NRR-DMPSPEm Resource

From: Hon, Andrew
Sent: Monday, December 04, 2017 6:39 PM
To: Grzeck, Lee (Lee.Grzeck@duke-energy.com); Murray, William R. (Bill) (Bill.Murray@duke-energy.com) (Bill.Murray@duke-energy.com)
Subject: Brunswick Unit 1 and Unit 2 Request for Additional Information related the Exigent Amendment Request for One-Time Extension of EDG Completions Time - PRA (EPID: L-2017- LLA- 0398)

In a letter dated November 28, 2017, (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML17332B024), Duke Energy Progress (the licensee) requested the subject amendment to Operating Licenses OLs DPR-71 and DPR-62.

The U.S. Nuclear Regulatory Commission (NRC) staff is reviewing your submittal and has determined that additional information is required to complete the review. The proposed questions related to the probabilistic risk assessment (PRA) review were discussed by telephone with your staff on December 4, 2017. Your staff confirmed that the request for additional information (RAI) shown below:

1. was understood,
2. does not contain sensitive information, and
3. you will provide a response by December 6, 2017, after receiving this request.

The NRC staff considers that timely responses to RAIs help ensure sufficient time is available for staff review and contribute toward the NRC's goal of efficient and effective use of staff resources. Please note that if you do not respond to this request by the agreed-upon date or provide an acceptable alternate date, we may deny your application for amendment under the provisions of Title 10 of the *Code of Federal Regulations*, Section 2.108. If circumstances result in the need to revise the agreed upon response date, please contact me.

Andy Hon, *PE*
Project Manager (Brunswick Nuclear Plant 1 & 2, Sequoyah Nuclear Plant 1 & 2)
Plant Licensing Branch II-2
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation
301-415-8480
OWFN O8E06
Mail Stop O8B1A
andrew.hon@nrc.gov

Request for Additional Information – PRA Licensing Branch B

PRA-RAI 1 - Fire PRA methods

Regulatory Position 6.3.1 of Regulatory Guide (RG) 1.174, Revision 2, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis" states that a summary of the risk assessment methods used should be submitted to provide confidence that the risk assessment is adequate to support the proposed change.

The licensee stated that the change to credit for incipient detection originally in FAQ 08-0046, "Incipient Fire. Detection Systems" (Agencywide Document Access and Management System (ADAMS) Accession No. ML093220426) and now in NUREG-2180, "Determining the Effectiveness, Limitations, and Operator Response for Very Early Warning Fire Detection Systems in Nuclear Facilities (DELORES-VEWFIRE) Final Report" (ADAMS Accession No. ML16343A058), developed for Bin 15 (electrical enclosures) fires, has no effect on the

Brunswick Steam Electric Plant (BSEP) fire probabilistic risk assessment (FPRA). However, the licensee did credit in-cabinet incipient detection for Bin 4 (main control board) fires and referenced the NRC staff discussion in Section 3.2.6 of the safety evaluation for its National Fire Protection Association (NFPA) 805 license amendment (ADAMS Accession No. ML14310A808). Upon further review of the FPRA analysis in license amendment request (LAR) Attachment 8, Section 1.0 and Section 3.4 of the NFPA 805 license amendment safety evaluation, which addresses the credit taken for incipient detection for Bin 4, it appears that the conclusions in the NFPA 805 license amendment regarding the acceptability of the application of credit for in-cabinet incipient detection for Bin 4 fires remain valid.

Please confirm that any credit for incipient detection in the model that supports this LAR remains unchanged from the credits used in the NFPA-805 submittal and that the credit is limited exclusively to Bin 4 fires.

PRA-RAI 2 - High Winds

Consistent with Regulatory Position 2.3.2 of RG 1.177, Revision 1, the scope of the analysis should include all hazard groups (e.g., high winds in this case) unless it can be shown that the contribution from specific hazard groups does not affect the decision. The licensee indicated in LAR Section 3.2.2.3 that the potential increase in risk from high winds "is negligible due to the plant's design and expected weather during the exposure period".

