

*General Directions: This Model safety evaluation (SE) provides the format and content to be used when preparing the plant-specific SE of a license amendment request (LAR) to adopt TSTF-557. The **bolded** bracketed information shows text that should be filled in for the specific amendment; individual licensees would furnish site-specific nomenclature or values for these bracketed items. The italicized wording provides guidance on what should be included in each section and should not be included in the SE.*

**FINAL MODEL SAFETY EVALUATION**

**BY THE OFFICE OF NUCLEAR REACTOR REGULATION**

**TECHNICAL SPECIFICATIONS TASK FORCE TRAVELER**

**TSTF-557, REVISION 1,**

**“SPENT FUEL STORAGE RACK NEUTRON ABSORBER MONITORING PROGRAM”**

**USING THE CONSOLIDATED LINE ITEM IMPROVEMENT PROCESS**

**(EPID L-2017-PMP-0025)**

**1.0 INTRODUCTION**

By application dated [enter date], (Agencywide Documents Access and Management System (ADAMS) Accession No. [MLXXXXXXXXX]), [as supplemented by letters dated [enter date(s)]], [name of licensee] (the licensee) submitted a license amendment request (LAR) for [name of facility (abbreviated name), applicable units].

The amendment would revise Technical Specification (TS) Section 5.5, “Programs and Manuals.” The proposed change would add a new program titled, “Spent Fuel Storage Rack Neutron Absorber Monitoring Program.” The program ensures the boron-10 areal density of the neutron absorber material assumed in the spent fuel pool (SFP) storage rack nuclear criticality analyses remains conservative with respect to the actual plant conditions. The proposed changes are based on Technical Specifications Task Force (TSTF) Traveler TSTF-557, Revision 1, “Spent Fuel Storage Rack Neutron Absorber Monitoring Program,” dated December 19, 2017 (ADAMS Accession No. ML17353A608). The U.S. Nuclear Regulatory Commission (NRC or the Commission) issued a final safety evaluation (SE) approving TSTF-557, Revision 1, on [enter date] (ADAMS Accession No. ML19007A226).

[The licensee has proposed variations from the TS changes described in TSTF-557. The variations are described in Section 2.2.1 of this SE and evaluated in Section 3.3.] [The licensee is not proposing any variations from the TS changes described in TSTF-557 or the applicable parts of the NRC staff’s SE of TSTF-557.]

[The supplemental letters dated [enter date(s)], provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the NRC staff’s original proposed no significant hazards consideration determination as published in the *Federal Register* on [enter date] (cite FR reference).]

## 2.0 REGULATORY EVALUATION

### 2.1 DESCRIPTION OF SPENT FUEL POOL STORAGE RACKS

The credited neutron absorbing material (NAM) installed in SFP storage racks ensures that the effective multiplication factor ( $k_{\text{eff}}$ ) does not exceed the values and assumptions used in the criticality analysis of record (AOR) and other licensing basis documents. The AOR is the basis, in part, for demonstrating compliance with plant TS and with applicable NRC regulations. Degradation or deformation of the credited NAM may reduce safety margin and potentially challenge the subcriticality requirement. The NAM utilized in SFP racks exposed to treated water or treated borated water may be susceptible to reduction of neutron absorbing capacity, changes in dimension that increase  $k_{\text{eff}}$ , and loss of material. A monitoring program is implemented to ensure that degradation of the NAM used in SFPs, which could compromise the ability of the NAM to perform its safety function as assumed in the AOR, will be detected.

### 2.2 PROPOSED CHANGES TO THE TECHNICAL SPECIFICATIONS

A new program would be added to TS Section **[5.5, “Program and Manuals.”]** The new program would appear as:

**5.5.[XX]      Spent Fuel Storage Rack Neutron Absorber Monitoring Program**

This Program provides controls for monitoring the condition of the neutron absorber used in the spent fuel pool storage racks to verify the Boron-10 areal density is consistent with the assumptions in the spent fuel pool criticality analysis. The program shall be in accordance with NEI 16-03-A, “Guidance for Monitoring of Fixed Neutron Absorbers in Spent Fuel Pools,” Revision 0, May 2017[, with the following exceptions:

**1. ]**

#### **[2.2.1 Variations from TSTF-557 and exceptions to NEI 16-03-A]**

*{NOTE: Technical reviewers and/or project manager are to assess the adequacy of any variations from the approved traveler and document their acceptability. Choose the applicable paragraphs based on information provided in the LAR.}*

**[The licensee is proposing the following exceptions to Nuclear Energy Institute (NEI) topical report NEI 16-03-A, “Guidance for Monitoring of Fixed Neutron Absorbers in Spent Fuel Pools,” May 2017 (ADAMS Accession No. ML17263A133), and/or variations from the TS changes described in TSTF-557, or the applicable parts of the NRC staff’s SE of TSTF-557. [Describe the variations and/or exceptions.]**

