

August 12, 2013

Mr. James E. Demby, Jr  
Federal Emergency Management Agency.  
1800 South Bell Street  
Arlington, VA 20598-3030

SUBJECT: TWO YEAR DAM SAFETY STATUS REPORT FOR FISCAL YEARS  
2012 AND 2013.

Dear Mr. Demby:

By letter dated June 20, 2013, the Federal Emergency Management Agency requested the U.S. Nuclear Regulatory Commission (NRC) to provide information for the biennial report on the implementation status of the Federal Guidelines for Dam Safety (FGDS). Our report, which discusses NRC progress on implementing the FGDS from October 2011 through September 2013, is enclosed.

During this period, the NRC continued to use the technical assistance of the Federal Energy Regulatory Commission (FERC) to help with dam safety inspections at NRC-licensed facilities. This cooperative effort is the result of the Interagency Memorandum of Agreement signed in September 1992. By the end of this biennial period (September 2013), FERC and NRC personnel will have completed inspections at seven NRC-licensed facilities. All seven of the inspections were of dams at nuclear-powered electric generating facilities.

I trust this letter and enclosure fully responds to your request.

Sincerely,

**/RA/ (Daniel H. Dorman for)**

Eric J. Leeds, Director  
Office of Nuclear Reactor Regulation

Enclosure:  
As stated

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**THE U.S. NUCLEAR REGULATORY COMMISSION**  
**2012-2013 PROGRESS REPORT**  
**TO THE FEDERAL EMERGENCY MANAGEMENT AGENCY**  
**IMPLEMENTATION OF THE FEDERAL GUIDELINES FOR DAM SAFETY**

18th Progress Report  
Reporting Period October 2011 through September 2013

## **I. INTRODUCTION**

The U.S. Nuclear Regulatory Commission (NRC) was created as an independent Federal agency to regulate and license nuclear facilities and the use of nuclear materials and to conduct research in support of licensing and the regulatory process. The Commission does not plan, design, construct, or operate such facilities, nor does it control the land on which the facilities are constructed. The legal authority of the Commission, in terms of dam safety, derives 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 (UMTRCA). With respect to dams, the NRC has regulatory authority over (1) uranium mill tailings dams, (2) storage water pond dams at in-situ leach uranium mining facilities, and (3) those dams integral to the operation of licensed facilities, or the possession and use of licensed material, that pose a radiological safety-related hazard should they fail. Exceptions to dams in the third category are (1) dams that are submerged in other impoundments (e.g., to provide an ultimate heat sink) and, therefore, do not pose flooding threats, or (2) dams that are regulated by other Federal agencies (e.g., Army Corps of Engineers, Federal Energy Regulatory Commission (FERC), Tennessee Valley Authority). No changes in dam safety responsibilities have occurred during this reporting period.

Sequestration and “budgeting by continuing resolution” have not affected the execution or efficiency of risk reduction efforts or compliance with the Federal Guidelines for Dam Safety in our Dam Safety Program.

## **II. PROGRESS ON IMPLEMENTATION OF THE FEDERAL GUIDELINES FOR DAM SAFETY**

### **A. Organization, Administration, and Staffing**

The NRC organization for the administration of the Dam Safety Program has not changed since the last reporting period. During this reporting period, Mr. Kenneth J. Karwoski was appointed as the NRC’s Dam Safety Officer. None of the personnel associated with the program are dedicated full time to the effort.

The NRC’s organizational structure and staffing are fully adequate and capable of implementing the existing Dam Safety Program. Since the completion of the initial round of dam safety inspections in 1998, the average allocated resources to sufficiently address the inspections performed as part of the Dam Safety Program have been 0.2 full-time equivalent (FTE) staff and \$34,000 dollars per year.

ENCLOSURE

Feedback on the previous report identified no deficiencies in the NRC's program implementation plan; thus, no specific actions were required.

