TMI-2 SOLUTIONS

January 5, 2022

TMI2-RA-COR-2022-0001

10 CFR 50.90

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

Subject: Supplemental Information to License Amendment Request- Three Mile Island, Unit 2, Decommissioning Technical Specifications
Three Mile Island, Unit 2
NRC Possession Only License No. DPR-73
NRC Docket No. 50-320

References:

(1) Letter TMI2-RA-COR-2021-0002 from van Noordennen (TMI-2 Solutions LLC) "License Amendment Request- Three Mile Island, Unit 2, Decommissioning Technical Specifications," (ML21057A047) dated February 19, 2021.

(2) Letter TMI2-RA-COR-2021-0010 from van Noordennen (TMI-2 Solutions LLC) "Supplemental Information to License Amendment Request - Three Mile Island, Unit 2, Decommissioning Technical Specifications," (ML21057A047) dated May 5, 2021.

On February 19, 2021, TMI-2 Solutions submitted an application for a license amendment for Three Mile Island Nuclear Station, Unit 2 ("TMI-2") to revise the Possession Only License and the associated Technical Specifications to support the transition of TMI-2 from a Post-Defueling Monitored Storage (PDMS) condition to that of a facility undergoing radiological decommissioning (DECON) (Reference 1). On May 5, 2021, TMI-2 Solutions submitted a supplement to the application submitted on February 19, 2021 (Reference 2). Specifically, this letter transmitted additional information related to a calculation that was submitted in Reference 1 that provides the basis for establishing a new Safe Fuel Mass Limit (SFML). This letter transmits some clarifying information based on input received on Reference 2. Attachment 1 contains a response to questions on the analysis. Attachment 2 contains a revision to TMI2-EN-RPT-0001 "Determination of the Safe Fuel Mass Limit for Decommissioning TMI-2" based on the responses to the questions in Attachment 1. Attachment 3 contains a revision to TMI2-EN-RPT-0002 "MCNP Version 6.2 Bias Determination for Low Enrichment Uranium Using the ENDF/B-VIII.0 Cross Section Library" based on the responses to the questions in Attachment 1.

In accordance with 10 CFR 50.91(b)(1), a copy of this submittal has been sent to the Commonwealth of Pennsylvania.

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In the event that the NRC has any questions with respect to the content of this document or wishes to obtain any additional information, please contact me at 860-462-9707.

I declare under penalty of perjury that the foregoing is true and correct. Executed on January 5, 2022.

Sincerely,

Gerard van Noordennen

Digitally signed by Gerard van Noordennen
DN: cn=Gerard van Noordennen, o=EnergySolutions, ou=Regulatory Affairs, email=gpvannoordennen@energysolutions.com, c=US
Date: 2022.01.05 13:14:25 -05'00'

Gerard van Noordennen
Senior Vice President Regulatory Affairs

Attachments:

Attachment 1 -	Response to Questions on SFML Analysis
Attachment 2 -	Revision to TMI2-EN-RPT-0001 "Determination of the Safe Fuel Mass Limit for Decommissioning TMI-2"
Attachment 3 -	Revision to TMI1-EN-RPT-0002 "MCNP Version 6.2 Bias Determination for Low Enrichment Uranium Using the ENDF/B-VIII.0 Cross Section Library"

cc w/Attachments
Ted Smith, NRC Project Manager
NRC Region I Administrator
NRC Lead Inspector

TMI-2 Service List
cc w/ Attachments:

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Attachment 1 to TMI2-RA-COR-2022-0001

Supplemental Information to License Amendment Request

Three Mile Island Nuclear Station, Unit 2

NRC Possession Only License No. DPR-73

Response to Questions on SFML Analysis

	Comment	Response
1	The Safe Mass Calc correctly uses the term "margin of subcriticality (MoS)" however, the validation report incorrectly uses the term "margin of safety (MoS)" in this same context. This is not semantics; it is important to distinguish between these two terms as they are not at all the same. Margin of safety refers to margin in terms of NCS parameters (e.g., setting the mass limit at 8kg when the calcs demonstrate that the actual safe mass is 12kg, or setting the maximum column diameter to 4" when the calcs demonstrate it's safe up to 5"). Margin of subcriticality refers to margin in terms of direct margin in k_eff (e.g., setting USL at 0.95 instead of 0.98 or 1.00). The margin of safety can (and does) have an impact on subcritical margin; however, the impact is indirect and non-linear (e.g., a 2% margin in safety does not necessarily correspond to a 2% subcritical margin). A 5% change in moderation could yield a 20% change in k_eff, etc.	Section 1.2 and 6.3 of the validation report have been updated with the MoS terminology and it's derivation. It is also included as part of Section 7. Section 2.2.2 of the SFML calculation report has been updated to be consistent with the validation report.
2	The validation report states that the "...MoS should be determined on a case-by-case basis..." however, this is inconsistent with the way the NRC treats subcritical margin. I understand that this project does not fall under 10 CFR 70, but typically the NRC reviews and approves an applicant's minimum margin of subcriticality based on the rigor of validation; similarity, quality, and quantity of the benchmark experiments used in validation; statistical methodology of validation; conservatism in treatment of NCS parameters and modelling assumptions; etc. This needs to be discussed with the licensee and we need to get together to decide how to handle this as this is something that needs to be under the NRC's control and not potentially changed under the licensee's own authority now or at some point in the future.	See above section changes.
3	The Safe Mass Calc/validation report states that the MoS is justified based on conservative assumptions. While this can be part of the justification, this is not nearly enough. An argument needs to be provided that references the rigor of the validation and all other things noted above in No. 2	A more detailed justification has been added to Section 6.3 in the validation report.
4	The validation report states that "the bias minus the MoS is the USL." There is no discussion and/or quantification of the bias uncertainty or calculational uncertainty. The USL should be as follows: USL > k_calc +2sigma_calc > bias + sigma_bias + MoS + any penalty for extensions to the AOA.	The bias uncertainty was originally quantified in the validation report (Section 5.4). Text has been added to clarify how and where it is addressed. See Section 1.2 and Table 1 for changes.
5	There is no discussion as to how the penalty for an AOA extension would be determined. We need at least a methodology.	Section 6.2 of the validation report has added text regarding AOA extension.
6	The bias is not defined correctly.	Text is added to Section 1.2 of the validation report for the MoC, and 1-MoC as the bias.
7	In the AOA, both the fissile materials and fissile geometries need to specified; they are too general.	The AOA table has been updated in both the validation report (Table 2) and the calculation report (Table 2-1).
8	Do any current or planned calcs fall outside of the AOA?	There are no plans for any future calculations and no current calculations fall outside of the AOA. This has been stated in the validation report Section 6.2.
9	Does credit for impurities, including absorbers, assume that they are of uniform spatial distribution?	The impurities are uniformly and homogeneously distributed through each fuel kernel within the lattice. A statement was added in Section 5.1, and a bullet was added in Section 5.2 of the SFML calculation report.
10	What is the basis for assuming spheres of fuel surrounded by moderator in a lattice vs. a true homogeneous mixture?	Some explanation for the core geometry model is in the third report, which is not being revised. That is the Input Consensus report. Some text has been added to Section 5.2 of the SFML calculation report.
11	Will the activities be monitored by some kind of criticality accident alarm system?	Based on high background radiation levels, physical underwater separation of waste processing locations in the canal, a SFML calculation bounding of all remaining material on site, that the remaining material on site is distributed across multiple large plant components, and defense in depth via an operating sequence based on individually handling and disposing of large components, the Project considers a criticality event to be of exceedingly low likelihood and would not be feasible for the activities planned. Therefore, the Project is not planning on a traditional CAAS. However, the project is evaluating additional operational controls and alternate methods of detection.