

RS-22-072

10 CFR 50.90

June 6, 2022

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

Braidwood Station, Units 1 and 2
Renewed Facility Operating License Nos. NPF-72 and NPF-77
NRC Docket Nos. STN 50-456 and STN 50-457

Subject: Response to Request for Additional Information Regarding
License Amendment to Revise Braidwood Station, Units 1 and 2, Technical
Specification 3.7.9, "Ultimate Heat Sink"

- References:
- 1) Letter from D. Gullott (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, " License Amendment to Revise Braidwood Station, Units 1 and 2, Technical Specification 3.7.9, "Ultimate Heat Sink"," dated August 2, 2021 (ADAMS Package Accession No. ML21214A331).
 - 2) Email from J. Wiebe (U.S. Nuclear Regulatory Commission) to P. A. Henderson (Constellation Energy Generation, LLC), "Request for Additional Information Regarding Braidwood, Units 1 and 2, Amendment Request for Technical Specification 3.7.9, "Ultimate Heat Sink," dated March 29, 2022.

By application dated August 2, 2021 (Reference 1), Exelon Generation Company, LLC (EGC) requested an amendment to the Technical Specifications (TS) for Renewed Facility License Nos. NPF-72 and NPF-77 for Braidwood Station, Units 1 and 2 (Braidwood). On February 1, 2022 the NRC approved the license transfer of the above facilities to Constellation Energy Generation, LLC, (CEG). The proposed amendment adds two Required Actions and associated Completion Times to Technical Specification (TS) 3.7.9, "Ultimate Heat Sink," for an inoperable Ultimate Heat Sink (UHS) due to the average water temperature.

The proposed amendment also revises TS 3.7.9 Surveillance Requirement (SR) 3.7.9.2 to delete the temporary allowance for the UHS average water temperature of 102.8°F until September 30, 2021. This temporary change to the SR was implemented by Amendment No. 222 to Renewed Facility Operating License No. NPF-72 and Amendment No. 222 to Renewed Facility Operating License No. NPF-77 for the Braidwood Station, Units 1 and 2, respectively, as documented in NRC Safety Evaluation Report (SER) dated July 13, 2021. (ADAMS Access No. ML21154A046). This is an administrative change.

In NRC email dated March 29, 2022 (Reference 2), the NRC determined that additional information is needed to complete its review. The Attachment to this letter provides the requested information.

CEG has reviewed the information supporting the No Significant Hazards Consideration and the Environmental Consideration that was previously provided to the NRC in Attachment 1 of the Reference 1 letter. The additional information provided in this submittal does not affect the conclusion that the proposed license amendment does not involve a significant hazards consideration. This additional information also does not affect the conclusion that there is no need for an environmental assessment to be prepared in support of the proposed amendment.

In accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b), CEG is providing a copy of this letter and its attachment to the State of Illinois.

This letter contains no regulatory commitments. Should you have any questions concerning this submittal, please contact Mr. Phillip A. Henderson at (630) 657-4727.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 6th day of June 2022.

Respectfully,

Kevin Lueshen
Sr. Manager – Licensing
Constellation Energy Generation, LLC

Attachments:

- 1 Response to Request for Additional Information
- 2 Markup of Technical Specifications Pages

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

ATTACHMENT 1
Response to Request for Additional Information

By application dated August 2, 2021 (Reference 1), Exelon Generation Company, LLC (EGC) requested an amendment to the Technical Specifications (TS) for Renewed Facility License Nos. NPF-72 and NPF-77 for Braidwood Station, Units 1 and 2 (Braidwood). On February 1, 2022 the NRC approved the license transfer of the above facilities to Constellation Energy Generation, LLC, (CEG). The proposed amendment adds two Required Actions and associated Completion Times to Technical Specification (TS) 3.7.9, "Ultimate Heat Sink," for an inoperable Ultimate Heat Sink (UHS) due to the average water temperature.

The proposed amendment also revises TS 3.7.9 Surveillance Requirement (SR) 3.7.9.2 to delete the temporary allowance for the UHS average water temperature of 102.8°F until September 30, 2021. This temporary change to the SR was implemented by Amendment No. 222 to Renewed Facility Operating License No. NPF-72 and Amendment No. 222 to Renewed Facility Operating License No. NPF-77 for the Braidwood Station, Units 1 and 2, respectively, as documented in NRC Safety Evaluation Report (SER) dated July 13, 2021. (ADAMS Access No. ML21154A046). This is an administrative change.

