

10 CFR 50.90

RS-25-078

April 23, 2025

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

Dresden Nuclear Power Station, Units 2 and 3
Renewed Facility Operating License Nos. DPR-19 and DPR-25
NRC Docket Nos. 50-237 and 50-249

Subject: Response to the Request for Additional Information Related to License Amendment Request to Revise Technical Specifications to Adopt Risk Informed Completion Times TSTF-505, Revision 2, "Provide Risk-Informed Extended Completion Times - RITSTF Initiative 4b," and TSTF-591, "Revise Risk Informed Completion Time (RICT) Program"

- References:
1. Letter from Mark D. Humphrey (Constellation Energy Generation, LLC) to U.S. Nuclear Regulatory Commission, "License Amendment Request to Revise Technical Specifications to Adopt Risk Informed Completion Times TSTF-505, Revision 2, 'Provide Risk-Informed Extended Completion Times - RITSTF Initiative 4b,' and TSTF-591, 'Revise Risk Informed Completion Time (RICT) Program'," dated May 8, 2024 (ADAMS Accession No. ML24129A135)
 2. Letter from Mark D. Humphrey (Constellation Energy Generation, LLC) to U.S. Nuclear Regulatory Commission, "Supplement to License Amendment Request to Revise Technical Specifications to Adopt Risk Informed Completion Times TSTF-505, Revision 2, 'Provide Risk-Informed Extended Completion Times - RITSTF Initiative 4b,' and TSTF-591, 'Revise Risk Informed Completion Time (RICT) Program'," dated October 21, 2024 (ADAMS Accession No. ML24295A350)
 3. Letter from Mark D. Humphrey (Constellation Energy Generation, LLC) to U.S. Nuclear Regulatory Commission, "Supplement to License Amendment Request to Revise Technical Specifications to Adopt Risk Informed Completion Times TSTF-505, Revision 2, 'Provide Risk-Informed Extended Completion Times - RITSTF Initiative 4b,' TSTF-591, 'Revise Risk Informed Completion Time (RICT) Program,' and 10 CFR 50.69, 'Risk-Informed Categorization and Treatment of Structures, Systems and Components for Nuclear Power Reactors'," dated March 21, 2025 (ADAMS Accession No. ML25080A153)

4. "Final APLC RAI - Dresden TSTF-505 & 591," dated March 25, 2025
(ADAMS Accession No. ML25084A129)

In Reference 1, Constellation Energy Generation, LLC (CEG) requested an amendment to Renewed Facility Operating License Nos. DPR-19 and DPR-25 for Dresden Nuclear Power Station (DNPS) Units 2 and 3. The proposed amendment requested in Reference 1 would modify the Technical Specifications (TS) requirements to permit the use of Risk Informed Completion Times (RICTs) in accordance with TSTF-505, Revision 2, "Provide Risk-Informed Extended Completion Times – RITSTF Initiative 4b." The supplement in Reference 2 modifies Enclosures 1 and 9 provided in Reference 1 to incorporate the high wind/tornado missile penalty factor. The supplement in Reference 3 adds TS 3.6.2.4.A.1 to the station RICT program and provides additional information to support the NRC review of References 1 and 2.

In Reference 4, the NRC requested additional information to support its review of the external flooding hazard discussed during the audit. In response, CEG is providing the attached information.

CEG has reviewed the information supporting the findings of no significant hazards consideration, and the environmental considerations, that were previously provided to the NRC in References 1, 2, and 3. The additional information provided in this submittal does not affect the bases for concluding that the proposed license amendments do not involve a significant hazards consideration. In addition, the 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 amendments.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this letter, please contact Ms. Erin Whitsell at (309) 738-9650.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 23rd day of April 2025.

Respectfully,

Mark Humphrey
Sr. Manager Licensing
Constellation Energy Generation, LLC

Attachment:

1. Response to Request for Additional Information

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – DNPS
NRC Project Manager, NRR – DNPS
Illinois Emergency Management Agency and Office of Homeland Security – Division of
Nuclear Safety

ATTACHMENT 1

**Dresden Nuclear Power Station
Docket Nos. 50-237 and 50-249**

Facility Operating License Nos. DPR-19 and DPR-25

**Response to the Request for Additional Information Related to License Amendment
Request to Revise Technical Specifications to Adopt Risk Informed Completion Times
TSTF-505, Revision 2, "Provide Risk- Informed Extended Completion Times - RITSTF
Initiative 4b," and TSTF-591, "Revise Risk Informed Completion Time (RICT) Program"**

Response to Request for Additional Information

1. SCOPE

The following response addresses the Dresden Nuclear Power Station (DNPS) RAI letter issued on March 25, 2025 (ADAMS Accession No. ML25084A129) in support of the station TSTF-505 (RICT) and TSTF-591 License Amendment Request (LAR). The RAI consists of parts a, b, and c. The response options are to answer parts a and c OR part b. Constellation chooses to reply to part b.