The licensee has a PRA model for high winds, which it used to quantify delta Core Damage Frequency (CDF), Incremental Conditional Core Damage Probability (ICCDP), delta Large Early Release Frequency (LERF), and Incremental Conditional Large Early Release Probability (ICLERP) in this one-time Technical Specification change LAR. LAR Section 1.0 states that the High Winds PRA model was peer reviewed in 2012. LAR Section 1.0 also states that the licensee employed the Facts and Observations (F&O) independent assessment process in July 2017 to close-out all open F&Os. The LAR does not specify the peer review process used to perform this peer-review. Nuclear Energy Institute (NEI) 12-13, "External Hazards PRA Peer Review Process Guidelines" (ADAMS Accession No. ML122400044) provides guidance for use in conducting and documenting External Hazards PRA peer review. While NEI 12-13 follows a process similar to NRC endorsed peer review processes, NEI 12-13 has not been endorsed by the NRC in RG 1.200, Revision 2, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities" (ADAMS Accession No. ML090410014). Therefore, the NRC staff has not reviewed the acceptability of the licensee's High Winds PRA to support this application or the licensee's closure of the associated F&Os from the 2012 peer review via the recent closure effort in support of LAR.

Please provide the qualitative arguments (e.g. that the diesel generators and SSCs required for safe shutdown are protected from high winds and associated missiles), the bounding analyses, or the compensatory measures (e.g. measures are in place to protect diesels and SSCs required for safe shutdown from tornado missiles) to demonstrate that the risk contribution from high winds would not affect the LAR conclusions.

PRA-RAI 3 – Facts and Observations (F&O) Closure

On May 3, 2017, the NRC staff transmitted its review results of Appendix X to NEI 05-04, NEI 07-12 and NEI 12-13, *"Close-out of Facts and Observations"* (F&Os) (ADAMS Accession No. ML17079A427). Based on the NRC staff review, the NRC approved Appendix X for use by licensee's to close F&Os that were generated during a peer review process. While the NRC has not officially endorsed the guidance in Appendix X, it plans to consider it as part of the upcoming revision to Regulatory Guide 1.200 (estimated notice for public comments 2018 and publication 2019).

LAR Attachment 8, Section 2.2 states that the licensee employed the F&O closure process for the F&Os associated with Internal Events, Internal Flood, High Winds, and Fire models. The NRC staff has identified three primary issues based on recent observations of industry's implementation of the closure process: 1) closure with respect to Capability Category (CC)-II for the supporting requirement (SR); 2) written justification of basis for why closure is determined to be maintenance or upgrade; and 3) independence of reviewers.

Please summarize how the August 2017 F&O closure process fulfilled each of guidelines below.

a) The documented licensee justification and associated F&O closure team assessment about whether each F&O finding resolution constitutes a PRA upgrade or maintenance update, as defined in the ASME/ANS RA-Sa-2009 PRA Standard, endorsed by RG 1.200, Revision 2

b) The review team's confirmation that the underlying supporting requirements of each closed F&O are now met at CC II, or met if there is no separate CC II

c) The review team's summary rationale for determining the adequacy for closure of each finding in relation to the affected portions of the associated SR for every SR and weakness identified in the F&O

d) The description of remote reviews participation (if used) confirming web and teleconference connection between any remote reviewers and the on-site review team and host utility to support full participation of the remote reviewers

e) The confirmation that every weakness in each F&O has been addressed, that a closed finding has been achieved, and that the documentation has been formally incorporated in the PRA Model of Record before closure in the final F&O closure report

PRA-RAI 4 - F&O 1-36

Regulatory Position 2.3.3.4 of RG 1.177 states that truncation levels should be used appropriately to ensure that significant underestimation, caused by truncation of cutsets, does not occur. Additional precautions relevant to the cutset manipulation method of analysis are needed to avoid truncation errors in calculating risk measures.

