AREVA

Response to Request for Additional Information – BAW-10179P Revision 9

BAW-10179
Revision 9 Q1NP
Revision 0

Topical Report

March 2017

AREVA Inc.

Nature of Changes

Item	Section(s) or Page(s)	Description and Justification
1	All	Initial Issue

Contents

Nomenclature

Acronym	Definition
ASME	American Society of Mechanical Engineers
LOCA	Loss of Coolant Accident
NRC	United States Nuclear Regulatory Commission
OBE	Operating Basis Earthquake
RAI	Request for Additional Information
SSE	Safe Shutdown Earthquake

Introduction

The United States Nuclear Regulatory Commission (NRC) provided a request for additional information (RAI) regarding the topical report BAW-10179P Revision 9 (Reference 1) in Reference 2. A total of 5 questions were received from the NRC.

The following sections document the response to the five questions.

Section 8.0 provides markup pages for the topical report. The markup includes changes to incorporate NRC concurrence (Reference 5) that the currently approved methodology for analysis of stainless steel replacement rods applies to analysis of fresh fuel assemblies fabricated with stainless steel replacement rods.

1.0 RAI 1

Question:

Step 2 of the process delineated on page 1-5 of Topical Report (TR) BAW-10179, Revision 9, "Safety Criteria and Methodology for Acceptable Cycle Reload Analyses" (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16106A285) appears not to reflect the practice used most recently between the U.S. Nuclear Regulatory Commission (NRC) and AREVA Inc. (AREVA) in two noteworthy respects. First, the NRC has provided separate safety evaluations (SEs) approving BAW-10179 revisions and new methodology TRs. In addition, Revision 7 incorporated all material that had previously been included in appendices. Revision 9, presently under review, also incorporates appendices into the main body of the TR. Please consider revised wording for Step 2 to incorporate this recent practice.

Response:

Revised wording for Step 2 in Section 1.0, page 1-5, is provided in the markup section (Section 8.0) of this document. This revised wording will be incorporated into the approved version of BAW-10179P Revision 9 when it is issued.

2.0 RAI 2

Question:

In Section 4.2.5.1 of the TR, additional clarification regarding AREVA's approach to satisfying the American National Standards Institute/American Nuclear Society (ANSI/ANS) 57.5, "Light Water Reactors Fuel Assembly Mechanical Design and Evaluation," event classification scheme is warranted.

First, the NRC staff observed that the methods in the TR take a specific approach to the ANSI/ANS-57.5 event classification scheme that is inconsistent with the final, revised criterion in Section 4.2.5.1. Specifically, page 2-2 of the TR states, "AREVA assures compliance with the NRC regulations by requiring the limiting Condition III transient to meet the acceptance criteria for Condition II events." However, the criteria for stress levels [ ] in Section 4.2.5.1 of the TR.

Furthermore, the discussion in Section 4.7, "Fuel Rod Mechanical Fracturing," of the SE approving BAW-10227P-A, "Evaluation of Advanced Cladding and Structural Material (M5®) in PWR Reactor Fuel" (ADAMS Accession No. ML15162B043), appears to relate more to design criteria applicable specifically to Condition IV events, discussing the process used to evaluate postulated accidents. Note that, in Figure 2-1 of the TR, the majority of overlap between the NRC's accident classification occurs with the ANSI/ANS-57.5 Condition IV event. Also, the unrevised criterion, in discussing solely a faulted condition, appears more consistent with the discussion in Section 4.7 of the BAW-10227 SE, which discusses accident conditions. This is reflected also in the Revision 8 and earlier wording in Section 4.1.2.1 of the TR, which stated that the limits for fuel rods applied to Condition IV only.

Finally, the discussion in Section 4.7 of the SE approving BAW-10227P-A refers to Revision 3 of BAW-10179 for acceptance criteria, stating that these are unchanged and previously approved. This reference appears circular, and absent further explanation, does not properly justify the proposed revision to the acceptance criterion.

Therefore, for several reasons, this proposed revision appears inadequately justified and inconsistent with referenced, supporting documentation. Please provide additional information to explain, and consider proposing a revision that rectifies the noted inconsistencies. For example, explain whether fuel rod performance under Condition III event conditions is evaluated by applying limiting conditions associated with the less frequent, but more severe, Condition IV events.

Response:

The text in BAW-10179P, Revision 9 summarizing criteria for fuel rod stresses under faulted conditions is being modified to provide consistency with previous approvals of AREVA Topical Reports.

