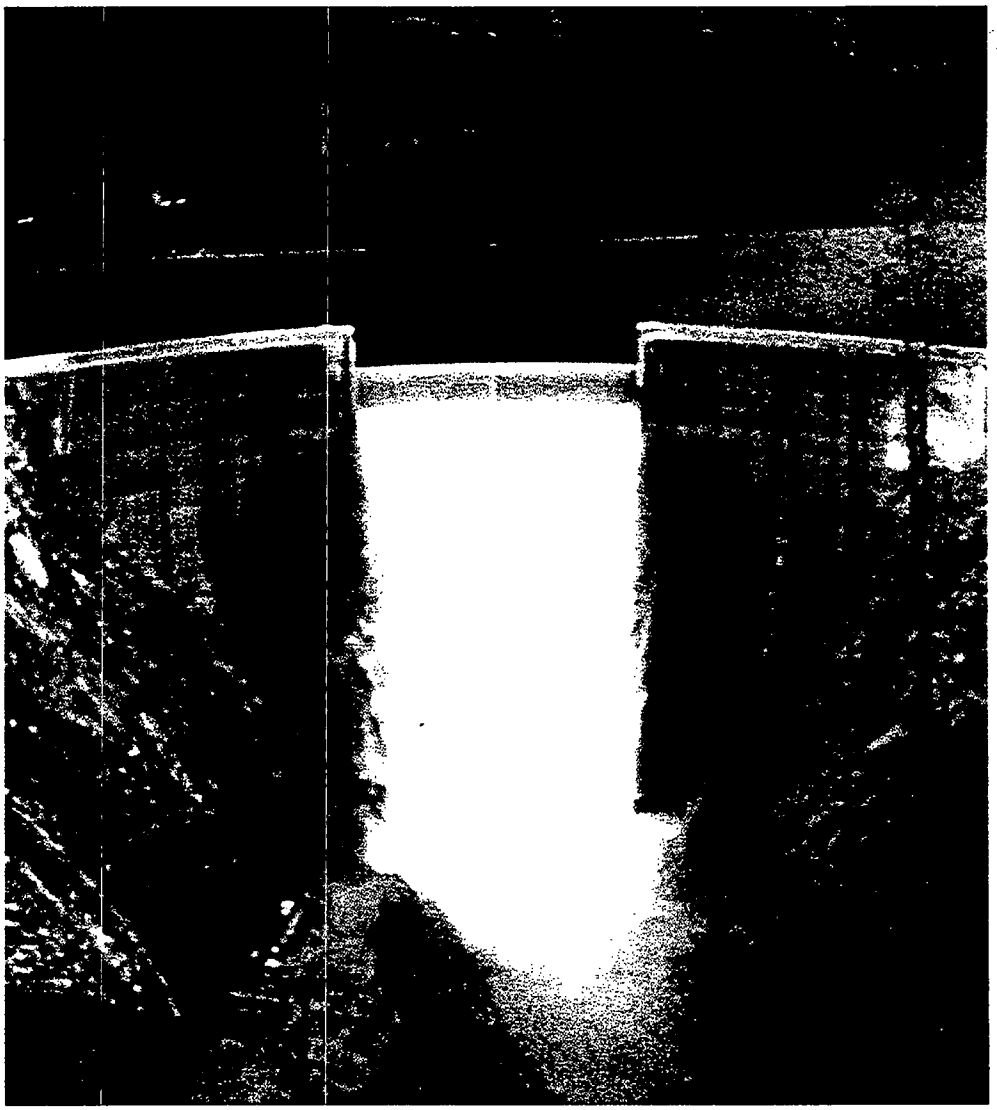
The Bureau of Indian Affairs (BIA) identified direct positive action to respond to the recommendation in the FY 92-93 Progress Report by establishing budget priorities to increase accomplishment of EAP's.

Federal Energy Regulatory Commission

As recommended in the FY 92-93 Progress Report, the Federal Energy Regulatory Commission (FERC) reports the continuation of research work in developing revisions to the procedures for developing and selecting a Probable Maximum Flood.

Mine Safety and Health Administration

The Mine Safety and Health Administration (MSHA) reports concurrence with the recommendations in the FY 92-93 Progress Report, and has increased implementation of its dam safety program. The recommendations in this report reflect some of the concern expressed in the previous progress report.



Nuclear Regulatory Commission

The NRC was asked in the FY 92-93 Progress Report "... to hasten these inspections to identify problems and minimize risks, and prepare emergency action plans..." The agency reports less than planned accomplishment on inspections (seven completed in 3 years) and little progress on completion of EAP's.

Summary Status of Dams

Department	Dam Inventory				Periodic Inspections			
Agency	Total	Hazard Classification			Total	Since Last Report		
		High	Sig.	Low		Formal	Inter.	Const.
USDA (Total)	27,725[1]	2,128	2,739	22,856	12,435	1,569	10,365	501
ARS	1			1	3		3	
FS	2,349	548	671	1,130	1,761	518	895	348
RUS	14	4	1	7	10	10		
RHS	[2]				[3]			
NRCS	25,361	1,576	2,067	21,718	10,661	1,041	9,467	153
DOD (Total)	833	474	99	260	491	212	274	5
USACE	569	440	66	63	393	206	182	5
Army	216	33	33	150	98	6	92	
Navy	16	1		15				
Air Force	32[4]			32				
DOE	23	2	6	15	29		27	2
DOI (Total)	2,054	339	96	1,619	775	107	659	9
BOR	327[5]	244	18	65	157	10	147	[6]
BLM	917	1	1	915	204		204	
BIA	265	71	23	171	76	21	55	
FWS	155	9	17	129	67	59	8	
NPS	389	14	37	338	270	17	244	9
USGS	1			1	1		1	
FERC	2,342	672	252	1,418	3,938	389	2,633	916
IBWC	7	4		3	84		82	
MSHA (Total)	943				5,471[7]			
Coal	564				4,315			
M/NM	379				1,156			
NRC (Total)	19			19	254	32	222	
NRR	9			9	33	12	21	
NMSS	10			10	221	20	201	
TVA	54	31	14	9	1,239[8]	87	152	

Investigations & Studies		Dam Safety Modifications		Dams with EAP's	
'94-95	Active	'94-95	Active	High	Sig.
127	92	89	61	704	84
		1			
99	42	49	40	388	84
		1		3	
28	50	38	21	313	
11	47	35	47	421	47
11	47	16	11	407	37
		19	36	14	10
1	1	1		2	6
64	100	30	24	275	60
23	83	6	20	244	18
		4		1	1
11	12[7]	3	1	10	3
11	5	3	2	9	17
19		14		11	21
66	28	66	28	636	229
	2		1	2	
		1			
		1			
3	4	3	1	30+	14

1. Totals include small numbers of dams with unknown hazard classification.
2. Unknown since USDA reorganized Agency's responsibilities; estimated as 60 pending survey by field offices.
3. Not applicable. Lending is primary Agency involvement with dams.
4. Four of the 32 reported have been transferred to other agencies.
5. BOR has 475 dams and dikes listed in the National Inventory of Dams. Of these, 382 dams and dikes are classified as high and significant hazard. Many reservoirs are formed by a main dam and one or more dikes (or smaller dams) along the reservoir rim. BOR's 382 dams and dikes are located at 262 individual sites. The facilities count is utilized for this presentation.
6. BOR provides its own construction management during dam construction and modification. Inspection is a daily activity with ongoing construction.
7. Some dams included for which prior phase work was completed during the reporting period.
8. Total included approximately 1,000 monthly inspections.

"The agencies with dams as a major function of their agency are meeting the realignment challenge with studies and/or research to improve or retain capabilities by functioning smarter and more efficient."

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Right:
Lake Evergreen Dam, Illinois.

Implementation of Federal Guidelines by Agencies

Organization, Administration, and Staffing

Almost all Federal agencies are experiencing reorganizations, realignment of functions, and reductions in overall staff and budget as the emphasis on reinventing Government and budgetary deficit reduction continues. The reports are encouraging in that while agencies identify pressures on staff and budget, most recognize their continuing responsibility to the public for dam safety within their jurisdiction. The agencies with dams as a major function of their agency are meeting the realignment challenge with studies and/or research to improve or retain capabilities by functioning smarter and more efficiently. Most of the agencies with dams as a secondary function recognize the future resource problem, but have not yet identified their actions for response. Following are the more pressing administrative actions to be accomplished to advance the implementation of the Guidelines.

In the USDA, the responsibilities of the former FmHA for dams have been distributed to the FSA, the RHS, and the RUS. The FmHA had accomplished little in classifying hazards or defining the conditions of dam structures under its jurisdiction. The USDA submission for this reporting period did not include a report from the FSA. The report from RHS seems to recognize the agency's responsibility for dam safety and indicates the RHS intent to define the inventory and, hopefully, the scope of the dam safety threat by completing hazard classifications. The Soil Conservation Service is now the Natural Resources Conservation Service (NRCS). The restructuring of the agency may impact dam safety in that the National Technical Centers have been eliminated, state teams now serve several states, and engineers make fewer formal inspections of dams. The process for review and approval of dam work also has been delegated primarily to state offices.

In the Department of Defense (DOD), the Corps reports that the responsibility for technical review and approval authority for all dam safety reports has been delegated to the district office responsible for accomplishing the work. The Army made a commendable decision to incorporate the FEMA-published technical guideline into its regulations rather than prepare separate guidelines; however, the Army still has not issued its dam safety regulations.

The Department of Energy (DOE) has transferred a few dams to the United States Enrichment Corporation (USEC).

In the Department of Interior (DOI), most agencies report a realignment in organizational structure and downsizing in staff resources. BIA mentions passage of the Indian Dam Safety Act, which permanently establishes the Safety of Dams Program and, presumably, responsibility for its accomplishment within the BIA. The Bureau of Mines (BOM) has been closed. The Office of

Status of Dam Inspections

Agency	# of Dams	Inspections
USDA	27,725	12,485
DOD	833	491
DOE	23	23
DOI	2,854	775
FERC	2,342	3,933
IBWC	7	84
MSHA	943	5,477
NRC	19	234
TVA	54	1,239

Surface Mining (OSM) reports the issuance of some regulations, but continues rather slowly in the preparation of its dam safety directory of organizational responsibilities.

Although MSHA has issued guidelines to coal mine operators covering EAP procedures, it still holds draft guidelines to metal/non-metal dam operators within the agency. MSHA's realignment has changed some lines of reporting on dam safety up through the agency.

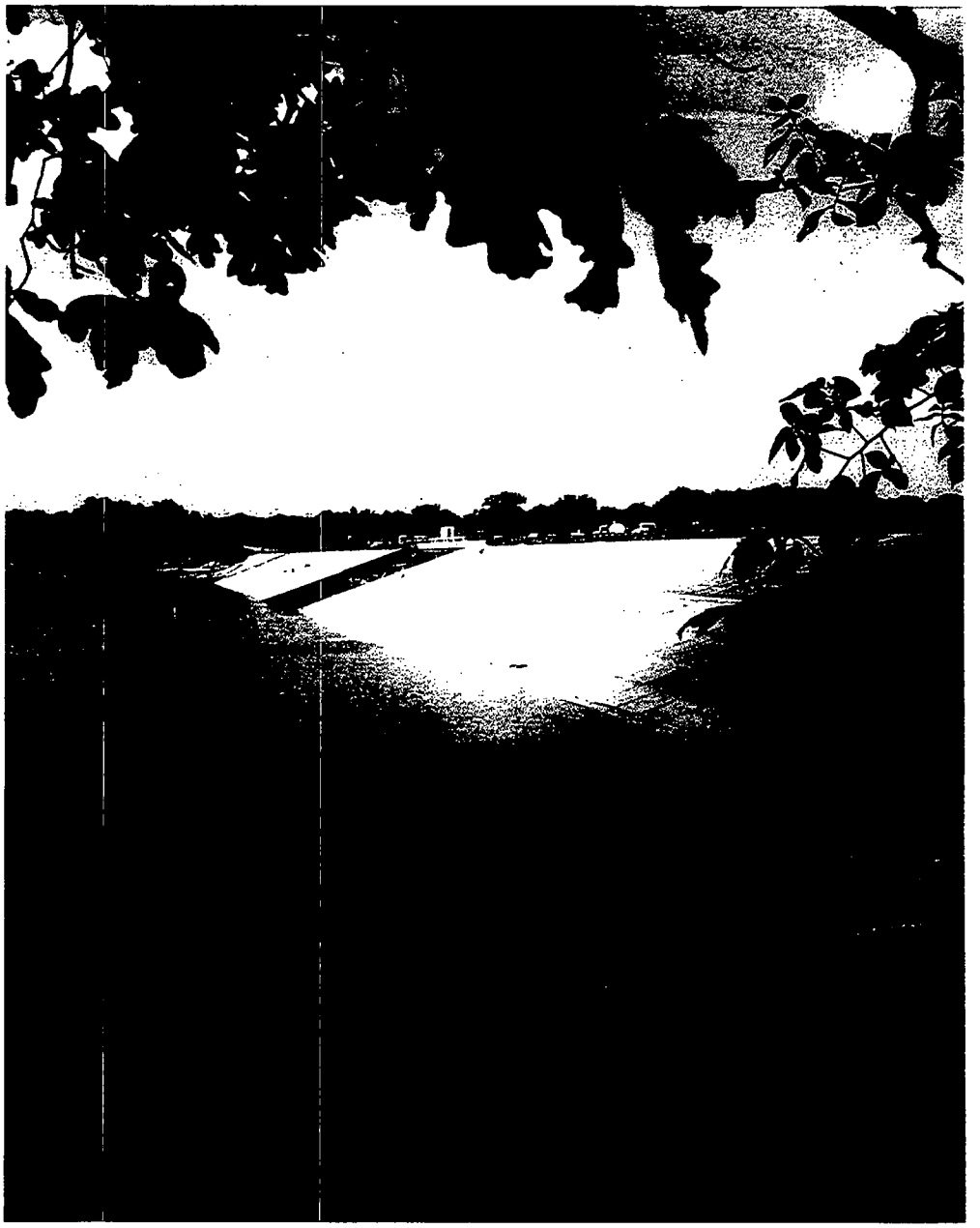
While the NRC has a management structure and relationship with FERC in place for an adequate dam safety program; the NRC's accomplishment of dam safety activities seriously lags behind with respect to the potential risks represented by the dams under NRC jurisdiction. NRC mentions that "Once the current strategic assessment that is underway Agency- wide has been completed, it will be necessary for the Commission to again consider the Dam Safety Program Plan, ..."

While several agencies identified reduced funding for dam safety activities, the National Park Service (NPS) reports no future budgeting of funds for dam safety corrective construction. The NPS states that reprogramming would be required to accomplish such activities.

Dam Safety Training Activities

The dam safety training activities of most agencies are appropriate to their responsibilities for dams. Two USDA agencies, the RHS and the RUS, responded that their dam safety training activities could not be assessed. Some agencies canceled desired training because of restrictions in funding. Overall, however, the accomplishments of the agencies in training are adequate. The Training Aids for Dam Safety (TADS) Program remains an important dam safety training aid for many agencies.

The agencies with dams as a primary function continue to provide training opportunities to other agencies. These agency training offerings tend to compliment rather than duplicate one another. In particular, FEMA has been active in its participation



with other agencies. FEMA has conducted training for the Tennessee Valley Authority (TVA), and has sponsored and supported seminars with the Interagency Committee on Dam Safety (ICODS) and the Association of State Dam Safety Officials (ASDSO). The major dam owner agencies focus much of their training efforts on improving the knowledge and capabilities of their project operations personnel. In such an effort, the Bureau of Reclamation (BOR) uses its in-house quarterly Water Operation and Maintenance Bulletin as one dam safety training opportunity.

MSHA has some unique dam issues for which the agency has developed specialized training. MSHA also has provided special focus training for the OSM. Special training has included hazard rating of metal/nonmetal tailings dams for the purpose of completing data on these dams in the National Inventory of Dams.

Dam Inventories

Accomplishment of this activity is basic to an agency's commitment to implementation of the Guidelines, and to establishing an agency's program for dam safety. Almost all agencies are doing well in their inventory of dams. Most have all data fields of the inventory complete and have processes for updating their inventory. Most reported the changes that occurred in additions, ownership, or hazard classification of dams in their inventory.

The NRCS reports progress to rectify data with state agencies and to verify hazard classifications. More work to rectify data with state agencies is reported to be required. The new USDA agencies, RHS and RUS, recognize the need to field verify and update the former FmHA inventory.

The Bureau of Land Management (BLM) reports that its inventory (low hazard dams) varies in accuracy by state. No statement to improve this condition was made. BOR mentioned an agency-wide shared maintenance Dam Safety Information System which contains data from 15 organizational areas on over 1,100 dams, and a data inventory titled Working Group on Dam Safety Priority List for the high and significant hazard DOI-owned dams.

MSHA reports progress in its inventory work. A total of 564 out of 772 coal-related structures have been input to the inventory. Of metal/nonmetal facilities, 379 were identified and included in the inventory. Work to continue improvement of inventory and verification interaction with the states is to continue.

The NRC reports that the "NRC has not completed the creation or verification of an inventory of all dams for which the Agency has regulatory authority..."

Independent Reviews

This area of the implementation of the Guidelines appears to be completely implemented by all agencies. The regulatory agencies consider their reviews of licensee work to be independent reviews. The agencies with dams as a secondary function use state dam safety or engineer offices or one of the agencies with dams as a primary function (NRCS, Corps, BOR, FERC, TVA) to provide independent reviews. The agencies with dams as a major function use both internal and outside private consultants for independent reviews.

Across the agencies, the Corps has instituted the greatest change in independent review policy. The Corps requires one level of internal independent technical review. The

change is "internal," which means the review can now be accomplished within the installation accomplishing the work, usually a District Office.

For the last reporting period, BOR stated that independent reviews had not been conducted in cases where the decision was that a dam had no safety deficiencies. BOR reports the completion of such reviews for six dams. Three dams were reviewed by private consultants and three dams were reviewed by engineers working for the Corps.

Inspection Programs

The inspection requirements in the Guidelines are implemented into policy and practice by most agencies. All agencies with dams as a primary function have adequate inspection capability, schedules, and accomplishments. The NRCS, which does not own dams, "... no longer routinely provides assistance for periodic inspections in all states. NRCS policy is to encourage State agencies to inspect the majority of existing NRCS-assisted dams."

The agencies with dams as a secondary function vary broadly in the scope of their inspection programs. The variance depends in part on whether the agency is a dam owner, financier but non-owner of the dam, or a regulator over dams. Of the owner agencies, some conduct inspections themselves; others have agreements with one of the agencies with greater expertise in dams; and others use a combination of these two inspection models. The finance agencies, such as RHS and RUS, do not inspect dams because they perceive that to be the owner's responsibility. The RHS needs to follow through on its stated intent to seek copies of reports of inspections on dams within projects it has financed. Many of the regulators conduct inspections as part of their independent review responsibility. Although the NRC uses FERC to accomplish inspections, it only accomplished four inspections during this reporting period.

MSHA's inspection of dams and citation issuance on dam deficiencies are greatly increased. The coal industry inspections totaled over 2,000 per year for this reporting period and over 550 each year for metal/nonmetal mine impoundments and tailings structures.

Dam Safety Rehabilitation Programs

The agencies with dam safety programs that have implemented the Guidelines have adequate rehabilitation programs. It is encouraging to see the seriousness with which agencies pursue the correction of dams found to have safety deficiencies. Because of the high costs associated with many rehabilitation of dam activities, the agencies that own dams also have some process (although in some cases an informal one) for associating comparative risks so they can schedule those projects which need to precede others to construction.

Most of the agency reports include the names of dams at which corrective construction was accomplished during the reporting period.

Management Effectiveness Reviews

Most agencies report no Management Effectiveness Reviews for this reporting period.

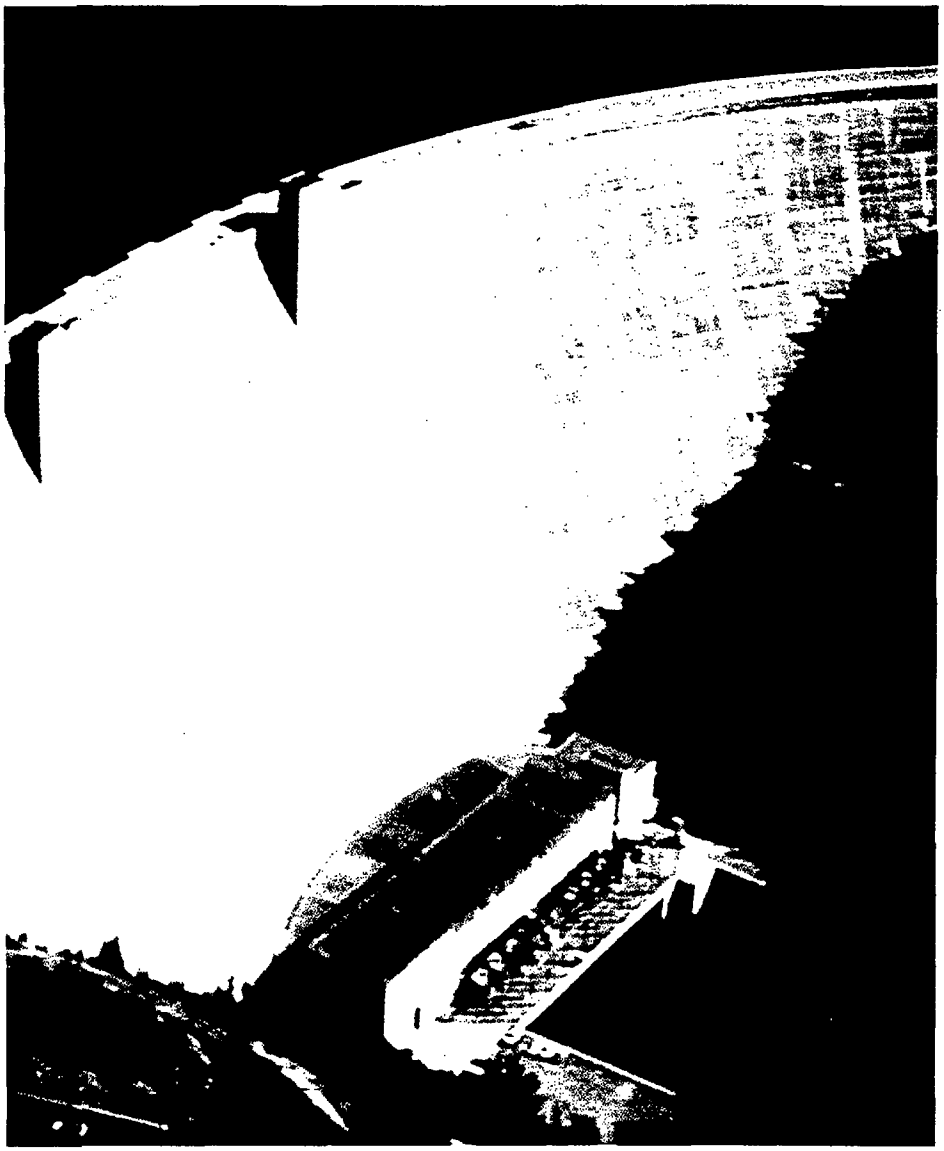
Two external reviews are reported. FERC received a review from the General Accounting Office (GAO). FERC reports the following quotes from the GAO report. "FERC's monitoring and inspection procedures are generally as stringent, or more stringent, than those of other Federal and state agen-

"The agencies with dams as a secondary function vary broadly in the scope of their inspection programs."

■

cies responsible for dam safety...." and "FERC's efforts to ensure structural soundness and public safety are showing positive results."

The BIA received a program review from the DOI Office of the Inspector General (IG).



The reported recommendations from that review are (1) to review procedures for cost-effectiveness; and (2) to implement Emergency Management Systems and EAP's at all BIA dams.

The agencies that reported internal reviews include the following.

- *The Forest Service (FS) Washington Office Dam Safety Officer conducted reviews of two Regions in 1994. One of the findings is that this review applies to other agencies as well. "... there is a lack of an engineering evaluation of dams prior to their acquisition."*
- *The Corps Dam Safety Committee reviewed program effectiveness in three Divisions, one in 1993 and two in 1994. All reviews showed the programs to be proactive and to be addressing problems identified at Corps dams.*
- *BOR reports a review of its dam safety program by a team of employees representing its various offices (project, regional, Denver).*
- *The NPS conducted a management review to ensure that dams with serious deficiencies were being acted upon with corrective or mitigating measures.*
- *The OSM conducted an Alternative Management Control Review, but has not finalized the draft directive to implement the recommendations from the review.*
- *MSHA reports that it employs a three-tier accountability program that includes annual review of management controls by first- and second-level management and a biennial review of Headquarters (third level).*
- *The DOE states that because its "... dam safety program is rather small, Management Effectiveness Reviews are generally not considered necessary."*

Dam Failures and Remedial Actions

The agencies have provided good reporting of dam failures, near failures, and major incidents at dams during this reporting period. The description of events, observations, and consequences associated with these incidents are included in the agency reports. Several agencies are at best inconsistent in their reporting of incidents to the National Performance of Dams Program

(NPDP). NRCS reports transferring hundreds of reports to the NPDP and developing a Memorandum of Understanding (MOU) with NPDP to archive reports.

The FS reports two dam failures, two near failures, and emergency situations during flooding conditions in which EAP's paid large dividends. The Army reported one dam failure. No comment as to damage beyond that to the dam was mentioned. The OSM reports the failure of five impoundments; four of the impoundments have been reconstructed. MSHA reports three dam failures, one resulting from the Northridge earthquake. All dam failures were associated with small or remotely-located dams, with minimal adverse consequences on downstream populations.

The NRCS, Corps, BIA, BOR, NPS, FERC, MSHA, and TVA report incidents at dams under their jurisdictions.

Emergency Action Planning

To a large measure, an agency's commitment to and accomplishments in causing EAP's to exist and to be tested are a direct reflection of its commitment to public safety. Most Federal agencies report progress in establishing EAP's and in local testing exercises.

While FS identifies budgetary limitations, it reports progress in working with states and permittees to prepare and test EAP's. NRCS requires that an EAP be prepared before construction of a new high hazard dam. NRCS states that it has no authority to require the development of EAP's for dams built before 1982. (The NRCS Dams Inventory includes 1,443 high hazard dams built before 1982.) NRCS reports that all NRCS-assisted dams in Minnesota and Missouri have EAP's in place while no NRCS-assisted dams in Alabama, Florida, or Georgia have EAP's. NRCS continues to work with dam owners to provide inundation maps for EAP's, but it does not have adequate resources to complete all the needed work in the near future. The RHS does not have information on the status of EAP's, but plans to seek such data in its 1996 survey of dam owners. The RUS reports that EAP's exist on 5 of its 14 dams. At least six of the dams without an EAP are classified as low hazard.

The Corps reports 449 dams with EAP's, and that the remaining 11 dams requiring EAP's have them in preparation. During this reporting period, EAP's were tested at 13 Corps dams. The Corps is concerned about the lack of progress by downstream local communities in preparing evacuation plans; it is aware of approximately 70 completed evacuation plans. "Districts are being asked to increase their public awareness programs and perform follow-up visits to local communities periodically to obtain the status of evacuation plans." The Army conducted a workshop on Emergency Action Planning and provided copies of the ICODS EAP Manual to each installation owning dams. EAP's exist for approximately 36 percent of the Army's high and significant hazard dams and for approximately 11 percent of its low hazard dams. Emphasis is on installations with no EAP's. "Local government involvement is being encouraged during the formulation of EAP's..."

DOE reports that EAP's have been prepared, approved, and tested for all of its high and significant hazard dams.

BIA reports that all of its safety of dam coordinators attended one of six EAP training seminars conducted for the BIA by the BOR, and that EAP's exist for approximately one-third of its dams. In response to the DOI

"To a large measure, an agency's commitment to and accomplishments in causing EAP's to exist and to be tested are a direct reflection of its commitment to public safety.

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Left:
Hungry Horse Dam, Montana.

"Most Federal agencies report purposeful, good relationships with states, including state dam safety offices."

IG review, the BIA plans additional emphasis on completing EAP's. For the high and significant hazard dams BLM owns, the agency has EAP's in place and reviews them annually. BLM does not report on the status of EAP's on dams owned by permittees other than Clark County, Nevada. BLM does not require EAP's to be tested. BOR reports that EAP's exist for all of its high and significant hazard dams. Similar to the Corps, the BOR finds less than one-half of the downstream communities have emergency warning and evacuation plans, and fewer than 1 in 10 of these communities have a dam-specific plan to address community safety. During this reporting period, the BOR published a two-volume "Emergency Planning and Exercise Guidelines." The BOR Emergency Management Orientation Seminars were conducted three times in FY 1994 and two times in FY 1995. The NPS reports that 17 dams need EAP's completed. The OSM rule requires operators to have procedures no less effective than the Federal rules for notifying the regulatory authorities of a potential hazard and for public protection and remedial action.

FERC continues to be a lead agency in EAP development, testing, guidelines preparation, and training for the dams industry. All dam owner licensees have revised their EAP's to follow the most recently established format. The FERC EAP training program is nationally recognized and highly acclaimed. FERC has given its program in-house twice in each fiscal year of this reporting period. In addition to opening its training courses to many beyond FERC staff, the agency conducted one course for TVA and plans to give a course for MSHA in FY 1996. FERC continues to aggressively pursue the higher level EAP exercises (tabletop and functional) with local and state disaster preparedness agencies. FERC staff also have been major participants in the revision of ICODS EAP Guidelines. FERC has added one interesting aspect to its EAP's. "For a project located within a 10-mile radius of a nuclear power plant, the Commission's regulations also require a radiological emergency response plan."

MSHA coal industry owners are required to have procedures for evacuating coal miners from coal mine property during hazardous conditions. To upgrade EAP requirements, MSHA issued a bulletin in June 1994. Of the 363 high and significant hazard impoundment structures, approximately 30 percent have EAP's that include downstream areas. MSHA did not discuss the status of EAP's for metal/nonmetal impoundments.

"... NRC does not have an emergency action planning program for dam safety." NRC states that it has "... the basic organization, methodology, and interfaces with State and local governments..." to establish EAP's. NRC's Dam Safety Program Plan includes the development of EAP's that conform to the Guidelines after the completion of reviews and inspections. The agency continues to defer this activity.

Application of ICODS Technical Guidance

Most agencies have adopted the technical guidance developed by ICODS. Those agencies which have separate guidelines have evaluated their guidelines as fully incorporating the intent of the ICODS technical guidance. Most agencies which plan separate guidelines, but have not yet issued them, have distributed the ICODS technical guidance to their operating offices for use until the agency guidelines are issued. The Army has decided to incorporate the ICODS technical guidance into their regulations for dam safety rather than develop separate guidelines.

The agencies which report less acceptance than described above include the following.

- *The RHS has adopted the ICODS technical guidance and plans to incorporate it into RHS guidelines. The RHS report does not indicate if an interim distribution of the ICODS technical guidance to operating offices has occurred.*
- *The RUS does not state an agreement to adopt, accept, or include ICODS technical guidance into dam safety engineering regulations that are in the process of being updated.*
- *The OSM does not state if ICODS technical guidance has been distributed to operating offices for interim use until the agency directive is issued.*
- *NRC reports that its criteria "meet the intent" and "are consistent with" the ICODS technical guidance except the ICODS EAP guidance. The NRC statement with respect to EAP guidance is "There are currently no plans for NRC to adopt these guidelines, but they will be considered when an EAP must be developed for dam safety."*

State Dam Safety Agency Involvement

Most Federal agencies report purposeful, good relationships with states, including state dam safety offices, and illustrate this in their reports with one or two examples. The new agencies of the RHS and RUS report that no information is available on this subject. The Navy reports "None." The International Boundary and Water Commission (IBWC) and TVA report no formal agreements but some contacts, especially with respect to EAP development and coordination.

The unique response is that of BIA. "States do not have any authority over American Indians without the individual tribes giving specific authority. The BIA has full responsibility for implementing the Safety of Dams Program on Indian Reservations."

Research and Development and Special Initiatives in Dam Safety

Research, and to somewhat of a lesser degree Special Initiatives, are most appropriate to those agencies with dams as a major function of the agency. These agencies share information through their participation in the Interagency Research Coordination Conference. The agencies have published interesting studies during the reporting period; some are currently in progress. Areas of active research include the following:

USDA (Agricultural Research Service and NRCS)

- *Improved Guidelines for the Design and Management of Earth Spillways (vegetated earth spillway failure processes and gully formation)*
- *Technology to Predict Overtopping Breach of Earth Embankments*
- *Revised Guidelines for Sand and Gravel Filter Gradations, Chapter 26 of Part 633 of NRCS National Engineering Handbook*

DOD

- *Corps Repair, Evaluation, Maintenance, and Rehabilitation (REMR-II) Research Program*
- *Improved Nondestructive Evaluation Systems for Concrete Structures*
- *Remedial Stability Measures for Concrete Structures*
- *Predicting Concrete Service Life (includes alkali-silica reaction)*
- *Use of Geotextiles and Membranes to Prevent Leakage*
- *New and Improved Materials and Techniques for Use in Repair and Rehabilitation of Concrete Dams*

- *Maintenance of Relief Wells and Drains*
- *Assessment of the Impact of Drains on Uplift Pressures*

Corps Special Initiatives:

- *Inspection and Nondestructive Testing Program for Structures Older than 20 Years and Subject to Corrosion*
- *Model for Automated Data Acquisition Systems*
- *Demonstration of New Instrumentation Systems*

DOE

- *Research may be conducted by units being acquired from terminated BOM*

DOI (BOR)

- *Risk-based Analytical Techniques and Methodologies*
- *Breach Characteristics of Embankment Dams*
- *Dam Foundation Erosion (Concrete Dams)*
- *Dam Overtopping (Embankment Dams)*
- *Use of Geomembranes in BOR Canals, Reservoirs, and Dam Rehabilitation*
- *Inflow Design Flood Parameters*
- *Hydrometeorological Evaluations*

FERC

- *Evaluation of "Classical" Gravity Dam Stability Analysis*
- *Ability of Embankment Dams to Withstand Overtopping*
- *"User Friendly" software for 3-D Finite Element Analysis of Dams*
- *Alternative Approaches to NWS Probable Maximum Precipitation (PMP) Estimates*

FERC Special Initiatives

- *Hydrology of the Flooding from Tropical Storm Alberto*
- *The NRC Study of the Current State-of-the-Art in PMP Determinations*
- *Publishing Engineering Guidelines for Evaluation of Hydropower Projects*

MSHA Special Initiatives

- *A Database on the Dynamic Properties of Mine Tailings*
- *Acceptable Methods of Seismic Stability Analysis for Mine Tailings Impoundments (MSHA has proposed that the BOM conduct these projects under its previous arrangement with BOM. Due to the elimination of BOM, the research funding is uncertain but continuing efforts will be made when funding is available.)*

TVA Special Initiatives

- *Automated Collection of Instrumentation Data at Three Dams; uplift pressure and flow, concrete growth and stresses, stress and temperature, and all with an array of instrumentation manufacturers*

Public Concerns

All agencies report formalized and effective procedures for taking issues to the public and for receiving comments from the public. Some agencies identified their environmental compliance process as a part of their formal public involvement program. Several agencies identified particular processes or individual dams for which public concerns were expressed and responses were required. One FS Region raised the sometimes public issue relating to changes on wetlands which result from the removal of an old dam or corrective actions to a dam. While the BIA primarily defines its public as American Indians, the report states that it contacts the off-reservation public when events will cause flood flows downstream of a reservation. The BOR states that utilization of risk analysis approaches has been an asset in presenting complex dam safety issues to the public. •

"All agencies report formalized and effective procedures for taking issues to the public and for receiving comments from the public."

■

Left:
Oquossoc Power and Light Company Dam, Kennebago River, Maine.

The State Role in Dam Safety

"The states have primary responsibility for protecting their populations from dam failure disasters. Of the 74,053 dams in the United States, 95 percent are owned by states, local governmental entities, industry, or individuals."

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Right:
Green Peter Dam,
Oregon.

Historical Background

Concern for the regulation of dams to ensure public safety surfaced after the failure of the St. Francis Dam in California in 1928. This failure led to the enactment of legislation in California, which became the model for laws in other states. By the mid-1970's, approximately one-half of the states had a system for protecting the public from the potential hazards of dams. Today, all but two states (Alabama and Delaware) have adopted dam safety regulatory laws.

The states have primary responsibility for protecting their populations from dam failure disasters. Of the 74,053 dams in the United States, 95 percent are owned by states, local governmental entities, industry, or individuals.

The Role of the Association of State Dam Safety Officials

The need for a unified voice for state dam safety officials was recognized following several major dam failures in the 1970's. Since its founding in 1983, the Association of State Dam Safety Officials (ASDSO) has moved to a leadership role in dam safety. There are now five regions active in the support of the Association, 50 full voting members (49 states and Puerto Rico), and over 1,100 members when Associate, Affiliate, and Student members are included.

The mission of ASDSO is to:

- *provide a forum for the exchange of ideas and experiences on dam safety issues.*
- *foster interstate cooperation.*
- *provide information and assistance to state dam safety programs.*
- *provide representation of state interests before Congress and Federal agencies responsible for dam safety.*
- *help improve dam safety programs.*

Activities of the Association of State Dam Safety Officials

Newsletter

The bi-monthly newsletter keeps members abreast of ASDSO activities.

Annual Conferences

ASDSO's 1994 annual conference, held in Boston, Massachusetts, had a record-breaking audience of over 500. Experts in all the major dam safety disciplines presented technical sessions. Equally successful was the 1995 annual conference in Atlanta, Georgia, which was attended by approximately 600 participants.

ASDSO Committees

Affiliate Member Advisory Committee

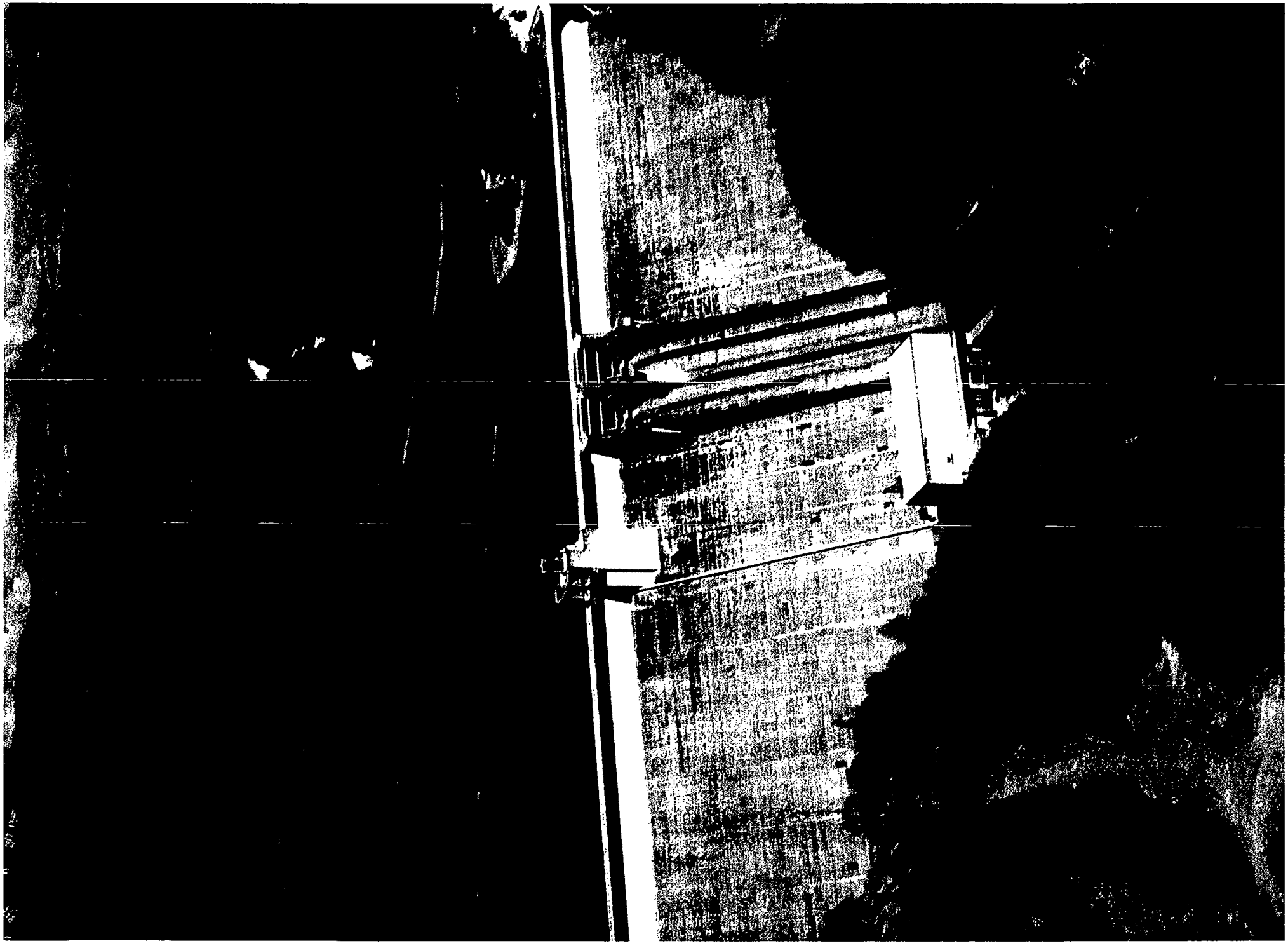
The membership of this committee is drawn from the private sector of the ASDSO membership.

Scholarship Committee

The third annual ASDSO Undergraduate Scholarships ($2,500) were awarded in May 1995 for the 1995-1996 school year.

Technical Committee

The Technical Committee is used by the Board to review completed projects and de-



velop projects for sponsorship by the Federal Emergency Management Agency (FEMA).

Legal and Liability Issues Committee

This committee, which has been retired, produced one final product: a pamphlet on dam owner responsibility and liability awareness.

Clearinghouse

ASDSO maintains a clearinghouse which responds to approximately 25 inquiries per week on issues related to dam safety laws, regulations, state programs, and technical documentation of dam safety. A bibliography of dam safety publications, articles, and presentations also has been developed and placed in a database for access by members. In 1995, ASDSO updated its publications, Summary of State Dam Safety Laws and Regulations and Bibliography on Dam Safety Practices.

Working Relationships

Closer ties were forged in 1994 and 1995 with related groups. The most significant partnership of 1995 was with the United States Committee on Large Dams.

In 1995, the American Society of Civil Engineers asked ASDSO to participate on a subcommittee to rewrite guidelines for the retirement of dams and hydroelectric facilities. ASDSO maintains membership in the Rebuild America Coalition, the leading national organization dedicated to keeping Congress, state governments, and the public aware of the need for infrastructure improvement and financing.

In 1994, ASDSO joined the Bureau of Reclamation (BOR) and Southern University in Louisiana to launch the Safety of Dams Educational Program, a specialty curriculum within the civil engineering department at Southern University. Other sponsors are the U.S. Office of Historically Black Colleges and Universities Program, the Job Corps, and the Louisiana Department of Transportation and Development.

Cooperation with the Federal agencies continues through the Interagency Committee on Dam Safety (ICODS). ASDSO chairs the ICODS Subcommittee on Federal/Non-Federal Dam Safety Coordination.

Legislative Activities

In 1995, ASDSO testified on behalf of FEMA's FY 1996 dam safety budget and in support of the U.S. Army Corps of Engineers (Corps) funding for the National Inventory of Dams. ASDSO continued to promote legislation for a national dam safety program as part of the Water Resources Development Act of 1995.

NBC Dateline devoted national air time to dam safety in June 1995, after network researchers read ASDSO written testimony to Congress last year concerning the need for a national dam safety program. ASDSO played a major role in the development of this presentation.

Leadership Activities with the Federal Emergency Management Agency in FY 1994-95

Since 1984, FEMA, through its National Dam Safety Program, has contracted with ASDSO for projects which enhance dam safety in the United States. Some of these projects are described below.

National Non-Federal Dam Inventory

With funding from FEMA and from appropriations authorized to the Corps, this pro-

ject to update state dam inventory data and transfer it to a national database is fully operational. Forty-eight states and one territory are participating in the program. The information is available to the public on CD-ROM through FEMA.

National Performance of Dams Program

The National Performance of Dams Program is now a national information resource. In 1994, an ASDSO working group developed an instructional manual to guide the user in transferring dam performance data to the library. Training for state officials and others on how to use the guidelines was conducted in 1994-1995.

Public Awareness Workshops

The public awareness program is in its tenth successful year. In 1995, eight states organized workshops to bring owners, operators, state and local officials, and others together to learn about dam safety and discuss issues of concern.

Comprehensive Update of the Model State Dam Safety Program

A complete update of the manual, which is used by many states as a benchmark, will be completed in 1996.

Peer Review Program

Three dam safety programs were reviewed in 1994 by ASDSO peer review teams: the states of Hawaii, Idaho, and North Carolina. Two states, Oregon and Utah, were reviewed in 1995. ASDSO Peer Review teams are scheduled to conduct reviews at BOR, the U.S. Bureau of Indian Affairs, and at B.C. Hydro, a private company in Canada.

Pilot Project to Analyze Extreme Precipitation Events in Two States

This program offers technical assistance to state dam safety programs interested in the analysis of extreme storm events. The primary applications for the analysis are to estimate the magnitude of extreme events for use in flood studies that assess hydrologic adequacy and to help set requirements for rehabilitation or improvements to spillways. Montana, Wyoming, and Michigan were pilot states for this project.

Environmental Guidelines for Dam Safety

An ASDSO team has been working to develop a guidebook for dam safety officials, dam owners, consultants, and others which will present an overview of what can be expected as environmental regulations increase. The guidebook will summarize relevant Federal and state environmental laws and will present lessons learned from past experiences.

Regional Technical Seminars

This program, started in 1989, provides technical instruction to state personnel. In 1994, each of the five ASDSO regions was presented with in-depth technical training on determining the probable maximum flood. Topics for 1995 seminars included roller-compacted concrete; embankment dams; geosynthetics use on dams; and probable maximum precipitation.

Awareness Pamphlet on Procurement of Engineering Services for Dam Owners

This brochure, published in 1995, is the second in a series for dam owners. The brochure will assist dam owners in hiring a competent engineer. •

"ASDSO maintains a clearinghouse which responds to approximately 25 inquiries per week on issues related to dam safety laws, regulations, state programs, and technical documentation of dam safety."

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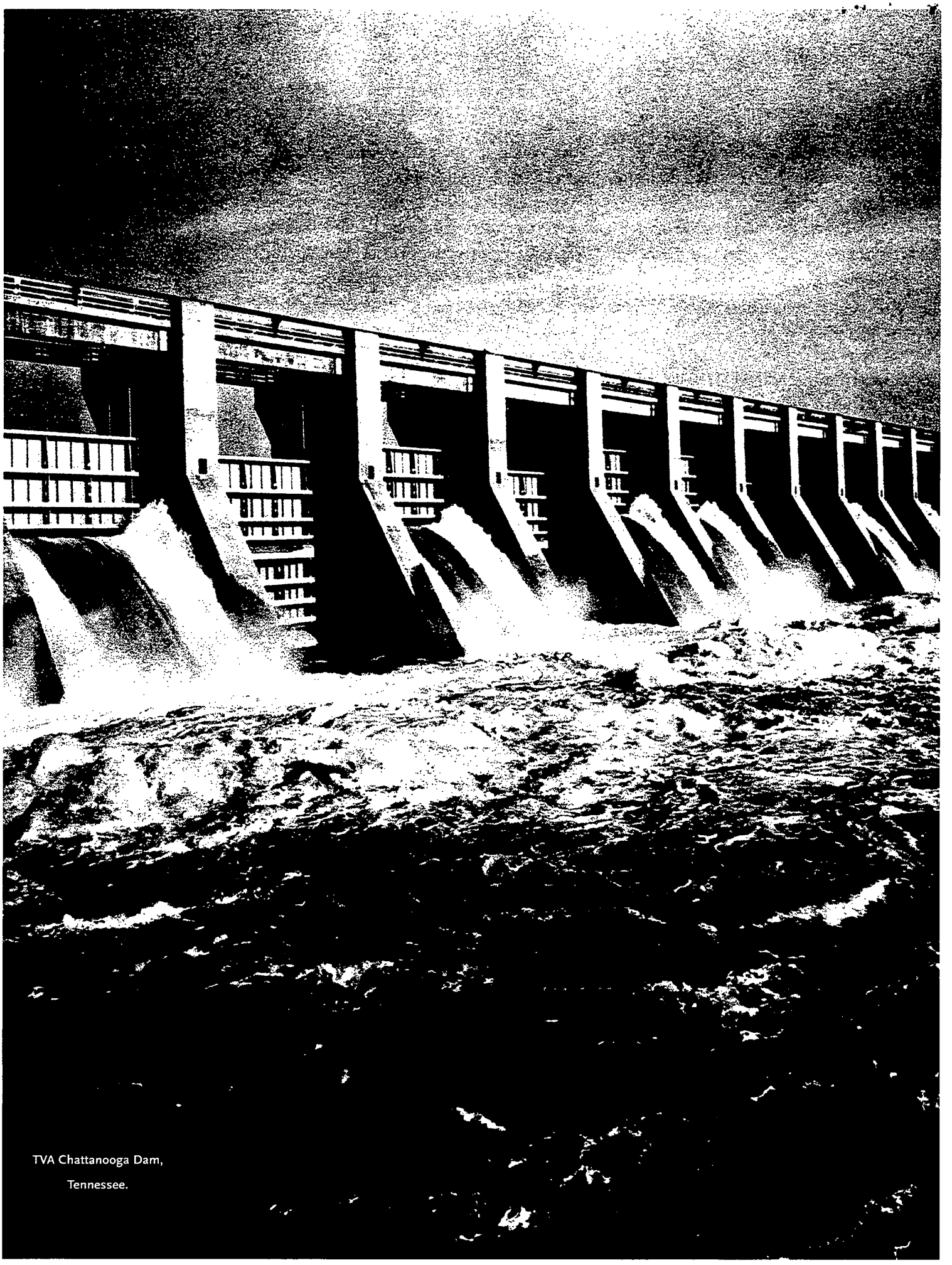


TVA Chattanooga Dam,

Tennessee.

Conclusions and Recommendations

Overall Status of the Implementation of the National Dam Safety Program

Most agencies continue to meet the demands needed for viable dam safety programs. The major dam agencies all have adopted the Guidelines, have established and fully implemented excellent dam safety programs, and are well through the evaluation of the dams assigned to their responsibility.

Most of the agencies with dams as a secondary responsibility have adopted the Guidelines, have adequate dam safety programs in place, and are making reasonable progress in the evaluation of the dams under their responsibility. The recommendations in this section identify where these agencies can improve the evaluation of their accomplishments with increased attention or priority, and without requiring significant change in the resources they are applying to dam safety. Two of the agencies with dams as a secondary responsibility lag seriously behind in establishing dam safety programs and in the evaluation of individual dams.

Several of the agencies with dams as a primary responsibility have mature safety of dam programs and are well into implementation. With the State Programs, these agencies appear to be showing reductions across the Nation in the number of failures of high and significant hazard dams. Most of these agencies are in the process of re-evaluating the completeness of their programs and researching ways to continue and improve the accomplishment of their dam safety program responsibilities with anticipated reductions in personnel. The National Performance of Dams Program (NPDP), a new comprehensive database on the performance of dams, can assist in this area. The NPDP requires the involvement of all dam engineering professionals, each of whom serves a vital role in learning from dam incidents and implementing effective dam safety policies.

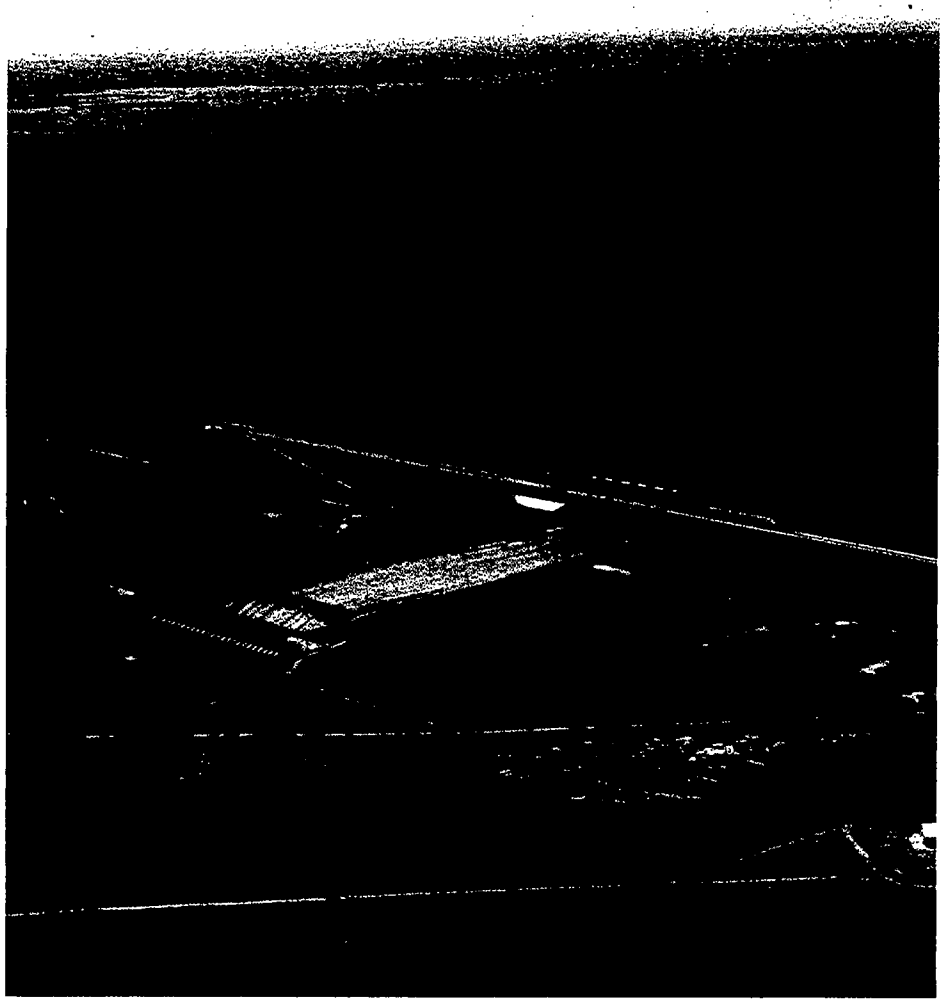
The major dam agencies continue to be aware of their value to an improvement in knowledge across the dam safety industry, and of the need to share their thinking and learning through professional gatherings. Most of these agencies continue to make training for their employees and contractors available to other interested agencies. Training in the development and exercise of Emergency Action Plans (EAP's), which are important mitigation tools against dam failure, will continue to be a major focus of the agencies serving on the Interagency Committee on Dam Safety (ICODS) during the next reporting cycle.

Department of Agriculture

The United States Department of Agriculture (USDA) has restructured. Dam safety responsibilities are now assigned to six rather than five agencies within USDA. While dam safety passed intact from the old to the new agency in several reassignments, this was not the case for dams previously assigned to the Farmers Home Administration (FmHA). Those dams have been distributed to the Farm Service Agency (FSA) and the Rural Housing Service (RHS). The FSA did not submit a response for this report and the RHS report

states that it plans in 1996 to survey the field offices to update the inventory of dams list of the FmHA.

- *USDA leadership needs to encourage the structuring of the new agencies, especially FSA, RHS and the Rural Utilities Service, to accomplish the recommendations to the FmHA in the FY 92-93 Progress Report. Those recommendations were to formally adopt the Guidelines and to accomplish hazard classification of dams in their inventory.*
- *If the FSA has dams assigned under its responsibilities, it needs to respond to the next call for reporting on progress in implementing the Guidelines.*



The Forest Service (FS) continues to make progress toward accomplishment of the evaluation of dams owned and permitted to exist on managed lands. The FS report reflects the decentralized way its dam safety program is administered and accomplished. Some regions have made excellent use of state dam safety capabilities.

- *The FS should be able to improve its knowledge, consistency, and accomplishment with existing dam safety resources if the national biennial dams workshops and/or a computer communications page can encourage dam safety coordinators to share how they manage the accomplishment of dam safety implementation problems common across the agency.*

The RHS is in the process of organizing and establishing its policies and procedures. Its report indicates that it plans to update its inventory of dams during 1996.

- *The RHS needs to formally adopt the Guidelines into its policy statements.*
- *The RHS needs to complete hazard classifications for the dams in its inventory.*

Department of Defense

The U.S. Army Corps of Engineers (Corps) has made a major adjustment in responsibilities to increase the authority for accomplishment and completion of tasks to lower organizational levels. The Corps states that there will be no impact to dam safety from this change. The greatest potential impact to dam safety could be to the independence associated with its internal review process.

- *Because of its legislative responsibility for the National Dam Safety Program, the Corps should request in its appropriations the funds required to maintain the National Inventory of Dams.*

The Army shows progress in the implementation of its dam safety program.

- *The Army needs to distribute in final its AR for dam safety, and to keep focus on maintaining the progress in the program that it has initiated.*

While the Navy report remains brief, acceptance that it has good maintenance and evaluation of the hazard associated with its dams probably creates a low threat to public safety.

- *The Navy should accomplish on Fena Dam any outstanding structural improvement recommendations that were contained in the report of investigation by Wahler Associates, and prepare an EAP designed to protect lives that would be threatened by a large flow discharge through the spillway or from failure of the dam.*

Department of the Interior

The Department of Interior (DOI) uses a Departmental level group, the Working Group on Dam Safety (WGDS), for evaluation of its overall Dam Safety Program and for the distributions between its agencies of construction funding for dam corrective actions.

- *The WGDS needs to assure itself of the balance in priorities between the agencies when the Bureau of Indian Affairs (BIA) expresses a capability for construction at over $10 million per year more than is being appropriated, and the National Park Service states that there is no designated construction funding appropriated to resolve deficiencies at many small dams.*
- *The WGDS should be able to provide from other DOI agencies the capability for the Office of Surface Mining to complete the dam safety directive it continues to report as not issued, and to supply for the Bureau of Land Management the training in dams reported to still be required.*

Department of Energy

A few Department of Energy (DOE) dams have been transferred to the new United States Enrichment Corporation (USEC), and some of the functions of the dissolved Bureau of Mines (BOM) may be transferred to DOE.

- *The DOE should review the research that was being accomplished by the BOM that it believed applicable to dam safety. If DOE agrees to continue the research, it should include the monitoring of that research in future Progress Reports at the appropriate ICODS research meetings.*

Federal Energy Regulatory Commission

- *The Federal Energy Regulatory Commission (FERC) should continue its established commitment to technical assistance and education for other Federal and state agencies.*
- *The FERC should be responsive to requests from the Nuclear Regulatory Commission (NRC) when it responds to recommendations directed to the NRC in this report.*

Department of State

International Boundary and Water Commission

- *The International Boundary and Water Commission should familiarize itself with the tabletop exercise for EAP's and schedule such exercises for the two major dams with EAP's.*

Department of Labor

Mine Safety and Health Administration

The Mine Safety and Health Administration (MSHA) has increased its progress in imple-

"The major dam agencies all have adopted the Guidelines, have established and fully implemented excellent dam safety programs, and are well through the evaluation of the dams assigned to their responsibility.

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Left:
Falcon Dam,
Rio Grande, Texas.

mentation since the last reporting period. Noteworthy are the frequency of inspection activities, improved inventory verification, and development of specialized training. MSHA needs to continue the progress made on EAP preparation. The agency still has not

issued all the required additional regulations. While MSHA concurred with the recommendations in the previous report, this goal has not been accomplished.

- *MSHA should request that the Association of State Dam Safety Officials organize a peer review of its dam safety program.*
- *MSHA should set a date for release to public comment on metal/nonmetal mine standards that are consistent with the Guidelines.*

Nuclear Regulatory Commission

The NRC has made the least implementation progress of any agency. In light of almost two decades of Federal agency focus on dams, the reported progress by NRC reflects a lack of commitment to fully implement the Guidlines.

- *NRC should change to a proactive commitment to fully implement the Guidelines.*
- *Because dam safety is a risk management program, it should be evaluated within the agency-wide strategic assessment.*
- *NRC should explore expanded opportunities under their Memorandum of Understanding (MOU) with FERC. For example, FERC processes to accomplish selected dam safety studies through licensees should be directly adopted by NRC.*
- *NRC should adopt the use of FERC engineering guidelines and annual updates rather than developing a separate set of guidelines and updates. NRC should explore which expanded inspections, investigations analyses, reviews, and evaluations can be contracted to FERC or managed by FERC through the licensees to NRC.*
- *NRC should consider expanded involvement through an MOU that identifies FERC dam safety expertise within the NRC matrix of technical resources.*
- *NRC should establish a commitment to public safety by scheduling and completing EAP's for dams. The FERC model for accomplishing EAP's through its licensees should be transferable to NRC.*
- *The NRC should commit to an effective dam safety program.* •

Acknowledgements

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The Federal Emergency Management Agency also would like to acknowledge Mr. Neil Parrett and HCR for their contributions to the development of this report.

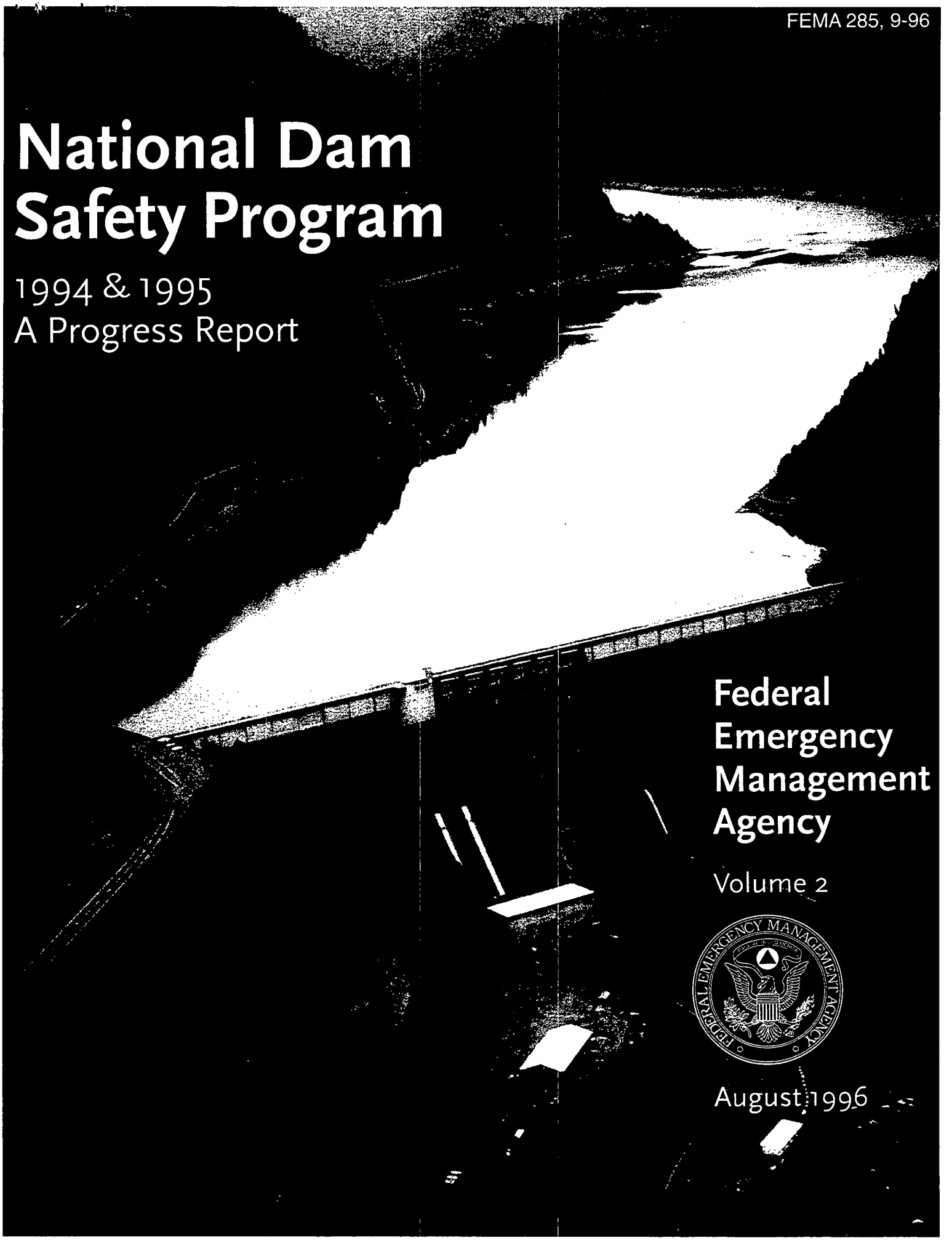
Information for this report was obtained from individual agency reports submitted to the Federal Emergency Management Agency. These individual reports are contained in Volume 2 of this report.

This report has been cleared in accordance with Federal Information Resources Management Regulation 201-45.6 and assigned interagency report control number 0295-FEM-XX.

