



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

July 14, 2016

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

SUBJECT: BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3 – SUMMARY REPORT FOR THE MAY 10 TO MAY 11, 2016 AUDIT IN SUPPORT OF SPENT FUEL POOL CRITICALITY AND BORAL MONITORING PROGRAM REVIEWS ASSOCIATED WITH EXTENDED POWER UPRATE LICENSE AMENDMENT REQUEST (CAC NOS. MF6741, MF6742, AND MF6743)

Dear Mr. Shea:

By letter dated September 21, 2015, as supplemented by letters dated November 13, December 15 (2 letters), and December 18, 2015, Tennessee Valley Authority (TVA, the licensee) submitted a license amendment request (LAR) for the Browns Ferry Nuclear Plant, Units 1, 2, and 3. The proposed amendment would increase the authorized maximum steady-state reactor core power level for each unit from 3,458 megawatts thermal (MWt) to 3,952 MWt. This LAR represents an increase of approximately 20 percent above the original licensed thermal power level of 3,293 MWt, and an increase of approximately 14.3 percent above the current licensed thermal power level of 3,458 MWt.

In addition, by letters dated January 28 and January 29, 2016, the U.S. Nuclear Regulatory Commission (NRC) issued requests for additional information (RAIs) associated with spent fuel pool criticality and the Boral monitoring program at Browns Ferry. The licensee, by letters dated February 16, 2016 and March 8, 2016, responded to the NRC staff's requested information.

On March 22, 2016, the NRC staff forwarded, by electronic mail (email), draft RAIs to TVA. On April 7, 2016, the NRC staff held a conference call to provide the licensee with an opportunity to clarify any portion of the draft RAIs and discuss the timeframe for which TVA could provide the requested information. Subsequently, the NRC staff determined that an audit would be the most effective approach to enable the NRC staff to develop focused RAIs in order for the licensee to provide quality and timely responses.

The audit was held at the EXCEL Services Corporation facility in Rockville, Maryland, from May 10 to May 11, 2016. The audit plan dated April 27, 2016, is available in Agencywide Documents Access and Management System under Accession No. ML16105A441. A list of audit attendees is provided in Enclosure 1.

During the audit, the licensee provided to the NRC staff a documentation package that included the NRC staff's draft RAIs that were emailed to TVA on March 22, 2016, TVA's draft responses, and the supplemental information that would support completion of the NRC staff's review. The

J. Shea

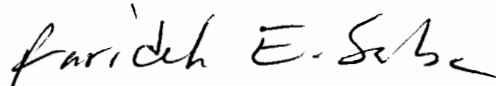
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NRC staff reviewed the information provided in the package and discussed it with the TVA staff and the AREVA (TVA contractor) staff.

As the result of this audit, the NRC staff was able to finalize the draft RAIs. The NRC's letter dated June 21, 2016, documents the finalized RAIs associated with associated with the Boral monitoring program and spent fuel pool criticality. The licensee was able to identify draft responses that would need to be revised to provide additional clarifications. As agreed to by the NRC and TVA staffs, TVA will respond to the staff RAIs by July 29, 2016. Enclosure 2 to this letter provides the audit summary report.

If you have any questions, please contact me at (301) 415-1447 or Farideh.Saba@nrc.gov.

Sincerely,



Farideh E. Saba, Senior Project Manager
Plant Licensing II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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

Enclosures:

1. List of Attendees
2. Summary Report for Audit

cc w/encls: Distribution via Listserv

LIST OF ATTENDEES
MAY 10 - 11, 2016, AUDIT OF TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3
SPENT FUEL POOL CRITICALITY AND BORAL MONITORING PROGRAM REVIEW
ASSOCIATED TO EXTENDED POWER UPRATE
LICENSE AMENDMENT REQUEST

Name	Affiliation	Entrance (05/10)	05/10	05/11	Exit (05/11)
Ben Beasley	NRC			X	X
Scott Krepel	NRC	X	X	X	X
Kent Wood	NRC	X	X		X
Mathew Yoder	NRC			X	X
Farideh Saba	NRC	X	X	X	X
Gloria Kulesa	NRC			X	X
Ed Schrull	TVA		In PM	X	X
Gerard Doyle	TVA	X	X	X	X
Dan Green	TVA	X	X	X	X
Pete Donahue	TVA	X	X	X	X
Jeff Kimberlin	TVA	X	X	X	X
Tom Eichenberg	TVA	X	X	X	X
Zita Martin	TVA	X	X	X	X
Earl Riley	AREVA	X	X	X	X
Ed Fowles	AREVA	X	X	X	X
Alan Meginnis	AREVA	X	X	X	X
David McBurney	AREVA	X	X	X	X

