From: Mirzai, Mahvash
To: Guzman, Richard
Subject: [External_Sender] RE: Indian Point Inter-Unit SF Transfer Amendment - Clarification Call re: 10/2 RAI response
Date: Wednesday, October 25, 2017 2:01:45 PM

Rich,

Please find below the response to the clarification items that were discussed during our teleconference at 2:00 pm on October 19, 2017:

RAI-4 Follow-up Question

The licensee proposes the BPRA burnup and cooling time limits for the new fuel loads (Loads 7 thru 12) to be the same as the host assembly that the BPRA. This is based on an analysis that uses a BRPA equivalent burnup/exposure of 60 GWd/MTU and the cooling time of the host assembly. The staff notes that this approach appears reasonable to all but the inner region of Load 11. Per the analysis in the SAR/licensing report, any BPRAs with a cooling time less than
9 years would use the design basis BPRA source (which is actually 848.4 curies of Co-60). For 60 GWd/MTU at 6 years cooling (the cooling time of the inner assemblies in Load 11), the BPRA would be at 1101 Ci. The staff also notes that even with the lower burnup of the host assemblies at 45 GWd/MTU, the resulting BPRA curie level would be higher than the design basis amount. The staff would like to discuss the response to RAI-4 and the proposed TS (as it relates to Load 11 inner assemblies).

Response to RAI-4 Follow-up Question

We agree that the source terms for the maximum BPRA burnup allowed in the inner region of loading pattern 11 may be slightly higher than what was used in the analyses. Here is our perspective:

- For clarification, the value for the design basis of 848.4 Curies is only for the active region, the total design basis BPRA Cobalt-60 activity is 895 Ci (Total amount from Table 7.2.5).
- We agree with the value of 1101 Ci for 60 GWd/mtU and 6 years, which can be derived from Table 7.2.9.
- For 45 GWd/mtU and 6 years, as a check, we had initially just scaled the value of 1101 Ci by the burnup, resulting in 1101/60*45 = 826 Ci, which would have been below the value used in the analysis of 895 Ci.
- However, we now realize that due to the lower assumed enrichment for the 45 GWd/mtU fuel of 3.2 wt%, and the fact that BPRA curies does not scale in exact proportion to burnup, the cobalt content would be larger. A more detailed upper bound calculation indicates a BPRA with a burnup of 45 GWd/mtU, cooling time of 6 years, and paired with an assembly in the reactor core with an enrichment of 3.2 wt% having a Cobalt-60 activity of approximately 980 Ci, i.e. a value about 10% higher than the design basis value used.
- When considering this increase in the analyses for loading pattern 11, where the four inner spent fuel assemblies assume a source of 980 Ci rather than 895 Ci, dose rates increase on average by about 1.0%. The maximum dose rate increase is less than 4%. No conclusions are affected by this increase.

- **Discussed Action**
  - A qualitative discussion will be added to Chapter 7, in Sections 7.0.1 and 7.4.3.2, to explain that for the inner region of pattern 11, the BPRA activity for 45 GWd/mtU and 6 years may be slightly higher than that of the design basis value used, but that this has no significant effect on dose rates, and does not affect any conclusions.

- An Appendix will be added to the Shielding Calculation package HI-2084109 to document alternative BPRA activity and dose rate calculations related to loading pattern 11.

RAI-8 Follow-up Question

Table 7.4.10 shows some of the dose rates on the HI-TRAC at the surface and at 1 meter changing, but none of those at further distances. The staff notes that with some of the dose rates changing in Table 7.4.10, none of the estimates in Table 7.4.22 had to change for operations and personnel locations that are at these close distances from the HI-TRAC. The staff would like to get clarification on this item.

Response to RAI-8 Follow-up Question

The doses shown in Table 7.4.22 are dominated by the dose rates from the bare STC, and by dose rates on top of the STC or HI-TRAC. Only the activities characterized as "Measure the dose rate and prepare for transfer operation to the VCT" and "Movement of HI-TRAC to Unit 2 FSB" would be affected, and these activities contribute less than 0.5% to the primary dose and less than 1.5% to the secondary dose. The small increase in the HI-TRAC dose rates (changes shown on Table 7.4.10) would hence have a negligible effect.

Discussed Action:

- A brief discussion will be added to Chapter 7, Section 7.4.12, on this issue, but Table 7.4.22 will remain unchanged.

RAI-10 and RAI-11 Follow-up Question

The staff requests clarification on the description of how RCCAs are treated in the dose rate calculations for comparison against the measured dose rates for STC #s 1 and 3. The SAR and the shielding calculation package (Section I.5.5) state that the calculations neglect the RCCAs. Is it that the RCCAs presence and materials are credited in the model but not the source? Or are the RCCAs (including their materials and mass) completed neglected from the calculation models?

Response to RAI-10 and RAI-11 Follow-up Question

The RCCAs are completely neglected in the calculations and the calculational models for the comparisons against the measured dose rates, i.e. neither the materials nor the source terms are credited. With respect to the materials, this is consistent with the design basis calculations, where the materials of the RCCAs are also not credited.

No further action needed for this issue, i.e. no further changes to the Shielding Calculation package or Licensing Report.

Please let me know if you have any further questions.

Thanks,

Mahvash Mirzai

Nuclear Safety/License Specialist IV

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From: Guzman, Richard [mailto:Richard.Guzman@nrc.gov]
Sent: Thursday, October 19, 2017 8:43 PM
To: Mirzai, Mahvash
Subject: RE: RE: RE: Indian Point Inter-Unit SF Transfer Amendment - Clarification Call re: 10/2 RAI response

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From: Guzman, Richard [mailto:Richard.Guzman@nrc.gov]
Sent: Tuesday, October 17, 2017 9:32 AM
To: Mirzai, Mahvash
Cc: Walpole, Robert W
Subject: Indian Point Inter-Unit SF Transfer Amendment - Clarification Call re: 10/2 RAI response

Mahvash,

Good morning. I just left you a voice message. Below are clarification items the staff would like to discuss via teleconference. Please let me know if you can support a call this Thursday (preferable) or Friday. At this time, we are available 9:30-10:30a, 11-12p, or 2-2:30p on Thursday. If not, please provide some alternate proposed times and I will check availability w/the technical reviewer.

RAI-4
The licensee proposes the BPRA burnup and cooling time limits for the new fuel loads (Loads 7 thru 12) to be the same as the host assembly that the BPRA. This is based on an analysis that uses a BRPA equivalent burnup/exposure of 60 GWd/MTU and the cooling time of the host assembly. The staff notes that this approach appears reasonable to all but the inner region of Load 11. Per the analysis in the SAR/licensing report, any BPRAs with a cooling time less than 9 years would use the design basis BPRA source (which is actually 848.4 curies of Co-60). For 60 GWd/MTU at 6 yrs cooling (the cooling time of the inner assemblies in Load 11), the BPRA would be at 1101 Ci. The staff also notes that even with the lower burnup of the host assemblies at 45 GWd/MTU, the resulting BPRA curie level would be higher than the design basis amount. The staff would like to discuss the response to RAI-4 and the proposed TS (as it relates to Load 11 inner assemblies).

RAI-8
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operations and personnel locations that are at these close distances from the HI-TRAC. The staff would like to get clarification on this item.

RAI-10, RAI-11

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