FEMA 285, 9-96

National Dam Safety Program

1994 & 1995
A Progress Report



Federal Emergency Management Agency

Volume 2

August 1996

Foreword

The Federal agencies of the Interagency Committee on Dam Safety were directed to implement the Federal Guidelines on Dam Safety almost 17 years ago. As mandated by the Presidential memorandum of October 4, 1979, the agencies report their progress in implementing the Guidelines through the Federal Emergency Management Agency (FEMA) to the President. *National Dam Safety Program - 1994 & 1995: A Progress Report, Volume II* includes the FEMA-supplied format for Federal agency reports and the individual agency progress reports. These reports were taken verbatim from individual agency submissions and were edited and formatted for consistency only.

William S. Bivins
Chairman
Interagency Committee on Dam Safety

Table of Contents

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Mr. Constantine Tjoumas	Deputy Director, Division of Dam Safety and Inspections Federal Energy Regulatory Commission 888 First St., N.E., 5th Floor Washington, D.C. 20426	COMM 202-219-2735 FAX 202-219-2731
Mr. Jose S. Valdez*	Principal Engineer, Operations International Boundary and Water Commission The Commons, Building C, Suite 310 4171 North Mesa El Paso, Texas 79902-1422	COMM 915-534-6693 FAX 915-534-6680

*Denotes Representative

Name	Address	Telephone/Fax
Mr. Paul Storing	Special Assistant, IBWC Office of Mexican Affairs ARA/MEX, Room 4258 Department of State Washington, D.C. 20520	COMM 202-647-8529 FAX 202-647-5752
Mr. Robert Shaw*	Director of Engineering Engineering Division - USDA/NRCS P.O. Box 2890 Washington, D.C. 20013	COMM 202-720-2520 FAX 202-720-0428
Mr. William Irwin	National Design Engineer USDA/NRCS/CED P.O. Box 2890 Room 6136S Washington, D.C. 20013-2890	COMM 202-720-5858 FAX 202-720-0428
Mr. Richard Serbu*	Dam Safety Officer U.S. Department of Energy EH - 33 Washington, D.C. 20585	COMM 301-903-2856 FAX 301-903-6383
Mr. Thomas McSpadden	Alternate Dam Safety Officer U.S. Department of Energy EH - 32 Washington, D.C. 20585	COMM 301-903-5656 FAX 301-903-6383
Mr. David Achterberg*	Dam Safety Officer U.S. Bureau of Reclamation P.O. Box 25007, ATTN: Code D-6600 Denver, Colorado 80225-0007	COMM 303-236-4200 FAX 303-236-6763
Mr. Jack Brynda	Program Formulation Unit, W-6340 U.S. Bureau of Reclamation 1849 C Street, N.W. Washington, D.C. 20240	COMM 202-208-6029 FAX 202-208-3484
Mr. Charles Karpowicz	Civil Engineer National Park Service Code 610, P.O. Box 37127 Washington, D.C. 20013-7127	COMM 202-343-7027 FAX 202-523-5186

*Denotes Representative

This report has been cleared in accordance with Federal Information Resources Management Regulation 201-45.6 and assigned interagency report control number 0295-FEM-XX.

All individual reports included in this volume were taken verbatim from individual agency submissions. Changes made were for editorial and format consistency.

PRESIDENTIAL MEMORANDUM
OF OCTOBER 4, 1979

THE WHITE HOUSE

WASHINGTON

October 4, 1979

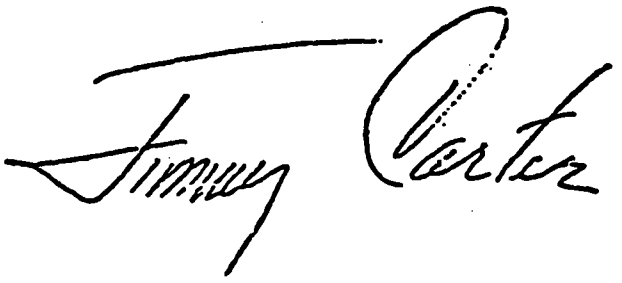
MEMORANDUM FOR

THE SECRETARY OF THE INTERIOR
THE SECRETARY OF AGRICULTURE
THE SECRETARY OF THE ARMY
DIRECTOR OF THE OFFICE OF MANAGEMENT AND BUDGET
DIRECTOR OF THE FEDERAL EMERGENCY MANAGEMENT AGENCY
CHAIRMAN OF THE TENNESSEE VALLEY AUTHORITY
CHAIRMAN OF THE NUCLEAR REGULATORY COMMISSION
CHAIRMAN OF THE FEDERAL ENERGY REGULATORY COMMISSION
COMMISSIONER, U.S. SECTION OF THE INTERNATIONAL BOUNDARY AND WATER COMMISSION, UNITED STATES AND MEXICO

The Chairman of the Federal Coordinating Council for Science, Engineering, and Technology (FCCSET) has reported to me that the three-step review of Federal dam safety activities, which I directed in my April 23, 1977 Memorandum, has been completed. Results of this unprecedented Federal and independent review process reveal generally sound Federal dam safety practices, but show that there remain several areas where Departmental Agency action should be taken.

While many departments and agencies have already begun to strengthen their procedures as a result of this review, the main follow-up must be initiated. Therefore, I ask that the head of each Federal Agency responsible for or involved with planning, site selection, design, construction, certification or regulation, inspection, maintenance and operation, repair, financial or technical assistance, or ultimate disposition of dams adopt and implement the Federal guidelines, as applicable.

Further, each Department and Agency head should submit, no later than January 31, 1980, a report to the Director of the Federal Emergency Management Agency (FEMA), indicating the progress toward implementing the guidelines and the major recommendations for improving dam safety.



FEMA SUPPLIED FORMAT FOR FEDERAL AGENCY REPORTS

FORMAT FOR THE
1994-1995 PROGRESS REPORT TO FEMA
ON
THE IMPLEMENTATION OF THE FEDERAL GUIDELINES FOR DAM SAFETY

The Director of the Federal Emergency Management Agency (FEMA) is responsible for reporting biennially to the President on Federal agency progress in implementing the Federal Guidelines for Dam Safety (Guidelines). Each agency is required to provide FEMA with information on the status of its policies, standards, and procedures to bring their dam safety programs in conformance with the Guidelines. The submission date of your agency information to be provided to FEMA is 45 days after receipt of this request.[1]

Following is the format for the 1994-1995 Progress Report to FEMA.[2]

I. Introduction

Briefly describe your agency's dam safety responsibilities and jurisdiction. Highlight any changes in responsibility from the last report.

II. Program Actions Since Last Progress Report

A. ***Implementation.*** Are all provisions of the Guidelines implemented by the agency? If not, what are they? Please describe impediments to the agency's progress and/or the agency's planned schedule for implementation of all the provisions. What are the projected milestone dates for implementation of the provisions?

B. ***Actions Taken.*** Please review the "Conclusions and Recommendations" section (pp. 37-40) of *National Dam Safety Program - 1992 & 1993: A Progress Report*. Describe actions taken or actions planned in response to the general and specific comments contained therein.

C. ***Changes in Administration.*** Describe changes in your agency's dam safety program as a result of legislative, policy, budget, or organizational activities since the last reporting period.

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[1]This progress report to FEMA on implementation of the Federal Guidelines for Dam Safety covers the period October 1993 through September 1995.

[2]Reports may be structured as (1) Departmental Reports with individual agency data addressed in appropriate subject areas, or (2) as individual agency reports collected by the department.

III. Progress on Implementation of the Federal Guidelines for Dam Safety

The items discussed below focus on policy or activities that demonstrate either progress or lack of progress in compliance with the Guidelines. Please respond to the following items.

A. ***Organization, Administration, and Staffing.*** Please describe the agency's administrative framework and procedures, and any changes within the agency in the administration of the dam safety program since the last reporting period. Are your agency's dam safety organization and staff adequate? If changes have been made, what is the impact of those changes on accomplishing dam safety program activities? Please identify actions being taken to eliminate or mitigate reported deficiencies.

B. ***Dam Safety Training Activities.*** Describe in detail dam safety-related training that the agency has performed, supported, or participated in during the reporting period. Include a description of training offered to agency staff and training programs conducted with other agencies. Please identify staff training deficiencies and actions being taken to correct the deficiencies.

C. ***Dam Inventories.*** Does the agency have a current, complete inventory of dams reflecting the status of the dam and defining the associated risks? Are new dams being entered into the agency inventory and into the updates for the National Inventory of Dams? Please detail changes in your inventory reporting since the last reporting period. Please identify changes in land use downstream from dams under your jurisdiction that may be unclassified or underclassified.

D. ***Independent Reviews.*** Report on your agency's status for independent review of design, construction, and operation of dams. Are reviews conducted within the agency, by other agencies and departments, by state agencies, or by independent consultants? Identify the use of external consultant services, if any.

E. ***Inspection Programs.*** Please report the total number of inspections conducted of dams under your agency's jurisdiction. Identify the agency or agencies used to conduct dam inspections. Discuss any problems associated with inspections; staffing (quality, experience, training, and numbers of inspectors); and any critical findings of the inspections, such as unsafe dams and conditions, improper classifications or changes in classifications, and data on the responses and actions following inspections.

F. ***Dam Safety Rehabilitation Programs.*** Identify the dams, by name and State, that were rehabilitated for safety since the last report, and briefly describe the rehabilitations. Identify the dams, by name and State, for which there is a dam safety rehabilitation scheduled.

G. ***Management Effectiveness Reviews.*** Identify agency-conducted management effectiveness reviews and General Accounting Office reviews dealing with the activities associated with the dam safety program. Include a listing of recommendations arising from those reviews and actions taken or scheduled to address the recommendations.

H. ***Dam Failures and Remedial Actions.*** Identify any dam failures or incidents that have occurred during the reporting period and describe follow-up actions, both site-specific and specific to the agency's dam safety program. Were the failures or incidents reported to the National Performance of Dams Program?

I. ***Emergency Action Planning.*** Describe in detail the status of the agency's emergency action planning program. Report on the agency's procedures for testing established Emergency Action Plans (EAP's). Identify those dams that do not yet have programs comparable to those defined in the Guidelines and the schedule for implementing emergency action planning at those dams. Also identify actions taken to coordinate and encourage State and local government involvement regarding your agency's dam safety program, especially in emergency action planning.

J. ***Application of ICODS Technical Guidance.*** Identify the status of the agency's adoption of technical guidance developed by the Interagency Committee on Dam Safety:

- Emergency Action Planning Guidelines for Dams
- Federal Guidelines for Earthquake Analyses and Design of Dams
- Federal Guidelines for Selecting and Accommodating Inflow Design Floods for Dams

K. ***State Dam Safety Agency Involvement.*** Please describe in detail those areas in which your agency maintains cooperative relationships with state agencies for such activities as inspections, training, or inventories.

L. ***Research and Development and Special Initiatives.*** Identify special initiatives taken to support or improve your agency's dam safety program. Include in the discussion dam safety research studies completed or in progress, technology transfer implemented as a result of research design standards or procedural guidelines that have been published, and complete special technical or instrumentation studies with a potentially broad or significant impact on dam safety.

M. ***Public Concerns.*** Public concerns include, but are not limited to, local or regional political interests, legislation, perceptions of risk or hazard, environmental factors, and social conflict. Have dams under your jurisdiction been the subject of public concern?

If so, what actions were taken? Does your dam safety program have procedures for the early assimilation of public views into dam planning, construction, and operation?

IV. Impact on Agency Operations

Provide information on the impact of the Guidelines on agency operations, both positive and negative. Beneficial impacts can be expressed by reduced risk of loss of life and reduced potential for damage losses. Negative impacts can include such aspects as additional costs or time delays in regulatory approval or the provision of Federal financial assistance.

A. ***Budget Impact.*** What is or will be the impact of compliance with the Guidelines on the agency budget?

B. ***Impact on Contracting Procedures.*** What is or will be the impact of compliance with the Guidelines on agency contracting procedures for the design, construction, and rehabilitation of new dams?

C. ***Budget Allocation for Training/Education.*** What are the resource commitments (funding and staffing) for any in-house or outside training and education activities on the Guidelines that the agency has initiated?

INDIVIDUAL AGENCY PROGRESS REPORTS

DEPARTMENT OF AGRICULTURE

DEPARTMENT OF AGRICULTURE
OFFICE OF THE SECRETARY
WASHINGTON, D.C. 20250

March 25 1996

Mr. James L. Witt
Director
Federal Emergency Management Agency
Federal Center Plaza
500 C Street, S.W.
Washington, D.C. 20472

Dear Mr. Witt:

Thank you for your letter of November 2, 1995, regarding the status of the implementation of the Federal Guidelines for Dam Safety (the Guidelines) promulgated in 1979. In response to your request, enclosed is the Department of Agriculture's (USDA) Progress Report on Implementation of the Federal Guidelines for Dam Safety.

If there are questions, please contact William Irwin, Design Engineer, Natural Resources Conservation Service, Conservation Engineering Division, at (202) 720-5858.

Again, thank you for writing. We appreciate being able to assist you. If I can be of further assistance, please do not hesitate to contact me.

Sincerely,

DAN GLICKMAN
Secretary

Enclosures

Background

A Presidential Memorandum dated April 23, 1977, initiated a broad Federal effort toward improving the safety of both Federal and non-Federal dams. Included in this program were reviews by each Federal agency or department on its dam safety program, an overview of various agencies or departments by the Federal Coordinating Council for Science, Engineering, and Technology, along with proposed Guidelines, and an independent review of Federal dam safety by a panel of recognized experts.

The United States Department of Agriculture (USDA) report, "Review of Practices for Safety of Dams," dated August 1977, has provided a framework for dam safety activities within the USDA. In June 1978, each of the USDA agencies involved with dams completed its plans for safety of dams. The plans were developed in consideration of the USDA report and the then-proposed Guidelines. The Guidelines were completed by the Federal Coordinating Council for Science, Engineering, and Technology on June 25, 1979. In a memorandum dated October 4, 1979, the President directed the head of each Federal agency having responsibility or involvement with dams to prepare a report on progress toward implementing the Guidelines, and to provide major recommendations for improving dam safety. Each agency reported on its progress toward implementing the Guidelines in January 1980. These separate agency reports were consolidated in a report titled "Early Progress to Implement the Federal Guidelines for Dam Safety and Recommendations to Improve Federal Dam Safety Programs," dated July 1980. At the request of the Director of the Federal Emergency Management Agency (FEMA), the USDA submitted additional reports in 1981, 1983, 1985, 1987, 1989, 1991, and 1993, covering USDA activities for the 2-year period since the previous report.

The Director of FEMA, by letter dated September 15, 1995, requested each agency to submit a follow-up report on Guideline implementation. This report is the USDA response to these issues and covers the period of Fiscal Year (FY) 1994 and 1995.

Introduction

The USDA, in fulfilling its assigned responsibilities to American agriculture, has a major involvement with dams as a permitter, owner, manager, planner, designer, constructor, financier, and grantor. Most of the dams are small, but a few range up to approximately 200 feet in height. The purposes of dams include livestock water, electric power, flood prevention, irrigation storage, fish and wildlife, recreation, municipal water, sediment detention, and research.

Up until last year, five agencies within the USDA were involved with dams; Agricultural Research Service (ARS), Farmers Home Administration (FmHA), US Forest Service (FS), Rural Electrification Administration (REA), and Soil Conservation Service (SCS).

On October 13, 1994, the President signed H.R. 4217, the Federal Crop Insurance Reform and Department of Agriculture Reorganization Act of 1994, Public Law No. 103-354, authorizing the Secretary of Agriculture to reorganize of the Department. On October 20, 1994, the Secretary signed Secretary's Memorandum 1010-1, which established among others:

> Consolidated Farm Service Agency (CFSA), which assumed responsibilities for farm services, including agricultural conservation programs formerly performed by the Agricultural Stabilization and Conservation Service, and farm related agricultural credit programs formerly performed by the FmHA. The Agency's name was later changed to Farm Service Agency (FSA).
>
> Rural Utilities Service (RUS), which assumed responsibilities for functions related to rural utility services, including electric loan programs formerly performed by the REA, and water and waste facility loans formerly assigned to the Rural Development Administration.
>
> Rural Housing and Community Development Service (RHCDS), which assumed responsibilities for programs related to rural housing and community development, including housing loan programs formerly performed by the FmHA, and community facilities loan programs formerly performed by the Rural Development Administration. In November 1995, the Agency's name was changed to Rural Housing Service (RHS).
>
> Natural Resources Conservation Service (NRCS) which assumed responsibilities for functions related to natural resources conservation, including all soil and water conservation programs formerly performed by the SCS.

Secretary's Memorandum 1010-1 also abolished the following Agencies, among other: FmHA; REA; and SCS.

Presently, six USDA Agencies are generally involved with dams, as follows:

ARS is involved in dams through its research programs and hydrology and hydraulics in its use of small dams and structures in specific research studies. Only one dam, a 27-foot high dam in Wyoming, is large enough or of sufficient hazard potential to be included under the Guidelines.

FSA and RHS provide loans and grants to individuals and groups. Neither has technical engineering expertise related to the safety of dams. Less than 100 dams have been financed through former FmHA programs.

FS owns approximately 1,000 dams, and administers permits for an additional 2,000 dams, as defined by the Guidelines. Although the FS has a major direct responsibility for dams as an owner, it does not have separate budgeting and funding accounts for dam safety activities. Some dams are designed and constructed by the FS in conjunction with the management of

national forests and grasslands. FS also regulates dams operated by private agencies on FS-administered land. The owner designs, contracts, and operates these dams, but FS reviews and approves activities related to dam safety. FS maintains a staff of engineers trained in the design, construction, and operation of dams.

RUS provides loans and loan guarantees for dams for hydroelectric plants, thermal electric plants, and water and waste facilities, some of which involve dams. RUS does not design, build, own, or operate dams, and only has limited technical expertise on dam safety. About 29 dams have been financed through former REA programs.

NRCS provides technical assistance for planning, design, installation, and operation and maintenance (O&M), and financial assistance for installation of dams. The dams are owned by local or state units of government, individuals, or groups. NRCS has provided technical assistance for more than 26,000 dams, and provided financial assistance for more than 10,000 dams, as defined by the Guidelines. NRCS maintains a staff of engineers trained in all aspects of planning, design, construction, and O&M of dams.

USDA Departmental Regulation 1043-18 requires the establishment of dam safety officers within the Department. These dam safety Officers constitute a USDA Dam Safety Committee, which is chaired by the Undersecretary for Natural Resources and Environment. The committee serves to coordinate dam safety matters within USDA. Each dam safety officer has direct access to the agency head on dam safety matters within the agency. The dam safety officer for NRCS serves as executive secretary for the committee.

Both NRCS and FS participate in Interagency Committee on Dam Safety technical activities for the Department.

Because of the differences in mission, authorities, and responsibilities of the USDA agencies involved with dams, each addresses the Guidelines separately in the appendices which follow. The format of the report for each agency is intended to follow the proposed format requested by FEMA.

AGRICULTURAL RESEARCH SERVICE

I. Introduction

The Agricultural Research Service (ARS) owns or maintains 140 streamflow measuring stations at 10 locations. The large majority of these are flumes that store no water. In a few locations, where sediment is not a major factor, V-notch weirs are used for measuring streamflow. The largest V-notch weir has a height of less than one meter at the notch which stores an insignificant amount of water.

The ARS conducts research on hydraulic structures in channels and laboratory flumes. In all cases, ARS obtains water for these experiments from water supplies under the control of State universities and/or local government authorities. ARS does not maintain water storage reservoirs for experimental purposes other than as noted below.

The ARS learned in 1990 that it owns, and has responsibility for, an earth dam near Cheyenne, Wyoming. The dam, which is located on land leased from the city, was constructed in 1929 by the former Irrigation Investigations Division (of the United States Department of Agriculture) headquartered in Fort Collins, Colorado. The specifications for this earth dam include a height of 27.3 feet for the main structure, and a storage of 260 acre-feet at spillway crest level. The dam was inspected by the Omaha District of the Corps of Engineers in September 1979. An agreement to establish a formal inspection procedure, consistent with the requirements of the National Dam Safety Program, was reached in 1990, and an inspection of the structure was made on October 19, 1990. The actions recommended in this inspection of the report have been completed. These included measures to limit rodent activity, the removal of large trees growing on the lower face of the dam, replacement of the gate valve in the auxiliary dam, and servicing of the gate in the main dam. Measures to control erosion in the spillway exit channel included minor regrading and seeding of perennial grasses. However, the scouring observed in the spillway exit channel does not present a threat to the safety of the spillway or dam.

The City of Cheyenne has requested a meeting with the High Plains Grasslands Research Station to discuss the possible enlargement of the reservoir for raw water storage for City parks. ARS may wish to transfer responsibility of the dam and reservoir to the City of Cheyenne since it will be largely to supply water for their needs and the land is owned by the City. A decision on this enlargement will not be made before the end of this 1995 reporting period.

II. Program Actions Since Last Progress Report

A. Implementation

Not applicable.

B. Actions Taken

Following the instructions received from the Natural Resources Conservation Service (NRCS) and State of Wyoming Engineer's Office, the dam in Cheyenne, Wyoming, has been, and will continue to be, inspected regularly. Personnel inspections were made three times in 1995 to ensure that shrubs, trees, and rodents were not present on the dam structure and to evaluate the level of seep-flow from the dam. The dam face was found to be free of trees and shrubs and rodent activity. Seep flow is consistent and very low. The reservoir level is maintained at about 50 percent of storage capacity through water releases into the City of Cheyenne's park ponds and a small reservoir on the F.E. Warren Air Force Base.

C. Changes in Administration

No change.

III. Implementation Progress

A. Organization, Administration, and Staffing

Dam safety is the responsibility of a Dam Safety Officer appointed to ensure the ARS complies with the Federal Dam Safety Guidelines. As ARS owns or manages only small structures, with just one dam included within the definition of the Federal Guidelines, the current level of staffing for this activity is considered adequate.

The agreement entered into by ARS with NRCS and the Wyoming State Engineer's Office, supported by periodic inspections by ARS personnel at the site, adequately addresses the issue of dam safety at the Cheyenne location.

B. Dam Safety Training Activities

No training of ARS personnel has been recommended. The responsible ARS official at Cheyenne carried out the 1995 inspection and is aware of the need for continued maintenance of the embankment, spillway, and exit channel conditions.

C. Dam Inventories

ARS has responsibility for only one earth dam near Cheyenne, Wyoming. Details on the structure have been provided in earlier Agency reports on dam safety. ARS has not contributed to the National Inventory of Dams.

D. Independent Reviews

ARS is not engaged in the design and construction of dams.

E. Inspection Programs

Personal inspections were made by ARS personnel three times in 1995 after the reservoir was cleaned and serviced. ARS will continue to use the expertise available at the State office of the NRCS and the Wyoming State Engineer's Office for formal inspections and technical guidance on repair and maintenance requirements for the dam at Cheyenne.

F. Dam Safety Rehabilitation Programs
Minor repair and maintenance activities, as recommended in the inspection report, were completed for the ARS dam at Cheyenne.

G. Management Effectiveness Reviews

None.

H. Dam Failures and Remedial Actions
None.

I. Emergency Action Planning
No emergency action plan has been developed.

J. Application of ICODS Technical Guidance
No action has been taken to date.

K. State Dam Safety Agency Involvement
The State Engineer's Office in Cheyenne, Wyoming has advised ARS and the NRCS that the State Engineer will continue to participate in all future inspections of the dam.

L. Research and Development and Special Initiatives
Neither the inspection report nor the spillway breach analysis recommended that any specific initiatives be taken to improve this Agency's dam safety program. However, ARS has been engaged in research related to the safety of dams and the improved design of hydraulic structures for some time. This research supports the operational programs of other governmental agencies, primarily the NRCS. A major objective of the ARS research at Stillwater, Oklahoma, is the development of improved guidelines for the design and management of earth (soil and rock) auxiliary spillways. An ARS/NRCS Design and Analysis of Earth Spillways team developed new technology for predicting the performance and breach potential of earth spillways and has incorporated this technology into the NRCS SITES, Natural Resource Site Analysis software. This software and supporting documentation are scheduled for distribution in March 1996. Research is underway to extend this technology to the prediction of overtopping breach of earth embankments.

M. Public Concerns
ARS is not aware of any public concerns.

IV. Impact on Agency Operations

A. Budget Impact
No impact.

B. Impact on Contracting Procedures
No impact.

C. Budget Allocation for Training/Education
No resources are allocated for any agency training or education activities.

FOREST SERVICE

I. Introduction

There has been little change in Forest Service (FS) dam safety responsibility and jurisdiction since the last report. The FS has responsibility and jurisdiction for approximately 2,350 dams with a height of 25 feet or greater, or a potential reservoir capacity of 50 acre-feet or greater. About one-half of these dams are owned and operated by others under special-use permits. The number of dams listed has not changed significantly since the last report.

Dams are classified as:

High Hazard	500
Moderate Hazard	670
Low Hazard	1,130
Total	2,350

Permitted dam owners include private parties, cooperative and nonprofit groups, local Governments, and other Federal agencies. Most newer dam permits include a clause requiring full compliance with the Federal Guidelines for Dam Safety (Guidelines) by the permittee.

Nine FS Regions are responsible for overseeing the operation, maintenance, and repair of FS-owned dams. Owners of permitted dams design, construct, operate, and maintain the structures subject to FS review and approval. Many dam safety responsibilities are delegated directly to the National Forests where the dams are located. Maintenance and repair work is based on the management priorities, availability of funds, and the relative needs of each structure.

Forest Service Manual (FSM) 7500 - Water Storage and Transmission, and Forest Service Handbook (FSH) 7509.11 - Dams Management Handbook, establish policies and procedures in accordance with the Guidelines.

Throughout this report, the responses of each of the nine FS Regions are listed for each question. These Regional responses have been edited for continuity.

Specific Regional Responses

Region 1 (Northern Region, Missoula, MT) - No separate introduction.

Region 2 (Rocky Mountain Region, Lakewood, CO) - Region 2 continues to implement the Guidelines. The region has made substantial progress in upgrading several dams for the safety of the public. The Region has Memoranda of Understanding (MOU) with Colorado, Nebraska, and Wyoming for exchanging design review reports, inspection reports, and cooperation on dam safety actions. Colorado inspects all State jurisdictional dams and provides inspection reports to the FS for all such dams on National Forest System lands.

Nebraska is inspecting the jurisdictional dams jointly with the FS. Wyoming is inspecting the Special Use and Easement dams, and Region 2 is inspecting FS dams and exchanging inspection reports. South Dakota has taken the position that the FS can insure dam safety and inspection adequately on FS lands and has no reason to enter into a MOU. Plans for construction or structural repairs of dams are reviewed and approved by both the State and FS. The States are recognized as the lead agency for dam safety enforcement.

Region 3 (Southwestern Region, Albuquerque, NM) - The Region is responsible for operation, maintenance, and repair of FS-owned dams. The Region coordinates with States on special use dams and with other agencies regarding dam construction and maintenance on National Forest Lands.

Region 4 (Intermountain Region, Ogden, UT) - Region 4 administers FS Dam Safety mandates per the 1977 Executive Order and subsequent agency and Regional manuals and supplements (FSM 7500). There have been no significant changes in practices since the last report.

Region 5 (Pacific Southwest Region, San Francisco, CA) - The primary objectives of the dam safety program in Region 5 are:

- to ensure that dams and other water-related structures on National Forest System (NFS) lands have a low probability of failure.

- to preserve the utility of dams and other water-related structures.

There are 271 dams in the Region of sufficient height and storage to be reportable to the Federal Emergency Management Agency (FEMA) (hereafter referred to as large dams). Of these, 63 are owned by the FS, 13 are owned by other Federal agencies, and 195 are owned by the State of California, local governments, public utilities, corporations, and private persons. The Federal agency owners administer their own dams. Of the 195 non-Federally owned dams, 194 are in California and 1 is in Nevada. The 194 dams are administered by the State of California Division of Safety of Dams (DSOD) in accordance with a MOU between DSOD and Region 5. Because DSOD has an aggressive and effective program for dam safety, the FS accepts the State's technical judgment concerning the safety of these structures. The Regional workload is thus limited, for the most part, to administration of the FS-owned dams (including those dams too small to be reportable to FEMA) and for the smaller permitted structures that are not administered by the State (and, also, not reportable to FEMA). The Region 5 inventory of dams not reportable to FEMA includes 586 structures.

The Region's dam safety responsibility and jurisdiction remain unchanged for Fiscal Year (FY) 1994 and 1995.

Region 6 (Pacific Northwest Region, Portland, OR) - There has been little change in the regional Dams Safety Program during the reporting period. The Region has responsibility for 31 high hazard, 38 moderate hazard, and 59 low hazard dams that meet FEMA reporting

requirements (128 total). All high hazard dams are owned by permittees or other government agencies.

Region 8 (Southern Region, Atlanta, GA) - The Chief's policy is being carried out, as outlined in the FSM's responsibilities of the Regional Forester. Delegations to the Regional Engineer have been made for engineering and technical responsibilities. Additional delegations have been made to Forest Supervisors for Class D, low-hazard dams activities. Programming of work is based on the management priorities established by the Chief, the investment funds available, and the relative needs of each structure.

Region 9 (Eastern Region, Milwaukee, WI) - There have been few changes in regional dam safety responsibilities and jurisdiction since the last report. Region 9 has responsibility and jurisdiction for about 247 dams, as defined by the Guidelines. The 247 dams are classified as: High Hazard - 16; Moderate Hazard - 30; Low Hazard - 201.

Region 10 (Alaska Region, Juneau, AK) - Region 10, Regional Office Engineering Staff is responsible for the oversight of the regional program. The Forest Engineering staffs are responsible for inspection, maintenance, and operation monitoring of all dams on their Forest.

II. Program Actions Since Last Progress Report

A. Implementation

The FSM and FSH were rewritten and adopted in 1993. FSM direction now includes adoption of the Guidelines as FS policy. The direction emphasizes working with states, local agencies, and dam owners in all areas of dam safety. All the Regions are working toward implementation of the Guidelines within the restraints of available budget and personnel.

Specific Regional Responses

Region 1 - No specific response.

Region 2 - The dam safety program follows the Guidelines to the extent of available funding and manpower. Funding has been by beneficial functions for the past 4 years. District Rangers prioritize the work based on importance.

Region 3 - Formal inspections generally have not been conducted since Phase I inspections. Funding for dams administration is not a priority in the FS due to constrained budget levels. Owners of FS-permitted dams have difficulties obtaining adequate funding for formal dam inspections. Available funds are primarily used to remedy problems found in Phase 1 inspections.

Region 4 - Region 4 is in strict compliance with all Guidelines within constraints due to budgetary limitations. The Region has developed strong alliances with State dam safety

organizations to amplify its efforts and decrease potential weaknesses. The Region 4 Regional Forester considers dam safety one of his prime objectives and has exhibited truly substantial sustained support and awareness at the field level.

Region 5 - The provisions of the Guidelines have essentially been implemented. Most of the work in the past 2 years has been routine and of low to moderate cost. Of the large dams in the Region (those reportable to FEMA), 78 percent are administered by the State of California DSOD and by other Federal agencies. These dams are regularly inspected and well-maintained. The large FS-owned dams are, for the most part, regularly inspected and well-maintained. However, due to decreases in personnel and funding, some of the FS-owned dams are not inspected on time and are not well-maintained. Nevertheless, continued efforts are being made to eliminate these deficiencies through Regional assistance, monitoring, and training.

The Region 5 milestone date for completion of all emergency action plans (EAP's) by dam owners who have dams on FS lands is 1 January 1997. There are still 15 dams that need EAP's, out of 125 dams that require them.

Region 6 - The provisions outlined in the Guidelines have been implemented.

Region 8 - The Guidelines have been adopted but have not been fully implemented. The Region has not completed all of its earthquake analyses. The Region did have a consultant complete a design for rock anchors for Cave Mountain Dam on the Jefferson National Forest, which will make the dam safe from earthquakes and a Probable Maximum Flood (PMF). The remaining two or three high hazard dams that are in earthquake prone areas will be analyzed as funds become available.

Region 9 - Timely maintenance and a lack of EAP testings continue to be problem areas for full implementation of the Guidelines. The Region has several inoperative low level drain valves resulting from a failure to follow O&M procedures or a lack of written procedures. Impediments to implementation include recent personnel turn-over and unavailability due to down-sizing; lack of proper maintenance due to inadequate budgets, especially in the Recreation Departments; and lack of funding for, or indifference to, EAP testing by local emergency response agencies. Projected milestones for full implementation are typically tied to periodic State inspections (often a 5-year cycle) and budget optimism (maybe next year).

Region 10 - Region 10 is moving toward implementing all provisions of the Guidelines. EAP's are not available for some of the significant hazard dams, but work on one EAP is currently underway.

B. Actions Taken

There are no specific comments directed to the FS in the previous Progress Report. In response to the general comments, the FS continues to work with the States and dam owners to complete and test EAP's. The FS backlog of inspections, maintenance, and repairs remains at

about the same level as last reported. As noted in the following Regional responses, the FS is working to accomplish as much as possible with limited budgets, with its priority given to high hazard dams. FS budgets and staffing have declined for the past few years and will most likely continue to decline for several more.

Specific Regional Responses

Region 1 - As result of the evaluations by the Natural Resources Conservation Service (NRCS) using "breach" and "dambreak," the hazard ratings for the four high hazard dams mentioned in the last report have been dropped to low or moderate hazard. As a result, only the four EAP's for State-owned dams remain to be completed. The draft EAP has been issued for one dam with the remaining three EAP's in progress. All EAP's should be completed by the next reporting period.

Region 2 - EAP's continue to receive more support from the States and FEMA. This has resulted in more and better plans, with some testing of plans by the State in Colorado. The Region had all its State and NRCS MOU's in place and operating before this review period. The Region works closely with the State agencies to promote and facilitate dam construction and repairs on NFS lands. Colorado continues to push for EAP's for high and moderate hazard dams. The Region plans to promote EAP compliance are described later in the report. The States are starting to test EAP's for permitted dams.

The backlog of maintenance and repairs is increasing. Colorado is doing a better job on inspections, and requiring compliance on maintenance and repairs despite recent staff reductions. In 1994, both Nebraska and Wyoming lost their dam inspectors; however, both positions have been filled. FS recreation funding levels improved during the period, resulting in the accomplishment of more maintenance and repairs.

Region 3 - No specific response.

Region 4 - Region 4 is continuing its training effort for field personnel and is adhering to routine safety inspections of all inventoried dams by hazard class.

Region 5 - In response to the general recommendations on page 37 of the National Dam Safety Program--1992 & 1993: A Progress Report (there are no specific recommendations for the FS), Region 5 has accomplished the following in the last 2 years.

- Region 5 continues to strengthen its program through biennial Regional workshops, attendance at FS national workshops, and participation in professional meetings, such as those held by the Association of State Dam Safety Officials (ASDSO) and the United States Committee on Large Dams (USCOLD). Bill Huf attended the Seepage, Piping, and Remedial Measures seminar in Berryville, VA, in March 1995.

- Region 5 continues to strengthen its program though periodic monitoring trips to its 18 National Forests. The usual number of such trips is about 5 each year.

- Region 5 has determined that 110 dams (89 percent) have EAP's of the 125 dams requiring them. The Region will be working with the owners that do not yet have EAP's to develop them.

Region 6 - Region 6 believes that the dams inventories and classifications within its jurisdiction are complete. Reclassification, as needed, is done by the State agencies. The Region adjusts its records accordingly and works with the States to gain compliance with the reclassifications. This effort is hampered in older, permitted dams until the permits come up for renewal.

Region 8 - Region 8 has used outside training, as described in III-B.

Region 9 - Faced with decreasing budgets and increasing work loads, the Eastern Region Forests are making few gains against the backlog of missing EAP's, Operation and Maintenance Plans, and Safety Inspections.

Region 10 - Region 10 plans to provide Training Aids for Dam Safety (TADS) training for Forest-level engineers during the next reporting period. Additional training will be provided through outside formal training programs. This will provide the knowledge at the Forest level to conduct proper inspections and prepare EAP's.

C. Changes in Administration

There have been no significant changes in the dam safety program since the last report. The Dams Engineer position in the Washington Office was vacant for most of 1995, but has recently been filled.

Specific Regional Responses

Region 1 - See III-A below.

Region 2 - Changes within the agency that favorably impact the dam safety program include more funding for recreation projects. External changes include more aggressive State dam safety programs which require repair of serious safety conditions and promote better maintenance of dams.

Region 3 - See III-A below.

Region 4 - There have been no significant changes in the Region's approach to its dam safety activities since the last report.

Region 5 - The only changes in the Region 5 dam safety program in the last 2 years have resulted from budget reductions. These reductions have led to more maintenance deferrals and, for several Forests, inspection deferrals. However, most of the inspection deferrals have been for smaller, low-hazard dams.

Region 6 - There have been no changes of note in the dam safety program as a result of legislative, policy, budget, or organizational activities.

Region 8 - There have been no changes within the Region in legislative, policy, or budget activities. There has been a great deal of reorganization in Engineering throughout Region 8, but the dam safety program continues to be administered by the same people in the manner.

Region 9 - The Regional Office staff role for consultation and oversight of dam safety, previously delegated to an Engineer stationed at a field unit, is now staffed in the Regional Office. Dam safety is a collateral duty for this position, which had gone unfilled for the previous 18 months. Two Forests in Wisconsin are combining their technical services into one unit and Forests in the vicinity of the Great Lakes are creating a pool of specialized individuals who will be available to all. These administrative changes should result in more specialized engineering assistance on the ground.

Region 10 - As a result of tighter budgets, Region 10 is in the process of investigating possible efficiencies in sharing the Dams Program responsibilities with another Region.

III. Implementation Progress

A. Organization, Administration, and Staffing

The FS Dam Safety Officer is appointed by the Chief of the FS, and is responsible for establishing procedures, service-wide coordination, monitoring, and reporting. Regional Foresters are responsible for: design and safety evaluations of class A, B, C, and high hazard D dams; establishing Regional policy, standards, and criteria for dam safety; design, construction, operation and maintenance of class D moderate and low hazard dams; maintaining a dams inventory; monitoring the dams program; and providing training and assistance with EAP's. Forest Supervisors, working through Forest Dams Engineers, are responsible for: dams operation and maintenance; management of permitted facilities; inspections; EAP's; and maintenance of documents and records.

The organization and policy are adequate for proper administration of the dams safety program. The bar to complete accomplishment results from a limited budget.

Specific Regional Responses

Region 1 - The previous Regional Dams Engineer retired in September 1995. There is an acting in this position at the present time. The Region will be filling the position by the next reporting period.

There are currently three trained dam engineers on the Forests with extensive training and experience. Of the dams engineers assigned by the remaining Forests, however, some have little experience. A Regional training session has been scheduled to provide the required basic program administrative and technical background to these personnel.

Region 2 - The Region's staff strength is at a minimum. Staff have many responsibilities competing for their time due to decreasing full-time equivalents (FTE's). In spite of this trend, the Region has made progress in complying with the Guidelines.

Region 3 - Responsibilities for the dams program is a collateral duty at the Forest level and the Regional level. Engineering staff time available for the dams program will be reduced by current downsizing. The Region has continued the shared services agreement with Region 4 to provide several pay periods of high level expertise to the part-time Regional dams personnel.

Five of the 11 engineers responsible for dams at the Forest level have retired or left that area of responsibility; only 1 was replaced by a person with dam management experience, and 1 has not been replaced. Embankment inspection training was given this year and more training is planned for next year.

Region 4 - The Regional Forester is responsible for all dam safety activities, as delegated through the Regional Director of Engineering to the Regional Dams & Hydraulics Engineer. Emphasis for this effort is delivered to the field level as the Regional Forester makes dam safety a critical element on each Forest Supervisor's performance evaluation. At the Forest level, dam safety is primarily handled by the Forest Engineer and his staff, as supported by the Regional Dams & Hydraulics Engineer.

The most critical problem associated with this effort is budgetary limitations, which translate directly to inadequate staffing. Simply put, there are not enough people to cover the Region's dam safety needs without straining workloads and individual efforts.

Region 5 - The organization of the dams program in Region 5 consists of a Regional Dams Engineer (GS-12) under a Regional Dams Leader (GS-13), which has been vacant since May 1994. The Regional Dams Engineer and two other Geotechnical Engineers rotate in the Dams Leader position. The GS-13 Regional Dams Leader position should be filled to achieve maximum program effectiveness. The Regional Dams Engineer provides technical leadership to the Forests, with approximately five monitoring trips a year, a biennial dams workshop, a Regional dams inventory, and functional assistance to the Forests. The Regional Dams Engineer devotes about 1/3 of his time to the dams program and the rest to other duties.

Each of the Region's 18 Forests has a Dams Engineer responsible for the operation of the Forest's dams program, including inspection, operation, and maintenance of FS-owned dams. All of the Forest Dams Engineers have duties outside of the dams program that consume the great majority of their time. As discussed in Section I, dams owned by other Federal agencies are managed by those agencies, and non-Federally-owned dams of Class C size or greater are managed by the State of California DSOD, as well as by the owners.

Other than the vacant position of Regional Dams Leader, the Regional dams organization remains as described in the last report, and is adequate. The Forests' dams organizations are adequate except for the following.

Eldorado NF: Funding and available personnel time are inadequate for full program accomplishment.

Los Padres NF: Funding and available personnel time are inadequate for full program accomplishment.

Plumas NF: Funding and available personnel time are marginally adequate for program accomplishment.

Stanislaus NF: Funding is inadequate for program accomplishment.

Where the Forest Programs are inadequate, the Forest Dams Engineers try to accomplish the higher-priority work, and the Regional Dams Engineer tries to make up for the deficiencies during functional assistance trips. These efforts are only partly successful. Even where the Forest's dams programs are adequate, dams work is often given low priority, especially for smaller, remote, low-hazard structures. Maintenance for these dams must be done with funds from the various benefiting functions, and the dams work must compete intensely with the work of other programs.

Region 6 - Region 6 maintains a Regional Dams Safety Officer at the Regional Office level. The duty is a collateral one and consists primarily of disseminating information to the Forests and developing regional reports. Each Forest assigns a Forest Dams Safety Officer as a collateral duty. The Forest Officer is responsible for inspection compliance and record keeping of that Forest's dams. This entails 20 people working part-time on the dams program, which is certainly adequate staff.

The 19 Forests generate a turnover of safety officers of about four per year. New safety officers require training in reporting procedures. These procedures are complicated by an outdated database methodology. The Region believes this problem will resolve itself with the implementation of a universal "Infrastructure" database later this year.

Region 8 - The staff on the Forests are nearly the same as reported for the last period, with one engineer responsible for dam safety per Forest. However, with downsizing, these engineers have less time to dedicate to dams. This could become a problem.

Region 9 - Not only have the number of trained and experienced dams safety personnel decreased since the last report, the budgets have decreased so that many dams are not being inspected on any regular basis, and maintenance is minimal or nonexistent. Drain valves and gates which should be exercised periodically are rusting shut or silting in. Brush and trees grow onto dam embankments and clog emergency spillways without a regular mowing schedule. Isolated seepage occasionally threatens the longevity of smaller dams which, if repaired in a timely fashion, would be innocuous. Properly funded maintenance would cure most, if not all, of these problems.

Region 10 - Region 10 has an adequate dam safety organization and staff. However, with the Regional Office cutbacks and combining job responsibilities with other functions, how and where the job is accomplished will change. The Regional Office will provide program direction in the future, and the Forest will be responsible for inspections and EAP's.

B. Dam Safety Training Activities

The FS is a member of the Interagency Committee on Dam Safety (ICODS) and ASDSO, and attends their training sessions and meetings. Regions and Forests also attend State meetings and training sessions. The FS holds biennial dams workshops at the National level. Most Regions hold biennial dams workshops or training sessions. Extensive use is made of TADS.

Specific Regional Responses

Region 1 - The Acting Regional Dams Engineer participated in the following training.

- ICODS, Seepage, Piping, and Remedial Measures Seminar at Berryville, VA, March 1995
- Bureau Reclamation (Reclamation) Dams Safety Inspection training in Denver, April 1995
- ASDSO Conference in Atlanta, September 1995
- Regional dam engineering training, April 1996, as noted above

Region 2 - The last dam safety training sponsored by the Region was 1-½ years ago. The States sponsor yearly training and seminars that are attended by Forest and Regional staff.

Region 3 - Region 3 conducted an 8-hour embankment inspection workshop using the TADS modules. Eight passed the test.

The Region's Water Resources Engineer attended the ICODS's Technical Seminar - Seepage, Piping and Remedial Measures, March 1995, and ASDSO's Technical Seminar - Determination of the Probable Maximum Flood, November 1994. He also participated in Region 8 dams training this year.

Region 4 - The Region conducted a formal dam safety training session as part of its Regional Engineering Technical University in 1994. Staff also participated in Regional FEMA training sessions and ASDSO sessions. Training in this area is ongoing and accomplished on an as-needed basis.

Region 5 - Bill Huf, the Regional Dams Engineer, put on a Regional Dams Workshop in South Lake Tahoe in April 1994. He attended the ASDSO National Meeting in Boston in September 1994, the ASDSO National Meeting in Atlanta in September 1995, the USCOLD National Meeting in San Francisco in May 1995, and the ICODS Seepage, Piping, and Remedial Measures seminar in Berryville, VA, in March 1995. He has conducted on-the-job training for Forest Dams Engineers on nine National Forests during scheduled monitoring trips, and on some of those and other National Forests during project-related trips.

The Forest Dams Engineers have participated in the following training.

- Eleven of the 18 Forest Dams Engineers attended the Regional Dams Workshop in April 1994.

- All of the Forests have access to the TADS modules and some of them have used them extensively.

Region 6 - Three Forest Dams Safety Officers attended the Oregon State annual conference. One attended an 8-hour technical session by Oregon in Grants Pass. One Forest Officer attended the Washington State annual update. The assistant Regional Dam Safety Officer attended both State sessions. In addition, he attended an ICOD's technical seminar in March 1995.

Region 8 - The Regional Dams Safety Engineer and the Dams Safety Engineer from the George Washington National Forest attended the ICOD's Seminar on Seepage, Piping, and Remedial Measures in March 1995.

Seven of the Region's Dams Safety Engineers attended the ASDSO annual meeting in Atlanta in September 1995. The Region also held a 1-1/2 day meeting in the Regional Office after the ASDSO meeting; 12 Region 8 dams safety engineers attended, along with 5 engineers from other regions.

Region 9 - Region 9 is making use of the TADS video and handbook training series. The Regional Dams Safety Engineer attended ICODS and ASDSO seminars and the ASDSO annual convention. A joint workshop between Southern Region and Eastern Region was held in

Atlanta following the ASDSO annual convention in 1995. The various State-sponsored safety workshops are annually attended by FS personnel.

Region 10 - The Region is using the TADS training modules for self-study. Additional training will be required for hazard rating and EAP's.

C. Dam Inventories

The FS maintains an inventory of dams that meets the reporting requirements for the National Inventory of Dams, and also includes dams greater than 6 feet in height or capacity greater than 50 acre-feet. See the comments below for information on changes and downstream land use.

Specific Regional Responses

Region 1 - The Region has a dam inventory which is currently updated for the National Inventory of Dams.

Region 2 - The Regional Office continues to maintain and update the inventory on all its dams within the region. The Region is converting the database to Infrastructure.

Region 3 - The Region 3 inventory has been migrated to the Infrastructure database. It is being transferred to the Forests. The Forests will be responsible for maintenance of data.

Dams are added that meet the size requirements of the National Inventory of Dams.

Region 4 - Region 4 has a current dam inventory per agency direction. The Region is ready for potential updates, as needed.

Region 5 - The Region has a current inventory of dams. Most of the data fields are complete, especially the critical ones. The inventory reflects the status of each dam and the hazard to downstream structures. New dams are entered into the inventory, and thus into the yearly National Inventory updates. This Region has had no changes in its inventory reporting since the last update. No significant land-use changes have occurred that would affect dam hazard classification since the last report.

Region 6 - The Region has a complete inventory of dams located on FS land as reported by the Forests. New dams are entered by the Forests and decommissioned dams removed. The updated inventory is sent to the National Inventory of Dams on request. Land use classification downstream, which is the responsibility of the Forest Officer, seldom changes significantly. One dam was upgraded from low to moderate during the last reporting period.

Region 8 - The Region keeps a current inventory of dams. New dams will be entered if any are acquired. The number of dams over 25 feet high has not changed since the last report.

The land use downstream of dams is reviewed every 5 years, during the safety inspections. There are two dams on the George Washington National Forest that are a concern because of downstream development. These dams are programmed to have breach analysis and inundation maps made next fiscal year.

Region 9 - Region 9, similar to the other Regions, has converted its inventory to a new database, Infrastructure. Changes in land use downstream from one dam in the Region have resulted in the upgrading of that dam from moderate to a high hazard rating. The Region has asked the State to cooperate in seeking land use restrictions that are appropriate for potential downstream flood zones.

Region 10 - Region 10 maintains a current inventory of dams which includes the status and classification of these dams. Changes in this inventory reflect the transfer of two class "C" significant hazard dams to the City of Wrangell, Alaska. These two dams were special-use dams and were transferred through a land exchange.

D. Independent Reviews

The FS works closely with many States to perform independent reviews. Reviews are also done within the FS, through contractors and other Federal agencies.

Specific Regional Responses

Region 1 - The draft EIS has recently been issued for the Rock Creek Mine tailings dam project, for which an independent review was reported in 1993.

A risk assessment review will be performed during FY 1996 for the tailings impoundment alternatives for the proposed Crown Butte Mine on the Gallatin NF.

Region 2 - Independent review of design, construction, and operation for dams on NFS lands are provided by the States in this Region, except for dams in South Dakota.

Region 3 - The Kaibab National Forest in Arizona hired Reclamation to inspect the Steel Dam and to provide recommendations and costs for the repair of this old steel structure.

The Region used the State Dam Engineer from Utah to provide an independent report on the failure of McCrystal Dam.

Region 4 - Region 4 routinely cooperates with State dam safety organizations and other Federal agencies (such as Reclamation and NRCS) during the review process of dam engineering and construction.

Region 5 - The following independent reviews have been conducted during this reporting period.

Angeles NF: As the result of a recent wildfire, Forest and Regional Office personnel have performed a review of the erosion potential and land rehabilitation needs for land surrounding Littlerock Dam.

Cleveland NF: As the result of a recent wildfire, the Forest Vegetative Management Specialist has performed a review of the erosion potential and land rehabilitation needs for land surrounding El Capitan Dam.

Region 6 - The Region uses the principal of independent review. This can take the form of State Dam Safety Office review or an internal independent review. The Region has used the services of dams experts from other FS regions, NRCS, and the Army Corps of Engineers (Corps) for these reviews. Some Forests have hired private consulting firms. This year, a Forest proposal to raise Spalding Dam, OR, by 3 feet was reviewed in the Regional Office Engineering group.

Region 8 - Region 8 has outsourced two designs in the last few years. These designs were then reviewed by Region engineers. One was the Cave Mountain Dam rock anchor design. The other was the Corney Lake Dam Spillway design, which is under construction.

The State of Louisiana inspected four FS dams on the Kisatchie National Forest.

The National Forests in North Carolina is negotiating with the Tennessee Valley Authority to inspect Persimmon Creek Dam. They also have had the State review all of their dam modifications on dams greater than 15 feet.

The States of Texas and Virginia also inspect some of the Region's dams and its permittees' dams.

The NRCS in Alabama and Arkansas inspect some of the dams that they constructed for the Region's drainage district permittees.

Region 9 - Region 9 has not had any new construction of dams in the last biennium. Forest-level engineering studies or evaluations are typically reviewed in the Regional office or by a consultant.

Region 10 - The Region has used the State of Alaska Dam Safety Office reports, prepared by their consultants, as a third-party review for the proposed Kensington Tailings Dam. The Region also obtained interagency technical assistance from Region 1 for review of the Kensington proposal.

E. Inspection Programs

Approximately 1,680 inspections were performed on FS dams during the reporting period. The inspection program continues to be limited by budget in some Regions. Where all inspections can not be done, priority is given to high hazard dams. Inspection of permitted

dams continues to be a problem area. As permits come up for renewal, they will be modified to include requirements for inspection, in accordance with the Guidelines.

Specific Regional Responses

Region 1 - 66 inspections: 22 High Hazard Special Use, 24 High Hazard Other Federal, 20 Significant Hazard Special Use.

Region 2 - 523 inspections: 371 Formal, 61 Intermediate, 91 During Construction.

Region 3 - There have been 62 inspections conducted on dams under Regional jurisdiction. These were accomplished by several different agencies. The largest number was performed by the State Dam Safety Departments. The remainder were completed by the Forests, Federal Energy Regulatory Commission (FERC), NRCS, and dam owners. The Forests have lost some experienced people and it will take some time for new personnel to get up to speed. Inspections have shown the need to repair dams to extend their life. These are not usually dams that would cause loss of life, but would cause a loss of resources if they failed. The loss would be to wildlife, recreation, and stock water. Rangers are reluctant to spend their limited funds on dams that are still functioning.

Region 4 - Region 4 cooperates with each State within its geographic area of jurisdiction (through formal MOU's) to enhance its inspection programs and reduce duplication of effort. Since the last report, inspections were completed on the following basis: all High Hazard dams were inspected annually; all Moderate Hazard dams were inspected every 2 years; and all Low Hazard dams were inspected every 5 years. Through the MOU's mentioned above, the Region is dividing the inspection responsibilities in one-half (State ½.....FS ½) for all High Hazard dams on the following basis: State inspects the first year in the schedule; FS inspects the second year; and a mutual inspection to insure program credibility in the third year. For Moderate Hazard dams, the FS inspects ½ of all each year. For Low Hazard dams, the FS inspects 1/5 of all dams annually. This method, which the Region calls the Five-Year Plan, reduces its efforts by cooperation with the States and allows an even workload and the ability to keep staff technical inspection competence alive and well. For exact numbers of dam inspections performed, refer to inventory listings.

Region 5 - For the 63 FS-owned dams reportable to FEMA, 61 inspections were done during this reporting period. The inspections were done by the Forest Dams Engineers and by the Regional Dams Engineer.

The inspections of other Federal Agency-owned dams are not tracked systematically by Region 5. These dams are inspected by the engineers employed by the several agencies and reported separately to FEMA.

Of the dams under the jurisdiction of the California DSOD, the vast majority were inspected on schedule, although a few were deferred. These dams are inspected by DSOD engineers and reported separately to FEMA.

Problems with inspections include insufficient funding due to budget cutbacks and other workload requirements of Forest Dams Engineers. See the discussion in Section III, A.

Staffing is adequate, although other demanding duties often detract from the accomplishment of inspections.

All discovered deficiencies have been Priority 2 or lower during this reporting period. No other critical findings were observed.

Region 6 - 18 inspections were performed, as detailed below.

Ochoco	-	4 inspections by FS personnel.
Siskiyou	-	2 inspections by FS personnel.
Umpqua	-	2 inspections of FERC dams by private consultants.
Colville	-	3 inspections by FS personnel
		4 inspections by permittee consultants.
Rogue R.	-	1 inspection by FS after earthquake.
Wal-whit	-	1 inspection by Oregon Water Resources.
Mt Hood	-	1 inspection by Oregon Water Resources.

Region 8 - Total Dams Inspected = 110

Nearly all of the FS dams were inspected by FS engineers.

In North Carolina, Virginia, and Texas, State engineers inspected some of the Region's dams.

In Alabama, Arkansas, Virginia, and West Virginia, the NRCS has been inspecting permittees' PL534 and PL566 dams.

Region 9 - Approximately 40 percent of the 247 dams in Region 9 were inspected during the past biennium. Nearly 25 percent of those were done by State dam safety officials under cooperative agreements.

In a small number of cases, State officials as well as FS personnel have recommended corrective repairs which have not been accomplished due to budget limitations. One involves a High Hazard dam which cannot pass 100 percent of PMF, and thus needs more than $4,000,000 worth of repairs and overtopping protection. Congress has not provided the line item funding necessary to repair this historically-registered dam.

Region 10 - Inspections of four dams were conducted during the past 2-year reporting period (3 Formal, 1 Intermediate). Budgets for inspections and training for personnel have been cut and are expected to be cut further during the next 2 years.

F. Dam Safety Rehabilitation Programs

Rehabilitations Completed

Arkansas
Lake Wedington - Work is in progress to replace the mechanical gate lift with a hydraulic lift and to repair and strengthen the outlet lift tower.

California
Jenks Lake Dam, San Bernardino NF, Class C, Significant Hazard - The Forest constructed a reinforced concrete cutoff wall, 65-feet long x 10-feet high x 1-foot thick, within the embankment and just below the top of the dam.

Hume Lake Dam, Sequoia NF, Class B, High Hazard - The Forest significantly rehabilitated the outlet works of the dam. The work is continuing into FY 1996.

Colorado
Bear Lake (Upper Stillwater) - Repair spillway and outlet works.

Alto Dam - Repair main embankment.

Lake Isabel Dam - Stabilize downstream slope.

Monarch Lake Dam - Stabilize downstream slope and cut vegetation.

Peterson Lake - Armor downstream slope with roller compacted concrete.

Louisiana
Corney Lake Dam - A new concrete spillway is under construction with an estimated completion date of September 1996. The project was designed and administered by the NRCS, acting under an agreement with the FS.

Michigan
Little Bass Lake Dam - Outlet works and emergency spillway are undergoing complete rehabilitation.

Mississippi
Marathon Lake Dam - The rusted out corregated metal pipe outlet pipe was repaired by inserting a polyethylene liner and grouting it in place.

Montana
Como Lake Dam - Bitterroot NF, Reclamation - Raise height and flatten downstream slope. Completed 1994.

North Carolina
Lake Powhatan Dam - The sluice gate structure was replaced and cracks on the upstream face were sealed.

Cliffside Lake Dam - The structural concrete was repaired and sealed.

Wilson I Dam, High Hazard - Is being breached rather than spend the money to meet the Guideline requirements for spillways.

New Mexico
McClure Dam, Santa Fe National Forest - Retrofitted with free-standing labyrinth fuse-gates in the spillway.

Oklahoma
Cedar Lake - The sluice gate and its stem and lift mechanism were replaced. The deteriorated concrete in the morning-glory spillway outlet was repaired.

Kuli Dam - Work in progress to repair piping damage and install a siphon for normal pool level control.

Oregon
Timberlake Dam, Mt. Hood - The spillway was widened and deepened to pass newly calculated inflow designs.

Pennsylvania
Cole Run Dam - Outlet was beaver-proofed and emergency spillway cleared, rip-rapped, and revegetated.

South Carolina
Lickfork Dam - The joints in the concrete spillway have been repaired.

Parson's Mountain Dam - The joints in the concrete spillway have been repaired.

South Dakota
Bismark Lake - Repair valve and manhole.

Roubaix Lake - Remove vegetation and clean up of area.

Utah

Long Lake Dam, Wasatch-Cache NF, High Hazard reduced to Low Hazard - Completely rebuilt to eliminate unsafe, deteriorated condition (breached).

Washington Lake Dam, Wasatch-Cache NF, High Hazard - Completely rebuilt for safety compliance reasons.

Lost Lake Dam, Wasatch-Cache NF, High Hazard - Under construction to eliminate safety deficiencies.

Crystal Lake Dam, Wasatch-Cache NF, Low Hazard - Completely rebuilt for safety deficiency reasons.

Star Lake Dam, Wasatch-Cache NF, High Hazard reduced to Low Hazard - Completely rebuilt for safety deficiency reasons.

Mill Hollow Dam, Wasatch-Cache NF, Moderate Hazard - Stabilized for safety reasons.

Browne Lake Dam, Ashley NF, Moderate Hazard - Toe drain installation to stabilize embankment.

Lower Willow Bottom Dam, Dixie NF, Low Hazard - Embankment stabilization to reduce safety concerns.

Upper Willow Bottom Dam, Dixie NF, Moderate Hazard - Embankment stabilization and spillway enlargement for safety reasons.

Spectacle Dam, Dixie NF, High Hazard - Embankment stabilization, spillway reconstruction, outlet replacement, new instrumentation with remote solar powered controls, and new outlet control structure.

Lower Bowns Dam, Dixie NF, High Hazard - New toe drains to eliminate embankment seepage problems.

Ferron Dam, Manti-LaSal NF, High Hazard - Complete rebuild due to embankment deterioration; includes new outlet, new drains, new embankment with fabric, and new spillway.

Upper Boulger Dam, Manti LaSal NF, Low Hazard - New embankment and spillway.

Lower Boulger Dam, Manti LaSal NF, Low Hazard - New embankment and spillway.

Farnsworth Dam, Fishlake NF, Moderate Hazard - New outlet and lowered spillway.

Twin Lakes Dam, Fishlake NF, Low Hazard - New embankment and spillway.

Virginia
Cave Mountain Dam - The design for an anchor system was completed by a consultant. The work will be completed when funding is available.

Wyoming
Fremont Lake Dam, Bridger-Teton NF, High Hazard - Completely rebuilt for safety reasons.

Stateline Dam, Wasatch-Cache NF, High Hazard - Core replacement (in situ) to eliminate safety deficiency reasons.

Park Reservoir - Repair of outlet pipe and head gate. Replace stop logs.

Frog Creek Reservoir - Rebuilt failed structure.

Big Stahley - Replaced draw down pipe.

Foltz - Replaced draw down pipe.

Townsend - Installed pipe.

Gleason - Failed structure.

TB-9-233-4 - Rebuilt failed spillway.

TB-9-246-4 - Failed structure repaired.

Boardman - Failed structure repaired.

Rehabilitations Scheduled

Alabama
Payne Lake Dam - Replace the sluice gate, stem, lift mechanism, and the tower that supports the lift mechanism.

Arkansas
Blanchard Springs Dam - Improve the access to, and operation of, the gate lift.

Cove Lake Dam - Rehabilitate the concrete spillway.

Storm Creek Lake - Replace the bulkhead in the outlet tower and replace the lift mechanism and lift stem.

Bear Creek Dam - Repair the leakage around the sluice gate.

Clear Fork Dam - Replace sluice gate, stem, and lift mechanism.

Shady Lake Dam - Replace sluice gate, stem, and lift mechanism.

Colorado
Manitou Dam - Repair concrete in spillway apron.

Trujillo Meadows - Repair seepage problems.

Brainard Lake - Repair outlet works and spillway.

Priest Lake - Install new outlet works and toe drain.

Fish Creek Reservoir Dam - Raise the existing dam 19 feet to obtain 2,300 acre feet of additional municipal water storage.

Freeman Reservoir Dam - Construct a concrete control box.

Military Park Dam - Replace outlet conduit.

Minnesota Reservoir Dam - Unknown, will be based on monitoring data.

Peterson Reservoir Dam - Planning exploration for foundation and embankment reconstruction.

Illinois
Pounds Hollow - Sluice gate repair.

Tecumseh - Seepage repair.

One Horse Gap - Rip-rap the upstream face and repair downstream channel.

Whoopie Cat Lake - Reduce seepage through reservoir bottom.

Michigan
Sylvester Dam - Stabilization work scheduled for Fall 1995.

Montana
Bass Lake Dam, Bitterroot NF, Bass Lake Water Users - Planned for 1996, draft EIS issued.

Oregon
Fish Lake Dam, Rogue River, OR - Reviewed the seismic safety upgrade proposed for construction in Summer 1996.

The "North Umpqua (OR) Hydroelectric Project," FERC License 1927, includes several large dams. It is presently undergoing relicensing; Forest personnel are active in the project; including dam safety issues.

Washington
Growden Dam, Colville, WA - Plans is to construct an emergency spillway or decommission when funding becomes available.

Little Twin Lakes - Will have an emergency spillway installed when funding is available.

Wyoming
Tie Hack Dam - Design and construction of new dam.

Sand Lake - Design reconstruction of breached dam.

Twin Lakes Dam - Construct replacement dam to combine two reservoirs into one larger reservoir with a PMF spillway.

G. Management Effectiveness Reviews
No dam-related General Accounting Office (GAO) reviews were conducted during the reporting period. Two reviews were conducted by the FS Washington Office Dam Safety Officer in 1994. The two reviews scheduled for 1995 were postponed because the Dam Safety Officer position was vacant. The review program of two or three reviews per year will start again in 1996. See the Regional responses for details of these two 1994 reviews and reviews conducted by Regional Dams Engineers.

Specific Regional Responses

Region 1 - None.

Region 2 - A Washington Office review was scheduled for the Summer 1995. There has been no agency-conducted management effectiveness reviews or GAO reviews in the past 2 years. Postponement by the Washington Office was due to the vacancy of the Dam Safety Engineer position.

Region 3 - The Washington Office conducted a Dams and Geotechnical Monitoring Trip of Region 3 in August 1994. This monitoring trip brought out the need for technical training in dam breach analysis, and a better understanding of geotechnical engineering and when to apply it. There also was a lack of an engineering evaluation of dams before their acquisition.

Region 4 - There have been no GAO reviews in Region 4 for dams since the last report. Region 4 conducts management reviews as needed on a routine basis to insure dam safety mandate compliance and provide assistance. In terms of findings, the Region can always use more money and personnel; the bottom line in most cases is a noble effort under the circumstances.

Region 5 - The Washington Office has conducted no management reviews of the Region 5 dams program during this reporting period.

Region 6 - The Region conducts geotechnical/dams engineering reviews for about 3 Forests (of 19 total) per year. The Forest Dams Program is included in these reviews. There have been no GAO reviews of the program. Findings are that the Forests are essentially complying with FSM direction. Management review findings and recommendations are reported for corrective action. In this reporting period, there were no instances of negative findings.

