Rich,

Good Morning. In response to your comment regarding the IPEC Response to the RAI-8 Follow-up Question, please find below a revised write-up with added information to bolster the response:

## RAI-8 Followup 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 Followup Question

With respect to Table 7.4.10 it is recognized that only some but not all dose rates changed as the results of the additional calculations performed for the HI-TRAC. The reason is that this table combines results from different cases, and not all of them have changed. Specifically, in the IPEC STC Shielding Calculation Package HI-2084109R13, the two bounding loading patterns for the HI-TRAC with STC under normal conditions are provided in Tables 22 and 23. Table 23 was changed in the most recent revision to

provide dose rates for loading pattern 8, which has replaced loading pattern 3 as the loading pattern with the highest neutron dose rates. Table 7.4.10 of the STC Licensing Report had been updated with the bounding dose rates from those Tables 22 and 23, but only in dose point locations where loading pattern 8 has the bounding total dose rates. In dose point locations where loading pattern 4 remains bounding, no changes to Table 7.4.10 were made.

With respect to Table 7.4.22, the doses shown in that table 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 Tables 7.4.10 and 7.4.22 will remain unchanged.

Please let me know if you have any further questions.

Thanks,

Mahvash Mirzai

Nuclear Safety/License Specialist IV

Indian Point Entergy Center

914-254-7714 (Work) 203-705-9676 (Cell) *mmirzai@entergy.com* 

From: Guzman, Richard [mailto:Richard.Guzman@nrc.gov]
Sent: Wednesday, October 25, 2017 3:37 PM
To: Mirzai, Mahvash
Subject: RE: Indian Point Inter-Unit SF Transfer Amendment - Clarification Call re: 10/2 RAI response

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Mahvash,

I appreciate your quick turn-around response.

The one comment I have is on the response to the RAI-8 Follow-up Question: the staff recalls during the October 19 teleconference that in regards to the discussion of Table 7.4.10 where some close dose rates changed while those further out did not, Entergy (or Holtec for the licensee) indicated that the shielding package tables showed this in greater detail to demonstrate bounding dose rates for the different loads. Please let me know if my understanding is not correct. As previously mentioned, the follow-up clarification items below will be documented as appropriate in the staff's safety evaluation.

Thanks, Rich ~~~~~~ Rich Guzman Sr. PM, Division of Operating Reactor Licensing Office of Nuclear Reactor Regulation U.S. Nuclear Regulatory Commission Office: O-9C07 | Phone: 301-415-1030

From: Mirzai, Mahvash [mailto:mmirzai@entergy.com] Sent: Wednesday, October 25, 2017 2:01 PM To: Guzman, Richard <<u>Richard.Guzman@nrc.gov</u>> Subject: [External\_Sender] RE: Indian Point Inter-Unit SE Transf

**Subject:** [External\_Sender] RE: Indian Point Inter-Unit SF Transfer Amendment - Clarification Call re: 10/2 RAI response

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 Followup 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.
- o 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 Followup 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 Followup 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 1.5.5) 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

Indian Point Entergy Center 914-254-7714 (Work) 203-705-9676 (Cell) *mmirzai@entergy.com*  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

# EXTERNAL SENDER. DO NOT click links, or open attachments, if sender is unknown, or the message seems suspicious in any way. DO NOT provide your user ID or password.

# 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.

# <u>RAI-4</u>

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).

# <u>RAI-8</u>

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.

# RAI-10, RAI-11

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?

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Rich Guzman Sr. PM, Division Operator Reactor Licensing Office of Nuclear Reactor Regulation U.S. Nuclear Regulatory Commission Office: O-9C7 | Phone: (301) 415-1030 <u>Richard.Guzman@nrc.gov</u>