



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
WASHINGTON, D.C. 20555-0001

March 24, 2014

Mr. Joseph W. Shea  
Vice President, Nuclear Licensing  
Tennessee Valley Authority  
1101 Market Street, LP 3D-C  
Chattanooga, TN 37402-2801

SUBJECT: BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3 - REQUEST FOR  
ADDITIONAL INFORMATION RELATED TO POTENTIAL LOSS OF SPENT FUEL  
POOL COOLING (TAC NO. ME6761)

Dear Mr. Shea:

The U.S. Nuclear Regulatory Commission (NRC) has received a petition submitted in accordance with Title 10 of the *Code of Federal Regulations* (10 CFR) 2.206, "Requests for Action under This Subpart," related to the potential loss of forced cooling to spent fuel pools (SFPs) at boiling-water reactors (BWRs). Mr. David Lochbaum, on behalf of the Union of Concerned Scientists (the Petitioner), requested that the NRC issue a demand for information (DFI) to all licensees of BWRs with Mark I or Mark II containment designs.<sup>1</sup> The Petitioner requested that the DFI compel the licensees to describe how their individual facilities comply with 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 44, "Cooling Water," and/or with 10 CFR 50.49, "Environmental Qualification of Electric Equipment Important to Safety for Nuclear Power Plants." The request was based on the need to transfer the heat from the SFP to an ultimate heat sink or account for the effects of potential boiling of the SFP following a design-basis event on the temperature, humidity, and submergence conditions within the reactor building.

The NRC staff initially considered this petition to be within the scope of issues that may be addressed as a result of the NRC's post-Fukushima actions because the request involved SFP boiling, which was an area of concern at the Fukushima Dai-ichi Nuclear Power Plant following the March 11, 2011, Great East Japan Earthquake and resultant tsunami. However, the focus of post-Fukushima actions has been on the protection of the fuel within the pool following beyond-design-basis events, rather than the potential for boiling in the SFPs to affect other systems and components essential for accident mitigation or safe shutdown following design-basis events.

The NRC staff has completed an initial evaluation of the petition request using information contained in each subject facility's safety analysis report, and has concluded that additional information is necessary from certain facilities in order to evaluate the response of the facilities following design-basis events. Specifically, the NRC staff has selected facilities that share a common secondary containment surrounding two SFPs for its initial information request. These facilities are more likely to have a high decay heat load due to refueling in one of the SFPs, during a time when other equipment within the secondary containment may be essential for

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<sup>1</sup> See Letter from David Lochbaum, Director, Nuclear Safety Project, Union of Concerned Scientists, to R. William Borchardt, Executive Director for Operations, NRC (July 29, 2011) (Agencywide Documents Access and Management System Accession No. ML11213A030).

accident mitigation or safe shut down of an adjacent, operating unit. Some facilities in this group had sufficiently detailed information in the associated safety analysis report to indicate that forced SFP cooling could be reestablished to even an isolated SFP using equipment designed to function following the facility design-basis earthquake. However, other facility safety analysis reports had descriptions indicating that reestablishment of forced SFP cooling was not assured because, for example, connections from the residual heat removal (RHR) system to the SFP were not seismically qualified or the system was not configured to both draw water from and return cooled water to the SFP.

The NRC staff believes, based on information in the safety analysis reports for Browns Ferry Nuclear Plant, Units 1, 2, and 3 (Browns Ferry), that a reliable means of SFP forced cooling may not exist at this facility. Since the RHR system may not be configured to provide reliable forced cooling to the SFP and the normal SFP cooling system was not safety-related at the Browns Ferry facility, the NRC staff believes that a sustained loss of forced cooling to the SFPs at these facilities could be a potential consequence of a design-basis earthquake with an associated loss of offsite power. The configuration of the secondary containment at these facilities may allow accumulation of evolved steam or condensed water into reactor building areas housing safety-related equipment that could result in inoperability of this safety-related equipment.

In order to better understand the reliability of the SFP cooling systems, the expected response of the affected facilities to their loss, and the safety significance of the SFP cooling function at the Browns Ferry facility; please respond to the request for additional information provided in the enclosure to this letter. A draft of the RAIs was sent to Gordon Williams of your staff via email on February 24, 2014. Your staff informed the NRC via a phone call to Farideh Saba, NRC Browns Ferry project manager, on March 5, 2014, that you would respond in 90 days from the date of the letter. If you have any questions regarding this request, please contact the petition project manager, Mr. John Lamb, at 301-415-3100.

Sincerely,



Patrick L. Hiland, Director  
Division of Engineering  
Office of Nuclear Reactor Regulation

Docket Nos. 50-259, 50-260,  
and 50-296

Enclosure: Request for Additional Information

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REQUEST FOR ADDITIONAL INFORMATION

RELIABILITY OF FORCED SPENT FUEL POOL COOLING

2.206 PETITION FROM UNION OF CONCERNED SCIENTISTS

BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3

TENNESSEE VALLEY AUTHORITY

DOCKET NOS. 50-259, 50-260, AND 50-296

Please respond to the following requests for information for the requested facility. The performance of structures, systems, and components (SSCs) should consider standard accident analysis methods and assumptions used in the safety analysis report, including loss of function under conditions beyond those considered in the design of the SSC and consideration of additional single failures. Operator actions may be included when the action is specified in existing operating, alarm response, or emergency procedure and the personnel expected to execute the action have been properly trained.

1. Describe the ability to maintain forced cooling of the spent fuel pool (SFP) using installed equipment following a design-basis earthquake with consequential loss of offsite power. Please consider SFP configurations encountered during routine refueling and normal operating conditions. The normal SFP cooling system and the SFP cooling assist mode of the residual heat removal system should be considered at a minimum, and, if a sustained loss of forced SFP cooling is expected, identify the expected range of times for the pool to reach saturation conditions.
2. If the response to the above request determines that the SFP would experience a sustained loss of SFP forced cooling, describe the expected changes in environmental conditions within each affected secondary containment ventilation zone. Address the expected response of operators to manage environmental conditions, consistent with existing procedures, and describe the survivability of ventilation systems, such as the standby gas treatment system. Identify any secondary containment areas that could experience a harsh environment (*i.e.*, an environment significantly more severe than the environment that would occur during normal plant operation with respect to radiation, temperature, humidity, or submergence of equipment as a result of accumulated condensate) as a result of the sustained loss of SFP forced cooling.
3. If the response to the above request identifies harsh environmental conditions in any area of the facility secondary containment, describe the effect of these environmental conditions on important-to-safety electrical equipment within those areas necessary to maintain the integrity of the reactor coolant pressure boundary, the capability to shut down the reactor and maintain it in a safe shutdown condition or the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposure.

Enclosure

4. If the response to the above request identifies that electrical equipment necessary to shut down the reactor and maintain safe shutdown conditions could be adversely affected by a sustained loss of SFP forced cooling potentially resulting from a design-basis event, describe any corrective actions that will be implemented at the affected facility and the basis for concluding that those actions would acceptably resolve the described condition.

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/ra/

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Docket Nos. 50-259, 50-260,  
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