Region 8 - The Regional Office made two Dams Safety Monitoring Trips in 1994 and one in 1995. Two trips are scheduled for 1996.

Region 9 - A management review was conducted by the Washington Office of the Eastern Region's dam safety program in August 1994. The following recommendations were made by John Steward, former Dams/Geotech Engineer, Washington Office.

1. Share specialized technical skills between Forests.
2. Provide more technical training to Forest personnel.
3. Improve dam inventory maintenance and reporting.
4. Utilize incremental damage analysis methods, State standards, or PMF methods for sizing spillways on existing dams.
5. Check each dam's hydraulic height by routing the design flood through the dam when determining hazard classifications.
6. Improve compliance with FS policy and the Guidelines.
7. Seek cooperation with States and establish MOU's for compliance inspections.
8. Regional Office should review dam safety work of the Forests more thoroughly, including land and dam procurement procedures.
9. Update the inventory when it is moved to the Infrastructure database.
10. Review Special Use Permits and update to comply with current direction for inspections/safety evaluations, including guidance by dam safety personnel in the process.

Actions taken to address the issues include the recruitment of a Regional Dams Safety Engineer whose job description includes (as a collateral duty) assisting Forests in complying with these recommendations. Forest visitation trips are budgeted for FY 1996. An MOU with Wisconsin was completed and Minnesota officials have expressed an interest in creating one with them. Land acquired, which included two unsafe dams, was delayed until after the sellers had safely breached both structures and brought them into compliance with State recommendations.

Region 10 - No management effectiveness reviews have been conducted since the last report. However, periodic monitoring of the dam safety program is accomplished.

H. Dam Failures and Remedial Actions
See the Regional responses.

Specific Regional Responses

Region 1 - None.

Region 2 - Sand Lake failed after high Spring runoff this year.

Region 3 - McCrystal Dam on the Carson NF had a severe foundation seepage upon initial filling that threatened the dam. The reservoir was drained and core drilling was performed to identify the problem. The weak formation was identified and a grouting with cutoff trench solution was proposed. The Forest Supervisor chose to remove the dam rather than fix it.

Region 4 - Region 4 encountered severe runoff situations on the Dixie NF during Spring 1994 and Spring 1995. The Region enacted EAP's and averted serious complications. As a result of EAP compliance and cooperation between local agencies and dam owners, no major structures were lost. Similar situations occurred on the Bridger-Teton NF, the Humboldt NF, the Toiyabe NF, the Wasatch-Cache NF, and the Ashley NF. However, due to pre-emergency notification, planning and use of Incident Command resources, no dams were lost and damages which occurred resulted solely from natural runoff. The Region believes its emergency preparedness effort exceeds almost any other similar program in the United States.

Region 5 - Modoc NF, Bayley Dam, Height 10 Feet, Storage 93 Acre-Feet, Low Hazard: The reservoir breached at an unknown time during the Winter or Spring 1994-95, which had unusually high precipitation. The reservoir is in an undeveloped area with no downstream improvements. The breach was excavated and repaired by a force account crew. The dam is being evaluated for upgrading, and the incident is being reported to the National Performance of Dams Program (NPDP).

Region 6 - There were no dam failures or reportable incidences during the reporting period.

Region 8 - There have been no reportable incidents in the Region during this reporting period.

Region 9 - Only one dam, Kenton Lake in Ohio, has experienced an incident of an emergency nature. Seepage from a corroding spillway pipe through this low hazard dam apparently caused a sink hole to develop on the downstream face. A swimming and boating closure was posted and the level was drawn down by siphoning (the low level drain valve is inoperable) to eliminate flow through the spillway pipe. Concurrently, the NEPA process was started to determine whether the Forest should breach the dam or seek funds to repair it. It was reported

to State officials, who inspected and made recommendations. As this is an ongoing situation, it has not yet been reported to the NPDP.

Region 10 - No dam failures or incidents have occurred since the last report.

I. Emergency Action Planning

The FS is making progress in meeting the Guidelines requirements for EAP's. The number of dams that do not have plans in accordance with the Guidelines has been reduced during the reporting period. Where the FS is responsible for EAP's, they are being prepared within the limitations of current budgets. Where EAP's have not been completed for permitted dams, the FS is working with States and permittees to have them prepared and tested.

Specific Regional Responses

Region 1 - See Part II.

Region 2 - The Region 2 EAP's require review, with many plans updated to present State and Federal requirements. Many owners have not updated their emergency phone lists in the past year. The Region has no procedure for testing the plans; however, County emergency coordinators have tested some plans in Colorado. The Region has not recently reviewed the plans to determine if they are comparable to the Guidelines. Coordination of the dam safety program with State and local governments has been encouraged by the Dam Safety Engineer. However, meaningful accomplishments can only be achieved at the Forest and District level. The Region has requested the Districts to inventory their EAP's, the adequacy of the plans for State and Federal Guidelines, the date of the current emergency phone list, and to report their findings by February 11, 1996. They will be provided with guide letters for requesting EAP's and current emergency phone lists from owners of special use dams. The Regional Office will coordinate the EAP review and results with the State Dam Safety agencies. Training on EAP preparation and testing will be part of future training.

Region 3 - Lynx Lake's Draft EAP is being reviewed by the Arizona Department of Water Resources.

There have been efforts over the last 2 years to obtain an EAP for the Curtis Canyon Dam owned by the Otero Soil Conservation District in New Mexico.

Beyond these efforts, there has not been much accomplished to complete the needed EAP's.

Region 4 - No specific response.

Region 5 - Region 5 has polled the owners of 125 high-hazard dams that require EAP's. Of these dams, 110 have EAP's in place (89 percent). Only 1 of the 125 dams (Hume Lake Dam) is owned by the FS, and this dam has an EAP. A number of significant-hazard dams have

EAP's as well. The following dams either do not have EAP's, or they have not been determined to have such plans.

Dam Name	Owner
Bear Valley Dam	Big Bear Munic. Water District
Antelope Dam	California Department of Wat. Res.
Frenchman Dam	California Department of Wat. Res.
Grizzly Valley Dam	California Department of Wat. Res.
Mojave Dam	Corps of Engineers
Mojave River Fork Saddle Dam	Corps of Engineers
Hog Flat Dam	Lassen Irrigation District
Bouquet Canyon Dam	City of Los Angeles
Grant Lake Dam	City of Los Angeles
Blanchard F1	Los Angeles County
Cogswell Dam	Los Angeles County
Pacoima Dam	Los Angeles County
Juncal Dam	Montecito Water District
Lake Van Norden Dam	Pacific Gas and Electric
Thing Valley Dam	Spencer Trust

The Region will be working with the owners that do not yet have EAP's to develop them, with an anticipated completion date of January 1997.

The one FS-owned high-hazard dam has an EAP. The EAP was updated in March 1994 and last tested on 22 February 1994.

Of the other 109 dams that presently have EAP's, most are tested annually; 2 are tested biennially; 5 are tested triennially; 5 are tested quintennially; 2 are tested irregularly; and 4 have not been tested. The Region will remind the owners of the requirement to test periodically and will encourage them to do so. The Region will also contact the State Division of Safety of Dams to enlist their support in ensuring that EAP's are complete and tested.

Region 6 - EAP's have been prepared for all high hazard dams under the Region's jurisdiction. Some permitted moderate hazard dams have EAP's. The permitted dams are reviewed for the need for EAP's as the permit comes up for renewal. No FS-owned dams are high hazard so the FS has not tested any EAP's. To the Region's knowledge, no permittee has initiated a test this reporting period.

The Region has involved the States of Oregon and Washington in its Dam Safety Program in several areas. The Region accepts State inspections for its permittee-owned dams and encourages State inspection of its structures. Since both Oregon and Washington have full-time dedicated staff and budgets, the Region relies on them as its primary source of information, review, and enforcement.

Region 8 - All FS dams which need EAP's have them, except for Cave Mountain Dam in Virginia. The Cave Mountain Dam EAP will be completed this year. The inundation map has been completed.

Progress has been made on the EAP's for the George Washington National Forest high hazard permittee dams. The State of Virginia is providing an engineer to complete the plans for NRCS that are maintained by Conservation Districts.

Region 9 - The few dams in Region 9 which require EAP's are in substantial compliance, although very few have been tested recently. A permitted dam in West Virginia is lacking an EAP. However, the Forest has notified them of the deficiency. Saddle Lake Dam's (Indiana) EAP is being written. Coordination with States is occurring through MOU's.

Region 10 - The Region has developed three additional EAP's since the last report. Three additional EAP's are required on significant hazard dams to complete the EAP requirements. Region 10 must review the hazard classification for FS and special-use dams. Training, development, salary, and travel are required to make sure the dams requiring EAP's are identified.

J. Application of ICODS Technical Guidance

The ICODS publications have been distributed to Regions and Forests. The guidance is being used where appropriate. Current FSM direction adopts these guides.

Specific Regional Responses

Region 1 - No comment.

Region 2 - The agency will have officially adopted the technical guidance developed by ICODS when the new FSM 7500 is adopted and printed. These standards will be implemented on new and reconstructed dams as design and construction occurs. Existing dams found deficient will be identified and the owners encouraged to comply. The State agencies can easily apply storage restrictions to safe levels for deficient dams. Restricted use is an effective tool for dam repair.

Region 3 - Region 3 used parts of three TADS training guides for training materials in its dam inspection workshop.

Region 4 - Region 4 uses ICODS Guidelines on a routine basis.

Region 5 - The Region follows the Guidelines for emergency action planning, earthquake analysis and design, and inflow design floods.

Region 6 - The three Guidelines mentioned have been adopted and are utilized in the Region's program. Copies reside on most Forests and are available in the Regional Office for others.

Region 8 - The Region uses the Guidelines for all design decisions on high and moderate hazard dams.

Region 9 - Where they apply, the Eastern Region has adopted the ICODS manuals as a supplementary guide for design and analysis of dams.

Region 10 - Region 10 is following the national direction toward adoption of technical guidance developed by ICODS. Earthquake analysis has been done on three significant hazard dams. Review of inflow design floods is planned during the 2 years.

K. State Dam Safety Agency Involvement

FS policy encourages involvement with States in all aspects of dam safety. See the Regional responses for examples.

Specific Regional Responses

Region 1 - The Region works closely with the Montana State dam inspector in development of EAP's, inspections, and remedial actions.

Region 2 - The Region is a regulatory agency when dealing with Special Use and Permitted dams. The Region can enforce compliance with the Guidelines to the extent permitted in the contract documents and to generally accepted safety standards for facilities on National Forest lands. Some older Special Use permits do not require maintenance or removal upon termination of the permit. These could only be enforced by court order. Dam easements were granted by the Department of Interior and authority to enforce safety has to be transferred to the FS on a case-by-case basis. States can pull water storage rights and can more easily levee fines in their role of protecting public safety under State statute than can the FS under Federal statute. The Region supports the States in their enforcement of dam safety as the most effective way to gain compliance.

Region 3 - The State of Arizona Department of Water Resources inspects all jurisdictional dams in Arizona except Federal dams. The FS accompanies them on inspections of dams on FS-managed lands. Cooperation between the FS and Arizona State Dam Safety is very good.

The relations with New Mexico State Dam Safety are strained over McCrystal Dam.

Region 4 - Please see item E above. In addition, all emergency activities (planning and response) are coordinated with State agencies, as needed.

Region 5 - As discussed in Section I, Region 5 has a MOU (17 April 1950) with the State of California DSOD to manage Class A, B, and C non-Federally owned dams on NFS lands. The DSOD reviews and approves plans for new dams and for improvements to existing dams, and they inspect all dams on an annual basis. Bill Huf has frequent contact with personnel from DSOD, including having them speak at biennial Regional workshops.

Region 6 - The Region is totally subordinate to the States in the areas of inspection, training, and inventories. The Region relies on their inspections of permitted dams. At times, they do the inspections for FS-owned dams. The Region relies on the training each State holds annually to update skills. The Regional inventory information is adjusted to match that of the States.

Region 8 - There are no cooperative agreements with State dams safety offices in Region 8. However, in Louisiana, Texas, North Carolina, and Virginia, the State dams safety offices have assisted the Forests with dams inspections.

Region 9 - Through MOU's with Wisconsin, Pennsylvania, Michigan, and (soon) Minnesota, Forest dams are inspected and records are shared. All States in the Region provide annual dam safety seminars which are attended locally by FS personnel. Many Forests have a designated member of ASDSO who participates in their workshops and annual convention.

Region 10 - Cooperation with the Alaska State Dams Engineer includes access to engineering inspection reports, exchange of agencies' dam safety requirements, and occasional discussions on safety issues.

L. Research and Development and Special Initiatives

No dams research or development was done during the reporting period. See the Region 4 response for an example of what is possible when a true initiative is implemented and supported at high levels in an organization.

Specific Regional Responses

Region 1 - None.

Region 2 - No specific response.

Region 3 - No research or special initiatives were done in Region 3.

Region 4 - The Region developed a dam safety initiative in 1988. The results of that effort are developing as in item III-F above.

Region 5 - The question is not applicable to Region 5.

Region 6 - The Region has not completed or undertaken any dam safety research or studies during the reporting period.

Region 8 - Region 8 has no special initiatives in dam safety.

Region 9 - None to report.

Region 10 - No research and development or special initiatives have been taken since the last report, nor has a need been identified.

M. Public Concerns

The FS has in place policy and procedures to involve the public and other agencies in all aspects of its work. Management at all levels of the FS is sensitive to the public, and strives to have the public involved at all stages of planning and design. See the Regional responses for specific cases.

Specific Regional Responses

Region 1 - There was public concern over remedial work to the Bass Lake Dam due to its location within the boundary of the Selway-Bitterroot Wilderness. The draft EIS has been issued.

Region 2 - No specific response.

Region 3 - The NEPA process is used for public input for dam planning and construction.

Region 4 - The Region emphasizes public information and input at the District level. This is an ongoing process on all Region 4 dam efforts.

Region 5 - The following dams have become a public concern during this reporting period.

Los Padres NF: A new Los Padres Dam has been proposed by the Monterey Peninsula Water Management District. Although the existing dam and reservoir are not on FS lands, the proposed dam would inundate FS wilderness and non-wilderness land. Consequently, a land exchange has been proposed, but it awaits voter approval. The public scoping process has been completed and the EIS and EIR have been finalized.

Mendocino NF: Scott Dam, owned by Pacific Gas and Electric, requires rehabilitation for earthquake protection. No action has been taken yet.

Stanislaus NF: Fourteen wilderness dams (12 of which are larger than Class D) have received intense interest from the public regarding future disposition of these structures. Some want

them removed, others want them kept and maintained, and still others want them kept but allowed to deteriorate. An EIS is in the final preparation stages regarding this issue.

Region 6 - Bagley Dam-WA. The public has voiced concern that holes in the dam are always flowing (the dam is normally drawn down). During high inflow, the dam both spills and leaks. Safety is actually not an issue.

The Willamette Forest, OR, reports public concern over the Corps dams lack of fish ladders and discharges of water too cold for the fish. The Corps is studying.

Region 8 - Corney Lake Dam - Rehabilitation in Louisiana was the subject of several public meetings and newspaper articles.

Region 9 - Where dams enhance waterfowl, wildlife, fisheries, flood control, conservation, and flat water recreation, the public has been very supportive. When a safety warning was issued due to a potential breach of a low hazard dam, the main concern from the public centered on the possibility of the dam's removal. The NEPA process was initiated to determine whether intentional breaching was a viable option.

Many small impoundments that have been in place for more than 20 years are in disrepair for lack of available funding. The concern now rises over breaching and draining these man-made wetlands; is this a form of "aquatic ecological restoration" or does it constitute "ecological degradation?" Further study is indicated.

Region 10 - Dams under the Region's jurisdiction have not been of elevated public concern.

IV. Impact on Agency Operations

A. Budget Impact

Compliance with the Guidelines has not increased or decreased the FS budget. Because the FS dams safety program is funded by benefitting functions from existing budgets, it has to compete with all the other program areas in that budget functional area for funds. It is becoming increasingly difficult to try to meet the Guidelines with fixed or reducing funds. The Guidelines do provide dam managers with a consistent standard and the tools to use in competing for limited funds.

Specific Regional Responses

Region 1 - No comment.

Region 2 - No specific response.

Region 3 - There is not a budget line item for dams, which require funds to come from benefiting functions. With tight or declining budgets in the funded areas, money for dams is hard to obtain.

Region 4 - On the assumption that most of the Guidelines are only a template to the dam safety effort Region 4 would be demonstrating, the impact is not apparent. The problems of inadequate funding are ongoing in terms of achieving public safety in dams.

Region 5 - The Guidelines have benefited Region 5 by providing an impetus to more frequently inspect, better operate, and more carefully maintain and rehabilitate Class A, B, and C dams. The result has been reduced risk to the environment, to property, and to human life. Indeed, in the 14 years since the publication of the Guidelines, little property has been damaged and no one has been injured or killed by the failure of Region 5 dams. The only structures that have failed have been relatively small, low-hazard, and remotely-located.

Despite the benefits of the Guidelines, they are not without costs. These costs are, in the end, budgetary. Money must be supplied for employee pay and training; dam operation; and maintenance, rehabilitation, and razing (most dams cannot be simply abandoned).

Unfortunately, budgetary constraints are greatly increasing, and the competition with other programs is greatly increasing. Keeping inspections up to date is difficult, and insuring adequate maintenance is extremely difficult.

Region 6 - The dams program is funded by beneficial use dollars, which at the Forest level means essentially unfunded. Implementation of the Guidelines will have no effect on that unfunded status.

Region 8 - Meeting the spillway capacity requirements in the Guidelines has the potential of a large impact on the Region's budget. Some of the FS dams in Region 8 have private land downstream, which has the potential for development. If the land is developed, the dams will become high hazard and very expensive spillway modifications will become necessary.

Region 9 - The Guidelines are on a collision course with the budget in Region 9. Recreation managers who lack funds to operate and maintain existing campgrounds are reluctant to provide salaries for engineers who inspect their recreational reservoirs and produce a list of projects which further impact their budget.

Region 10 - Compliance with the Guidelines will continue. However, with continued budget cuts, the Region will be exploring shared service arrangements with others to minimize costs.

B. Impact on Contracting Procedures

There is little or no impact on contracting procedures.

Specific Regional Responses

Region 1 - No comment.

Region 2 - No specific response.

Region 3 - The geotechnical drilling contract for McCrystal Dam was an unplanned contract that increased the workload of the contracting officer. With downsizing, any increase in workload is an adverse impact.

Region 4 - This is not an element of concern.

Region 5 - Very few new dams are being built. In fact, no new Class A, B, or C FS-owned dams were built during this reporting period, and none are planned. Therefore, the impact of compliance with the Guidelines for new dams is minimal.

Region 6 - Since design work is contracted out by the Forests, and all contractors will be using the "standards of the profession" in their design, some negligible price increase may develop.

Region 8 - The Guidelines have had no effect on contracting procedures.

Region 9 - There is no impact since there are so few funds with which to construct or rehabilitate dams.

Region 10 - Region 10 does not plan to construct any dams in the foreseeable future. As a result, there is no anticipated impact on contracting procedures.

C. Budget Allocation for Training/Education

Training and related travel budgets are generally decreasing in the FS. The Guidelines have increased the efficiency of the training provided. Training requirements and budgets are determined at the local level. The FS is taking advantage of training provided by other agencies where it is cost effective.

Specific Regional Responses

Region 1 - No comment.

Region 2 - No specific response.

Region 3 - The Regional Office has committed funds to train the individual responsible for dams in the Regional Office. The Forests are having difficulty in obtaining funds to send personnel to training.

Region 4 - The Region is doing the best it can under the circumstances. There are too many needs and not enough money. Therefore, the Region is stretched to accomplish dam safety.

Region 5 - The impact of the Guidelines on in-house and outside training has probably been to increase training within Region 5. The Region has an excellent continuing series of biennial Regional Dams Workshops for Dams Engineers. The Forest Dams Engineers, as well as the Regional Dams Engineer, are encouraged to take advantage of outside training activities. However, budget constraints have prevented some Forest Dams Engineers from participating in training.

Region 6 - There is no budget and hence no allocation. It is presumed the States' training will cover the Guidelines.

Region 8 - Although there is no explicit commitment in the Region's budget for dam safety training, funding has not been a problem in training engineers. The biggest obstacle in training staff is allocating time for the training. Since dam safety is a small part of the total job of the engineers assigned to dams, it is difficult for them to take time from their other duties. As downsizing continues, this will become more of a problem.

Region 9 - A universal need at all levels of the Region is specialized training applicable to dam safety: EAP preparation and testing, hydrologic analysis, inspection techniques, policy and regulations, NPDP, hazard classification, among others. However, when training has been offered, attendance has been very low due to lack of funds from the benefiting function. The Region must rely on State agencies, ICODS, and ASDSO to provide formal education. The TADS training modules are the only affordable tool under current budgets on most Forests in the Eastern Region.

Region 10 - Budget allocation for training/education has been adequate in the past. However, cuts in personnel have resulted in staff with multiple program responsibilities. The dams program requires significant training, which is a major burden for a small Region with few dams.

NATURAL RESOURCES CONSERVATION SERVICE

I. Introduction

The Natural Resources Conservation Service (NRCS), formerly Soil Conservation Service, assists land users and owners in the conservation, protection, and enhancement of soil, water, air, plant, and animal resources. NRCS has a broad range of programs that use dams as a part of conservation systems to achieve flood protection, sediment control, irrigation, fish and wildlife habitat, water supply, and recreation.

NRCS is directly involved in the planning, design, and construction of dams, and has provided assistance for more than 2 million water control practices that involve dams. The vast majority of these are ponds too small to meet the Federal Guidelines for Dam Safety (Guidelines) size definition of a dam, i.e., high or significant hazard potential, or low hazard potential and, height greater than 25 feet plus storage greater than 15 acre-feet or height greater than 6 feet plus storage greater than 50 acre-feet. Others are large dams; over 1,100 exceed 50 feet in height and about 40 dams exceed 100 feet in height. NRCS-assisted, Guideline-size dams are classified as follows:

Class A (low-hazard potential)	21,718
Class B (moderate-hazard potential)	2,067
Class C (high-hazard potential)	1,576
Unknown Class	16
TOTAL	25,377

NRCS-assisted dams can be categorized as "project" or "non-project" dams. Project dams are installed with NRCS technical assistance and financial assistance under programs such as the Watershed Protection and Flood Prevention Program (PL566), the Flood Prevention Program (PL534), or the Resource Conservation and Development Program (RC&D). Project dams are built on land obtained by the project sponsors, and they become the dam owner after construction. The project sponsors execute an Operation and Maintenance (O&M) Agreement as one condition for financial assistance, and it details their responsibility to operate and maintain the dam. NRCS can provide additional technical assistance to inspect or design modifications to the dam at the sponsor's request and as resources permit. Approximately 10,000 of all NRCS-assisted, Guideline-size dams are project dams.

Non-project dams are installed with NRCS technical assistance only under programs such as the Soil Conservation Act of 1935. Non-project dams are built on private land, and the land owner is the dam owner. NRCS usually provides an O&M plan as part of technical assistance; however, there is no formal agreement ensuring proper operation and maintenance of the dam. Approximately 15,000 of all NRCS-assisted, Guideline-size dams are non-project dams.

The Guidelines are applicable to NRCS because of the technical and financial assistance NRCS provides. However, as a non-owner, NRCS does not operate or maintain any dams, and it must be recognized that the NRCS role under those parts of the Guidelines is very limited.

II. Program Actions Since Last Progress Report

A. Implementation

All provisions of the Guidelines applicable to NRCS, which does not operate or regulate any existing dams, have been implemented.

B. Actions Taken

Past Progress Reports have expressed concern about the large number of NRCS-assisted, Guideline-size dams with unknown hazard potential classifications. The last Progress Report commended NRCS for reducing this number by 26 percent, down to 269 dams. This Report shows this number further reduced to only 16 dams. However, it should be noted that these improvements were achieved by processing and filtering data in the old NRCS mainframe database, not by reviewing the hazard potential of a significant number of dams in the field. NRCS had always tracked the original "design" hazard potential classification of assisted dams, and a "current" classification, as any data, was updated through periodic inspections or other work. When NRCS converted its dams inventory database from mainframe to the National Inventory of Dams (NID) field format, the conversion program entered the "design" classification field data if the "current" hazard classification field was empty or unknown. Although the resulting NRCS database information is reasonably accurate, it likely misclassifies many dams where downstream development has occurred since the dams were originally designed and constructed. The current NID database is probably more accurate because hazard classification data is obtained primarily from State regulatory or other agencies that, in most cases, have reviewed the potential hazard conditions in the field. NRCS could adjust its database to contain the "current" classifications from the NID, but this would introduce the problem of different classification systems between all of the parties contributing data to the NID. NRCS does not have the resources to attempt to revisit and reclassify all of its older dams.

The past Progress Report also expresses concerns about the large number of NRCS-assisted, high-hazard potential dams that do not have an Emergency Action Plan (EAP) in place. The Report also commends NRCS for making progress to reduce the number during the reporting period down to 546 high-hazard dams not covered by EAP's. However, query of the current NRCS dam inventory database as updated by NRCS State offices for the current NID Update cycle only shows 313 of 1576 NRCS-assisted, high-hazard dams covered by EAP's, i.e., less than the previous Report. NRCS does not have any legal agreements or other authority to require dam owners of the vast majority of NRCS-assisted, high-hazard dams to develop EAP's, but can provide the technical assistance to map the breach inundation areas needed for EAP development. Many NRCS State offices reported doing some work in this area during the current reporting period. However, NRCS does not have the resources to provide all of the needed breach inundation maps in the near future.

C. Changes in Administration

On December 7, 1994, the Chief of the NRCS released a Reorganization/Reinvention Plan providing concepts, staffing targets, and organizational responsibilities and structure for the Agency. The concept design was a Headquarters level that establishes program, technical, and administrative policies and standardized procedures; a Regional Office level that provides line officer guidance, program oversight and evaluation, and administrative support; and a State Office level that implements programs, provides line officer guidance and technical support to field operations. The functional changes were to reassign operational functions from National Headquarters (NHQ) to other units, provide necessary technical authority and responsibility closer to the field level for effectiveness, and perform administrative functions in a more centralized and consistent manner for efficiency. Concerning dam safety, the Headquarters will continue to work with the Interagency Committee on Dam Safety (ICODS) and the Association of State Dam Safety Officials (ASDSO), while State offices will continue to work with their State agencies.

The former NRCS organizational structure contained several levels of technical expertise and authority relevant to dams. Smaller dams were designed and approved at the Field Office, Area Office, or State Office levels, while most larger dams were designed at the State Office or National Technical Center (NTC) level and approved at the NTC or NHQ level. The NRCS reorganization/reinvention eliminated the NTC offices and diminished the NHQ role in technical reviews and approvals. The reinvented NRCS has embraced a philosophy of one level of review and established policy that empowers the State Conservation Engineer at the State Office to approve all sizes of dams. The policy preserves technical quality assurance by requiring that large or high hazard dams receive an independent technical review by another qualified NRCS, or non-NRCS, office or team. These operational procedures will delegate responsibility for dam safety closest to the offices doing the design and construction work, provide closer contact with the State dam safety agency having legal authority for dam safety, and allow wider and more efficient utilization of existing NRCS technical expertise for dams.

III. Implementation Progress

A. Organization, Administration, and Staffing

The majority of NRCS States responded that they have an adequate organization and staff for dealing with current dam safety responsibilities and workload. NRCS staffing levels and dam design expertise in most States have declined in recent years, and in many cases are not sufficient to maintain a technically qualified work force in that State to design and construct dams. However, one of the outcomes of NRCS reorganization was to consolidate engineering expertise into about a dozen States, based on workloads and geographic locations, for the purpose of providing expertise to several States. These multi-State technical resource staffs can provide a wider range of technical disciplines and a higher level of dam design expertise than many smaller staffs. Consolidation of technical staffs is appropriate because NRCS has a decreasing workload in dam design and construction. NRCS built 1250 Guideline-size dams in 1965, but less than 100 in 1991, and probably only several dozen last year. Another concern

of NRCS staff in several States is that although the necessary technical expertise is available, other priorities have reduced the needed inputs into dam safety efforts, particularly formal inspections of existing dams.

B. Dam Safety Training Activities

Dam safety-related training is somewhat difficult to break out as a separate item, as it is an integral part of overall NRCS engineering training and professional development. Many States have made use of the modules produced through the Training Aids for Dam Safety (TADS) Program, especially for technicians who are inspecting dams. Many NRCS State staffs cooperate with their State dam safety agency in conducting joint training seminars and workshops; notably, Utah recently provided training at the ASDSO West Regional Technical Seminar, and Wyoming assisted in teaching a dam safety inspection workshop. Approximately 30 NRCS engineers attended, and several presented papers at, annual ASDSO conferences in Boston and Atlanta. Approximately 10 NRCS engineers attended the recent ICODS seminar on Seepage, Piping, and Remedial Measures in Virginia. NRCS conducts several formal, 1-week training courses yearly in construction of earthfill and concrete structures applicable to dams.

C. Dam Inventories

NRCS has populated and maintained a dams inventory database tracking over 120 fields of data for more than 20 years. In 1993, NRCS restructured its database to comply with the NID data dictionary and utilized the NID contractor to download the files from mainframe to DOS ASCII format. Data was transferred directly to NRCS State Offices so that they could update the data in close cooperation with appropriate State dam safety agencies. NRCS Headquarters has collected updated data from the NRCS State Offices and transmitted its data to the NID contractor for both the 1994 and 1995 NID Updates. Some NRCS States have done exceptional work to rectify their data with State agencies and to verify current hazard conditions; others have not updated their databases with required information or are awaiting State assignment of dam identification numbers. Transmittal Reports received from the NID contractor show that records for almost 23,000 NRCS-assisted dams are complete and will be included on the 1995 NID Update CD ROM. NRCS dam inventory files are available on the Internet, and query capabilities through the World Wide Web may be available in the next year or two.

D. Independent Reviews

From October 1993 through September 1995, NRCS States offices reported roughly 100 internal and external independent reviews of dam designs. The reviews outside of NRCS were typically performed principally by State agencies, and occasionally by private consultants. NRCS designs were also reviewed by Bureau of Reclamation for three dam rehabilitations in New Jersey and an RCC dam in Georgia, and U.S. Army Corps of Engineers for a dam in Oregon. Major dam designs by consultants for NRCS have received independent reviews within NRCS.

As noted in II C above, NRCS has developed policy to assure independent reviews of all high-hazard dam design. Previously, dam designs prepared at the NTC's were seldom peer reviewed by other offices.

E. Inspection Programs

NRCS direct technical assistance to owners of completed dams is probably less now than at any time since the 1980 report, and NRCS no longer routinely provides assistance for periodic inspections in all States. NRCS policy is to encourage States agencies to inspect the majority of existing NRCS-assisted dams.

NRCS States offices reported varying situations in different States. For example, NRCS in Maine conducted formal inspection of all project dams during the reporting period. NRCS in Alabama assisted local sponsors on O&M inspections for all project dams, and NRCS engineers assisted on 51 formal dams inspections. NRCS in Arkansas assisted on O&M inspections of all 193 Guideline-size dams. In general, NRCS non-engineers are frequently assisting owners with O&M inspections on project dams, although few NRCS engineers are assisting owners with formal inspections.

F. Dam Safety Rehabilitation Programs

NRCS does not own dams and does not have an ongoing program to cost share the expense of rehabilitation with dam owners. However, rehabilitation work has been done on NRCS-assisted dams by a variety of methods. If a problem is caused by a mistake or misjudgment on the part of NRCS and the dam is a project dam, then the cost of the repair/rehabilitation can be shared at the same rate as the original construction. When an emergency situation occurs because of a natural disaster, NRCS can use Emergency Watershed Protection program funds to restore existing dams. On all existing NRCS-assisted dams, NRCS can provide technical assistance for rehabilitation as resources permit.

Rehabilitation type work completed in the past 2 years and future scheduled work are shown in Tables A and B.

G. Management Effectiveness Reviews

There have been no agency-wide management effectiveness reviews or General Accounting Office (GAO) reviews dealing with dam safety.

H. Dam Failures and Remedial Actions

Specific site data on the failures and incidents are shown in Table C. It is unlikely that NRCS reported any of these incidents to the National Performance of Dams Program (NPDP) located at Stanford University. They may have been reported by others.

NRCS has investigated and reported incidents on NRCS-assisted project and non-project dams for many years. During the past 2 years, NRCS has organized and transferred hundreds of reports concerning dam performance during storms and dam problems needing repairs to the NPDP. NRCS is also developing a Memorandum of Agreement (MOA) with NPDP to archive

these past reports. NRCS also intends to distribute several dozen recent reports over the World Wide Web in the coming year.

I. Emergency Action Planning

Since 1982, NRCS has required that an EAP be prepared before construction of each new Class C (high-hazard) dam. For dams built before 1982, NRCS has no authority to require the development of an EAP. NRCS, in some States, has been providing data for EAP development on these pre-1982 dams. In other States, nothing has been done due to other priorities. According to data in the NRCS Dams Inventory, 1,443 of the 1,576 Class C (high-hazard) dams were built in 1982 or earlier.

NRCS State offices reported varying situations in different States. For example, in Alabama, which does not have a State dam safety program, NRCS reports that no NRCS-assisted dams currently have EAP's, although NRCS has surveyed and initiated breech analysis work on 6 of 17 identified high hazard sites. NRCS in Florida and Georgia also reports that no NRCS-assisted dams currently have EAP's. NRCS in Arkansas reports that sponsors have developed 3 EAP's and are planning to develop 6 EAP's in 1996, but also have a backlog of 31 additional sites needing EAP's. NRCS in Mississippi, Massachusetts, and Kentucky similarly report progress toward reducing the number of dams without EAP's, while NRCS in Minnesota and Missouri report that all NRCS-assisted, high-hazard dams currently have EAP's in place. In general, NRCS is working with dam owners to provide inundation maps for EAP's, but does not have the resources to complete all of the needed work in the near future.

J. Applications of ICODS Technical Guidance

The EAP Guidelines for Dams have been incorporated into the NRCS O&M Manual as guidance for engineering staffs in the field. Because many of the suggestions in the Guidelines contain actions that must be accomplished by local officials, NRCS cannot mandate these requirements, as noted above.

Copies of the Federal Guidelines for Earthquake Analysis and Design of Dams have been distributed to NRCS State office staffs for reference and information. NRCS policy is within the Guidelines, and will be updated when the current draft Guidelines are finalized.

Copies of the Federal Guidelines for Selecting and Accommodating Inflow Design Floods for Dams have been distributed to NRCS State office staffs for reference and information. The Guidelines have been used in several individual case studies. NRCS policy is within the Guidelines, and is being updated to further support Inflow Design Flow concepts for rehabilitation designs.

K. State Dam Safety Agency Involvement

NRCS has a policy of encouraging strong State programs for dam safety. Due to concern that some states still do not have effective programs, NRCS requires each State Conservationist to periodically assess the adequacy of the State's program in determining whether or not to continue assistance for building new dams in that State. Information from State offices

indicates that there is no dam safety program or legislation in Alabama. NRCS Headquarters and ASDSO have developed a draft Memorandum of Understanding (MOU) to regularly exchange information on dam safety activities, provide data to the NPDP, maintain data in the National Inventory of Dams, share research or technology, and encourage NRCS States offices to develop individual agreements with their respective State agencies. The majority of NRCS States work closely with their state agencies. For example, NRCS in Connecticut recently entered into an agreement with its State dam safety unit to develop four EAP's. NRCS in Mississippi has developed an MOU with its State agency, and the South Carolina NRCS State Engineer serves on the technical advisory committee for the State agency.

L. Research and Development and Special Initiatives

NRCS continues to concentrate most of its dam safety development efforts into earth spillway performance prediction. NRCS and the Agricultural Research Service (ARS) have monitored spillway performance since 1983 and built a database of performance with regard to soil and rock conditions and spillway flow parameters. ARS also conducted research related to vegetated earth spillway failure processes and gully formation. For the past 2 years, ARS and NRCS have coordinated their efforts into developing new technology for spillway design. A three-phase system was developed that models the development and progression of gully erosion in spillway flow conditions. This new technology has been inserted into the NRCS SITES (formerly DAMS2) computer program, which utilizes an incremental time process to compute maximum flood pool stage and maximum gully formation during passage of dam design storms. The program will be available in February 1996.

NRCS has also worked on revising guidelines for sand and gravel filter gradation design for dams based on work in its soil mechanics laboratories. The new guidelines are similar to current industry practice, but add important new requirements for gradation uniformity and broadness. The new guidelines were published as Chapter 26 of Part 633 of NRCS National Engineering Handbook last year.

NRCS in Georgia is involved with a special initiative to rehabilitate many NRCS-assisted dams in Georgia. A partnership has been established between the Georgia Soil and Water Conservation Commission, Georgia Safe Dams Program, and NRCS to address concerns relating to NRCS-assisted project dams that do not have adequate hydraulic capacity to meet the Safe Dams criteria. The partnership has initially identified six dams to evaluate for upgrading and rehabilitation. The State of Georgia has authorized $2.5 million dollars for this rehabilitation work in the coming year. NRCS will provide the technical assistance to design the rehabilitation work.

M. Public Concerns

No NRCS State offices reported any particular public concerns about dam safety. The nature of NRCS programs to work with private landowners and sponsors assures adequate procedures for early assimilation of public views into dam planning, construction, and operation.

IV. Impact on Agency Operations

A. Budget Impact

Compliance with the Guidelines has had negligible impact on the agency budget. NRCS builds less dams every year, and the Guidelines will have less impact in the future.

B. Impact on Contracting Procedures

Compliance with the Guidelines has had negligible impact on agency contracting procedures.

C. Budget Allocation for Training/Education

NRCS does not commit specific training resources to specific activities. Many NRCS engineers take part in ASDSO and ICODS training activities and will continue to do so.

TABLE A
REPAIRS AND REHABILITATION COMPLETED -- FY 1994 AND 1995

CO00167 Rist-Benson Dam
Approximately 60% of embankment removed and replaced to correct seepage.

CT00485 Blackberry River Site #6
Berm installed on downstream slope, toe drains extended, plunge pool modified.

CT00486 Blackberry River Site #9
Principal spillway joints caulked, auxiliary spillway slope drainage installed.

CT00483 Blackberry River Site #15
Accumulated sediment removed from flood pool (25000 CY), new reservoir drain inlet structure installed, beaver fence installed, new O&M access installed.

CT00202 Spaulding Pond Dam #1
Auxiliary spillway regraded and precast block lining installed.

CT00315 Blast and Cast Club Pond
Entire principal spillway system replaced, foundation drainage improved.

GA00201 Tobesofkee Creek Watershed Dam #1
Redesign and replacement of gate seals and modification of hydraulic appurtenances that control automatic gate operation.

ID00337 Brundage Dam
System of 13 vibrating wire strain gages and automatic recorder installed to monitor hydrostatic embankment pressures.

IL00967 Mill Creek Site #8
Upstream dam face and berm regraded and rock riprap added for wave protection.

IL00743 Big Blue Creek Site #8
Outlet section of principal spillway pipe reset and pipe outlet pool lined with rock riprap.

IL00693 Shoal Creek Site #8
Eroded outlet channel sideslopes reshaped and armored with gabion mattresses and baskets.

IL00478 Hadley Creek Structure #2
Principal spillway riser cleared of debris from beavers and inverted siphon structure installed to prevent reoccurrence.

KY00023 Mud River Multiple Purpose Site #2A
Treated for under seepage by gravity grouting.

KY00251 East Fork Pond River Flood Retarding Structure #7B
Treated for under seepage by gravity grouting.

KY00357 East Fork Pond River Flood Retarding Structure #9B
Treated for under seepage by gravity grouting.

MN00151 Canby Creek R-1 Site
Clay blanket placed along upstream toe and deep slurry trench installed to reduce underseepage and relieve downstream piezometric pressures.

MS01038 Abiaca Creek Watershed #1
Riprap lining added to pipe outlet pool, toe drain components replaced, diversions for erosion control constructed, disturbed areas revegetated.

MS01042 Abiaca Creek Watershed #5
Riprap lining added to pipe outlet pool, riprap wave protection added to upstream dam face, principal spillway trash rack and slide gate replaced, disturbed areas revegetated.

MS01043 Abiaca Creek Watershed #6
Riprap lining added to pipe outlet pool, riprap wave protection added to upstream dam face, diversions for erosion control constructed, disturbed areas revegetated.

MS01044 Abiaca Creek Watershed #7
Riprap lining added to pipe outlet pool.

MS00084 Black Creek Site #11
Wave berm on upstream dam face and earth spillway inlet reconstructed, principal spillway slide gate replaced, disturbed areas revegetated

MS00108 Tackett Creek #9
Eroded and disturbed areas revegetated, principal spillway slide gate replaced.

NJ00530 Upper Blue Mountain Lake
Embankment and outlet works removed.

NJ00531 Lower Blue Mountain Lake
Embankment raised 1.5 feet, drainage system installed to intercept seepage, structural sill installed in rock auxiliary spillway.

NJ00283 Long Pine Pond
Existing earth embankment removed and replaced with new conduit, intake structure, outlet structure, and compacted earth fill.

NJ00137 Furnace Brook Dam
Measures installed to control erosion along downstream toe of dam.

NJ00390 Stoney Brook #4
Trash rack added to intake structure.

NM00447 Upper Gila Site #3
Filled sediment pool excavated and soil cement grade stabilization installed at upstream end of pool.

NM00501 Cottonwood-Walnut Site #6
Serious rilling of earth spillway sideslope from overland flow on dispersive soils repaired with diversion dikes and grouted riprap chute outlet.

ND00081 Middle Branch Park River Site #10
Tilting riser (intake tower) repaired.

OK00536 Fort Cobb Site #12
Foundation leakage due to gypsum sink holes and solution cavities repaired with consolidated low strength material cutoff trench.

OR00443 Plat I Dam
Pond drain gate repaired.

TN????? Mary's Creek #8
Animal burrows completely through the dam were excavated and earth fill replaced.

TN04710 Johnson Creek #5
Deteriorated concrete spillway conduit replaced.

UT00365 Long Park Dam
Automated piezometer system installed.

UT00276 Silver Lake Flat Dam
Sink holes in reservoir earth blanket repaired by excavating, installing geotextile, and replacing earthfill.

WY00120 H-1 Detention Dam
Graded gravel filter installed to repair embankment cracks caused by differential settlement.

WY????? A-3 Detention Dam
Graded gravel filter installed to repair embankment cracks caused by differential settlement.

WY00459 Big Horn Reservoir
Perforated pipe and grader filter drain installed along downstream toe of dam to intercept seepage.

TABLE B
REPAIRS AND REHABILITATIONS SCHEDULED

AZ00083 Magma Flood Water Retarding Structure
Installation of central transition zone along centerline of embankment to interrupt existing transverse embankment cracks and lessen piping concerns planned.

AZ00027 Florence Flood Water Retarding Structure
Installation of central transition zone along centerline of embankment to interrupt existing transverse embankment cracks and lessen piping concerns planned.

AZ00108 White Tanks Flood Water Retarding Structure #3
Alternatives to increase spillway capacity to current standards being studied.

AZ00177 Short Creek #1
Dam will be lengthened to increase reservoir area and correct existing downstream erosion problems.

GA00660 Etowah River #12
Addition of concrete chute spillway structure with labyrinth inlet weir being designed.

GA00077 Raccoon Creek #7
Addition of concrete chute spillway structure with labyrinth inlet weir being designed.

GA01646 Palmetto Creek #1
Addition of concrete chute spillway structure with labyrinth inlet weir planned.

GA00643 Hightower Creek #25
Addition of concrete chute spillway structure with labyrinth inlet weir planned.

GA00508 North Broad River #38
Addition of concrete chute spillway structure with labyrinth inlet weir planned.

GA01613 Potato Creek #6
Addition of concrete chute spillway structure with labyrinth inlet weir planned.

IL ????? Upper Salt Lake Creek Structure #2
Severe erosion near inlet to earth spillway will be regraded and rock riprap protection will be added.

KY00253 East Fork Pond River Flood Water Retarding Structure #8
Foundation will be grouted.

MA00318 Washington Mountain Brook, Meadow Site
Modifications to intake structure to eliminate permanent pool and completion of foundation treatments to correct seepage problems planned. Construction plans prepared.

MA01052 Clam River, Lake Site
External post-tensioning and grouting to repair cracked intake tower structure, and modifications to pond drain inlet, erosion repairs in earth auxiliary spillway planned. Construction plans prepared.

MI00067 Misteguay Creek #4
Inadequate spillway capacity cannot physically be increased to Guideline standards, removal recommended to owners.

MS00425 Second Creek #6A
Inadequate spillway capacity due to increased hazard classification. Alternatives being studied.

MS00429 Second Creek #7
Inadequate spillway capacity due to increased hazard classification. Alternatives being studied.

NM00502 Cottonwood-Walnut Site #6
Cracked embankment being monitored with inclinometers and settlement probes.

NM00501 Cottonwood-Walnut Site #8
Cracked embankment and reservoir sinkholes being investigated.

NM00237 Santa Cruz Site #3
Repairs for embankment cracking and conduit openings being designed.

NM00238 Santa Cruz Site #3A
Deteriorating auxiliary spillway concrete due to reactive aggregate being investigated.

NM00207 Prop Canyon Site #1
Embankment and foundation cracking being investigated.

NM00253 Upper Gila Site #6
Structure filling with sediment, will probably be decommissioned.

OK11032 Okfuskee Tribs Site S-1
Deteriorated concrete in riser (intake tower) will be repaired by shotcreting the lower portions and seal coating the upper portions.

PA01226 Brandywine Site PA-432
Tilting riser (intake tower) will be replaced.

VA11301 White Oak Run Dam
Eroded auxiliary spillway will be repaired with RCC liner.

TABLE C
DAM FAILURES AND INCIDENTS -- FY 1994 AND 1995

GA00201 Tobesofkee Creek #1
Flood discharge from Tropical Storm Alberto transported debris that damaged radial gates and hydraulic control valves.

GA83660 Tobesofkee Creek #41
Flood discharge from Tropical Storm Alberto eroded areas below the outlet sections of each earth auxiliary spillway.

VA11308 Beautiful Run Site #11
June 1995 storm caused flows up to 4 feet deep in earth auxiliary spillway. Large area of spillway eroded several feet deep.

VA01508 South River Site #23
June 1995 storm caused flows in earth auxiliary spillway and eroded area near outlet.

VA11301 White Oak Run Dam
June 1995 storm caused flows up to 12 feet deep in earth auxiliary spillway. Most of spillway eroded down to bedrock. Gullies up to 30 feet deep headcut to edge of pool and almost breached the dam.

RURAL HOUSING SERVICE

I. Introduction

In October 1994, the U.S. Department of Agriculture (USDA) was reorganized and the Rural Housing and Community Development Service (RHCDS) was created. RHCDS contains some of the Community programs of the Rural Development Administration (RDA). RDA was abolished by the reorganization. In November 1995, the agency's name was changed to Rural Housing Service (RHS).

The purpose of the RHS Community programs is to provide financial assistance to eligible public entities, local organizations, and non-profit corporations to develop community facilities that provide essential services in rural areas and towns, and authorized watershed area improvements. On occasion, these facilities or improvements involve the construction or repair of a dam. The Natural Resources Conservation Service (NRCS) is usually the lead agency on projects which include dams. RHS program regulations require the State Office Engineer to review the applicant's development plans. This review is conducted from the perspective of a lending institution. The agency relies on NRCS or private engineering consultants retained by the borrower to review the safety of dams.

On RHS Community program projects, any dam which is not designed by NRCS must be designed by a professional engineer registered in the state where the dam is located. This professional engineer is responsible for ensuring that the dam is properly designed and will apply a professional engineering seal to the plans, drawings, and other design documents. This professional engineer is also responsible for ensuring that the dam is constructed in accordance with the design. The borrower (owner of the dam) is responsible for proper operation and maintenance.

II. Program Actions Since Last Progress Report

A. Implementation

The RHS Community programs have implemented the Federal Guidelines for Dam Safety by direct reference in its program regulations.

B. Actions Taken

The RHS Community program regulations are in the process of revision. One of the proposed revisions encourages owners to conform with the technical guidance developed by the Interagency Committee on Dam Safety (ICODS).

C. Changes in Administration

The reorganization of USDA involved the reassignment of financial assistance programs to RHS; however, this did not cause any notable changes in the administration of dam safety related to these programs.

III. Implementation Progress

A. Organization, Administration, and Staffing

Rural Economic and Community Development field offices direct and support the RHS Community programs. These offices currently operate at the State and District level. RHS's dam safety organization and staff are adequate to comply with the Federal Guidelines for Dam Safety.

B. Dam Safety Training Activities

RHS technical managers discuss dam safety issues and remind the State Office Engineers of their responsibilities during annual technical training sessions.

C. Dam Inventories

NRCS includes the RHS Community program dams in its inventory. These dams are currently listed as Farmers Home Administration (FmHA) dams and are included on the list with other dams financed through other FmHA programs (note: FmHA was recently abolished during the USDA reorganization in October 1994). During Fiscal Year (FY) 1996, RHS plans to survey its field offices to update this inventory of dams.

D. Independent Reviews

When requested, NRCS provides technical and administrative review assistance related to the safety aspects of design, construction, operation, and maintenance.

E. Inspection Programs

RHS does not own, operate, or regulate any of the dams it finances. The owners of these dams are responsible for the proper operation, maintenance, and inspection of these facilities. RHS has not maintained any information on the inspection programs conducted by owners; however, it will request and compile this information from the owners of Community program facilities during a survey it will conduct in FY 1996.

F. Dam Safety Rehabilitation Programs

No RHS Community program dams were rehabilitated for safety reasons during the reporting period.

G. Management Effectiveness Reviews

Neither the General Accounting Office nor RHS conducted any dam safety reviews during the reporting period.

H. Dam Failures and Remedial Actions

No dam failures occurred during the reporting period.

I. Emergency Action Planning

RHS does not own, operate, or regulate any of the dams it finances. The owners of these dams are responsible for the proper operation, maintenance, and inspection of these facilities. RHS has not maintained any information on the emergency action plans established by these owners; however, it will request and compile this information from the owners of Community program facilities during the survey it will conduct in FY 1996.

J. Application of ICODS Technical Guidance

The RHS Community program regulations are in the process of revision and will encourage owners to conform with the technical guidance developed by ICODS.

K. State Dam Safety Involvement

No information is available on cooperative relationships established with state agencies.

L. Research and Development and Special Initiatives

No special initiatives were undertaken during the reporting period.

M. Public Concerns

RHS complies with the National Environmental Policy Act and its requirements for involving the public. The public is given the opportunity to participate in RHS's decision-making process by reviewing and commenting on the environmental considerations of each action.

IV. Impact on Agency Operations

A. Budget Impact

Compliance with the Guidelines will have negligible impact on the agency budget.

B. Impact on Contracting Procedures

Compliance with the Guidelines will have negligible impact on agency contracting procedures for the design, construction, and rehabilitation of new dams.

C. Budget Allocation for Training/Education

The agency has not committed any resources for training or education activities related to the Guidelines.

RURAL UTILITIES SERVICE

I. Introduction

The Rural Utilities Service (RUS) is the successor agency to the Rural Electrification Administration and includes certain programs that were formerly a part of the Farmers Home Administration and the Rural Development Administration. RUS has three major divisions - the Electric Program, the Telecommunications Program, and the Water and Waste Program. The Electric Program and the Water and Waste Program provide financial assistance for projects which may include dams. The Telecommunications Program does not finance dams.

The RUS Electric Program is authorized to make loans and loan guarantees for rural electrification purposes to private companies, States, Territories, and subdivisions and agencies thereof, municipalities, peoples' utility districts, and cooperative, nonprofit, or limited-dividend associations for the purpose of financing the construction and operation of generating plants and electric transmission and distribution lines or systems. RUS-financed electric systems sometimes include dams for generation facilities. Most hydroelectric facilities have dams. Many thermal power plants also use dams in connection with cooling water reservoirs, waste treatment facilities, and water storage. RUS reviews borrowers' plans and specifications for dams but only to confirm the security of the loan or loan guarantee.

The purpose of the RUS Water and Waste Program is to provide financial assistance to public entities, nonprofit corporations, and Indian tribes to develop water and waste disposal systems. On occasion, these systems involve the construction or repair of a dam. The Natural Resources Conservation Service (NRCS) is usually the lead agency on projects which include dams. RUS program regulations require the agency's State Engineer to review the applicant's development plans. This review is conducted from the perspective of a lending institution. The agency relies on NRCS or private engineering consultants retained by the borrower to review the safety of dams.

On RUS Water and Waste projects, any dam which is not designed by NRCS must be designed by a professional engineer registered in the State where the dam is located. This professional engineer is responsible for ensuring that dam is properly designed and will apply a professional engineering seal to the plans, drawings, and other design documents. This professional engineer is also responsible for ensuring that the dam is constructed in accordance with the design. The borrower (owner of the dam) is responsible for proper operation and maintenance.

RUS is not responsible for and has no experience in the design, construction, operation, or regulation of dams.

II. Program Actions Since Last Progress Report

A. Implementation

RUS requires electric borrowers to have a qualified professional engineer, registered in the State where the project is being built, to design the facilities, including any dams. This

engineer is generally responsible for both the design and construction of the project and must apply his professional seal to all design documents. The private electric utility which borrows funds from RUS is responsible for the operation and maintenance, including all dam safety inspection.

Although RUS has no direct responsibility for dam safety, RUS concern with the adequate design and construction of dams for the protection of life and property prompted the adoption of the recommendations contained in the Woodward-Clyde Consultants Report. This report recommended that RUS require an independent review of design and construction for significant hazard potential or high hazard potential dams. A supplement to RUS Bulletin 41-1, dated November 3, 1978, requires RUS electric borrowers to retain the services of a qualified engineer who was not involved in the original design to perform the review. RUS does not maintain an engineering staff with experience in dam design or operation and maintenance. The professional engineer hired by the owner for each project is required to oversee construction.

The RUS Water and Waste Program has implemented the Federal Guidelines for Dam Safety by direct reference in its program regulations.

B. Actions Taken

RUS is in the process of updating its engineering requirements, including those relating to dam safety. RUS will review its dam safety requirements and revise them, as appropriate, to insure continued dam safety.

RUS has made a survey of RUS-financed electric generation projects to determine the dam safety situation at RUS-financed dams. Dam safety surveys were sent to approximately 60 RUS borrowers, and about 50 replies were received. None of the non-respondents are thought to have dams. This survey was completed in 1991. RUS has identified 14 dams that have been financed by RUS and are not under the jurisdiction of another Federal Agency. In October 1995, a follow-up letter was sent to the owners of the 14 dams, and the responses received are reflected in this report.

C. Changes in Administration

The reorganization of the United States Department of Agriculture (USDA) involved the reassignment of Water and Waste financial assistance programs to RUS; however, this did not cause any notable changes in the administration of dam safety related to these programs.

III. Implementation Progress

A. Organization, Administration, and Staffing

The RUS Power Supply Division is responsible for all RUS line activities related to power generation facilities, including dams. The Electric Staff Division supports these activities as required, including preparation of technical regulations as necessary.

Rural Economic and Community Development field offices direct and support the RUS Water and Waste programs. These offices currently operate at the State and district level.

RUS' dam safety organization and staff are adequate to comply with the Federal Guidelines for Dam Safety.

B. Dam Safety Training Activities

RUS technical managers routinely discuss dam safety issues and remind the agency's State Engineers of their responsibilities during annual technical training sessions.

C. Dam Inventories

Many of the dams financed by RUS are under the jurisdiction of the Federal Energy Regulatory Commission or Nuclear Regulatory Commission dam safety program, or included in the inventory of NRCS. To avoid double counting these dams, these dams have not been included in the data provided. The 14 remaining dams are under the jurisdiction of the State in which they are located. A list of these dams is attached. One dam included in previous inventories is no longer capable of impounding water and is no longer classified as a dam.

NRCS includes the RUS Water and Waste Program dams in its inventory. These dams are currently listed as Farmers Home Administration (FmHA) dams and are included on the list with other dams financed through other FmHA programs (note: FmHA was recently abolished during the USDA reorganization in October 1994). During Fiscal Year 1996, RUS plans to survey its field offices to update this inventory of dams.

D. Independent Reviews

When requested, NRCS provides technical and administrative review assistance related to the safety aspects of design, construction, operation, and maintenance.

E. Inspection Programs

RUS does not own, operate, or regulate any of the dams it finances. The owners of these dams are responsible for the proper operation, maintenance, and inspection of these facilities. Some information regarding dam inspections is included on the attached list of dams.

F. Dam Safety Rehabilitation Programs

No RUS-financed dams were rehabilitated for safety reasons during the reporting period. One dam had some minor safety modifications made during the reporting period.

G. Management Effectiveness Reviews

Neither the General Accounting Office nor RUS conducted any dam safety reviews during the reporting period.

H. Dam Failures and Remedial Actions

No dam failures were reported during the reporting period.

I. Emergency Action Planning

RUS does not own, operate, or regulate any of the dams it finances. The owners of these dams are responsible for the proper operation, maintenance, and inspection of these facilities. Some information regarding emergency action plans established by these owners is included on the attached list of dams.

J. Application of ICODS Technical Guidance

RUS is in the process of updating its engineering requirements, including those relating to dam safety. RUS will review its dam safety requirements and revise them as appropriate to insure continued dam safety.

K. State Dam Safety Involvement

No information is available on cooperative relationships established with State agencies.

L. Research and Development and Special Initiatives

No special initiatives were undertaken during the reporting period.

M. Public Concerns

RUS complies with the National Environmental Policy Act and its requirements for involving the public. The public is given the opportunity to participate in RUS' decision-making process by reviewing and commenting on the environmental considerations of each action. RUS also invites public involvement through the rule-making procedures used in conjunction with promulgating its regulations.

IV. Impact on Agency Operations

A. Budget Impact

Compliance with the Guidelines will have negligible impact on the Agency budget.

B. Impact on Contracting Procedures

Compliance with the Guidelines will have negligible impact on Agency contracting procedures for the design, construction, and rehabilitation of new dams.

C. Budget Allocation for Training/Education

The Agency has not committed any resources for training or education activities related to the Guidelines.

RURAL UTILITIES SERVICE
ELECTRIC PROGRAM
DAM SAFETY SURVEY
FY 94 & FY 95

Borrower	Plant/Dam/Reservoir	Purpose Of Dam	Jurisdiction	Hazard Class	Inspected FY 94-95	EAP	Safety Mods.	Remarks
AR 34	Flint Creek	Cooling	State-AR					Operated by SW Elec Power
IL 50	Marion/Lake of Egypt	Cooling	State-IL	High	Yes	Yes	No	State hazard class #1
IN 106	Mermon/Turtle Creek	Cooling	State-IN	High	Yes	No	No	Not ranked as to hazard class
KY 59	Spurlock/Dam A	Silt Basin	State-KY	Low	No	No	No	
KY 62	Green/Bottom Ash Pond	Ash Pond	State-KY	Low	No	No	No	
KY 62	Coleman/N Ash Pond	Ash Pond	State-KY		Yes	No	No	Hazard class "Moderate"
MO 73	Thomas Hill	Cooling	State-MO	High	No	Yes	No	
ND 20	Center/Nelson Lake	Cooling	State-ND		Yes	Yes	Yes	Hazard class "V" (five)
ND 45	Laramie River/Grayrocks	Water Supply	State-WY	High	Yes	Yes	No	CO 47 also Part owner
UT 21	Bonanza/N Evap Pond	Evaporation	State-UT	Low	Yes	Yes	No	
UT 21	Bonanza/Raw Water	Storage	State-UT	Low	Yes	No	No	
UT 21	Bonanza/Recycle Pond	Storage	State-UT	Low	Yes	No	No	Drained - Not in Service
UT 21	Bonanza/Runoff Pond #1	Silt Basin	State-UT	Low	Yes	No	No	
UT 21	Bonanza/S Evap Pond	Evaporation	State-UT	Low	Yes	No	No	

DEPARTMENT OF DEFENSE

DEPARTMENT OF THE ARMY
U.S. Army Corps of Engineers
WASHINGTON, D.C. 20314-1000

REPLY TO
ATTENTION OF:

26 DEC 1995

Engineering Division

Mr. William S. Bivins
Chairman, Interagency Committee
on Dam Safety
Program Development Branch
ENH Division
Federal Emergency Management Agency
500 C Street, S.W.
Washington, DC 20742

Dear Mr. Bivins:

In response to your letter of September 15, 1995, I am submitting the progress report for the Department of Defense on implementing the "Federal Guidelines for Dam Safety." The report covers the period for fiscal years 1994 and 1995 and includes input from all the Services (Army, Navy and Air Force) in addition to the Corps of Engineers. Included are also diskettes that contain copy of the report in WordPerfect format.

The POC for the action is Dr. Yung Kuo, CECW-EP-E, (202) 761-4533.

Sincerely,

Douglas J. Kamien, P.E.
Acting Chief, Engineering Division
Directorate of Civil Works

Enclosure

DEPARTMENT OF THE AIR FORCE

I. Introduction

All of the Air Force Major Air Commands (MAJCOM) were surveyed to identify and evaluate the condition of the dams and reservoirs which are under Air Force jurisdiction. There are 32 dams which meet the reporting criteria. All are in good to excellent condition and all are in the low hazard risk category. Ownership of 4 of the 32 dams in the report are transferred to other agencies.

II. Program Actions

All dams and reservoirs on Air Force installations are inspected and maintained to the same standards as other real property, facilities, and systems. All dams are in good condition and are in low risk category, requiring little to no maintenance. The Air Force current operation and maintenance (O&M) program is adequate to ensure safety because of the minor nature and condition of the dam inventory.

III. Implementation Progress

The Air Force dam safety staff and administration are adequate to manage this relatively small low hazard program. Air Force dams are designed primarily for flood control and pose insignificant risks downstream. The base engineering organizations are staffed to monitor and plan rehabilitation projects on an as required basis.

DEPARTMENT OF THE ARMY

I. Introduction

The U.S. Army Center for Public Works (USACPW) is the dam safety program manager and technical proponent for dams that are either (1) on Army installations; or (2) controlled by Army installations.

USACPW, formerly the Engineering and Housing Support Center (EHSC), is a field operating agency of the U.S. Army Corps of Engineers (Corps). The USACPW provides program guidance on inventory, inspection, maintenance, and repair of Army installation or installation-controlled dams. Technical support to Army installations is provided through Headquarters U.S. Army Corps of Engineers (HQUSACE) and the Corps Direct Support Divisions and Districts. Research assistance and inventory management are provided by the Corps Waterways Experiment Station (WES). The Army Chief of Staff for Installation Management (ACSIM) is responsible for policy on dam safety, maintenance, operation, and minor repair of Army installation and installation-controlled dams. The Major Army Commands (MACOMS) and installations have responsibility for meeting Federal laws and the Federal Guidelines. USACPW provides oversight to the MACOM's and installations to assure that MACOM's and installations are aware of their responsibilities.

II. Program Actions Since Last Progress Report

A. Implementation

The Federal Guidelines for Dam Safety have been implemented for U.S. Army installations. The Department of Army Inventory of Installation Dams was completed in 1990 and has been updated annually. Inspections of dams are in progress, with approximately 87 percent of the inventory inspected. Emergency Action Plans (EAP's) are being formulated for high or significant hazard dams, with approximately 36 percent completed. Additional high and significant hazard dams were added to the inventory during the reporting period. The remaining inspections and EAP's are to be completed as funds become available.

B. Actions Taken

The National Dam Safety Program FY 1992-1993 Report did not contain any recommendations for the U.S. Army. However, the USACPW has continued to update the dam inventory to track progress of the Army Dam Safety Program. Training was conducted in EAP's and in earthen dam inspections for installation personnel. Instructional guidelines on dam safety were sent to commanders of all installations with dams. Reports were initiated to determine repair, construction, and maintenance being done on dams. A draft Army Regulation has been completed that incorporates the Federal Guidelines on Dam Safety and is scheduled to be published in FY 1996.

C. Changes in Administration

Policy for dam safety on Army installations has changed in that the Army will not publish a separate technical manual on dam safety, as previously planned. Instead, the Army will

incorporate the FEMA documents on dam safety guidelines and EAP's into the Army program as published. This initiative will reduce paper work in the government and provide more standardization between Federal and state agencies in the dam safety program.

III. Implementation Progress

A. Organization, Administration, and Staffing

The USACPW organization has two personnel that perform the administrative work on the Dam Safety Program. Each MACOM and installation has a Dam Safety Officer. Information and guidance are routed through the MACOM's to the installations. The USACPW organization and staff for the Dam Safety Program is considered adequate for the Army.

B. Dam Safety Training Activities

USACPW sponsored four workshops on earthen dam inspection for installation personnel. The workshops provided training on responsibilities, inspection, and maintenance of earthen dams of the type found on Army installations. USACPW sponsored two workshops on EAP's. The workshops provided training on responsibilities, coordination, formulating, and testing an EAP. MACOM's and installations were also encouraged to attend Proponent Sponsored Engineer Corps Training (PROSPECT) courses. These courses offer the same level and proficiency of training as the Corps of Engineers Civil Works Districts and Division personnel receive. Training for staff personnel was conducted with FEMA and the Bureau of Reclamation on dam inspection and on how their programs were conducted to increase the knowledge of the staff.