2. NRC RAI

b. Alternatively – as allowed by section 2.3.1, item 7, of NEI 06-09 – perform a reasonable bounding analysis quantifying the risk for the combined effects flood external event. Also discuss how the quantified risk will be applied along with the internal events risk contribution in calculating the configuration risk and the associated RICT.

The justification should include consideration of and, as applicable, the basis for the following factors:

- The frequency of the combined effects flooding hazard at flooding elevations of significance.
- The impact the combined effects flooding hazard has (at flooding elevations of significance) on plant operation and structures including the ability to cope with the hazard.
- The reliability of flood protection measures (if applicable).
- The reliability of human actions (if applicable).
- Consideration of uncertainties and wind wave effects in the determination of demonstrably conservative mean values as discussed in section 6.2-3 of ASME/ANS RA-Sa-2009

CEG Response

b.

CEG has chosen to quantify the risk of the combined effects external flood event at DNPS, to include this risk in the total plant CDF and LERF for Units 2 and 3, and to account for this risk in RICT calculations for specific configurations.

The DNPS analysis for the external flood (XF) combined effects flood mechanism has been revised in DR-LAR-008 [1] to utilize a demonstrably conservative approach to estimating the risk from such floods at the station. The external flood hazard curve presented in Figure E4-1 of the RICT LAR [2] provides the basis for the combined effects flood hazard frequencies. Two scenarios are analyzed; the first scenario includes floods where the water surface elevation (WSE) starts to impact the plant at 510.5' up to 517.5'. For floods less than 517.5', there are no postulated impacts to the station that are not already accounted for in the full power internal events model and risk from these combined effects flood mechanisms are considered negligible (i.e., CDF and LERF = 0). At 517.5' (Scenario 2), the Isolation Condenser (IC) shell-side inventory supply is transferred to the ICMUPs (the IC provides core cooling for these combined effects floods).

The scenarios are shown in Table 1, below.

Table 1: Combined Effects River Flooding Scenarios with CDF Impact

Scenario Name	WSEL Range	Frequency (per yr)	CCDP	CDF (per yr)
Scenario 1	510.5'-517.5'	1E-2	ϵ (negligible)	ϵ (negligible)
Scenario 2	517.5'-523'	2E-5	1	2E-5
Total				2E-5

As water reaches 517.5', the IC shell-side inventory supply is transferred to the diesel driven isolation condenser make up pumps (ICMUPs) due to the loss of offsite and emergency AC power. Core cooling for this scenario relies on the IC and FLEX since all other installed mitigation capability is assumed to be lost for external floods with levels equal to or greater than a Water Surface Elevation (WSE) of 517.5'. After the WSE reaches 521', core cooling is transferred to the FLEX pumps. Although there is a viable mitigation strategy for floods greater than 517.5', It is conservatively assumed that the CCDP for Scenario 2 is equal to 1.0. This results in a total CDF of 2E-5/yr for external floods.

For LERF, an analysis of the progression of core damage events from Scenario 2 was conducted by developing and performing a Modular Accident Analysis Program (MAAP) run simulating this scenario. This is documented in Appendix C of DR-LAR-008 Revision 3 [1] and summarized here.

At Dresden, the design basis external flooding event results in flood waters reaching Elevation 528', which is well above the nominal ground Elevation of 517.5'. Before flood water enters the Turbine Building, the site will de-energize all electrical equipment on Elevation 517.5' per procedures and essentially induce a Station Blackout (SBO). For the purposes of the LERF analysis, the IC is conservatively not credited from the time when flood water reaches 517.5' (e.g., assumes IC makeup pump flood barriers not successfully installed). Deploying Diverse and Flexible Coping Strategies (FLEX) equipment and the pump on the floating barge in the Turbine Building trackway are also conservatively not credited for mitigating this event.

Thus (for the purposes of the LERF analysis only) it was assumed no core cooling capability exists for floods greater than 517.5' for the entire accident duration. The loss of offsite AC power and emergency power (i.e., SBO scenario) is modeled to occur at t=18 hours for this design basis external flooding scenario.

The Dresden PRA assumes that the determination that AC power is not likely to be restored within the 4-hour time frame is made within the first 30 minutes following the initiation of the SBO event. As such, a General Emergency is assumed declared at t=18.5 hours. The evacuation process would then be initiated after the declaration and is estimated to be completed within 6.6 hours (i.e., t=18.5hours + 6.6 hours, or approximately 25 hours) under worst assumed conditions based on site specific evacuation studies for weather and times of day variations [3].

An estimation of the time to reach the high magnitude release threshold (i.e., 10% Csl release fraction) is approximately 35 hours, which is 10 hours longer than the time to complete evacuation including the 30 minutes to declare the General Emergency.

Therefore, the design basis external flood core damage accident is not an early release by a substantial margin and is not considered a LERF event. The additional 10 hours between the estimated completion of evacuation and the time to reach a high magnitude Csl release provides margin to account for the potential impact of an external flooding event on the evacuation times (e.g., flooding of evacuation routes).

Impact on the TSTF-505/591 (RICT) Program

In order to account for the external flood hazard risk in the RICT program, an external flood penalty factor will be applied to RICT calculations for LCO 3.5.3 (IC System) only. It has already been established that there is a negligible risk increase for external floods impacting key SSCs below 517.5'. For floods greater than 517.5', the IC system is the only mechanism for core cooling until FLEX is used. Therefore, configurations associated with all LCOs, except LCO 3.5.3, do not result in an increase in external flood risk, since IC is the only system that is critical for success of the external flood strategy for floods above 517.5'. The only LCO configuration for floods above 517.5' that would result in an increase in the flood risk is the unavailability of the IC or the ICMUPs (LCO 3.5.3 - IC System).

Rather than determining the increase in external flood risk when the IC or ICMUPs are unavailable, it is conservatively assumed that the entire flood CDF (2E-5/yr) will be used as the penalty factor (ΔCDF) for either unit:

ΔCDF_{XF} : 2E-5/yr for LCO 3.5.3

ΔCDF_{XF} : 0.0 for all other LCOs/SSCs

Since the LERF is 0.0 for all floods, there is no LERF penalty for any LCOs in the RICT program

$\Delta LERF_{XF}$: 0.0 for all LCOs/SSCs

Impact on the 10 CFR 50.69 Program

The combined effects flooding mechanism cannot be screened from the 50.69 program for floods that exceed plant grade (517.5'). Floods below this elevation do not have any impacts to key SSCs responsible for maintaining the plant in a safe stable condition during an event. Once water exceeds 517.5', all mitigation capabilities, except for the IC and FLEX, are assumed to be lost and no core cooling capabilities are assumed available. This is conservative given the documented strategies in the UFSAR to provide alternate sources of core cooling during a flood.

As stated in References [4] and [5], an External Flood Safe Shutdown Equipment List (XFSSEL) will be developed prior to categorizing systems at DNPS.

In Reference [5] the response to Question 3c, "Equipment Lists" describes six criteria from Section 3.2.4.1 of the 50.69 LAR [4] that will be used to screen out as Low Safety Significant (LSS) Scenario 2 SSCs (i.e., SSCs associated with Combined Effects External Floods above plant grade). The response stated all of the six criteria have to be met (i.e., True) in order to categorize an SSC as LSS with respect to the external flooding hazard for 50.69.

A change to Criterion 3 is deemed necessary to specify as LSS those SSCs in systems that are assumed unavailable *during or following* an External Flood Scenario 2 event." The original Criterion 3 specified as LSS those "SSCs in systems that are assumed unavailable following an external flooding event."

Baseline CDF/LERF

Tables 2 and 3 below list the CDF and LERF point estimate values that resulted from a quantification of the baseline internal events (including internal flooding) and fire Probabilistic Risk Assessment (PRA) models as described in Enclosure 5 from the original TSTF-505/591 LAR [2]. The tables have been updated to include the conservative 2.0E-5 external flood CDF described above and documented in [1]. As described above, there is no significant contribution from external flood to total LERF.

Other external hazards remain below accepted screening criteria and therefore do not contribute significantly to the totals.

Table 2 Unit 2 Total Baseline CDF/LERF			
DNPS Unit 2 Baseline CDF		DNPS Unit 2 Baseline LERF	
Source	Contribution	Source	Contribution
Internal Events PRA	3.1E-06	Internal Events PRA	2.2E-07
Fire PRA	3.3E-05	Fire PRA	3.6E-06
Seismic	8.0E-06	Seismic	2.6E-06
High Winds	1.5E-05	High Winds	9.0E-07
External Floods	2.0E-05	External Floods	No significant contribution
Other External Events	No significant contribution	Other External Events	No significant contribution
Total CDF	7.9E-05	Total LERF	7.3E-06

Table 3 Unit 3 Total Baseline CDF/LERF				
DNPS Unit 3 Baseline CDF			DNPS Unit 3 Baseline LERF	
Source	Contribution		Source	Contribution
Internal Events PRA	3.1E-06		Internal Events PRA	2.3E-07
Fire PRA	3.2E-05		Fire PRA	4.7E-06
Seismic	8.0E-06		Seismic	2.6E-06
High Winds	1.6E-05		High Winds	8.8E-07
External Floods	2.0E-05		External Floods	No significant contribution
Other External Events	No significant contribution		Other External Events	No significant contribution
Total CDF	7.9E-05		Total LERF	8.4E-06

As demonstrated in Tables 2 and 3, the total CDF and total LERF are within the guidelines set forth in RG 1.174 and support small changes in risk that may occur during RICT entries following TSTF-505/591 implementation. Therefore, DNPS TSTF-505/591 and 10 CFR 50.69 implementation is consistent with NEI 06-09 and NEI 00-04 guidance with the deviation allowing use of the XFSSEL.

Updated Example RICT Calculation for Isolation Condenser TS 3.5.3.A

The example RICT calculation result for TS Condition 3.5.3.A (IC System Inoperable) as shown in Attachment 1 of Reference [6] is updated below. The RICT is based on the Unit 2 internal events and internal fire PRA model calculations with seismic, high winds, and external flood penalties.

While $RICT_{CDF}$ decreased from 13.5 to 12.5 days by applying the XF CDF penalty factor, $RICT_{LERF}$ remains the more limiting value of 11.0 days (which did not change since there is no XF LERF penalty). Hence the revised RICT estimate for TS Condition 3.5.3.A remains 11.0 days.

Following TSTF-505 implementation, the actual RICT value will be calculated using the actual plant configuration and the current revision of the PRA models representing the as-built, as-operated condition of the plant, as required by NEI 06-09, Revision 0-A and the NRC safety evaluation.

Conclusions

- Given that the combined effects flooding mechanism in rivers and streams cannot be screened for external flood scenarios, a CDF penalty factor of $2E-5$ will be used only for RICT configurations involving LCO 3.5.3 (the IC system). The Enclosure 1 sample RICT calculation from [6] remains unchanged at 11-days as it is limited by LERF.
- An XFSSEL will be developed prior to categorizing systems at DNPS under 50.69 that include a revised Criterion 3 to specify as LSS those "SSCs in systems that are assumed unavailable during or following an External Flood Scenario 2 event."
- The total CDF for both units have been updated to reflect the $2E-5$ /yr contribution from the XF hazard as shown in Tables 2 and 3. The DNPS total CDF and total LERF remain below the guidelines established in RG 1.174 (i.e., no more than about $1E-4$ /year for CDF and $1E-5$ /year for LERF).

3. REFERENCES

- [1] DR-LAR-008, "External Hazards Assessment for Dresden Nuclear Power Station," Revision 3, April 2025.
- [2] Constellation Letter to NRC, License Amendment Request to Revise Technical Specifications to Adopt Risk Informed Completion Times TSTF-505, Revision 2, "Provide Risk-Informed Extended Completion Times - RITSTF Initiative 4b," and TSTF-591, "Revise Risk Informed Completion Time (RICT) Program," May 8, 2024 (ADAMS Accession No. ML24129A135).
- [3] Exelon Nuclear, EP-AA-1004, "Radiological Emergency Plan Annex for Dresden Station," Revision 33, June 2013.
- [4] Constellation Letter to NRC, "Application to Adopt 10 CFR 50.69, "Risk-Informed Categorization and Treatment of Structures, Systems, and Components for Nuclear Power Reactors," dated May 28, 2024 (ADAMS Accession No. ML24149A261).
- [5] Constellation Letter to NRC, Supplement to License Amendment Request to Revise Technical Specifications, "Revise Risk Informed Completion Time (RICT) Program," and 10 CFR 50.69, "Risk-Informed Categorization and Treatment of Structures, Systems and Components for Nuclear Power Reactors," dated March 21, 2025 (ADAMS Accession No. ML25080A153).

3. REFERENCES CONTINUED

- [6] Constellation Letter to NRC, Supplement to License Amendment Request to Revise Technical Specifications to Adopt Risk Informed Completion Times TSTF-505, Revision 2, "Provide Risk-Informed Extended Completion Times - RITSTF Initiative 4b," and TSTF-591, "Revise Risk Informed Completion Time (RICT) Program," dated October 21, 2024 (ADAMS Accession No. ML24295A350).