**[The [PLANT] TS utilize different [numbering][and][titles] than the Standard Technical Specifications on which TSTF-557 was based. Specifically, [describe differences between the plant-specific TS numbering and/or titles and the TSTF-557 numbering and/or titles.]**

**[The [PLANT] design is different than the model plant assumed in the Standard Technical Specifications. [Describe differences.]]**

**[The [PLANT] [TS/Operating license] contain SFP storage rack neutron absorber material monitoring requirements approved by the NRC in [Reference]. [Describe, at a high level, the existing requirements and location.] [Licensee] proposes to replace the existing requirements with the TS Administrative Controls program in TSTF-557.]**

## 2.3 APPLICABLE REGULATORY REQUIREMENTS AND GUIDANCE

Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.36(a)(1) requires each applicant for a license authorizing operation of a utilization facility to include in the application proposed TS.

The regulation at 10 CFR 50.36(b) requires:

Each license authorizing operation of a ... utilization facility ... will include technical specifications. The technical specifications will be derived from the analyses and evaluation included in the safety analysis report, and amendments thereto, submitted pursuant to [10 CFR] 50.34 ["Contents of applications; technical information"]. The Commission may include such additional technical specifications as the Commission finds appropriate.

The regulation at 10 CFR 50.36(c)(5) requires TS to include administrative controls, which "are the provisions relating to organization and management, procedures, recordkeeping, review and audit, and reporting necessary to assure operation of the facility in a safe manner."

The regulation in paragraph (b)(4) of 10 CFR 50.68, "Criticality accident requirements," states that if the licensee does not credit soluble boron in the SFP criticality AOR, the  $k_{\text{eff}}$  of the SFP storage racks must not exceed 0.95 at a 95 percent probability, 95 percent confidence level. If the licensee does take credit for soluble boron, the  $k_{\text{eff}}$  of the SFP storage racks must not exceed 0.95 at a 95 percent probability, 95 percent confidence level, if the racks are flooded with borated water, and if flooded with unborated water, the  $k_{\text{eff}}$  must remain below 1.0 at a 95 percent probability, 95 percent confidence level.

The NRC staff's guidance for the review of TS is in Chapter 16.0, "Technical Specifications," of NUREG-0800, Revision 3, "Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants: LWR [Light-Water Reactor] Edition" (SRP), March 2010 (ADAMS Accession No. ML100351425). As described therein, as part of the regulatory standardization effort, the NRC staff has prepared Standard Technical Specifications (STS) for each of the LWR nuclear designs. Accordingly, the NRC staff's review includes consideration of whether the proposed changes are consistent with the applicable reference STS (i.e., the current STS), as modified by NRC-approved travelers. In addition, the guidance states that comparing the change to previous STS can help clarify the TS intent.

Section 9.1.1, Revision 3, of the SRP, "Criticality Safety of Fresh and Spent Fuel Storage and Handling," March 2007 (ADAMS Accession No. ML070570006), provides guidance regarding the acceptance criteria and review procedures to ensure that the proposed changes satisfy the requirements in 10 CFR 50.68.

Section 9.1.2, Revision 4, of the SRP, "New and Spent Fuel Storage" (ADAMS Accession No. ML070550057), provides guidance regarding the acceptance criteria and review procedures to ensure that the proposed changes satisfy the requirements in 10 CFR 50.68.

*{NOTE: Choose applicable STS}*

**[U.S. Nuclear Regulatory Commission, "Standard Technical Specifications, Babcock and Wilcox Plants," NUREG-1430, Volume 1, "Specifications," and Volume 2, "Bases," Revision 4.0, April 2012 (ADAMS Accession Nos. ML12100A177 and ML12100A178, respectively).**

**U.S. Nuclear Regulatory Commission, "Standard Technical Specifications, Westinghouse Plants," NUREG-1431, Volume 1, "Specifications," and Volume 2, "Bases," Revision 4.0, April 2012 (ADAMS Accession Nos. ML12100A222 and ML12100A228, respectively).**

**U.S. Nuclear Regulatory Commission, "Standard Technical Specifications, Combustion Engineering Plants," NUREG-1432, Volume 1, "Specifications," and Volume 2, "Bases," Revision 4.0, April 2012 (ADAMS Accession Nos. ML12102A165 and ML12102A169, respectively).**

**U.S. Nuclear Regulatory Commission, "Standard Technical Specifications, General Electric BWR/4 Plants," NUREG-1433, Volume 1, "Specifications," and Volume 2, "Bases," Revision 4.0, dated April 2012 (ADAMS Accession Nos. ML12104A192 and ML12104A193, respectively).**

