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RS-13-228

September 18, 2013

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Quad Cities Nuclear Power Station, Units 1 and 2
Renewed Facility Operating License Nos. DPR-29 and DPR-30
NRC Docket Nos. 50-254 and 50-265

Subject: Supplemental Information Regarding License Amendment Request Associated with Use of Neutron Absorbing Inserts in Spent Fuel Pool Storage Racks

References:
1. Letter from D. M. Gullott (Exelon Generation Company, LLC) to U.S. NRC, "License Amendment Request – Use of Neutron Absorbing Inserts in Units 1 and 2 Spent Fuel Pool Storage Racks," dated July 16, 2013
2. Letter from B. Mozafari (U.S. NRC) to M. J. Pacilio (Exelon Generation Company, LLC), "Quad Cities Nculear Power Station, Units 1 and 2 – Acceptance Review – Unacceptable with Opportunity to Supplement (TAC Nos. MF2489 and MF2490)," dated August 29, 2013

In Reference 1, Exelon Generation Company, LLC (EGC) requested a license amendment to modify the Technical Specifications (TS) to include the use of neutron absorbing spent fuel pool rack inserts (i.e., NETCO-SNAP-IN® rack inserts) for the purpose of criticality control in the spent fuel pools (SFPs) at Quad Cities Nuclear Power Station (QCNPS), Units 1 and 2. This change was requested due to the degradation of the Boraflex neutron absorbing material, currently being used in the QCNPS SFPs.

In Reference 2, the NRC provided the results of the acceptance review of the license amendment request. The NRC concluded that supplemental information is needed to enable the NRC to make an independent assessment regarding the acceptability of the proposed amendment request in terms of regulatory requirements and the protection of public health and safety and the environment. The NRC requested that EGC supplement the application to address the information requested by September 19, 2013. In response to this request, EGC is providing the attached information.

EGC has reviewed the information supporting a finding of no significant hazards consideration, and the environmental consideration, that were previously provided to the NRC in Attachment 1

of Reference 1. The additional information provided in this submittal does not affect the bases for concluding that the proposed license amendment does not involve a significant hazards consideration. In addition, the additional information provided in this submittal does not affect the bases for concluding that neither an environmental impact statement nor an environmental assessment needs to be prepared in connection with the proposed amendment.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this letter, please contact Mr. Kenneth M. Nicely at (630) 657-2803.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 18th day of September 2013.

Respectfully,

Patrick R. Simpson
Manager – Licensing

Attachment: Response to Request for Supplemental Information

cc: NRC Regional Administrator, Region III
NRC Senior Resident Inspector – Quad Cities Nuclear Power Station
Illinois Emergency Management Agency – Division of Nuclear Safety

ATTACHMENT
Response to Request for Supplemental Information

NRC Request 1

The licensee has performed the nuclear criticality safety analysis using an insert ^{10}B areal density of 0.0116 gm/cm^2. As stated in the application, during the manufacturing process an uncertainty is applied to the areal density measurements to provide a 95 percent probability at a 95 percent confidence level (95/95) that those measurements meet or exceed 0.0116 gm/cm^2 areal density. While this provides 95/95 that a given batch of material meets or exceeds 0.0116 gm/cm^2 areal density, it also means that there is a 5 percent probability at a 95 percent confidence level that the measured ^{10}B areal density of a given batch is actually below 0.0116 gm/cm^2. Based on this approach one would expect 5 percent of the batches to have a ^{10}B areal density below 0.0116 gm/cm^2. Given the number of batches of material expected to complete the installation of inserts there would be potentially hundreds of inserts below the ^{10}B areal density used in nuclear criticality safety analysis. Since criticality is a local phenomenon, collocation of the inserts from a batch with a ^{10}B areal density below 0.0116 gm/cm^2 would result in a higher keff than estimated in the nuclear criticality safety analysis. In this regard the NRC staff requests the following additional information:

- How is the licensee controlling the installation of the inserts to ensure that none with a potential ^{10}B areal density less than 0.0116 gm/cm^2 are collocated?

- How are the proposed Technical Specifications and material surveillances applicable, given that the actual as-built areal density of numerous inserts is potentially below the minimum acceptable standard of 0.0116 gm/cm^2?

Response

The following information is provided to clarify the verification methods that assure the NETCO-SNAP-IN® rack inserts meet or exceed the minimum areal density utilized in the criticality safety analysis.

Chemical Assay Analysis

To confirm that material used to manufacture NETCO-SNAP-IN® rack inserts for Quad Cities Nuclear Power Station (QCNPS) is of consistent composition with the specified ALCAN W1100N.17B material, NETCO performs chemical analyses using a qualified laboratory supplier. The chemically analyzed samples are traceable, using a NETCO qualified process, to individual production heats and are therefore representative samples of W1100N.17B material. Traceability of the chemical assay to heat identification and insert serial number is documented and maintained throughout the insert manufacturing process. This is to provide initial fabrication assurance of material nuclear performance prior to rolling and forming of the NETCO-SNAP-IN® rack insert.