In its disposition to F&O 1-36 related to supporting requirement (SR) QU-B2, QU-F2, QU-B3, FQ-B1 and FQ-F1, the licensee stated that the truncation approach scenarios "now run at an effective truncation of 1E-09/yr [year] for CDF and 1E-10/yr for LERF." Based on the licensee's response to NRC RAI 4.c dated August 15, 2016 (ADAMS Accession No. ML16238A152) in support of relocating specific surveillance frequencies to a licensee controlled program (ADAMS Accession No. ML17096A129), the use of the truncation value 1E-09/yr would lead to changes of CDF at each unit (23% at Unit 1 and 16% at Unit 2). Using appropriate truncation levels for the fire CDF and LERF (i.e., truncation to a level such that neither the fire CDF nor LERF changes by more than 5%) would imply an effective truncation of 1E-11/yr based on the table provided in response to RAI 4.c, with CDF being the governing metric since it changes more than LERF for successive truncation levels.

Describe the truncation levels used in analyses that support this application and explain the impact of the effective truncation levels on the ICCDP and ICLERP. Alternatively, demonstrate that the selected truncation level does not have an impact on this application.

PRA-RAI 5 - F&O 4-1

Regulatory Position 6.3 of RG 1.174 states that the licensee's resolution of the findings of the peer review should be submitted since the response could indicate whether the PRA was modified following the peer review or could justify why no change was necessary to support decision making for the licensing basis change under consideration.

In its disposition to F&O 4-1 related to SR FSS-A1, the licensee implied that the use of the breaching factor of 0.23 from FAQ 14-0009, "Treatment of Well Sealed MCC Electrical Panels Greater than 440V" (ADAMS Accession Number ML15118A810), minimally impacts Motor Control Center fires for the EDG 4 risk assessment. It is not clear whether the licensee has implemented the breaching factor specified in FAQ 14-0009 or performed a sensitivity on the breaching factor in the development of this LAR.

Please clarify whether the breaching factor of 0.23 was used in the FPRA model used to support this application. Alternatively, describe the impact of using the factors in BSEP FPRA in the quantification of the ICCDP and ICLERP using sensitivity analysis.

PRA-RAI 6 - Scope of Internal Flooding Focused-Scope Peer Review

Regulatory Position 1 of RG 1.200 addresses the technical acceptability of a PRA. Regulatory Position 2 further states that one acceptable approach to demonstrate conformance with regulatory position 1 is to use a national consensus PRA standard or standards that address the scope of the PRA used in the decisionmaking and that a peer review is needed to determine if the intent of the requirements in the standard is met.

The licensee submitted in Section 4.2 of Attachment 7 to the LAR, the history of peer reviews for the internal events and internal flooding PRA. In June 2010, a full-scope peer review was performed on the internal events and internal flood PRAs in accordance with the ASME/ANS PRA Standard RA-Sa-2009 PRA Standard, as clarified by RG 1.200, Revision 2. In December 2016, the internal flood PRA was subjected to a focused-scope peer review for 28 SRs.

Describe the scope of the focused-scope peer review performed in December 2016 (e.g. the high level requirements within the scope, and modeling change that triggered upgrade and subsequent peer review).

PRA-RAI 7 – PRA Model of Record

Regulatory Position 2.3.4 of RG 1.174 states that the PRA results used to support an application are derived from a PRA model that represents the as-built and as-operated plant to the extent needed to support the application. Consistent with this regulatory position, the PRA should realistically reflect the risk associated with the plant at the time of the application.

Attachment 8, Section 1.0, states that, “since completion of previous NRC reviews, Duke Energy has issued a routine Model of Record (MOR) update of the Brunswick Units 1 and 2 full power internal events (FPIE) PRA model. The model designation is updated from MOR13 to MOR16 per the PRA Standard and Duke Energy procedures.” Changes between MOR13 and MOR16 are also provided. LAR Attachment 8, Section 2.1, further states that, “the working model for the BSEP represents the most up-to-date versions of the constituent PRA internal and external hazard models. The September 2017 working model is used for this analysis of the EDG #4. The latest version of the internal events model is Model of Record 16 issued in June 2017. The other PRA models are built on internal event MORs with enhancements to resolve findings from the 2017 F&O close-out review.”

a) Confirm that the BSEP PRA model of record (MOR16) was used to support the quantitative risk assessments provided in the LAR.

b) Describe any changes between the June 2017 MOR16 update and the September 2017 working model. Discuss the impact of those changes on results of risk assessments provided in LAR using sensitivity analyses.

c) Changes between MOR13 and MOR16 are also provided in Attachment 8, Section 1.0 of the LAR. One change involves the, “added additional post-initiator action for the Supplemental Diesel for EDG failures not related to planned maintenance”. Provide a description of this change and how this change impacts the EDG 4 risk assessment.