SUMMARY REPORT FOR MAY 10 - 11, 2016, AUDIT
AT EXCEL FACILITY IN ROCKVILLE, MARYLAND
REVIEW OF EXTENDED POWER UPRATE
LICENSE AMENDMENT REQUEST
TENNESSEE VALLEY AUTHORITY
BROWNS FERRY NUCLEAR PLANT, UNITS 1, 2, AND 3
DOCKET NOS. 50-259, 50-260, AND 50-296

By letter dated September 21, 2015 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML15282A152), as supplemented by letters dated November 13, December 15 (2 letters), and December 18, 2015 (ADAMS Accession Nos. ML15317A361, ML15351A097, ML15351A113, and ML15355A413, respectively), Tennessee Valley Authority (TVA, the licensee) submitted a license amendment request (LAR) for Browns Ferry Nuclear Plant (BFN), Units 1, 2, and 3 (Browns Ferry). The proposed amendment would increase the authorized maximum steady-state reactor core power level for each unit from current licensed thermal power of 3,458 megawatt thermal (MWt) to extended power update (EPU) level of 3,952 MWt. This LAR represents an increase of approximately 20 percent above the original licensed thermal power level of 3,293 MWt, and an increase of approximately 14.3 percent above the CLTP.

In addition, by letters dated January 28 and January 29, 2016, the U.S. Nuclear Regulatory Commission (NRC) issued requests for additional information (RAIs) associated with spent fuel pool (SFP) criticality and The Boral monitoring program at Browns Ferry (ADAMS Accession Nos. ML16019A283¹ and ML16020A111,² respectively). The licensee, by letters dated February 16, 2016 (ADAMS Accession No. ML16049A248³) and March 8, 2016 (ADAMS Accession No. ML16069A142⁴), responded to the NRC staff's requested information.

On March 22, 2016, the NRC staff forwarded, by electronic mail (email), two separate draft RAIs to TVA. On April 7, 2016, the NRC staff held a conference call to provide the licensee with an opportunity to obtain clarification on any portion of the draft RAIs and discuss the timeframe for which TVA could provide the requested information. Subsequently, the NRC staff determined that an audit would be the most effective approach to enable the NRC staff to develop focused RAIs in order for the licensee to provide quality and timely responses.

The audit was held at the EXCEL Services Corporation facility in Rockville, Maryland, from May 10 to May 11, 2016. The audit plan dated April 27, 2016, is available in ADAMS under Accession No. ML16105A297. A list of attendees in the entrance meeting, audit days, and exit meeting was shown in Enclosure 1. The following NRC staff participated in the audit

¹ It contains SFP-RAI 1 and SFP-RAI 2.

² It contains ESGB [Steam Generator Tube Integrity and Chemical Engineering Branch]-RAI 1.

³ It contains TVA responses to SFP-RAI 1 and ESGB-RAI 1.

⁴ It contains TVA response to SFP-RAI 2.

discussions: Kent Wood, senior criticality engineer; Scott Krepel, lead spent fuel pool criticality reviewer; Matthew Yoder, lead Boral monitoring program reviewer; and Farideh Saba, project manager.

The audit team held an entrance meeting on May 10, 2016. At this meeting, following the introduction, TVA and its contractor, AREVA, provided a short discussion about SFP criticality analyses associated with each fuel transitioning, and manufacturing and installation of the Boral-containing racks at the Browns Ferry plant.

During the audit, the licensee presented to the NRC staff, a documentation package that included the NRC staff's nine draft RAIs regarding SFP criticality and two draft RAIs associated with the Boral monitoring program that were emailed to TVA on March 22; TVA draft responses to all draft RAIs; and the supplemental information that would support the NRC staff's review. The documents in the package presented by TVA are listed below:

1. Letter from NRC to TVA, "Browns Ferry Nuclear Plant, Units 1, 2, and 3 – Regulatory Audit Plan for May 10 - 11, 2016, Audit at EXCEL Facility in Rockville, Maryland, in Support of Extended Power Uprate License Amendment Request (CAC Nos. MF6741, MF6742, and MF6743)," dated April 27, 2016 (ML16105A441).
2. Draft NRC SFP RAIs, "MF6741-3 BFN EPU LAR Draft RAI SFP," dated March 22, 2016. (transmitted RAIs Additional SFP-RAI 2.1 through SFP RAI-10).
3. AREVA Draft Response to SFP-RAIs 3b, 4, 6, 7, 8, 9, and 10.
4. TVA Draft Response to SFP-RAIs 2-1, 3a, and 5.
5. Draft NRC ESGB RAIs, "MF6741-3 BFN EPU LAR Draft RAI ESGB," dated March 22, 2016. (transmitted Round 2 for RAIs ESGB-RAI 1 through ESGB-RAI 2).
6. TVA Draft Response to ESGB Round 2 RAIs 1 and 2.
7. AREVA Final Response to SFP Round 1 RAI 1.
8. TVA Final Response to SFP Round 1 RAI 2.
9. TVA Final Response to ESGB Round 1 RAI 1.

During the audit, the NRC staff reviewed the information provided in the package and discussed it with the TVA and AREVA staffs. There was open communication throughout the audit and it was conducted in accordance with the audit plan with no known deviation. Discussions on May 10, 2016, were focused on the responses associated with the RAIs for SFP criticality and discussions on May 11, 2016, were mainly focused on the Boral monitoring program RAIs and issues. From the 11 draft RAIs (9 from SFP and 2 from ESGB) that were discussed during the audit the TVA staff determined that the additional clarification or additional work was necessary to provide appropriate responses to 7 RAIs. The NRC staff also determined the necessity of adding one more RAI, as a followup to SFP-RAI 1, asking the licensee to propose means to ensure that the maximum reactivity of fuel assemblies loaded in SFP is limited for future fuel

assemblies loaded in the SFP, consistent with the k-infinity limit specified in the standard technical specifications.

During the audit, the NRC staff noted that the NRC Generic Letter (GL) 2016-01, "Monitoring of Neutron-Absorbing Material in Spent Fuel Pools," dated April 7, 2016, requested, the licensees submit information that demonstrates that credited neutron absorbing materials in the SFP are in compliance with NRC regulatory requirements for subcriticality. The staff also pointed out that Nuclear Energy Institute (NEI) document NEI 16-03, "Guidance for Monitoring of Fixed Neutron Absorbers in Spent Fuel Pools," was submitted to the NRC on May 10, 2016. However, both the NRC staff and the TVA staff had a mutual understanding that the NRC staff's concerns regarding the Boral monitoring program would need to be resolved prior to completion of the staff review of TVA's response to GL 16-01 and NEI document. Therefore, the NRC staff and the TVA staff agreed that TVA, in its response to the staff's RAI, would propose a license condition associated with the Boral monitoring program.

At the conclusion of the audit, the NRC staff conducted an exit meeting on May 11, 2016. At that meeting, the staff provided a summary of the audit results in each subject area defined in the audit scope. In addition, the NRC staff and TVA staff agreed to renumber the draft followup SFP-RAI 2 (renumbered as SFP-RAI 12⁵) and round 2 ESGB-RAIs 1 and 2 (renumbered as ESGB-RAI 2 and 3). The NRC staff and TVA staff both agreed that the audit helped the licensee to better focus on the scope of NRC's draft RAIs. The audit also provided the NRC staff with a better understanding of TVA's submittals and approach for responding to the NRC staff's RAIs. Additionally, the NRC staff utilized results of the audit to finalize and issue the RAIs, which are documented in the NRC letter dated June 21, 2016 (ADAMS Accession No. ML16154A635).

Subsequent to the audit, on May 12, 2016, the NRC staff emailed a draft RAI associated with in-rack k-infinity and sent another email on May 26, 2016, that contained a revised SFP-RAI 12 (followup RAI to SFP-RAI 2) to add clarifications to the requested information. These changes are captured in the finalized RAIs in the NRC letter dated June 21, 2016. Currently, TVA is planning to submit its responses to the staff RAIs by July 29, 2016.

⁵ The followup RAI to SFP-RAI 1 is numbered as SFP-RAI 11.

NRC staff reviewed the information provided in the package and discussed it with the TVA staff and the AREVA (TVA contractor) staff.

As the result of this audit, the NRC staff was able to finalize the draft RAIs. The NRC's letter dated June 21, 2016, documents the finalized RAIs associated with associated with The Boral monitoring program and spent fuel pool criticality. The licensee was able to identify draft responses that would need to be revised to provide additional clarifications. As agreed to by the NRC and TVA staffs, TVA will respond to the staff RAIs by July 29, 2016. Enclosure 2 to this letter provides the audit summary report.

If you have any questions, please contact me at (301) 415-1447 or Farideh.Saba@nrc.gov.

Sincerely,
/RA/
Farideh E. Saba, Senior Project Manager
Plant Licensing II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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

Enclosures:

1. List of Attendees
2. Summary Report for Audit

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ADAMS Accession No.: ML16189A343

By email

OFFICE	NRR/DORL/LPLII-2/PM	NRR/DORL/LPLII-2/LA	NRR/DSS/SNPB/BC*
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DATE	7/12/2016	7/14/2016	7/13/2016
OFFICE	NRR/DE/ESGB/BC(A)	NRR/DORL/LPLII-2/BC(A)	NRR/DORL/LPLII-2/PM
NAME	JPeralta	TOrf	FSaba
DATE	7/13/2016	7/13/2016	7/14/2016

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