In NRC email dated March 29, 2022 (Reference 2), the NRC determined that additional information is needed to complete its review. The Attachment to this letter provides the requested information.

References:

- 1) Letter from D. Gullott (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, " License Amendment to Revise Braidwood Station, Units 1 and 2, Technical Specification 3.7.9, "Ultimate Heat Sink", " dated August 2, 2021 (ADAMS Package Accession No. ML21214A331).
- 2) Email from J. Wiebe (U.S. Nuclear Regulatory Commission) to P. A. Henderson (Constellation Energy Generation, LLC), "Request for Additional Information Regarding Braidwood, Units 1 and 2, Amendment Request for Technical Specification 3.7.9, "Ultimate Heat Sink," dated March 29, 2022.
- 3) NUREG-1431, Standard Technical Specifications, Westinghouse Plant, Volume 1, Revision 5, dated September 2021.

NRC RAI A

The proposed changes to LCO 3.7.9 potentially allows indefinite operation above the currently approved UHS average temperature limit of 102°F. An example of how this could occur is if the average UHS temperature remains above 102°F and very briefly falls below 102°F overnight due to diurnal cooling effects. At the time when the average UHS temperature falls below 102°F, the LCO would be exited and then reentered shortly thereafter as the temperature increased back above 102°F. This cycle could be repeated indefinitely. Given this situation, the UHS temperature limit would effectively be the "maximum analyzed temperature" which would be contained in a licensee-controlled document. In addition to being located in a licensee-controlled document, based on discussions during the regulatory audit on January 28, 2022, the calculations to determine the "maximum analyzed temperature" are not based on an NRC approved methodology.

ATTACHMENT 1
Response to Request for Additional Information

10 CFR 50.36(b) states in part “The technical specifications will be derived from the analyses and evaluation included in the safety analysis report.” The final policy statement on TS (58 FR 39132) states “The purpose of Technical Specifications is to impose those conditions or limitations upon reactor operation necessary to obviate the possibility of an abnormal situation or event giving rise to an immediate threat to the public health and safety by identifying those features that are of controlling importance to safety and establishing on them certain conditions of operation which cannot be changed without prior Commission approval.” By moving the UHS maximum allowable temperature to a licensee-controlled document, this would allow changes to the “conditions of operation” without NRC approval.

NRC staff requests the licensee to explain how the proposed changes to LCO 3.7.9 meets the requirements and intent of 10 CFR 50.36.

The NRC staff notes that it has previously approved one way to meet the requirements and intent of 50.36 (ADAMS Accession No. ML21154A046), which proposed verification that the UHS was less than or equal to the actual “maximum analyzed temperature” value in SR 3.7.9.2 and provided a summary of the calculations used in determination of this value including a detailed description of all assumptions used.

CEG Response to NRC RAI A

The maximum analyzed temperature will be determined following the same method discussed in ADAMS Accession No. ML21154A046 (NRC SER for 102.8 °F). As discussed in the Request for Additional Information, this method is acceptable to the NRC.

The Braidwood Ultimate Heat Sink maximum analyzed temperature does have a limiting value which is controlled by the Braidwood Technical Specifications.

Braidwood Technical Specifications (TS) Section 5.5.16 (Under Administrative Controls, Section 5), “Containment Leakage Rate Testing Program:”, lists the peak calculated containment internal pressure (Pa) values for the design basis Loss of Coolant Accident (LOCA), 42.8 psig for Unit 1 and 38.4 psig for Unit 2. The Braidwood design basis analysis for maximum internal pressure post-LOCA uses the heat removal rates for the Reactor Containment Fan Coolers (RCFCs) based on a cooling water temperature of 104 °F from the UHS.

Therefore, up to a UHS temperature of 104 °F, compliance is maintained with the TS purpose as stated in the final policy statement on Technical Specifications.

Increasing the UHS temperature above 104 °F would result in higher calculated Containment internal pressure. Increasing the peak calculated Containment internal pressure above the values in TS 5.5.16 requires NRC approval.

Moving the maximum UHS allowable temperature to licensee documents does not result in changes to “conditions of operation” imposed by the Technical Specifications without NRC Approval.

The time period permitted to exceed TS 3.7.9 UHS temperature limit of 102 °F is limited by a Completion Time of 7 days. For this time period, the results of the Design Basis Analysis for peak calculated Containment internal pressure are maintained up to a UHS temperature of 104 °F. Compliance with TS 5.5.16 is maintained.