A comparison of staff (in FTE) and contract funding from the last reporting period (fiscal year (FY) 2010/2011) to this reporting period is provided in the table below.

| <b>Reporting Period</b> | <b>FTE</b> | <b>Contract Funding</b> |
|-------------------------|------------|-------------------------|
| FY 2010/2011            | 2          | \$110,650               |
| FY 2012/2013            | 1.4        | \$235,000               |

#### B. Dam Safety Training Activities

Although the NRC has not sponsored in-house dam safety-related training during the reporting period, the Commission has supported such training and two NRC staff members have participated in training since the last reporting period. The NRC relies on technical assistance from FERC to perform dam safety inspections at NRC-regulated facilities and requires those personnel to be adequately trained. There are no staff training deficiencies in the Dam Safety Program.

#### C. Dam Inventories

The NRC continues to update the inventory of all dams for which the Commission has regulatory authority by providing the information necessary to complete the basic fields in the National Inventory of Dams (NID) database. The NRC has a current, complete inventory of its dams that reflects the status of the dam and defines the associated risk. The NRC uses actual dam inspections to verify the data related to the status of the dam and the hazard classification to define the associated risks.

No new dams (i.e., new dams being designed, constructed, and put into operation) have come under the NRC's regulatory jurisdiction during this reporting period. The NRC will add any new dams that come under the agency's regulatory jurisdiction to the dam inventory and provide the information for the NID database.

Since the agency makes the initial hazard classifications based on information existing at the time the NRC licenses a facility with a dam, the NRC considers land-use changes downstream of dams, among other important items, during its inspections of dams. To date, no revisions to hazard classifications have been necessary because of land-use changes.

#### D. Independent Reviews

Since the NRC is a regulatory agency, it does not own dams and, consequently, any NRC reviews of an NRC-licensed facility are independent. During the current reporting period, the NRC continued to use the technical assistance of FERC to assist with dam safety inspections at NRC-licensed facilities. This cooperative effort is the result of the Interagency Memorandum of Agreement signed in September 1992. During this biennial period, FERC and NRC personnel completed inspections at seven of the nine NRC-licensed facilities which have dams under

NRC's jurisdiction. All seven of the inspections were at nuclear-powered electric generating facilities. No design or construction activities were underway for dams that are, or would be, under the NRC's regulatory authority and the Dam Safety Program.

As noted previously, the NRC carries out its review activities with the technical assistance of FERC personnel working for, and in conjunction with, NRC staff during the inspection process. From the standpoint of the dam owner (the NRC licensee), these are considered to be independent reviews.

#### E. Inspection Programs

As stated above, FERC and NRC personnel conducted seven dam safety inspections at NRC-licensed facilities during this reporting period, under the technical assistance agreement between the two Federal agencies. All seven of the inspections were of dams at nuclear-powered electric generating facilities. NRC personnel have reviewed the inspection reports and have not identified any problems with these inspections related to the quality, experience, and training of the inspection team staff.

The inspection teams identified no unsafe dams or improper classifications during this reporting period. To address items noted during the inspection, the NRC sends the final report and a list of actions to be completed to the appropriate NRC licensee for action. This process has been effective in obtaining corrective action on any safety significant items.

#### F. Dam Safety Rehabilitation Programs

No regulated dams within the NRC's Dam Safety Program were involved in rehabilitation programs during this reporting period, and none are scheduled.

#### G. Management Effectiveness Reviews

Because of the low level of resources needed by the NRC to support this program and the fact that all dams under the NRC's purview are considered low-hazard structures (i.e., the potential for loss of life or property damage downstream of a dam from floodwaters released as a result of dam failure would be small (no lives lost and minimal economic loss)), neither internal NRC management nor the Government Accountability Office has performed any management effectiveness reviews.

#### H. Dam Failures and Remedial Actions

No failures or incidents have occurred during this reporting period.

