



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

December 18, 2017

OMB Control No. 3150-0231

To Those on the Attached List

**SUBJECT:** GENERIC LETTER 2016-01, "MONITORING OF NEUTRON-ABSORBING MATERIALS IN SPENT FUEL POOLS" – REQUEST FOR SUPPLEMENTAL INFORMATION (CAC NOS. MF9406, MF9407, MF9408, MF9412, MF9413, MF9418, MF9419, MF9421, MF9422, AND MF9451; EPID L-2016-LRC-0001)

On April 7, 2016, the U.S. Nuclear Regulatory Commission (NRC) issued Generic Letter (GL) 2016-01, "Monitoring of Neutron-Absorbing Materials in Spent Fuel Pools" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16097A169), to address the degradation of neutron-absorbing materials (NAM) in wet storage systems for reactor fuel at power and non-power reactors.

The GL 2016-01 requested that licensees provide information to allow the NRC staff to verify continued compliance through effective monitoring to identify and mitigate any degradation or deformation of NAM credited for criticality control in spent fuel pools.

To facilitate each licensee's response, GL 2016-01 established four categories (Category 1, Category 2, Category 3, and Category 4). Categories 1, 2, and 3 were established to identify situations where a detailed response to the GL 2016-01 would not be required. The categorization criteria were generally based on if a licensee does not credit NAM for criticality control, or if a licensee has, or will soon have, an approved monitoring program for NAM in the plant technical specifications or as a license condition. A full description of the categories can be found in Enclosure 1.

Enclosure 2 provides a list of GL 2016-01 responses by plant. To complete its review, the NRC staff requests that licensees provide the supplemental information requested in Enclosures 3 and 4. It is requested that you would provide a response by May 31, 2018.

In accordance with Title 10 of the *Code of Federal Regulations* Section 2.390, "Public inspections, exemptions, requests for withholding," a copy of this letter will be available electronically in the NRC Library, in the ADAMS Public Documents Collection from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

If you have any questions, please contact the Project Manager, Scott Wall, at 301-415-2855 or via e-mail at [Scott.Wall@nrc.gov](mailto:Scott.Wall@nrc.gov).

Sincerely,

A handwritten signature in black ink, appearing to read "Doug A. Broaddus". The signature is fluid and cursive, with a large initial "D" and "B".

Douglas A. Broaddus, Chief  
Special Projects and Process Branch  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket Nos. 50-250, 50-251, 50-335,  
50-387, 50-388, 50-389, 50-482,  
50-483, 50-390, and 50-391

Enclosures:

1. List of GL 2016-01 Categories
2. List of Plants, Incoming Letters, and CAC and EPID Numbers
3. Request for Supplemental Information - Generic Boral Question 1
4. Request for Supplemental Information - Generic Boral Question 2

cc: Listserv

LETTER TO THOSE ON THE ATTACHED LIST DATED DECEMBER 18, 2017

Callaway Plant, Unit 1  
Union Electric Company  
Docket No. 50-483  
License No. NPF-30

Mr. Fadi Diya  
Senior Vice President and Chief  
Nuclear Officer  
Union Electric Company  
Callaway Plant  
P.O. Box 620  
Fulton, MO 65251

St. Lucie Plant, Units 1 and 2  
Florida Power and Light Company  
Docket Nos. 50-335 and 50-389  
License Nos. DPR-67 and NPF-16

Mr. Mano Nazar  
President and Chief Nuclear Officer  
Nuclear Division  
Florida Power & Light Company  
Mail Stop: EX/JB  
700 Universe Blvd.  
Juno Beach, FL 33408

Susquehanna Steam Electric Station, Units 1  
and 2  
Susquehanna Nuclear, LLC  
Docket Nos. 50-387 and 50-388  
License Nos. NPF-14 and NPF-22

Mr. Brad Berryman  
Site Vice President  
Susquehanna Nuclear, LLC  
769 Salem Boulevard  
NUCSB3  
Berwick, PA 18603-0467

Turkey Point Nuclear Generating Units 3  
and 4  
Florida Power & Light Company  
Docket Nos. 50-250 and 50-251  
License Nos. DPR-31 and DPR-41

Mr. Mano Nazar  
President and Chief Nuclear Officer  
Nuclear Division  
Florida Power & Light Company  
Mail Stop: EX/JB  
700 Universe Blvd.  
Juno Beach, FL 33408

Watts Bar Nuclear Plant, Units 1 and 2  
Tennessee Valley Authority  
Docket Nos. 50-390 and 50-391  
License Nos. NPF-90 and NPF-96