**U.S. Nuclear Regulatory Commission, "Standard Technical Specifications, General Electric BWR/6 Plants," NUREG-1434, Volume 1, "Specifications," and Volume 2, "Bases," Revision 4.0, April 2012 (ADAMS Accession Nos. ML12104A195 and ML12104A196, respectively).**

**U.S. Nuclear Regulatory Commission, "Standard Technical Specifications, Westinghouse Advanced Passive 1000 (AP1000®) Plants," NUREG-2194, Revision 0, April 2016, Volume 1, "Specifications," and Volume 2, "Bases" (ADAMS Accession Nos. ML16110A277 and ML16110A369, respectively).]**

NUREG-1801, Revision 2, "Generic Aging Lessons Learned (GALL) Report," December 2010 (ADAMS Accession No. ML103490041), provides guidance on what constitutes an acceptable monitoring program for NAM credited for criticality control in the SFP.

The TS Section **[5.5]** program imposes a requirement to have a licensee-controlled program that is in accordance with Nuclear Energy Institute (NEI) topical report NEI 16-03-A, "Guidance for Monitoring of Fixed Neutron Absorbers in Spent Fuel Pools," Revision 0, dated May 2017 (ADAMS Accession No. ML17263A133). The NRC staff approved NEI 16-03 in an SE dated March 3, 2017 (ADAMS Accession No. ML16354A486). The NEI 16-03-A topical report and the NRC staff's SE for NEI 16-03 provide the technical justification for the proposed program.

**[PLANT] TS Section [4, "Design Features," Section 4.3, "Fuel Storage,"]** provides limits on the SFP storage racks, including limits on  $k_{eff}$  in various conditions. **[LICENSEE]** has credited NAM in the SFP storage racks at **[PLANT]** to meet these requirements. There are currently **[no]** requirements in the TS that require monitoring the condition of the NAM in the SFP. **[The TS requirements for monitoring the condition of the NAM in the SFP are contained in TS XX.]**

### **3.0 TECHNICAL EVALUATION**

The licensee stated in Section 2.1 of the LAR that it had reviewed the NRC staff's SE of TSTF-557, Revision 1, as well as the information provided in TSTF-557, Revision 1, and concluded that the justifications presented in TSTF-557, Revision 1, and the SE prepared by the NRC staff are applicable to **[PLANT]** and justify the proposed changes.

The NRC staff reviewed the proposed changes to the TS. The NRC staff reviewed the changes to ensure the licensee properly accounted for any limitations or conditions placed on adoption of TSTF-557. In addition, the NRC staff reviewed the proposed TS changes to ensure the TS, as modified by adoption of TSTF-557, would continue to comply with the requirements of 10 CFR 50.36.

#### **3.1 NEW PROGRAM FOR MONITORING NEUTRON ABSORBER**

The purpose of the program is to ensure the boron-10 areal density of the neutron absorber material assumed in the SFP storage rack nuclear criticality analyses remains conservative with respect to the actual plant conditions.

The TS Section **[5.5]** program imposes a requirement to have a licensee-controlled program that is in accordance with NEI 16-03-A, "Guidance for Monitoring of Fixed Neutron Absorbers in Spent Fuel Pools," Revision 0, May 2017. In the SE for NEI 16-03, dated March 3, 2017, the NRC approved and accepted the document for referencing in licensing applications for nuclear power plants. The NEI 16-03-A topical report and the NRC's SE for NEI 16-03 provide the technical justification for the proposed program.

The purpose of a NAM monitoring program is to verify that the NAM installed in SFPs continues to perform its safety function (i.e., criticality control) as assumed in the AOR. The guidance provided in NEI 16-03 for a NAM monitoring program relies on periodic inspection, testing, monitoring, and analysis of the NAM to ensure that the required subcriticality margin is maintained in accordance with 10 CFR 50.68 requirements. To accomplish this purpose, the guidance document states that a monitoring program must be capable of identifying unanticipated changes in the absorber material and determining whether anticipated changes can be verified. The guidance recommends a combination of coupon testing, in situ measurement, and SFP water chemistry monitoring as a means to monitor potential changes in characteristics of the NAM.

The NRC staff reviewed the proposed guidance for what constitutes an acceptable monitoring program and its ability to ensure that potential degradation of SFP NAM will be detected, monitored, and mitigated. In the NRC's SE for NEI 16-03, the staff determined that an appropriate combination of the three methods listed above (coupon testing, in situ measurement, and SFP water chemistry monitoring) as described in NEI 16-03-A, can comprise an effective NAM monitoring program. Section 3.4 of the NRC's SE of NEI 16-03 states that in order for a NAM program to be acceptable, a licensee must perform neutron attenuation testing to verify the boron-10 areal density. Further, in Section 4.0 of the NRC's SE for NEI 16-03, the NRC staff concluded that a NAM monitoring program implementing the guidance in NEI 16-03 provides reasonable assurance that such program will be able to detect degradation of NAM, and provides assurance that the ability of the NAM to provide the criticality control relied upon in the AOR, is maintained.