- For M5® material, the Revised Safety Evaluation (SE) for Topical Report BAW-10227PA, (TAC No. M99903, S.A. Richards to T.A. Coleman, dated February 4, 2000) pages xxiv and xxv under fuel rod mechanical fracturing (Section 4.7) states "The design limit proposed by FCF to prevent fracturing is that the stresses due to postulated accidents in combination with the normal steady-state fuel rod stresses should not exceed the yield strength of the components in their fuel assemblies."

- For Zircaloy-4 material, the Technical Evaluation Report for the original submittal of BAW-10179P (Appendix A of NRC Safety Evaluation, TAC No. M80189, A.C. Thadani (NRC) to J.D. McCarthy (B&W Owners Group), dated March 16, 1993), under fuel rod mechanical fracturing (Section 4.7) also states that the stresses due to postulated accidents in combination with the normal steady-state fuel rod stresses should not exceed the yield strength.

However, the analysis criteria shown in BAW-10179P Rev. 07, Section 4.2.5.1 stated fuel rod stresses under faulted conditions are evaluated using the methods outlined in [

] For consistency

and for conservatism, the limit for faulted fuel rod stresses is limited to the [

] in the updated section 4.2.5.1. For further consistency with previous versions of BAW-10179, the text will be modified to reflect only the change in allowable faulted condition stresses.

A revision to Section 4.2.5.1 (page 4-20) in BAW-10179P Revision 9 is provided in the markup section (Section 8.0) of this document. This revised wording will be incorporated into the approved version of BAW-10179P Revision 9 when it is issued.

3.0 RAI 3

Question:

Regarding the allowable stress intensity, for which a distinction between Zircaloy and M5® and stainless steel and Inconel is proposed to be made, the allowable membrane stress intensity for stainless and Inconel does not indicate that the limit at room temperature must be the least of 2/3 S_y (minimum yield stress) or 1/3 S_u (ultimate stress). Given the difference in wording, and the use of the phrase "whichever is less at room temperature" in the Zircaloy and M5 limits, please provide a justification for applying different, and apparently less restrictive, criteria to stainless and Inconel.

Response:

The text in BAW-10179P Revision 9 summarizing criteria for component stresses is being modified to provide consistency with previous approvals of AREVA Topical Reports. No changes in the NRC approved criteria are being proposed.

Sm is defined directly above the referenced criteria in the question as "the lowest of the following:". However, for consistency and clarification, AREVA will change the wording for stainless steels and Inconel as follows:

"For stainless steel and Inconel components: the least of 2/3 Sy or 1/3 Su at room temperature, the least of 1/3 Su or 0.9 Sy at operating temperature."

A revision to Section 4.1.2.1 (page 4-3) in BAW-10179P Revision 9 is provided in the markup section (Section 8.0) of this document. This revised wording will be incorporated into the approved version of BAW-10179P Revision 9 when it is issued.

4.0 RAI 4

Question:

In Section 4.1.9.2 of the TR, proposed changes appear to remove specificity from, and relax requirements in, the reload licensing document. The prior revisions state that the combined seismic and loss-of-coolant accident (LOCA) loads must be within [ ] whereas the proposed revision states that that maximum load must be within the limit defined in BAW-10133P-A, "Mark C Fuel Assembly LOCA – Seismic Analysis," and supplements. In addition, this paragraph (on page 4-9 of the TR) changes a stated requirement so that it now appears as a logical conclusion. Previously, the TR stated, " [ ] " The statement is now changed to conclude, " [ ] " Please clarify which limits, specifically, are referenced in BAW-10133 and supplements, and explain whether the requirement related to [ ] If so, provide a basis for doing so.

Response:

BAW-10179 references BAW-10133PA as the appropriate methodology for evaluating the fuel assembly response to external loads such as seismic and LOCA for fuel in B&W plants. The intent of BAW-10179 is to reference the BAW-10133PA methodology without alteration. The wording in Section 4.1.9.2 that has previously accompanied the reference to BAW-10133PA is intended to be descriptive and was not intended to overwrite any aspect of the methodology in BAW-10133PA.

Specifically, BAW-10179PA Revision 8 Section 4.1.9.2 contains the following wording:

[

] The use of the words "elastic" and "no permanent grid deformation" in these statements may be misinterpreted relative to what is defined in BAW-10133PA.