ATTACHMENT 1
Response to Request for Additional Information

The short time period with UHS temperature above 102 °F does not create the possibility of an abnormal situation or event giving rise to an immediate threat to the public health and safety.

Engineering judgement is used for other analysis that use the initial UHS temperature as input. These analyses do not result in consequences that give rise to an immediate threat to the public health and safety. Although some of the inputs in these analyses may change, Engineering Judgment is used to conclude that the results are not adverse. These analyses are reviewed as part of the method discussed in ADAMS Accession No. ML21154A046 (NRC SER for 102.8 °F).

During the long-term response to a large break LOCA, when the Emergency Core Cooling System is drawing water from the containment recirculation sump, the UHS temperature can have an effect on fuel cladding temperatures. As documented in ADAMS Accession No. ML21154A046 (NRC SER for 102.8 °F, July 13, 2021) the fuel Peak Clad Temperature is not challenged by the increase in UHS temperature.

NRC RAI B

It appears that Required Action A.1.2 is intended to limit the time the UHS temperature is above the currently approved UHS temperature limit of 102°F and below the “maximum analyzed temperature” to 7 days. However, as discussed above in RAI A, if the Condition were exited overnight given the diurnal cooling and then reentered the next day, the 7 days would be irrelevant as the completion time clock would reset. This is inconsistent with the intent of the Use and Application rules as stated in Section 1.3 of the Braidwood TS.

Braidwood TS Section 1.3 states:

It is possible to alternate between Conditions A, B, and C in such a manner that operation could continue indefinitely doing so would be inconsistent with the basis of the Completion Times. Therefore, there shall be administrative controls to limit the maximum time allowed for any combination of Conditions that result in a single contiguous occurrence of failing to meet the LCO. These administrative controls shall ensure that the Completion Times for those Conditions are not inappropriately extended.

NRC staff requests the licensee to:

- a) provide details of any administrative controls that would allow the 7 days completion time to remain in effect if the overnight temperature of the UHS falls below 102°F, and
- b) provide the technical basis for A.1.2 which allows operation to continue at UHS temperatures above the currently approved limit of 102°F for 7 days.

CEG Response to NRC RAI B(a)

Constellation Energy Generation (CEG) currently operates Braidwood under the current TSs based which are based on NUREG-1431 (Reference 3). The NRC approved the adoption of TSTF-439, Eliminate Second Completion Times Limiting Time Frame from Discovery of Failure to Meet an LCO, Revision 2, with Amendment Nos. 203 issued to Braidwood, Units 1 and 2, dated October 8, 2019 (ML19266A527). Consistent with TSTF-439, the approved change: (1)

ATTACHMENT 1
Response to Request for Additional Information

modified Braidwood Technical Specifications Completion Times Example 1.3-3 to eliminate the second Completion Times contained within and revised the discussion in the Example to state that alternating between Conditions in such a manner that operation could continue indefinitely without ever restoring systems to meet the LCO is inconsistent with the basis of the Completion Times and is inappropriate, and (2) removed second Completion Times contained in the TS. Under the same methodology of the approved license amendment, CEG added a requirement to Section 1.3 of TS to require administrative controls to limit the maximum time allowed for any combination of conditions that result in a single contiguous occurrence of failing to meet the LCO.

CEG implemented a procedure revision to fleet procedure OP-AA-108-104, Tech Specification Compliance, Revision 3 to implement the requirements contained in TSTF-439 that applies to all TS Completion Times. The revision was approved for implementation on November 14, 2019 and added section 2.8 "LCO Completion Time"; which, adds wording similar to TS 1.3.

Operations currently monitors the Ultimate Heat Sink (UHS) temperature by averaging the running Essential Service Water (SX) pump discharge temperatures. This temperature is recorded twice per day in the Shiftly And Daily Operating Surveillance when in Modes 1-4 (1/2BwOSR 0.1-1,2,3 for Modes 1, 2, and 3, and 1/2BwOSR 0.1-4 for Mode 4). When the UHS temperature is >99.0 °F operations measures the UHS temperature locally at a spare thermowell using precision instrumentation. In addition, the LCO 3.7.9 Tech Spec Conditions and Required Actions are controlled in administrative procedure 1/2BwOL 3.7.9, "LCOAR Ultimate Heat Sink (UHS) Tech Spec LCO 3.7.9.