#### I. Emergency Action Planning

As previously noted, all dams under the NRC's purview are considered low-hazard structures. It is unlikely that the hazard status of these structures will be elevated. For these reasons, the NRC does not have an emergency action planning program for dam safety. The NRC Dam Safety Program Plan states that all radiological safety-related dams or mill tailings dams under NRC jurisdiction that are classified as high- or significant-hazard dams shall have to provide

emergency action plans (EAPs) that conform to Federal Guidelines for Dam Safety (FGDS). At this time, the NRC does not foresee the need to write EAPs for any of the structures within its program, but in the future if it becomes necessary, the NRC has arranged with FERC for technical assistance with EAPs should the need arise.

If it becomes necessary to write an EAP in the future, the NRC intends to allow NRC licensees to use elements of the existing radiological EAPs associated with the facility. Thus, the basic organization, methodology, and interfaces with State and local governments already exist and will aid in the development of any necessary additional elements for dam safety EAPs.

#### J. Application of Interagency Committee on Dam Safety Technical Guidance

##### Emergency Action Planning for Dam Owners

Because of the low-hazard nature of all structures in the program, the NRC currently has no plans to adopt the emergency action planning guidelines but will consider them if an EAP must be developed for dam safety.

##### Federal Guidelines for Earthquake Analyses and Design of Dams

The NRC has incorporated its criteria for the seismic design of safety-related structures at nuclear power reactor sites, which include dams involving radiological safety, in Sections 2.5 and 3.7 of NUREG-0800, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants," issued March 2007 (hereafter referred to as the SRP), and in Regulatory Guide 1.127, "Inspection of Water-Control Structures Associated with Nuclear Power Plants," issued March 1978. Regulatory Guide 3.11, "Design, Construction, and Inspection of Embankment Retention Systems at Uranium Recovery Facilities," Revision 3, issued November 2008, also addresses seismic issues and implements the seismic siting requirements for impoundments in Criterion 4(e) of Appendix A, "Criteria Relating to the Operation of Uranium Mills and the Disposition of Tailings or Wastes Produced by the Extraction or Concentration of Source Material from Ores Processed Primarily for Their Source Material Content," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 40, "Domestic Licensing of Source Material."

These criteria and guidelines are comprehensive and should produce safe seismic designs. The NRC staff has concluded that these guidance documents are consistent with or meet the intent of the Federal guidelines.

##### Selecting and Accommodating Inflow Design Floods for Dams

The NRC's criteria for selecting and accommodating the design flow appear in Section 2.4 of the SRP for nuclear power reactor sites and in the Policy and Guidance Directives, "Standard Review Plan the Review of Remedial Action of Inactive Mill Tailings Sites Under Title I of the Uranium Mill Tailings Radiation Control Act," Revision 1, issued June 1993, for inactive tailings embankments (dams). These criteria are quite conservative and are consistent with the Federal guidelines. Regulatory Guide 3.11, "Design, Construction, and Inspection of Embankment Retention Systems at Uranium Recovery Facilities," Revision 3, issued November 2008, also addresses the 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.

Furthermore, Regulatory Guide 1.59, "Design Basis Floods for Nuclear Power Plants," Revision 2, issued August 1977, considers flood conditions that could be caused by dam failures from earthquakes.

#### Hazard Potential Classification System for Dams

As previously mentioned, all dams within the NRC's program are considered low-hazard structures, based on hydraulics and the remoteness of the sites. For this reason, no action has been required to address reclassification of the structures. Should the overall Hazard Classification System be redefined to include factors other than hydraulics and the potential loss of life from structural failure, the NRC will review each structure to determine whether a change in hazard classification is warranted.

#### K. State Dam Safety Agency Involvement

The NRC maintains a liaison with the dam safety agencies in various States to avoid duplicated effort and inventory data. Since all dams associated with a nuclear power plant are not necessarily related to radiological safety, the NRC and the States coordinate to ascertain that no dams are excluded from the NID. At this time, the NRC has no direct relationship with the various States in terms of training or the performance of inspections.

#### L. Research and Development and Special Initiatives

During the previous reporting period, the NRC stated that it was in the process of developing guidance on the probable maximum precipitation (PMP) estimates in the Southeastern U.S. (North and South Carolina Pilot Project). The purpose of the guidance was to provide the applicants for a license a technical basis on acceptable methods and data sources for estimating and using PMP to calculate probable maximum floods. These probable maximum floods must be considered by the applicants when evaluating siting factors and in the design of their facilities. As a result of this effort, three draft technical reports are currently being finalized by the NRC.