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

Wolf Creek Generating Station, Unit 1  
Wolf Creek Nuclear Operating Corporation  
Docket No. 50-482  
License No. NPF-42

Mr. Adam C. Heflin  
President, Chief Executive Officer,  
and Chief Nuclear Officer  
Wolf Creek Nuclear Operating Corporation  
P.O. Box 411  
Burlington, KS 66839

## LIST OF GENERIC LETTER 2016-01 CATEGORIES

- Category 1: Power reactor addressees that do not credit neutron-absorbing materials other than soluble boron in the analysis of record (AOR). In some cases, no neutron-absorbing material is present in the spent fuel storage racks, and in other cases, credit for the neutron-absorbing material has been removed through a regulatory action (e.g., approved license amendment). Those addressees may submit a response letter confirming that no neutron-absorbing materials are currently credited to meet U.S. Nuclear Regulatory Commission (NRC) subcriticality requirements in the spent fuel pool (SFP).
- Category 2: Power reactor addressees that have an approved license amendment to remove credit for existing neutron-absorbing materials and that intend to complete full implementation no later than 24 months after the issuance of this generic letter. Licensees may request extensions to this implementation timeframe if there are extenuating circumstances. Those addressees may submit a response letter affirming that they will implement the approved license amendment request within the specified time. However, they must still provide information equivalent to Category 3 or Category 4 for any other neutron-absorbing material credited in the SFP criticality AOR after the license amendment has been fully implemented.
- Category 3: Power reactor addressees that have incorporated their neutron-absorbing material monitoring programs into their licensing basis through an NRC-approved technical specification (TS) change or license condition. Those addressees may submit a response letter referencing their approved TS change or license condition and affirming that no change has been made to their neutron-absorbing material monitoring program, as described in the referenced license amendment request. If a change has been made since NRC approval of the reference, the response letter should also describe any such changes. (Licensees with a monitoring program approved as part of a license amendment request or license renewal application that was **not** incorporated as a TS change or license condition are considered to belong in Category 4.)
- Category 4: All other power reactor addressees. The NRC seeks information in five areas depending upon the type of neutron absorber material used by the licensee in the SFP.

**LIST OF PLANTS, INCOMING LETTERS, COST ACTIVITY CODE NUMBERS,  
AND ENTERPRISE PROJECT IDENTIFIERS**

| <b>Plant</b>                                         | <b>Incoming Letter<br/>(ADAMS<br/>Accession No.)</b> | <b>CAC No(s).</b> | <b>EPID</b>     |
|------------------------------------------------------|------------------------------------------------------|-------------------|-----------------|
| Callaway Plant, Unit 1                               | ML16308A443                                          | MF9451            | L-2016-LRC-0001 |
| St. Lucie Plant, Units 1 and 2                       | ML16312A050                                          | MF9421<br>MF9422  | L-2016-LRC-0001 |
| Susquehanna Steam Electric<br>Station, Units 1 and 2 | ML16354B569                                          | MF9418<br>MF9419  | L-2016-LRC-0001 |
| Turkey Point Nuclear Generating<br>Units 3 and 4     | ML16312A050                                          | MF9412<br>MF9413  | L-2016-LRC-0001 |
| Watts Bar Nuclear Plant, Units 1 and<br>2            | ML16354B569                                          | MF9407<br>MF9408  | L-2016-LRC-0001 |
| Wolf Creek Generating Station,<br>Unit 1             | ML16313A080                                          | MF9406            | L-2016-LRC-0001 |

## REQUEST FOR SUPPLEMENTAL INFORMATION – GENERIC BORAL QUESTION 1

For the plants listed below, the following information is needed for the U.S. Nuclear Regulatory Commission (NRC) staff to complete its review.