Applicable Shiftly And Daily Operating Surveillances and administrative procedures will be revised to include local precision instrument monitoring once per 4 hours when the UHS temperature is >102 °F. The maximum analyzed UHS temperature limit will be documented in the procedures 1/2BwOSR 0.1-1,2,3, for Modes 1, 2, and 3, 1/2BwOSR 0.1-4, for Mode 4, and 1/2BwOL 3.7.9 for use by Operations.

In addition to the aforementioned changes, CEG will include the information for the Engineering Change as a reference to the procedures and the maximum analyzed temperature that has been evaluated for the initial implementation. Following implementation and prior to periods where the UHS average temperature may be challenged a review will be conducted to determine if the Engineering Change or procedures need to be revised from the previous implementation to update the maximum analyzed temperature.

In summary, the administrative controls imposed by CEG will increase the monitoring of the UHS average temperature to ensure that the maximum analyzed temperature will be met during the period when the UHS temperature exceeds the LCO limit. The time period that is allowed to exceed TS 3.7.9 UHS temperature limit of 102 °F is limited to 7 days. For this time period, the results of the Design Basis Analysis for peak calculated Containment internal pressure are maintained up to a UHS temperature of 104 °F. Compliance with TS 5.5.16 is maintained.

CEG Response to NRC RAI B(b)

In accordance with the proposed TS markups provided in Attachment 2, Required Action A.1.2 has been revised to Required Action A.2.

ATTACHMENT 1
Response to Request for Additional Information

The Braidwood Ultimate Heat Sink maximum analyzed temperature does have a limiting value which is controlled by the Braidwood Technical Specifications as discussed in the response to RAI A above. Therefore, up to a UHS temperature of 104 °F, compliance is maintained with the TS purpose as stated in the final policy statement on Technical Specifications.

The time period that is allowed to exceed TS 3.7.9 UHS temperature limit of 102 °F is limited to 7 days. During this time period, the results of the Design Basis Analysis for peak calculated Containment internal pressure are maintained up to a UHS temperature of 104 °F. Compliance with TS 5.5.16 is maintained.

The time period when the UHS temperature is above 102 °F does not create the possibility of an abnormal situation or event giving rise to an immediate threat to the public health and safety because all of the applicable analyses and evaluations will continue to be met.

Increasing the UHS temperature above 104 °F would result in a higher calculated Containment internal pressure. Increasing the peak calculated Containment internal pressure above the values in TS 5.5.16 requires NRC approval.

Braidwood could operate with the UHS temperature up to 104 °F indefinitely given that the other system parameters are maintained within their current operating limits. The most restrictive limit is the RCFC cooling water temperature of 104 °F. Required Action A.2 verifies the margins to those contained in the design basis analyses and evaluations within 7 days to ensure that the risk associated with exceeding the SR 3.7.9.2 limit for average UHS temperature is appropriately managed during the short period of time. Past historical temperature trending of the UHS provides reasonable assurance that a prolonged period of higher temperatures will not exceed a period of 7 days.

If the water temperature of the UHS exceeds the limits of the maximum analyzed temperature or 7 days, Condition B must be entered immediately, requiring entry into MODE 3 within 12 hours and entry into MODE 5 within 36 hours.

NRC RAI C

Regulatory Guide (RG) 1.27, "Ultimate Heat Sink for Nuclear Power Plants," Revision 2, dated January 1976, provides an acceptable approach for satisfying General Design Criteria 2 and 44. The application indicates that the UHS design analysis methodology is based on RG 1.27, Revision 2, and NUREG-0693, "Analysis of Ultimate Heat Sink Cooling Ponds," dated November 1980.

RG 1.27 C.1.b states, "Sufficient conservatism should be provided to ensure that a 30 day cooling supply is available and that design-basis temperatures of equipment that is important to safety are not exceeded. For UHSs where the water supply may be limited or the temperature of plant intake water from the UHS eventually may become critical (e.g., ponds, lakes, cooling towers, or other UHSs where recirculation between plant cooling water discharge and intake can occur), transient analyses of supply and/or temperature, as appropriate, should be performed. The transient analysis for the effluent from one unit affecting the performance of an adjacent unit should also be considered, for both normal operation and accident conditions. The analysis should account for all variations of design parameters and the full range of operating conditions that may exist at the time of the postulated event. This type of analysis is commonly accomplished when the most severe set of operating parameters and/or operational

ATTACHMENT 1
Response to Request for Additional Information

conditions is assumed to occur simultaneously and is commonly referred to as a bounding analysis. Alternatives to this approach should be communicated to the NRC staff for review.”