Section 3 of the main body of BAW-10133PA provides the definition of grid acceptance criteria for OBE, SSE, and SSE+LOCA conditions. Under OBE conditions, BAW-10133PA defines grid strength as the yield load limit determined from testing. For accident conditions (SSE and LOCA), BAW-10133PA defines "a permanent deformation limit" which has been shown to maintain a control rod path and a coolable core geometry.

The use of the terminology "no permanent deformation" and "elastic" stem from NUREG/CR-1018 which defines "no deformation" as deformation within the manufacturing tolerance of the grid. While the use of these terms is historically consistent, AREVA views that the continued use of these terms can lead to confusion. Thus, the language for BAW-10179P Revision 9 was revised to be consistent with the NRC approved grid strength definitions.

5.0 RAI 5

Question:

In Section 4.2.9.2 of the TR, the revised text will shift the reload safety analysis method from one in which the [

] Please provide a basis for this change.

Response:

[

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6.0 ADDITIONAL INFORMATION

AREVA Inc. (AREVA) requested NRC concurrence (Reference 4) that topical report BAW-2149A is applicable to cores containing fresh fuel assemblies fabricated with stainless steel rods as well as reconstituted fuel assemblies. The NRC provided a letter (Reference 5) indicating concurrence that topical report BAW-2149A is applicable to fresh fuel assemblies. In Reference 5 the NRC requested that AREVA provide a revision to BAW-10179PA Revision 8 reflecting the NRC concurrence.

In Section 8.0 of this document markup pages for BAW-10179P Revision 9 (Reference 1) are provided reflecting the NRC concurrence. Markup pages are provided for: page ii, page xiv, page 1-3, page 4-16, page 5-28, page 6-30, and page 11-7.

7.0 REFERENCES

1. BAW-10179P Revision 9, "Safety Criteria and Methodology for Acceptable Cycle Reload Analyses," April 2016.

2. Letter from Jonathan G. Rowley (NRC) to Gary Peters (AREVA Inc.) "Request for Additional Information Regarding AREVA Inc. Topical Report BAW-10179P, Revision 9, 'Safety Criteria and Methodology for Acceptable Cycle Reload Analyses', (CAC No. MF8167)," February 23, 2017.

3. Letter from J. McCarthy (B&W Owners Group) to R. C. Jones (NRC), "B&W Owner's Group, Core Performance Committee: Response to Request for Information for Topical Report BAW-10179P, 'Safety Criteria and Methodology for Acceptable Reload Analyses'," August 25, 1992.

4. Letter to Document Control Desk (NRC) from Gary Peters (AREVA Inc.), "Request for NRC Concurrence Regarding the Applicability of Topical Report BAW-2149A 'Evaluation of Replacement Rods in BWFC Fuel Assemblies' to Cores Containing Fresh Fuel Assemblies With Stainless Steel Rods," NRC:16:018, July 7, 2016.

5. Letter from Kevin Hsueh (NRC) to Gary Peters (AREVA Inc.), "Request for NRC Concurrence Regarding the Applicability of Topical Report BWR-2419A, 'Evaluation of Replacement Rods in BWFC Fuel Assemblies', to Cores Containing Fresh Fuel Assemblies with Stainless Steel Rods," February 1, 2017.

8.0 TOPICAL REPORT MARKUP PAGES

Markup pages to BAW-10179P Revision 9 are provided reflecting the changes discussed in this document. The markups are for:

Question 1 – page 1-5

Question 2 – page 4-20

Question 3 – page 4-3

Additional Information - page ii, page xiv, page 1-3, page 4-16, page 5-28, page 6-30, and page 11-7

Item	Section(s) or Page(s)	Description and Justification
9	Section 4.2.9.1 Fuel Temperature (Centerline Fuel Melt) Limit Analysis Criteria	Updated to correct and clarify criteria for application to predicted maximum fuel temperature of UO_2 and gadolinia fuel types.
10	Section 4.2.9.2 Fuel Temperature (Centerline Fuel Melt) Limit Analysis Method	Updated to correct and clarify differences in approved fuel rod average burnup limits for TACO3, GDTACO, and COPERNIC applications, and to clarify application of burnup-dependent fuel melt limits in analyses.
11	Section 6.1 Core Thermal-Hydraulics Design Criteria	Revised for consistency with approved response to RAI Question #6 of BAW-10179P Revision 0
12	Section 9.0 Loss-of-Coolant Accident Evaluation	Revised to address analysis methodology changes for the fuel initialization codes and adjustments to the fuel pin input and steady-state initialization process for the LOCA transient codes to account for burnup-dependent fuel thermal conductivity degradation (TCD) as described in the supplement to BAW-10192P-A Revision 0.
13	Section 11.0 References	a) Updated Reference 75 to refer to BAW-10164P-A Revision 6, consistent with BAW-10179P-A Revision 8. b) Added Reference 83 to BAW-10179P. c) Added Reference 84 to BAW-10179P
14	Throughout	Updated report format to conform to AREVA's current topical report style guide; updated Company name; and corrected misspelled words and symbols.
15	Sections 4.1.13, 5.4, 6.8	Added Reference 84 to text

(Section 9.0).

- Update the methodology for fuel assembly stress analysis criteria (Section 4.1.2.1), fuel assembly grid strength definition (Section 4.1.9.2), and fuel rod stress analysis criteria (Section 4.2.5.1) to be consistent with the response to RAI Question 13 issued during the review of BAW-10179P Revision 0.
- Update the fuel assembly hold down analysis criteria (Section 4.1.3.1) for consistency with the approved response to RAI Question #6 of BAW-10179P Revision 0.
- Update the transient cladding strain analysis description (Section 4.2.6.2) to correct and clarify differences in transient cladding strain definitions used in approved TACO3, GDTACO, and COPERNIC applications.
- Update the fuel rod pressure analysis description (Section 4.2.8.2) to correct and clarify differences in approved fuel rod average burnup limits for TACO3, GDTACO, and COPERNIC applications.
- Update the fuel temperature (centerline fuel melt) limit analysis criteria (Section 4.2.9.1) and analysis method description (Section 4.2.9.2) to correct and clarify application to UO_2 and gadolinia fuel types, and to correct and clarify differences in approved fuel rod average burnup limits for TACO3, GDTACO, and COPERNIC applications.
- Update the core thermal-hydraulics design criteria (Section 6.1) for consistency with the approved response to RAI Question #6 of BAW-10179P Revision 0.
- Correct misspelled words and symbols, as appropriate, throughout the report.
- Update the description for analysis of fuel assemblies containing stainless steel rods per Reference 84.

- Update the methodology for fuel assembly stress analysis criteria (Section 4.1.2.1), fuel assembly grid strength definition (Section 4.1.9.2), and fuel rod stress analysis criteria (Section 4.2.5.1) to be consistent with the response to RAI Question 13 issued during the review of BAW-10179P Revision 0.
- Update the fuel assembly hold down analysis criteria (Section 4.1.3.1) for consistency with the approved response to RAI Question #6 of BAW-10179P Revision 0.
- Update the transient cladding strain analysis description (Section 4.2.6.2) to correct and clarify differences in transient cladding strain definitions used in approved TACO3, GDTACO, and COPERNIC applications.
- Update the fuel rod pressure analysis description (Section 4.2.8.2) to correct and clarify differences in approved fuel rod average burnup limits for TACO3, GDTACO, and COPERNIC applications.
- Update the fuel temperature (centerline fuel melt) limit analysis criteria (Section 4.2.9.1) and analysis method description (Section 4.2.9.2) to correct and clarify application to UO_2 and gadolinia fuel types, and to correct and clarify differences in approved fuel rod average burnup limits for TACO3, GDTACO, and COPERNIC applications.
- Update the core thermal-hydraulics design criteria (Section 6.1) for consistency with the approved response to RAI Question #6 of BAW-10179P Revision 0.
- Correct misspelled words and symbols, as appropriate, throughout the report.
- Update the description for analysis of fuel assemblies containing stainless steel rods per Reference 84.

AREVA has developed criteria for determining when a design change must be submitted to the NRC for review and approval. The criteria are:

1. The change meets any of the eight criteria specified in paragraph (c)(2) of 10CFR50.59.
2. A change to the plant technical specifications is required.
3. The applicability of NRC-approved design/analysis evaluation methods is affected.

This report describes the entire spectrum of methodologies that are applicable to the reload fuel currently supplied by AREVA for the B&W 177-FA plants. An overview of the design considerations addressed in these methods is provided in Section 2.0. A brief description of the Mark-B fuel design is provided in Section 3.0. The mechanical design methods are described in Section 4.0. The nuclear design methods are described in Section 5.0, which also includes the radiological evaluation parameters. The thermal-hydraulics methods are described in Section 6.0. Section 7.0 includes the methods for determining reactor protection system (RPS) trip setpoints. Section 8.0 describes the non-LOCA accident evaluation methods, and Section 9.0 presents the LOCA accident evaluation methods. Figure 1-1 provides an overview on how the different analytical disciplines interact to complete a reload evaluation. Section 10.0 provides generic guidelines on the use of limited scope high burnup lead test assemblies.

The methodology described in this report is constantly evolving to include improvements and enhancements to analytical techniques. This will result in a succession of updates to BAW-10179P-A. To facilitate these updates AREVA will implement the following procedure:

1. For revisions to NRC-approved topical reports already referenced in BAW-10179P-A, such revisions will be incorporated by referencing the latest approved revision in the COLR.

2. For new methodology topical reports, AREVA will prepare a corresponding revision to BAW-10179P-A. ~~and include it with the submittal.~~ The revision to BAW-10179P-A will include ~~an appendix that provides~~ a brief summary of the methodology topical and its range of applicability. When the NRC completes its review of the ~~methodology topical, a single SER will be issued which approves both the methodology topical and the revision to BAW-10179P-A. Accepted versions of both topical reports will then be prepared and the latest revision of BAW-10179P-A will be available for referencing in the plant COLR. Any NRC conditions or limitations on the methodology will be included in the accepted version of BAW-10179P-A.~~ revision to BAW-10179 an approved version will be issued.

where

Pm = general primary membrane stress intensity,

Pl = local primary membrane stress intensity,

Pb = primary bending stress intensity,

Q = secondary stress,

Sm = allowable membrane stress intensity which is equal to the lowest of following:

For Zircaloy and M5® components:

Sm = 2/3 Sy or 1/3 Su, whichever is less at room temperature, or

Sm = 2/3 Sy or 1/3 Su at operating temperature.

(For conservative purposes, the unirradiated material properties are used to define the stress limits. Room temperature values are the minimum specified.)

For stainless steel and Inconel components:

Sm = the least of 2/3 Sy or 1/3 Su at room temperature,

Sm = the least of 1/3 Su or 0.9 Sy at operating temperature.

(For conservative purposes, the stainless steel unirradiated material properties are used to define the stress limits. Room temperature values are the minimum specified.)

Sy = minimum yield stress,

Su = ultimate stress.

4.1.13 Stainless Steel Replacement Rod Methodology

The in-field repair of irradiated fuel assemblies with leaking rods involves the replacement of defective fuel rods with heat producing and/or non-heat producing rods. BAW-2149-A (reference 23) provides justification for the use of replacement rods without imposing unnecessary power peaking restrictions on the repaired fuel assemblies. This report addresses the nuclear, thermal-hydraulic, and mechanical aspects of the design that are affected by repair operations. The use of replacement rods for AREVA supplied fuel assemblies is determined to be acceptable by the NRC per the SER included in BAW-2149-A.

The NRC concurred in Reference 84 that the topical report BAW-2149A is applicable to the use of stainless steel rods in fresh (i.e. unirradiated) fuel assemblies.

The stainless steel replacement rods weigh slightly less than Zircaloy-clad fuel rods, but the effect on fuel assembly weight of up to 10 replacement rods is negligible. Therefore, the use of stainless steel replacement rods has an insignificant effect on fuel assembly hydraulic lift.

Stainless steel replacement rods are designed and analyzed to ensure that there is no adverse impact on fuel assembly performance. The rods are designed to ensure that adequate performance with respect to differential thermal expansion, irradiation growth, seismic-LOCA response, grid relaxation, and fretting due to vibration will be maintained. The replacement rods can be installed in any fuel rod location in the fuel assembly.

4.2 *Fuel Rod Design*

The design of the fuel rod must ensure that the integrity of the cladding is maintained under all Condition I and II events. The integrity of the cladding is maintained by requiring that the fuel rod design meet the constraints discussed below.

Analysis criteria and methods are applicable to both Zircaloy-4 and M5® cladding types as noted. The M5® cladding is approved for use in AREVA fuel in reference 18.

[ ]

4.2.5 Stress

4.2.5.1 Analysis Criteria

[ ]

The NRC concurred in Reference 84 that the topical report BAW-2149A is applicable to the use of stainless steel rods in fresh (i.e. unirradiated) fuel assemblies.

5.4.1 Transient Neutronic Parameters

The safety analysis evaluations performed for the accidents in the SAR assumed values for the neutronic parameters related to the reactivity coefficients and worths, control system reactivity, kinetics, and transient power peaking. When the accidents were analyzed, parametric cases were evaluated to determine the combination of conditions and the key neutronic parameters that would produce the most severe transients. The resulting limiting conditions, and bounding values of the key neutronic parameters, are the ones that must be analyzed for each reload cycle. The methodology used for the reload analysis must consequently ensure that the calculations of the key neutronic parameters are performed with the appropriate limiting conditions. The results are then reviewed using the methods described in Section 8.0 to ensure that the values are bounded by those used in the safety analyses. If the reload calculations contain the proper conditions, and the results are within the bounds of the reference safety analysis, then the SAR results will continue to be applicable to each respective reload cycle.

5.4.1.1 Acceptance Criteria

1. The key neutronic parameters shall be determined using the appropriate limiting conditions. The key neutronic parameters are then reviewed using the methods described in Section 8.0 to ensure that the values are bounded by those used in the safety analysis.

2. Design changes shall be reviewed with respect to the accident scenarios in the safety analyses to ensure that the change does not affect the scenario for defining the appropriate limiting conditions for calculating the neutronic parameters.

1. The LCO on RCS pressure is established such that during normal plant operation the steady-state core exit pressure will be maintained at a level greater than or equal to the value assumed for DNBR analysis of Condition II transients from full power.

2. The LCO on RCS hot leg temperature is established such that during normal plant operation the steady-state RCS hot leg temperature will not be greater than that corresponding to the initial conditions assumed for DNBR analysis of Condition II transients from full power.

3. The LCO on RCS flow rate is established such that during normal plant operation the steady-state RCS flow rate will not be less than the initial condition value assumed for DNBR analysis of Condition II transients initiated from full power.

Transient core thermal-hydraulic analyses are performed with either a single-pass LYNXT model or the closed-channel RADAR code initialized to a LYNXT initial condition DNBR prediction. For full-power transients, the initial conditions modeled are as described in Table 6-2. Transient inputs to the core thermal-hydraulic calculation typically include RCS flow and pressure, core inlet temperature, and neutron power.

6.8 *Stainless Steel Replacement Rod Methodology*

BAW-2149-A (reference 23) defines a methodology for the use of stainless steel replacement rods in AREVA fuel designs. Reference 23 addresses the nuclear, thermal-hydraulic, and mechanical aspects of the fuel design that are affected by the use of stainless steel replacement rods.

The NRC concurred in Reference 84 that the topical report BAW-2149A is applicable to the use of stainless steel rods in fresh (i.e. unirradiated) fuel assemblies.

NRC approval has been obtained for the methodology for the use of as many as ten stainless steel replacement rods within a single fuel assembly. From a DNB perspective, the impact of the stainless steel rods on the peaking of adjacent heat-producing fuel rods is to be explicitly examined on a cycle-by-cycle basis to ensure continued compliance to the $F_{\Delta H}^{N}$ design limit.

79. Letter from H. N. Berkow (NRC) to J. F. Mallay (Framatome ANP), Subject: Evaluation of Framatome ANP Preliminary Safety Concern (PSC) 2-00 Relating to Core Flood Line Break and Operator Action Time, April 10, 2003.

80. Letter from R. A. Gramm (NRC) to J. S. Holm (Framatome ANP), Subject: Request for Amendment of Safety Evaluation for "Report of Preliminary Safety Concern (PSC) 2-00 Related to Core Flood Line Break with 2-Minute Operator Action Time, January 10, 2005.

81. BAW-10242-A, "ZPPT Modifications for B&W Designed Reactors," November 2003.

82. BAW-10243P-A, "Statistical Fuel Assembly Hold Down Methodology," September 2005.

83. BAW-10192P-A, Revision 0, Supplement 1P, Revision 0, "BWNT LOCA – BWNT Loss-of-Coolant Accident Evaluation Model for Once-Through Steam Generator Plants," November 2015.

84. Letter from Kevin Hsueh (NRC) to Gary Peters (AREVA Inc.), "Request for U.S. Nuclear Regulatory Commission Concurrence Regarding the Applicability of Topical Report BWR-2149A, 'Evaluation of Replacement Rods in BWFC Fuel Assemblies' to Cores Containing Fresh Fuel Assemblies with Stainless Steel Rods," February 1, 2017.