C. Dam Inventories

The U.S. Army has an updated inventory of dams reflecting the status of the dam and defining associated risks. New dams are being entered into the agency inventory and into updates for the national inventory of dams. There was one dam deleted and six dams added to the inventory. There has been no change in reporting procedures and no changes in land use.

D. Independent Reviews

The Corps is the Design and Construction agent for the Army and, as such, provides engineering design, construction, and operation expertise to the MACOM's and installations through Military Construction Army (MCA) and other programs. When independent review of design, construction, and operation of dams is necessary, USACPW utilizes the Corps of Engineers for technical support. MACOM's and installations obtain support through Direct Support Districts and Divisions of the Corps. In addition, installations, MACOM's, and the Corps utilize external consultants on a project-specific, as needed basis.

E. Inspection Programs

There were 98 dams inspected out of 216 dams in the inventory. The majority of the dams were inspected by local Corps Districts. A few dams had maintenance inspections conducted by installation engineers or by USACPW personnel. The biggest problem with inspections is

obtaining the funding to do the inspections. Most inspection results showed that the dams do not meet current criteria and will need additional work to meet the current criteria. One dam was reclassified from significant hazard to low hazard based upon re-evaluation of flood flow.

F. Dam Safety Rehabilitation Programs

For FY 1995, the following dams were reported to have had rehabilitation work.

Cone Reservoir, Anniston Army Depot (AD), AL. Place rip-rap upstream and clean and cut downstream face.
Brown Lake Dam, McAlister AD, OK. General maintenance and rip-rap replacement.
Area 7, Section 4 Dam, Pine Bluff Arsenal, AR. Spillway erosion repaired.
Yellow Lake Dam, Pine Bluff Arsenal, AR. Concrete curb replaced across spillway.
Caney Creek Dam, Red River AD, TX. Routine maintenance and repair. Toe drain cleaned.
Elliot Creek Dam, Red River AD, TX. Routine maintenance and repair. Vegetation removed.
Stephens Lake Dam, Fort Gillem, GA. Repair washout at spillway. Grout outlet pipe.
Pond 4 Dam, Fort Stewart, GA. Repair flood damage.
Pond 2 Dam, Fort Stewart, GA. Replace concrete water control structure.
Pond 1 Dam, Fort Stewart, GA. Replace water control structure.
Semmes Lake Dam, Fort Jackson, SC. Repair erosion and sinkhole.
Upper Douglas Structure #1, Fort Knox, KY. Rip-rap shoreline, replace sluice gate and operator.
Mononame 835, Fort Leonard Wood, MO. Increase height, width, and length of dam. Construct concrete riser and conduit through dam.
Bullocks Pond Dam, Fort A.P. Hill, VA. Replace water control structure.
Lower Lake Royer Dam, Fort Ritchie, MD. New RCC spillway, increase height of dam.
Green Leaf Lake Dam, Camp Gruber, OK. Remove all trees and shrubs. Repair access road to dam. Install security gate.
Robinson Lake Dam #2, Camp Robinson, AR. Added 60' to the upstream outlet drain. Widen crest. General maintenance and repair.
Tactical Bridge Dam, Fort Pickett, VA. General maintenance and repair.
Upper Butterwood Lake, Fort Pickett, VA. General maintenance and repair. Repair overflow pipe and trashrack.
Engineer Dam, Fort Hunter Liggett, CA. Repair spillway.

For FY 1995, the following dams were reported to have rehabilitation work scheduled.

Lower Derby Dam, Rocky Mt. Arsenal, CO. Repair outlet structure.
Upper Derby Dam, Rocky Mt. Arsenal, CO. Rehab spillway.
Brown Lake Dam, McAlester Army Ammunition Plant, OK. Replace trap door, weld retaining straps.
Arsenal Power Dam, Rock Island Arsenal, IL. General repairs.
Marquette Lake Dam, Fort Indiantown Gap, PA. Repair sluice gate, dredge lake, general concrete and masonry repairs.
Pond 4 Dam, Fort Stewart, GA. Rehab concrete emergency spillway.

Twilight Pond, Fort Benning, GA. Repair spillway, install drain pipe.
Kings Pond, Fort Benning, GA. Replace spillway.
Hedley's Pond, Fort Benning, GA. Replace spillway, install drain pipe.
Kirk's Pond, Fort Benning, GA. Replace drain pipe.
Russ Pond, Fort Benning, GA. Replace drain pipe.
Averett's Pond, Fort Benning, GA. Repair spillway, install drain pipe.
Clear Creek, Fort Benning, GA. Install drain outlet.
Weem's Pond, Fort Benning, GA. Install culvert.
Semmes Lake Dam, Fort Jackson, SC. Repair erosion, replace outlet pipe, repair channel below emergency spillway, construct stabilization berm.
Upper Legion Lake Dam, Fort Jackson, SC. Install screens on outlet structure, repair erosion.
Lower Twin Lake Dam, Fort Jackson, SC. Repair erosion and emergency spillway channel.
Messers Pond Dam, Fort Jackson, SC. Replace weir structure.
Weston Lake Dam, Fort Jackson, SC. Repair seepage, raise dam height. Enlarge emergency spillway.
Lower Big Bethel Dam, Fort Monroe, VA. General repairs.
Upper Big Bethel Dam, Fort Monroe, VA. General repairs.
Lake George, Fort Sill, OK. General repairs.
Ketch Lake, Fort Sill, OK. General repairs.
Potawatomi Twins, Fort Sill, OK. General repairs.
Upper Canyon, Fort Sill, OK. General repairs.
Bowies Pond, Fort A.P. Hill, VA. Replace water control gate valve.
Lower Travis, Fort A.P. Hill, VA. Repair water control structure.
Herns Pond, Fort A.P. Hill, VA. Repair water control structure.
Upper Lake Royer Dam, Fort Ritchie, MD. Major rehab.
Green Leaf Lake, Camp Gruber, OK. Replace rip-rap.
Fort Pickett Reservoir Dam, Fort Pickett, VA. General repairs.
Ship Creek, Fort Richardson, AK. Dredge reservoir.

G. Management Effectiveness Reviews

No review of the dam safety program has been conducted.

H. Dam Failures and Remedial Actions

One dam failed during the reporting period: Lake Tholocco, Fort Rucker, AL. This dam was breached through a temporary repair made after a previous failure. The permanent repair was under design at the time of the failure. A new design is being made while funding approval is being pursued. The temporary repair was considered adequate for normal conditions, but not for the extreme flooding and overtopping that occurred. The Army is looking into the matter of funding dam repair. The incident was not reported to the National Performance of Dams Program.

I. Emergency Action Planning

The USACPW conducted workshops on Emergency Action Planning and sent copies of the FEMA manual on Emergency Action Plans to each installation owning dams. Coordination

with installations and MACOM's resulted in Corps Districts preparation of EAP's. Approximately 36 percent of the Army high and significant hazard dams now have EAP's. Eleven percent of the low hazard dams have EAP's. The USACPW emphasis is on installations with high or significant hazard dams that still do not have EAP's. Emphasis on completing EAP's is being placed through command letters and training. Local government involvement is being encouraged during the formulation of EAP's and during major construction or repair project review.

J. Application of ICODS Technical Guidance

The USACPW distributed the ICODS technical guidance to installations and at training workshops. Instructions to installations have been to follow these documents until official Army Regulations are published. The guidance in these documents has been incorporated into the Draft Army Regulation as the documentation to be used by the U.S.Army.

K. State Dam Safety Agency Involvement

The U.S. Army has encouraged installations to cooperate with state agencies in requests for review of designs and joint inspections.

L. Research and Development Special Initiatives

Currently, no research and development initiatives are being undertaken which are directly related to Army installation dams. However, potential requirements are reviewed annually. The USACPW took the special initiative to send a complete set of Training Aids For Dam Safety (TADS) to every installation that has a dam. One of the MACOM's conducts maintenance inspections for installations that request this assistance and USACPW will, if requested, conduct maintenance inspections for installations or MACOM's.

M. Public Concerns

Dams under Army control have been the subject of public concern in several areas. The Army, in conjunction with the Corps, has conducted public hearings to discuss these concerns. Public hearings are the procedure that the U.S. Army uses to inform the public, obtain feed back, and alleviate concerns.

IV. Impact on Agency Operations

A. Budget Impact

The impact of the Guidelines will be on the Army's budget. The Guidelines will generate approximately $11 million annually in requirements over a 6-year period. The funding will be competing with other critical requirements.

B. Impact on Contracting Procedures

There is no impact on agency contracting procedures.

C. Budget Allocation for Training/Education
Annually, $12,000 is budgeted for training.

DEPARTMENT / AGENCY	DAM INVENTORY				PERIODIC INSPECTIONS CONDUCTED				DAMS UNDER FURTHER INVESTIGATION AND STUDY		DAM SAFETY MODIFICATIONS		DAMS WITH EAP (BY HAZARD CLASSIFICATION)	
	TOTAL	HAZARD CLASSIFICATION			TOTAL	SINCE LAST REPORT			COMPLETED SINCE LAST REPORT	CURRENTLY IN PROGRESS	COMPLETED SINCE LAST REPORT	CURRENTLY IN PROGRESS		
		HIGH	SIG.	LOW		FORMAL	INTER-MEDIATE	DURING					HIGH	SIG.
ARMY	216	33	33	150	98	6	92	--	--	--	19	36	14	10

DEPARTMENT OF THE NAVY

I. Introduction

Naval Facilities Engineering Command (NAVFAC) is responsible for implementing the dam safety program for the Department of the Navy. There are 16 candidate dams under the Navy jurisdiction for safety inspection. These dams are all small and low hazard potential except for one, which is classified in the high hazard potential category. There is no change in responsibility from the previous report.

II. Program Action Since Last Progress Report

A. Implementation

All provisions of the guidelines are implemented by the Navy.

B. Actions Taken

There was no urgent event during this period which required action.

C. Changes in Administration

There was no change in administration which affected the dam safety program.

III. Implementation Progress

A. Organization, Administration, and Staffing

The candidate dams are monitored by civil and geotechnical engineers from the NAVFAC Engineering Field Division (EFDs) and Naval Facilities Engineering Service Center when a need arises. Staff is currently adequate.

B. Dam Safety Training Activities

There was no training during this period. A dam inspection training program was planned for Fiscal Year (FY) 1994 at the Fena Dam site where the dam is classified as a high hazard potential category. However, the on-site training program was canceled due to funding constraints.

C. Dam Inventories

The Navy has a current inventory of dams reflecting the status of the dam and defining the associated risk. No new dams were entered into the inventory during this period.

D. Independent Reviews

Independent review is generally conducted internally, as need arises. No external consultant service was required during this reporting period.

E. Inspection Programs

No inspections were conducted during this period.

E. Dam Safety Rehabilitation Programs
No dam failure has occurred during the reporting period.

G. Management Effectiveness Reviews
Emergency Action Plans are not established in view of the low hazard potential and the relatively good condition of the existing dams. The Navy has made no change in its operation and maintenance program.

H. Dam Failures and Remedial Actions
None during this period.

I. Emergency Action Planning
None during this period.

J. Application of ICODS Technical Guidance
The Navy has adopted technical guidance developed by ICODS. It was adopted into the Navy's dam operation and maintenance requirements. No dam was built by the Navy during this reporting period.

K. State Dam Safety Agency Involvement
None.

L. Research and Development and Special Initiatives
Naval Facilities Engineering Service Center has conducted a research and development program on evaluation of seepage flow through drydock and waterfront structures. The results of the research program may be applied to the dam stability analysis in the future.

M. Public Concerns
All the dams under the Navy's jurisdiction are within the Navy's base. In general, there is little public concern regarding the risk of environmental hazard because the dams are small and low hazard potential.

IV. Impact on Agency Operations

A. Budget Impact
None.

B. Impact on Contracting Procedures
None.

C. Budget Allocation for Training/Education
Training for dam safety implementations is conducted within the current training budget.

LIST OF CANDIDATE DAMS FOR SAFETY INSPECTION
Dept. of the Navy (NAVFAC)

1995 Progress Report

STATION/ DAM IDENTIFICATION (CLAIMANT)		HEIGHT (ft)	STORAGE (acres-ft)	REMARKS	INSPECTION
NAS Meridian	Lake Helen Dam	25	160	Possible seepage	Completed Phase I (See Note 2) investigation in Sept. 1979 by NAVFAC inspection team
NAS Meridian (CNET)	Lake Lucille Dam	25	216	Possible seepage	Same as above
NAS Miramar (CINPACFLT)	Finger Canyon Dam	20	22	Spillway capacity inadequate, Minor seepage at toe	
NAS Miramar (CINPACFLT)	Station Fish Pond Dam	25	17	Spillway capacity inadequate	
SUBBASE Bangor (CINPACFLT)	Sewage Lagoon Dam	22	99	Temporary structure	
SUBBASE Bangor (CINPACFLT)	Cattail Lake Dam	11	60	None	
SUBBASE Bangor (CINPACFLT)	Devil's Mole Dam	12	90	None	
Guam, Mariana (Isl./PACDIV)	Fena Dam	85	3,000	A post-earthquake safety inspection was made on August 11-12, 1993 (See Note 3)	Completed Phase I investigation in 1979 by an A/E firm, Wahler Associates
NWSC Crane (NAVSEA)	Lake Greenwood	55	Unknown	Seepage problem reported in 1982	
Mare Island (NAVSEA)	Dredge Spoil Ponds Dam	10	108-735	Periodic seepage and small slide	
Mare Island (NAVSEA)	Salt Water Reservoir Dam	30	6	None	
MCDEC Quantico (CMC)	Breckenridge Dam	58	Unknown	Frequent overtoping Contract for repair pending fund availability	Completed Phase I investigation in 1981. Repair concept study completed in 1986.

Enclosure (2)

STATION/ DAM IDENTIFICATION (CLAIMANT)		HEIGHT (ft)	STORAGE (acres-ft)	REMARKS	INSPECTION
MOB Camp Pendleton (CMC)	Case Springs Dam	Unknown	67	None	
MCB Camp Pendleton (CMC)	Pilgrim Creek Dam	12	50	None	
MCB Camp Pendleton (CMC)	Lake O'Neil Dam	8	1320	None	
MCB Camp Pendleton (CMC)	Pulgas Dam	40	125	None	

NOTES:

1. This list of candidate dams was compiled in July 1978 by NAVFAC, and updated in November 1995.
2. Phase I investigation was conducted in accordance with Recommended Guidelines for Safety Inspection of Dams, Department of the Army, Office of the Chief of Engineer.
3. An earthquake (8.1 on Richter Scale) occurred at Guam on August 8, 1993.

U.S. ARMY CORPS OF ENGINEERS

I. Introduction

The U.S. Army Corps of Engineers (the Corps) responsibilities and jurisdictions were published in Federal Emergency Management Agency (FEMA) July 1980 report "Early Progress To Implement the Federal Guidelines for Dam Safety and Recommendations To Improve the Dam Safety Programs." Changes in the Corps responsibilities and jurisdictions since publication of the July 1980 FEMA report are those set forth in Title XII - Dam Safety Act of the Water Resources Development Act of 1986, PL 99-662.

During this reporting period, the Corps operated 234 navigation locks, 12,000 miles of commercial navigation channel, and approximately 1,200 Civil Works projects of various types. The Corps has varying degrees of responsibility or jurisdiction for five categories of dams: (1) dams which the Corps planned, designed, constructed, and operates; (2) dams which the Corps designed and constructed, but operation and maintenance is by others; (3) those non-Corps dams and reservoir projects subject to Section 7 of the 1944 Flood Control Act, the 1920 Federal Power Act, as amended and other laws for which the Corps of Engineers is responsible for prescribing the regulations for the use of storage allocated to flood control and/or navigation; (4) dams for which the Corps issues permits under its regulatory authorities; and (5) dams which the Corps inventoried and inspected under the National Dam Inspection Act of 1972 (PL 92-367) and under the Dam Safety Act of 1986 (PL 99-662).

The Corps is solely responsible for the safety of dams in category (1) and shares the responsibility for dams in category (2). The owners are responsible for the safety of dams in categories (3) and (4). The owners and state officials are responsible for the safety of dams in category (5).

The National Dam Safety Act of 1972 (PL 92-367) authorized and directed the Secretary of the Army, acting through the Chief of Engineers, to conduct several activities culminating in a report to Congress in 1982. That report contained results of the inventory updating, dam inspections and recommendations for improving the safety of non-Federal dams, and a recommendation for authorization and funding to continuously maintain the National Inventory of Dams. The Water Resources Development Act of 1986 (PL 99-662) and 1992 (PL 102-580, Sect 209) provided authority for updating and maintaining the National Inventory through FY 1994. In 1989, the Corps and FEMA developed a Memorandum of Agreement whereby FEMA would maintain and update the Inventory for the Corps. **Amendment to this MOA was signed in February 1995 to continue in effect indefinitely unless terminated by either party.** The National Inventory of Dams 1995 is scheduled to be published by the end of Calendar Year (CY) 1995.

II. Program Actions Since Last Progress Report

A. Implementation

All provisions of the guidelines are implemented.

B. Actions Taken

The Corps met with the dam safety staff from the office of Assistant Chief of Staff for Installation Management, Department of the Army, in FY 1995 to discuss dam safety. The Army is preparing an Army Regulation (AR) and guidance on the Installation Management of Dams and Dam Safety on military installations. This AR and guidance may be applicable to the Air Force and Navy as well. Pending the completion of this guidance, the Corps will forward this guidance for possible Air Force use. The Navy (dam safety office staff) has not requested assistance from the Corps concerning its dam safety program.

C. Changes in Administration

As a result of Corps-wide restructuring, Corps districts will perform an independent technical review of all project-related reports to include Dam Safety Reports. The districts will approve periodic inspection reports for dams and all design documents, except for project authorization and budget decision documents, which will be given a policy review and approval by HQUSACE in coordination with ASA(CW). The Major Subordinate Commands (MSC) will perform policy adherence and quality assurance oversight responsibility for work being accomplished at the districts. This change in process will eliminate redundant, multiple levels of review and will provide an intensive technical review at the implementation (district) level.

III. Implementation Progress

A. Organization, Administration, and Staffing

Dam safety in the Corps continues to be implemented through the Headquarters Dam Safety Officer. Organization and staff are adequate. Although the Agency has been undergoing a downsizing, a high priority emphasis is being placed on Dam Safety program activities and the Corps continues to maintain a viable and well-qualified work force. There are no deficiencies. The Headquarters Dam Safety Officer is identified as the Chief of Engineering Division, Civil Works Directorate, Headquarters, U.S. Army Corps of Engineers (HQUSACE), Washington, D.C. In execution of his duties, the Headquarters Dam Safety Officer chairs a standing committee of senior design, construction, and operations personnel in HQUSACE. Duties of the officer include surveillance and evaluation of the administrative control and the technical regulatory practices related to dam safety concerning design and construction of new dams, and operation, maintenance, and rehabilitation of existing dams; recommending improvements in practices when evaluation reveals safety-related deficiencies; and maintaining an inventory of agency dams. The Corps Dam Safety Officer is also the Corps member of the Interagency Committee on Dam Safety (ICODS), chaired by FEMA.

The Corps' Dam Safety Officer and Committee were appointed by the Chief of Engineers in 1980. The duties and responsibilities of the Dam Safety Officer and Committee members at Headquarters, Division, and District were updated by regulation dated 31 July 1992.

The HQUSACE, Division, and District Dam Safety Officers and the Standing Committee members meet periodically to discuss dam safety matters. During this reporting period, the HQUSACE committee made field visits to the North Central, North Pacific, and Southwestern Divisions. The findings of this committee were furnished to the appropriate directors in the HQUSACE, as well as the visited organization. These visits will continue on a periodic basis.

Corps regulations are continually being updated to reflect normal and emergency reporting requirements, inspection requirements, and up-to-date evaluation of structures.

The Corps also has delegated technical review of all dam safety reports and approval authority for periodic inspection reports to the district offices. Division offices will have quality assurance responsibility over the dam safety program activities.

B. Dam Safety Training Activities

The Corps has an extensive program for training personnel in all matters related to its missions in water resources development. Much of the training is directly or indirectly related to dam safety. This program, which provides training for engineers and dam operation and maintenance personnel, consists of formal class training and periodic on-site training. Site training is designed to acquaint project personnel with basic engineering considerations pertaining to the major structures, with procedures for surveillance, monitoring, and reporting of potential problems, and with emergency operations. Operations and maintenance personnel are retrained periodically, with a maximum interval of 4 years. New project personnel are immediately scheduled for dam safety training. No training deficiencies were identified during this reporting period.

In April 1994 and May 1995, the Corps conducted the training course "Design and Safety Surveillance of Embankment Dams." It was first offered in 1990, and now has become an annual course. This course trains engineers, geologists, project managers, and project operating personnel in engineering, construction, and operations fields to apply modern methods of design, construction surveillance, and inspection of embankment dams and major levees.

Practical on-the-job training is continually provided using formal exercises simulating dam safety emergencies. Alert notification tests were conducted at the project level. These tests involved various levels of the Corps organization as well as other Federal, state, and local officials. Valuable information on emergency action and evacuation planning was gained and is being used to update notification procedures. Several districts conclude project dam safety training with a class emergency exercise. Further dam safety exercises will also include basin wide exercises that involve several projects and agencies that would be affected by a single emergency event upstream. The requirement for dam safety exercises is established by regulation (ER 1130-2-419, Dam Operations Management Policy).

The Corps and the 13 other Federal agency members of ICODS have developed a professionally prepared Training Aids for Dam Safety (TADS) Program using an array of

modern training materials, including videotapes, audiotapes, workbooks, and testing materials. The program is organized in modular form according to subjects and designed to meet the dam safety training needs of the Federal, state, local, and private communities. All 21 modules proposed have been completed. The Corps uses these training aids extensively to train project personnel and in its public awareness program for local officials.

C. Dam Inventories

The Corps' Dam Inventory was updated in FY 1995 and has 80 fields of data. The Corps Inventory is a subset of the National Inventory of Dams. New dams are added to the inventories as they become operational, and the inventories are updated on an annual basis.

There have been no changes in the Corps reporting practices since the last reporting period.

A change in land use downstream of Mt. Morris Dam in Buffalo District has occurred. The Akzo salt mine downstream of the dam collapsed, causing area ground water to flood the mine and ground subsidence. However, Mt. Morris Dam was not affected. It is sufficiently upstream and sits in a foundation of bedrock, while the ground subsidence downstream occurred in an area of significant overburden deposits. Akzo Noble Salt Co. is planning to construct a new salt mine at Hampton Corners, Livingston County, at river mile 62 of the Genesee River. Otherwise, land use downstream from Corps dams remains the same.

D. Independent Reviews

All significant actions involving design, construction, and operation of Corps dam projects are subject to one level of internal independent technical review. External consultants are often employed to give overall technical advice and to review the design and construction procedures for complex or unique projects. About 80 percent of Corps dam designs are accomplished internally and about 20 percent are accomplished externally by contract with private engineering firms.

E. Inspection Program

A total of 392 periodic inspections were conducted at Corps dams during this period. All formal inspections were conducted by in-house teams of district professionals representing the various technical specialty areas pertinent to the project's design and construction. Informal inspections were conducted by engineering professionals of the district's dam safety program and Operations and Readiness staff, with other technical specialty areas represented on an as-needed basis. At this time, there are no staffing inadequacies that threaten the inspection program. Occasionally, an AE firm is contracted to attend the inspection with Corps staff and write the report. All formal inspections are documented in a periodic inspection report.

Most deficiencies found are of a minor nature and are routinely handled through normal operation and maintenance processes. More pressing deficiencies are prioritized for immediate attention, such as the grouting of the foundation at Red Rock Dam in Iowa. Another example is Homme Dam in North Dakota, where an investigation for the possibility of voids forming under the spillway chute due to high piezometer levels and piping is being performed. If this

condition is determined to be conclusive, repair of the voids under the existing spillway will be pursued. See Appendices A through E for status of dam safety-related remedial action.

Current hydrologic and meteorological criteria, along with a more detailed hazard classification procedure and new development around the reservoir and downstream, have prompted the change in classification from low to significant or high at several dams.

F. Dam Safety Rehabilitation Programs

Rehabilitation of Corps dams for safety purposes is accomplished through two separate programs: the Major Rehabilitation Program and the Dam Safety Assurance Program.

The Major Rehabilitation Program allows accomplishment of significant, costly, one-time structural rehabilitation or major replacement work (less costly repairs related to dam safety are accomplished under the normal Operation and Maintenance program). The work under this program restores the project to its original condition to serve as originally intended.

The Dam Safety Assurance Program provides for modification of completed dams which are potential safety hazards in light of present-day engineering standards and knowledge. This program provides for upgrading of project features related to dam safety to permit the project to function effectively as originally intended.

Under each of these programs, preliminary investigations are conducted and a report is prepared to determine the need for and scope of remedial measures, and to form the basis for obtaining construction funds for a specific dam. The report is followed by more detailed investigations and reported in design memorandum. This report forms the basis for preparing plans and specifications for the remedial work. Over any given 2-year period, the Corps will have several projects in various phases (*i.e.*, study, design, construction).

Progress of rehabilitation work is as follows:

Major Rehabilitation Program. Approximately $80 million was spent during FY 1994 and FY 1995. A tabulation of all the Major Rehabilitation work for this reporting period is attached as Appendix A. In the future, dams that qualify under this program will be added.

Dam Safety Assurance Program. Approximately $171 million was spent for Dam Safety Assurance Construction on six dams during FY 1994 and FY 1995. A tabulation of all the Dam Safety Assurance work for this reporting period is attached as Appendix B. A listing of dams with ongoing or scheduled studies is attached as Appendix C and future construction in this program is shown in Appendix D. It is anticipated that investigations now underway (Appendix C) will disclose that no remedial work is required at some of these dams.

Operation and Maintenance Program. Approximately $31 million was spent on dam safety repairs or modifications (other than those under the Major Rehabilitation or Dam Safety

Assurance programs) at 29 dams during FY 1994 and FY 1995. A summary of this work is attached as Appendix E.

G. Management Effectiveness Reviews

GAO did not conduct any management reviews. However, internal program review by the Dam Safety Committee has consistently occurred at Headquarters, division, and district levels.

Management effectiveness reviews of dam safety programs were accomplished at the following three Corps Divisions.

North Central Division - 25-29 October 1993
Southwestern Division - 4-6 May 1994
North Pacific Division - 19-24 September 1994

In all of the reviews, the HQUSACE Dam Safety Committee was encouraged by the interest and response of the division, district, and project personnel. It was apparent that the dam safety program in these three divisions is proactive and the critical issues at Corps projects are being adequately addressed. Recommendations of a general nature were provided by the committee, none of which were deemed critical or germane to the intent of this report.

H. Dam Failures and Remedial Actions

No dam failures occurred during the reporting period. However, the following four incidents did occur during this period. They have not been reported to the NPDP (National Performance of Dams Program) pending completion of the remedial action.

Hopkinton Lake. During FY 1995, fractures were discovered in four of the six flood control gates at Hopkinton Lake in New Hampshire. As a result, a contract will be issued by New England Division for replacement of the six flood control gates during FY 1996, and a follow-up contract for installation of the gates will be issued later during FY 1996.

Warm Springs Dam. On 25 January 1995, personnel at Warm Springs Dam in California were in the process of incrementally increasing flood releases when a hydraulic malfunction caused the intake structure bulkhead gate to slam shut. Divers were subsequently sent down to investigate the problem, and a barge and crane were mobilized to remove the gate so that flood releases could be resumed. A Board of Investigation was convened immediately after the incident to assess reasons for the bulkhead failure and to provide expert guidance on future actions. The Board recommended that a remote-operated vehicle be used for routine inspections rather than, in the case of emergencies, dewatering the conduit. The gate will be repaired and installed to verify its serviceability. It will then be removed and stored in the baseyard for use as backup only.

Hodges Village Dam, Oxford, Massachusetts. A major rehabilitation report was prepared by New England Division and submitted to HQUSACE in June 1995. The report proposed construction of a concrete seepage cutoff wall along the entire length of the dam (2,140 feet)

and through the center of the dam down to bedrock below the foundation. In addition, the plan included a proposal for another concrete cutoff wall at the upstream toe of a dike about 400 feet west of the main embankment. The wall at the dike would be approximately 1,200 feet long and also extend to bedrock. The report was approved by HQUSACE in August 1995. Total cost of this project is estimated at $17.4 million.

Townshend Lake, Townshend, Vermont. The channel bottom just downstream of the outlet works at Townshend had experienced some erosion since the construction of the dam in the late 1950's. However, the flood of April 1987, with releases up to 9,000 cfs, caused considerable erosion, and resulted in a large scour hole downstream of the outlet structure, approximately 140 feet long and about 16 feet deep. In addition, the lower embankment slopes surrounding the outlet structure were also adversely affected, causing erosion of material from the slopes and its deposition into the river channel. Because of the possible threat the scour hole had on the stability of the outlet structure, a contract was awarded in FY 1995 to fill the hole with tremie concrete. The concrete pour will be made immediately downstream until the bottom of the hole is raised to elevation of the lip at the end of the concrete outlet structure. The contract also includes construction of concrete retaining walls along both sides of the downstream channel for slope stabilization.

I. Emergency Action Planning

Corps field offices were instructed in March 1978 to begin preparation of flood emergency action plans (FEAP's) for Corps dams under their jurisdiction. Initially, the effort was directed toward delineation of the areas downstream from the dams that would be flooded in the event of dam failure. The product of these efforts was inundation area maps. In June 1980, the Corps issued a document to its field offices entitled "Flood Emergency Plans - Guidelines for Corps Dams," which provided detailed instructions for the preparation of FEAP's. As of this reporting, most of the required FEAP's have been completed, as follows:

*Number of Corps projects requiring a FEAP	460
Number completed	449
Number underway	11
Number not started	0

*All dams were reviewed for possible need for FEAP's. It was determined that 109 dams do not need FEAP's because spillway discharges, flooding upstream, or failure does not have the potential for loss of life or structural damages downstream of the project.

During this reporting period, FEAP's were tested by conducting dam safety emergency exercises at 13 dams. The exercises usually simulate a dam failure or a condition that could lead to a failure if the right actions are not taken. In addition, several smaller scale emergency exercises are held in which other agencies, and state and local governments, usually participate in the exercise. The notification charts within the plans are periodically updated and verified. State and local emergency action personnel as well as other Federal agencies are often invited to participate in the Corps dam safety emergency exercises. As part of the Dam Safety

Program, the districts are also encouraged to share ideas with state officials and extend invitations to state dam safety officials and local engineering students to attend periodic inspections.

While the Corps has completed most of the dam safety FEAP's, the local communities responsible for the evacuation plans have not. To date, the Corps is aware of approximately 70 projects where local evacuation plans have been completed by the local entities. The Corps districts continue to encourage local entities to develop their portion of the dam safety plans. Districts are being asked to increase their public awareness programs and perform follow-up visits to local communities periodically to obtain the status of evacuation plans. At a minimum, the districts are asked to write letters periodically to each of the communities stressing the importance of developing these plans.

J. Application of ICODS Technical Guidance

The Corps has adopted the technical guidance developed by ICODS for EAP's, earthquake analysis, and inflow design floods.

K. State Dam Safety Agency Involvement

Districts invite state dam safety officials to participate in formal periodic inspections, and state representatives typically attend one or more inspections per district each year. State agencies from time to time have sent employees to the district dam safety training sessions held on a regular basis at district projects. District dam safety personnel have responded to state requests for assistance during emergencies and to other requests for technical assistance. The impact of a dam break for non-Federal dams located upstream of present Corps dams is included in the FEAP for that dam.

States with dam safety programs are very involved in the design and construction of Corps dams that will be turned over to local sponsors for operation and maintenance. The state dam safety officer reviews all design documents for these projects, and makes frequent inspections during construction.

L. Research and Development and Special Initiatives

Research. The Repair, Evaluation, Maintenance, and Rehabilitation (REMR-II) Research Program is a multi-disciplinary effort to identify and develop effective and affordable technology for maintaining and extending the service life of existing Corps water resources projects. The program addresses field-identified problems in six broad areas: Concrete and Steel Structures; Geotechnical; Hydraulics; Coastal; Electrical and Mechanical; and Operations Management. Several individual research studies are related to dam safety. These include improved nondestructive evaluation systems for concrete structures; remedial stability measures for concrete structures; predicting concrete service life; use of geotextiles and membranes to prevent leakage; new and improved materials and techniques for use in repair and rehabilitation of concrete dams; maintenance of relief wells and drains; and assessment of the impact of drains on uplift pressures.

During the last year, a concept for installing geomembranes underwater to prevent leakage of hydraulic structures was demonstrated; guidance for assessing the uplift pressure beneath gravity structures was issued; a technique for assessing the service life of concrete subjected to alkali-silica reaction was developed; and guidance was provided on improved procedures for maintenance of relief wells and drains.

REMR technology transfer is accomplished through technical reports, workshops, training courses, field demonstrations, REMR Technical Notes, input to Corps guide specifications and engineering manuals, and The REMR Bulletin, which is widely distributed throughout the Corps and other Federal agencies and is available to others upon request.

Management. Management awareness of dam safety was the reason for conducting the initial conference for the Corps Dam Safety Coordinators in January 1991. Subsequently, each Major Subordinant Command has followed this example and continues to hold annual dam safety program reviews with their respective districts. The Corps continues to hold Corps-wide technical conferences at least biennially in which dam safety is a major part of the agenda.

General. Various other initiatives have been taken by Divisions and Districts throughout the Corps to improve individual dam safety programs. These include the following:

- Formulating a specific inspection and nondestructive testing program for structural members of outlet structures older than 20 years and subject to corrosion.

- Installing pilot programs for automated data acquisition systems as a model for future systems and offering demonstrations of new instrumentation systems to other offices and agencies.

M. Public Concerns

Of the Corps 569 **completed** dams, the only public concerns are with those that have been determined to be hydrologically or seismically deficient, and a modification to the project is required. Projects of concern to the Corps and the public have either been corrected or are being further evaluated to determine a proper response, if necessary. See Appendices A through E for a status of all dam safety-related work. The modification to correct for a hydrologic deficiency may call for raising the dam and/or increasing the emergency spillway capacity. In most cases, the reservoir will retain more water during a flood event, causing a higher reservoir level. This may impact development around the reservoir rim as well as a higher discharge downstream during the flood event. All Corps projects with dam safety deficiencies have been the subject of public meetings to inform those impacted. An Environmental Impact Statement(EIS) is prepared with complete NEPA documentation and is included with the Dam Safety Assurance Evaluation Report. Any recommended alternative has the support of outside agencies and other appropriate resource agency/group.

For new projects, the Corps has in place a rigid procedure during all phases (recon, feasibility, design and construction) to include the public views as well as the views of other Federal and state government bodies. All new Corps projects will have a local sponsor/partner with a Project Cooperation Agreement signed by both parties that provides a project amenable to all those impacted.

IV. Impact on Agency Operations

A. Budget Impact

The execution of Dam Safety Programs, including inspections, exercises, and training, requires substantial division and district financial and personnel commitment. Budgeting must be planned carefully to schedule work by the most pressing priority. The positive impact is that the Dam Safety Program activities provide safer projects.

B. Impact on Contracting Procedures

There have been no contracting procedural problems (nor are there any anticipated) as a result of compliance with the Dam Safety Guidelines.

C. Budget Allocation for Training/Education

The Corps has initiated and is committed to all of the training and education Guidelines that are included in the Federal Guidelines for Dam Safety. Resource commitments (Funding and Staffing) for these activities are such that it would be a major effort to prepare detailed numbers.

Funding for dam safety training and education at the districts is typically from O&M sources or overhead. However, there are other sources for funding various types of training. As an example, one district recently performed formal dam safety training for a class cost of $8,500, which did not include personnel costs of the attendees. Training comes from many different sources. There is formal education at a college or university, in-house formal and informal training, on-site training by in-house staff or consultants, both long- and short-term training, experience through on-the-job training, and emergency dam safety exercises.

STATUS OF
MAJOR REHABILITATION CONSTRUCTION

Reporting Period: October 1993 - September 1995

PROJECT	STATE	TOTAL CONSTRUCTION COST, ($M)	STATUS	DEFICIENCY
Lockport	IL	9.3	Ongoing	Concrete/Mech/Elec
Brandon Road	IL	4.7	Ongoing	Gates/Opns
Marseilles	IL	4.1	Ongoing	Gates/Opns/Bublr
Dreesden Isl.	IL	4.4	Ongoing	Gates/Opns/Bublr
L & D 13	IL	22.5	Ongoing	Concrete/Mech/Elec
L & D 16	IL	19.2	Ongoing	Concrete/Mech/Elec
Hodges Village	MA	17.0	Completed	Seepage
	Total	81.2		

STATUS OF
DAM SAFETY ASSURANCE CONSTRUCTION

Reporting Period: October 1993 - September 1995

PROJECT	STATE	TOTAL CONSTRUCTION COST, ($M)	STATUS	DEFICIENCY
Center Hill	TN	10.3	Under Construction	Hydrologic
Baldhill	ND	33.7	Partially complete	Hydrologic
Sam Rayburn	TX	27.4	Award 1993, Start Jan 1994	Hydrologic
Beaver Dam	AR	26.2	Completed 1995	Seepage
Sardis Dam	MS	13.8	Completed 1995	Seismic-Phase II
Mud Mountain Dam	WA	60.2	Completed 1995	Seismic/Hydrologic
	Total	171.6		

Appendix B

DAM SAFETY ASSURANCE PROGRAM
EVALUATION STATUS OF
DAMS REMAINING ON PRIORITY LIST
September 1995

PROJECT	NATURE OF DEFICIENCY	STATUS
Lower Mississippi Valley Division		
Enid, MS	Seismic	Design Team formed
Arkabutla, MS	Seismic	Design Team formed
Durden Creek, MS	Hydrologic	No fix req'd
Sardis, MS	Seismic	Const completed 6-95
Wappappello, MO	Seismic	Dist awaiting Final Rpt from contractor
Missouri River Division		
Harlan County, NE	Hydrologic	Initial Appraisal Rpt-SS FY 97
Kanopolis, KS	Hydrologic	Initial Appraisal Rpt-SC 9-96
Milford, KS	Hydrologic	Initial Appraisal Rpt-SS FY 96
Cherry Creek, CO	Hydrologic	Eval Rpt-SS FY 97
Cold Brook, SD	Hydrologic	Recon Rpt-AC 8-93, Dis advised to revise
Tuttle Creek, KS	Seismic	Eval Rpt-SS FY 96
North Atlantic Division		
Prompton, PA	Hyd & Risk Assessment	Rpt-AC 5-95
Waterbury, VT	Seismic	No fix req'd
North Central Division		
Eau Galle, WI	Hydrologic	Recon Rpt-SC 2-96
Marsh Lake, MN	Hydrologic	Recon Rpt-SS FY 97
Pine River, MN	Hydrologic	DM-AS 10-95, Const-SS 3-99
Baldhill, ND	Hydrologic	Const-AS 8-94, -SC 10-97
Homme Dam, ND	Hydrologic	VE Study-AC 4-95, Const-SS 3-98
Lake Traverse, SD/MN	Hydrologic	Eval Study-SC 3-96, Const-SS 5-99
Mount Morris, NY	Seismic	AC, No Fix req'd
New England Division		
Mansfield Hollow, CT	Seismic	Rpt-AC 3-94
Franklin Falls, NH	Seismic	Rpt-AC 3-94
Surry Mountain, NH	Seismic	Rpt-SC FY 96
West Thompson, CT	Seismic	No fix req'd
Ohio River Division		
Atwood, OH	Hydrologic	Rpt-SS 10-97
Bluestone, WV	Hydrologic	Rpt-SC 9-97
Delaware, OH	Stability	Const-AC 93
Dover, OH	Hydrologic/Stability	Rpt-SC 10-97
Tygart, WV	Hydrologic	Rpt-SC FY 96
Zoar, OH	Hydrologic	Rpt-SS FY 97
Barkley, KY/TN	Seismic	No fix req'd
Beach City, OH	Hydrologic	Rpt-AC 6-95, Const-SS 3-97
Boliver, OH	Hydrologic	Const completed 89
Center Hill, TN	Hydrologic	Const-SS 93; AS 9-93; SC 1-96
Dewey, KY	Hydrologic/Seismic	Rpt-AC 6-94/Seismic Eval Rpt-SC 11-96
Mohawk, OH	hydrologic	Const completed 88
Piedmont, OH	Hydrologic	Rpt-SC 11-95
Pleasant Hill, OH	Hydrologic	Rpt-SC 11-96: Proj funded 4-97
Senecaville, OH	Hydrologic	Const-AC FY 93
Wolf Creek, TN	Hydrologic	Rpt-AC 8-92, No fix req'd
North Pacific Division		
Bonneville, OR/WA	Seismic	Rpt-SS FY 96
Howard Hanson, WA	Seismic/Stability	Design/Const-SS FY 96
McNary, OR/WA (Levees)	Seismic	Rpt-SC FY 96
Lucky Peak, ID	Seismic	Rpt-SC FY 96
Mud Mountain, WA	Seismic/Hyd	Const completed 9-95
Ririe (BuRec), ID	Seismic	No fix req'd

South Atlantic Division

John H. Kerr, VA	Stability-O&M	Const-SC FY 96
W. Kerr Scott, NC	Seismic	No fix req'd
Hartwell/Clemson, GA/SC	Seismic	Rpt-SC FY 96

South Pacific Division

Big Dry Creek, CA	Hydrologic	Rpt-SC FY 98
Buchanan, CA	Seismic	Rpt-SC FY 96
Farmington, CA	Risk Assessment	Rpt-SC FY 97
Hidden, CA	Seismic	Rpt-SC FY 97
Martis, CA	Seismic/Stability	Rpt-SS FY 98
Merced Streams, CA	Risk Assessment	Rpt-SS FY 99
New Hogan, CA	Fault Study	Rpt-AC FY 95
North Fork, CA	Hyd/Seismic	Rpt-SS FY 99
Pine Flat, CA	Fault Study	Rpt-SC FY 97
Alamo, AZ	Hydrologic	Rpt-AS FY 93
Black Butte, CA	Seismic	AC 83-No fix req'd
Folsum, CA	Seismic	Const-AC FY 95
Isabella, CA	Hydrologic	Rpt-SC FY 97
Prado, CA	Hydrologic	Const funded under Santa Ana
Succcess, CA	Seismic	Reeval Rpt-SC FY 96

Southwestern Division

Beaver, AR	Seepage/Stability	Const completed 95
Northgate, TX	Hydrologic	Const completed 86
Pershing, TX	Hydrologic	Const completed 92
Range, TX	Hydrologic	Const completed 86
Sam Rayburn, TX	Spillway/Erodibility	Const-SC FY 96
Santa Rosa, NM	Hydrologic	Const completed 82
Skiatook, OK	Spillway/Erodibility	Prel Rpt-SC FY 96
Trinidad, CO	Hydrologic	Const completed 84
Abiquiu, NM	Hydrologic	Const completed 86
Abiquiu, NM	Abut Drainage	Const completed 90
Addicks/Baker, TX	Hydrologic	Const completed 88
Clearwater, MO	Hydrologic	Const completed 89
Cochiti, NM	Hydrologic	Eval Rpt-SC FY 96
Galisteo, NM	Hydrologic	Rpt-AC 6-95, FDM-SC FY 97
Jamez Canyon, NM	Hydrologic	Const completed 87
Proctor, TX	Hydrologic	Eval Rpt-SC FY 96
Table Rock, MO	Hydrologic	Rpt-AC 7-95, FDM-SC FY 97
Tenkiller, OK	Hydrologic	Rpt-AC 3-94, FDM-SC FY 95
Two Rivers, NM	Hydrologic	Rpt-AC 6-95, FDM-SC FY 97
Waco, TX	Hydrologic	Rpt-AC 1-92, FDM-SC FY 96

SS for Scheduled Start
SC for Scheduled Completion
AS for Actual Start
AC for Actual Completion

FUTURE CONSTRUCTION RELATED TO DAM SAFETY

PROJECT	STATE	DEFICIENCY	SCHEDULE
(Major Rehabilitation)			
John H. Kerr	NC	Seepage	FY 96-97
Hodges Village	MA	Seepage	FY 97
(Dam Safety Assurance)			
Pine River	MN	Insufficient spwy capacity	FY 99
Homme	ND	Insufficient spwy capacity	FY 98
Orwell	MN	Insufficient spwy capacity	FY 96
Howard Hanson	WA	Seismic	FY 96
Prompton	PA	Hydrologic	FY 99
(Operation & Maintenance)			
Garrison	ND	Spillway Tainter Gates	FY 97-98
Randall	SD	Spillway Tainter Gates	FY 96
York-Indian Rock	PA	Spillway resurfacing	FY 96
Saylorville	IA	'93 Flood rock erosion	FY 96-97
Red Rock	IA	Foundation seepage	FY 96-97
John Redmond	KS	Slope protection repair	FY 96
(Other Funding)			
Prado	CA	Hydrologic	FY 98
Milford	KS	Outlet channnel repair	FY 96-97(with FY93 Flood Money)
Tutle Creek	KS	Spillway erosion repair	FY 96-97(with FY93 Flood Money)
Piedmont	OH	Relief wells	FY 96
Dillon	OH	Seepage berm	FY 96
Dover (Magnolia Levee)	OH	Toe drain & seepage berm	FY 96
Atwood	OH	Abutment grouting	FY 98
Dworshak	ID	Seepage - Grout foundation under 4 monoliths	FY 96

Appendix D

STATUS OF
OPERATIONS & MAINTENANCE CONSTRUCTION RELATED TO DAM SAFETY

Reporting Period: October 1993 - September 1995

PROJECT	STATE	TOTAL CONSTRUCTION COST, ($M)	STATUS	DEFICIENCY
Grenada	MS	1.4	Completed 1994	Replace toe drainage ditch
Sardis	MS	0.69	Completed 1995	Rip-rap placement on emergency spillway channel approach
Enid	MS	1.95	Completed 1995	Emergency spillway channel repair
Grenada	MS	0.89	Completed 1994	Emergency spillway channel repair
De Grey	AR	0.38	Completed 1995	Repair erosion on downstreeam slope
Blakely Mountain	AR	0.29	Completed 1995	Repair rip-rap protection on upstream slope
Big Bend	SD	0.7	Completed 1995	Tainter gate renovation
Oahe	SD	0.16	Completed 1994	Tainter gate renovation
Rathbun	IA	1.9	Completed 1994	Toe seepage collector and replacement of rrelief wells
Milford	KS	0.02	Completed 1995	Spillway erosion repair
Whitney Point	NY	2.5	Under construction	Seepage cut-off wall
Red Rock (Stg.II)*	IA	0.84	Ongoing	Grouting
Red Rock ('93 Flood)	IA	0.52	Ongoing	Outlet works
Lockport Lock*	IL	1.95	Completed 1995	Approach dike
Pine River	MN	0.112	Completed 1995	Toe uplift
Hwy 75 Dam	MN	0.249	Under construction	Eroded embankment toe
McAlpine L & D	KY	3.1	Completed 1994	ICOS wall constructed for seepage through dike
Pleasant Hill	OH	0.6	Completed 1995	Toe drain and seepage berm
Charles Mill	OH	0.7	Completed 1995	Toe drain and seepage berm
Painted Rock*	AZ	1.42	Completed 1994	Emergency spillway repair
Painted Rock	AZ	3.30	Under construction	Additional relief wells and seepage control
Townshend	VT	0.7	Under construction	Repair scour hole
Ray Roberts*	TX	3.85	Completed 1995	Upstream embankment riprap repair
Aquilla	TX	0.24	Completed 1995	Relief wells and seepage collector addition
Joe Pool	TX	0.47	Completed 1995	Upstream embankment riprap "belly band" addition
Lewisville	TX	1.25	Under construction	Embankment slide repair
Denison	TX/OK	0.40	Under construction	Toe drain, collector & relief well renovation
John Redmond	KS	0.10	Completed 1995	Relief well addition
Moose Creek	AK	0.15	Completed 1994	Relief wells addition
	Total	30.831		

* Reported in 1993 as under construction

Appendix E

SUMMARY OF DATA FOR NATIONAL DAM SAFETY PROGAM (INDICATE NUMBER OF DAMS)

DEPARTMENT / AGENCY	DAM INVENTORY				PERIODIC INSPECTIONS CONDUCTED				DAMS UNDER FURTHER INVESTIGATIONS AND STUDY		DAM SAFETY MODIFICATION		DAMS WITH EAP* (BY HAZARD CLASSIFICATION)	
	TOTAL	HAZARD CLASSIFICATION			TOTAL	SINCE LAST REPORT			COMPLETED SINCE LAST REPORT	CURRENTLY IN PROGRESS	COMPLETED SINCE LAST REPORT	CURRENTLY IN PROGRESS	HIGH	SIG.
		HIGH	SIG.	LOW		FORMAL	INTER-MEDIATE	DURING CONSTRUC-TION						
DOD														
ARMY	216	33	33	150	98	6	92				19	36	14	10
NAVY	16	1	0	15										
AIR FORCE	32 Note #1	0	0	32										
CORPS	569	440	66	63	392	206	182	5	11	47	16	11	407	37

NOTES:

1. Four of the 32 reported have been transfered to other agencies.

2. * EAP not required for dams with no expected loss of life.

DEPARTMENT OF ENERGY

Department of Energy
Washington, DC 20585
December 29, 1995

Mr. James L. Witt
Director
Federal Emergency Management Agency
Washington, DC 20472

Dear Mr. Witt:

Your November 2, 1995 letter addressed to Secretary O'Leary requesting information on the status of the Department of Energy's Implementation of Federal Guidelines for Dam Safety by December 31, 1995. As noted in that letter, a similar request was made in a separate letter by Mr. William S. Bivins, Chairman of the Interagency Committee on Dam Safety to Mr. Sarbes Acharya, our designated dam safety coordinator.

I am pleased to inform you that the Department of Energy transmitted the necessary information in detail, consistent with Federal Emergency Management Agency's Guidelines and formats, in a letter addressed to Mr. Bivins on November 30, 1995. A copy of that transmittal is enclosed. As documented in the enclosure, the Department of Energy's implementation of the National Dam Safety Program is in full compliance with Federal Guidelines. If you need clarification or additional information, please contact Mr. Acharya by telephone (301) 903-1341 or by fax (301) 903-6383.

Sincerely,

Tara O'Toole, M.D., M.P.H.
Assistant Secretary
Environment, Safety and Health

Enclosure

I. Introduction

In the Fiscal Year (FY) 1992-93 Progress Report, the Department of Energy (DOE) reported a total of 83 structures under its jurisdiction, 24 of which met the Federal definition of a dam. The current total is 81 structures, 23 of which meet the Federal definition of a dam: since the last reporting period, 1 dam was decommissioned and deleted from Table 1 (see below) and 1 structure was removed from Table 2 (see below) because it had been included in error. Of the 23 dams, 6 represent a significant hazard and 2 represent a high hazard. Some hazard classifications have changed since the previous report. The Alaska Power Administration (APA) operates two dams, and DOE contractors operate the remainder. The contractors report to DOE Operations Offices located in Albuquerque, New Mexico; Oak Ridge, Tennessee; Golden, Colorado; and Aiken, South Carolina.

Inspection and surveillance activities of the DOE dams are supported by the Federal Energy Regulatory Commission (FERC), Division of Dam Safety and Inspections. Under an interagency agreement, FERC provides significant expertise to inspect all DOE water impoundment structures, except those operated by APA. APA conducts inspections of its two dams.

The number and hazard classification of DOE dams in each geographical location is as follows.

Location	Number of Dams	High or Significant Hazard	Low Hazard
Albuquerque Operations Office	1	0	1
Alaska Power Administration	2	1	1
Oak Ridge Operations Office	6	3	3
Rocky Flats Area Office	6	1	5
Savannah River Operations Office	8	3	5
Total	23	8	15

During this reporting period, there have been no significant changes in management and operating (M&O) contractors responsible for the operation of DOE-owned dams, or the dam safety program. An agreement with FERC to inspect the structures continuous to exist. Attached to this report are two tables which provide relevant information about DOE dams and DOE water impoundment structures.

II. Program Actions Since Last Report

A. Implementation

DOE has made significant progress during this reporting period. Inspections are continuing, all Emergency Action Plans (EAP's) have been finalized, and the last EAP was tested on September 30, 1994. This action brings DOE into full compliance with the Federal Guidelines. Retesting of EAP's is planned every 3 years.

B. Actions Taken

The Conclusions and Recommendations section of the FY 1992-1993 report does not discuss DOE.

C. Changes in Administration

The creation of the United States Enrichment Corporation (USEC) has resulted in the transfer of several dams from DOE control to USEC control. DOE is studying the impact of this change.

III. Implementation Progress

A. Organization, Administration, and Staffing

DOE has a new Dam Safety Officer, Sarbes Acharya, EH-32, (301) 903-1341. The Alternate Dam Safety Officer is Thomas E. McSpadden, EH-32, (301) 903-5656. Technical support on natural phenomena hazards (NPH) mitigation is provided by James R. Hill, Manager, NPH Safety Program, (301) 903-4508. In addition there are several other headquarters collateral duty staff in the Program Offices. Each field location has several individuals concerned with dam safety. This staff is considered adequate. Inspection support is provided by the FERC regional offices where DOE dams are located. DOE is reimbursing FERC for the costs incurred through a Memorandum of Agreement.

In some cases where deficiencies or general problems have been identified, interagency agreements with the U.S. Army Corps of Engineers (Corps) or the Department of Interior, Bureau of Reclamation (BOR) have been established to provide additional expertise. DOE has on a number of occasions obtained needed expertise from in-house sources or external organizations.

B. Dam Safety Training Activities

DOE has supported dam safety training by providing field organizations with books and video tapes (Training Aids For Dam Safety) which were developed by the Interagency Committee on Dam Safety (ICODS). The ICODS liquefaction conference held in Beckeley, West Virginia, in April 1993, was attended by a number of DOE and DOE contractor personnel. The ICODS seepage and piping conference held in Berryville, Virginia, in March, 1995, was also attended by a number of DOE and DOE contractor personnel.

C. Dam Inventories

The DOE dam inventory is current and complete. The inventory is updated as soon as conditions warrant. All dams are included in the National Inventory of Dams (NID) and updated DOE information is included each time the NID is revised. Since the last reporting period, DOE has changed the hazard classification of three dams. No dams are unclassified or underclassified.

D. Independent Reviews

DOE has contracted with the Corps, the BOR, the Tennessee Valley Authority, Brookhaven National Laboratory, private consultants, and FERC to perform independent reviews of various aspects of DOE's dam operations.

E. Inspection Programs

Inspection of DOE structures by operating contractor personnel can occur as frequently as every day. However, these inspections are not well documented and no credit is taken for them. DOE's agreement with FERC provides for continued inspections of all dams and other water impoundment structures except those maintained by the APA. APA inspects the two dams in Alaska.

FERC inspections are performed every year on significant and high hazard dams, every other year on low hazard dams, and every third year on the water impoundment structures. The latter category (see Table 2 below) consists of structures that do not meet the minimum criteria for a dam but which are being inspected anyway.

F. Dam Safety Rehabilitation Programs

The major DOE rehabilitation effort the last few years has been the PAR Pond Lower Dam at the Savannah River site in South Carolina. That repair is now complete and the impoundment has been refilled. Minor work continues at most DOE structures but no major rehabilitation efforts are anticipated.

G. Management Effectiveness Reviews

The DOE dam safety program is rather small (23 dams). Management effectiveness and General Accounting Office reviews are not considered necessary.

H. Dam Failures and Remedial Actions

Only one dam failure has occurred in DOE in recent years (Twin Lakes Dams at Savannah River in 1991). The incident was reported to the National Performance of Dams Program.

I. Emergency Action Planning

EAP's have been prepared and approved for all significant and high hazard dams. All plans have been tested. Retesting is planned each 3 years.

J. Application of ICODS Technical Guidance

ICODS documents will be used in future DOE activities where they are applicable.

K. State Dam Safety Agency Involvement

In general, DOE does not maintain cooperative relationships with state agencies. All DOE dams are on Federal property under Federal control. There is little interaction with the states.

L. Research and Development and Special Initiatives

During the repair work at PAR Pond Dam, DOE undertook a number of special initiatives to support DOE's dam safety program. These included state-of-the-art seismic analyses. Other special initiatives will be undertaken as warranted.

M. Public Concerns

There has been no public concern over DOE dams. There are no plans to bring the public into DOE operations.

IV. Impact on Agency Operations

A. Budget Impact

There should be no budget impact for compliance with most guidelines. If guidelines are developed which require the retrofit of existing structures, the impact could be severe.

B. Impact on Contracting Procedures

The impact of compliance with guidelines on agency contracting procedures should be minimal.

C. Budget Allocation for Training/Education

Attendance at training sessions or conferences is paid for by the individual's employer.

TABLE 1 DOE DAMS

FIELD OFF.	SITE	DAM	NID IDENTIFIER	STATE	STRUCTURAL HEIGHT (feet)	MAXIMUM STORAGE (ac-ft)	DAM HAZ
Alaska	Alaska Pow	Eklutna Dam*	AK00038	AK	56	240000	S
		Long Lake Dam*	AK00044	AK	30	147000	L
Albuquerque	Los Alamos	Los Alamos Canyon Dam	NM00299	NM	35	49	L
Oak Ridge	ORNL	White Oak Dam	TN14501	TN	25	300	S
	Paducah	C-616-F Full Flow Lagoon	KY83401	KY	9	95	L
	Portsmth	X-611-B New Line Sludge Lag.	OH00196	OH	55	406	L
		X-230-K South Holding Pond	OH00195	OH	27	57	L
	Weldon Sp	Raffinate Pit 3	MO83401	MO	25	90	S
		Raffinate Pit 4	MO83402	MO	36	230	S
Rocky Flats	RFP	A-2	CO00973	CO	36	38	L
		A-3	CO02100	CO	42	70	L
		A-4	CO02243	CO	52	160	L
		B-5	CO02244	CO	57	116	L
		C-2	CO02245	CO	43	188	S
		Sanitary Landfill	CO02341	CO	46	39	L

* These Dams Are Not To Be Inspected By FERC

FIELD OFF.	SITE	DAM	NID IDENTIFIER	STATE	STRUCTURAL HEIGHT(feet)	MAXIMUM STORAGE (ac-ft)	DAM HAZ
Savannah Rvr	SRP	Par Pond Dam	SC03401	SC	66	77500	H
		Steel Creek Dam	SC03403	SC	90	39616	H
		Pond B	SC01688	SC	45	4413	L
		Pond C	SC03402	SC	47	4667	L
		Pond 2	SC01691	SC	29	138	L
		Pond 5	SC01693	SC	30	722	L
		D Area Ash Disp. Basin	SC01689	SC	20	126	S
		H Area Ash Disp. Basin	SC03404	SC	14	98	L

TABLE 2 DOE WATER IMPOUNDMENT STRUCTURES

FIELD OFF.	SITE	STRUCTURE	IDENTIFIER	STATE
Albuquerque	Los Alamos	Guaje		NM
Idaho	INEL	Gaging Station Dike		ID
		Diversion Dam		ID
		Diversion Dike		ID
		Dike No. 1		ID
		Dike No. 2		ID
		Dike No. 3		ID
Oak Ridge	K-25	Duck Pond Dam	Portal 2	TN
		Pond	K-1007-B	TN
		Pond	K-901-A	TN
		Retention Lagoon	K-1515-C	TN
	ORNL	HFIR Pond	7905	TN
		HFIR/REDC Ipoundments	7906&7&8	TN
		Solid Waste Storage Area Imp.	SWSA 5	TN
		SWSA Emergency Ret. Basin	SWSA 6	TN
		Well Drill&Steam Clean Imp.		TN
		Swan Pond at Main Entrance		TN
		Waste Basin	3513	TN
		Equalization Basin	3524	TN
		Retention Ponds	190	TN
		Sewage Treatment Plant Lagoons		TN
		Coal Yd Runoff Treat. Fac. Lagoon		TN
		Hydrofracture Pond		TN

FIELD OFF.	SITE	STRUCTURE	IDENTIFIER	STATE
Oak Ridge	Paducah	Settling Basin	C-611-D	KY
		Settling Basin	C-611-E	KY
		Sludge Lagoon	C-611-F	KY
		Settling Basin	C-611-G	KY
		Full-Flow Lagoon	C-611-V	KY
		Full-Flow Lagoon	C-611-W	KY
		Full-Flow Lagoon	C-611-Y	KY
		Sludge Lagoon	C-616-E	KY
		Holding Pond	C-617-B	KY
	Portsmouth	West Containment Basin	X-230-J3	OH
		West Containment Pond	X-230-J5	OH
		Northeast Containment Pond	X-230-J6	OH
		East Drainage Ditch Cont. Pond	X-230-J7	OH
		North Holding Pond	X-230-L	OH
		GCEP SW Holding Pond	X-2230-M	OH
		GCEP West Holding Pond	X-2230-N	OH
		Water Treatment Pl. Basins	X-611	OH
		North Line Sludge Lagoon	X-611-A-N	OH
		Middle Line Sludge Lagoon	X-611-A-M	OH
		South Line Sludge Lagoon	X-611-A-S	OH
		Clay Barrow Pit	X-231-B	OH

FIELD OFF.	SITE	STRUCTURE	IDENTIFIER	STATE
Oak Ridge	Weldon Spring	Raffinate Pit 1		MO
		Raffinate Pit 2		MO
		Quarry Water Treat. Ponds		MO
		Ash Pond		MO
		Frog Pond		MO
		Material Staging Area Ponds		MO
	Y-12	Lake Reality Settling Basin		TN
		East Borrow Settling Basin		TN
		West Borrow Settling Basin		TN
		Kerr Hollow Quarry Sed. Disp. Basin		TN
		Sanitary Landfill II Sed. Pond		TN
		Sanitary Landfill IV Sed. Pond		TN
		Water Plant Sediment Ponds		TN
Savannah Rvr	SRP	New Fire Pond		SC

Enclosure 2

DOE Information for Status Table

Summary Status of Dams

Dept.	Dam Inventory				Periodic Inspections			
	Hazard Classification				Since Last Report			
Agency	Total	High	Sig.	Low	Total	Formal	Inter.	Const.
DOE	23	2	6	15	29	0	27	2

Dams Under Investigation and Study		Dam Safety Modifications		Dams With EAP's	
'94-'95	Active	'94-'95	Active	High	Sig.
1	1	1	0	2	6

DEPARTMENT OF THE INTERIOR

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, D.C. 20240

Honorable James L. Witt
Director, Federal Emergency
Management Agency
500 C Street, S.W.
Washington, D.C. 20472

Dear Mr. Witt:

In response to your November 2, 1995, letter to Secretary Babbitt, the Department of the Interior is transmitting its progress report on implementing the *Federal Guidelines for Dam Safety*. The report covers dam safety progress within Interior from October 1993 through September 1995.

Each of the Interior bureaus with responsibility for dam safety prepared the portion of this report which dealt with its program. In most bureau reports, only the program aspects which changed or were initiated from our previous report to FEMA are discussed. A brief introduction summarizes the Interior Dam Safety Program, and lists the key points addressed in each bureau report.

If you have any questions regarding the contents of the report, please contact Mr. Jack Brynda of Reclamation's Washington Office at 208-6029, or Mr. David Achterberg, Chief of the Dam Safety Office in Denver at (303) 236-4200, extension 520.

Sincerely,

Patricia J. Beneke
Assistant Secretary
for Water and Science

Enclosure

cc: Assistant Secretary - Indian Affairs
Assistant Secretary - Fish Wildlife and Parks
Assistant Secretary - Land and Minerals
Commissioner, Bureau of Reclamation
Director, National Park Service
Director, Fish and Wildlife Service
Director, Bureau of Land Management
Director, Office of Surface Mining
Director, U.S. Geological Survey
Director, Bureau of Mines

I. Introduction

As the Nation's principal conservation agency, the Department of the Interior (DOI) has responsibility for most of our nationally-owned public lands and natural resources. This includes fostering sound use of our land and water resources; protecting our fish, wildlife, and biological diversity; preserving the environmental and cultural values of our national parks and historical places; and providing for the enjoyment of life through outdoor recreation. The Department assesses our energy and mineral resources and works to ensure that their development is in the best interests of all our people by encouraging stewardship and citizen participation in their care. The Department also has a major responsibility for American Indian reservation communities and for people who live in island territories under U.S. Administration.

The DOI, through its Bureaus, is responsible for the planning, design, construction, operation, maintenance, and regulation of about 2,054 dams meeting the definition stated in the "Federal Guidelines for Dam Safety" (Guidelines).

The Guidelines apply in varying degrees to eight DOI Bureaus: Bureau of Reclamation (Reclamation), Bureau of Land Management (BLM), Bureau of Indian Affairs (BIA), Fish and Wildlife Service (FWS), U.S. Geological Survey (USGS), National Park Service (NPS), Office of Surface Mining (OSM), and the Bureau of Mines (BOM). Two Bureaus, the OSM and the BOM, do not directly own, design, construct, operate, or maintain dams; thus, many of the provisions within the Guidelines apply to a lesser extent. The BOM has been slated for termination in Fiscal Year (FY) 1996.

II. Department of Interior Programs and Bureaus

The Commissioner of Reclamation is designated as DOI's coordinator for dam safety and is responsible for advising the Assistant Secretaries and the Secretary of the Interior on program development and operation of the Safety of Dams (SOD) Program. DOI's policy, as it relates to dam safety, is detailed in Departmental Manual, Part 753 DM 1, dated April 14, 1982.

On November 15, 1989, the DOI Water Policy Council chartered the Working Group on Dam Safety (WGDS). It is chaired by the Commissioner of Reclamation. Members represent the Office of the Secretary; the Office of the Solicitor; the Assistant Secretary - Fish and Wildlife and Parks; the Assistant Secretary - Indian Affairs; the Assistant Secretary - Land and Minerals Management; the Assistant Secretary - Policy, Management, and Budget; and the Assistant Secretary - Water and Science. To assist the Secretary in resolving dam safety issues, the WGDS was chartered to perform the following tasks:

1. Review priorities for corrective action, particularly where ranking criteria, and the resulting priority listings, are inconclusive.

2. Assure consistency of DOI's priority ranking and funding requests.

3. Provide, as appropriate, a forum for quick action on dams which are in imminent danger of failing and which may endanger lives or property.

4. Maintain communication with other Federal entities concerned with dam safety issues.

5. Review the emergency action planning (EAP) activities by each Bureau for high- or significant-hazard dams under its jurisdiction.

The charter of the WGDS supplements, but does not change or modify, the responsibilities and functions relating to DOI's Dam Safety Program, as established under Departmental Manual Part 753. Three meetings with the DOI Working Group were held in FY 1995.

The prevention of dam failure, which could cause loss of human life or serious property damage, is the emphasis of DOI's dam safety program. Corrective actions are sought which will maximize protection of human life and property downstream while minimizing the cost of structural modification. In that regard, the Bureaus recommend a structural solution only if an effective nonstructural solution cannot be instituted due to physical, contractual, economic, or other constraints.

Following is a summary of the progress of the eight DOI Bureaus in implementing the Guidelines between October 1, 1993, and September 30, 1995. The complete report from each Bureau is also a part of this report.

BUREAU OF INDIAN AFFAIRS

The BIA is responsible for ensuring the safety of dams arising from its trust obligations in relation to the development of Indian water and related land resources. BIA has inventoried 265 dams, 94 of which are classified as high- or significant-hazard. Modifications were completed at three facilities since the last report. The BIA executes Public Law 93-638 contracts with interested tribes to provide for tribal government accomplishment of dam safety corrective action.

An Inspector General Audit in 1994-95 reviewed the status of program activities, including the implementation of the Guidelines. The audit determined that BIA needed to review implementation of Emergency Management Systems and institute procedures for cost-saving opportunities.

In August 1994, the United States Congress passed the "Indian Dams Safety Act." This Act permanently established the SOD Program within the BIA.

During the reporting period, three dams have completed rehabilitation construction.

BUREAU OF LAND MANAGEMENT

BLM is responsible for BLM-owned dams on public lands in 10 Western States and Alaska. Of the approximately 917 BLM-owned dams, only 2 are classified as high- or significant-hazard. The 270 million acres of BLM-administered land also hosts a variety of dams owned and operated by other public and private entities.

During the reporting period, four dams were rehabilitated for safety reasons.

BUREAU OF MINES

BOM does not directly own, design, construct, operate, or maintain dams. The BOM has been slated for termination and selected activities transferred to other Federal agencies. Currently, it is uncertain if the dam safety research will continue. The in-house expertise in tailings and waste rock dam stability will most likely be transferred to the Department of Energy.

BUREAU OF RECLAMATION

Reclamation controls reservoirs impounded by approximately 475 dams and dikes. Of these, 382 are classified as high- and significant-hazard. The 382 dams and dikes are located at 262 facilities or reservoirs. Corrective actions were completed at six facilities since the last report. The reservoirs, located throughout the 17 Western States, serve many purposes, such as power generation, irrigation, municipal and industrial water supply, flood control, recreation, and fish and wildlife benefits. Reclamation also provides advice and technical assistance, upon request, to other DOI bureaus.

Reclamation Regional and Area Offices began implementing an emergency management program to address all potential emergency incidents at Reclamation facilities that could reasonably affect the safety of the general public or environmental resources. The program encourages downstream jurisdictions to develop "dam-specific" warning and evacuation plans by the potentially affected local jurisdictions downstream of the structures.

Dam safety research and development projects continue, particularly in risk analysis, flood overtopping analysis, early warning systems, and structural analysis. Reclamation has provided dam safety training to attendees from Federal, State and local governments, and the private sector. It also has participated in the training of engineers from other countries. Reclamation completed the final two modules in the Training Aids for Dam Safety (TADS) program. The TADS program is sponsored by 14 Federal agencies and assisted by the Association of State Dam Safety Officials (ASDSO).

Reclamation has established a Memorandum of Understanding with Southern University in Baton Rouge, Louisiana, to establish a Dam Safety Education Program. The dam safety engineering classes began in the Fall 1993. Southern University is an Historically Black University.

NATIONAL PARK SERVICE

This agency manages 389 stream flow control structures and monitors 248 non-NPS structures within or adjacent to park boundaries. Program policy and practice comply with all environmental, preservation, and recreation laws, including the Guidelines. All proposed, operational, and deactivated structures are inventoried and all operational structures are required to have an inspection and maintenance program to ensure the protection of public safety, health, property, or natural resources.

There are currently 27 high- or significant-hazard and 83 low-hazard potential dams. For the reporting period, modifications have been completed for 14 structures.

Approximately 270 evaluations have been conducted in the past few years. Currently, there are 110 NPS dams with serious maintenance, operations, structural, or public safety-type deficiencies. During this reporting period, 32 incidents were reported.

OFFICE OF SURFACE MINING

OSM regulates dams and impoundments associated with coal mining operations. OSM is in the process of preparing a draft dam safety directive implementing the Guidelines by requiring an inventory of dams and effective emergency actions. Due to budgetary constraints and organizational changes, the draft has not been finalized. Staff has been reduced by one-third.

U.S. FISH AND WILDLIFE SERVICE

FWS is responsible for operating dams associated with the preservation and enhancement of fish and wildlife resources. FWS owns all dams on its land; therefore, agency responsibility for the safety of these structures is sole and absolute. FWS has a total inventory of 155 dams.

All of the FWS 26 high- and significant-hazard dams have functional EAP's. Modifications were completed on three structures since the last report.

U.S. GEOLOGICAL SURVEY

USGS owns and has maintenance responsibility for one low-hazard dam and one small concrete-topped earthen embankment that offer no significant downstream hazard, even in the event of a catastrophic failure. USGS continues to collect and provide valuable information for use in dam safety analyses.

Interior's Continuing Commitment to Dam Safety

Over the past 2 years, DOI's Dam Safety Program has continued to actively pursue the selection of corrective actions and the implementation of those actions. Dam inspection and

the investigation of suspected deficiencies continue to be a priority. Emphasis has also been placed on EAP activities.

Funding will continue to be requested for the remedial measures necessary to ensure public safety and the operational integrity of DOI dams in an environmentally responsible manner. Although each Bureau is responsible for its Dam Safety Program, implementation of remaining studies and corrective actions are being prioritized in compliance with DOI's established priorities.

DOI's Dam Safety Officers have continued to meet annually to discuss mutual problems relevant to dam safety topics and to develop coordinated solutions. The Dam Safety Officer meetings also serve to promote communication and cooperation among DOI Bureaus. The most recent meeting was held in May 1995 in Port Angeles, Washington.

Data on the scope and status of DOI's Dam Safety Programs are presented in Table No. 1.

SUMMARY OF DATA FOR NATIONAL DAM SAFETY PROGRAM (INDICATE NUMBER OF DAMS)
(Fiscal Years 1994-95)

DEPARTMENT AGENCY	DAM INVENTORY (As of September 30, 1995)				PERIODIC INSPECTIONS CONDUCTED (1994-95 Field Seasons)					DAMS UNDER FURTHER INVESTIGATION AND STUDY		DAM SAFETY MODIFICATIONS		DAMS WITH EAP (BY HAZARD CLASS.)	
	TOTAL	HAZARD CLASSIFICATION			TOTAL	SINCE LAST REPORT				COMPLETED SINCE LAST REPORT	CURRENTLY IN PROGRESS	COMPLETED SINCE LAST REPORT	CURRENTLY IN PROGRESS	HIGH	SIG.
		HIGH	SIG.	LOW		FORMAL	INTERME DIATE	INTER. SPECIAL	DURING CONSTR						
DOI Totals	2054	339	96	1619	775	107	377	282	9	64	100	38	24	275	60
BOR	a. 327	244	18	65	157	10	116	31	c.	23	83	6	20	244	18
BLM	917	1	1	915	204		204					4		1	1
BIA	265	71	23	171	76	21	18	37		11	b. 12	3	1	10	3
FWS	155	9	17	129	67	59	8			11	5	3	2	9	17
NPS	389	14	37	338	270	17	31	213	9	19		14		11	21
USGS	1			1	1			1							

a. BOR has a total of 475 dams and dikes on the National Dam Inventory. Of these, 382 dams and dikes are classified as high- and significant hazard. Many reservoirs are formed by a main dam and one or more dikes (or smaller dams) along the reservoir rim. Reclamation's 382 dams and dikes are located at 262 individual facilities. The facilities count is utilized for this presentation.

b. Some dams included for which prior phase work was completed during the reporting period.

c. BOR provides their won construction management during dam construction and modification. Inspection is a daily activity with ongoing construction.

BUREAU OF INDIAN AFFAIRS

I. Introduction

The Bureau of Indian Affairs (BIA) Safety of Dams (SOD) Program was initially designed to implement the recommendations outlined by the Federal Coordinating Council for Science, Engineering, and Technology (FCCSET) in its report, "Improving Federal Dam Safety," published November 1, 1977. The BIA is executing Public Law 93-638 contracts with interested tribes to provide for tribal government accomplishment of dam safety corrective action.

The BIA developed its SOD Program direction and guidelines based on the Department Manual Part 753 and 55 BIAM Supplement 6. The latest Release of 55 BIAM Supplement 6 was developed in August 1, 1980. Under Section 1.2 Responsibility: "Area Directors, Agency Superintendents, and Project Engineers are responsible for the safety and integrity of all dams under their jurisdictions. The intent of these guidelines is to define for these officials the scope of activities that are to be undertaken in order to insure that a thorough dam safety program is carried out."

II. Program Actions Since Last Report

A. Implementation

The BIA underwent an in-depth Inspector General (IG) Audit during 1994-95 to review the status of program activities, including the implementation of the Federal Guidelines. The audit determined the BIA needed to review implementation of Emergency Management Systems and institute procedures for cost-saving opportunities. While there is still room for program improvement, the BIA feels it has improved greatly since the last report and has implemented the Federal Guidelines.

B. Actions Taken

The previous report recommended the BIA "make a concerted effort to complete new EAP's or to reactivate those that have been dropped." The BIA expects to commit approximately $3-4 million during Fiscal Year (FY) 1996 in the area of Emergency Management Systems, including EAP's. These funds should allow the BIA to "catch up" in implementing EAP's for its high and significant hazard dams.

C. Changes in Administration

In August 1994, the United States Congress passed the "Indian Dams Safety Act." This Act permanently establishes the SOD Program within the BIA. The Act also provides authorization and direction for other activities, such as establishing a maintenance action plan and the Tribes request for additional monies for enhancements to dams within their respective reservations to meet their own priorities for the future.

III. Implementation Progress

A. Organization, Administration, and Staffing

The BIA's administrative framework includes a Bureau SOD Officer at the Headquarters level with six coordinators in each of the BIA area offices with SOD activities. The Area Directors, Superintendents, and Project Engineers (where appropriate) have the responsibility for implementing the SOD Program at the field level. The area coordinator oversees the activities to ensure the Federal Guidelines, Departmental Orders and Directives, and BIA Policy are properly implemented.

Due to the planned budget cuts and reorganization of the BIA, the Assistant to the SOD Officer has been eliminated. While this has had some administrative impact, it is hoped better utilization of automation and existing resources will allow the program to continue to improve.

B. Dam Safety Training

The BIA has requested the Bureau of Reclamation (Reclamation) to provide training on Emergency Management Systems, with an emphasis on EAP's.

C. Dam Inventories

The BIA has a complete list of all high, significant, and low hazard dams based on the information available. The BIA is requesting that several low hazard dams be re-evaluated for possible reclassification to high or significant. The BIA has approximately one-fourth of all departmental high or significant hazard dams.

D. Independent Reviews

Much of the program activities are accomplished through P.L. 93-638 contracts with tribes. These tribes in turn contract a majority of the work with Reclamation. Reclamation performs most of the independent reviews of BIA activities. In those situations where Reclamation does not perform the independent review, this activity is contracted out to a qualified firm.

E. Inspection Program

The BIA performs most of the informal inspections internally, with Reclamation performing most formal inspections. During 1994-95, there have been 47 special/intermediate inspections and 20 formal inspections performed.

F. Dam Safety Rehabilitation Programs

Since the last report, three dams have completed rehabilitation construction: Ganado Dam and Round Rock Dam, Navajo Reservation, Arizona; and Pablo Dam, Flathead Reservation, Montana.

Round Rock Dam rehabilitation consisted of repair of the outlet works and enlargement of the spillway. Ganado Dam construction required replacement of the embankment and outlet works. Pablo Dam construction consisted of replacement of the outlet works.

G. Management Effectiveness Reviews

The Department of the Interior's (DOI's) Office of the Inspector General conducted a program review during 1994-95. This was a follow-up audit to one performed in 1989 of the BIA SOD Program.' The recent audit recommended: (1) reviewing procedures for cost-effectiveness; and (2) implementing Emergency Management Systems and EAP's at all BIA dams.

H. Dam Failures and Remedial Actions

There have been no major dam failures. The only incident occurred at Weber Dam in Nevada. During the spring runoff of 1995, two people tried to ride the spillway water. One person drowned. Additional signs and an improved fence were installed to help prevent a future occurrence.

I. Emergency Action Planning

The BIA has coordinated its efforts with Reclamation for EAP training. All of the BIA SOD coordinators attended an EAP training session during 1994. The BIA is continuing to work with Reclamation to establish or update EAP's at all BIA dams as soon as possible. FY 1996 funding has been identified for this purpose. Approximately one-third of all BIA dams have EAP's in place.

J. Application of ICODS Technical Guidance

The BIA has adopted the technical guidance developed by ICODS and is closely following issues and developments discussed at ICODS meetings.

K. State Dam Safety Agency Involvement

The Federal Government has a unique relationship with the American Indian Nations through the BIA. States do not generally have any authority over American Indians without the individual tribes giving specific authority. The BIA has full responsibility for implementing the SOD Program on Indian Reservations.

L. Research and Development and Special Initiatives

The BIA has no current effort in this area. The BIA and Reclamation are sister agencies within the DOI, with Reclamation having "Departmental Oversight"responsibilities for the SOD Program. The BIA relies on the "in house" expertise of Reclamation.

M. Public Concerns

The BIA has unique dam safety program responsibilities due to its special relationship with American Indians. All dams are located on Indian reservations. The BIA's relationship with the public for this program is generally only with the Indian community. In those instances where flooding would occur off a reservation, coordinating efforts involve off-reservation authorities and appropriate notice to local public entities.

IV. Impact on Agency Operations

A. Budget Impact

The SOD budget is a separate line item within the BIA. Each year, funds are requested based on planned work to be performed, and on the Technical Priority Rating List for the DOI. Dams at the top of the list are considered less safe than lower rated dams. The BIA requested $30 million in the President's FY 1996 budget. This request was reduced to $18 million by Congress in the Government's effort to reduce budget deficits. The BIA expects to receive $18 million each year for the foreseeable future.

B. Impact on Contracting Procedures

Due to its unique relationship with American Indians, the BIA contracts with the various tribes under the authority of P.L. 93-638. Complying with the Guidelines does not affect the BIA's contracting procedures with the tribes or with the private sector.

C. Budget Allocation for Training/Education

As stated above, the BIA's sister agency, Reclamation, has departmental oversight for the SOD Program for DOI. With Reclamation's experience and qualified personnel, the BIA utilizes the resources of Reclamation for training and technical consultation and construction contracting expertise.

BUREAU OF LAND MANAGEMENT

I. Introduction

The Bureau of Land Management (BLM) is responsible for BLM-owned dams located on public lands in 10 Western States and Alaska. Of the approximately 917 BLM-owned dams, only 2 are in the top 430 of the Department of Interior's list of significant or high hazard dams. Neither poses an immediate threat and both have repairs planned or underway. Dam maintenance and damage correction during the period was normal. BLM did not experience any dam failures or incidents during the reporting period and had no dams that were the subject of public concern. While BLM-administered land hosts other dams owned and operated by a variety of public and private entities, these other-owned dams occupy BLM lands only by obtaining occupancy rights from the BLM or Federal Energy Regulatory Commission (FERC). Their maintenance is the responsibility of the dam owners.

II. Program Actions Since Last Progress Report

A. Implementation

BLM's dam safety organization is adequate for the type, size, location, and hazard of dams owned by the Bureau. Government-wide downsizing and reorganization have temporarily left some Field offices with staffing that is marginal to accomplish current inventory requirements and risk ratings, but capable of emergency action planning. The full range of activities normally associated with dam safety programs is not always competitive in times of tight budgets. While the protection of human life is always a high priority for the Bureau, BLM dams are not always recognized for the protection they can provide to valuable public land resources.

B. Actions Taken

BLM's dam safety program has made good progress toward adopting the Guidelines. However, during the past 2 years, buy-outs, reorganizations, and transfers of personnel in the BLM have resulted in shortages in trained dam safety personnel in some offices. During this transition, some State Offices have been unable to designate a contact person for dam safety. The BLM is seeking support to emphasize the implementation of the program through training and new contacts for dam safety in each state.

C. Changes in Program Administration

In 1995, BLM established the National Applied Resources Science Center (NARSC) in Denver, which hosts the BLM's Dam Safety Program. NARSC is aligned with the Headquarters office but it is located to better serve the field offices. A new Dam Safety Officer was appointed and will serve as contact and liaison for the Dam Safety Program, working with State Offices to maintain and focus program priorities in this time of budget shortages. The Dam Safety Officer is examining the liabilities involved in the implementation of the Guidelines as they pertain to permitted dams.

III. Implementation Progress

A. Organization, Administration, and Staffing

Each BLM State Office Director has dam safety responsibilities for their jurisdiction and report to BLM's Director. The responsibility is exercised through the Deputy State Director for Operations. Each State Office should have a contact for dam safety responsible to the Deputy State Directors for Operations. These contact positions receive technical and policy guidance, information, and assistance from NARSC. Currently, BLM is reorganizing to be more responsive to its customers. During this reorganization, some states temporarily do not have dam safety contacts.

Within each State Office, each District Manager is responsible for providing the District with technical direction. Each District Manager is responsible to the BLM Director through the State Director.

This organization is adequate and flexible enough to meet BLM's responsibilities, although program funding shortages limit the ability to expand priorities and training.

B. Dam Safety Training Activities

BLM's former Dam Safety Officer provided the Federal Emergency Management Agency (FEMA) Training Aids for Dam Safety (TADS) to the State Offices. He informed the State Offices of dam safety training classes offered. BLM's new Dam Safety Officer attended Safety Evaluation of Existing Dams (SEED) training. State Offices did not send personnel to the SEED training in 1995 because of funding shortages and reorganization.

C. Dam Inventories

In the past, BLM has utilized the Bureau of Reclamation's computer to house its dam inventory. During the reporting period, BLM added a dam safety module to the Bureau's Facility Inventory and Maintenance Management Program. The module only needs minor adjustments for smooth operation. This new BLM data base will be more identifiable and accessible to the field offices. Currently, BLM lacks an accurate, comprehensive inventory. The accuracy and completeness of the dam safety inventory varies by state. The new module will also allow improved inventory and tracking of resource risks in the event of a dam failure.

D. Independent Reviews

BLM did not utilize independent consultants for the review of design, construction, and operation of dams during the reporting period. The State Offices provide an independent review as oversight of the District Office's actions.

E. Inspection Programs

At least 225 BLM dams were inspected during the reporting period. Inspections were accomplished by BLM personnel. The significant and high hazard dams have been inspected more often than required in guidance. Inspections of low hazard dams tend to be lower than

the guidance level. BLM expects to evaluate policy, procedures, priorities, liabilities, and cost recovery options in dam safety inventories and operations in the coming year.

F. Dam Safety Rehabilitation Programs

The following dams were rehabilitated for safety reasons during the reporting period.

1. Idaho: Minor rehabilitation work was accomplished on the Uhrig and Pitt Reservoir Dams. An old gate structure was removed and the intake structure improved on the Bentonite Detention #1 Dam.

2. Oregon: Spaulding and Walls Lakes Dams were reconstructed by armoring the spillway.

3. Montana: Beardsley Reservoir and Lobella Detention Dam were fitted with new riser and barrel. Lobella Detention, Dwarf Detention, and Whitetail Detention Dams, Maier and Homestead Reservoirs had their upstream faces rebuilt.

4. Wyoming: Teton Reservoir outlet pipe was replaced because of ice damage.

None of these were rated as high hazard and the work was largely preventive or damage-corrective in nature.

The following dams will need rehabilitation for safety reasons as funding becomes available.

1. California: Paynes Creek and Upper Biscar Dams need rehabilitation to correct beaver damage to the crests of the dams.

2. Colorado: There is a need to halt a backcutting problem below the spillway of Goshawk Dam.

3. Idaho: Horseshoe Retention Dam needs spillway repair. Need to repair concrete control structures upstream from Bradshaw Detention #4. Need vegetation removal and clean outlet structure on the Southfork Detention Dam. Need upstream drainage on the Bradshaw Detention #3 Dam.

4. Montana: Those scheduled for rehabilitation include Homestead, Hot Well, and Blackfoot Reservoirs.

5. Wyoming: Wiley Reservoir outlet pipe will be replaced because of ice damage.

None of these are rated as high hazard dams and planned work is largely preventive or damage-corrective in nature.

G. Management Effectiveness Reviews
BLM did not conduct Management Effectiveness Reviews (BLM's Technical Procedure Reviews) during the reporting period.

H. Dam Failures and Remedial Actions
BLM did not experience any dam failures or incidents during the reporting period.

I. Emergency Action Planning
BLM's high and significant hazard dams have EAP's which are reviewed and updated annually. BLM does not have local procedures in place for testing the EAP's effectiveness, nor have they been tested. BLM has required the Flood Control District of Clark County, Nevada to prepare EAP's for high hazard permitted dams. There are eight dams constructed in Clark County, but none of the EAP's is finalized.

J. Application of ICODS Technical Guidance
These documents have been made available to State Offices. However, BLM plans to revise Manual guidance and right-of-way stipulations to reflect ICODS guidance.

K. State Dam Safety Agency Involvement
The level of State government dam safety agency involvement varies among the BLM State Offices from joint operations to minimal formal contact.

L. Research and Development and Special Initiatives
BLM had no dam safety R&D or special initiatives during the reporting period.

M. Public Concerns
BLM is not aware of any BLM dams or permitted dams under its jurisdiction which have been the subject of public concern.

IV. Impact on Agency Operations

A. Budget
None.

B. Impact on Contracting Procedures
BLM has in place all procedures and staffing to contract necessary design, construction, and rehabilitation of dams. Currently, adequate staff exists to do the work in-house. As the workload increases or the staffing shrinks, BLM has the capability of using outside contracts.

C. Budget Allocation for Training/Education
As noted, BLM has not emphasized new training or education for identification of risks or rehabilitation because of the lack of funding and demands of other priorities.

U.S. BUREAU OF MINES

I. Introduction

The Bureau of Mines (USBM) does not directly own, design, construct, operate, or maintain dams. This is consistent with previous FEMA reports.

II. Program Actions Since Last Progress Report

A. Implementation

The Health and Safety component of the transferred USBM functions to the Department of Energy (DOE) has adequate staff to devote to research on mine wastes, including impoundments and embankments, if it is agreed to be a viable research area within DOE or another organization. Formal coordination and funding between DOE and the Department of Interior (DOI) would allow research to be directed toward solving these problems.

B. Actions Taken

Future program directions are being made at this time.

Research has been ongoing on alternative waste disposal, alternative mining methods, and stabilization/alteration of wastes to reduce the potential for mine-related waste impoundments. The alternative disposal work is directed to submarine or subaqueous disposal and mine backfilling, thus eliminating some of the need for tailings dams.

In cooperation with the Forest Service (FS), existing techniques for determining the fundamental engineering properties for assessing the stability of new and existing hardrock mine dumps have been evaluated. Soil moisture data from cased drill holes located in a 50-yr-old rock dump indicate that the maximum increase from baseline values recorded last September was only 4 percent. Despite precipitation values well above normal, soil moisture content decreased this spring and early summer. This information indicates that expensive dump closure procedures, such as capping, may not always be necessary.

C. Changes in Administration

During the current Legislative actions on the Fiscal Year 1996 budget, the USBM had been slated for termination and selected activities transferred to other Federal agencies (House Joint Resolution 108, One Hundred Fourth Congress). Limited health and safety and related research in Pittsburgh, PA and Spokane, WA will continue under the DOE, Fossil Fuels Division. At this time, it is uncertain if the dam safety research conducted by the USBM will continue. However, the in-house expertise in tailings and waste rock dam stability will most likely be transferred to the DOE.

III. Implementation Progress

A. Organization, Administration, and Staffing

Not applicable.

B. Dam Safety Training Activities
Not applicable.

C. Dam Inventories
Not applicable.

D. Independent Reviews
Not applicable.

E. Inspection Programs
Not applicable.

F. Dam Safety Rehabilitation Programs
Not applicable.

G. Management Effectiveness Reviews
Not applicable.

H. Dam Failures and Remedial Actions
Not applicable.

I. Emergency Action Planning
Not applicable.

J. Application of ICODS Technical Guidance
Not applicable.

K. State Dam Safety Agency Involvement
Not applicable.

L. Research and Development and Special Initiatives
Not applicable.

M. Public Concerns
Not applicable.

IV. Impact on Agency Operations

A. Budget Impact
Not applicable.

B. Impact on Contracting Procedures
Not applicable.

C. Budget Allocation of Training/Education
Not applicable.

BUREAU OF RECLAMATION

I. Introduction

The mission of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

The objective of the Dam Safety Program is to ensure that Reclamation structures do not present unacceptable risk to public safety and welfare, property, the environment, and cultural resources.

The Commissioner of Reclamation is the Department of Interior (DOI) coordinator for dam safety and is responsible for advising the Secretary of the Interior on program development and operation of the DOI Dam Safety Program. Reclamation's responsibilities include:

- assisting other Interior agencies with their individual Dam Safety Programs.
- developing dam safety policy standards and practices for implementation within Interior.
- evaluating the dam safety practices of other Interior Bureaus.
- promoting interagency cooperation in instances where operations at a given dam affect the operations of facilities administered by another agency.
- coordinating with the Federal Emergency Management Agency (FEMA) and other Federal agencies regarding Interior's dam safety matters.
- establishing priorities for initiating corrective actions on Reclamation's and other Interior agencies' dams rated high and significant hazard.

Under the Small Reclamation Projects Act, Public Law 84-984, Reclamation has the responsibility for providing assistance in the development of small Reclamation projects by non-Federal organizations. The non-Federal owner of any dam or related facility constructed, modified, or rehabilitated with loan funds provided under this Act, however, is solely responsible for the structural integrity and safety of the facility.

II. Program Actions Since Last Report

A. Implementation

All provisions of the Federal Guidelines have been implemented by Reclamation through the development of formal and informal policies, regulations, and procedures. The development of technical policy is a continuing endeavor.

B. Actions Taken

No recommendations for action were addressed to Reclamation in the "National Dam Safety Program, 1992 and 1993 Progress Report."

C. Changes in Administration

The President introduced his new Administration as one that would give every American an opportunity to see what their Government is doing for them--to ensure a government that is responsive to the people. He then charged the Vice President with conducting an intensive 6-month study of the Executive Branch of Government. Coinciding with the National Performance Review (NPR), Cabinet members were directed to initiate internal reviews of their functions, programs, and organizations, and to establish performance agreements with the President for reinventing their departments. Secretary Babbitt responded to that requirement by committing to "the transforming of the Bureau of Reclamation from a civil works agency into a pre-eminent water management agency that is cost effective in serving its customers."

Reclamation was the first bureau in DOI to undertake an agency study through formation of the Commissioner's Program and Organization Review Team. In its August 1993 report, the review team made recommendations to Commissioner Beard concerning the changes needed in Reclamation's programs to successfully complete the transition from a water resources development agency to a water resources management agency. The report also assessed how Reclamation could function better and the organizational culture and values needed as Reclamation endeavors to be more customer focused. In addition, the Reclamation Employees Organization for Ethics and Integrity, the Executive Management Committee, and hundreds of employees candidly identified problems and made thoughtful suggestions for improving their functions and meeting Reclamation's mission. On November 1, 1993, Commissioner Beard set forth his decisions in a report, "Blueprint for Reform: The Commissioner's Plan for Reinventing Reclamation."

Through the remainder of Fiscal Year (FY) 1993, the wheels were set in motion for change in the agency. The most fundamental change was the recognition that Reclamation is no longer a construction agency but a water resource management agency. Between May 1993 and August 1995, the number of Reclamation employees was reduced by 1,600, from 8,200 to 6,600. Another 800 employees will be retiring over the next year. As a result, Reclamation's workforce will have been reduced by 25 percent. Reclamation also restructured and empowered its area offices so they now have the responsibility for day-to-day decisions. The Regional offices were downsized and the Denver headquarters concept was abolished. The Denver operation was reduced by 25 percent and is now predominately a reimbursable technical service center.

Through the restructuring, Reclamation also continued to recognize that there is $11 billion in initial investment in water and power infrastructure which requires maintenance and periodic rehabilitation to ensure that benefits continue to be safely provided. Managing public safety issues is a critical activity in water resource management.

Reclamation's Dam Safety Program recognizes two needs. First, those with day-to-day operating responsibility must take responsibility for monitoring and assuring the safe operation of their facilities. Second, Reclamation has a responsibility to the downstream public. The organizational independence of the Dam Safety Program from the direct day-to-day operating responsibility for dams is an important part of Reclamation's self-regulation.

The Dam Safety Program, which consists of periodic inspection, performance monitoring, data collection, analysis, and corrective action formulation and implementation, was maintained as a centrally managed Reclamation-wide program. However, the management was shifted from the technical center to a component of the Commissioner's Office, under the Director of Operations. This organizational restructuring reduced the management layers between the Commissioner and the Chief of the Dam Safety Office. The restructuring also maintained the Dam Safety Program as separate from the direct day-to-day operational responsibility which was delegated to Reclamation's five Regional Directors.

Reclamation has continued to place a priority on funding dam safety remediations. The FY 1996 enacted budget for corrective action studies and implementation was $91 million, approximately 22 percent of Reclamation's total construction budget.

III. Implementation Progress

A. Organization, Administration, and Staffing

Reclamation has adequate management and technical staff to accomplish the defined and appropriated Dam Safety Program. Through the restructuring, appropriation funding was used to identify staffing levels. Because of the good financial support for the program, expertise was maintained in critical areas.

Continued reduction of the overall staff will occur over the next year through retirements and financial incentives to discontinue Federal service. A considerable amount of experience will be lost; however, recognition of individuals who have signed up to discontinue service is allowing Reclamation to take steps to transfer experience and corporate knowledge.

B. Dam Safety Training Activities

Reclamation continues to rely on active participation with the Association of State Dam Safety Officials (ASDSO), U.S. Committee on Large Dams (USCOLD), American Society of Civil Engineers (ASCE), and other professional societies to provide professional training opportunities and to facilitate technology and information exchange. The agency has also participated in the Interagency Committee on Dam Safety (ICODS) technical seminars which were conducted during the reporting period. Reclamation employees also participated in FEMA training.

Reclamation continues to be actively involved in providing dam safety training to Federal, state, and foreign governments and individuals in the private sector. Reclamation also provides assistance to states through ASDSO.

The Dam Safety Training Program at Southern University at Baton Rouge, Louisiana, is the product of a cooperative effort between Southern University at Baton Rouge and Reclamation. A two-course series, Introduction to Dam Safety, and Engineering of Dam Safety, was developed as the foundation of the Safety of Dams (SOD) Training Program. The main source of technical information used for teaching was the Training Aids for Dam Safety (TADS) manuals published by Reclamation. Other activities of the SOD Training Program during 1994-95 included (1) development and distribution of an in-house information brochure; (2) initial contacts with several consulting firms to introduce the program and to assess the feasibility of establishing an internship program; (3) the development of a multimedia course with emphasis on dam safety training; and (4) a general effort to introduce the SOD Training Program at the state and national level.

During the reporting period, Reclamation was involved in presenting or participating in the following training programs.

- The Annual DOI Dam Safety Coordinators Meeting was held in May 1995 in Port Angeles, Washington. The National Park Service (NPS) was the host. Over 100 participants attended. In May 1994, the meeting was held in Mescalero, New Mexico, and was hosted by the Bureau of Indian Affairs (BIA).

- Reclamation and ICODS jointly produced a two-video tape lecture by Dr. Ralph Peck on Seepage and Piping. These tapes will be accompanied with copies of articles recommended by Dr. Peck. The tapes will be distributed to Federal agencies and to each state dam safety office.

- In April 1995, Reclamation conducted a 1-week seminar in Denver on Safety Evaluation of Existing Dams. The Seminar was attended by over 125 engineers, technicians, and administrators from Federal, state, and municipal agencies, and the private sector.

- A 2-week International Technical Seminar on Dam Safety, Operation, and Maintenance was conducted in October 1994 by Reclamation. The Seminar, with more than 40 attendees, consisted of technical lectures and a field study tour of selected Reclamation facilities in the Phoenix, Arizona area.

- A 1-week Water Systems Operation and Maintenance Workshop was conducted in February 1994 and 1995. Nearly 120 water system supervisors, managers, watermasters, and similarly responsible personnel from other DOI agencies and district board members attended each of these workshops.

- TADS is a multi-agency project sponsored by ICODS and ASDSO Officials to provide self-study training. Reclamation has been managing the project. During FY 1994 and 1995, two modules of the initial series, along with the Group Facilitators Guide, were completed and widely distributed.

In addition to formal training, Reclamation also provides quarterly Water Operation and Maintenance (O and M) Bulletins to approximately 1,200 managers, watermasters, district board members, and operators associated with Reclamation projects. An additional 300 copies of the bulletin are furnished to other individuals and organizations. The following Water O and M Bulletins have been published during FY 1994 and FY 1995. Topics provided in the bulletins are listed below.

Water O and M Bulletin No. 167, March 1994 - 24 pages
"Grand County Dipper" Makes Its Debut
Multipurpose Constructed Wetlands - Hemet Site Demonstration Project
Innovations in Penstock Lining
Low-Cost Sedimentation Cure Tested
Ellis Self-Cleaning Screen
New Dimensions of Conservation Used To Stretch Water Supplies
Innovative Methods for Levee Repair

Water O and M Bulletin No. 168, June 1994 - 26 pages
Wetland Mitigation and Stream Restoration
Bridge Diving Inspection and the Competitive Bid System: Problems and Pitfalls
Artificial Reef Tested in Beach Erosion Control Project
Seeking Solutions for Icing at Dams and Hydroplants
Aging Infrastructure Revitalized

Water O and M Bulletin No. 169, Sept. 1994 - 16 pages
Hazardous Energy Control Program
Gate Stem Covers
Leaking Joint Problem Solved With Internal Seal
A 'Whole' Lot of Planning Going On
Manual Collection of Digital Data

Water O and M Bulletin No. 170, Dec. 1994 - 18 pages
Deschutes Canal Lining Demonstration - Construction Report
Slide Gate Air Slot for Cavitation Damage
Solar Panel Protection
Project Innovations
Sharks at Coralville Lake?

Water O and M Bulletin No. 171, March 1995 - 21 pages
System Scheduling Using Efficiency Block Technology
Seismic Monitoring/Strong Motion Program and Notification System
Remote Control of a Solar-Powered, Inflatable-Gate Check Structure
Project Innovations:
Protecting Pushbutton Controls at Granby Dam
Oil-Absorbent Socks

Water O and M Bulletin No. 172, June 1995 - 34 pages
Repair and Rehabilitation of Prestressed Concrete Pipe at the Central Arizona Project
Tolt Dam Advance Warning System
Gate Automation Upgrade - A Solar-Powered Gate Operator
Panel Wall Heaters

Water O and M Bulletin No. 173, Sept. 1995 - 26 pages
Project Innovation: San Juan-Chama "Tunnel" Cat
Zinc Thermal Spray.....The Corrosion Solution for the Mormon Flat Dam
Specifying Higher-Efficiency Motors
Wrap Protects Watering System from Corrosion
Directors' Group Troubleshoots Tough Public Works Problems

Water O and M Bulletin No. 174, Oct. 1995 - 34 pages
Hoover Dam Visitor Facilities Attract Record Crowds
Laboratory and Field Evaluation of Acoustic Velocity Meters at Hoover, Davis, and Parker Dams
Stepped Overlays Proven for Use in Protecting Overtopped Embankment Dams
Canal Sealants for Use on "Green" Concrete
Roller Compacted Concrete Overtopping Protection in the USA

C. Dam Inventories

During this reporting period, Reclamation had only minor changes to the National Inventory of Dams. This reflects a better integration of information within the agency. Jordanelle Dam was added to the inventory as construction was completed during the reporting period. Reclamation continues to support the National Inventory through ICODS.

Congress authorized the transfer of title of Picacho North, Picacho South, and Lucero Dike to the El Paso County Water Improvement District #1 and the Elephant Butte Irrigation District in Public Law 102-575. The transfer of title was subject to the National Environmental Policy Act which Reclamation was completing during the reporting period. The actual transfer was accomplished January 19, 1996. This will place the structures under the regulatory authority of the State of New Mexico. Dam safety information will be transferred to the state.

Within Reclamation, considerable effort has been put forth to integrate the data bases which exist throughout the various organizations and individuals involved with the program.

The Dam Safety Information System (DSIS) was implemented during FY 1995. DSIS warehouses information combined from individually established databases and allows organizations to share information throughout Reclamation. DSIS is unique in that anyone involved in Reclamation's Dam Safety Program owns part of the database. Other organizations have databases that connect and link to DSIS. If the need arises to share information, the tables can be incorporated into DSIS. Dam safety information from 15 different areas is available on more than 1,100 dams. Several improvements have been made to enhance information being collected and stored. Fields in existing tables have been added or changed. New tables have been added as program needs and goals changed. Meetings were held with the Region and Area Offices to introduce them to DSIS, show them the capabilities of the DSIS, and help foster their ownership of DSIS.

Reclamation continued maintaining the DOI Working Group Technical Priority List for all high and significant hazard DOI dams. The list ranks all dams based on the severity of the safety deficiencies, and has been very valuable to DOI managers in prioritizing corrective action and funding on the highest ranked structures. Three meetings with the DOI Working Group were held during FY 1995.

D. Independent Reviews

Reclamation policy makes independent review of work mandatory when there is a major element of public safety involved. For design and construction of new dams and major modifications, this is accomplished using outside consultants.

Reclamation has no difficulty in acquiring the services of well-qualified, competent consultants, whether individuals or firms. In addition to using outside consultants on dams, Reclamation often assigns senior-level technical staff as advisors to a design team and requires that principal designers inspect specific construction activities. Independent consultants hired to review the designs are usually invited to occasional on-site inspections of construction activities.

Operations of dams are conducted in accordance with instructions in a Standard Operating Procedure (SOP) document prepared for each dam. Independent review is performed periodically by two Reclamation programs: Review of Operation and Maintenance and Safety Evaluation of Existing Dams.

In addition, outside independent review was utilized to review six dams which Reclamation had evaluated as having no outstanding deficiencies. Three of the dams were reviewed by a panel of practicing professionals from the Corps of Engineers (Corps) and the remaining dams were reviewed by a panel of outside consultants.

E. Inspection Programs

During FY 1994, Reclamation engineers inspected 69 Reclamation dams, 27 BIA dams, and 40 NPS dams, and reassessed the hazard classification of 1 dam. During FY 1995, 88

Reclamation dams, 34 BIA dams, and 43 NPS dams were inspected and the hazard classification of 9 dams was reassessed.

F. Dam Safety Rehabilitation Programs

Reclamation has a variety of authorities by which structures can be rehabilitated. Generally, dam safety modifications which are undertaken to modify a dam for new seismic, hydrologic, or state-of-the-art criteria utilize the authority provided by the Reclamation Safety of Dams Act of 1978, as amended in 1984. The Act provides $750 million in appropriation authority for Safety of Dam modifications. Since 1978, Reclamation has completed structural modifications of 28 dams. During the reporting period, construction modifications were completed on 2 dams where all dam safety issues were addressed; 11 dams are under construction; 4 facilities had early warning systems completed; and 9 have early warning system implementation underway. Approximately $544.5 million of the Safety of Dams Act authority has been expended as of September 30, 1995, and indexing allows $351.3 million of available authority.

Dam Name, State and Year Corrective Construction Action Completed	SOD Deficiencies	Corrective Actions	Cost ($1,000)
Deer Flat, ID 1994	Seepage Seismic stability	Installed stabilization berms; Filter/drain system; Upstream embankment protection	$ 20,300 est
Steinaker, UT 1994	Liquefaction Seismic stability Seepage Upstream slope stability	Installed downstream drainage; Foundation densification; Constructed stability berm; Modified upstream slope	$ 10,322
Angostura, SD 1994	Overtopped by large flood events	Early Warning System	$ 33
Belle Fourche, SD 1994	Overtopped by large flood events	Early Warning System	$ 80
Horseshoe, AZ 1995	Seismic Overtopped by large flood events	Constructed auxiliary fuse-plug spillway Constructed stability berm	$ 22,784 est
Joes Valley, UT 1995	Erosion of the embankment during large flood events	Early Warning System	$ 91

Como, MT 1991[2/]	Liquefaction Sandboils/seepage Overtopped by large flood events	Constructed filtering blanket; Construct downstream filtered toe drain with berm; Raise dam and install Early Warning System to reduce risk due to large floods; Modify spillway to increase efficiency	$ 12,053 est Under construction
Ochoco, OR 1991[2/]	Seepage Overtopped by large flood events	Placed impervious layer on upstream face of embankment; Install upstream filtered seepage trench; Modify spillway and install Early Warning System to reduce risk due to large floods	$ 33,000 est Under construction
Bumping Lake, WA	Seismic stability Seepage Spillway wall overtopped and floor slab failure during large flood events	Downstream stabilization berms; Filter/drain system Modify outlet works tunnel and spillway; Install Early Warning System to reduce risk	Under construction
Folsom/Mormon Island, CA	Liquefaction	Foundation densification upstream and downstream	Under construction Phase II complete
Coolidge, AZ[3/]	Static and dynamic stability Overtopped by large flood events	Realign and replace spillways; Stabilize abutments; Armor downstream abutments; Stabilize rock mass above right spillway; Early Warning System	Under construction
Theodore Roosevelt, AZ	Overtopped by large flood events Seismic	Raise dam Modify spillways	Under construction
Meeks Cabin, UT	Seepage Overtopped by large flood events	Construct diaphragm cutoff wall; Install Early Warning System	Under construction
Bartlett, AZ	Seismic Overtopped by large flood events	Raise dam; Stabilize dam; Modify spillway	Under construction

Cold Springs, OR	Seepage Liquefaction Inadequate spillway	Install downstream drainage system; Foundation densification; Stabilization berms; Replace existing spillway	Under construction
Rye Patch, NV	Liquefaction	Downstream foundation treatment; Construct berm	Under construction
Jamestown, ND[1/]	Seepage Overtopped by large flood events	Relief well and filter berm; Early Warning System being evaluated to reduce risk due to large floods	Under construction
Olympus, CO	Overtopped by large flood events	Early Warning System	EWS installation complete; EAP being revised
Clark Canyon, MT 1985[2/]	Seepage Overtopped by large flood events	Replaced right and left toe drains; Early Warning System	$ 158 EWS initiated
Bonny, CO 1988[2/]	Seepage Overtopped by large flood events	Installed toe drain Early Warning System	$ 1,805 est EWS initiated
Box Butte, NE	Overtopped by large flood events	Early Warning System	EWS initiated
Foss, OK	Overtopped by large flood events	Early Warning System	EWS initiated
Boysen, WY	Overtopped by large flood events	Early Warning System	EWS initiated
Bull Lake, WY	Overtopped by large flood events	Early Warning System	EWS initiated
Twin Lakes, CO	Overtopped by large flood events	Early Warning System	EWS initiated
A. R. Bowman, OR	Overtopped by large flood events	Proposed: Embankment overtopping protection	Modification Report in OMB
Twin Buttes, TX	Seepage Overtopped by large flood events	Proposed: Relief wells or cutoff wall; Install Early Warning System to reduce risk due to large floods	Modification Report in Congress
Scofield, UT	Liquefaction	Proposed: Stone columns	Modification Report in Congress

Bradbury, CA	Liquefaction Dynamic stability Overtopped by large flood events	Interim downstream dewatering Proposed: Downstream foundation treatment berm, spillway crest modification, and Early Warning System to reduce risk due to large floods	Implemented Modification Report being developed

1/ Corrective action funded with other than Safety of Dams (SOD) funding.
2/ A continuing SOD deficiency remains.
3/ BIA-owned.

G. Management Effectiveness Reviews

In May 1994, Reclamation utilized an internal team of individuals representing area offices, regional offices, and the Denver Office to evaluate the Dam Safety Program for areas where processes could be improved and where the organization could operate more efficiently. The team recommended improvements in the process by which instrumentation data was collected and transmitted to Denver, and also recommended that Reclamation's various examination processes be consolidated into a single team process which includes annual examination, periodic facility review on an interval not to exceed 3 years, and a comprehensive facility review on an interval not to exceed 6 years. The report also recommended the utilization of Reclamation-wide resources to accomplish dam safety activities rather than the traditional organizational responsibilities. The Dam Safety Program has been implementing the team recommendations and is establishing policies and directives where necessary.

H. Dam Failures (Incidents) and Remedial Actions

Failure of Spillway Gate No. 3 - Folsom Dam - California

On July 17, 1995, at approximately 8:00 a.m,, gate number 3 at Folsom Dam failed. Folsom Dam is located on the American River, about 25 miles upstream from Sacramento, California.

The spillway gate was being operated to maintain downstream releases. Just before failure, the gate setting was between 2.5 and 3.0 feet with a release of about 6,000 ft_3/s. The reservoir level was elevation 464.6 feet, about 1.4 feet below the maximum water surface. Gate vibration was noted at this setting.

The operator shut off the gate hoist mechanism when vibration began. Shortly thereafter, the gate began to fail. The right side of the gate face moved downstream, allowing a release of approximately 43,000 ft_3/s through the opening.

After reporting the failure, the operator traveled to Nimbus Dam, an afterbay directly downstream, and opened enough gates to safely pass the inflow. The incident was also reported to downstream agencies. Shortly following notification, the American River Parkway

was evacuated. Channel capacity was not exceeded, but portions of the parkway were inundated.

Closure of the spillway bay was not possible with an initial head of over 40 feet. Reclamation and the Corps developed a plan to fabricate and install stoplog guides and stoplogs when the reservoir head reached about 10 feet above the spillway sill. Stoplog guides, with bracing extending across bays 3 and 4, were installed in August 1995.

Inspection reports before failure noted the presence of corrosion on connections and frame members. These inspections were not detailed or close up due to access problems. Following failure, Reclamation and the Corps, with cooperation from the State of California, Department of Transportation, began inspection of the remaining seven gates. Inspections were by experienced professionals with knowledge of climbing and inspection of bolted and welded connections.

No final conclusions have been drawn about the cause of failure. Probable factors include friction in the trunion pin connection, flow-induced gate vibration, and under-designed connections and gate members. It appears that corrosion by itself may not have been a leading factor in the failure as initially thought. Reclamation has ruled out operational errors. The gate was operated in accordance with the standard operating procedures.

All possible contributing factors, including vibration, are being investigated. A detailed report will be published by Reclamation and the Corps when the investigation is completed.

As of November 28, 1995, the seven remaining gates are being strengthened with additional members and reinforcing plates. Bolt sizes have been increased, and in some cases bolted connections have been redesigned as welded connections.

Incident - Increased Seepage and Piping - Ochoco Dam - Oregon
Extensive embankment modifications were completed at Ochoco Dam in December 1994. While under 24-hour per day monitoring during initial filling of the reservoir, a sudden increase in seepage in the drain systems and internal pressures was observed on the night of May 17, 1995. Conditions stabilized within a few days.

Intensive investigations and monitoring occurred throughout the summer. As the reservoir was drawn down, a concentrated seepage inflow area was identified on the upstream face of the embankment. The concentrated seepage inflow allowed for cinders to be placed over the area and the seepage and internal pressures dropped dramatically. Pumps allowed the reservoir to be pulled down below the area and the embankment was excavated. The cinders which were used to choke off the seepage allowed for the forensic excavation to locate a riprap layer which was not discovered in the initial modification. The area will be repaired before onset of the local flood season. Filling of the reservoir will be intensively monitored. During the incident, a local emergency response team was mobilized. This team coordinated public awareness

efforts with Reclamation. Rapid response emergency action plans were updated and a level 1 alert was declared.

Incident - Seepage and Uplift - Twin Buttes Dam - Texas
A reservoir operating restriction was implemented in December 1993 to address dam safety concerns related to seepage through the foundation of the dam. The restriction reduces the conservation storage in the reservoir by approximately 75,000 acre-feet and includes increased monitoring requirements should the restricted operating level be exceeded during large inflow events. It also includes revisions to the Emergency Action Plan (EAP) and development of an Emergency Response Plan by the City of San Angelo to ensure adequate response in the event of an emergency at the dam. The operating restriction will remain in effect until completion of structural corrective actions.

The middle 4 miles (approximately) of the 8-mile long dam were constructed without a positive cutoff to bedrock. A soil-cement-bentonite cutoff wall has been selected as the preferred corrective action alternative. Construction will be initiated in the spring of 1996 and is scheduled to be completed by early 1999.

Incident - Seepage and Piping - Jamestown Dam - North Dakota
Dam safety concerns related to piping through the foundation of Jamestown Dam were identified in the Spring 1995. This coincided with a period of unusually high inflows to the reservoir which caused the reservoir to rise to within 1 foot of the maximum operating level experienced to date.

Reclamation and the Corps coordinated the operations of Jamestown Dam and Pipestem Dam (located on an adjacent drainage) to reduce storage in Jamestown Reservoir while minimizing impacts in the City of Jamestown (located immediately downstream of the dam) caused by releases from the two dams. Operations of the two dams were closely coordinated with officials from the City.

Reclamation initiated activities to address the seepage-related dam safety concerns at Jamestown Dam in the Summer 1995. A contract to install eight relief wells and a collection system was awarded in September 1995. Construction is expected to be completed by early 1996. Additional structural measures are being considered for implementation in the Spring 1996.

Incident - Seepage and Uplift - Lake Alice Dams - Nebraska
A reservoir operating restriction was implemented in December 1994 to address seepage-related dam safety concerns at Lake Alice Dam No. 1. The restriction allows safe operation of the dam during inflow events of up to the 100-year flood. The restriction reduces the conservation pool level by 2 feet and includes increased monitoring requirements if the restricted operating level is exceeded. The operating restriction will remain in effect until completion of structural corrective actions. Construction of a filtered toe drain is scheduled to begin in the Fall 1996 and be completed by early 1997.

Incident - Seepage and Piping - Glen Elder Dam - Kansas
The operating procedures of Glen Elder Dam (Waconda Lake) were revised in June 1995 to address seepage-related dam safety concerns at Cawker City Dike. Cawker City Dike is a protective dike which prevents reservoir storage from impacting Cawker City, Kansas.

In 1993, unusually high inflows caused the reservoir water surface to rise approximately 16 feet above the previous maximum operating level. Monitoring of the performance of the facilities indicated that piping through the foundation of the dike had been initiated during the period of high reservoir storage. The modified operating criteria require the controlled flooding of the downstream toe area of Cawker City Dike as the reservoir approaches the levels experienced in 1993. Reclamation has initiated activities to identify a preferred long-term solution to address the seepage related deficiency.

Cable Failure - Yellowtail Dam - Montana
On July 13, 1995, the wire hoist ropes for Spillway Gate No. 2, a 25-foot by 64.4-foot radial gate, slipped from the hoist drum and fell into the reservoir. The ropes were retrieved and reattached to the hoist drum to allow for operations of the spillway. Subsequent analyses of the incident have resulted in several recommendations for improvements to the ropes and hoisting mechanism.

I. Emergency Action Planning
During the reporting period, Reclamation strengthened the Emergency Management Program to address potential emergency incidents that could affect life and property. Unanticipated situations sometimes develop at facilities that could result in large or rapid water releases, or dam failure. Reclamation is responsible for ensuring the safety of the public and protecting environmental resources that could be affected by such incidents.

This Emergency Management Program offers technical assistance to local communities and jurisdictions downstream from Reclamation dams to encourage the development of emergency warning and evacuation plans. A Reclamation survey found that:

- less than one-half of downstream communities have any emergency warning and evacuation plans.

- fewer than 1 in 10 of these communities have dam-specific plans that address community safety needs in conjunction with dam operations.

Even though most states do not require them, downstream jurisdictions need to prepare dam-specific emergency warning and evacuation plans.

It is not within Reclamation's authority to carry out public warning and evacuation; however, public safety is more important than bureaucratic jurisdiction. To provide the necessary measure of safety for the public, Reclamation encourages development of dam-specific warning and evacuation plans to ensure that the public is warned and evacuated in dangerous situations.

In addition, Reclamation has developed an EAP for each of its dams that provides specific procedures for notifying local emergency management personnel of anticipated high water releases or dam failure.

Reclamation's emergency management initiatives are not intended to reduce the emphasis placed on dam safety and implementing the Federal Guidelines for Dam Safety.

Reclamation helps local jurisdictions develop dam-specific emergency operation plans by providing:

- dam failure inundation maps, flood travel times, and maximum flood depths.

- notification procedures, equipment descriptions, and related communication information such as phone numbers of Reclamation personnel and radio frequencies.

- compatible communication equipment to ensure timely notification of emergency management authorities (not including equipment needed by local jurisdictions for warning and evacuation activities).

- information from the appropriate EAP, including facility descriptions, operational data, roles and responsibilities, response levels, and Reclamation's corresponding actions.

- sample warning and evacuation plans or information from Reclamation's Warning and Evacuation Guidelines, if appropriate.

- staff support for interpreting technical information provided by Reclamation.

- staff support to review local dam-specific Emergency Operations Plans to ensure that their emergency response procedures are properly linked to corresponding notification procedures in Reclamation's EAP's.

- staff to participate on Federal/state/local exercise design teams and in other emergency management planning activities.

- staff to participate in exercising local dam-specific Emergency Operations Plans that are undertaken jointly with Reclamation's EAP's.

- technical liaison with other Federal/state/local agencies.

During the reporting period, Reclamation has finalized the document, "Emergency Planning and Exercise Guidelines," dated March 1995. The document has two volumes: Volume 1: "Guidance Documents," and Volume 2: "Technical Handbook." The information contained in this document is intended to help in the development and/or revision of EAP's for dams and

reservoirs and local warning and evacuation plans for communities located downstream from dams that could potentially be impacted by operations at those dams.

Emergency Management Orientation Seminars (EMOS) were developed to help Reclamation comply with Departmental Manual requirements with regard to emergency management training, exercises, and coordination with downstream jurisdictions. This will help familiarize Reclamation and state and local emergency management personnel with emergency management concepts and philosophies as they relate to dam safety and early warning systems and early warning system components.

Training included three seminars during FY 1994 and two during FY 1995 for Reclamation offices in various locations throughout the West. Participants included approximately 100 local, state, and Federal emergency management personnel and dam tenders. Each seminar consisted of 1-1/2 or 2 days of classroom training conducted by Emergency Management Specialists. Six seminars were also conducted during FY 1995 in various locations for the BIA and one orientation was held at a BIA dam. In addition, an Emergency Management Workshop was conducted during FY 1995 in Sacramento and one in Denver for Reclamation personnel.

Tabletop exercises were held at three Reclamation dams during FY 1995 and one included an orientation. Orientation only was held at two other Reclamation dams during FY 1995.

In fulfillment of Reclamation's obligation under the Memorandum of Understanding with Southern University at Baton Rouge regarding its Dam Safety Training Program, Reclamation provided a lecturer on Emergency Action Planning for the 1995 spring semester course entitled "Introduction to Dam Safety."

An Emergency Management Specialist provided training to the Colorado Natural Hazard Mitigation Council in 1995 in Grand Junction and Boulder, Colorado.

J. Application of ICODS Technical Guidance

Reclamation maintains its own technical guidelines on many subjects associated with dam safety. ICODS Guidelines are generally encompassed within Reclamation's publications.

During the reporting period, Reclamation has participated on the ICODS technical guideline update efforts. Reclamation has provided team members for the draft updates and also has participated in the EAP pilot training activities which will be used in the update of the guidelines. The update of the guidelines will be beneficial to Reclamation.

K. State Dam Safety Agency Involvement

Reclamation's cooperation with state dam safety agencies has been both general and specific. In general, Reclamation has Memoranda of Understanding with each of the 17 Western states where Reclamation has facilities. Meetings between Reclamation and the states are conducted annually and state representatives may participate with Reclamation staff in dam safety

inspections. States have also participated with Reclamation on information briefing. The Dam Safety Section with the Washington Department of Ecology and Reclamation have been collaborating in a joint research project to investigate inflow design flood parameters. In addition, Vern Persson, Chief, Division of Safety of Dams, for the California Department of Water Resources, has been collaborating with Reclamation as a member of the Folsom Dam Gate Failure Forensic Team.

L. Research and Development and Special Initiatives

The Federal Guidelines for Dam Safety stated that risk-based analytical techniques and methodologies are a relatively recent addition to the tools available for assessing dam safety. The Guidelines also noted that with further refinement and improvement, risk-based analysis will probably gain wider acceptance in the engineering profession and realize potential as a major aid to decision-making in the interest of public safety. Agencies were encouraged to conduct research to refine and improve the techniques and to develop the methodologies and base of expertise necessary to apply them to dam safety evaluation.

Reclamation has, to a limited extent, used risk analysis in its evaluation processes. However, Reclamation has increased its efforts to develop its agencies' ability to apply risk-based approaches to dam safety evaluations. In January 1995, Reclamation started collaboration with British Columbia Hydro and with the State of Washington to collect information on risk analysis approaches. In September 1995, Reclamation entered a collaborative effort with Utah State University to develop criteria and procedures for using risk-based analysis as a tool in Reclamation's decision-making.

Much of the other research or other activities described is focused on developing information which will improve risk-based tools. In general, Reclamation has tried to collaborate with other interested parties in the described research. In this way, the funding available to Reclamation is leveraged to provide a broader benefit.

Breach Characteristics of Embankment Dams Research

Once embankment dams begin to overtop, the size, peak discharge, and time to develop the breach are important parameters in assessing downstream risks. Currently, these parameters are not well understood and, as a result, are conservatively estimated.

Description: The objective of the research is to develop a new physically-based state-of-the-art numerical model to simulate the dam breach process and produce the dam breach parameters required as input for the NWS DAMBRK model or other dam break flood forecasting. These parameters include breach formation time and the width, depth, and side slopes of dam breaches as a function of time during the breach process. The physically-based model will simulate the relevant erosion, headcutting, and geotechnical processes, and will be applicable to dam breaches caused by dam overtopping or liquefaction failures induced by piping or seismic events.

Status: Presently in a background research, planning, and experimental design phase. The next 3 years will encompass the main efforts of the study, with large-scale (near-prototype) testing of model embankments, development of instrumentation, and finally, development of the new dam breach model. Collaborative funding is also being sought to keep this project on schedule.

Dam Foundation Erosion Research

Safe performance from a concrete dam during overtopping caused by large flood events typically depends on the erosion potential of rock foundation materials. Existing erosion prediction methods have limited application in hard-rock or cohesive foundation materials. Erosion potential in various geologic settings and progressive erosion as a function of time need to be better understood. More accurate erosion estimates would permit more efficient and reliable solutions to be implemented. In addition, rock formations and jointing influences that can safely withstand overtopping without protection can hopefully be established with confidence. Dam owners may avoid expensive retrofit such as additional or expanded spillways or foundation armoring if they can show that erosion in the foundation area of a dam does not place the dam in jeopardy.

Pacific Gas and Electric, Electric Power Research Institute (EPRI), Colorado State University (CSU), and HDR engineering are collaborating on improving technology for estimating the progressive extent of dam foundation erosion due to overtopping. The primary objective of the investigation is to develop a method for estimating the progressive extent of erosion for various geologic site conditions. The investigation involves researching existing methods and data, conducting a systematic series of physical model tests, and developing a computer model for simulating the progressive extent of erosion. A numerical model with properly formulated boundary conditions, simulating physical processes rather than parametric empirical correlation, will provide a useful tool for estimating progressive extent of dam foundation erosion.

A large prototype model has been constructed at the CSU Foothills Research facility which will allow for testing in 1996.

Dam Overtopping Research

Overtopping protection for embankment dams offers a cost competitive alternative for correcting dam safety deficiencies related to large flood events. To implement with confidence, performance and design considerations of various overtopping protection alternatives need to be better understood. Reclamation, cooperatively with CSU and EPRI, has been investigating overtopping protection systems for embankment dams. Reclamation has completed investigations of tapered, overlapping, concrete blocks and large size of riprap (D_{50}=15) and (D_{50}=28 inch) in a large outdoor facility located at CSU Foothills Research facility. The facility is 50-ft-high with a maximum width of 10 ft on a 2:1 slope, and is capable of passing 158 ft^3/s.

Analysis is complete on the concrete block protective system and design criteria have been developed for their use on typical embankment dam slopes from 4:1 to 2:1. The criteria allows the designers to choose the most appropriately shaped block for their site, based upon stability and energy dissipation requirements.

New design criteria will be developed for stability of riprap on steep slopes for use as an overtopping protection method, and for assessing failure potential of existing riprap protected dams.

The unique size and capabilities of the large outdoor facility make it ideal for testing any number of overtopping protection schemes.

Geosynthetics Research

The use of geosynthetics to protect and rehabilitate dams is increasing. Over the last 3 years, several investigations of various geosynthetic materials have been performed which investigate the long-term and low temperature behavior of these relatively new construction materials.

An REC research report "Use of Geomembranes in Bureau of Reclamation Canals, Reservoirs, and Dam Rehabilitation" is currently being printed. This report covers Reclamation's history using various geomembranes and will have a wide distribution. The final report, "Freeze-Thaw Cycling and Cold Temperature Effects on Geomembrane Sheets and Seams," will be published jointly with the co-sponsor of the research, the U.S. Environmental Protection Agency.

Several papers, including: "Effects of Freeze-Thaw Cycling on Geomembrane Sheets and their Seams," "Bureau of Reclamation Experiences Lining the Rough Subgrade at Black Lake Dam," "Lessons Learned from the Failure of a Canal Liner Due to Ice Lens Accumulation," and "Water Conservation Strategies using Geosynthetics" have been published and presented in national and international conferences over the last 2 years.

Reclamation continues to monitor the durability of various types of geomembranes to establish life cycle costs for these polymeric construction materials. Reclamation is currently working with the Corps to investigate the underwater placement of a PVC geomembrane to reduce seepage from a concrete dam.

Inflow Design Flood Parameter Study

The purpose of this investigation, which began January 1995, is to develop a probability distribution that represents the range of possible floods that could occur if the Probable Maximum Precipitation (PMP) occurred at a given area, and to make more reliable extensions of the flood frequency curve to the Probable Maximum Flood (PMF). Decision-makers can use this information to better select an inflow design flood and determine the appropriate level of expenditures for corrective actions. This study will focus on three or four watersheds for model calibration and testing; however, the computer models and analysis procedure will be generalized and applicable to other basins. The study will examine the difference between the

PMF, as computed by traditional methods, and the expected value of the most likely flood resulting from the PMP. The investigation will test the sensitivity of various hydrologic parameters and assumptions that are used in Reclamation's flood hydrology methodologies.

New or updated technologies are needed in flood hydrology to more reliably determine deficiencies and/or engineer cost-effective dam safety solutions. Savings to taxpayers and project beneficiaries could result from reducing or eliminating the need for corrective actions. Models and methodologies developed as a part of this research project may provide a basis for selecting an inflow design flood lower than the PMF and eliminate part of the uncertainty in determining justifiable expenditures for corrective actions. Determination of the probability distribution of floods which could result from a PMP event may result in lower surcharge storage requirements at the test sites and other Reclamation projects. In dams with known hydrologic deficiencies, the need for corrective actions could be reduced or eliminated. In dams without hydrologic deficiencies, additional reservoir storage could become available for other uses, such as instream flows and environmental enhancement.

Results of this project have national implications. States and private consultants may alter current design practices to allow selection of inflow design floods less than the PMF at other dams. This could affect decisions and proposed corrective actions at thousands of dams across the country, and save taxpayers and project beneficiaries millions of construction dollars. Reduced surcharge requirements may also allow enlarged conservation pools for environmental enhancement or other water uses.

Hydrometeorological Research

1. In FY 1995, Hydrometeorological Report No. 57, "Probable Maximum Precipitation - Pacific Northwest States" was published. The report, which represents a cooperative effort among the National Weather Service (NWS), the Corps, and Reclamation, provides estimates of design storm precipitation used in the design and safety evaluation of water control structures located in the Northwestern United States.

2. Cooperative research to update estimates of PMP for the State of California are underway with the NWS, the Corps, Natural Resources Conservation Service, and Reclamation. Revised estimates are used in the design and safety evaluation of water control structures located in California. Publication of results is expected in late 1996 as Hydrometeorological Report No. 58.

3. Cooperative study effort among representatives of the NWS, the Corps, and Reclamation will continue research in 1996 and 1997 using information obtained from the application of Atmospheric Storm Modeling Techniques to help in defining current estimates of PMP in the United States.

M. Public Concerns

Reclamation considers its dam safety activities to be Federal actions and, as such, provides opportunities to the public for information and involvement.

During the reporting period, Reclamation has received a full range of public responses to its dam safety activities and Federal actions. The Reclamation Safety of Dams Act Amendments of 1984, Public Law 98-404, require 15 percent reimbursement of the cost of dam modification. This reimbursement responsibility has led to denial of problems and resistance to Federal actions. The downstream public generally has not been as vocal in support of corrective actions as the water users responsible for repayment. Water users organizations are also becoming more sophisticated and want more detailed and technical information associated with Reclamation's actions. Water user groups have begun retaining the services of engineering consultants to advise them on the complex dam safety issues.

Reclamation's utilization of independent consultants has added creditability to Reclamation's actions. However, in some instances, the water users' consultants are not in agreement with Reclamation or the independent consultants retained by Reclamation. Therefore, implementation of the Dam Safety Program or application of the Federal Guidelines has not been without conflict.

The utilization of risk analysis approaches has provided a benefit to Reclamation in presenting complex dam safety issues to the public. The risk analysis allows for the engineering analysis and results to be organized such that the dam loading, dam response, and the consequences are presented in a logical fashion. Reclamation's decision-making on several projects has been enhanced and, with the risk analysis backup, the presentation of the action has been supported by both the downstream public and the water user groups.

IV. Impact on Agency Operations

A. Budget Impact

The long-term impact of compliance with the Federal Guidelines for Dam Safety is a reduction in public and agency risk cost. The funding requirement of the Guidelines does, however, compete with short- and medium-term water resource-related activities.

B. Impact on Contracting Procedures

The impact of the Guidelines on contracting is minor for the design, construction, and rehabilitation of dams. The scheduling of the involvement of independent consulting boards during critical periods of design and construction is sometimes difficult as some specialty consultants are in high demand. Independent review of dam safety actions provides a benefit to the agency in the oversight of technical issues and the creditability which they lend to Reclamation's actions.

C. Budget Allocation for Training/Education

Reclamation has made large human resource commitments to ensuring that it maintains the technical expertise to manage our infrastructure. Protection of the downstream public is a major responsibility of the agency and has received the individual attention of the Commissioner of Reclamation.

FISH AND WILDLIFE SERVICE

I. Introduction

The Fish and Wildlife Coordination Act of 1934 (U.S.C. 661-666) established the statutory authority for the Fish and Wildlife Service (Service) to operate facilities associated with fish and wildlife conservation. Under this authority and several other statutes and executive orders, the Service operates water control structures that have been designed and constructed internally, acquired through certain agreements, or the use and control of which has been acquired through the Federal Aid Program. Service dams are located on national wildlife refuges, waterfowl production areas, wildlife research centers, and national fish hatcheries. The dams are operated to accomplish the preservation and enhancement of fish and wildlife resources. The Service owns all dams on its land; therefore, agency responsibility for the safety of these structures is sole and absolute.

The Service's Safety of Dams Program, implemented in response to the President's memorandum of October 4, 1979, and Secretarial Order 3048, includes Safety Evaluation of Existing Dams (SEED) inspections and the repair and rehabilitation of dams to remedy deficiencies or structural problems identified through dam inspections. There have been no significant changes in the Service's dam safety responsibility or jurisdiction since the previous report.

II. Program Actions Since Last Progress Report

Organization of the Service's dam design and construction management program was realigned in 1995. Planning, design, construction, and SEED management functions have been realigned, with similar functions being performed in the Service Engineering Center (SEC). SEED functions are still being administered by the Service Dam Safety Officer. The planning, design, and construction management functions are being administered by the Chief, Dams Design and Construction.

III. Implementation Progress

A. The Service dam safety staff monitors the formal and intermediate safety inspections of its dams, and oversees the design and analysis efforts of private Architect/Engineer (A/E) firms and SEC staff for the rehabilitation and construction of Service dams. During the reporting period, SEED inspections and dam safety designs were accomplished by A/E firms and SEC staff. Dam safety construction management was performed by engineers from the Service and the U.S. Army Corps of Engineers (Corps).

Regional Dam Safety Officers, engineers, and hydrologists associated with the dam safety program are professionals, either registered in the various States where they work or with experience in planning, design, or construction management of dams. These individuals also prepare Standing Operating Procedures and Emergency Action Plans (EAP's).

Normally, Service engineers do not prepare in-house designs of Service high and significant hazard dams. If large dams are to be designed and constructed, professional design assistance is obtained from the Corps or a qualified A/E firm under contract to the Service. Also, if problems are encountered during SEED inspections, or an analysis cannot be made of a particular situation using SEC staff, additional expertise is acquired to assist in the field investigations analysis and/or report.

B. Most high and significant hazard dams are designed by A/E firms or the Corps. Designs are reviewed by in-house experts and outside organizations such as a private A/E firm, the Bureau of Reclamation, or the Corps. In addition to the review provided by Service engineers, designs for low hazard dams are reviewed one level higher than the designer before the start of construction. All construction management is performed by the SEC or the Corps. Operation of the Service's dams, such as surveillance, monitoring, and testing EAP's, is the responsibility of Regional Office and field station staffs.

C. The following is the status of all Service high and significant hazard dams.

High and Significant Hazard
Dams Rehabilitated for Safety

Name of Dam Station & State	Hazard Class	Summary Schedule of Repairs/ Modification Status
Lake Darling Upper Souris NWR North Dakota	High	Phase I of the construction consisted of downstream berm filter drain and coffer dam, and was completed in FY94. Phase II of construction is underway and is scheduled for completion in FY97. Project is in cooperation with Corps as part of the Souris River Flood Control Project.
Elmer Thomas Wichita Mountains WR Oklahoma	High	Construction of a new Roller Compacted Concrete (RCC) dam to replace old dam. Construction was completed in FY95. Reservoir is currently undergoing first filling.
Greenwood Lake North Attleboro NFH Massachusetts	High	Phase II construction was completed in FY95. Reconstruction consisted of a spillway, outlet works, and upstream slope repairs and replacements.

Lake Ilo Lake Ilo NWR North Dakota	High	Construction is underway and is scheduled for completion in FY97.

High and Significant Hazard Dam Safety Rehabilitation Scheduled

Jessup Mill Creston NFH Montana	High	Feasibility designs were completed in FY95. Final design is scheduled to commence in FY97. Construction has not been scheduled.
Comanche	Significant	Feasibility designs will be completed in FY96. Final design is scheduled to commence in FY96 in conjunction with Grama Lake (multi-dam situation). Construction is scheduled for FY97.
Cash Lake Patuxent WRC Maryland	Significant	Final design and construction are scheduled for FY97.
Erie Pool #9 Erie NWR Pennsylvania	Significant	Final design is scheduled for completion in FY96. Construction is not scheduled.
Grama Lake Wichita Mountains WR Oklahoma	Significant	Feasibility designs will be completed in FY96. Final design is scheduled to commence in FY96. Construction is scheduled for FY97.
Jed Johnson Wichita Mountains WR Oklahoma	Significant	Feasibility designs are scheduled for completion in FY96. Construction is not scheduled.
Lake Bee Carolina Sandhills NWR South Carolina	Significant	Dam removal is scheduled for FY96.
Lake Thibadeau Diversion Lake Thibadeau NWR Montana	Significant	Design and construction are not scheduled.

Lake Rush Wichita Mountain Oklahoma	Significant	Feasibility design is scheduled for completion in FY96. Construction is not scheduled.
Little White River Lacreek NWR South Dakota	Significant	Design and construction are not scheduled.
McKinney Lake McKinney Lake NFH North Carolina	Significant	Design and construction are not scheduled.
Muskrat Arapaho NWR Colorado	Significant	Design and construction are not scheduled.
Orangeburg Substation Orangeburg NFH South Carolina	Significant	Design and construction are not scheduled.
Rynearson #1 Necedah NWR Wisconsin	Significant	Final design is complete. Construction is not scheduled.
Rynearson #2 Necedah NWR Wisconsin	Significant	Final design is complete. Construction is not scheduled.

D. The following dam safety incident occurred during the reporting period:

Dam Name:	Lake Bee Dam
Station:	Carolina Sandhills NWR
State:	South Carolina
Hazard Classification:	Significant

In 1993, a significant downstream slope failure occurred. The reservoir has been drained and designs for a permanent breach of the dam are underway.

E. All of the Service's 26 high and significant hazard dams have functional EAP's.

The Service has developed and implemented an annual Testing Program for EAP's which consists of a simplified test, a modified test, and a full-scale test. The simplified test confirms that the EAP is available and up-to-date, and that the communications network is correct. The modified test verifies actions to be taken by the dam operator for a predetermined event and verifies contacts listed in the

EAP. The full-scale test simulates an emergency situation and verifies that the communications network operates correctly and efficiently. The testing schedule has been customized for each dam, depending upon the degree of the potential hazard. Dams which have a very high hazard potential have a testing plan similar to the following: first year - simplified test; second year - modified test; third year - simplified test; fourth year - full-scale test. Subsequent years repeat the sequence. The schedule for the remaining dams, dams with a lesser hazard potential (i.e., those having two or three structures downstream), is identical to the previously described testing plans, with the elimination of the fourth year - full-scale test. Testing of the EAP's began in FY 1989 and will continue indefinitely. Concerted efforts were made during FY 1992 and FY 1993 to make the tests more meaningful. Comments from dam managers have indicated that this has been the result.

State and local officials were invited to participate in the preparation and review of the EAP's. Several participated in tests of the plans.

F. In the rehabilitation of high and significant hazard dams, the Service utilizes technical guidance developed by the Interagency Committee on Dam Safety (ICODS) that is included in the Emergency Action Planning Guidelines for Dams, Federal Guidelines for Earthquake Analysis and Design of Dams, and Federal Guidelines for Selecting and Accommodating Inflow Design Floods for Dams.

G. The Service has developed and implemented an automated data information system for the Dam Safety Program. This data base contains general, technical, and funding information for all Service dams. The data base was used and included in the National Inventory of Dams developed by ICODS and the Association of State Dam Safety Officials (ASDSO).

The Service does not perform dam safety research or develop dam safety guidelines for other agencies to follow. However, the Service's Dam Safety personnel strive to keep abreast of all the latest dam safety technological developments and methods to enable the Service to maintain safe dams. The efforts to provide more meaningful training and testing of EAP's resulted in a paper presented at one of the annual conferences of ASDSO.

U.S. GEOLOGICAL SERVICE

I. Introduction

The U. S. Geological Survey (USGS) owns and has maintenance responsibility for one low hazard dam and one small concrete topped earthen embankment.

II. Program Actions Since Last Report

A. Implementation

The USGS maintains the position of Dam Safety Officer. The USGS will inform Interagency Committee on Dam Safety (ICODS) members of any proposed changes in policy or standards should such occur and will strive to adopt uniform standards in accord with ICODS recommendations.

B. Actions Taken

None required.

C. Changes in Administration

None.

III. Implementation Progress

A. Organization, Administration, and Staffing

The USGS dam safety organization and staff are considered to be adequate. The Sioux Falls Dam is continually inspected and maintained by a trained engineering and maintenance staff. The embankment in Reston, Va, is regularly inspected by Branch of Facilities Management Personnel.

B. Dam Safety Training Activities

No dam safety training is currently being performed or supported. No training deficiencies are thought to exist at this time.

C. Dam Inventories

The USGS owns and operates one dam. There has been no change since the previous report.

D. Independent Reviews

The USGS does not engage in the independent review of dam design, construction, and operation.

E. Inspection Programs

The Sioux Falls Dam is inspected by maintenance personnel on a continuous basis.

F. Dam Safety Rehabilitation Programs

None.

G. Management Effectiveness Reviews

None.

H. Dam Failures and Remedial Actions
None.

I. Emergency Action Planning
No emergency action planning has been implemented. The two small dams under USGS jurisdiction are perceived to offer no significant downstream hazard, even in the event of a catastrophic failure.

J. Application of ICODS Technical Guidelines
No special plan of adoption of specific guidelines is required for the management of two low hazard structures.

K. State Dam Safety Agency Involvement
None.

L. Research and Development
Not applicable.

M. Public Concerns
None known.

IV. Impact on Agency Operation

A. Budget Impact
None.

B. Impact on Contracting Procedures
None. No contract for the design, construction, or rehabilitation of dams was let during this period.

C. Budget Allocation for Training/Education
None.

NATIONAL PARK SERVICE

I. Introduction

The Federal Guidelines for Dam Safety (Guidelines) are an integral part of the National Park Service (NPS) responsibility for the management of NPS dams (389) and monitoring of non-NPS dams (248). This responsibility is based upon environmental, historic preservation, recreation, and public safety and health laws to ensure the protection of park visitors, employees, property, and natural resources. Normally, NPS acquires existing dams through its Land Acquisition Program, instead of the usual design and construction sequence by which most Federal agencies acquire dams. To keep these structures in satisfactory condition, NPS undertakes planning, design, construction (rehabilitation), and maintenance to assure satisfactory project management. Since 1989, this agency has inventoried an additional 123 NPS and 77 non-NPS structures. In some instances, impoundments that no longer serve an essential purpose to park operations are drained and the dams breached.

II. Program Actions Since Last Report

A. Implementation

All provisions of the Guidelines, including operational, maintenance, and public safety assessments at dams, have been implemented.

B. Actions Taken

No response is necessary because no comments were made regarding NPS Dams Program.

C. Changes in Administration

As a result of the influence of the Department of the Interior Working Group on Dam Safety, this agency has been able to obtain funding from the NPS construction line item for Safety of Dams Modification for those dams which are given official Technical Rankings by the Bureau of Reclamation (BOR). In Fiscal Year (FY) 1994 and 1995, funding in the amount of $1.45 million and $0.30 million was obtained, respectively, under the agency line item construction program. However, funding is not available for out years for 11 dam safety modifications because of budget constraints.

Some of the non-Federal dams that are located either within or immediately adjacent to park boundaries have only a minimal inspection and maintenance program because of varying standards for state dam safety programs, and the discontinuance of the National Program for the Inspection of non-Federal Dams.

Another concern is the large number of NPS dams without base funding for maintenance, operations, or minor repairs. Of the reported 389 NPS dams, a substantial number do not have established operations and maintenance funding. Although this type of funding is difficult for the parks to obtain, it is crucial in preventing structural failures, misoperations, and accidents.

III. Implementation Progress

A. Organization, Administration, and Staffing

There is no substantial change in how this program is managed. However, as last reported, severe personnel constraints continue to exist because of personnel ceilings and below average compensation for qualified engineers and maintenance workers in the Federal Government, particularly in high cost of living areas. However, BOR expertise is used to provide formal inspections of downstream high or significant hazard potential NPS dams. They also are utilized to assist in corrective action measures, such as design/construction, or to provide review of NPS design/construction activities on the above type dams. In addition, BOR is utilized for training of NPS maintenance workers and rangers who are responsible for the preparation of Annual Informal Inspection Reports and Operation and Maintenance Logs. Some program activities are being performed for NPS by the Natural Resources Conservation Service (NRCS) and under contract by architect/engineering firms.

B. Dam Safety Training Activities

The Dams Program Officer, several of the Field Area and System Support Office coordinators, and numerous park maintenance, ranger, public safety, and natural resources personnel have received BOR training on small dams. The BOR video and workbook modules, Training Aids for Dam Safety (TADS), also have been distributed nationwide. No known training deficiencies exist in the NPS Dams Program.

C. Dam Inventories

NPS has a current and complete inventory which includes newly acquired structures. These data are downloaded into the National Inventory of Dams to provide current information. There have been no changes in reporting since the last report. Some dams, both NPS and non-NPS, are having both their Downstream and Public Safety Hazard Potential classifications increased because of greater visitor/employee activity downstream and around dams and impoundments.

D. Independent Reviews

For important or significant dam modifications, this agency uses the expertise of other agencies, most frequently the BOR or NRCS, to ensure the least risk and most cost-effective modification possible. Frequently, where states are involved with NPS on modifications, their review also is given.

E. Inspection Programs

NPS has conducted approximately 270 evaluations within the past few years with the assistance of others. NPS personnel typically perform the annual informal type inspection for routine maintenance and repairs whereas the BOR or NRCS, with state accompaniment, are utilized for formal dam safety examination and analyses for larger, more complicated projects. Overall, the inspection program is thorough and provides timely information to park managers for the prompt correction of serious deficiencies. There are currently 110 NPS dams with

serious maintenance, operations, structural, or public safety type deficiencies which are being corrected at a steady rate, albeit a slow one, because of budget constraints. To date, corrective action has been completed on 141 dams and 125 dams are deactivated.

F. Dam Safety Rehabilitation Program

Within NPS's modification program, there are currently 27 high or significant and 83 low hazard potential dams as a result of inspections and studies. A list of completed and planned modifications follows. For the reporting period, modifications have been completed for 14 structures and planned at 27. To date, modifications have been completed at 141 dams and 125 dams are deactivated.

List of projects (14) where modifications have been completed during the reporting period.

Name of Project	NPS Field Area and park	State	Modification
Shubert Gap Dam	Appalachian NST	PA	Deteriorated crest removal
Armington Dam No. 1	Midwest Cuyahoga Valley NRA	OH	Embankment stability and emergency spillway
Ricks Estate Dam	Midwest Hot Springs NP	AR	Instability resolved and intake and sediment control structure installed
Dam No. 4	National Capital	MD/WV	Foundation voids filled
Dam No. 5	National Capital Chesapeake & Ohio Canal NHP	MD/WV	Foundation voids filled
Lower Blue Mountain Dam	Northeast	NJ	Embankment stability and emergency spillway
Upper Blue Mountain Dam	Northeast	NJ	Lake drained and dam removed
Long Pine Dam	Northeast	NJ	Dam replaced
Carpenters Pond Dam	Northeast	PA	Dam deactivation/reduction
Lake Lettini Dam	Northeast	PA	Dam deactivation/reduction
Hemlock Dam	Northeast Delaware Water Gap NRA	NJ	Beaver resistance inlet installed
M-Line Dam	Pacific West Redwood NP	CA	Seepage (pipe) repair
Trout Lake Dam	Southeast Carl Sandburg NHS	NC	Seepage (pipe) repair

Sope Dam	Southeast Chattahoochee River NRA	GA	Embankment stability and emergency spillway

List of projects (27) for which modifications are planned.

Name of Project	NPS Field Area and park	State	Modification
Colt Estate Dam	Appalachian NST	NY	Ownership transfer or deactivation
Little Dam Lake	Appalachian NST	NY	Replacement or deactivation
Virginia Kendall Dam	Midwest Cuyahoga Valley NRA	OH	Spillway capacity and outlet exit instability
Sleepy Valley Lower	Midwest	AR	Impoundment draining, dam removal, and landscaping
Sleepy Valley Middle	Midwest Hot Springs NP	AR	Impoundment draining, dam removal, and landscaping
Dam No. 4	National Capital	MD/WV	Resolution of public safety deficiencies
Dam No. 5	National Capital Chesapeake & Ohio Canal NHP	MD/WV	Resolution of public safety deficiencies
Dam No. 3	National Capital Harpers Ferry NHP	WV/MD	Stabilize/remove remains of old hydropower project
Camp 5 Dam	National Capital	VA	Resolution of public safety deficiencies and structural deterioration and outlet works
Camp 4 Dam	National Capital Prince William Forest Park	VA	Embankment repair and outlet works
Pierce Mill Dam	National Capital Rock Creek Park	DC	Resolution of public safety deficiencies
Jones Mill Pond Dam	Northeast	VA	Upstream slope instability, embankment repair, and outlet works
Wormley Creek Dam	Northeast Colonial NHP	VA	Embankment repair and spillway
Hidden Lake Dam	Northeast	PA	Seepage and spillway capacity

Pickerel Lake Dam	Northeast	PA	Embankment repair and spillway capacity
Egypt Mill Pond Dam	Northeast	PA	Embankment repair and spillway
Whitsell Dam	Northeast Delaware Water Gap NRA	PA	Spillway capacity
Manzanita Lake Dam	Pacific West Lassen Volcanic NP	CA	Deferred maintenance, embankment repair, and spillway capacity
Kehoe Ranch Dam	Pacific West	CA	Embankment stability and spillway
Home Ranch Dam	Pacific West Point Reys NS	CA	Embankment stability
Rocky Oaks Dam	Pacific Western Santa Monica Mountains NRA	CA	Embankment stability and spillway
A-Frame Pond Dam	Pacific West Whiskeytown NRA	CA	Deferred maintenance and spillway capacity
Hare Mill Pond Dam	Southeast	NC	Embankment stability
Sims Pond Dam	Southeast Blue Ridge Pkwy	NC	Embankment stability and spillway
East Cape Canal Plug	Southeast	FL	Structure replacement
Homestead Canal Plug	Southeast Everglades NP	FL	Structure replacement
Fort Pulaski Dikes	Southeast Fort Pulaski NM	GA	Raise and strengthen dikes

G. Management Effectiveness Reviews

A management oversight review was completed for this program. The focus of the review was to ensure that dams which are listed as seriously deficient have some type of corrective action initiated, mitigation measures taken, or funding established for corrective action. Although there continues to be some NPS dams which do not have any corrective action initiated, emergency mitigation steps taken, or funding established, parks continue to make progress, albeit slow, in correcting these structures, despite budget constraints and the added responsibility of maintenance and repair of recently acquired dams.

H. Dam Failures and Remedial Actions

A total of 126 incidents have been reported since 1981, with corrective action still being performed at some of these dams. For this reporting period, 32 incidents were reported and are provided in the following Table. Most incidents have been reported to the National Performance of Dams Program at Stanford University in Palo Alto, CA.

I. Emergency Action Planning

The NPS has implemented an Emergency Action Plan (EAP) testing procedure. During the periodic updating of EAP's by NPS, the parks have been requested to perform simulated dam failure or major spillway releases every 3 years, and to carry out a mock warning and evacuation of those areas under NPS jurisdiction or involvement.

There are currently 17 NPS dams which do not have EAP's completed because of (1) their recent entry into the NPS Inventory of Dams; (2) recent high or significant hazard potential classification; or (3) the park has initiated deactivation of the project, thus negating the need for an EAP. Work is currently underway to complete any required EAP's.

NPS also cooperates with other dam owners whose structures affect the National Park System by preparing and annually updating early warning, search/rescue, and evacuation plans for affected NPS areas in the event of large releases from, or failure of, these non-NPS dams.

J. Application of ICODS Technical Guidance

The NPS has adopted the Federal Guidelines.

K. State Dam Safety Agency Involvement

During all formal NPS and BOR evaluations, the states are notified and sometimes participate. State dam safety and environmental program representatives provide helpful suggestions in managing NPS dams and monitoring non-NPS ones. Those states which have been particularly active with the NPS Dams Program are Massachusetts, Pennsylvania, New York, New Jersey, Virginia, North Carolina, Florida, Ohio, Wyoming, Washington, Tennessee, and Colorado. At times, city and county officials are also involved.

L. Research and Development and Special Initiatives

BOR is performing fuse plug and overtopping studies for utilization at NPS dams. This research will determine the feasibility of minimizing drastic alteration of NPS dams because of seriously inadequate spillway capacity.

M. Public Concerns

Because of this agency's experience with environmental review and practice and association with experienced dam safety engineers, most major modifications represent a good balance of safety, economy, and protection of natural resources, and in some instances have won awards. Problems occur when planners, environmentalists, and design engineers do not provide a good range of alternatives for park managers and the public from which to decide.

IV. Impact on Agency Operations

A. Budget Impact

Funding for the maintenance, operations, and repair/modifications of dams must compete intensely with numerous other type facilities for which NPS is responsible. Because of severe

budget constraints, funding for dams, when it is available, is perceived as taking away funding from other NPS facilities.

B. Impact on Contracting Procedures

A recent experience at Delaware Water Gap National Recreation Area, NJ/PA, revealed that a park, even a large one, can be quickly overwhelmed by the administration of a major dam modification. Although the contract was concluded, it was not without considerable effort which could have been spent on more traditional park projects. Fortunately for all other modifications, NPS also has used the assisting engineering agency to administer the construction contracts. This has given NPS excellent results with little or no burden on the park staff.

C. Budget Allocation for Training/Education

Several thousand dollars is expended annually to ensure that NPS Dams Program Coordinators at the park, System Support, and Washington offices receive training and other educational opportunities to promote the inspection, operation, maintenance, and repair/modification of dams affecting the National Park System. For the reporting period, it is estimated that 100 persons attended training and other educational opportunities at a cost of approximately $50,000. This training also provides innumerable occasions where knowledge learned about dams is transferrable to the management of other NPS facilities.

OFFICE OF SURFACE MINING
RECLAMATION AND ENFORCEMENT

I. Introduction

The Surface Mining Control and Reclamation Act of 1977, P.L. 95-87 (the Act), established the Office of Surface Mining Reclamation and Enforcement (OSM) to regulate surface coal mining operations and the surface effects of underground coal mining operations. Under the Act, OSM or the State regulatory authorities regulate dams and impoundments associated with coal mining operations through specific permitting requirements and performance standards for locating, constructing, and maintaining water impoundments. The Act also requires OSM to coordinate with other agencies whose laws impact on the construction and maintenance of impoundments such as the Federal Coal Mine and Safety Act of 1969 (83 Stat. 742). Coal mining operations use dams to control the surface runoff of water, impound water for mining or postmining use, or dispose of coal processing waste. Planning, site selection, design, construction, maintenance, operation, repair, and removal of the dam or impoundment is the responsibility of the mining company.

The Act provides for states to become the exclusive regulatory authority by obtaining the Secretary of the Interior's approval for their regulatory program. Twenty-four States, the major coal-producers, now have primacy and are responsible for regulating surface coal mining operations within their borders. After a state receives primacy, OSM oversees the States' administration of their programs. In some areas, OSM is the regulatory authority and, therefore, regulates the dam structures.

Within the Act, performance standards for dams and impoundments are found in Section 515 for surface mining and in Section 516 for the surface effects of underground mining. The implementation procedures are the same for both. The public is protected by Section 521(a)(2), which authorizes a cessation order to be issued to any operator when an imminent danger to the health or safety of the public occurs, and also by section 521(a)(3), which authorizes a notice of violation to be issued when a violation of the Act occurs.

II. Program Actions Since Last Report

A. Guideline Implementation

OSM is in the process of preparing a draft dam safety directive implementing the Federal Guidelines by requiring an inventory of dams and effective emergency action plans (EAP's). This directive will also establish policy on dam safety coordination and will assign responsibilities to the appropriate field and Headquarters organizations to carry out the program.

Further, on October 20, 1994, OSM published final rules (59 FR 53022) for regulating impoundments and coal mine waste structures. Several parts of the Federal Guidelines that apply to OSM are being implemented in the regulations. On January 23, 1995, OSM had a meeting with its field and operating units to coordinate the implementation of the impoundment rule. Dam safety officers from the Mine Safety and Health Administration (MSHA) and OSM

also met to coordinate procedures on the construction, inspection, and maintenance of impoundments to ensure uniform safe dam policies in compliance with the Federal Guidelines.

B. Actions Taken

The report includes no comments referring to specific advances or deficiencies applicable to OSM.

C. Changes in Administration

Due to budgetary constraints and organizational changes, OSM has not been able to finalize the draft directive which will establish policy on dam safety coordination and assign responsibilities to the appropriate field and Headquarters organizations to carry out the program. OSM's staffing has been reduced by one third.

III. Implementation Progress

A. Organization, Administration, and Staffing

OSM relies on the in-house capability of the dam safety staff, which is normally adequate for accomplishing its program. If critical expertise is needed, OSM would contact other Federal or State agencies.

B. Dam Safety Training Activities

OSM does not itself perform dam safety-related training. Instead, OSM uses training by the Bureau of Reclamation (BOR) and MSHA.

C. Dam Inventories

The Western Regional Coordinating Center, OSM's office in Denver, CO, completed an initial inventory of dams and impoundments on coal mines in the Federal Program States and on Indian Lands. The inventory includes dams that are regulated by MSHA and OSM. The inventory includes 42 dams from nine mines in the Federal Program State of Washington and on Indian Lands in Arizona, New Mexico, and Montana. The inspection reports for the dams have been completed in accordance with the OSM regulatory requirements.

D. Independent Reviews

The regulatory authority approves the design for all dams in permit applications. This is an external review, as defined in the Guidelines. OSM also relies on both in-house capability and experts from the BOR and MSHA to help with technical problems.

E. Inspection Programs

The Act provides for States to become the exclusive regulatory authority by obtaining the Secretary of the Interior's approval for their regulatory program. Twenty-four States, the major coal-producers, now have primacy and are responsible for inspecting and regulating surface coal mining operations within their borders. After a state receives primacy, OSM oversees the States' administration of their programs. In some areas, OSM is the regulatory

authority and, therefore, regulates the dam structures. OSM also coordinates with MSHA to ensure uniform safe dam policies in compliance with the Federal Guidelines.

F. Dam Safety Rehabilitation Programs

There have been a total of five impoundment failures, four in Montana and one in Wyoming. Four out of the five sites have been rehabilitated for safety during the reporting period; one site was not being repaired due to bond forfeiture.

Two impoundments, Permit No. 85005, West Moreland Mine, located in Big Horn County, Montana.

One impoundment, Permit No. 79012R, Spring Creek Mine, located in Big Horn County, Montana.

One impoundment, Permit No. 80009C, Coal Creek Mine, located in Powder River County, Montana.

One impoundment, Permit No. 334T2, EDC Mine, located in Carbon County, Wyoming, was not rehabilitated because of bond forfeiture.

G. Management Effectiveness Reviews

OSM had conducted an Alternative Management Control Review (AMCR) which evaluated the internal control requirements and standards of the dam safety program to determine whether the dam safety coordination program is being implemented and whether there are sufficient management controls in the process or in its implementation. A directive has been prepared to address recommendations of that review consistent with the implementation procedures set forth in the Federal Guidelines. This directive assigns responsibilities within OSM program offices and establishes policy on the dam safety coordination. Due to current budgetary constraints and organizational changes, OSM has not been able to finalize the draft directive.

The General Accounting Office has not reviewed OSM's dam safety program.

H. Dam Failures and Remedial Actions

Five dams failures on four mines occurred during the reporting period. Four of the five dams have been repaired; one site has not been repaired due to bond forfeiture.

I. Emergency Action Planning

Emergency procedures are required by OSM rules at 30 CFR 816.49(a)(12). The rule covers notifying the regulatory authority of a potential hazard and the procedures for public protection and remedial action. When OSM approves an amendment to a State program, the provisions for regulating impounding structures are reviewed. To be approved, they must be no less effective than the Federal rules. State agencies with responsibility for dam safety also may approve permits when the mining and reclamation plan includes dams or impounding structures of a specified size or capacity.

J. Application of ICODS Technical Guidance

The draft directive implementing the guidance has not been finalized due to the current budget situation.

K. State Dam Safety Agency Involvement

The agency adopts new provisions through formal rule making. Technical guidance is sent to OSM's offices in Denver, CO, Pittsburgh, PA, and Alton, IL, and to the Knoxville, TN field office. These offices distribute the technical guidance to State regulatory authorities, as appropriate.

OSM coordinates the dam safety activities at coal mining operations with MSHA.

L. Research and Development and Special Initiatives

OSM would enforce compliance with the Federal Guidelines by publishing them as part of the OSM regulations. A draft directive will establish dam safety responsibilities. The Office of Technology Development and Transfer is responsible for transferring current research information as it becomes available to the States and the field offices.

M. Public Concerns

OSM allows the public sufficient time to comment on proposed regulations through the INTERNET or by submitting written comments. OSM also hosts public meetings allowing the public to address their concerns. Written products, such as monthly activity reports, memoranda of understanding, meeting minutes, memoranda, and *RecTec* Newsletter, have adequately addressed OSM's position and response to public inquiries and committees. They also provide information on meetings and disseminate scientific information.

IV. Impact on Agency Operations

As a result of current budgetary constraints and organizational changes, OSM has not been able to finalize the draft directive. OSM has also been reduced in staffing by one third.

FEDERAL ENERGY REGULATORY COMMISSION

FEDERAL ENERGY REGULATORY COMMISSION
WASHINGTON, DC 20426

OFFICE OF THE CHAIR

December 21, 1995

The Honorable James L. Witt
Director
Federal Emergency Management Agency
Washington, D.C. 20472

Dear Mr. Witt:

In response to your letter of November 2, 1995, I enclose a report prepared by staff describing the Federal Energy Regulatory Commission's progress in implementing the Federal Guidelines for Dam Safety. Also enclosed is a computer disk which includes this report using Word Perfect word processing software.

This report demonstrates that the Commission's Dam Safety Program continues to conform to all provisions of the Federal Guidelines for Dam Safety.

Sincerely,

Elizabeth A. Moler

Elizabeth A. Moler
Chair

Enclosures

I. Introduction

Purpose and Scope. This report describes the actions and activities of the Federal Energy Regulatory Commission (Commission) from October 1, 1993 to September 30, 1995 to implement the Federal Guidelines for Dam Safety (Guidelines).

This progress report is the ninth report provided to the Federal Emergency Management Agency (FEMA) describing the Commission's progress in implementing the Guidelines. The initial progress report of January 1980 and subsequent reports (December 1981, February 1984, November 1985, December 1987, December 1989, December 1991, and December 1993) show that the Commission's Dam Safety Program conforms to all provisions of the Guidelines, and that the Commission carried out all proposals to improve the administration of the program.

Description of Dam Safety Responsibilities and Jurisdiction. Part I of the Federal Power Act (FPA, the Act) authorizes the Commission to license non-Federal hydroelectric projects. The FPA authorizes the Commission to issue licenses to individuals, corporations, States, and municipalities to construct, operate, and maintain dams, water conduits, reservoirs, powerhouses, transmission lines, or other project works necessary for the development of non-Federal hydroelectric projects located (1) on navigable streams; (2) on public lands of the United States; (3) at any Government dam; (4) at a Government dam and using surplus water or water power from the Government dam; or (5) on streams over which the Congress has jurisdiction under the Commerce Clause of the Constitution.

Section 30 of the FPA and the Energy Security Act of 1980 (ESA), Public Law 96-294, authorizes the Commission to exempt certain small hydroelectric power projects from all or part of Part I of the Act, including licensing. This exemption authority was provided to encourage small hydropower development. Commission implementation of its exemption authority for small hydroelectric projects provides that such projects are exempted from all licensing provisions of the Act, except as related to dam safety.

Projects Under Commission Jurisdiction. As of October 1, 1993, there were approximately 3,137 dams under Commission jurisdiction. Of the 3,137 jurisdictional dams, there were 17 dams under construction.

Applicability of Guidelines. The Commission's regulatory authority under the Act includes responsibilities related to the planning, design, construction, operation, and maintenance of dams. Therefore, the Guidelines are applicable to the Commission's Dam Safety Program.

Pursuant to Section 10© of the Act, a licensee must maintain and operate a licensed project and conform to the Commission's regulations for the protection of life, health, and property. The Commission's regulations issued under Section 10© of the Act, together with the terms and conditions of the licenses it issues, establish the requirements for the planning, design,

construction, operation, and maintenance of projects under the jurisdiction of the Commission. The Commission's responsibility is to ensure that licensees fulfill the obligations and responsibilities required by Section 10© of the Act. The current Commission's dam safety regulations were issued in 1981 (18 C.F.R., Part 12).

The Commission, in implementing its exemption authority, established regulations for granting exemptions from licensing that recognize the Commission's concern for dam safety. An inspection of all projects by the Commission's Regional Office staff is scheduled upon receipt of an application for exemption. Based on the inspection, size of dam, and potential downstream hazard of the project, the Commission determines whether the exemption should include special conditions requiring the owner of the project to be: (1) subject to the Commission's Dam Safety Program; (2) subject to periodic inspections of the project by the staff and inspection by an independent consultant at 5-year intervals; and (3) required to submit for Commission approval an emergency action plan (EAP).

II. Program Actions Since Last Progress Report

A. Implementation

Progress Toward Full Implementation of the Guidelines. Previous Commission progress reports demonstrated that the Commission's Dam Safety Program conforms to all provisions of the Guidelines. Through the rulemaking process, the Commission's current regulations, as revised in 1981, carry out specific recommendations to improve the administration of the Commission's Dam Safety Program. In addition, the Commission periodically reviews its Dam Safety Program to ensure its continued effectiveness and adequacy.

Revisions to the Operating Manual. The Commission's staff responsible for administering the Commission's Dam Safety Program (Division of Dam Safety and Inspections) issued an Operating Manual in 1979 (see discussion in January 1980 Progress Report to FEMA). The Operating Manual provides guidelines and procedures for field inspections of hydroelectric projects and the supervision of licenses for water power projects under the Commission's jurisdiction. The Operating Manual is a dynamic document that is updated to reflect current guidelines, procedures, and state-of-the-art engineering. These changes occur formally once a year. Necessary changes during the year are made as interim instructions to staff to improve the Commission's Dam Safety Program. The interim changes are included in the next annual update to the Operating Manual. There have been several interim revisions to the Operating Manual during this reporting period. The revisions generally consist of instructions and clarifications with respect to inspection, evaluation, and monitoring (both engineering and compliance matters) consistent with the Commission's dam safety policy.

Engineering Guidelines. The Commission's staff has a program to develop Engineering Guidelines for use by staff. The Engineering Guidelines provide guidance to the technical staff in the processing of applications for license and in the evaluation of dams under Part 12 of the Commission's Regulations. The Engineering Guidelines are also used to evaluate proposed

modifications or additions to existing projects. While the guidance applies to the majority of studies encountered by staff, special cases may require deviation from, or modification of, the guidelines. When such cases arise, staff determines if alternative criteria or procedures apply, based on experience and engineering judgment, when considering situations not covered by the guidelines.

Although these guidelines are primarily intended for internal use by its staff, the Commission has also made the guidelines a public document available to licensees, exemptees, applicants, Federal and state agencies, and the general public for use in any studies presented to the Commission, and to ensure that the analytical elements of the Commission's Dam Safety Program are well known to any party. Over recent years, a greater interest in the Engineering Guidelines has been shown by private and governmental entities in foreign countries.

To date, the Engineering Guidelines cover subjects such as hydrology, embankment dams, concrete gravity dams, foundations for dams and appurtenant structures, EAP's, construction quality control, and monitoring. In 1994, staff developed four examples to demonstrate proper application of the methodology presented in the chapter on the Probable Maximum Flood (PMF). In 1996, a text complementing the material in the PMF guideline chapter will be completed. The text will provide information on the proper use of hydrologic parameters, equations, and methodologies in PMF analyses. The embankment chapter is also being updated consistent with current state-of-the-art methodologies for both static and seismic loading evaluations and analyses. A chapter covering monitoring and instrumentation was completed in Fiscal Year (FY) 1995 and a chapter on dams other than embankment, concrete gravity, and arch dams will be distributed for peer review in early 1996. In addition, a chapter on existing arch dams is being prepared. The Commission plans to develop additional chapters or expand existing chapters, as necessary.

Dam Safety Policy. The Commission's Dam Safety Program continues to be consistent with the established policy that outstanding dam safety matters should be resolved promptly and should not await licensing proceedings that may occur in the future. Under this policy, the Dam Safety Program expeditiously implements dam safety repairs and modifications. In addition, if any hydropower developer determines it is not economical to continue operation of a hydropower project, that developer may apply for surrender of the license. Under those circumstances, it is the policy of the Commission that if any dam safety issues are outstanding, a surrender would not be accepted until the dam safety issues are remedied. This policy has been coordinated with state dam safety officials as the surrender of a license would cause the dam to revert to state jurisdiction.

B. Actions Taken

Actions Taken on 1991-1993 FEMA Report. In the Conclusions and Recommendations Section of the FEMA Report, *National Dam Safety Program - 1992 and 1993: A Progress Report*, the Commission was commended "for the continued strong effort being made to ensure that its dam safety program is strong, current, and adaptable. As a result of the FERC's efforts, other agencies are gaining benefits from FERC training and expertise in dam

inspections." The Commission, under the direction of the Chair, Elizabeth Moler, has taken a more positive role in seeking state participation in the inspection of projects it regulates. The Commission continues to invite state agency personnel to inspections of FERC licensed projects and furnishes those agencies with copies of inspection reports, independent consultant reports, and a status report on dam safety modifications. The Commission's program to develop Engineering Guidelines is received positively by state agencies. Some states use the FERC Engineering Guidelines or use them in part. These actions are relevant to the recommendation by FEMA that Federal agencies take a role in assisting states to develop standards and guidelines for dam safety.

C. Changes in Administration

There have been no changes in the Commission's Dam Safety Program as a result of legislative, policy, budget, or organizational activities. The Commission strives to make changes only to improve the strength of its Dam Safety Program, consistent with Section 10© of the FPA for the protection of life, health, and property. In this regard, all dam safety activities are consistent with the Guidelines.

III. Implementation Progress

The Commission has developed and carried out policies and procedures and committed substantial resources to ensure the safe design, construction, and operation of each dam under its jurisdiction. The following discussion shows that the policies, procedures, and activities of the Commission's Dam Safety Program comply with the requirements of the Guidelines.

A. Organization, Administration, and Staffing

1. Administration of the Dam Safety Program. The Commission considers the Dam Safety Program to be a priority among its regulatory responsibilities. The Director of the Office of Hydropower Licensing is delegated the responsibility for administering the Commission's Dam Safety Program. Implementation of the Commission's Dam Safety Program is further sub-delegated to the Director, Division of Dam Safety and Inspections, which includes the Commission's five Regional Offices and the Division of Project Review.

The Washington Office of Division of Dam Safety and Inspections (D2SI) provides technical supervision and assistance and administrative, policy, and procedural guidance to the Regional Offices in developing an effective inspection program; promoting and improving Commission inspection techniques; training of inspection personnel; and developing uniform standards of inspection.

The Regional Offices in New York, Atlanta, Chicago, Portland (Oregon), and San Francisco are supervised by a Regional Director. The Regional Director's staff performs field inspections and maintains liaison with licensees, exemptees, Federal and state agencies, and the public on dam safety and license and exemption compliance matters.

The Division of Project Review (DPR) is responsible for the technical engineering aspects of the Commission's hydroelectric licensing program that occur during the prelicensing stage of project development. DPR conducts an engineering analysis of the safety and adequacy of proposed projects in the planning stage of project development. After the issuance of a license or exemption, it is the responsibility of D2SI to oversee the design, construction, operation, and maintenance of projects.

2. Adequacy of Staff and Actions Taken to Mitigate Deficiencies. The Commission's technical staff is adequate and competent in hydrology, hydraulics, geology, engineering geology, field investigations and inspections, and geotechnical and structural design. When the need arises for expertise beyond the capability of the technical staff, the Commission employs qualified outside consultants to provide an independent assessment or to supplement staff expertise. The Commission currently employs consultants on sensitive and highly technical dam safety problems related to seismic effects on liquefiable soils. The Commission continually reviews the technical staff requirements of its Dam Safety Program to ensure its effectiveness and adequacy. Currently, there are 128 technical personnel assigned to the Commission's Dam Safety Program. Thirty-five (35) engineers and geologists are located in the Washington Office and 93 are located in the Regional Offices.

Current staffing is adequate. D2SI continues to review and improve its procedures to handle its work load. To provide guidance to the dam safety staff, D2SI has developed an Operating Manual. The Operating Manual is periodically updated to provide instruction and guidance to the Regional Office staff in the inspection of projects and the supervision of licenses and exemptions for hydropower projects.

B. Dam Safety Training Activities

Due to the size of its dam safety staff and its dispersement between the Washington, D.C. headquarters and the five Regional Offices, training in the past was mostly achieved by participating in classes offered by other Federal agencies, universities, and professional societies. To spend training funds efficiently and effectively, the Commission has concluded that training would be more effective if courses were developed to specifically satisfy its needs. Therefore, beginning in FY 1990, the Commission has concentrated its efforts and limited monetary resources in designing courses that fulfill its dam safety training needs. During FY 1994, the Commission developed and held courses on earth embankment seismic stability, foundation engineering, dam break and inflow design flood, and EAP testing. In FY 1995, the Commission developed courses covering PMF analysis and evaluation, rock mechanics, EAP testing, and analysis and inspection of concrete dams.

In February 1994, the Commission conducted its Emergency Action Plan Exercise Design Course for the Tennessee Valley Authority (TVA). In October 1994 and March 1995, the Commission conducted two pilot courses for FEMA/ICODS that were designed for the development and exercise of EAP's for dams. In 1996, the Commission plans to develop courses on dambreak analysis, rock mechanics, seismic evaluation, instrumentation and

monitoring, construction quality control inspections, and inspection and analyses of concrete dams.

In 1994-1995, ASDSO sponsored five seminars across the country that presented the new FERC Engineering Guideline chapter on PMF. The course was conducted by Dr. Arthur Miller of Penn State, Mr. Terry Hampton of Mead and Hunt, Inc., and Dr. John J. Cassidy of Bechtel, Inc.

In addition, the Commission supported the development of the Training Aids for Dam Safety (TADS) Program, designed to be a multi-phase dam safety training program. TADS includes several self-paced individual instruction modules composed of texts and supplemented with videos. This program is nearing completion. Many engineers in D2SI (Washington Office and Regional Offices) participated in the development of TADS.

To supplement the above training efforts, the Commission included in the Engineering Guidelines a list of references for use by staff. Each of the offices also established engineering libraries to make the references available to staff for further developmental purposes. The Commission continues to add to the libraries as more references become available.

Finally, during FY 1996, headquarters staff plan to travel to each of the five Regional Offices to conduct training on the review of inflow design flood studies. Technical analyses, dam safety criteria, and other technical matters are also discussed at periodic staff meetings with the Regional Directors and all Branch Supervisors.

C. Dam Inventories

The Commission maintains a current inventory of all dams under its jurisdiction. New dams are entered into the Commission inventory of dams when (1) the dams become jurisdictional; (2) new dams are constructed; or (3) applications with existing dams are filed for license. All updated information is provided to FEMA annually for the Inventory of Dams database.

D. Independent Reviews

The procedures and policies of the Commission's Dam Safety Program include the review and monitoring of all phases of the project development to ensure that the licensees carry out their responsibilities. Therefore, the Commission's staff independently reviews and evaluates the safety of dams under the Commission's jurisdiction during the design and construction phases, and ensures that existing dams are properly operated and maintained. Within the definitions contained in the Guidelines, these staff reviews are considered external from those done by the licensee/owner and, therefore, are consistent with the intent stated in the Guidelines. To supplement the external review of staff, the terms and conditions of the license for major unconstructed projects require the licensee to engage an independent qualified Board of Consultants, approved by staff, to review the design and construction of the project. There is one exception to this requirement. When the Commission licenses a non-Federal hydropower development at a Federal dam, the design and construction of the licensed hydropower facility (that will be an integral part of, or that could affect the structural integrity or operation of, the

Federal project) is also subject to the review and approval of the Federal agency that constructed the dam.

Between October 1, 1993 and September 30, 1995, staff has independently reviewed the safety and adequacy of 389 projects. This includes both unconstructed projects and existing projects undergoing structural modifications. During FY 1994 and 1995, construction of 76 safety modifications were completed, with 90 now in progress. During the same period, 4,714 investigations and studies were completed; 352 were in progress at the end of the period. A summary of the Commission's Dam Safety Program is included in Table 1. Staff review includes evaluation of site geological conditions, review of subsurface investigations, hydrologic and hydraulic studies, stability and stress analyses of all major structures under all probable loading conditions, and suitability of proposed construction materials.

The Commission staff monitors construction activities at dams under its jurisdiction through staff inspections. When required, Boards of Consultants are utilized to assist in determining the adequacy of construction and to evaluate the effect any unanticipated site conditions may have on the safety and adequacy of the project. The Commission requires licensees to maintain a detailed construction quality control program to ensure adequate inspection during construction of a project and for any alteration of a project. During the reporting period, the staff inspected and monitored 265 projects undergoing construction activities.

Construction plans and specifications are also reviewed by staff for all licensed projects. Three of the projects under construction have been subject to review by independent Boards of Consultants and eight (located at Corps of Engineers dams) have been monitored by Corps personnel. There were 916 construction inspections conducted between October 1, 1993 and September 30, 1995.

The Commission staff reviews the safety of existing dams in detail when an application for a license is submitted for a constructed hydroelectric power project not previously licensed, or when construction is proposed at an existing non-Federal dam. Dam safety is reviewed again during the relicensing process that occurs at the end of the initial license period (maximum of 50 years).

In addition to the dam safety reviews of operational projects, the Commission's regulations require the inspection and evaluation of the larger operating projects at 5-year intervals by an independent consulting engineer retained by the licensee and approved by the Commission staff (see discussion below).

All constructed projects (with an application for a license or exemption filed and those with a license issued) are subject to inspection by the staff. All licensed and exempted projects that are classified high and significant hazard potential are normally inspected on an annual basis by staff to ensure that they are properly maintained, that unauthorized modifications have not been made to the projects, and that the projects are being operated efficiently and safely, and in compliance with the terms of the license or exemption. These periodic inspections are

considered to be intermediate inspections, as defined by the Guidelines. In addition, low hazard potential licensed and exempted projects are inspected every 2 or 3 years. Low hazard potential dams 25 feet or higher or that have 50 acre-feet or more of storage are inspected every 2 years. All other low hazard potential dams are inspected every 3 years. During the reporting period, 2,633 intermediate dam safety inspections have been completed by staff.

Part 12 of the Commission's regulations requires inspection and evaluation every 5 years by an independent consultant of licensed or exempted dams that exceed 32.8 feet (10 meters) in height, have a reservoir with a gross storage capacity of 2,000 acre-feet or more, or have a high downstream hazard potential, as determined by staff. These inspections are considered formal inspections, as defined by the Guidelines. The inspection is performed by a qualified consultant retained by the licensee and approved by staff. The purpose of the inspection is to provide an independent/outside view as to whether there are current or potential deficiencies in the condition of the structures, quality and adequacy of maintenance, or methods of operation that might endanger project structures and public safety. The consultant is required to evaluate the adequacy of spillways and the stability and structural adequacy of all structures under all credible loading conditions to determine if the structures meet currently accepted engineering design criteria and practices. The Commission's regulations require that the results of the inspection and evaluation be submitted in a report to the proper Regional Director. To help in the preparation of these reports, staff has developed an outline that it provides to licensees or exemptees at the time of staff approval of the independent consultant. The staff reviews the reports of these inspections to ensure that the inspection and evaluation conform to the regulations and that the licensee implements the consultant's recommendations. Additional requirements may be required by staff based upon staff knowledge obtained from operation inspections performed by staff. Independent consultants performed 533 formal inspections during the reporting period.

Staff has conducted 493 inspections of dams where specific problems have occurred that related to design changes required by unanticipated field conditions encountered during construction, where poor maintenance caused concern for project safety, and where special remedial actions were necessary to ensure the continued structural integrity of a project and compliance with license requirements and exemption conditions. These inspections are considered special inspections, as defined by the Guidelines.

In addition to all of the above types of review, the Commission has found it necessary to supplement staff expertise when reviewing complex foundation problems at certain dams. During the reporting period, the Commission retained consultants to assist staff in reviewing seismic evaluation and liquefaction and deformation analyses associated with embankment dams.

E. Inspection Programs

The Commission's response to this topic is covered in other sections of this report, primarily in Sections III.A. and III.D.

F. Dam Safety Rehabilitation Programs

Between October 1, 1993 and September 30, 1995, 66 dam safety modifications were completed. Table 2 identifies those dam safety modifications. In addition, dam safety modifications were required at 28 dams (see Table 3).

G Management Effectiveness Reviews

At the request of Congressman John D. Dingell (MI), the General Accounting Office (GAO) conducted a review of the Commission's hydropower licensing program in 1994. As part of this effort, the GAO reviewed the Commission's Dam Safety Program. In a report by the GAO issued in May 1994, the GAO concluded that the "FERC's monitoring and inspection procedures are generally as stringent, or more stringent, than those of other Federal and state agencies responsible for dam safety...." The GAO report further stated that the "FERC's efforts to ensure structural soundness and public safety are showing positive results."

In addition, as mentioned in the December 1993 report, the Commission planned several changes to help staff in meeting the goals of the Dam Safety Program more efficiently and effectively. These included the further development of the Engineering Guidelines, improved instructions for inspections and inspection reports, and the development of innovative training opportunities. These improvements have enhanced the quality of the staff's review of dam safety problems and increased staff's ability to deal with an increased workload without significant new resources.

H. Dam Failures and Remedial Actions

Since October 1993, there have been 50 minor incidents at dams under the Commission's jurisdiction. Several of these incidents, which occurred at minor structures during flood flows and slides, caused damage to penstocks and did not cause significant damage or significant incremental increases in the downstream flood stages. The incidents are tabulated in Table 4. Information about each incident was coordinated with the appropriate state agency.

Because many projects licensed by the Commission are older structures (more than two-thirds are over 50 years old), adequate maintenance and monitoring of the performance of the structures are extremely important. Therefore, although not a life- or property-threatening situation, priority is given to maintenance matters so that today's maintenance problems do not become tomorrow's dam safety problems.

I. Emergency Action Planning

The Commission's regulations require that an EAP be developed by licensees or exemptees for all constructed projects where failure could endanger life and property. An EAP provides the operation and mobilization procedures in case of an impending or actual release of water caused by an accident to or failure of project structures. For a project located within a 10-mile radius of a nuclear power plant, the Commission's regulations also require a radiological emergency response plan. The EAP must be developed in consultation and cooperation with appropriate Federal, state, and local emergency preparedness agencies responsible for evacuation. The EAP provides an early warning to upstream and downstream inhabitants,

property owners, operators of water-related facilities, recreational users, and other persons in the vicinity of a project that might be affected by a project emergency.

Under Part 12 of the Commission's regulations, the Commission revised the guidelines for the preparation of EAP's. The notice of revised EAP guidelines was issued on February 22, 1988. The guidelines were revised to assist in the preparation, annual review, testing, and updating of EAP's to ensure their effectiveness and workability. One of the major revisions to the new guidelines was the establishment of a specific format to assist in preparing an effective and workable EAP. All owners have revised their EAP's to follow the established format. The Commission has received many comments from licensees that revising their EAP's consistent with the required format has resulted in improved EAP's. The revised guidelines are comparable to the Emergency Action Planning Guidelines for Dams issued in February 1985 by the Interagency Committee on Dam Safety (ICODS), as well as the updated version that will be issued in 1996. The Commission's staff was represented on the ICODS sub-committee on emergency action planning that prepared the guidelines. At the end of FY 1993, ICODS formed an ad hoc subcommittee to review and update several Federal Guidelines, including the 1985 EAP document. The task group assigned to the review of the EAP guidelines recommended that they be rewritten to be more detailed and comprehensive, and to reflect lessons learned from EAP exercises. Subsequently, ICODS tasked the Commission staff to rewrite the EAP Guidelines. The Commission EAP Guidelines were used as the basis for the revisions. The EAP Guidelines have been completed, reviewed, and accepted by the ICODS members. The EAP Guidelines are now out for peer review by the United States Committee on Large Dams (USCOLD). Acceptance is anticipated and publication is expected in 1996.

All owners test the state of training and readiness of key licensee personnel responsible for actions during an emergency to ensure that they know and understand the procedures to be followed and actions required during an emergency. These annual tests include a drill simulating emergency conditions. This type of testing procedure is very important, but has limitations because there is no active participation by state and local emergency preparedness agencies. A full-scale exercise of a simulated emergency is considered the ideal approach to evaluate every participant's knowledge and understanding of an EAP. This has been clearly demonstrated by the Commission's required full-scale exercises of the comprehensive EAP for the Santee-Cooper Project No. 199, located near Charleston, S.C. However, there are practical considerations, particularly costs, that show that full-scale exercises may not be feasible in all cases. Nevertheless, because more in-depth testing of an EAP is essential for all parties and the Commission's EAP Guidelines contemplate comprehensive exercises, the Commission is requiring licensees to conduct functional exercises to involve the emergency preparedness agencies.

The functional exercise is preceded by orientation seminars, a drill, and a tabletop exercise. The functional exercise involves gathering representatives from all involved agencies and licensee representatives to test the EAP under stressful conditions (including time constraints). The exercise evaluates the effectiveness of the notification plan and inundation maps and the actions the local agencies will take once they receive notification that a dam has failed. After

the exercise, an oral critique is held to discuss possible changes to the EAP to improve its effectiveness.

Two in-house EAP training courses were held in FY 1994 and 1995. In addition, in February, 1994, the Commission conducted a course for TVA. In response to a request from the Mine Safety and Health Administration (MSHA), the Commission will conduct a course for that agency in 1996. On October 6, 1993, the Commission signed a Memorandum of Agreement (MOA) with FEMA to cooperatively develop and conduct EAP training for state- regulated dams in the furtherance of national dam safety. Two pilot courses were delivered to refine the course. The course was well received. After making necessary changes, a train-the-trainer session was held on October 17-19, 1995 at FEMA's training facility in Emmitsburg, Maryland. The Commission continues to aggressively pursue the higher level EAP exercises (tabletop and functional) to incorporate the local and state disaster preparedness agencies. Under the Commission's EAP exercise program, each licensee and exemptee with a high hazard potential dam conducts a tabletop and functional exercise of an EAP on at least one of its dams during a 5-year period. The 5-year cycle will be repeated with a different dam and EAP selected for a functional exercise. This program will continue at this level because it is a means to maintain the state of readiness of the local and state officials through the cooperation and assistance of the dam owners. In this manner, there can be changes or improvements to EAP's and all changes in personnel can keep this information and knowledge up-to-date.

Personnel from states and other Federal agencies such as TVA, the Bureau of Reclamation (BOR), Forest Service, and California Department of Water Resources have attended the Commission's EAP classes, as well as hydro representatives from Canada. The Commission plans to encourage participation of other state agencies and state dam safety officials.

The Commission's EAP training program, a nationally recognized and highly acclaimed program, is now receiving international interest.

J. Application of ICODS Technical Guidance

The ICODS comprises all Federal agencies that have dam safety responsibilities, including the Commission. The ICODS has developed, through subcommittees having membership agency representation, guidance on key dam safety issues. In FY 1993, ICODS formed an ad hoc Subcommittee to review and update several Federal Guidelines. The Commission's staff is participating in this endeavor. In this regard, the Commission's Dam Safety Program, while not specifically adopting the guidance, has issued regulations and Engineering Guidelines that are consistent with the following.

1. Emergency Action Planning Guidelines for Dams

This publication, issued in February 1985, is consistent with the Commission's EAP requirements, as contained in its regulations issued in January 1981 and the Appendix thereto, as revised on February 22, 1988 and supplemented September 8, 1988 (18 CFR Part 12-Subpart C). The guidelines were updated for reissue in 1996. ICODS requested that the Commission prepare the revised draft for review. The Commission's EAP Guidelines and

lessons learned by the Commission as a result of its EAP exercise program were used as the basis for the revision to the guidelines. The guidelines have been accepted by the ICODS members and are currently under peer review by USCOLD. The guidelines are the foundation for the course material the Commission developed for the FEMA/ICODS EAP Development and Exercise Design Course for dam owners.

The Commission's EAP program is in compliance with the Federal Guidelines. The Commission's regulations require that, unless specifically exempted, every applicant or licensee must develop and file an EAP with the proper Regional Director. For unconstructed projects, the EAP must be filed 60 days before the initial filling of the project reservoir. For an unlicensed constructed project, the applicant must file an EAP no later than 6 months after the license application is filed. For exempted small hydroelectric power projects of 5 megawatts or less, the EAP must be filed on a date specified by the Regional Director, usually 6 months after the exemption order is issued.

2. Federal Guidelines for Earthquake Analyses and Design of Dams

This publication, issued in March 1985 and revised in 1995, contains general guidance on seismic analyses of dams. The Commission's staff utilizes its own analyses and requires developers to use the methodologies outlined in this publication. The Commission's Engineering Guidelines refer to many of the same reference materials listed in the bibliography included in the publication.

3. Federal Guidelines for Selecting and Accommodating Inflow Design Floods For Dams

This publication, issued in March 1985 and revised in 1995, is consistent with the Commission's regulations issued January 1981 regarding evaluation of spillway adequacy (18 CFR Section 12.35 (b)) and Chapter II of the Commission's Engineering Guidelines titled "Selecting and Accommodating Inflow Design Floods for Spillways," issued July 1987 and revised April 1991. In fact, the basis for the revision to the document is Chapter II of the FERC Engineering Guidelines.

K. State Dam Safety Agency and Other Federal Agency Involvement

The Commission's efforts to coordinate with state agencies has been expanded through discussions and implementation of MOA's. The Commission has advised state dam safety officials and other agencies of its willingness to enter into cooperative agreements to coordinate its dam safety activities with the states. For instance, the Commission entered into a formal MOA on August 10, 1992 with the State of Washington, Department of Ecology, to cooperate on dam safety matters in that state. The Commission also has entered into, at the request of the State of Oregon, an informal agreement to cooperate and coordinate with the state dam safety official to effectively provide the same level of cooperation as with the MOA mentioned above. A similar agreement with the State of Colorado has been reached. The policy of the Commission is to have an open and publicly accessible dam safety program through cooperation and coordination at the Federal, state, and local level.

The Commission is continuing the MOA with the Nuclear Regulatory Commission (NRC) to conduct dam safety inspections and analytical reviews on the NRC jurisdictional dams. The MOA was implemented on June 1, 1992. This is similar to the MOA between the Department of Energy (DOE) and the Commission to inspect and review DOE-owned dams. During FY 1994 and 1995, four NRC developments were inspected.

An MOA was developed between the Commission and the DOE and implemented on September 14, 1990 to utilize Commission staff and expertise to conduct dam safety inspections and analytical reviews on dams owned by the DOE. The MOA was signed to continue inspecting dams for another 5 years for DOE. There are 92 dams and impoundments that require inspections and evaluations. The hazard potential classifications of these dams include 6 high hazard potential dams; 10 significant hazard potential dams; and 76 low hazard potential dams. Two small impoundment dams are breached. All the dams have been inspected. Several require follow-up inspections because maintenance work is necessary before a thorough inspection can be completed. All high hazard potential and significant hazard potential dams will be inspected each year, and all low hazard potential dams will be inspected every 3 years. The Commission staff has provided comments to the DOE on follow-up actions that are necessary at each dam. During FY 1994 and 1995, there were 15 inspections of DOE dams completed. Most comments are about maintenance type items, the need for additional analytical information and, where necessary, information to complete EAP's. Construction of remedial measures was completed on one dam.

The Commission continues to stress the importance of EAP's. The agency's strong policies and practices and in-depth testing (exercises) that involve local officials in the exercise process continue to reflect the reasons for the commendation given in 1992, and referenced in the 1994 FEMA Report: "FERC is in full compliance with the Federal Guidelines and is to be complimented on its EAP policy which stresses the need for in-depth testing (exercises) that involves local officials in the exercise process." The Commission implemented such a practice in 1989, and is aggressively pursuing this program. Under this program, approximately 40 functional exercises are conducted each year. Each licensee and exemptee having a high hazard potential dam will conduct a functional exercise on at least one of its dams during a 5-year period. To assist licensees and exemptees in preparing for EAP exercises, the Commission has developed and conducts exercise design courses for licensees, exemptees, and staff.

Two in-house EAP training courses were presented by staff in both FY 1994 and 1995. The Commission has invited other Federal and state agencies to attend the course. In addition, the Commission has presented the course for the TVA in February, 1994, and has been asked to conduct the course for MSHA in 1996.

On October 6, 1993, the Chair of the Commission signed a MOA with FEMA to cooperatively develop and deliver EAP training for state-regulated dams in furtherance of national dam safety. As a result, two pilot courses were held: one in Denver, Colorado, in October, 1994 and one in Panama City, Florida, in March, 1995. Subsequently, the course was refined and a

train-the-trainer session was held on October 17-19, 1995, at FEMA's training facility in Emmitsburg, Maryland.

L. Research and Development and Special Initiatives

Dam safety research activities are generally carried out by other agencies; Commission staff coordinate in the review of activities and participate in an advisory capacity. However, staff does participate in the Interagency Research Coordination Conference to keep abreast of the latest developments in the research activities performed by other Federal agencies. Staff also participates, with the Corps of Engineers and BOR, in the research activities sponsored by EPRI. Staff also serves on the Advisory Committee to EPRI on research on dam safety; as such, they have been instrumental in suggesting the initiation of research into key dam safety areas. This EPRI Committee provides the hydro-electric industry with useful technical reports and funds important research on dam safety matters. There are several important research projects now in progress that are focused on the adequacy of current "classical" gravity dam stability analyses, the ability of embankment dams to withstand overtopping, formulation of complete "user friendly" software packages for the 3-D finite element analysis of dams, and alternative approaches to the regional National Weather Service Probable Maximum Precipitation (PMP) estimates.

The Commission staff co-funded a contract with EPRI for developing a guideline for PMF determinations such that the PMF can be verified independently and reproduced within a reasonable range. The contract for the study was awarded in February 1992 to Bechtel Corporation, Inc. of San Francisco, California. The effort of this research will be included in the Commission's Engineering Guidelines. The PMF Guideline has national implications and affect the hydrology requirements of the Commission's Dam Safety Program. The report became available for distribution as Chapter VIII of the Commission's Engineering Guidelines in October, 1993. Subsequent to finalizing the report, the Commission extended the contract with EPRI to develop examples, based on case studies, which demonstrate proper application of the PMF Guideline. These examples are necessary because of the complexity of PMF development under various situations. The contractor for the examples was Mead and Hunt, Inc. of Madison, Wisconsin. The examples were completed by December 31, 1994 and are available as an appendix to the PMF Guideline. During the 1994-1995 calendar year, ASDSO sponsored five seminars across the country that cover the PMF Guidelines and the examples. The Commission has also asked Mead and Hunt, Inc. to develop a companion text to the PMF Guideline that will provide information on the proper use of hydrologic parameter equations and methodologies recommended for PMF analyses to ensure consistent application of the PMF guidelines.

In 1995, the Commission supported a meteorologic investigation that included a detailed analysis of tropical storm Alberto which caused massive flooding in Georgia, Alabama, and northern Florida in July, 1994. Alberto's meteorology has been compared to other historically significant events. This research provides information useful for evaluating the potential impact of similar storms over other watersheds.

The Commission is currently studying the hydrology of the flooding that resulted from tropical storm Alberto. The hydrologic data from this extreme flood event will be used to test the utility and accuracy of the methodology in the PMF Guidelines.

The Commission coordinated with the National Research Council (NRC) to explore the current state-of-the-art in PMP determinations, and determined whether there are better methods available to develop the data needed to establish the PMP. As a part of the contract, the NRC held a forum on October 21, 1993 with recognized experts in the field of PMP determinations to discuss this subject and the complex issues regarding PMP methodology.

The Commission has published Chapters I through IV of its Engineering Guidelines for Evaluation of Hydropower Projects. The first nine chapters deal with General Requirements, Inflow Design Floods, Gravity Dams, Embankment Dams, Foundation Engineering, Emergency Action Plans, Construction Quality Control Inspection Program, the PMF Guideline, and Instrumentation and Monitoring. The primary purpose of these guidelines is to provide guidance to the Commission staff. However, due to interest expressed by the owners of dams regulated by the Commission, the guidelines have been published for use by the public. There has also been interest expressed by state and Federal agencies, the consulting engineering community, and the international community.

IV. Impact on Agency Operations

Authority to Enforce Compliance With Federal Guidelines for Dam Safety. Part 12 of the Commission's regulations are consistent with the Federal Guidelines for Dam Safety and govern the safety of all water projects and project works licensed or required to be licensed under Part I of the FPA. Under section 10© of the Act, the holder of a license, permit, or exemption, or any other order issued by the Commission, is subject to the enforcement provisions of Section 31 of the FPA. However, due to the importance of ensuring the public's safety, the Commission has, for the most part, received excellent cooperation from dam owners so that compliance with its dam safety program has not created major compliance problems.

V. Conclusions

The Commission's Dam Safety Program is in conformance with all provisions of the Guidelines.

TABLE 1
SUMMARY OF DATA FOR NATIONAL DAM SAFETY PROGRAM (INDICATE NUMBER OF DAMS)
(October 1, 1993 - September 30, 1995)

	Dam Inventory				Periodic Inspections Conducted				Dams Under Further Investigation and Study		Dam Safety Modifications		Dams with EAPs By Hazard Class.)	
Department		Hazard Classification			Since Last Report				Completed Since Last Report	Currently In Progress	Completed Since Last Report	Currently In Progress		
Agency	Total	HI	SIG	LO	Total	Formal	Intermediate	During Constr.					HI	SIG
FERC	2342	672	252	1418	3938	389	2633	916	66	28	66	28	636	229

Table 2

Date Run: *10/31/95*

Dam Safety Modifications Completed Between October 1, 1993 and September 30, 1995

FERC No.	Dam Name	STATE	Description of Rehabilitation
00308-01-01	WALLOWA FALLS DIVERSION	OR	MODIFY EXISTING STRUCTURE BY INSTALLING DOWNSTREAM IMPERVIOUS CORE & ROCKFILL BUTTRESS
00349-01-01	MARTIN	AL	POST-TENSIONED ANCHOR INSTALLATION
00349-01-01	MARTIN	AL	PROVIDE EMBANKMENT OVERTOPPING PROTECTION
00516-01-01	SALUDA	SC	REPLACE SPILLWAY GATES
00659-01-01	CRISP COUNTY (WARWICK)	GA	RECONSTRUCT BREACHED EARTH EMBANKMENT (NORTH)
00659-01-01	CRISP COUNTY (WARWICK)	GA	REPAIR SOUTH EMBANKMENT UPSTREAM SLOPE
01218-01-01	FLINT RIVER	GA	REBUILD EARTH EMBANKMENTS FOLLOWING JULY 1994 BREACH DURING TROPICAL STORM ALBERTO
01218-01-01	FLINT RIVER	GA	REBUILD THE SUBSTATION AND POWERHOUSE EQUIPMENT
01490-01-01	MORRIS SHEPPARD	TX	INSTALL RELIEF WELLS AND PLACE SURCHARGE
01490-01-01	MORRIS SHEPPARD	TX	CONSTRUCT EMERGENCY SPILLWAY
01759-03-01	WAY	MI	INCREASE SPILLWAY CAPACITY
02030-01-01	PELTON	OR	EXCAVATE MATERIAL FROM GRABEN PORTION OF SLIDE AREA
02144-01-01	BOUNDARY	WA	EPOXY GROUTING OF THE CRACKS
02146-01-01	WALTER BOULDIN	AL	GROUT CONTRACTION JOINTS BETWEEN MONOLITHS OF INTAKE
02161-01-01	RHINELANDER	WI	CONSTRUCT AUXILLIARY SPILLWAY
02188-05-01	BLACK EAGLE	MT	POST TENSIONED WASTE GATE SECTION. INSTALLED BUTTRESS FOR THE FOREBAY SECTION.
02225-01-01	SULLIVAN LAKE	WA	DAM REHABILITATION
02330-03-01	EAST NORFOLK	NY	REPLACE OPEN FLUME & INTAKE STRUCTURE: INSTALL 4 POST-TENSIONED ANCHORS AT INTAKE; PLACE UPSTREAM GROUT CURTAIN AT INTAKE AREA.

Table 2

Date Run: 10/31/95

Dam Safety Modifications Completed Between October 1, 1993 and September 30, 1995

FERC No.	Dam Name	STATE	Description of Rehabilitation
02354-04-01	MATHIS & TERRORA	GA	INSTALLATION OF POST-TENSIONED ROCK ANCHORS
02389-01-01	EDWARDS	ME	FILL NON-OVERFLOW CONCRETE CRIB WITH CONCRETE AND ADD CONCRETE DECK
02394-01-01	CHALK HILL	MI	INCREASE SPILLWAY CAPACITY
02416-01-01	WARE SHOALS	SC	REPAIR PENSTOCKS
02431-01-01	BRULE	WI	ADD BERM AND DRAINAGE SYSTEM TO RIGHT DIKE
02436-01-01	FOOTE	MI	REPAIR SPILLWAY CONCRETE
02447-01-01	ALCONA	MI	INCREASE SPILLWAY CAPACITY
02451-01-01	ROGERS	MI	REPAIR SPILLWAY CONCRETE
02488-01-01	BRADFORD	VT	CONSTRUCT AN ICE SLUICE GATE
02514-02-01	BUCK	VA	INSTALLATION OF ANCHORS
02539-01-01	SCHOOL STREET	NY	CONSTRUCT NEW REINFORCED CONCRETE CANAL WALL IN FRONT OF EXISTING WALL
02547-01-01	HIGHGATE FALLS	VT	RAISE DAM BY 7.4 FEET, SURMOUNTED BY A 15-FOOT INFLATABLE RUBBER CREST GATE
02568-01-01	WEBBER	MI	REPAIR VOID AREA BENEATH SPILLWAY SLAB
02580-01-01	TIPPY	MI	REPLACE FAILED RETAINING WALL
02586-02-01	POINT "A"	AL	CONVERT SLAB-AND-BUTTRESS STRUCTURE TO GRAVITY MODE
02589-01-01	FORESTVILLE (DAM 2)	MI	INSTALL ROCK ANCHORS
02645-02-01	SOFT MAPLE TERMINAL	NY	INSTALL SLURRY TRENCH CUTOFF WALL AND TOE DRAINAGE IMPROVEMENTS; CONSTRUCT BERM AND DRAINAGE SYSTEM ON DOWNSTREAM SLOPE
02655-01-01	EAGLE & PHENIX	GA	GROUTING OF TRAINING WALL TO REDUCE SIGNIFICANT LEAKAGE

Table 2

Date Run: *10/31/95*

Dam Safety Modifications Completed Between October 1, 1993 and September 30, 1995

FERC No.	Dam Name	STATE	Description of Rehabilitation
02659-01-01	POWERDALE	OR	REPAIR SPILLWAY SLAB
02680-01-01	LUDINGTON	MI	REPAIR TRENCHES IN CLAY LINER
02695-01-01	DEXTER NORTH CHANNEL	NY	SEALOFF AND FILL IN ABANDONED OLD CANAL STRUCTURE.
02713-05-01	HEUVELTON	NY	TAINTER GATES & GATE STRUCTURE REHABILITATION AND REPLACEMENT; INSTALL ROCK ANCHORS IN PIERS
02727-01-01	ELLSWORTH	ME	FILL MASS CONCRETE IN THE AREA BETWEEN ALL BUTTRESSES
02727-02-01	GRAHAM	ME	CONSTRUCT NEW UNCONTROLLED CONCRETE SPILLWAY DOWNSTREAM OF EXISTING DAM
02788-01-01	COLLIERSVILLE	NY	INSTALL ANCHORS IN BUTTRESS PIERS; PROVIDE EROSION PROTECTION TO EAST ABUTMENT
02959-02-02	REGULATING BASIN SOUTH DAM	WA	CONSOLIDATE FOUNDATION BY ADDING STONE COLUMNS AND BERM
02985-01-01	WILLOW MILL	MA	CONSTRUCT A CONCRETE BUTTRESS
03449-01-01	MURRAY LOCK & DAM NO. 7	AR	REPAIR HEADRACE SHEETPILE WINGWALL
03605-01-02	MOHAWK PAPERS-WEST DAM	NY	RECONSTRUCTION OF FOREBAY WALL
04906-01-03	SPICER - 'C' DAM	NY	REPAIR BREACHED SECTION OF BIG SPICER DAM
05461-01-01	SOUTH GLEN FALLS	NY	REHABILITATE DAM; REPLACE FLASHBOARDS WITH CREST GATES
05998-01-01	EMPORIA	VA	GROUTING, FOLLOWED BY INSTALLATION OF TENDONS
06066-01-01	LAKE HOUSATONIC	CT	INSTALL FILTER DRAIN ALONG TOE OF DAM
07289-01-01	JIM BOYD	OR	REPAIR DAMAGE AT INTAKE STRUCTURE & POWER CANAL BREACH
08369-01-01	LAKE FLOWER	NY	RECONSTRUCT FAILED SECTION OF PENINSULA TRAINING WALL

Table 2

Date Run: 10/31/95

Dam Safety Modifications Completed Between October 1, 1993 and September 30, 1995

FERC No.	Dam Name	STATE	Description of Rehabilitation
08640-01-01	SEABRIGHT	ME	CONCRETE CAPPING OF ROCKFILL ALONG TOE OF SPILLWAY; CONSTRUCT NEW EAST WING SPILLWAY
08825-01-01	MORELY DAM	MI	REPAIR SPILLWAY CONCRETE
09088-01-01	LOWER VILLAGE	NH	POST-TENSION BUTTRESS DAM AND CANAL WALL
09340-01-01	LOWER KEZAR FALLS	ME	RESTORE CANAL DIKE AND REPAIR CANAL HEADGATE STRUCTURE
10253-01-01	LOWER PELZER	SC	RESTORE HOIST SUPPORT WITH STEEL BEAMS; EPOXY GROUT MASONRY CRACKS
10253-01-01	LOWER PELZER	SC	BUILD A WORK PLATFORM ABOVE HEADGATE TRASHRACKS
10254-01-01	UPPER PELZER	SC	INSTALL NEW TRASHRACKS
10254-01-01	UPPER PELZER	SC	BUTTRESS DOWELED INTO ROCK
10461-01-01	PARISHVILLE	NY	INSTALL 5 POST-TENSIONED TENDON ANCHORS; RECONSTRUCT THE AMBURSEN NON-OVERFLOW SECTION INTO A GATED CONCRETE GRAVITY STRUCTURE
10551-01-01	HIGH DAM	NY	POST-TENSION DAM, SPILLWAY AND FOREBAY WALL
10676-01-01	RED BRIDGE	MA	RAISE EMBANKMENT DAM BY INSTALLING A STEEL SHEET PILE WALL; REPAIR GATEHOUSE
10828-01-01	UPPER OCCOQUAN DAM	VA	INSTALLATION OF POST-TENSION ANCHORS
11408-02-01	LIGHTHOUSE HILL	NY	STABILIZE CONCRETE DAM STRUCTURES WITH POST-TENSIONED ANCHORS, AND ARMOR THE EARTH DIKE WITH ROLLER COMPACTED CONCRETE (RCC) FOR EROSION PROTECTION

Table 3

Date Run: *10/31/95*

Dam Safety Modifications Ongoing or Under Review as of October 1, 1993

FERC No.	Dam Name	STATE
00005-01-01	KERR	MT
01218-01-01	FLINT RIVER	GA
02073-01-01	MICHIGAMME FALLS	MI
02146-03-01	LOGAN MARTIN	AL
02146-03-01	LOGAN MARTIN	AL
02188-09-01	HEBGEN	MT
02392-01-01	GILMAN	VT
02394-01-01	CHALK HILL	MI
02404-02-01	FOUR MILE DAM	MI
02407-01-01	YATES	AL
02458-02-01	DOLBY	ME
02468-01-01	CROTON	MI
02491-01-01	JIM FALLS	WI
02566-01-01	WEBBER	MI
02586-02-01	POINT "A"	AL
02652-01-01	BIG FORK	MT
02652-01-01	BIG FORK	MT
02713-04-01	EEL WEIR	NY
02790-01-07	GRW - BAYBOARD STANCHION SECT.	MA
02943-01-01	O'SHUAGHNESSY	OH
02959-01-01	TOLT RIVER - SOUTH FORK	WA
05251-01-01	LEE CREEK	AR
05276-01-01	HUDSON FALLS	NY
07161-01-01	GALESVILLE	OR
07161-01-01	GALESVILLE	OR
08185-01-01	CLIFTON NO. 3	SC
09185-01-01	CLAM RIVER	WI
10200-01-01	CONGDON	CT

TABLE 4
DAM FAILURES AND STRUCTURAL ACCIDENTS

11/27/95

Project No.	Project Name	River	State	Date	Type of Dam Failure/Accident	Effect of Failure/Accident	Remedial Action
029520101	Keuka Lake	Keuka Lake Outlet	NY	12/19/93	Rupture of steel penstock above first expansion joint.	Loss of generation and minor property damage.	Licensee repaired penstock during July 1994.
104820101	Swinging Bridge	Mongaup River	NY	12/21/93	Buckling of a portion of penstock steel liner at invert below intake tower.	Loss of generation of Unit No. 1.	Licensee made temporary repairs during April 1994. Final repairs were completed in September 1994.
026450101	Beaver River	Beaver River	NY	3/14/94	Unit No. 2 steel penstock collapsed during dewatering.	None	Collapse caused by frozen vent pipe - licensee planed to replace penstock with spare pipe sections. Work completed in early May 1994.
027900107	Lowell	Northern Canal	MA	3/15/94	Failure and washout of a portion of canal wall.	Partial loss of generation capacity.	Licensee has submitted proposal for temporary and permanent repair measures.
076620101	Ontelaunee	Maiden Creek	PA	2/22/94	Failure of bridge parapet wall over spillway section of dam.	PA State Route 73 has been closed to traffic.	Exemptee and PADOT are investigating repair/replacement options.
026160101	Hoosic River	Hoosic River	NY	1/12/95	200 feet of the middle penstock collapsed from surge tank to powerhouse during scheduled dewatering.	None	Licensee completed installation of new penstock during April 1995.

TABLE 4
DAM FAILURES AND STRUCTURAL ACCIDENTS

11/27/95

Project No.	Project Name	River	State	Date	Type of Dam Failure/Accident	Effect of Failure/Accident	Remedial Action
025690201	Black River	Black River	NY	1/17/95	Sloughing of a 25 foot long section of the power canal north of the powerhouse.	None	Licensee repaired canal by flatting slope and adding new riprap protection.
024820501	Hudson River	Hudson River	NY	2/9/95	Leakage from small hole along a joint at intake structure bay for future Unit No. 10.	None	Licensee made temporary repairs by filling portion of intake with concrete; need for further repairs under review.
039840101	South Milton	Salmon Falls River	NH	7/8/94	Failure of penstock expansion joint.	Loss of generation.	Licensee repaired expansion joint and replaced second expansion joint.
030250101	Kelley's Falls	Piscataquog River	NH	12/25/94	Partial failure of masonry plug to abandoned intake.	Loss of generation.	Permanent concrete plug installed during the summer 1995.
023060101	Clyde River	Clyde River	VT	5/1/94	Right abutment of spillway washed out.	Loss of generation.	Decision on dam removal and construction of a penstock pending on relicensing.
069030101	Middle Greenwich	Batten Kill River	NY	7/28/95	A 30 square inch low level outlet at the base of the dam near the power intake failed, causing an uncontrolled release of water.	None. Repairs required temporary drawdown of pond with loss in generation.	Exemptee lowered pond four feet and made repairs on August 11, 1995. The repairs involved installation of a four foot square concrete plug. The pond level was

TABLE 4
DAM FAILURES AND STRUCTURAL ACCIDENTS

Project No.	Project Name	River	State	Date	Type of Dam Failure/Accident	Effect of Failure/Accident	Remedial Action
021460101	WALTER BOULDI	COOSA	AL	11/8/93	Failure of water stops in the intake structure construction joints.	Rapid rise in piezometric levels in the embankment downstream of the intake, with plumes of muddy discharge from embankment drains.	Grouting of contraction joints and evaluation of other possible sources of leakage (penstocks and embankment).
052510101	LEE CREEK	LEE CREEK	AR	2/28/94	Failure of portion of trashrack.	Debris clogged intake reducing flow which caused plant to go offline. Minor damage to the turbine; destruction of trashrack.	Replace failed portion with redesigned stronger trashrack.
079180101	WALKER MILL	LITTLE PIGEON	TN	3/28/94	Flood damage to generation and control equipment.	Loss of generation.	Damaged equipment cleaned and put back in operation.
026920101	NANTAHALA	NANTAHALA	NC	12/4/93	Landslide occurred in the spillway intake channel.	Practically blocked spillway intake channel.	Cleanup began January 1994. Cleanup and area stabilization should be completed by March 1995.
108960101	PINNACLES	DAN	VA	3/2/94	Rupture of wood stave pipeline by rockslide.	Temporary loss of generation.	Patched hole in pipeline with metal plate. Permanent repairs to pipeline and supporting steel trestle to be completed in 1994 with other scheduled work.
014900101	MORRIS SHEPPA	BRAZOS	TX	5/15/94	Uncontrolled operation of beartrap spillway gate and inability to return to closed position.	Loss of some water from reservoir; no apparent physical damage.	Adjusted and lubricated side seals, upgraded air supply to enhance buoyant forces, inspected valves, and modified gate operating procedures.

TABLE 4
DAM FAILURES AND STRUCTURAL ACCIDENTS

11/27/95

Project No.	Project Name	River	State	Date	Type of Dam Failure/Accident	Effect of Failure/Accident	Remedial Action
012180101	FLINT RIVER	FLINT	GA	7/7/94	Flooding caused by "Alberto" overtopped and breached embankment. Water damage to generating equipment when powerhouse flooded.	Loss of portion of embankment and drawdown of reservoir. Generation not possible until embankment repaired and reservoir refilled.	Rebuild embankment section to refill reservoir and clean and overhaul generating equipment. Embankment reconstruction completed by March 1, 1995.
006590101	LAKE BLACKSHEA	FLINT	GA	7/9/94	Flooding caused by "Alberto" overtopped and breached embankment. Water damage to generating equipment when powerhouse flooded.	Loss of portion of embankment and drawdown of reservoir. Generation not possible until embankment repaired and reservoir refilled.	Repair embankment section to refill reservoir and clean and overhaul generating equipment.
025140101	BUCK	NEW	VA	7/29/94	Wooden flashboard section failed during normal condition.	Partial loss of reservoir.	Replaced timbers and refilled reservoir.
024660101	NIAGARA	ROANOKE	VA	12/27/93	Leak developed in penstock.	7-month outage on unit 2.	Plates welded on exterior, lining placed on interior, section encased in concrete.
024660101	NIAGARA	ROANOKE	VA	12/27/93	Leak developed in penstock.	7 month outage on unit 2.	Plates welded on exterior, lining placed on interior, section encased in concrete.
108720101	TOWALIGA RIVER	TOWALIGA	GA	7/5/94	"Alberto" caused high discharge over spillway with headwater and tailwater greatly exceeding normal conditions at the State-owned dam (FERC license pending).	Erosion at toe of dam right nonoverflow section. Loss of downstream State-owned campgrounds and the abandoned steel highway bridge	State of Georgia (owner) filled eroded areas at dam nonoverflow. Proposed plans are to rebuild downstream campgrounds.

TABLE 4
DAM FAILURES AND STRUCTURAL ACCIDENTS

11/27/95

Project No.	Project Name	River	State	Date	Type of Dam Failure/Accident	Effect of Failure/Accident	Remedial Action
021460501	WEISS	COOSA RIVER	AL	3/29/95	Slope failure.	None. Slope failure occurred in freeboard dike. No water impounded by dike.	Embankment repairs scheduled for June 1995. Repairs to be similar to those conducted in past for shallow slope failures in this structure.
079160101	WALKER MILL	LITTLE PIGEON	TN	2/5/95	Underminding of powerhouse.	Loss of reservoir and generation.	Repairs pending until lower inflows.
026510101	Elkhart	St. Joseph	IN	9/18/94	Piping found in material	Temporary lowering of pond	Lost material replaced with grout
024300101	Ladysmith	Flambeau	WI	9/15/94	Erosion of earthen abutment due to overtopping	No downstream impact. Temporary lowering of reservoir	Fuse plug spillway in abutment area
026430101	BEND	DESCHUTES R	OR	10/7/93	Gate failure.	Uncontrolled release caused reservoir level to drop several feet.	Repair gate.
074470101	PORTNEUF RIVE	PORTNEUF R	ID	6/17/94	Foundation piping and erosion	Uncontrolled leakage.	Pumped concrete, additional upstream/downstream filtered riprap.

TABLE 4
DAM FAILURES AND STRUCTURAL ACCIDENTS

11/27/95

Project No.	Project Name	River	State	Date	Type of Dam Failure/Accident	Effect of Failure/Accident	Remedial Action
078560101	POTOSI POWER	S WILLOW CR,JE	MT	6/16/94	PVC penstock rupture	No apparent environmental damage. Loss of generation.	Penstock repair scheduled. Installed straw bale barriers.
021950201	NORTH FORK	CLACKAMAS R	OR	7/26/94	Gate failure.	Uncontrolled release caused spill at downstream River Mill Dam.	Repaired gate controls
019220201	BEAVER FALLS	BEAVER FALLS C	AK	8/14/94	Landslide into reservoir	Temporary minor rise in reservoir level	Repaired access road and log boom
026590101	POWERDALE	HOOD R	OR	10/27/94	Overtop and failure of cofferdams	Loss of generation. No downstream flooding.	Repair spillway and remove cofferdam.
026520201	BIG FORK	SWAN R	MT	1/13/95	Power canal failure.	Loss of generation, minor sdiment in river.	Repair pending.
053760201	HORSESHOE BEN	PAYETTE R	ID	4/9/95	Power canal seepage.	Delay in filling canal and full time operation.	Installed toe drain.

TABLE 4
DAM FAILURES AND STRUCTURAL ACCIDENTS

11/27/95

Project No.	Project Name	River	State	Date	Type of Dam Failure/Accident	Effect of Failure/Accident	Remedial Action
003080101	WALLOWA FALLS	E FK WALLOWA R	OR	6/15/94	Powerhouse tailrace wall collapse	Temporary minor turbidity in channel	Repaired wall
003080101	WALLOWA FALLS	E FK WALLOWA R	OR	6/7/95	Penstock guy wire failed allowing penstock to move and open a coupling at an expansion joint.	Erosion of hill side and trail. Reportedly only a very small amount of material reached the river.	Replaced anchor, realigned the penstock and returned the project to operation 6/24/95.
022300101	BLUE LAKE	MEDVETCHA R	AK	8/3/95	INTAKE GATE FAILURE	NONE	TEMPORARY REPAIR OF GATE RAILS - PERMANENT REPAIR IN SPRING 1996
067800101	Deadwood Creek	Deadwood Creek	CA	1/25/94	Landslide destroyed a penstock footing.	Erosion of hillside downhill from the penstock carried sediment into Deadwood Creek. Temporary loss of generation.	Licensee submitted plan for repair and geotechnical engineer evaluation. Project was repaired and placed on-line on March 18, 1994.
024260301	California Aqueduct	Mojave Siphon Pipel	CA	3/2/94	Existing buried pipeline ruptured at approximately sta 22 and 93.	Saturated fill above pipe dispersed over adjacent area, within project boundary. Cleanup and regrading required.	Failed section repaired, pipeline back in service by March 18, 1994. Licensee submitted report on July 29, 1994.
001840501	El Dorado	South Fork America	CA	1/10/95	Landslide destroyed 90-foot section of Flume #46.	Temporary loss of irrigation water source. Powerhouse inoperable until 08/31/96.	Flume repaired

TABLE 4
DAM FAILURES AND STRUCTURAL ACCIDENTS

11/27/95

Project No.	Project Name	River	State	Date	Type of Dam Failure/Accident	Effect of Failure/Accident	Remedial Action
001840501	El Dorado	South Fork America	CA	3/14/95	Landslide damaged 50-foot section of Flume #42/43.	Temporary loss of irrigation water source. Powerhouse inoperable until 08/31/96.	Flume repaired
006030301	DeSabla	Bear River	CA	1/8/95	Canal destroyed by debris flow.	Temporary loss of generation.	Reconstructed about 100 foot (32.8 m) long section of canal.
006060501	Kilarc-Cow Creek	Old Cow Creek	CA	2/2/95	Landslide affected the safety of Cow Creek Penstock.	As a precaution, the penstock was dewatered.	The penstock was not disturbed by the slide. The Cow Creek Powerhouse resumed generation.
011211701	Battle Creek	South Fork Battle Cr	CA	3/14/95	Minor erosion at the left abutment of Inskip Diversion.	Minimum effect to the safety of the dam.	Licensee did an emergency repair by placing about 30 cubic yards of riprap. After the rainy season, the licensee will place the area with concrete.
000671401	Big Creek No. 2A a	San Joaquin River	CA	3/10/95	No. 8 intake grating destroyed by debris from flood flows.	Intake structure and tunnel damaged. Powerhouse No. 8 shut down.	Repairs to be made when flows subside. Repairs will take several weeks.
013940601	Bishop Creek	Bishop Creek	CA	3/10/95	Portion of woodstave flowline damaged by landslide during storms.	A portion of the project was shut down for 82 days.	The licensee has replaced the damaged pipe with a steel flowline.

TABLE 4
DAM FAILURES AND STRUCTURAL ACCIDENTS

Project No.	Project Name	River	State	Date	Type of Dam Failure/Accident	Effect of Failure/Accident	Remedial Action
008140101	Upper Beaver	Beaver Creek	UT	6/5/95	A portion of the penstock was damaged by a rockslide.	A portion of the project was shut down for four days.	The penstock was repaired.
001371701	Mokelumne River	Mokelumne River	CA	5/10/95	Electra Powerhouse's needle valve shaft failed.	The needle valve shaft failure caused damage to the deflector and runner of the turbine and to the turbine shut-off valve. Also, a small amount of oil was	All impulse units in the PG&E hydro system were reviewed for designs similar to the Electra Powerplant design. All four needle shafts were replaced on

INTERNATIONAL BOUNDARY AND WATER COMMISSION

INTERNATIONAL BOUNDARY AND WATER COMMISSION
UNITED STATES AND MEXICO

OFFICE OF THE COMMISSIONER
UNITED STATES SECTION

MAR 2 2 1996

Mr. William S. Bivins, Chairman
Interagency Committee on Dam Safety
Federal Emergency Management Agency
Washington, D.C. 20472

Dear Mr. Bivins:

I am pleased to enclose the U.S. Section's biennial progress report to FEMA dated March 1996 relative to status of implementing the "Federal Guidelines for Dam Safety" as requested by your letter of November 2, 1995.

We apologize for the delay in submitting this report.

Should you or other members of your staff have any questions relative to the enclosed report, please feel free to call me at 915-534-6693 or Carlos Marin at 915-534-6690.

Sincerely,

J. S. Valdez
Principal Engineer

Enclosure:
As Stated

cc: Mr. James L. Witt
Director
Federal Emergency Management Agency
Washington, D.C. 20472

THE COMMONS, BUILDING C, SUITE 310 • 4171 N. MESA STREET • EL PASO, TEXAS 79902
(915) 534-6700 • (FTS) 570-6700

I. Introduction

The International Boundary and Water Commission (IBWC), composed of a U.S. Section and a Mexican Section, is charged with carrying out the provisions of a number of treaties between the United States and Mexico. Among its responsibilities, the IBWC has jurisdiction over two large international storage dams and four small diversion dams on the Rio Grande and Colorado Rivers. The U.S. Section also is responsible for the maintenance of the American Dam and five Natural Resources and Conservation Service (NRCS) arroyo control dams, which are not fully international in nature. See Appendix A.

The international dams under IBWC jurisdiction are jointly operated and maintained by the United States and Mexican Sections of the IBWC. Each Section is headed by an Engineer-Commissioner and each has staffs of engineers and technicians to carry out the work assigned to it by treaties. Each Section also has available to it special consultants (Technical Advisors) who supplement the expertise of the IBWC staff.

Due to the international character of the dams under the jurisdiction of the IBWC, the National Dam Inspection Act of 1972 exempted IBWC dams from inspection by the U.S. Army Corps of Engineers (Corps), but not from the Act's safety of dams provisions.

This report briefly describes progress made by the U.S. Section since the last report, dated December 1993, in implementing the Federal Guidelines for Dam Safety of June 25, 1979, as mandated by Presidential Memorandum dated October 4, 1979. There have not been any changes in the U.S. Section's dam safety responsibilities since the previous report.

II. Program Actions Since Last Progress Report

A. Implementation

The U.S. Section continues to formulate its safety of dam program relative to the general intent and requirements of the Federal Guidelines for Dam Safety. Coordination with Mexico is based upon an exchange of memoranda by the United States and Mexican Commissioners. No changes have been made relative to the way the U.S. Section administers its dam safety activities.

Five-year safety of dam inspections of the Morelos, International, and American diversion dams are to be performed this year. Five-year safety of dam inspections of the large Amistad and Falcon storage dams and Anzalduas and Retamal diversion dams are to be performed in 1997. Some planned activities, such as an updated stability analysis of Falcon and updated spillway and freeboard adequacy evaluation for Falcon and Amistad Dams, have been deferred because of budget limitations.

B. Actions Taken

Not applicable.

C. Changes in Administration

There have not been any changes in administration in the IBWC dam safety program.

III. Implementation Progress

A. Organization, Administration, and Staffing

The U.S. Section's dam safety organization and staff are adequate. The U.S. Section has considered the establishment of a separate office to be responsible for dam safety, and has concluded that such an office is neither economically justified nor necessary to carry out the adopted program in an organization of the relatively small size of the U.S. Section. Instead, dam safety is made a separate function of the Principal Engineer, Supervising, with specific requirements for reporting to the Commissioner.

B. Safety of Dams Training Activities

Project Managers periodically conduct reviews of available manuals, TADS videotapes, and guidelines with their staffs.

C. Dam Inventory

The U.S. Section's inventory of dams is attached as Appendix A. There have not been any changes to the inventory since 1969. IBWC dams are entered into the National Inventory of Dams. Minimal changes have occurred in land use downstream from IBWC dams.

D. Independent Reviews

Although the U.S. Section's staff prepares the routine annual safety of dam reports for IBWC dams, the IBWC relies very heavily on the Corps in performing the joint 5-year inspections of the two large storage dams, and to perform special inspections and studies as may arise.

E. Inspection Programs

The two large storage dams are inspected weekly and comprehensive annual reports are compiled for these dams. Approximately six special inspections also were made of Amistad Dam by technical advisors to the U.S. Section, furnished by the Corps, relative to the installation of a supplementary grout curtain and back fill of several sink holes observed on the Mexican side of the dam since the last biennial report to FEMA. The five NRCS arroyo control dams are inspected annually with the joint participation of IBWC and NRCS staff. The inspections of smaller IBWC irrigation diversion dams is less formal, and are performed by operating personnel of each dam.

F. Dam Safety Rehabilitation Programs

The IBWC currently has a grouting operation underway at Amistad Dam, Del Rio, Texas, to fill foundation seepage paths observed in a limited reach of the Mexican portion of the dam.

G. Management Effectiveness Reviews

Prior internal and external management reviews have covered all management areas of this agency; however, none of those specifically addressed any problem in the U.S. Section's safety of dams program.

H. Dam Failures and Remedial Actions

No dam failure occurred during the reporting period.

I. Emergency Action Planning

The U.S. Section has an Emergency Action Plan (EAP) in place for each of its two large storage dams. All features of this agency's emergency preparedness program have been developed for its two large storage dams and have been distributed to local agencies; however, no specific program or procedure is in place to test the EAP's. The communication sections of the EAP's are updated annually to assure appropriate communications to governmental agencies and the public.

J. Application of ICODS Technical Guidance

With regard to the IBWC's adoption of other ICODS guidance, the following comments are provided.

1. Emergency Action Planning Guidelines for Dams

IBWC EAP's contain the basic elements suggested in this document, but deviate with respect to the following items.

a. Inundation maps for Falcon and Amistad are based on a discharge of 1,000,000 cfs, which is slightly larger than the discharge given by the equation in the 1980 Corps report, "Flood Emergency Plans Guidelines for Corps Dams."

b. The U.S. Section presented its emergency preparedness plans to local officials in 1984. Other than communications directory updates, no additional coordination has occurred with local officials in their development of evacuation plans.

2. Federal Guidelines for Earthquake Analysis and Design of Dams

Falcon Dam was designed for horizontal and vertical accelerations of 0.1 g with a 1 second period. Amistad Dam was designed for a horizontal acceleration of 0.05 g. Since both dams are located in seismic zone 0 and are rolled earth fill on bedrock, it is believed that little or no damage would result if an earthquake were to occur.

3. Federal Guidelines for Selecting and Accommodating Inflow Design Floods for Dams

The original Spillway Design Flood (SDF) for Amistad Dam was based on the criteria that a storm equal to the 1954 storm could occur with Amistad Reservoir full and the ground primed for maximum runoff, and that another storm of the type of the 1921 Thrall, Texas, storm could occur 3 days later. The Thrall storm was transposed to the area upstream of Amistad Dam

with rainfall amounts modified by the factor of 0.92. This storm was one of the controlling storms used in developing the "Maximum Possible Precipitation," later called "Probable Maximum Precipitation" or PMP. A subsequent re-evaluation of the "Amistad SDF" study verified that the original SDF closely matched the Probable Maximum Flood (PMF), as developed using Hydrological Report No. 51.

The SDF for Falcon Dam was based on studies by the Corps. Assumptions made by the Corps included:

a. Flood releases at the potential Agua Verde Dam site, approximately 110 miles above the Devils River confluence, would be 50,000 cfs.

b. This would be followed by a maximum storm, assumed to be centered near the mouth of the Devils River, with a heavy concentration of precipitation in a relatively short period of time, producing a run-off of 4,000,000 acre-feet within 10 days at the Falcon site.

c. It was next assumed that a storm reached the lower 30,000 square mile of drainage area, including the entire area drained by the Rio Salado, immediately upstream from Falcon Dam. This storm was timed to occur 5 days following the maximum storm and assumed as 150 percent of the maximum flood that has been observed from the Rio Salado, equated to the total drainage area involved.

K. State Dam Safety Agency Involvement

None except for occasional attendance of New Mexico representatives at NRCS arroyo dams inspections.

L. Research and Development and Special Initiatives

None.

M. Public Concerns

No dam under the U.S. Section's jurisdiction has been subject of public concern.

IV. Impact on Agency Operations

A. Budget Impact

Moderate but acceptable impact.

B. Impact on Contracting Procedures

None.

C. Budget Allocation for Training/Education

Somewhat constrained.

DAMS

NAME	PURPOSE	LOCATION	HEIGHT	MAX. STORAGE (Acre-Feet)
DAMS UNDER THE JURISDICTION OF THE IBWC, UNITED STATES AND MEXICO				
Amistad	Conservation, flood control, & power	Rio Grande near Del Rio, TX	254'	5,250,000
Falcon	Conservation, flood control, & power	Rio Grande near Roma, TX	150'	3,177,000
Anzalduas	Flood diversion & irrig. diversion	Rio Grande near Mission, TX	23.5'	16,400
Retamal	Flood diversion	Rio Grande near Weslaco, TX	18'	6,000
International	Irrigation diversion	Rio Grande at El Paso, TX	7.5'	70
Morelos	Irrigation diversion	Colorado River near Yuma, AZ	11'	1,160
DAMS UNDER JURISDICTION OF UNITED STATES SECTION				
American	Irrigation diversion	Rio Grande at El Paso, TX	20'	130

NRCS ARROYO DAMS MAINTAINED BY U.S. SECTION

Broad Canyon	Flood Control	Dona Ana Co., NM	71.5'	6,520
Crow Canyon	Flood Control	Dona Ana Co., NM	62'	14,604
Green Arroyo	Flood Control	Sierra Co., NM	80'	6,400
Jaralosa #4	Flood Control	Sierra Co., NM	80'	12,420
Jaralosa #5	Flood Control	Sierra Co., NM	27'	490

MINE SAFETY AND HEALTH ADMINISTRATION

U.S. DEPARTMENT OF LABOR

SECRETARY OF LABOR
WASHINGTON, D.C.

JAN 29 1996

The Honorable James L. Witt
Director
Federal Emergency Management Agency
Federal Center Plaza
500 C Street, S.W.
Washington, D.C. 20472

Dear Mr. Witt:

The Department of Labor is pleased to submit its report describing the process made in implementing "Federal Guidelines for Dam Safety." The report is prepared by the Mine Safety and Health Administration (MSHA) in the format requested in your letter of September 15, 1995, and describes MSHA's progress for the period of October 1, 1993 through September 30, 1995. If you or any member of your staff have any comments or questions concerning the report, please contact our Dam Safety Officer, Dr. Kelvin K. Wu at (412) 892-6903.

Sincerely,

Robert B. Reich

Enclosure

I. Introduction

The Mine Safety and Health Administration (MSHA) receives its authority and responsibility for regulating the safety and health-related aspects of the miner's working environment from the Federal Mine Safety and Health Act of 1977 (Mine Act), 30 U.S.C. 801 et seq. The Act requires the Secretary of Labor to develop and promulgate improved mandatory health or safety standards to protect the health and safety of the Nation's coal or other miners. The Act specifically includes "impoundments, retention dams, and tailings ponds" as part of a mine, as described in the Act's definition of terms. Since no changes have been made in the Mine Act, MSHA's overall dam safety mission is the same as reported in 1991.

II. Program Actions Since Last Progress Report

A. Implementation

The Federal Guidelines for Dam Safety have been adopted and used by MSHA to the extent consistent with Agency standards. The applicable technical requirements of the Guidelines are extensively utilized in the Agency's review of the engineering and design plans for mine waste impoundments. Further, MSHA has issued guidelines to coal mine operators covering the Federal Emergency Management Agency (FEMA) Emergency Action Planning (EAP) procedures.

B. Actions Taken

As clarified in the attached memorandum and letter dated July 16, 1979, and December, 1993, respectively, MSHA fully recognizes its responsibility to protect the public safety under Section 601 of the Fuel Use Act.

MSHA supports and welcomes the recommendation for a technical and management review of the Agency's dam safety program. The procedures developed by the Association of State Dam Safety Officials (ASDSO) review program can be utilized.

MSHA is continuing to evaluate possible changes in the Metal and Nonmetal mine standards, consistent with the Federal Guidelines for Dam Safety, before releasing them for public comment.

C. Changes in Administration

During the reporting period, the following changes have been made to the Agency's Dam Safety Program.

1. A new dam safety official for the Department of Labor has been assigned.

2. The Mine Waste and Geotechnical Engineering Division at MSHA's Denver Safety and Health Technology Center has been reassigned to report to the Pittsburgh Safety and Health Technology Center to improve the efficiency and consistency of the Dam Safety Program.

3. To expand MSHA's technical service capabilities in the dam safety program, five civil engineers have been hired during the reporting period to augment the staff performing impoundment plan evaluations and field investigations.

The MSHA personnel involved in dam safety technical review now includes 20 engineers and 1 technician. Seventeen of these are civil engineers and 3 are mining engineers. Among the 20 engineers, 1 has a Ph.D. degree, 6 have M.S. degrees, and 13 have B.S. degrees. Nine out of the 20 engineers are registered Professional Engineers. Seven of the 20 engineers each have more than 17 years of dam safety experience. All of the engineers have obtained post-graduate training.

III. Implementation Progress

A. Organization, Administration, and Staffing

As previously stated, MSHA has consolidated the Divisions located in Denver and Pittsburgh into a single Division so that the Dam Safety Program can be carried out more effectively and consistently.

Before a coal mine operator can build an impoundment structure which falls under the size or hazard potential criteria set forth in 30 CFR 77. 216, an engineering design plan must be approved by MSHA. MSHA's Mine Waste and Geotechnical Engineering Division is responsible for the technical review and recommends approval or rejection of the plan.

Under CFR 30 Parts 56.20010 and 57.20010 of the Metal and Nonmetal Safety and Health Regulations, tailing structures are required to be substantially constructed.

Five new civil engineers have been hired to augment the impoundment approval capability.

B. Dam Safety Training Activities

The Agency has recently hired five engineers to work full-time in dam safety. A considerable effort is being made to further develop their skills in the needed areas of expertise. Specialized staff development has also continued with division engineers attending training on seismic stability, hydrologic and hydraulic design, seepage analysis, conduit design and installation, and dam-break evaluations. Several of the Division engineers are pursuing post-graduate work in the Civil Engineering Department at the University of Pittsburgh.

MSHA has also provided training to the Office of Surface Mining. Several 1-day sessions have been conducted on slope stability aspects of impoundment design, including laboratory testing and analytical methods.

A 3-day Metal and Nonmetal Tailings Facility Awareness and Inspection Training Seminar was conducted in March 1994 at the National Mine Safety and Health Academy in Beckley, West Virginia. The training was specially developed to provide the MSHA inspectorate with a basic technical understanding of tailings structures and their inspection so that basic problems can be dealt with in the field. This knowledge will also enable inspectors to be aware of situations or conditions that require additional technical input. The scope of the training included development of the ability to evaluate and determine a hazard rating and to complete the National Inventory of Dams requirements. Approximately 50 nationwide representatives from Metal and Nonmetal attended.

Since 1982, MSHA has had an on-going program of annual training for its impoundment specialists. In these seminars, MSHA engineers and invited speakers review information on dam design and inspection, and provide updates on new dam safety developments and products.

C. Dam Inventories

Considerable progress has been made in preparing this inventory. A total of 564 coal-related structures (out of the 772 structures) have been input into the inventory. Efforts are continuing to update the inventory of coal-related structures. The Metal/Nonmetal facilities have undergone a preliminary screening following the March 1994 training noted above. As a result, 379 facilities were identified and included in the National Inventory of Dams. A verification process will be implemented as resources permit. This will be followed by close interaction with the states to ensure that all mining-related facilities are included in the inventory and that there is no duplication. A commitment has been made for full cooperation with the National Performance of Dams with respect to continued reporting of incidents involving mining impoundments and tailings structures.

D. Independent Reviews

Design plans and specifications for the impounding and tailings structures under the Agency's jurisdiction are prepared by the mine operator or its consultant. In the coal industry, in accordance with 30 CFR 77.216, these plans must be submitted to and approved by the MSHA District Manager before construction. The majority of the plans are forwarded to MSHA's Technical Support Offices in Pittsburgh and Denver for independent technical review by engineers in the Mine Waste and Geotechnical Engineering Division.

Over the reporting period, the MSHA Technical Support staff performed evaluations of 242 plans submitted by coal mine operators. This figure includes evaluation of the plans for new impoundments, review of revised plans which could not originally be recommended for approval, and review of modifications to previously approved plans for existing impounding

structures. In a few cases, Technical Support is assisted in the review of low hazard sites by engineers in the MSHA District offices.

Tailings structures in the metal and nonmetal mining industries are reviewed upon request from MSHA enforcement personnel.

E. Inspection Programs

The construction and operation of impounding structures in the coal industry are monitored by MSHA inspectors for adherence with the approved plans and for indications of unsafe operation or conditions. Structures associated with underground and surface coal mines are inspected at least four times and two times per year, respectively. In addition, as staffing permits, facilities under construction are inspected on a monthly basis by an Impoundment Specialist. Other examinations occur in conjunction with plan review or during investigation of potential problems. There were 2,164 inspections of impoundment structures performed in Fiscal Year (FY) 1994 and 2,151 inspections of impoundment structures performed in FY 1995.

Tailings structures associated with metal and nonmetal mines are inspected for indications of unsafe operation or conditions four times a year if the structure is associated with an underground mine, and twice a year if associated with a surface mine. If there are indications of a potential problem, the structure is examined in more detail by an MSHA engineer. The number of metal and nonmetal mine impoundment and tailings structure inspections in FY 1994 and FY 1995 were 589 and 567, respectively.

As a result of the inspections at coal mine impoundments, 196 citations were issued in FY 1994 and 146 citations were issued in FY 1995 for violations of MSHA's impoundment regulations. Citations were issued to mining companies for such things as not following the approved plan and not completing or recording the results of inspections that the mine operators are required to make. An example is a citation written on a site which was designed to store, and then decant, the runoff from the design storm. The site was found to have inadequate storm storage capacity because the construction staging was off schedule. The problem was corrected by the installation of an open-channel spillway. Other citations were issued for not following the compaction specifications. Citations can only be terminated by correcting the condition.

F. Dam Safety Rehabilitation Programs

All of the impounding and tailings structures under MSHA jurisdiction are owned and constructed by mining companies. MSHA's goal is to ensure that such facilities are designed, constructed, and maintained in accordance with current, prudent engineering practice. If a problem develops at a coal mine impoundment, the condition must be corrected based on a modification to the impoundment plan, which is approved by the District Manager. A problem at a metal or nonmetal mine tailings structure would also be corrected according to a plan approved by the District Manager. Cases requiring remedial action are described under Section H., Dam Failures and Remedial Actions.

G. Management Effectiveness Reviews

MSHA has a three-tier accountability program which has been in place for nearly 10 years. The program focuses on following standard operating procedures which contain appropriate administrative controls, including detailed tracking items. These include the technical review of engineering and design plans and report issuance, the conduct of field investigations, and the provision of technical assistance and technical training. A copy of each of the tracking forms is attached.

There is an annual review of management controls at the first and second level of management. Every other year a Headquarters or third level review is conducted. Review findings are used to take timely corrective action.

H. Dam Failures and Remedial Actions

During the reporting period there were six incidents involving impoundments and tailings structures on mining property. Once MSHA becomes aware of such an incident, an investigation is conducted to identify hazardous conditions and determine the probable cause of the occurrence. The mining company is responsible for engaging consulting engineers, if needed, and implementing corrective measures, subject to MSHA concurrence. The following list summarizes those activities.

1. No. 6 Dam and Tailings Basin
P.W. Gillibrand Company
Mine I.D. No. 04-01888
Site I.D. No. none
Report No. D8229-W3679 - 5/5/95
Dam failed during January 17, 1994, Northridge, CA, earthquake

2. Turkeypen Branch Slurry Dam
Harlan-Cumberland Coal Company
Mine I.D. No. 15-10657
Site I.D. No. 1211-KY07-07029-07
Report No. D8148-W3644 - 11/28/94
Investigate loss of pool due to mine subsidence breakthrough. Resulted in partial inundation of active mine.

3. AB/BC Tailings Impoundment - Ray Complex
ASARCO, Incorporated
Mine I.D. No. 02-00150
Site I.D. No. none
Report No. D8132-W3638 - 10/20/94
Investigate breach of impoundment due to possible piping along buried conduit.

4. Main Tailings Dam - Continental Complex
Cobre Mining, Phelps-Dodge
Mine I.D. No. 29-00725
Site I.D. No. none
Report No. W3575 - 1/26/94
Investigate mysterious appearance of seepage water on the face of dam. Seepage was determined to be from an overflowing surge tank located near crest.

5. East Dam and Tailings Reservoir
Excel Minerals Company, Inc.
Mine I.D. No. 04-02964
Site I.D. No. none
Report No. W3602 - 6/3/94
Investigate integrity of dam following January 17, 1994, Northridge, CA, earthquake. Several problems found at site.

6. HL2 Settling Pond
IMC-AGRICO Hopewell Mine
Mine I.D. No. 08-01004
Site I.D. No. none
Report dated 12/02/94
Investigate phosphate dam piping failure along decant. Downstream release was in excess of 500 million gallons.

I. Emergency Action Planning

Each of the 772 coal industry impoundments under MSHA's jurisdiction, as required under 30 CFR 77.216-3(e), has a program approved by the District Manager which includes:

1. a schedule and procedures for examining the impoundment and impounding structure by a designated qualified person;
2. a schedule and procedures for monitoring any required or approved instrumentation by a designated qualified person;
3. procedures for evaluating hazardous conditions;
4. procedures for eliminating hazardous conditions;
5. procedures for notifying the District Manager;
6. procedures for evacuating coal miners from coal mine property which may be affected by the hazardous condition.

To upgrade these programs and to ensure, for example, that they include delineation of the potential hazard area, MSHA issued Program Information Bulletin No. P94-18 on June 18, 1994. This bulletin informs mine operators "of the need to develop an Emergency Action Plan for impoundments that constitute a hazard to life and property in the event of failure," and refers them to FEMA Report No. 64, *Emergency Action Planning Guidelines for Dams*.

All existing coal mine industry impoundment structures under MSHA jurisdiction have the hazardous condition identification and warning program indicated above. Of the 363 high or significant hazard impoundment structures, roughly 30 percent have an EAP which includes the downstream area (beyond mine property) that may be affected in the event of a failure. Many of the impoundment structures under MSHA's jurisdiction have EAP's required by the state agency responsible for dam safety.

J. Application of ICODS Technical Guidance

As previously indicated, the *Emergency Action Planning Guidelines for Dams* are referred to in Program Information Bulletin No. P94-18. Mine operators are referred to this document in preparing EAP's.

MSHA's impoundment plan evaluations, with respect to seismic stability, are consistent with the guidance provided in *Federal Guidelines for Earthquake Analyses and Design of Dams*. Many of the structures under MSHA's jurisdiction are used for mine waste disposal. These facilities often are constructed using the "upstream construction" method, where the embankment is raised by constructing over settled fines. Because of their susceptibility to liquefaction, MSHA requires that such structures be evaluated for seismic stability.

The criteria used by MSHA in evaluating the hydrologic safety of the structures under its jurisdiction is consistent with the guidance provided in *Federal Guidelines for Selecting and Accommodating Inflow Design Floods for Dams*. MSHA's guidelines for coal industry structures are contained in Procedure Instruction Letter No. I90-II-6, "Impounding Structures Safety Design Procedures: Probable Maximum Flood," dated 12/14/90, and in "Design Guidelines for Coal Refuse Piles and Water, Sediment, or Slurry Impoundments, and Impounding Structures (Amendment to IR 1109)" dated March, 1983.

K. State Dam Safety Agency Involvement

MSHA cooperates with state agencies by exchanging information where there is common jurisdiction. This cooperation has been formalized in some areas with official memoranda of understanding. A copy of one of these memoranda is attached.

In the area of training, MSHA has provided assistance to the Office of Surface Mining on an annual basis in the presentation of a short course on slope stability analysis. Using MSHA's soil testing facilities, the training has focused on determination of the soil parameters to be used in the analyses. The course is annually attended by representatives of several state agencies involved in surface mine permit approval work.

L. Research and Development and Special Initiatives

In general, MSHA does not conduct research and development. When the need has arisen, MSHA has taken the initiative to make recommendations to the U.S. Bureau of Mines for research and development. During the reporting period, recommendations were made to compile a database on the dynamic properties of mine tailings and to investigate the applicability of currently accepted methods of seismic stability analysis to mine tailings

impoundments constructed with the upstream method. However, due to lack of research funding, these recommended research and development projects could not be fulfilled.

M. Public Concerns

It has been MSHA's practice to participate in meetings with the mining companies, consulting engineers, and public interest groups to explain MSHA impoundment approval procedures, discuss and address concerns, and receive comments from all participants.

IV. Impact on Agency Operations

In general, the Federal Guidelines have the beneficial effect of reinforcing and supporting MSHA's actions to ensure that impoundment and tailings structures on mining property are constructed in accordance with current, prudent engineering practice.

NUCLEAR REGULATORY COMMISSION

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

December 27, 1995

The Honorable James L. Witt
Director
Federal Emergency Management Agency
Washington, DC 20472

Dear Mr. Witt:

In response to your September 15, 1995, letter requesting information from the U.S. Nuclear Regulatory Commission for the biennial report you must prepare for the President regarding the status of the Federal agency implementation of the "Federal Guidelines for Dam Safety" (FGDS), we are enclosing our report. This report provides the progress on implementation of the FGDS from October 1993 through September 1995 (FY94 and FY95).

During this period, NRC continued to utilize the technical assistance of the Federal Energy Regulatory Commission (FERC) for dam safety inspections at NRC licensee facilities. This interagency cooperation is the result of the Interagency Memorandum of Agreement signed in September of 1992. During this biennial period, FERC personnel, accompanied by NRC staff, completed inspections at four separate licensee facilities, two of which are associated with the extraction of uranium, and two of which are nuclear safety-related dams at nuclear-powered electric generating facilities. Information has been provided for one updating of the National Inventory of Dams during this period, and NRC staff has received additional training in the geotechnical disciplines related to the performance of embankment dams.

During the coming biennial period, we expect to keep the Federal Emergency Management Agency informed of further progress in the implementation of the FGDS, through the quarterly meetings of the Interagency Committee on Dam Safety, that are chaired by your representative. Mr. John Greeves, Director, Division of Waste Management, Office of Nuclear Material Safety and Safeguards, remains the NRC Dam Safety Officer.

I trust this letter and the enclosure are fully responsive to your request.

Sincerely,

Carl J. Paperiello, Director
Office of Nuclear Material Safety
and Safeguards

Enclosure:
Ninth Biennial Report
(diskette)

I. Introduction

The U.S. Nuclear Regulatory Commission (NRC) was created as an independent Agency, authorized to regulate and license nuclear facilities and nuclear materials, and to conduct research in support of the licensing and regulatory process. The NRC not plan, design, construct, or operate such facilities, nor does it control the land on which the facilities are constructed. The legal authority for the Commission in the area of dam safety is derived from the Atomic Energy Act of 1954, as amended; the Energy Reorganization Act of 1974, as amended; and the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRAC). NRC has regulatory authority only over uranium mill tailings dams and those dams integral to the operation of licensed facilities, or the possession and use of licensed material, that pose a radiologically safety-related hazard if they fail.

No changes in dam safety responsibilities have occurred during this biennial period.

II. Program Actions Since Last Progress Report

A. Implementation

NRC continues to implement dam safety actions under the NRC Dam Safety Program Plan adopted in July 1991. The plan describes the manner in which NRC intends to implement the Federal Guidelines for Dam Safety (FGDS). The plan recognizes the need for a review and evaluation of existing NRC criteria and technical guidance against FGDS. It was envisioned, at the time of the development of the plan, that this step would be the first in the process of implementing FGDS. However, a decision was made as a result of funding restrictions to move directly to dam safety inspections. This was done on the basis that any significant safety issues would be identified because the inspections would be conducted by trained and experienced personnel from the Federal Energy Regulatory Commission (FERC), using FERC's standard operational inspection procedures. In addition, this could be accomplished without NRC's completion of a review and evaluation of existing NRC criteria and technical guidance against FGDS.

Consequently, some of the FGDS elements that were identified in the 1990-1991 Progress Report as issues for program review have not been formally incorporated into the NRC Dam Safety Program. These elements include organization management, management of technical activities, and those activities associated with operation and maintenance. Except for the following areas, NRC believes that the NRC Dam Safety Program meets FGDS.

NRC guidance regarding the documentation of the design record, construction record, reservoir filling and surveillance records, operation and maintenance records, and the permanent files should be updated. The elements of hazard evaluation, downstream effects, and warning systems should be reviewed and evaluated with respect to the NRC program. NRC guidance should be reviewed and evaluated for conformance to FGDS for the elements of operating responsibility and procedures, maintenance procedures, periodic inspection program,

deficiency correction and documentation, emergency action planning, as well as elements on the scope and completion of internal and external reviews.

Therefore, some items in the 1990-1991 Progress Report regarding the development of guidance to address FGDS by the end of March 1992 are not complete. Impediments to addressing these elements of FGDS and a revision of existing NRC guidance have been the reduction of Agency resources for dam safety and the decision to utilize the limited available resources in direct inspection efforts using FERC personnel. At present, the entire range of NRC responsibilities and programs is undergoing an Agency-wide strategic assessment. Until that effort is completed, no projections for the NRC Dam Safety Program can be made. NRC will update the Federal Emergency Management Agency (FEMA) on the program's status once the Agency-wide strategic assessment has been completed. Nevertheless, NRC's dam safety criteria for design and evaluation have been robust. With the inspection of existing dams through the technical assistance of FERC, NRC's available resources are being focused on the centerpiece of dam safety, ensuring the safety of existing dams.

B. Actions Taken

FEMA noted in the 1992-1993 Progress Report "...it is recommended that NRC make special effort to hasten these inspections to identify problems and minimize risks, and prepare emergency action plans (EAP) as appropriate."

When the NRC Dam Safety Program was considered by the Commission and subsequently adopted, the related Commission paper provided a staff estimate that five to eight dams would be reviewed and inspected, and an evaluation completed, each fiscal year. As reported in the last progress report, it was expected that the rate of dam safety reviews and inspections would not increase above three to five each fiscal year. In the three fiscal years that the NRC Dam Safety Program has been operational, a total of seven reviews and inspections of facilities have been completed, which is under the original goal as well as under this reduced goal. Because of higher priority Agency missions and programs, resources have been minimized for dam safety so that only a portion of the originally expected effort has been used for the Dam Safety Program. No significant changes have been made as a result of the FEMA recommendation and no new actions can be expected until the Agency-wide strategic assessment has been completed.

FEMA also identified the classification of dams under NRC jurisdiction as one of NRC's more critical needs. The original intent of the program execution was to complete the preliminary classification of each dam to be included in the FGDS Dam Safety Program based on information available within NRC hard copy records, such as the safety analysis reports submitted by licensees for a nuclear-powered electric generation facility. The next step was to conduct an on-site and field verification of the classification at the time of the initial dam safety inspection. Resources have only been directed to those high-priority facilities where inspections were to be conducted. As a result, an overall review of all dams and a preliminary classification have not been completed. No changes in this situation can be expected until the Agency-wide strategic assessment has been completed.

C. Changes In Administration

Funding for the NRC Dam Safety Program for FY 1994 and FY 1995 reflected a separate commitment for a dedicated 1.0 full-time equivalent (FTE) and $200,000 of technical assistance funding each year. A total of $10,000 is for support of the Interagency Committee on Dam Safety (ICODS) and $190,000 is for technical assistance from FERC in program implementation. As a result of Agency reductions, decisions have been made during this period to reduce the funding of the program in FY 1996 to 0.2 FTE and $ 0.0 of technical assistance funding. However, approximately $10,000 in technical assistance funds will be available from carryover money to maintain the program at past levels. In FY 1997, the program will be at a similar level. This reduction is a result of Agency reductions and the need to continue other NRC programs of higher safety significance.

As reported in the previous progress report, the Denver Field Office was closed and all program efforts related to mill tailings dams are now handled from NRC Headquarters. The efforts that have been completed during this reporting period reflect a nearly equal balance of the work associated with the mill tailings dams and the other dams considered under the program.

III. Implementation Progress

A. Organization, Administration, and Staffing

The NRC organization for the administration of the dam safety program has not changed since the last reporting period. The program is implemented through a matrix organization with the NRC Dam Safety Officer (DSO) as the focal point. None of the personnel associated with the program is devoted full time to the effort. Under this arrangement, NRC is able to define specific tasks for each dam facility that is to undergo a review and inspection by NRC with the technical assistance of FERC. The lead personnel involved in the implementation of the NRC Dam Safety Program report to the DSO, who is currently the Director, Division of Waste Management, Office of Nuclear Material Safety and Safeguards. The same personnel are members of the Division of Waste Management so that there is direct chain of control for the DSO. The DSO is directly responsible to the Director, Office of Nuclear Material Safety and Safeguards, who is responsible to the Executive Director for Operations (EDO) of NRC. The EDO is directly responsible to the Chairman of NRC.

The DSO is Chairman of the Dam Safety Advisory Group (DSAG), which provides coordination among the various NRC offices. DSAG provides for the consolidation of the interdisciplinary technical resources from within NRC that are necessary for an effective program. The management representatives to DSAG are responsible for the coordination of the implementation of the dam safety program in that particular office of NRC. The previous progress report indicated steps were being taken to include a representative from the Office of Nuclear Regulatory Research on DSAG. That has been accomplished.

The procedures that guide the implementation of the program are the procedural elements described in the Commission paper on the Dam Safety Program Plan, SECY-91-193 (June 25, 1991), the Dam Safety Program Plan (July 1991), and the Charter of the Dam Safety Officer (October 1990).

NRC believes that the organizational structure is fully adequate to implement the currently defined dam safety program. With regard to the adequacy of available staff to execute the program, it is necessary to focus on the combined resources of 1.0 FTE and contractual dollars that have been available in the past. To date, the allocated total of each has not been fully expended on the NRC Dam Safety Program in any one fiscal year because of other higher priority items within NRC. Consequently, the target level of work to be completed under the program has not been reached. At present, this combination of resources for the foreseeable future is decreasing; as a result, the rate at which NRC is able to review, evaluate, classify, and inspect dams will also decrease. Thus, the impact of decreasing resources will extend the time that will pass before NRC completes one review cycle of included dams. For NRC, changes may have to be made in the manner of implementing the program plan. For example, it may be necessary to adopt a plan that would eliminate direct NRC inspection activities and rely on the licensee or the licensee's consultants for the inspections related to existing facilities. Other alternatives may also be considered. Once the current strategic assessment that is underway Agency-wide has been completed, it will be necessary for the Commission to again consider the Dam Safety Program Plan, the impact of the strategic assessment, and the previous commitment of implementing FGDS in response to the original Presidential directive of October 1979. Once these steps have been completed, NRC will inform FEMA of the Commission actions.

No specific actions have been taken during this period to address the FEMA recommendations regarding program implementation and the noted deficiencies, as discussed in II.B. above.

B. Dam Safety Training Activities

As an Agency, NRC has not performed dam safety-related training during the reporting period. NRC has supported such training through ICODS and has had its staff participate in that training. During the reporting period, two NRC geotechnical engineers who provide support for the NRC Dam Safety Program attended the 2-day, March 1995, ICODS Technical Seminar on Seepage, Piping and Remedial Measures held in Virginia. In addition, the same two geotechnical engineers attended a 1-day training session sponsored by the Earthquake Engineering Research Center, University of California, in July 1995. The topic of the session was seismic design and performance of waste fills, a general topical area applicable to dam seismic safety. Less formal training has been received by three engineers who perform the bulk of the dam safety program support by the personal use of the series of video tapes produced at an ICODS Technical Seminar held in Spring 1993 on the subject of earthquake engineering.

Personnel involved in the support of the dam safety program continue to have direct access to the series of manuals, Training Aids for Dam Safety. All personnel maintain knowledge of current relevant literature and the state of the art on dam safety.

The goal defined in the last progress report for at least one staff member attend to an Emergency Action Planning (EAP) training session conducted by FERC was not accomplished. This remains a goal for the next reporting period. Fulfillment of this goal will correct the deficiency of a lack of staff formal training in this area.

C. Dam Inventories

NRC has not completed the creation or verification of an inventory of all dams for which the Agency has regulatory authority for the basic 49 fields in the National Inventory of Dams (NID) database. As described in II.B. above, NRC, at the present time, utilizes existing hard copy records within the Agency to generate the data necessary for NID, and then uses the actual dam inspections to verify the data that relate to the status of the dam and the hazard classification to define the associated risks.

No new dams, meaning new dams being designed, constructed, and put into operation, have come under the regulatory jurisdiction of NRC during this reporting period. If new dams were to come under NRC regulatory jurisdiction, they would be maintained in the dam inventory and the information provided to NID during a subsequent update.

No changes were made in the inventory reporting period for NID targeted for July 1995 to produce the 1995 NID Update. Because no verified information was available since the previous update, no changes were submitted.

Land use changes downstream of dams are one of the important items included in NRC dam inspections. This is because the initial hazard classifications were based on information existing at the time the facility was licensed by NRC. To date, no revisions to hazard classifications have been necessary as a result of land use changes.

D. Independent Reviews

NRC is a regulatory Agency. As a result, it is not an owner of dams and any reviews completed by NRC of a licensee's facility are considered to be independent reviews. During the current reporting period, no design or construction activities were underway for dams that are or would be under the regulatory authority and Dam Safety Program of NRC. In conjunction with the four initial inspections conducted as operational inspections during this reporting period at the four facilities, certain design and construction elements were part of the review. For example, issues such as the design basis precipitation and flooding events were discussed and reviewed, as well as the control of materials during construction.

As noted previously, these activities are carried out with the technical assistance of FERC working for NRC and in conjunction with NRC during the inspection process. From the standpoint of the owner (NRC licensee), these can be considered independent reviews.

To date, NRC has not used external consultants in the Dam Safety Program except for the interagency technical support from FERC.

E. Inspection Programs

Four dam safety inspections were conducted at NRC licensees' facilities during this reporting period. Two of the inspections were nuclear-powered electric generating facilities and two were uranium mill sites. The inspections were conducted by FERC with NRC personnel under a technical assistance agreement between NRC and FERC.

NRC has had no problems associated with these inspections related to the quality, experience, training, or the size of the inspection team. One critical item discovered as a result of one inspection reflected an element in the dam design for operational safety during maximum hypothetical design conditions that was never fully integrated into the as-constructed facility. The specific element not completed in the dam construction was the wave runup protection under a condition of maximum water level in the reservoir. This had gone undetected for 15 years, during which time several consultant-executed dam safety inspections by the dam owner had been completed. It was not until the first full dam safety inspection was completed by NRC and FERC that this deficiency was identified. No unsafe dams or other conditions and no improper classifications have been identified. With regard to responses and actions following the inspections, NRC sends the final report and a list of actions to be completed, along with a schedule, to the licensee for action. This process has been successful in obtaining corrective action on the items NRC has identified to the licensees.

F. Dam Safety Rehabilitation Programs

No regulated dams within the NRC Dam Safety Program were involved in rehabilitation programs during this reporting period and none are scheduled. To date, NRC has not identified any facilities requiring rehabilitation.

G. Management Effectiveness Reviews

No management effectiveness reviews have been performed either by internal management or the General Accounting Office.

H. Dam Failures and Remedial Actions

No failures or incidents have occurred during this reporting period.

I. Emergency Action Planning

Currently, NRC does not have an EAP program for dam safety. NRC recognizes this need and has addressed it in the Dam Safety Program Plan. The plan states that all radiologically safety-related dams or mill tailings dams under NRC jurisdiction, and classified as high or significant hazard dams, shall have EAP's that conform to FGDS. This policy is to be initiated as reviews and inspections are completed and dams in either of these classes are identified.

Where an EAP is required for dam safety, NRC intends to allow licensees to use elements of the existing radiological EAP's that are associated with the facility. Thus, the basic

organization, methodology, and interfaces with state and local governments already exist. This will aid in the development of any necessary additional elements for dam safety EAP's.

J. Application of ICODS Technical Guidance

Emergency Action Planning Guidelines for Dams

There are currently no plans for NRC to adopt these guidelines, but they will be considered when an EAP must be developed for dam safety.

Federal Guidelines for Earthquake Analyses and Design of Dams

NRC's criteria for seismic design of safety-related structures at nuclear power reactor sites, which include dams involving radiological safety, are incorporated in NUREG-800, "Standard Review Plan" (SRP), Sections 2.5 and 3.7, and in Regulatory Guide 1.127. NRC staff has concluded that these guidance documents for power reactors meet the intent of the Federal Guidelines. Regulatory Guide 3.11, for mill tailings embankments (dams), also addresses seismic issues and implements the seismic siting requirements for impoundments in Criterion 4(e) of Appendix A to 10 CFR Part 40. These criteria are quite comprehensive and should produce safe seismic designs.

Federal Guidelines for Selecting and Accommodating Inflow Design Floods for Dams

NRC's criteria for selecting and accommodating the design flow are embodied in NUREG-800 of the SRP, Section 2.4, for nuclear power reactor sites and the "Standard Review Plan for UMTRCA Title I Mill Tailings Remedial Action Plans," for inactive tailings embankments (dams). These criteria are quite conservative and are consistent with the Federal Guidelines. Regulatory Guide 3.11 also addresses upstream catchment requirements of Criterion 4(a) of Appendix A to 10 CFR Part 40, for UMTRCA Title II sites, and is equivalent to the Federal Guidelines. Regulatory Guide 1.59, which addresses the design basis floods for nuclear power plants, also addresses consideration of flood conditions that could be caused by dam failures from earthquakes.

K. State Dam Safety Agency Involvement

NRC has made contact with the agencies involved in dam safety in various states as the review and inspection process of the NRC Dam Safety Program has been implemented. One state has requested to be notified of upcoming inspections and to be provided with a copy of the inspection reports. NRC has agreed to this. In addition, NRC will maintain liaison with the dam safety agencies in the various states to avoid duplication of effort and inventory data. Because all dams associated with a nuclear power plant are not necessarily radiologically safety-related, coordination between NRC and the states ascertains that no dams are excluded from the NID. At this time, there has been no direct relationship with the various states in the area of training.

L. Research and Development and Special Initiatives

No new initiatives, research, technology transfers, or special studies were instituted during this reporting period. Efforts were focused on the necessary basics for the NRC Dam Safety Program.

M. Public Concerns

No dams under NRC jurisdiction for regulatory control have been the subject of public concern. NRC procedures relative to licensing facilities that could include the construction of new dams require that the licensing action be in the public view, with provisions for public participation. If the public were to desire participation in issues relative to the operation of a regulated dam, the public would have to petition for involvement.

IV. Impact on Agency Operations

A. Budget Impact

The implementation of FGDS has required the specific identification of the Dam Safety Program for internal budget purposes. In turn, this has required a deliberate decision process of weighing various risks in other programs for which NRC is directly responsible against the risks associated with dam safety. In the era of shrinking budgets, the Dam Safety Program becomes another responsibility to be addressed with less resources because the Dam Safety Program has not been the basis for additional funding. In this sense, the Dam Safety Program has meant redirecting funds from other areas. With across-the-board reductions, the ability to redirect funds becomes more limited. NRC is somewhat unique in that the focus of its main regulatory responsibility, *i.e.*, nuclear materials and their applications, has the potential for significant impact on a large population if safety is compromised, similar to what might be expected from the failure of a very large high hazard dam. Consequently, when NRC considers risk and cost benefits, there is a good understanding of the implications of changing the level of resources devoted to one or another safety program. Nevertheless, available resources have been directed to ensure safety of existing dams through inspection.

B. Impact on Contracting Procedures

NRC is not an owner of dams and is not involved in contracting for services in the design, construction, or rehabilitation areas.

C. Budget Allocation for Training/Education

The general guidance in NRC regarding training is that managers are responsible for the training of personnel under their direction, and that personnel are responsible for maintaining and expanding their background and knowledge through training. Most managers in NRC allow for a total of 2 weeks annually of off-site training. In-house training varies from 1 to 2 weeks per year. In the area of dam safety, NRC has supported staff attendance at special ICODS training seminars and at industry-sponsored training such as that offered by ACI, ASCE, and ASTM.

TENNESSEE VALLEY AUTHORITY

Tennessee Valley Authority, 400 West Summit Hill Drive, Knoxville, Tennessee 37902-1499

Craven Crowell
Chairman, Board of Directors

January 4, 1996

Mr. James L. Witt
Director
Federal Emergency Management Agency
Washington, DC 20472

Dear Mr. Witt:

Thank you for your November 2 letter requesting information on Tennessee Valley Authority's (TVA) implementation of the Federal Guidelines for Dam Safety.

Enclosed is a copy of TVA's "Progress Report to the Federal Emergency Management Agency" for the period October 1993 through September 1995.

If you have questions or need further information, please let us know and we will be pleased to provide it.

Sincerely,

Craven Crowell

Craven Crowell

Enclosure

I. Introduction

The Tennessee Valley Authority (TVA) is a Corporate Agency and instrumentality of the United States organized and existing pursuant to the Tennessee Valley Authority Act of 1933, as amended. Among other responsibilities, the Act authorizes TVA, in the operation of its dams or reservoirs, to regulate the streamflow primarily for promotion of navigation and flood control and, so far as may be consistent with such purposes, to generate hydroelectric power. Section 26a of the TVA Act further authorizes TVA to approve plans for the construction, operation, and maintenance of all structures affecting navigation, flood control, or public lands or reservations in the Tennessee River system. TVA has complete responsibility for the planning, design, construction, operation, and maintenance of its dams. In this respect, TVA's situation is somewhat different from that of other Federal agencies with dam safety responsibilities; TVA has historically constructed new dams with its own forces, and with one exception (Great Falls), all of its dams are located in a single river basin and operated and maintained for the unified development and regulation of the Tennessee River system.

This responsibility has not changed since the last report.

II. Program Actions Since Last Progress Report

A. Implementation

TVA implements the *Federal Guidelines for Dam Safety*, as applicable to its system, as an integral part of its Dam Safety Program. All Guideline provisions are implemented.

TVA has completed the detailed hydrologic design studies and the development of Emergency Action Plans (EAP's) for its dams as called for in its 9-year dam safety schedule, which ended at the close of Fiscal Year (FY) 1990. Detailed seismic studies, extending beyond the 9-year schedule, continue for three dams to evaluate the maximum credible earthquake.

The design and construction of the recommended remedial capital modifications will likely continue for another 7-8 years, depending on the availability of funding.

B. Actions Taken

As no specific comments or recommendations were made regarding TVA's Dam Safety Program in the last biennial report, no action was required on this issue. TVA agrees that high standards in dam safety should be maintained and remains committed to this practice.

C. Changes in Administration

There have not been any major organizational changes in TVA's Dam Safety Program since the last reporting period.

III. Implementation Progress

A. Organization, Administration, and Staffing

TVA implements the *Federal Guidelines for Dam Safety*, as applicable to its system, as an integral part of its Dam Safety Program. TVA's Dam Safety Program is adequate and properly staffed.

B. Dam Safety Training Activities

The main thrust of TVA's training efforts continues to be on-the-job training under the supervision of experienced engineers and inspectors. TVA has developed a training program for dam operating, maintenance, and inspection personnel. This training is composed of both general and site-specific parts. Technically qualified project personnel are trained in inspection procedures, problem detection, evaluation, and appropriate remedial (emergency and non-emergency) measures. This is essential for proper evaluation of developing situations at all levels of responsibility which, initially, must be based on on-site observations.

TVA also participates in outside training programs. During this reporting period, TVA representatives attended the following programs (the number of participants is provided in parentheses).

Conferences

USCOLD Alkali-Aggregate Reaction Conference (Hosted by TVA) - Chattanooga, TN (7)

ASCE Waterpower 95 Conference - San Francisco, CA (30)

ASDSO 1994 Conference - Boston, MA (6)

ASDSO 1995 Conference - Atlanta, GA (3)

Fourth U. S. Conference on Lifeline Earthquake Engineering - San Francisco, CA (1)

Tennessee Governor's Conference on Emergency Management - Nashville, TN (1)

Exercises

EAP Exercise Design Course, FERC - Knoxville, TN (8)

Dam Safety Functional Exercise for Watts Bar Seismic Event - Knoxville, TN (11)

Various Dam Safety Table Top Exercises - Various TVA Hydro Regions (15)

Preparedness for Response Exercise - Chattanooga, TN (12)

Seminars

Industrial Hydraulic Systems Seminar - Little Rock, AR (2)

Industrial Hydraulic Systems Seminar - Atlanta, GA (2)

Mechanical Maintenance for Cranes - Birmingham, AL (2)

Underground Corrosion Seminar - West Virginia University (1)

Embankment Dams - Soils Aspect - Scottsdale, AZ (1)

ICODS Seepage and Piping Seminar - Washington, DC (4)

National Electrical Code Seminar - Nashville, TN (1)

Bureau of Reclamation SEED Seminar - Denver, CO (8)

25th Acres International Corporation Seminars (2)

Earthquake Engineering Considerations for the New Madrid Seismic Zone - Little Rock, AR (2)

New Developments in Earthquake Ground Motion Estimation - Memphis, TN (3)

Overview of Earthquake Hazard Reduction in the Central U.S. - Knoxville, TN (4)

Emergency Plans and Disaster Response - Knoxville, TN (1)

Meetings

USCOLD 1994 Annual Meeting - Phoenix, AZ (7)

USCOLD 1995 Annual Meeting - San Francisco, CA (8)

1994 Annual Meeting of the Building Seismic Safety Committee - Denver, CO (1)

1995 Annual Meeting of the Building Seismic Safety Committee - Atlanta, GA (2)

Committees

ASCE Committee, Penstock Guidelines - Denver, CO (1)

Short Courses

Nondestructive Testing Short Course - Chattanooga, TN (2)

Seismic Design - Gatlinburg, TN (4)

Training Aids for Dam Safety (TADS) - Chattanooga, TN (3)

TVA Fossil and Hydro Power Coatings Course - Chattanooga, TN (24)

Power Systems Analysis Course - Atlanta, GA (2)

ACI Reinforced Concrete Design (3)

Bridge Inspection Course - Pierre, SD (1)

Introduction to Emergency Information Software - Knoxville, TN (3)

C. Dam Inventories

TVA has a current and complete inventory of all of its dams and annually updates the data for the National Inventory of Dams.

D. Independent Reviews

TVA has a Board of Hydro Consultants that reviews any special analysis, problems, or construction items judged to be warranted. Since October 1993, the consultants have met with TVA five times to review dam safety seismic studies at Watts Bar, Tellico, and Pickwick Landing Dams. The Board of Hydro Consultants also met to review the concrete growth problems at the Hiwassee, Fontana, and Chickamauga Dams and Chickamauga Lock.

TVA has contracted for the assistance of outside finite element analysis consultants to help evaluate the impacts of concrete growth at the Hiwassee, Fontana, and Chickamauga Dams; to review TVA studies on concrete growth; and to help evaluate the liquefaction potential at the Watts Bar, Tellico, and Pickwick Landing Dams. TVA has encountered no problems in obtaining the services of qualified outside experts.

E. Inspection Programs

TVA uses trained in-house mechanical, electrical, and civil engineers to conduct the dam safety inspections. The total number of inspections performed are listed in the attachment. An adequate number of trained inspectors were available to conduct the scheduled and special inspections. No critical findings were discovered during this period and no changes in classifications were made as a result of inspection findings.

F. Dam Safety Rehabilitation Programs

Guntersville, Alabama
For this dam to safely pass the probable maximum flood, the nonoverflow sections of the dam and the earth embankments were raised a maximum of 7.5 feet. Modifications consisted of constructing a concrete retaining wall and raising the earth embankments.

Hiwassee, North Carolina
To control the deflection of the nonoverflow dam into the spillway, causing binding of the spillway gates, two narrow 1/2-inch slots were cut during the last reporting period. With continued concrete growth, these slots will be recut on a periodic basis to control stresses and deformations around the spillway. To control the stresses due to concrete growth at the dam abutments, two vertical 8-inch-wide slots were cut to a depth of approximately 60 feet.

Blue Ridge, Georgia
The first modification to this dam, which was completed in October 1985, consisted of increasing the spillway capacity by 60 percent and installing a comprehensive dam failure emergency warning system. Experience with the warning system showed that achieving the degree of effectiveness intended was much more difficult and expensive than had been anticipated. As a result, another modification was completed in FY 1995 that consisted of raising the embankment by adding a 7-foot high concrete wall and increasing the spillway capacity to enable the dam to safely pass the probable maximum flood. The warning system was removed after the modification was completed.

Chickamauga, Tennessee
To control stresses and deflection due to concrete growth, a vertical slot is being cut between the powerhouse and spillway. Post-tensioning of the navigation lock blocks also is in progress to stabilize these blocks. This project was begun in this reporting period and continues into the next reporting period.

Additional projects scheduled for improvements to meet dam safety criteria are listed below.

Watts Bar, Tennessee (hydrologic concern)
Construction 1996-1997

Bear Creek Projects, Alabama (hydrologic concern)
Construction 1997-1998

Chickamauga, Tennessee (hydrologic concern)
Construction 1998-2001

G. Management Effectiveness Reviews
TVA did not conduct any reviews dealing with Dam Safety Program activities.

H. Dam Failures and Remedial Actions

Dam failures or incidents during the reporting period are listed below.

Chickamauga Lock, Tennessee

In June 1995, the Corps of Engineers (Corps) maintenance personnel discovered excessive bending of the pin plates for the upper gudgeon pin in the downstream lock gate. After closer inspection by TVA and Corps personnel, it was determined that the lock should be closed for emergency repairs. Starting at 9:30 p.m. on June 13, 1995, the Corps maintenance personnel were brought on-site to begin the repairs. TVA's Plant Support and Inspection Section provided technical support and coordinated the fabrication and machine work by Acme Industrial Piping with the Corps site installation activities. The repairs continued on an around-the-clock basis until the lock was returned to service on Saturday, June 17, 1995 at 11:30 a.m.

Normandy Dam, Tennessee

In June 1995, one of the spillway gates opened 10 percent and the 36-inch Regulating Sleeve Valve opened 12 percent during a thunderstorm. The open gate and valve were not detected until the next morning. During the time the gate was open, the tailwater rose 6.7 feet and the reservoir was lowered 1.1 feet. There was no flooding below the dam. An investigation determined that lightning damaged the Supervisory Control and Data Acquisition System, the emergency generator, and the aeration system. Due to this incident, the spillway gate controls were de-energized and now can only be opened manually by someone at the site.

Bear Creek Dam, Alabama

In September 1994, the 7-foot sluice gate opened to 100 percent without remote or on-site activation. The gate apparently opened after an AC power interruption, and was not detected for 2 days. A backup system, which prevents the gate from changing position more than 12 percent, did not activate. Upon investigation, it was determined that the backup system was inadvertently left disconnected during a gate control modification. During the time the gate was opened, the reservoir was lowered 10.4 feet. After the incident, the backup system was reconnected. It is operating properly at the present time.

None of these incidents was reported to the National Performance of Dams Program.

I. Emergency Action Planning

As shown in Table 1, full plans have been completed for all dams. All plans have been kept current, with key personnel and telephone numbers being periodically updated. A tabletop exercise utilizing the EAP's was conducted in each of the four hydro regions of TVA. A total of 174 people participated in these tabletop exercises. The participants included engineers, Public Safety Service/TVA Police personnel, reservoir system forecasters, personnel at the hydro plants, communications personnel, Corps personnel from the various locks, local and state Emergency Management Agency personnel, and Coast Guard personnel from the area. A functional exercise was held for one of the four hydro regions. A total of 18 people (with backgrounds similar to those of participants attending the tabletop exercise) participated in this

exercise. The purpose was to check out the notification process. Tabletop exercises will be conducted in the remaining hydro regions in the months ahead. Plans are to conduct at least two per year.

J. Application of ICODS Technical Guidance

Emergency Action Planning Guidelines for Dams
TVA assisted in the development of the Guidelines, and the agency's EAP's are consistent with these Guidelines. TVA served on a working group to review the Guidelines.

Federal Guidelines for Earthquake Analyses and Design of Dams
TVA assisted in the development of the Guidelines, and the agency's work in dam safety is consistent with these Guidelines. TVA served on a working group to review the Guidelines.

Federal Guidelines for Selecting and Accommodating Inflow Design Floods for Dams
TVA assisted in the development of the Guidelines, and the criteria TVA uses for the safety evaluation of its dams are consistent with these Guidelines. TVA served on a working group to review the Guidelines. TVA also served on a working group to review the Glossary of Terms for Dam Safety.

K. State Dam Safety Agency Involvement

TVA does not have cooperative relationships with any state for such activities as inspections, training, or inventories; however, the State of Kentucky periodically participates in an inspection of TVA facilities in that state. Emergency Management Agencies in the seven states that TVA serves also are invited to participate in TVA's EAP training.

L. Research and Development and Special Initiatives

TVA currently operates equipment for the automated collection of structural integrity data at three dams. New installations at Tellico and Fontana Dams began data collection during June 1995. Equipment installed during 1994 at Hiwassee Dam continues to function.

The purpose of these systems is to demonstrate the automated collection of three basic types of structural integrity measurements: flow, pressure, and movement. The Tellico system is designed to measure uplift pressure and flow from gallery drains. The Hiwassee system collects movement data associated with concrete growth and the modifications to relieve stresses. The Fontana system collects stress and temperature data that will be used to calibrate a finite element model of the dam.

These systems have all shown that automated collection is possible and practical. Costs vary considerably and depend mostly on the location of power, communications, and the point to be measured. Because these are demonstration projects, different equipment manufacturers are being used at different locations to assess reliability and ease of use. Experience indicates that

some variability in the quality of geotechnical sensors. Data collection electronics from various vendors have different features but are all reliable.

M. Public Concerns

TVA is not currently constructing new dams. However, dams are being modified to meet modern-day design criteria, usually by adding spillway capacity or raising the height of the dam. TVA always meets with local political leaders, conducts public meetings, and issues press releases before construction starts. TVA also prepares an environmental review to document the consequences of its actions. The process starts with an Environmental Decision Record, and can evolve into an Environmental Assessment or an Environmental Impact Statement.

IV. Impact on Agency Operations

A. Budget Impact

As a Corporate Agency of the United States, TVA has complete responsibility for its dams. TVA plans, designs, constructs, inspects, operates, and maintains its dams. Their safety is vital to the agency. For this reason, the Dam Safety Program ranks high in the budget process. There should not be any impact on the agency budget because of the Guidelines.

B. Impact on Contracting Procedures

TVA does not have any new dams planned.

C. Budget Allocation for Training/Education

TVA budgets approximately $50,000 for training and education activities each fiscal year.

Table 1

Status of Emergency Action Plans

The following final EAP's were in place at the end of September 1995.

Project	Number of Dams	Issued
Bear Creek	4	01/82
Blue Ridge		07/83
Bristol	2	10/83
South Holston		09/83
Watauga-Wilbur	2	09/83
Boone-Ft. Patrick Henry	2	09/83
Nolichucky		09/83
Beech	8	09/85
Chatuge-Nottely	2	09/85
Cherokee		09/85
Douglas		09/85
Hiwassee-Apalachia	2	09/85
Ocoee No. 1		09/85
Ocoee Nos. 2 and 3	2	09/85
Norris		09/86
Melton Hill		09/86
Fontana		09/86
Fort Loudoun-Tellico	2	09/86
Watts Bar		09/87
Chickamauga		05/89
Nickajack		05/89
Raccoon Mountain		09/89
Guntersville		09/89
Tims Ford		09/89
Wheeler		09/89
Wilson		09/89
Great Falls		09/90
Pickwick Landing		09/90
Normandy		09/90
Kentucky		09/91

ALL PLANS ARE REVISED AND UPDATED AT LEAST ANNUALLY.

SUMMARY OF DATA FOR THE NATIONAL DAM SAFETY PROGRAM (INDICATE NUMBER OF DAMS)

Dam Inventory					Periodic Inspections Conducted					Dams Under Further Investigation and Study		Dam Safety Modifications		Dams with EAP (by Hazard Classification)		
		Hazard Classification				Since Last Report				Completed Since	Currently	Completed Since	Currently			
							Intermediate		During							
Agency	Total	High	Significant	Low	Total	Formal		Special	Const.	Last Report	In Progress	Last Report	In Progress	High	Significant	Low
TVA	54	31	14	9	1239*	87	58	94	0	3	4	3	1	30+	14	3

* Total included approximately 1,000 monthly inspections

\+ Columbia Dam is included in the inventory, but does not have an EAP, since the decision has been made to not complete the dam.

ASSOCIATION OF STATE DAM SAFETY OFFICIALS

Introduction

According to the National Inventory of Dams, there are approximately 74,000 dams of significant size or hazard potential in the United States. The states regulate 95 percent of these structures and maintain inventories on thousands of other dams meeting individual state criteria. Millions of Americans are dependent on these dams for water supply, power generation, flood control, irrigation, and recreation. This same population could be devastated by loss of life or property damage should failure of a structure occur.

High safety standards are the key to mitigating disasters of this type. Safety can be maintained through active and well-staffed state dam safety programs, educated dam owners, and effective warning plans. State dam safety officials, spearheading the effort, continue to meet this challenge. Every year, the Association of State Dam Safety Officials (ASDSO) tracks state performance toward these goals.

In 1994, state dam safety budgets did not change significantly, personnel levels in three states increased slightly, and laws in two states were strengthened. However, 1994 was an unusually bad year for dam failures, which may affect programs in years to come. After an unprecedented number of natural disasters, there were approximately 62 failures, 6 incidents of note, and 3 controlled breaches, all within a dozen or so states.

In 1995, all states but two (Alabama and Delaware) adopted dam safety regulatory laws; however, legislative authority, budgets, and personnel dedicated to dam safety vary greatly among the states. A handful of states had their dam safety regulatory authority challenged within legislative chambers or through budget cuts. At press, Hawaii was in danger of having its dam safety laws repealed. Maine lost all budget funds dedicated to dam safety this year. (See attached graph for more information.)

In a recent ASDSO study, it was determined that 8 states needed to significantly strengthen their programs, while 31 states met the minimum criteria for adequacy (12 states did not supply enough information to make a determination). Among the areas needing the most attention were monetary resources, staffing dedicated to dam safety, comprehensive regulations, emergency action planning (EAP) programs, and continuing training and education for state staff and dam owners. The average annual budget for a state program was $373,710. The average number of full-time-equivalent staff dedicated to dam safety was 6.7. All-in-all, the majority of states continue to show progress in improving their dam safety programs.

During the past 12 months, the states reported approximately 20 dam failures, 10 incidents with no failure, and a handful of controlled breaches or reservoir drainings due to unsafe conditions. Most problems were caused by extreme precipitation events or heavy snow-melt.

Despite inconsistent public support, the strength of the dam safety message grows due to the efforts of the dam safety community. The Federal agencies work through the Interagency Committee on Dam Safety (ICODS) to improve technical expertise and lines of

communication. Other organizations such as the U.S. Committee on Large Dams (USCOLD) and the American Society of Civil Engineers (ASCE) assist with research and public awareness. ASDSO acts as the lead organization dedicated to improving dam safety in this Nation through research, education, and communication.

The Association of State Dam Safety Officials

Several massive dam failures in the late 1970's and subsequent national concern over the state of dam safety in this Nation led to the formation of ASDSO in 1983. In the 12 years since it was formed, ASDSO has made great strides toward improving dam safety in the states and is constantly initiating new efforts and placing higher demands on itself as the major supporter of state dam safety programs.

ASDSO was formed to serve these initial functions:

- Provide a forum for the exchange of ideas and experiences on dam safety issues
- Foster interstate cooperation
- Provide information and assistance to state dam safety programs
- Provide representation of state interests before Congress and Federal agencies responsible for dam safety
- Help improve state dam safety programs

To fulfill these goals, ASDSO maintains many programs to heighten public awareness of dam safety, to train state personnel in technical areas of importance, and to maintain channels of communication between states, between government levels, and between the public and private sectors. ASDSO produces research documents to keep the dam safety community abreast of current technical and policy issues and ideas.

ASDSO Membership

Membership numbers continue to rise. This year, recruitment focused on the New England and Southeast regions.

	FY92	FY93	FY94	FY95
Voting	50	50	50	50
Associates	446	500	529	661
Affiliates				
Companies	146	163	153	175
Individuals	197	252	269	293
Students	5	5	8	10
Total	867	970	1009	1189

Leadership Structure and Recent Actions

Each state is represented by one voting member. All states, including Puerto Rico and except for Iowa, have a representative to the voting membership. There are five ASDSO regions: New England, Mid-Atlantic, Southeast, Midwest, and West. The Board is made up of two representatives from every region and four from the West, plus the immediate past president. The Board meets quarterly and the voting membership meets once a year. Each Board member can serve two 2-year terms consecutively. An officer may serve two 1-year terms consecutively.

Officers

1993-94

Raul Silva (Massachusetts) president
James Simons (North Carolina) president-elect
George Mills (Ohio), vice president
Vernon Persson (California), secretary/treasurer
Dan Lawrence (Arizona), past president

1994-95

James Simons (North Carolina), president
George Mills (Ohio), president-elect
Alan Pearson (Colorado), vice president
Brian Long (West Virginia), secretary/treasurer
Raul Silva (Massachusetts), past president

ASDSO Regions

In 1994, four of the five regions held regional conferences-the Mid-Atlantic Region held its first annual meeting in August of 1994. All five regions have continued to solidify themselves by keeping in touch through the regional representatives (ASDSO Board members). The regions also met at the 1993 ASDSO Annual Conference to discuss state policy changes, problems, solutions, dam failures and incidents, and to continue the organized support for each state program.

The New England Region elects regional officers every year and did so in 1993 at its annual meeting in Marlborough, Massachusetts. Elected were Ann Kuzyk (Connecticut), president; Mark Cullinan (Massachusetts), vice president; and Richard DeBold (New Hampshire), secretary/treasurer.

In New England, a series of "recognition luncheons" were organized by Del Downing of New Hampshire to bring together state legislators, municipal and state dam safety officials, dam owners, and engineering consultants who have demonstrated a clear commitment to the welfare and safety of dams in the region. The luncheons focused on one state at a time. One luncheon was held in New Hampshire. Another is scheduled for Maine.

1994 Regional Conference Schedule

New England Region
March 31
Marlborough, Massachusetts

Southeastern Region
June 5-8
Charlotte, North Carolina

Mid-Atlantic Region
August 5
Philadelphia, Pennsylvania

Western Region
May 3-5
Park City, Utah

1995 Regional Conference Schedule

New England Region
May 9
Marlborough, Massachusetts

Western Region
May 24
Red Lodge, Montana

ASDSO Newsletter

The newsletter keeps members abreast of ASDSO projects, changes and innovations in state programs and policies, technical issues, and events occurring in the public and private sectors and in related organizations. A new section in 1995 was the brainchild of its editor Steve Snider of O'Brien & Gere Engineers. It presents historical perspectives on all things dam-related. In the past year, three interesting articles were written about turn-of-the century events. The newsletter is published bimonthly.

ASDSO Annual Conference

The annual conference has become the major forum in this country for the exchange of ideas and technical knowledge on dam safety, and continues to draw an audience not only from state government but from the other levels of government, related organizations, and the private sector.

1994
Boston, Massachusetts

Award Winners
National Award of Merit
Neil Parrett--Bureau of Reclamation (retired)

President's Award
William Bingham--Gannett Fleming Engineers

National Rehabilitation Design of the Year
HDR Engineering--Austin, Texas

1995
Atlanta, Georgia

Award Winners
National Award of Merit
NBC News/Dateline NBC

President's Award
Martin McCann-National Performance of Dams Program

National Rehabilitation Design of the Year
Whitman, Requardt and Associates—Baltimore, Maryland

Future conference sites:
1996--Seattle, Washington; Westin Hotel, September 8-11
1997--Mid-Atlantic Region, to be announced

ASDSO Committees

In 1993, the Board began to recognize the need to pronounce many ASDSO standing committees inactive. The original activities of these committees had since been taken over by the ASDSO staff, by the Board, or by individual ASDSO members. The following committees are now inactive and will not meet until called upon by the president or the Board:

Constitution and Bylaws	Legal & Liability
Resolutions	Legislative Activities
Membership	Finance

Legal and Liability Issues
Before this committee was pronounced inactive, it announced the completion of one final project. The committee has developed a pamphlet on dam owner responsibility and liability awareness. This pamphlet, printed late in 1995, is now being distributed to dam owners through the state dam safety agencies.

Affiliate Member Advisory Committee
Formed in 1988, this committee of private-sector ASDSO representatives has been of continual assistance to ASDSO. Mr. Cat Cecilio, formerly of Pacific Gas & Electric (retired), chairs the committee, which was established to advise the Board of Directors on everything from conference planning, to newsletter assistance, to seminar support. Committee members have

moderated conference sessions and have provided ASDSO with many fine technical articles for the newsletter. Last year, the committee began to work with the Board to further refine ASDSO's strategic plan.

One of the major goals of the committee is to see that regional advisory committees are formed. The plan is to establish a group of affiliate members-consultants, dam owners, academicians-in each of the five regions to assist in organizing regional conferences and technical seminars, and to advise the ASDSO regional representatives on issues of interest to the region.

A pilot project is underway in the Mid-Atlantic Region to determine the feasibility of the plan. An executive committee has been formed to spearhead this effort. The committee has worked to establish a framework for the organization and develop initiatives for implementation. The group is now publishing a regional newsletter, attracting membership support, promoting dam safety issues through small dam owner outreach, preparing for a regional conference in 1996, and providing support to regional dam safety officials.

Technical Committee

In 1994-95, Mel Schaefer (Washington) took over the chairmanship of the Technical Committee from Vern Persson (California). The Technical Committee has continued to pursue current projects and will rethink its goals for the future so that increased participation by committee members will produce a more significant body of work. The committee is being used more by the Board to review completed projects and develop projects for FEMA sponsorship. In the last year, the Technical Committee has taken on the task of reviewing and recommending to the Board a nominee for the National Rehabilitation Project of the Year.

Scholarship

The second pair of ASDSO scholarships was awarded in May 1994 for the 1994-95 school year. Committee Chairman John Moyle (New Jersey) reviewed 45 applications for the $2,500 scholarships (one each to a junior and a senior). The Board approved two winners, junior Lee Oscar Gallentine, Iowa State University, Iowa, and senior Michele Watkins of California Polytechincal University, California.

The 1995 ASDSO Undergraduate Scholarships were awarded for the 1995-96 school year to junior Shadi Sami, San Diego State University, California, and senior Shawnita Sterett of Oklahoma State University, Oklahoma.

ASDSO Clearinghouse

ASDSO maintains a clearinghouse of information on state dam safety laws and regulations, specific information on state programs as well as other programs, and technical documentation on dam safety. ASDSO receives approximately 25 inquiries per week on issues related to the above topics and is pleased to help supply such information. ASDSO has developed a

bibliography of dam safety publications, articles, and presentations. This bibliography has been added to a database system which members can access using Borland Paradox® database software. The ASDSO mailing lists continue to grow and can be accessed by any member.

ASDSO continues to develop a library of subject matter experts which can be accessed for information on individuals with noted expertise in various fields related to dam safety.

In the future, this database will house a bibliography of dam safety publications, the subject matter experts list, and information on current research in dam safety.

This past year, ASDSO updated its publications entitled *Summary of State Dam Safety Laws and Regulations* and the printed version of the *Bibliography on Dam Safety Practices*. Also new this year is ASDSO's e-mail address and CompuServe number.

E-Mail: ASDSO@UKCC.UKY.EDU
CompuServe: 72130,2130

Working Relationships

Closer ties were forged in 1994-95 with related groups. The most significant partnership was established in March 1995 when ASDSO officials met with the Board of Directors of USCOLD. The two leading organizations focusing on dams in this country formally shook hands over a partnering plan which marks the first step toward future coordination on projects and activities.

In 1994, ASDSO co-sponsored USCOLD's annual conference where the topic focused on dam rehabilitation.

In the Spring 1994, ASDSO executive director Lori Spragens briefed members of the Interstate Conference on Water Policy on ASDSO's current legislative initiatives.

In 1995, the ASCE asked ASDSO to participate on a subcommittee to write guidelines for the retirement of dams and hydroelectric facilities. Board member Richard Knitter (Wisconsin) is representing ASDSO on this committee and various ASDSO members will be used as peer reviewers for the guidelines when they are completed.

ASDSO maintains membership in the Rebuild America Coalition, the leading national organization dedicated to keeping Congress, state governments, and the public aware of the need for infrastructure improvement and financing. ASDSO sits on the steering committee of the National Watershed Coalition, which was formed to improve watershed management and support for the Small Watershed and Floodplain Management Program (PL-566) operated by the Natural Resources Conservation Service (NRCS).

In 1994, ASDSO joined with the U.S. Bureau of Reclamation and Southern University in Baton Rouge, Louisiana, to launch the Safety of Dams Educational Program, a specialty curriculum within the civil engineering department at Southern. Other sponsors are the U.S. Office of Historically Black Colleges and Universities Programs, the Job Corps, and the Louisiana Department of Transportation and Development. ASDSO sent a handful of lecturers to Baton Rouge during the 1994-95 fall semester.

ASDSO continues to cooperate with the Federal agencies through ICODS. As it has for many years, ASDSO meets with the members of ICODS at the annual joint meeting in the spring.

Out of the 1995 joint meeting came a new task group made up of ASDSO officials and representatives of the NRCS. The task at hand was to come to terms with the differences between NRCS technical criteria and the criteria used by state dam safety agencies. The group, led by Ed Fiegle (Georgia) and Robert Shaw of the NRCS, had a successful meeting at ASDSO headquarters in June. As a result of that meeting, a memorandum of understanding is being developed which charges the two entities to work more closely and to communicate better, and which articulates the NRCS commitment to improving its technical criteria for dam design.

ASDSO is active in the ICODS Subcommittee on Federal/Non-Federal Coordination and the Working Group on the National Inventory of Dams (NID) Fields. The first, chaired by ASDSO president Jim Simons, brings together dam safety experts from all areas of the dam safety community and related domains to focus on issues of mutual concern and to make recommendations to the full ICODS committee on future action items.

In 1994, the subcommittee focused on several issues, including support for regulation of tailings dams and support for quality-based selection of engineering firms within the dam safety community. ASDSO provided results from a state-by-state survey on the number of tailings/industrial use dams known to be in existence yet possibly unregulated. The numbers, ranging in the thousands, gave the subcommittee an excellent base of knowledge to begin a push for inventorying and eventually regulating these structures.

In 1995, the subcommittee focused on several issues, including defining hazard classification on a national level, promoting the National Performance of Dams Program at Stanford, and improving the new training sessions on EAP development and exercise.

The ICODS Working Group on the NID Fields, which is looking at improving the National Inventory of Dams, met twice during 1995. The Group is focusing on improvement of the Inventory and the addition and deletion of fields within the Inventory.

Another new effort which comes from the cooperation between ASDSO and ICODS is the EAP development and exercise workshops. These training sessions will bring together state dam safety personnel, dam owners, and state and municipal emergency managers to learn new techniques in developing and testing EAP's. ASDSO organized two pilot workshops in 1994-95 to critique the sessions. FEMA underwrote these sessions and the Federal Energy

Regulatory Commission conducted the training. In 1995, the curriculum was improved based on the results of the pilots, and regional training teams were designated. The training will be ready for nationwide release in 1996. FEMA, in cooperation with ASDSO, will spearhead this effort.

Finally, ASDSO has been heavily involved this past year in FEMA's reorganization. ASDSO officials attended many of the mitigation forums over the past year. ASDSO has contributed ideas which are being considered for FEMA's new long-term focus on disaster mitigation.

ASDSO maintains active communicative channels with and attends meetings of groups such as the National Hydropower Association, Western States Water Council, the National Coordinating Council on Emergency Management, the Canadian Association for Dam Safety, the American Water Resources Association, and others. ASDSO maintains links to the major engineering journals, including *Engineering News Record* and *Civil Engineering*. *Hydro Review Magazine* continues to strengthen its relationship with ASDSO by devoting a column to dam safety news in every issue.

Legislative Activities

Over the past 2 years, ASDSO has continued to strengthen its presence in Washington, D.C. ASDSO's legislative consultant since last year is Casey Dinges, senior manager at the ASCE Government Relations office in Washington, D.C. Mr. Dinges works with ASDSO legislative chairman Brad Iarossi (Maryland).

In 1994 and 1995, ASDSO testified on behalf of FEMA's dam safety budget and in support of the Corps of Engineers' funding for the National Inventory of Dams. In addition, the push for a national dam safety program continued.

A news piece that aired on a widely-viewed news magazine show in June 1995 could give a greater punch to ASDSO's legislative effort. *NBC Dateline* devoted national air-time to dam safety in June 1995, after network researchers read ASDSO-written testimony to Congress concerning the need for a national dam safety program. ASDSO played a major role in the development of this piece.

1994-95 FEMA-Sponsored Projects

Every year since 1984, FEMA, through its National Dam Safety Program, has contracted with ASDSO to conduct projects which enhance dam safety in the United States. Below is an overview of the projects being completed during 1994-95 with FEMA funds.

National Non-Federal Dam Inventory
With funding coming through FEMA, from appropriations authorized to the Corps of Engineers, this project to develop a national dam inventory of state and federal data on dams is

up-and-running. Forty-eight states and one territory are participating in the program to transfer descriptive information on dams under state jurisdiction to the national database.

The effort is ongoing. States submitted updated data in 1995 and will continue this process annually, if Federal funding is appropriated. A task committee made up of ASDSO representatives and Federal officials have been working this past year and will continue to work in the near future on improving and refining the database.

It was a noteworthy effort by FEMA and the Corps of Engineers which launched this project in 1988. Monies appropriated to the Corps from the *Dam Safety Act of 1986* were then transferred to FEMA, and then to ASDSO, to complete the project.

National Performance of Dams Program (NPDP)

The objective of this project, begun in 1990 under the direction of Martin McCann of Stanford University, is to develop a methodology for sending information on dam performance to a national database/archive housed at Stanford University. The Center for the Performance of Dams at Stanford will retrieve, archive, and disseminate information on dam performance.

In 1994, a working group put the final touches on an instructional manual which guides the user in transferring dam performance data to the library. Training for state officials and others on use of the guidelines took place in 1994-95.

Since the kickoff of the program at the 1994 ASDSO conference, the NPDP has begun to grow and has received some noteworthy recognition. To date, over 300 submittals have come into the Center. Some favorable publicity in *Civil Engineering Magazine* and *ENR Magazine* helped validate the NPDP. It was also selected as one of *ENR*'s top 25 newsmakers of 1994.

An executive committee was formed in 1995 to oversee the operation of the NPDP. Representatives from the states, ICODS, and other related organizations will plan for the future of this important project.

Public Awareness Workshops

The public awareness program is in its tenth successful year. In 1995, eight states organized workshops which bring dam owners and operators, legislators, and others together with state personnel to learn about dam safety in that state and to discuss issues of concern with the state regulators. In 1994, 14 states organized workshops.

Comprehensive Update of the Model State Dam Safety Program

Changes in standards over time, coupled with the recognition that many areas of the model program needed a more objective approach, prompted this update. A complete review of the manual, which has been used by many states as a benchmark over the past 6 years, will be completed in late 1995. The 20-year-old Model Law, developed by USCOLD, will also be updated.

Peer Review Program
Three state dam safety programs were reviewed in 1994 by ASDSO peer review teams: Hawaii, Idaho, and North Carolina. Two states, Oregon and Utah, were scheduled for review in 1995 but will be reviewed in early 1996.

As this program becomes more widely known, it attracts other interested parties. ASDSO is now analyzing the feasibility of reviewing private sector dam safety programs and federal programs as well.

Pilot Project to Analyze Extreme Precipitation Events in Two States
The objective of this project, completed in 1995, was to offer technical assistance to state dam safety programs interested in the analysis of extreme storm events. The primary applications for the analyses would be in estimating the magnitude of extreme events for use in flood studies which assess hydrologic adequacy, and as an aid in setting requirements for rehabilitation or improvements to spillways. Montana and Wyoming were pilot states for this project.

Environmental Guidelines For Dam Safety
An ASDSO team has been working to develop a guidebook for dam safety officials, dam owners, consultants, and others which presents an overview of what can be expected as the number and scope of environmental regulations increase. The book summarizes pertinent federal and state environmental laws and presents lessons learned from past experiences. The guidebook was completed in late 1995.

Regional Technical Seminars
This continuing program was begun in 1989 to provide technical instruction to state personnel at a reasonable cost. In 1994, each region conducted in-depth technical training on determining the probable maximum flood. The sessions were based on updated FERC guidelines and were presented by national experts who were all instrumental in the development of these guidelines: Art Miller (Penn State University), Terry Hampton (Mead & Hunt), and Jack Cassidy (Bechtel Corp.). In 1994, the Western Region also held an additional seminar on the Removal of Dams, presented by Burgess & Niple, Ltd.

In 1995, the following seminars were presented.

New England Region: *Roller-Compacted Concrete*, May 9-10, Marlborough, Massachusetts
Mid-Atlantic Region: *Embankment Dams,* July 31-August 1, Mendenhall, Pennsylvania
Southeast Region: *Geosynthetics Use on Dams,* September 15-16, Atlanta, Georgia
Midwest Region: *Roller-Compacted Concrete*, May 11-12, Chicago, Illinois
Western Region: *Probable Maximum Precipitation,* May 24-25, Red Lodge, Montana

Awareness Pamphlet on Procurement of Engineering Services for Dam Owners
This brochure is the second in a series of ASDSO pamphlets for dam owners (the first

pamphlet focused on dam owner liability). The intent in the second brochure is to assist dam owners in hiring a competent engineer. The brochure was completed in 1995.

Feasibility Study on Developing Tiered Structural Stability Standards
This project was completed in 1994 with the issuance of a report. The objective of this study was to determine the feasibility of developing a tiered set of regulatory standards related to the stability of dams that would be comparable to the tiered hydrologic standards used by many state agencies. The study was not intended to establish standards. It was intended to establish, through review of the technical literature and consultation with or survey of researchers or investigators currently working in the area, whether there was a well-defined, defensible basis for establishing differing stringency of static and dynamic stability standards for dams, the failure of which would result in markedly different levels of damage or loss of life.

Report on Quantifying the Dollar-Value of Upgrading Non-Federally-Owned Dams
A report and database was issued in 1994. This research effort focused on identifying a procedure for developing quick, approximate estimates of the required cost of upgrading non-Federally-owned dams. The ability to identify costs to upgrade dams or other structures vital to the development of an area is important to an owner and to the region. Although a final document has been produced, this will be an on-going project to retrieve new data and update the database.

ATTACHMENT 3

WRDA SECTION 215

> 27

Subdivision: 27
SEC. 215. NATIONAL DAM SAFETY PROGRAM.

(a) PURPOSE.--The purpose of this section is to reduce the risks to life and property from dam failure in the United States through the establishment and maintenance of an effective national dam safety program to bring together the expertise and resources of the Federal and non-Federal communities in achieving national dam safety hazard reduction. It is not the intent of this section to preempt any other Federal or State authorities nor is it the intent of this section to mandate State participation in the grant assistance program to be established under this section.

(b) EFFECT ON OTHER DAM SAFETY PROGRAMS.--Nothing in this section (including the amendments made by this section) shall preempt or otherwise affect any dam safety program of a Federal agency other than the Federal Emergency Management Agency, including any program that regulates, permits, or licenses any activity affecting a dam.

(c) DAM SAFETY PROGRAM.--The Act entitled "An Act to authorize the Secretary of the Army to undertake a national program of inspection of dams", approved August 8, 1972 (33 U.S.C 467 et seq.; Public Law 92-367), is amended--

(1) by striking the 1st section and inserting the following:

"SECTION 1. SHORT TITLE.

"This Act may be cited as the `National Dam Safety Program Act'.";

(2) by striking sections 5 through 14;

(3) by redesignating sections 2, 3, and 4 as sections 3, 4, and 5, respectively;

(4) by inserting after section 1 (as amended by paragraph (1) of this subsection) the following:

"SEC. 2. DEFINITIONS.

"In this Act, the following definitions apply:

"(1) BOARD.--The term `Board' means a National Dam Safety Review Board established under section 8(h).

"(2) DAM.--The term `dam'--

"(A) means any artificial barrier that has the ability to impound water, wastewater, or any liquid-borne material, for the purpose of storage or control of water, that--

"(i) is 25 feet or more in height from--

"(I) the natural bed of the stream channel or watercourse measured at the downstream toe of the barrier; or

"(II) if the barrier is not across a stream channel or watercourse, from the lowest elevation of the outside limit of the barrier;

to the maximum water storage elevation; or

"(ii) has an impounding capacity for maximum storage elevation of 50 acre-feet or more; but

"(B) does not include--

"(i) a levee; or

"(ii) a barrier described in subparagraph (A) that--

"(I) is 6 feet or less in height regardless of storage capacity; or

"(II) has a storage capacity at the maximum water storage elevation that is 15 acre-feet or less regardless of height;

unless the barrier, because of the location of the barrier or another physical characteristic of the barrier, is likely to pose a significant threat to human life or property if the barrier fails (as determined by the Director).

"(3) DIRECTOR.--The term `Director' means the Director of FEMA.

"(4) FEDERAL AGENCY.--The term `Federal agency' means a Federal agency that designs, finances, constructs, owns, operates, maintains, or regulates the construction, operation, or maintenance of a dam.

"(5) FEDERAL GUIDELINES FOR DAM SAFETY.--The term `Federal Guidelines for Dam Safety' means the FEMA publication, numbered 93 and dated June 1979, that defines management practices for dam safety at all Federal agencies.

"(6) FEMA.--The term `FEMA' means the Federal Emergency Management Agency.

"(7) HAZARD REDUCTION.--The term `hazard reduction' means the reduction in the potential consequences to life and property of dam failure.

"(8) ICODS.--The term `ICODS' means the Interagency Committee on Dam Safety established by section 7.

"(9) PROGRAM.--The term `Program' means the national dam safety program established under section 8.

"(10) STATE.--The term `State' means each of the several States of the United States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, and any other territory or possession of the United States.

"(11) STATE DAM SAFETY AGENCY.--The term `State dam safety agency' means a State agency that has regulatory authority over the safety of non-Federal dams.

"(12) STATE DAM SAFETY PROGRAM.--The term `State dam safety program' means a State dam safety program approved and assisted under section 8(f).

"(13) UNITED STATES.--The term `United States', when used in a geographical sense, means all of the States.";

(5) in section 3 (as redesignated by paragraph (3) of this subsection)--

(A) by striking "SEC. 3. As" and inserting the following:

"SEC. 3. INSPECTION OF DAMS.

"(a) IN GENERAL.--As"; and

(B) by adding at the end the following:

"(b) STATE PARTICIPATION.--On request of a State dam safety agency, with respect to any dam the failure of which would affect the State, the head of a Federal agency shall--

"(1) provide information to the State dam safety agency on the construction, operation, or maintenance of the dam; or

"(2) allow any official of the State dam safety agency to participate in the Federal inspection of the dam.";

(6) in section 4 (as redesignated by paragraph (3) of this subsection) by striking "SEC. 4. As" and inserting the following:

"SEC. 4. INVESTIGATION REPORTS TO GOVERNORS.

"As";

(7) in section 5 (as redesignated by paragraph (3) of this subsection) by striking "SEC. 5. For" and inserting the following:

"SEC. 5. DETERMINATION OF DANGER TO HUMAN LIFE AND PROPERTY.

"For"; and

(8) by inserting after section 5 (as redesignated by paragraph (3) of this subsection) the following:

"SEC. 6. NATIONAL DAM INVENTORY.

"The Secretary of the Army, acting through the Chief of Engineers, may maintain and periodically publish updated information on the inventory of dams in the United States.

"SEC. 7. INTERAGENCY COMMITTEE ON DAM SAFETY.

"(a) ESTABLISHMENT.--There is established an Interagency Committee on Dam Safety--

"(1) comprised of a representative of each of the Department of Agriculture, the Department of Defense, the Department of Energy, the Department of the Interior, the Department of Labor, FEMA, the Federal Energy Regulatory Commission, the Nuclear Regulatory Commission, the Tennessee Valley Authority, and the United States Section of the International Boundary Commission; and

"(2) chaired by the Director.

"(b) DUTIES.--ICODS shall encourage the establishment and maintenance of effective Federal and State programs, policies, and guidelines intended to enhance dam safety for the protection of human life and property through--

"(1) coordination and information exchange among Federal agencies and State dam safety agencies; and

"(2) coordination and information exchange among Federal agencies concerning implementation of the Federal Guidelines for

Dam Safety.

"SEC. 8. NATIONAL DAM SAFETY PROGRAM.

"(a) IN GENERAL.--The Director, in consultation with ICODS and State dam safety agencies, and the Board shall establish and maintain, in accordance with this section, a coordinated national dam safety program. The Program shall--

"(1) be administered by FEMA to achieve the objectives set forth in subsection (c);

"(2) involve, to the extent appropriate, each Federal agency; and

"(3) include--

"(A) each of the components described in subsection (d);

"(B) the implementation plan described in subsection (e); and

"(C) assistance for State dam safety programs described in subsection (f).

"(b) DUTIES.--The Director shall--

"(1) not later than 270 days after the date of the enactment of this paragraph, develop the implementation plan described in subsection (e);

"(2) not later than 300 days after the date of the enactment of this paragraph, submit to the appropriate authorizing committees of Congress the implementation plan described in subsection (e); and

"(3) by regulation, not later than 360 days after the date of the enactment of this paragraph--

"(A) develop and implement the Program;

"(B) establish goals, priorities, and target dates for implementation of the Program; and

"(C) to the extent feasible, provide a method for cooperation and coordination with, and assistance to, interested governmental entities in all States.

"(c) OBJECTIVES.--The objectives of the Program are to--

"(1) ensure that new and existing dams are safe through the development of technologically and economically feasible programs and procedures for national dam safety hazard reduction;

"(2) encourage acceptable engineering policies and procedures to be used for dam site investigation, design, construction, operation and maintenance, and emergency preparedness;

"(3) encourage the establishment and implementation of effective dam safety programs in each State based on State standards;

"(4) develop and encourage public awareness projects to increase public acceptance and support of State dam safety programs;

"(5) develop technical assistance materials for Federal and non-Federal dam safety programs; and

"(6) develop mechanisms with which to provide Federal

technical assistance for dam safety to the non-Federal sector.

"(d) COMPONENTS.--
"(1) IN GENERAL.--The Program shall consist of--
"(A) a Federal element and a non-Federal element; and
"(B) leadership activity, technical assistance activity, and public awareness activity.
"(2) ELEMENTS.--
"(A) FEDERAL.--The Federal element shall incorporate the activities and practices carried out by Federal agencies under section 7 to implement the Federal Guidelines for Dam Safety.
"(B) NON-FEDERAL.--The non-Federal element shall consist of--
"(i) the activities and practices carried out by States, local governments, and the private sector to safely build, regulate, operate, and maintain dams; and
"(ii) Federal activities that foster State efforts to develop and implement effective programs for the safety of dams.
"(3) FUNCTIONAL ACTIVITIES.--
"(A) LEADERSHIP.--The leadership activity shall be the responsibility of FEMA and shall be exercised by chairing ICODS to coordinate Federal efforts in cooperation with State dam safety officials.
"(B) TECHNICAL ASSISTANCE.--The technical assistance activity shall consist of the transfer of knowledge and technical information among the Federal and non-Federal elements described in paragraph (2).
"(C) PUBLIC AWARENESS.--The public awareness activity shall provide for the education of the public, including State and local officials, in the hazards of dam failure, methods of reducing the adverse consequences of dam failure, and related matters.

"(e) IMPLEMENTATION PLAN.--The Director shall--
"(1) develop an implementation plan for the Program that shall set, through fiscal year 2002, year-by-year targets that demonstrate improvements in dam safety; and
"(2) recommend appropriate roles for Federal agencies and for State and local units of government, individuals, and private organizations in carrying out the implementation plan.

"(f) ASSISTANCE FOR STATE DAM SAFETY PROGRAMS.--
"(1) IN GENERAL.--To encourage the establishment and maintenance of effective State programs intended to ensure dam safety, to protect human life and property, and to improve State dam safety programs, the Director shall provide assistance with amounts made available under section 12 to assist States in establishing and maintaining dam safety programs--
"(A) in accordance with the criteria specified in paragraph (2); and
"(B) in accordance with more advanced requirements and standards established by the Board and the Director with the assistance of established criteria such as the Model State

Dam Safety Program published by FEMA, numbered 123 and dated April 1987, and amendments to the Model State Dam Safety Program.

"(2) CRITERIA AND BUDGETING REQUIREMENT.--For a State to be eligible for primary assistance under this subsection, a State dam safety program must be working toward meeting the following criteria and budgeting requirement, and for a State to be eligible for advanced assistance under this subsection, a State dam safety program must meet the following criteria and budgeting requirement and be working toward meeting the advanced requirements and standards established under paragraph (1)(B):

"(A) CRITERIA.--For a State to be eligible for assistance under this subsection, a State dam safety program must be authorized by State legislation to include substantially, at a minimum--

"(i) the authority to review and approve plans and specifications to construct, enlarge, modify, remove, and abandon dams;

"(ii) the authority to perform periodic inspections during dam construction to ensure compliance with approved plans and specifications;

"(iii) a requirement that, on completion of dam construction, State approval must be given before operation of the dam;

"(iv)(I) the authority to require or perform the inspection, at least once every 5 years, of all dams and reservoirs that would pose a significant threat to human life and property in case of failure to determine the continued safety of the dams and reservoirs; and

"(II) a procedure for more detailed and frequent safety inspections;

"(v) a requirement that all inspections be performed under the supervision of a State-registered professional engineer with related experience in dam design and construction;

"(vi) the authority to issue notices, when appropriate, to require owners of dams to perform necessary maintenance or remedial work, revise operating procedures, or take other actions, including breaching dams when necessary;

"(vii) regulations for carrying out the legislation of the State described in this subparagraph;

"(viii) provision for necessary funds--

"(I) to ensure timely repairs or other changes to, or removal of, a dam in order to protect human life and property; and

"(II) if the owner of the dam does not take action described in subclause (I), to take appropriate action as expeditiously as practicable;

"(ix) a system of emergency procedures to be used if a dam fails or if the failure of a dam is imminent; and

"(x) an identification of--

"(I) each dam the failure of which could be reasonably expected to endanger human life;

"(II) the maximum area that could be flooded if the dam failed; and

"(III) necessary public facilities that would be affected by the flooding.

"(B) BUDGETING REQUIREMENT.--For a State to be eligible for assistance under this subsection, State appropriations must be budgeted to carry out the legislation of the State under subparagraph (A).

"(3) WORK PLANS.--The Director shall enter into a contract with each State receiving assistance under paragraph (2) to develop a work plan necessary for the State dam safety program to reach a level of program performance specified in the contract.

"(4) MAINTENANCE OF EFFORT.--Assistance may not be provided to a State under this subsection for a fiscal year unless the State enters into such agreement with the Director as the Director requires to ensure that the State will maintain the aggregate expenditures of the State from all other sources for programs to ensure dam safety for the protection of human life and property at or above a level equal to the average annual level of such expenditures for the 2 fiscal years preceding the fiscal year.

"(5) APPROVAL OF PROGRAMS.--

"(A) SUBMISSION.--For a State to be eligible for assistance under this subsection, a plan for a State dam safety program shall be submitted to the Director for approval.

"(B) APPROVAL.--A State dam safety program shall be deemed to be approved 120 days after the date of receipt by the Director unless the Director determines within the 120-day period that the State dam safety program fails to meet the requirements of paragraphs (1) through (3).

"(C) NOTIFICATION OF DISAPPROVAL.--If the Director determines that a State dam safety program does not meet the requirements for approval, the Director shall immediately notify the State in writing and provide the reasons for the determination and the changes that are necessary for the plan to be approved.

"(6) REVIEW OF STATE DAM SAFETY PROGRAMS.--Using the expertise of the Board, the Director shall periodically review State dam safety programs. If the Board finds that a State dam safety program has proven inadequate to reasonably protect human life and property and the Director concurs, the Director shall revoke approval of the State dam safety program, and withhold assistance under this subsection, until the State dam safety program again meets the requirements for approval.

"(g) DAM SAFETY TRAINING.--At the request of any State that has or intends to develop a State dam safety program, the Director shall provide training for State dam safety staff and inspectors.

"(h) BOARD.--

"(1) ESTABLISHMENT.--The Director may establish an advisory board to be known as the `National Dam Safety Review Board' to monitor State implementation of this section.

"(2) AUTHORITY.--The Board may use the expertise of Federal agencies and enter into contracts for necessary studies to carry out this section.

"(3) MEMBERSHIP.--The Board shall consist of 11 members selected by the Director for expertise in dam safety, of whom--

"(A) 1 member shall represent the Department of Agriculture;

"(B) 1 member shall represent the Department of Defense;

"(C) 1 member shall represent the Department of the Interior;

"(D) 1 member shall represent FEMA;

"(E) 1 member shall represent the Federal Energy Regulatory Commission;

"(F) 5 members shall be selected by the Director from among dam safety officials of States; and

"(G) 1 member shall be selected by the Director to represent the United States Committee on Large Dams.

"(4) COMPENSATION OF MEMBERS.--

"(A) FEDERAL EMPLOYEES.--Each member of the Board who is an officer or employee of the United States shall serve without compensation in addition to compensation received for the services of the member as an officer or employee of the United States.

"(B) OTHER MEMBERS.--Each member of the Board who is not an officer or employee of the United States shall serve without compensation.

"(5) TRAVEL EXPENSES.--Each member of the Board shall be allowed travel expenses, including per diem in lieu of subsistence, at rates authorized for an employee of an agency under subchapter I of chapter 57 of title 5, United States Code, while away from the home or regular place of business of the member in the performance of services for the Board.

"(6) APPLICABILITY OF FEDERAL ADVISORY COMMITTEE ACT.--The Federal Advisory Committee Act (5 U.S.C. App.) shall not apply to the Board.

"SEC. 9. RESEARCH.

"(a) IN GENERAL.--The Director, in cooperation with ICODS, shall carry out a program of technical and archival research to develop--

"(1) improved techniques, historical experience, and equipment for rapid and effective dam construction, rehabilitation, and inspection; and

"(2) devices for the continued monitoring of the safety of dams.

"(b) CONSULTATION.--The Director shall provide for State participation in research under subsection (a) and periodically advise all States and Congress of the results of the research.

"SEC. 10. REPORTS.

"(a) REPORT ON DAM INSURANCE.--Not later than 180 days after

the date of the enactment of this subsection, the Director shall report to Congress on the availability of dam insurance and make recommendations concerning encouraging greater availability.

"(b) BIENNIAL REPORTS.--Not later than 90 days after the end of each odd-numbered fiscal year, the Director shall submit a report to Congress that--

"(1) describes the status of the Program;

"(2) describes the progress achieved by Federal agencies during the 2 preceding fiscal years in implementing the Federal Guidelines for Dam Safety;

"(3) describes the progress achieved in dam safety by States participating in the Program; and

"(4) includes any recommendations for legislative and other action that the Director considers necessary.

"SEC. 11. STATUTORY CONSTRUCTION.

"Nothing in this Act and no action or failure to act under this Act shall--

"(1) create any liability in the United States or its officers or employees for the recovery of damages caused by such action or failure to act;

"(2) relieve an owner or operator of a dam of the legal duties, obligations, or liabilities incident to the ownership or operation of the dam; or

"(3) preempt any other Federal or State law.

"SEC. 12. AUTHORIZATION OF APPROPRIATIONS.

"(a) NATIONAL DAM SAFETY PROGRAM.--

"(1) ANNUAL AMOUNTS.--There are authorized to be appropriated to FEMA to carry out sections 7, 8, and 10 (in addition to any amounts made available for similar purposes included in any other Act and amounts made available under subsections (b) through (e)), $1,000,000 for fiscal year 1998, $2,000,000 for fiscal year 1999, $4,000,000 for fiscal year 2000, $4,000,000 for fiscal year 2001, and $4,000,000 for fiscal year 2002.

"(2) ALLOCATION.--

"(A) IN GENERAL.--Subject to subparagraphs (B) and (C), for each fiscal year, amounts made available under this subsection to carry out section 8 shall be allocated among the States as follows:

"(i) One-third among States that qualify for assistance under section 8(f).

"(ii) Two-thirds among States that qualify for assistance under section 8(f), to each such State in proportion to--

"(I) the number of dams in the State that are listed as State-regulated dams on the inventory of dams maintained under section 6; as compared to

"(II) the number of dams in all States that are listed as State-regulated dams on the inventory of dams maintained under section 6.

"(B) MAXIMUM AMOUNT OF ALLOCATION.--The amount of funds allocated to a State under this paragraph may not exceed 50 percent of the reasonable cost of implementing the State dam safety program.

"(C) DETERMINATION.--The Director and the Board shall determine the amount allocated to States needing primary assistance and States needing advanced assistance under section 8(f).

"(b) NATIONAL DAM INVENTORY.--There is authorized to be appropriated to carry out section 6 $500,000 for each fiscal year.

"(c) DAM SAFETY TRAINING.--There is authorized to be appropriated to carry out section 8(g) $500,000 for each of fiscal years 1998 through 2002.

"(d) RESEARCH.--There is authorized to be appropriated to carry out section 9 $1,000,000 for each of fiscal years 1998 through 2002.

"(e) STAFF.--There is authorized to be appropriated to FEMA for the employment of such additional staff personnel as are necessary to carry out sections 6 through 9 $400,000 for each of fiscal years 1998 through 2002.

"(f) LIMITATION ON USE OF AMOUNTS.--Amounts made available under this Act may not be used to construct or repair any Federal or non-Federal dam.".

(d) CONFORMING AMENDMENT.--Section 3(2) of the Indian Dams Safety Act of 1994 (25 U.S.C. 3802(2); 108 Stat. 1560) is amended by striking "the first section of Public Law 92-367 (33 U.S.C. 467)" and inserting "section 2 of the National Dam Safety Program Act".

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