^{10}B Areal Density

NETCO performs 100 percent areal density sample size testing. Two inserts and one areal density coupon are cut from each rolled sheet of W1100N.17B material. Traceability of each insert and coupon to the appropriate sheet are maintained throughout the entire manufacturing

process. The testing and data collection for each coupon is performed in accordance with NETCO procedures using NETCO qualified areal density standards. The data collected during the controlled testing is processed by NETCO qualified engineers in accordance with NETCO procedures. The test report is issued to QCNPS upon delivery of the inserts.

The test coupons are subjected to neutron attenuation areal density testing at the NETCO Penn State Laboratory. For each coupon, a specific measured areal density value is obtained. For each coupon, the uncertainty is subtracted from the measured value to determine the minimum measured areal density value. The minimum 95 percent confidence level (2σ) is applied when determining the uncertainty for a given measurement. The uncertainty is calculated by the propagation of the independent uncertainties associated with the parameters used to calculate the areal density. Therefore, the areal density uncertainty is not statistically determined; however, uncertainty associated with count rate is subject to statistical evaluation.

The reported uncertainty for each coupon, takes into account the following.

- Uncertainty of the certified areal density standards
  - Material density
  - Material thickness
  - Weight percent of boron in B_4C
  - Weight percent of ^{10}B in boron
- Uncertainty of neutron count and counting time for the transmission testing of the standards and test sample
  - Transmission ratio
    - Number of counts
    - Count time

The above uncertainties are combined using standard propagation formulas. Areal density data provided to QCNPS documents that all inserts delivered to QCNPS exceed the minimum certified areal density used in the criticality safety analysis.

As further confirmation of batch homogeneity and process control, a statistical analysis was performed on all areal density measurements for a batch of inserts. This was performed and showed that the batch population exhibited in excess of 95/95 compliance with the minimum areal density requirement.

How is the licensee controlling the installation of the inserts to ensure that none with a potential ^{10}B areal density less than 0.0116 gm/cm^2 are collocated?

As described above, 100 percent of the coupons are tested for boron areal density. The minimum 95 percent confidence level (2σ) is applied when determining the uncertainty for any given measurement. The uncertainty is subtracted from the measured value to determine the minimum measured boron areal density. Inserts are rejected if their corresponding coupon has a minimum measured boron areal density value less than 0.0116 g/cm^2. Given 100 percent sampling and the 95 percent confidence level for the uncertainty, Exelon Generation Company, LLC (EGC) is assured, based on areal density documentation for every insert that has been installed, that none of the inserts have an areal density below the minimum certified value

assumed in the nuclear criticality safety analysis at the 2σ level. Therefore, restrictions on rack cell placement during installation are not required.

How are the proposed Technical Specifications and material surveillances applicable, given that the actual as-built areal density of numerous inserts is potentially below the minimum acceptable standard of 0.0116 gm/cm^2?

The proposed Technical Specifications and material surveillances are applicable, since 100 percent testing of the coupons demonstrate that the actual as-built areal density of all inserts meets or exceeds the minimum acceptable standard of 0.0116 g/cm^2. Any insert that does not meet the acceptance criteria (i.e., minimum certified areal density of 0.0116 g/cm^2) at the 2σ level would be rejected for delivery and not used at QCNPS.

NRC Request 2

Section 2.7 of Holtec HI-2124245 R2 is essentially establishing a methodology for analyzing future fuel assemblies. However, the description of that methodology is incomplete. In this regard the NRC staff requests the licensee to provide full and complete description of the methodology including all analyses performed to support the methodology, assumptions both implicit and explicit, detailed implementation guidance, and all limitations and conditions.

Response

It should be noted that the correct reference to the Holtec report is HI-2125245. As discussed with the NRC during a conference call on August 29, 2013, EGC did not intend to request NRC approval of a new methodology for analyzing future fuel assemblies as part of the proposed license amendment request. As such, EGC intends to remove the description of the approach for qualifying future new lattice designs, which is currently contained in Section 2.7 of Holtec report HI-2125245, in the planned revision discussed in the response to NRC Request 3 below.

NRC Request 3

Additionally, the staff have also noted issues with the proprietary markings in the submittal. Additionally, the NRC staff has noted numerous instances where material that is marked as proprietary does not meet the 10 CFR 2.390 criteria for withholding or are not properly marked in accordance with 10 CFR 2.390. For example the submittal claims that Holtec HI-2104790 is proprietary in its entirety. However, most of what is in the document is essentially verbatim out of a publicly available NRC NUREG/CR. Therefore it does not meet 10 CFR 2.390 criteria (b)(4)(iv) or (b)(4)(v). Additionally, the proprietary version of HI-2124245 R2 does not have any proprietary markings on the text to indicate which portions are to be withheld and which are not met 10 CFR 2.390 criteria (b)(4)(iv) or (b)(4)(v). Additionally, the proprietary version of HI-2124245 R2 does not have any proprietary markings on the text to indicate which portions are to be withheld and which are not.

Response

EGC is working with Holtec to resolve the issues noted above with the proprietary markings within Holtec reports HI-2104790 and HI-2125245. EGC plans to submit revised versions of

these reports to the NRC following resolution of the issues with the proprietary markings. Based on information discussed during the conference call with the NRC on August 29, 2013, EGC understands that submittal of the revised reports does not need to occur within the timeframe necessary to support completion of the acceptance review process (i.e., by September 19, 2013); however, resolution of the issues with proprietary markings will be needed prior to the NRC reaching a determination on the proposed license amendment.