From: Valentin, Milton
To: Huhmann, Bruce E
Cc: Philpott, Stephen; Hiller, Justin W
Subject: Request for supporting information for the Callaway SPRA audit review - DRAFT Supplement
Date: Wednesday, June 10, 2020 1:36:00 PM

Bruce,

The purpose of this email is to solicit that the following supporting information associated with the draft supplement to the Callaway 50.54(f) seismic probabilistic risk assessment (SPRA) submittal (ADAMS Accession No. ML19225D321) and previously submitted supplement (ADAMS Accession No. ML19325D662) is made available in the ePortal (IMS Certrec) folder for audit:

Question CY2020-1 - Topic #14 - Peer Review of the Seismic PRA, Accounting for NEI 12-13 (SPID Section 6.7)

Section 5.7.6 of the draft submittal supplement dated May 28, 2020 (available in ePortal folder) states that two SPRA F&Os (i.e., F&O 25-12 and 25-19) remain open because the associated PRA standard Supporting Requirements (SRs) (i.e., SR SPR-B2 and SPR-E6) are met at less than (Capability Category (CC) II. The F&Os concern the nonresolution of two internal events F&Os (F&Os 13-1 and 22-3) that remain open after an F&O closure review on the updated internal events PRA. The draft supplement states that the internals events PRA updates were incorporated into the SPRA subsequent to the original SPRA submittal dated August 12, 2019. The recent F&O closure review on internal events PRA F&Os is not described in the submittal supplement. The submittal supplement states that the internal events PRA F&O 22-3 against SR SC-B4 regards exclusion of HVAC modeling for digital I&C equipment and equipment protection devices. The supplement did not identify the digital I&C equipment and equipment protection devices that would be affected by the loss of room cooling or explain the significance of these components to seismic core damage frequency (CDF) and large early release frequency (LERF). The supplement asserts that the random failure probability of HVAC is about and 2E-06 (when hardware and recovery failures are considered). The supplement also states that failure of components affected by room heat-up would not occur until about 19 hours after the loss of room cooling when room temperatures are elevated enough to be of concern. The seismic fragilities of the cited HVAC systems were not discussed. The supplement concludes that the impact to the seismic risk results of excluding the cited HVAC modeling "negligible." It is not clear to NRC staff that the impact of the excluded HVAC system modeling on the SPRA results is negligible. NRC staff notes that the random failure probabilities of the cited cooling systems may not be a valid comparison to the seismically induced failure probabilities of the room cooling systems. NRC notes that the supplement did not identify the components impacted by loss of room cooling or explain the significance of these failures to seismic CDF and LERF.

In light of these observations, address the following:

a) Provide a description of the F&O closure review that was performed on the internal events PRA. Include the time frame that the review occurred and the date that the review report was issued. Also, confirm that the review was performed using the independent assessment process outlined in Appendix X (ADAMS Accession No. ML17086A431) to NEI 05-04 (ADAMS Accession No. ML083430462) along with the conditions specified in NRC acceptance latter dated May 3, 2017 (ADAMS Accession No. ML17079A427) and that the scope of the review encompassed all outstanding internal events findings

b) Justify that the impact of not modeling HVAC for rooms with digital I&C and equipment protection devices that are vulnerable to room heat-up has a negligible impact on the seismic PRA results. Include identification of components impacted by loss of room cooling and discussion of their significance to seismic CDF and LERF. Also, include discussion of the fragility of the cited HVAC systems and how the seismic capacity of HVAC system supports (or does not support) the assumption that the excluded modelling has a negligible impact on conclusions of the submittal. One way to provide quantitative justification is to provide the results of a sensitivity study

Question CY2020-2 - Topic #15 - Documentation of the Seismic PRA (SPID Section 6.8)