- Callaway Plant, Unit 1
- St. Lucie Plant, Units 1 and 2
- Turkey Point Nuclear Generating, Units 3 and 4
- Watts Bar Nuclear Plant, Units 1 and 2
- Wolf Creek Generating Station, Unit 1

### **Generic Boral-RAI-1**

Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.68, "Criticality accident requirements," and 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 62, "Prevention of criticality in fuel storage and handling," provide the requirements for licensees with regard to maintaining subcriticality in the spent fuel pool (SFP). For licensees that utilize neutron absorbing materials (NAM) in the SFP, the boron-10 ( $^{10}\text{B}$ ) areal density (AD) of the NAM must be known so that the assumption for the  $^{10}\text{B}$  minimum AD in the SFP nuclear criticality safety (NCS) analysis of record (AOR) is supported. In order for the NRC staff to verify the requirements of 10 CFR 50.68 and GDC 62 are met, the staff needs to ensure that licensees are taking appropriate action to confirm that the  $^{10}\text{B}$  AD of their NAM can reasonably be expected to remain above the minimum assumed in the SFP NCS AOR. In addition, the condition of the NAM must be considered in the SFP NCS AOR. In order to verify whether or not the requirements of 10 CFR 50.68 and GDC 62 will continue to be met, the staff needs to verify that the potential reactivity changes due to degradation or physical changes to the NAM are accounted for in the SFP NCS AOR. This includes any changes that would affect the neutron spectrum for the SFP in addition to any loss of neutron attenuation capability.

Industry operating experience, as described in Information Notice (IN) 2009-26, "Degradation of Neutron Absorbing Materials in the Spent Fuel Pool," dated October 28, 2009 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML092440545), and IN 1983-29, "Fuel Binding Caused by Fuel Rack Deformation," dated May 6, 1983 (ADAMS Accession No. ML14043A291), has demonstrated that certain manufacturing processes and plant conditions (dose, chemistry, length of time installed, and installation configuration) have resulted in material deformation as a result of blisters or bulging associated with Boral.

**[Plant name above]** does not have a site-specific monitoring program, and consequently, is relying on general industry operating experience as a surrogate for the condition of the Boral installed in the SFP.

- a. Please describe whether industry operating experience bounds the condition of the Boral at **[plant name above]**, thereby ensuring that any degradation or deformation that may affect the Boral at **[plant name above]** is identified.
- b. In addition, discuss the criticality impact due to relevant material deformation identified in general industry operating experience, and whether it can be accommodated by the NCS AOR for **[plant name above]** without exceeding NRC subcriticality requirements.

## REQUEST FOR SUPPLEMENTAL INFORMATION – GENERIC BORAL QUESTION 2

For the plant listed below, the following information is needed for the U.S. Nuclear Regulatory Commission (NRC) staff to complete its review.

- Susquehanna Steam Electric Station, Units 1 and 2 (SSES)

### Generic Boral-RAI-2

Title 10 of the *Code of Federal Regulations* (10 CFR) Section 50.68, "Criticality accident requirements," and 10 CFR Part 50, Appendix A, General Design Criterion (GDC) 62, "Prevention of criticality in fuel storage and handling," provide the requirements for licensees with regards to maintaining subcriticality in the spent fuel pool (SFP).

For licensees that utilize neutron absorbing materials (NAM) in the SFP, the properties of the NAM must be known so that the assumptions in the SFP nuclear criticality safety (NCS) analysis of record (AOR) are supported. In order to verify whether or not the requirements of 10 CFR 50.68 and GDC 62 will be met, the staff needs to verify that the potential reactivity changes due to degradation or physical changes to the NAM are accounted for in the SFP NCS AOR. This includes any changes that would affect the neutron spectrum for the SFP in addition to any loss of neutron attenuation capability.

Industry operating experience, as described in Information Notice 2009-26, "Degradation of Neutron-Absorbing Materials in the Spent Fuel Pool," dated October 28, 2009 (ADAMS Accession No. ML092440545), has demonstrated that certain manufacturing processes and plant conditions (dose, chemistry, length of time installed, and installation configuration) have resulted in material deformation as a result of blisters associated with Boral.

SSES has indicated that similar operating experience was identified as a result of its site-specific monitoring program. Please discuss the criticality impact due to the material deformation identified at SSES, and whether it can be accommodated by the NCS AOR at SSES without exceeding NRC subcriticality requirements.

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RidsNrrLAIBetts Resource

RidsNrrLAJBurkhardt Resource

RidsNrrLALRonewicz Resource

RidsNrrLAPBlechman Resource

RidsNrrPMCallaway Resource

RidsNrrPMStLucie Resource

RidsNrrPMSusquehanna Resource

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RidsRgn4MailCenter Resource

SKrepel, NRR

SWall, NRR

TMensah, NRR

**ADAMS Accession No.: ML17304B153**

**\*via email**

|        |                     |                    |                  |               |
|--------|---------------------|--------------------|------------------|---------------|
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| NAME   | AGarmoe             | RLukes             | DBroadus         |               |
| DATE   | 9/22/17             | 9/21/17            | 12/18/17         |               |

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