During this reporting period, the NRC, with assistance from the Bureau of Reclamation, began developing guidance related to extreme precipitation in the Tennessee Valley. The guidance will provide the NRC staff an alternative to the National Weather Service Hydrometeorological Report Nos. 41, 51, and 56, and complement the National Oceanic and Atmospheric Administration Atlas 14 for specified areas and durations within the Tennessee River Basin. In addition, the NRC through the U.S. Bureau of Reclamation (USBR) is evaluating the technical adequacy and applicability of the publication, "Xu, Y., and L. Zhang (2009), Breaching Parameters for Earth and Rockfill Dams, *Journal of Geotechnical and Geoenvironmental Engineering*, 135(12), 1957-1970," for regulatory use by NRC. This publication discusses a new dam breach regression model for earthen and rockfill dams that has not been widely applied in regulatory applications.

During the reporting period, the NRC hosted a Probabilistic Flood Hazard Assessment (PFHA) workshop with the purpose of assessing, discussing and informing participants on the state-of-the-practice for extreme flood assessments within a risk context, as they relate to dam and levee safety, among other topics.

#### M. Public Concerns

No dams under the NRC's jurisdiction for regulatory control have been the subject of public concern. NRC procedures for licensing facilities that could involve the construction of any new dams require that the licensing actions be in the public view, with provisions for public participation. Members of the public may petition for involvement if they wish to participate in issues regarding the operation of an NRC-regulated dam.

#### N. Non-Federal Dams on Federal Lands

The NRC does not own any land; therefore, this item is not applicable to the NRC.

### III. IMPACT ON AGENCY OPERATIONS

The implementation of the FGDS has necessitated the specific identification of the Dam Safety Program for internal budget purposes. This has, in turn, required a deliberate decision process of weighing various risks addressed by other programs for which the NRC is directly responsible against the risks associated with dam safety. The NRC is unique in that its main area of regulatory responsibility, namely, 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 the NRC considers risk and the costs versus benefits of its actions, the agency has a good understanding of the implications of changing the level of resources devoted to one or another safety program. The NRC believes that it has directed adequate resources to ensuring the safety of existing dams through inspection.

Contract funding for the Dam Safety Program for FY 2012 and FY 2013 was approximately \$235,000, and 1.4 FTE was used to implement the program. The contract funding was for technical assistance from FERC, USBR and the PFHA workshop, as discussed in Sections A, D and L of this document. In FYs 2013 and 2014, the program is expected to function at a similar activity level.

### IV. ADDITIONAL OBSERVATIONS

The NRC continues to implement dam safety actions under the NRC Dam Safety Program Plan. The plan describes the manner in which the NRC will implement the FGDS. Because of the small number of dams under the NRC's purview, the agency made a programmatic decision to emphasize the performance of dam safety inspections. Trained and experienced FERC personnel conducted inspections using the NRC's standard operational inspection procedures. The inspections identified no significant safety issues.

The NRC updates its guidance regarding the documentation of the design record, construction record, reservoir filling and surveillance records, operation and maintenance records, and permanent files, as necessary. The agency has reviewed and evaluated the elements of hazard evaluation, downstream effects, and warning systems with respect to the NRC program. The NRC has reviewed and evaluated its guidance for conformance to the FGDS in terms of (1) operating responsibility and procedures, (2) maintenance procedures, (3) the periodic inspection program, (4) deficiency correction and documentation, (5) emergency action



planning, and (6) elements on the scope and completion of internal and external reviews.

All dams under the NRC's purview are on an inspection cycle of 2 to 3 years, as advised by FERC. Furthermore, the hazard classification has been reconfirmed as "low" for all structures; thus, the preparation of EAPs is not required. The NRC, however, has arranged to receive technical assistance from FERC if the need to prepare EAPs develops.