Section 5.7 of the draft submittal supplement dated May 28, 2020 presents the results of sensitivity studies using the updated SPRA model. In one case (i.e., Truncation Limits for Model Convergence), the results of the sensitivity study appear to be significantly different from the results reported in the original SPRA submittal dated August 12, 2019. In three cases (i.e., Non-Safety Component Fragility, Mission Time, and On-Site FLEX Equipment), results of the sensitivity studies are not significantly different from the results reported in the original SPRA submittal. In one other case (i.e., "Seismic HRA"), sensitivity study results are presented but the sensitivity study itself is not described in the report. Additionally, the results of four other sensitivity studies that were discussed in the original SPRA submittal are not discussed in draft submittal supplement dated May 28. Therefore, address the following:

a) Section 5.7.1 of the draft submittal supplement states concerning the sensitivity study on truncation levels that "*a significant impact to the total results from any one hazard interval does not occur*." However, NRC staff observes that the increase in LERF for the last decade decrease in truncation level is about 50% for three hazard intervals and 38% for one hazard interval. Likewise, NRC staff observes that the increase in CDF for the last decade decrease in truncation level is about 16-18% for three hazard intervals and 36% for one hazard interval. NRC staff recognizes the results of this table are based on incomplete ACUBE quantification. However, it is not clear how the current truncation levels for the updated SPRA are justified. Therefore:

   i. Justify that the uncertainty associated with the truncation levels used in the quantification of the updated SPRA does not impact the conclusions of the submittal. Include explanation or demonstration of how decreasing the truncation level would impact the F-V values of fragility group failures. Include justification that deceasing the truncation level an additional decade would have an insignificant impact on seismic CDF and LERF F-V values.

b) Table 5-11 of the draft submittal supplement presents the results of a sensitivity study titled "Seismic HRA," but there is no corresponding explanation in the

report that describes this sensitivity study. Given that the SPRA submittal does not provide F-V values for operator errors, it is important to the conclusions of this submittal to understand that the seismic PRA results are insensitive to human error probabilities. Therefore:

i. Describe the sensitivity study referred to Table 5-11 of the draft submittal.

ii. If the cited results in Table 5-11 of the draft submittal supplement cannot be used to support the conclusion that seismic PRA results are insensitive to human error probabilities, then justify why there are no plant improvements that could be implemented to reduce or eliminate operator errors that would decrease seismic CDF by 1E-05 per year or decrease seismic LERF by 1E-06 per year.

c) The draft submittal supplement does not present the results of four sensitivity studies that were discussed in the original SPRA submittal dated August 12, 2019 (i.e., Seismic HRA Bin Definition, Ex-Control Room Actions, Cumulative Capacity of SF-IE-S3, SF-RLOXX, and SF-NNO, and Plant Modifications). One of the sensitivity studies concerns PRA modeling credit for two plant modifications that have not yet been implemented, but the licensee has committed to the plant modifications in a license condition regardless of what the updated results would be. Another sensitivity study concerns how the HRA bins (which assign increased operator error probabilities based on the magnitude of the seismic event) are distributed across the seismic hazard bins. The sensitivity results presented in the original submittal showed that the seismic risk results were sensitive to the distribution of the HRA bins across the seismic hazard bins. Therefore:

i. Justify that the uncertainty associated with how the HRA bins are distributed across the seismic hazard intervals does not impact the conclusions of the submittal. One way to do this is to perform a sensitivity study showing that applying different but not unreasonable distributions of the HRA bins across the seismic intervals does not significantly change the seismic risk or the F-V values associated with the sensitivity case.

ii. Explain why the Ex-Control Room Actions and Cumulative Capacity of SF-IE-S3, SF-RLOXX, and SF-NNO sensitivity studies that were performed for the original seismic PRA submittal were not performed for the draft submittal supplement dated May 28, 2020. Include justification that the results would be similar or explain how they would be different. Alternatively, provide the results of updated sensitivity's studies for the cited parameters.

This information will help the staff to continue filling in the technical checklist used for our audit review (ADAMS Accession No. ML18173A017).

Please let me know when the information is available for audit or if we need to discuss this request.

Respectfully,

Milton Valentín, PM
Beyond Design Basis Management (Fukushima)
US NRC NRR/DORL/LPMB
Milton.Valentin@nrc.gov
301-415-2864