Based on its review of the proposed TS changes and previous approval of NEI 16-03, the NRC staff has determined that the licensee's NAM monitoring program meets the provisions in NEI 16-03-A. Therefore, the NRC staff finds that the ability of the NAM to perform its safety function, as assumed in the AOR, is maintained, thus demonstrating compliance with the subcriticality requirements of 10 CFR 50.68.

### 3.2 CONTINUED COMPLIANCE WITH THE REQUIREMENTS OF 10 CFR 50.36.

[PLANT] TS Section [5.5], as modified by adoption of TSTF-557, will continue to contain provisions relating to procedures, recordkeeping, review and audit, and reporting necessary to assure operation of the facility in a safe manner. The NRC staff determined that the TS, as modified, would continue to comply with the requirements of 10 CFR 50.36. Therefore, the staff determined that the proposed change is acceptable.

*{NOTE: Technical reviewers and/or project manager are to assess the adequacy of any variations from the approved traveler and document their acceptability. Choose the applicable paragraphs based on information provided in the LAR.}*

### 3.3 VARIATIONS FROM TSTF-557 AND EXCEPTIONS TO NEI 16-03-A

The licensee described variations from TSTF-557 and exceptions to NEI 16-03-A in Section 2.2 of the LAR. The licensee provided justification for the proposed variations and exceptions. Describe why TSTF-557 is still applicable.

The NRC staff reviewed the justifications and concluded the exceptions and variations from TSTF-557 are [not] acceptable because....

The NRC staff reviewed the justifications for the proposed exceptions to NEI 16-03-A and concluded the exceptions are [not] acceptable because...

The [PLANT] TS utilize different [numbering][and][titles] than the STS on which TSTF-557 was based. The NRC staff agrees these differences are editorial and do not affect the applicability of TSTF-557 to the proposed LAR.

The [PLANT] design is different than the model plant assumed in the STSs, but the TSTF-557 justification and the NRC staff's SE are still applicable. The NRC staff reviewed the design differences and concluded differences are [not] acceptable because ....

[The [PLANT] [TS/Operating license] contain SFP storage rack neutron absorber material monitoring requirements approved by the NRC in [Reference]. [Describe, at a high level, the existing requirements and location.] [Licensee] proposes to replace the existing requirements with the TS Administrative Controls program in TSTF-557. This is acceptable as the NRC has reviewed and approved NEI 16-03-A and determined it is an adequate monitoring program for SFP storage rack neutron absorber materials.]]

### 3.[4] TECHNICAL EVALUATION SUMMARY

The regulations at 10 CFR 50.36 require that TS will include items in specified categories, including administrative controls. Based on its review of the proposed TS changes and previous approval of NEI 16-03, the NRC staff has determined that the licensee's NAM monitoring program meets the applicable provisions in NEI 16-03-A. Therefore, the NRC staff finds that the

ability of the NAM to perform its safety function, as assumed in the AOR, is maintained, thus demonstrating compliance with the subcriticality requirements of 10 CFR 50.68. The NRC staff finds that the proposed new monitoring program, as adopted by **[LICENSEE]**, allows **[PLANT]** TS to continue to meet the requirements of 10 CFR 50.36(c)(5). Therefore, the staff determined that the proposed change is acceptable.

#### **4.0     STATE CONSULTATION**

*{This section is to be prepared by the plant project manager.}*

In accordance with the Commission's regulations, the **[Name of State]** State official was notified of the proposed issuance of the amendment(s) on **[date]**. The State official had **[no]** comments. **[If comments were provided, they should be addressed here.]**

#### **5.0     ENVIRONMENTAL CONSIDERATION**

*{This section is to be prepared by the plant project manager in accordance with current procedures.}*

#### **6.0     CONCLUSION**

*{This section is to be prepared by the plant project manager.}*

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendment(s) will not be inimical to the common defense and security or to the health and safety of the public.

#### **7.0     REFERENCES**

*{Optional section to be prepared by the PM and primary reviewers. If a document is publicly available, the ADAMS Accession No. should be listed.}*

*{NOTE: These are the principal contributors for the model SE of the traveler. Replace these names with those who prepared the plant-specific SE.}*

Principal Contributors: M. Hamm, NRR/DSS  
M. Yoder, NRR/DLMR

Date: