

NRR-PMDAPem Resource

From: Klos, John
Sent: Wednesday, December 21, 2016 9:18 AM
To: Garcia, Richard M.
Cc: Klos, John; Hovanec, Christopher
Subject: Columbia MUR LAR EVIB RAIs NON - proprietary version

Dear Mr. Garcia,

By letter dated June 28, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16183A365), as supplemented by letter dated August 18, 2016 (ADAMS Accession No. ML16231A511), Energy Northwest submitted a license amendment for Columbia Generating Station (CGS). The proposed amendment would revise the operating license and technical specification to implement an increase in rated thermal power from the current licensed thermal power of 3486 megawatts thermal (MWt) to a measurement uncertainty recapture (MUR) thermal power of 3544 MWt.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the submittal and determined that the following requests for additional information (RAIs) are needed to complete its technical review and make a regulatory finding regarding this license amendment.

Please note that the proprietary information in this document is identified by underlined text enclosed within double square brackets ([[]]). [[This sentence is an example.]]

Please see the formal RAIs below. A clarification call was held on December 14, 2016 to ensure your staff understood the RAIs. In the clarification call, Energy Northwest agreed to submit the response to the RAIs by Wednesday February 15, 2017.

REQUEST FOR ADDITIONAL INFORMATION
LICENSE AMENDMENT REQUEST TO REVISE OPERATING LICENSE AND TECHNICAL
SPECIFICATIONS FOR MEASUREMENT UNCERTAINTY RECAPTURE POWER UPRATE
(COLUMBIA GENERATING STATION
ENERGY NORTHWEST
DOCKET NO. 50-397)

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Regulatory Basis for EVIB RAIs:

10 CFR 50.60, "Acceptance criteria for fracture prevention measures for lightwater nuclear power reactors for normal operation," requires fracture toughness and material surveillance program requirements for the reactor coolant pressure boundary as set forth in 10 CFR 50, Appendix G, "Fracture Toughness Requirements," and 10 CFR 50, Appendix H, "Reactor Vessel Material Surveillance Program Requirements."

EVIB RAI 3.2-1 Upper Shelf Energy (USE)

Background:

Enclosure 9, "General Electric-Hitachi Nuclear Energy Report, NEDO-33853, Revision 0, Safety Analysis Report for Columbia Generating Station Thermal Power Optimization," to the license amendment request

(LAR) dated June 28, 2016, contains the USE information and associated input values of the reactor pressure vessel (RPV) components for the MUR. This information is provided in MUR LAR Table 3-1, "CGS Upper Shelf Energy 60-Year License (51.56 EFPY [effective full-power year])", Table 3-2, "RPV Beltline Plate USE Equivalent Margin Analysis (51.56 EFPY)," and Table 3-3, "RPV Beltline Plate [Weld] USE Equivalent Margin Analysis (51.56 EFPY)."

The information in the MUR LAR, Enclosure 9, tables include:

The USE projections and Equivalent Margin Analysis (EMA) performed at 51.56 EFPY for a 60-year license,

The CGS License Renewal Application (LRA) was evaluated and approved by NUREG-2123, "Safety Evaluation Report Related to the License Renewal of Columbia Generating Station" dated May 2012 (ADAMS Accession No. ML12139A300). The NRC staff's approval of the USE information and associated input values for the current 60-year operating license is based partially on its review of LRA Table 4.2-2, "USE Projections for 54 effective full-power year (EFPY)," Table 4.2-3, "RPV Beltline Plate USE Equivalent Margin Analysis for 54 EFPY," and Table 4.2-4, "RPV Beltline Weld USE Equivalent Margin Analysis for 54 EFPY," as revised by the applicable RAI responses.

The information in the licensee's LRA includes:

License Renewal (LR) Commitment No. 70, stating that CGS will perform a 54 EFPY equivalent margin analysis for the embrittlement (upper shelf energy) of the reactor vessel N12 (instrumentation) nozzle forgings in letter dated December 14, 2011 (ADAMS Accession No. ML11354A097),

Sections 2.C(34) and 2.C(35) of Renewed Facility Operating License No. NPF 21 (ADAMS Accession No. ML053130319), specifies that the LR commitments and information in the final safety analysis report (FSAR) Supplement are henceforth part of the FSAR. Appendix A of NUREG-2123 lists the LR commitments. The CGS FSAR Supplement is located in Appendix A of the LRA, dated January 2010, as revised by the applicable RAIs.

FSAR Supplement Section A.1.3.1.2, as revised by letter dated December 14, 2011 (ADAMS Accession No. ML11354A097), provides a summary description for the USE evaluation described in LRA Section 4.2.2. The time-limited aging analysis (TLAA) evaluation performed in LRA Section 4.2.2 and described in FSAR Supplement Section A.1.3.1.2 is for 54 EFPY and a 60-year operating license. The staff's evaluation of the TLAA is documented in Section 4.2.2 of NUREG-2123.

Issue:

There are inconsistencies between the information provided in the MUR LAR and that provided in the LRA.

Request:

- (1) Describe the impact of the MUR on LR Commitment No. 70. If the commitment is no longer going to use 54 EFPY, justify the use of the new value. If the commitment is no longer, applicable state the basis for its elimination.

EVIB RAI 3.2-2 Adjusted Reference Temperature (ART)

Background:

In the LAR dated June 28, 2016, Enclosure 7, "Safety Analysis Report for Columbia Generating Station Thermal Power Optimization," Revision 0, Proprietary Version contains the ART information and associated input values for the RPV components for the MUR. This information is provided in MUR LAR Table 3-4, "CGS Adjusted Reference Temperatures 60-Year License (51.56 EFPY)."

The information in the MUR LAR, Enclosure 7, Table 3-4 includes:

ART projections performed at 51.56 EFPY for a 60-year license,

A percent nickel of [[]] for the N12 nozzle, Heat lot 2199721/1.

The staff's approval of the ART information and associated input values for the current 60-year operating license is based partially on its review of LRA Table 4.2-5, "ART Values for 54 EFPY;" as revised by the applicable RAI responses.

The information in the licensee's LRA includes:

A percent nickel of 1.00 for the N12 nozzle, Heat/Lot 219972 is provided in LRA Table 4.2-5, as revised by letter dated January 28, 2011.

FSAR Supplement Section A.1.3.1.3, as revised by letter dated January 28, 2011, provides a summary description for the ART evaluation described in LRA Section 4.2.3. The TLAA evaluation performed in LRA Section 4.2.3 and described in FSAR Supplement Section A.1.3.1.3 is for 54 EFPY and a 60-year operating license. The staff's evaluation of the TLAA is documented in Section 4.2.3 of NUREG-2123.

Issue:

There are inconsistencies between the information provided in the MUR LAR and that provided in the LRA.

Request:

(1) Reconcile the inconsistencies between the ART information submitted in the MUR LAR and the ART information submitted in the LRA, with emphasis given to the:

a) Percent nickel for the N12 nozzles, 2199721/1.

Justify the values provided in the MUR LAR if they have not been previously evaluated by the NRC staff. Update the MUR LRA Tables and FSAR, as appropriate.

EVIB RAI 3.2-3 Circumferential and Axial Weld Parameters

Background:

Enclosure 9, "General Electric-Hitachi Nuclear Energy Report, NEDO-33853, Revision 0, Safety Analysis Report for Columbia Generating Station Thermal Power Optimization," of the LAR contains information related to the effects of irradiation on the RPV circumferential weld properties and axial weld properties. This information is provided in MUR LAR Table 3-6, "CGS 51.56 EFPY Effects of Irradiation on RPV Circumferential Weld Properties."

The information in the LAR, Enclosure 9, table includes:

A mean RT_{NDT} value of -5.6 degrees Fahrenheit based on limiting circumferential weld wire of 3P4955 in Table 3.6.

The staff's approval of the limiting circumferential and axial weld information for the current 60-year operating license is based partially on its review of LRA Table 4.2-6, "Circumferential Weld Parameters at 54 EFPY" as revised by the applicable RAI responses.

The information in the licensee's LRA includes a "mean ART" value of -6.0 degrees Fahrenheit based on a limiting circumferential weld wire of 5P6756 in Table 4.2.6.

FSAR Supplement Section A.1.3.1.6 provides a summary description for the RPV axial weld failure probability evaluation described in LRA Section 4.2.6. The TLAA evaluation performed in LRA Section 4.2.6 and described in FSAR Supplement Section A.1.3.1.6 is for 54 EFPY and a 60-year operating license. The staff's evaluation of the TLAA is documented in Section 4.2.6 of NUREG-2123.

Issue:

A justification has not been provided for establishing that circumferential weld wire 3P4955 is more limiting than 5P6756, with regard to the probability of failure. The limiting weld wire (3P4955) identified in LAR Table 3-6 appears to be less conservative than weld wire 5P6756. Weld wire 5P6756 has a larger ART value in LAR Table 3-4.

Request:

- (1) Justify the use of weld wire 3P4955, with a lower ART value than 5P6756, to evaluate the probability of failure of the circumferential welds. Substantiate that the evaluation for weld wire 3P4955 is bounding.

EVIB RAI 3.2-4 Pressure-Temperature (PT) Limits

Background:

Enclosure 9, "General Electric-Hitachi Nuclear Energy Report, NEDO-33853, Revision 0, Safety Analysis Report for Columbia Generating Station Thermal Power Optimization" of the LAR contains data concerning the current licensed PT curves and the ART values for the RPV beltline materials.

Specifically, LAR Enclosure 9, Section 3.2.1, "Fracture Toughness," states:

"The [Thermal Power Optimization] TPO end of cycle 27 cumulative energy is less than the [Current Licensed Thermal Power] CLTP cumulative energy, therefore the CLTP curves remain bounding for TPO, limited to the currently approved fluence/ EFPY (33.10 at OLTP). The current Adjusted Reference Temperature (ART) values for the beltline plates and welds from the PT curve report increase slightly for TPO conditions. However they remain bounded for TPO when compared to the TLAA evaluation (considers an EFPY and resulting higher fluence level)".

The information in the current licensing basis and LRA include:

License Amendment No. 193, dated May 12, 2005 (ADAMS Accession No. ML051160277). The staff confirmed in Section 4.2.4 of NUREG-2123 that the PT limit curves are valid for the current licensed

core thermal power level of 3486 MWt and 33.1 EFPY of facility operation, and bounding, for operation of the reactor coolant system through the end of the 40-year operating period.

The ART TLAA for 54 EFPY in LRA Section 4.2.3, as evaluated in NUREG-2123.

FSAR Supplement Section A.1.3.1.4 provides a summary description for the PT limits evaluation described in LRA Section 4.2.4, as revised by letter dated November 23, 2010 (ADAMS Accession No. ML103280370). The TLAA evaluation performed in LRA Section 4.2.4 and described in FSAR Supplement Section A.1.3.1.4 is for 3486 MWt and 33.1 EFPY. The staff's evaluation of the TLAA is documented in Section 4.2.4 of NUREG-2123.

Issue:

The LAR states that the beltline plate and weld ART values from the PT curve report have increased but data has not been provided to conclude that the CLTP (3486 MWt) PT curves remain bounding for the MUR increased thermal power level of 3544 MWt. Additionally, it is not clear to staff that the how the ART TLAA evaluation for 3486 MWt and 54 EFPY support the continued use of PT curves for 3486 MWt and 33.1 EFPY at the proposed MUR thermal power level of 3544 MWt.

Request:

1. Provide the ART values for the limiting beltline plate, limiting beltline weld, limiting beltline nozzle, N6 nozzle, and plate surrounding the N12 nozzle at the thermal power optimization (TPO) conditions. Justify that the CLTP PT curves for 3486 MWt remain bounding for the MUR increased thermal power level and ART values related to 3544Mwt.
2. Clarify how the ART TLAA evaluations support that the current PT limit curves remain bounding for the increased thermal power level and increased ART values.

John Klos

DORL Callaway, Columbia Project Manager

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