The current TS temperature limit is based on the conclusion of the bounding analysis for UHS average water temperature less than 102°F. As indicated in RG 1.27, the analysis should account for all variations of design parameters and the full range of operating conditions that may exist at the time of the postulated event. With the proposed TS use of an undefined “maximum analyzed temperature limit,” there is no identified current bounding value.

- a) Please describe how “the maximum analyzed temperature limit” will be defined and how the methodology accounts for all variations of design parameters and the full range of operating conditions that may exist at the time of the postulated event.
- b) Please clarify the method that alternatives to this approach will be communicated to the NRC staff for review, as indicated in RG 1.27.

CEG Response to NRC RAI C

The determination of the maximum analyzed temperature does not change inputs to the UHS Design Basis analysis. The limiting case from the DBA has been run with a UHS starting temperature of 104 °F to confirm the assumptions for the post-accident UHS temperature are supported:

- RCFC Heat removal with SX temperature of 104 °F. The maximum containment pressure and temperature occur early in the event, well before the UHS temperature increases above 104 °F.
- The maximum post accident UHS temperature remains below 106 °F. The post-accident performance of the equipment served by SX has been analyzed for a supply SX temperature of 106°F.

The maximum analyzed temperature will be determined following the same method discussed in ADAMS Accession No. ML21154A046 (SER for 102.8 °F in 2021).

The maximum analyzed temperature will be limited to 104 °F as discussed in RAI A.

NRC RAI D

The use of the OR statement in the construct of the proposed TS could lead to confusion on what action should be taken if the Required Actions of A.1.1 and A.1.2 are not met in their Completion Times (would the facility enter LCO 3.0.3 or A.2.1 and A.2.2?).

Clarify the intent of the OR statement and whether moving the proposed Required Actions A.2.1 and A.2.2 to a new Condition B to be entered if the Required Actions and Completion Times of Condition A are not met would meet the intent of the proposed TS.

CEG Response to NRC RAI D

ATTACHMENT 1
Response to Request for Additional Information

The Technical Specification (TS) markup included with the original submittal (Reference 1) was prepared with the intent that if Required Actions A.1.1 and A.1.2 could not be completed in their associated Completion Times, that Required Actions A.2.1 and A.2.2 would be implemented. To alleviate any confusion and to maintain the same intent as the initial TS markup, a revised TS markup is provided in Attachment 2 of this document. In the revised TS markup, Condition B was added, which states "Required Action and associated Completion Time of Condition A not met". Required Actions A.1.1 and A.1.2 are now A.1 and A.2, respectively, and Required Actions A.2.1 and A.2.2 are now B.1 and B.2 respectively. The TS markup provided in Attachment 2 supersedes the previous TS markup provided in Reference 1.

ATTACHMENT 2

**BRAIDWOOD STATION
UNITS 1 and 2**

Renewed Facility Operating License Nos. NPF-72 and NPF-77

Docket Nos. STN-50-456 and STN-50-457

Markup of Technical Specifications Pages

3.7.9-1

3.7.9-2

3.7 PLANT SYSTEMS

3.7.9 Ultimate Heat Sink (UHS)

LCO 3.7.9 The UHS shall be OPERABLE.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. UHS inoperable due to average water temperature.	A.1 Verify UHS average water temperature at or below the maximum analyzed temperature limit.	Immediately <u>AND</u> Once per 4 hours thereafter
	<u>AND</u> A.2 Verify UHS average water temperature within limit.	7 days
B. Required Action and associated Completion Time of Condition A not met.	B.1 Be in MODE 3.	12 hours
	<u>AND</u> B.2 Be in MODE 5.	36 hours
C. UHS inoperable for reasons other than Condition A.	C.1 Be in MODE 3.	6 hours
	<u>AND</u> C.2 Be in MODE 5.	36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.7.9.1	Verify water level of UHS is \geq 590 ft Mean Sea Level (MSL).	In accordance with the Surveillance Frequency Control Program
SR 3.7.9.2	Verify average water temperature of UHS is $\leq 102.8^{\circ}\text{F}$ until September 30, 2021. After September 30, 2021, verify average water temperature of UHS is $\leq 102^{\circ}\text{F}$.	In accordance with the Surveillance Frequency Control Program
SR 3.7.9.3	Verify UHS contains a water volume of \geq 555.8 acre-feet	In accordance with the Surveillance Frequency Control Program