September 16, 2025

TP-LIC-LET-0454
Docket Number 50-613

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

Subject: Transmittal of Response to NRC Request for Confirmation of Information for the Review of the Kemmerer Power Station Unit 1 Construction Permit Application

References: 1. TerraPower, LLC, "Submittal of the Construction Permit Application for the Natrium Reactor Plant, Kemmerer Power Station Unit 1," March 28, 2024 (ML24088A059)
2. Email, Nuclear Regulatory Commission, Deion Atkinson to TerraPower, "Kemmerer 1 – Request for Clarification of Information (EPID L-2024-CPS-0000)"

On March 28, 2024, TerraPower, LLC (TerraPower) submitted, on behalf of US SFR Owner, LLC (USO), a construction permit application (CPA) to construct a Natrium® Reactor Plant[1] at Kemmerer Power Station Unit 1 (Kemmerer Unit 1) (Reference 1). In Reference 2, the Nuclear Regulatory Commission (NRC) staff provided three requests for confirmation of information (RCIs).

The enclosure to this letter provides TerraPower's confirmation of each RCI. TerraPower requests NRC review of this information in support of its continued review of the Kemmerer Power Station Unit 1 CPA.

[1] Natrium is a TerraPower & GE Vernova Hitachi Nuclear Energy Technology

If you have any questions regarding this submittal, please contact Ian Gifford at igifford@terrapower.com.

Sincerely,

George Wilson

George Wilson
Senior Vice President, Regulatory Affairs
TerraPower, LLC

Enclosure: TerraPower, LLC/USO Response to NRC Requests for Confirmation of Information for the Review of the Kemmerer Unit 1 CPA

cc: Mallecia Sutton, NRC
Josh Borromeo, NRC
Nathan Howard, DOE

ENCLOSURE

TerraPower, LLC/USO Response to NRC Requests for Confirmation of Information for the Review of the Kemmerer Unit 1 CPA

RCI-1

RG 1.233 states, “The F-C target and related discussions in NEI 18-04 include an upper bound event sequence frequency (i.e., 95th percentile) of 5×10^{-7}/plant-year to define the lower range of BDBEs.”

While USO did use the 95th percentile frequency when determining which events to evaluate as BDBEs, mean frequency was used when determining which events would be classified and included in the CPA as BDBEs.

Please confirm that the following is a complete list of the additional events that would be categorized as BDBEs if the 95th percentile were used and that the correct frequency and consequence values are listed for these events.

LBE	5th Percentile Frequency	Mean Frequency	95th Percentile Frequency	5th Percentile 30-day EAB TEDE [rem]	Mean 30-day EAB TEDE [rem]	95th Percentile 30-day EAB TEDE [rem]
RFH-OERC-EX1	4.81E-09	3.30E-07	1.19E-06	1.20	3.31	5.05
IPI-IHEL-EX1	1.41E-08	1.57E-07	5.28E-07	no release		

In addition, please confirm that USO’s intent is to continue to use the mean frequency in categorizing events as BDBEs.

USO Response:

This information has been confirmed to be correct as stated.

RCI-2

Please confirm that the following description capturing the potential impacts of deviations from the LMP methodology is accurate.

The LMP methodology documented in NEI 18-04, as endorsed by RG 1.233, states that, “An SSC is classified as risk-significant if… A prevention or mitigation function of the SSC is necessary to meet the design objective of keeping all LBEs within the F-C Target.” The methodology further clarifies that, “An LBE is considered within the F-C Target when a point defined by the upper 95th percentile uncertainty on both the LBE frequency and dose is within the F-C target.” This evaluation is performed by assuming failure of the SSC in performing a prevention or mitigation function and checking how the resulting LBE risks compare with the F-C target.

These risk-significant functions are designated as required safety functions (RSFs) and result in safety related (SR) classifications if they are necessary to meet the F-C target for DBEs or high-consequence BDBEs when evaluated using mean risk values. The remaining risk-significant functions identified through the evaluation described above are classified as risk-significant NSRST functions. USO unintentionally deviated from the LMP methodology in two ways while performing these risk-significant function determinations for the CPA:

- Identification of RSFs was performed using the 95th percentile versus mean risk values.
- Identification of risk-significant NSRST functions needed to keep LBEs within the F-C target was not performed.

The first deviation is conservative and may have resulted in a small number of SSCs that should have been classified as risk-significant NSRST being classified as SR, reducing the impacts of the second deviation. Impacts of the second deviation are further reduced by an additional quantitative assessment step performed by USO as part of the defense in depth (DID) evaluation, beyond what is outlined in the LMP methodology. In this additional step, various sets of non-SR functions were evaluated, collectively with the SR functions, to identify the minimum set of additional non-SR functions that were needed to ensure that all LBEs were below the F-C target when assessed at the mean risk values. The set of additional non-SR functions were classified as NSRST for DID.

With this additional assessment step performed assuming all non-SR functions not in the evaluation set failed, this resulted in many of the SSCs that were not identified as risk-significant NSRST because of the second deviation being classified as NSRST for DID. With this and the use of the 95th percentile in identifying RSF, the impact of this second deviation on the overall design and facility risk at the CP stage is small. USO has modified their process and workflow to ensure that this step for identifying risk-significant NSRST functions is performed moving forward, in a manner consistent with the LMP methodology.

<u>USO Response:</u>

This information has been confirmed to be correct as stated, with one clarification. Due to the conservative nature of the deviation related to identification of RSFs, an analysis has not been performed to determine the number of SSCs conservatively classified as SR.

RCI-3

PSAR section 3.5, “LBE Summary,” provides the mean, 5th, and 95th percentile frequencies and consequences for each LBE in the form of the F-C target chart in figure 3.5-1, “F-C Chart for LBEs with Uncertainty Bands.” These values are used for determining SSC safety classification as well as the prevention and mitigation credit being taken for controls. To ensure accurate representation in the SE, please confirm that the following values are consistent with those represented in figure 3.5-1.

	Event Sequence Frequency [/year]			**Total Effective Dose Equivalent at Exclusion Area Boundary [rem]**		
Licensing Basis Event	**5th Percentile**	**Mean**	**95th Percentile**	**5th Percentile**	**Mean**	**95th Percentile**
DHP-L1PP-BL	4.82E-01	6.78E-01	8.98E-01	no release		
DHP-LOOP-BL	2.22E-03	2.29E-02	6.38E-02	no release		
SUD-LOOP-BL	4.40E-03	1.51E-02	3.21E-02	no release		
OTH-LMAC-BL	6.23E-03	1.14E-02	1.83E-02	no release		
DHS-ISTL-BL	2.76E-01	4.76E-01	8.49E-01	no release		
SUD-IACA-BL	1.17E-02	4.16E-02	8.98E-02	no release		
RPD-CW1ACS-BL	4.42E-05	1.06E-02	4.10E-02	no release		
RPD-SS-BL	7.91E-02	3.10E-01	6.63E-01	no release		
RFH-OERC-BL	2.78E-03	2.20E-02	6.49E-02	2.46E-03	3.62E-03	5.40E-03
RFH-LSPC-BL	9.47E-03	3.83E-02	5.97E-02	no release		
RFH-LTCA-BL	8.14E-02	3.73E-01	1.08E+00	no release		
DHP-L1PP-2	4.15E-05	1.11E-04	2.40E-04	no release		
DHP-LOOP-1	1.01E-05	1.80E-04	5.11E-04	no release		
SUD-LOOP-1	2.09E-05	1.35E-04	2.87E-04	no release		
DHS-ISTL-1	3.74E-04	7.87E-04	1.57E-03	no release		
DHS-ISTL-2	1.05E-03	3.02E-03	7.45E-03	no release		
DHS-RNBK-1	4.12E-04	2.40E-03	6.52E-03	no release		
DHS-RNBK-3	4.39E-05	1.84E-04	4.62E-04	no release		
SUD-IACA-1	1.40E-04	6.14E-04	1.49E-03	no release		

	Event Sequence Frequency [/year]			Total Effective Dose Equivalent at Exclusion Area Boundary [rem]		
Licensing Basis Event	5th Percentile	Mean	95th Percentile	5th Percentile	Mean	95th Percentile
IPI-IHEL-BL	1.46E-04	1.59E-03	5.18E-03	no release		
SUD-IHEL-BL	1.17E-05	1.81E-04	5.81E-04	no release		
RRS-CGR-BL	9.47E-06	2.48E-04	8.69E-04	2.27E-03	5.75E-03	9.37E-03
RRS-CGR-1	5.23E-06	1.49E-04	5.19E-04	2.27E-03	5.75E-03	9.37E-03
RRS-ISPL-BL	3.29E-05	8.77E-04	3.19E-03	5.93E-03	1.04E-02	2.04E-02
RRS-SPLX-BL	5.74E-06	5.33E-04	1.85E-03	1.15E-02	1.99E-02	3.98E-02
RRS-SPLA-BL	2.03E-04	3.68E-03	1.28E-02	1.15E-02	1.99E-02	3.98E-02
RRS-RWG-1	8.89E-04	6.33E-03	1.83E-02	2.14E-04	5.62E-04	1.03E-03
RRS-RWG-2	1.52E-05	5.11E-04	1.58E-03	2.38E-04	6.39E-04	1.15E-03
RFH-FDIV-BL	3.69E-05	9.48E-04	3.65E-03	no release		
RFH-FDIV-1	8.32E-05	2.26E-03	8.73E-03	8.38E-02	1.83E-01	2.90E-01
RFH-FDIV-3	4.33E-05	1.19E-03	4.32E-03	1.67E-01	3.66E-01	5.82E-01
RFH-FDSP-1	3.24E-05	8.77E-04	3.36E-03	1.20E-01	3.31E-01	5.05E-01
RFH-ESWR-BL	2.05E-05	5.50E-04	2.06E-03	no release		
RFH-ESWR-1	2.44E-06	1.03E-04	4.02E-04	1.20E-01	3.31E-01	5.05E-01
RFH-LTCA-1	5.12E-06	1.02E-04	3.72E-04	no release		
RFH-LBCA-BL	1.95E-05	5.02E-04	1.72E-03	no release		
RFH-LMCA-BL	7.51E-04	8.82E-03	2.46E-02	no release		
LFF-SAO-BL	3.32E-05	9.10E-04	3.36E-03	3.82E-03	5.70E-03	9.87E-03
DHP-L1PP-1	3.52E-05	7.33E-05	1.35E-04	no release		
DHP-L1PP-3	4.39E-05	6.69E-05	9.46E-05	no release		
DHP-L1PP-4	7.13E-06	4.52E-05	1.19E-04	no release		
DHP-LAPP-BL	1.66E-05	2.88E-05	4.87E-05	no release		
DHP-LOOP-2	2.84E-07	3.76E-06	1.18E-05	no release		
DHP-LOOP-3	1.99E-07	2.26E-06	6.17E-06	1.12E-01	1.62E-01	4.06E-01
DHP-LOOP-4	6.79E-08	1.52E-06	5.33E-06	1.12E-01	1.62E-01	4.06E-01
OTH-LMAC-1	1.74E-05	5.63E-05	1.22E-04	no release		
OTH-LMAC-2	5.87E-07	1.85E-06	4.08E-06	no release		

	Event Sequence Frequency [/year]			Total Effective Dose Equivalent at Exclusion Area Boundary [rem]		
Licensing Basis Event	5th Percentile	Mean	95th Percentile	5th Percentile	Mean	95th Percentile
DHS-ISTL-3	2.55E-05	4.70E-05	8.80E-05	no release		
DHS-ISTL-4	4.22E-06	3.17E-05	8.89E-05	no release		
DHS-RNBK-2	5.38E-06	5.56E-05	1.70E-04	no release		
SUD-IACA-2	1.62E-07	1.84E-06	6.17E-06	no release		
IPI-IHEL-1	2.33E-07	2.63E-06	8.74E-06	no release		
IPI-IHEL-2	7.66E-07	1.01E-05	3.46E-05	no release		
SUD-IHEL-1	8.53E-08	2.12E-06	5.78E-06	no release		
RPD-CW1ACS-1	3.79E-09	1.05E-06	4.08E-06	no release		
RPD-CW1ACS-2	5.47E-09	1.66E-06	6.74E-06	no release		
RPD-CW1ACS-3	4.63E-09	1.04E-06	4.19E-06	no release		
RPD-CW1ACS-4	1.57E-09	6.91E-07	2.95E-06	no release		
RPD-SS-1	7.26E-06	3.32E-05	8.02E-05	no release		
RPD-SS-2	9.53E-06	5.08E-05	1.31E-04	no release		
RPD-SS-3	7.84E-06	3.03E-05	6.61E-05	no release		
RPD-SS-4	2.02E-06	2.05E-05	6.43E-05	no release		
SUD-CGR-1	3.44E-07	1.83E-05	6.70E-05	7.73E-03	1.77E-02	3.47E-02
SUD-CGR-2	2.25E-07	1.10E-05	4.20E-05	7.73E-03	1.77E-02	3.47E-02
RFH-FDIV-2	3.06E-07	2.27E-05	8.48E-05	3.88E-01	6.74E-01	1.62E+00
RFH-FDEM-1	3.34E-06	8.80E-05	3.27E-04	9.53E-02	1.40E-01	2.09E-01
RFH-FDEM-2	7.28E-09	5.25E-07	1.99E-06	3.20E+01	4.60E+01	7.00E+01
RFH-FDET-BL	4.06E-07	1.09E-05	3.98E-05	no release		
RFH-FDET-1	5.92E-07	1.61E-05	6.01E-05	2.91E-02	4.32E-02	6.36E-02
RFH-FDPI-BL	1.98E-06	5.10E-05	1.93E-04	2.91E-02	4.32E-01	6.36E-02
RFH-FDPI-1	1.98E-08	5.10E-07	1.93E-06	1.00E+01	1.40E+01	2.10E+01
RFH-FDRC-1	2.59E-06	6.79E-05	2.50E-04	9.53E-02	1.40E-01	2.09E-01
RFH-FDIV-4	1.66E-07	1.19E-05	4.41E-05	3.88E-01	6.74E-01	1.62E+00
RFH-FDSP-2	2.41E-06	9.74E-05	3.72E-04	2.40E-01	6.62E-01	1.01E+00
RFH-ESWR-2	4.90E-07	3.40E-05	1.61E-04	1.20E+00	3.31E+00	5.05E+00

	Event Sequence Frequency [/year]			Total Effective Dose Equivalent at Exclusion Area Boundary [rem]		
Licensing Basis Event	**5th Percentile**	**Mean**	**95th Percentile**	**5th Percentile**	**Mean**	**95th Percentile**
RFH-ESWR-3	3.12E-08	1.38E-06	4.94E-06	1.00E+01	1.40E+01	2.10E+01
RFH-LMCA-1	1.04E-08	8.82E-07	3.43E-06	9.53E-02	1.40E-01	2.09E-01
RFH-LMCA-2	9.72E-09	8.82E-07	3.48E-06	3.20E+01	4.60E+01	7.00E+01
RFH-FDBL-1	4.63E-08	6.03E-05	2.09E-04	2.91E-02	4.32E-02	6.36E-02
RFH-FDBL-2	2.41E-08	6.10E-07	2.33E-06	1.00E+01	1.40E+01	2.10E+01
LFF-SAO-1	1.19E-08	1.02E-06	4.21E-06	9.29E-02	1.48E-01	2.37E-01
LFF-SAO-2	1.26E-07	9.13E-06	3.71E-05	9.29E-02	1.48E-01	2.37E-01
RFH-LSPC-1	1.53E-06	5.74E-06	9.84E-06	no release		

USO Response:

With the single exception of the mean Total Effective Dose Equivalent at the Exclusion Area Boundary value for RFH-FDPI-BL, this information has been confirmed to be correct as stated. The correct mean Total Effective Dose Equivalent at the Exclusion Area Boundary value for RFH-FDPI-BL is 4.32E-2 rem.