PRA-RAI 8 – Test and Maintenance

Regulatory Position 2.3.4 of RG 1.177 states that the change in average CDF should be estimated using the mean outage times (or an appropriate surrogate) for the current and proposed CTs when calculating the risk impacts. This regulatory position further states that if a licensee chooses to use the zero maintenance state as the base case, an explanation stating so should be part of the submittal. Assumptions concerning changes in maintenance practices under the extended CT regime should be discussed and their impact on the results of the analysis characterized.

LAR Attachment 7, Section 3.0, states that, “the supplemental diesel generator is assumed to be protected during the extended completion time and that is reflected in the model by setting the test and maintenance of

the supplemental diesel generator to 0.0." As part of the Tier 2 evaluation, Section 5.0 describes high risk equipment test and maintenance configurations and compensatory measures that are in place to mitigate those configurations.

Confirm that nominal test and maintenance, except for the supplemental diesel generator, is used for all PRA model calculations. Alternatively, specify if zero test and maintenance is assumed or that zero test and maintenance is used only for a subset of high risk equipment for which supplemental controls are in place. If zero test and maintenance is used only for a subset of equipment configurations, specify those configurations.

PRA-RAI 9 – Supplemental Equipment and Compensatory Actions

Regulatory Position 2.3.6 of RG 1.177 states that certain compensatory measures that balance the calculated risk increase caused by the changes may be considered. This consideration should be made in light of the acceptance guidelines given in RG 1.174.

LAR Attachment 7, Section 3.0, provides information regarding changes made to the baseline model to form the application-specific model configuration. This section included discussion of the credits or treatment of the supplemental and temporary diesels. Later, LAR Attachment 8, Section 3.3, and Attachment 7, Section 4.2.4, provide specific discussion of quantitative credit for the seismic hazards and high winds analyses, respectively. However, credit assumptions for supplemental equipment and compensatory measures are not discussed in detail for all the models (e.g. internal events, fire). For example, for the FPRA, it is not clear whether any quantitative credit is taken for the installation of a continuous fire watch that will be established for the Unit 1 and Unit 2 Cable Spread Rooms and for the Balance of Plant busses in the Unit 1 and Unit 2 Turbine Building 20 foot elevations. It is also not clear, if or how diverse and flexible coping strategies (FLEX) equipment is quantitatively credited in all models.

a. Please summarize the supplemental equipment and compensatory actions, including FLEX strategies, that have been quantitatively credited for each of the PRA models used to support this application.

b. If quantitative credit is taken for any of the models, please describe the associated PRA assumptions such as data and human reliability analyses in applying that credit. For example, confirm that PRA failure probabilities are representative of equipment current performance.

Hearing Identifier: NRR_DMPS
Email Number: 26

Mail Envelope Properties (BL0PR0901MB238696A96304DBD997ADC71E993C0)

Subject: Brunswick Unit 1 and Unit 2 Request for Additional Information related the Exigent Amendment Request for One-Time Extension of EDG Completions Time - PRA (EPID: L- 2017-LLA- 0398)
Sent Date: 12/4/2017 6:38:31 PM
Received Date: 12/4/2017 6:38:32 PM
From: Hon, Andrew

Created By: Andrew.Hon@nrc.gov

Recipients:
"Grzeck, Lee (Lee.Grzeck@duke-energy.com)" <Lee.Grzeck@duke-energy.com>
Tracking Status: None
"Murray, William R. (Bill) (Bill.Murray@duke-energy.com) (Bill.Murray@duke-energy.com)" <Bill.Murray@duke-energy.com>
Tracking Status: None

Post Office: BL0PR0901MB2386.namprd09.prod.outlook.com

Files	**Size**	**Date & Time**
MESSAGE	17513	12/4/2017 6:38:32 PM

Options
Priority: Standard
Return Notification: No
Reply Requested: No
Sensitivity: Normal
Expiration Date:
Recipients Received: