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RS-19-058

10 CFR 50.90

May 23, 2019

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: Supplement to Quad Cities Nuclear Power Station Application to Increase Technical Specifications Allowable MSIV Leakage Rates and Revise Secondary Containment Surveillance Requirement 3.6.4.1.1

References:

1. Letter from P.R. Simpson (Exelon Generation Company, LLC) to U.S. Nuclear Regulatory Commission, "Application to Increase Technical Specifications Allowable MSIV Leakage Rates and Revise Secondary Containment Surveillance Requirement 3.6.4.1.1," dated March 5, 2019 (ML19064B369)

2. Letter from K.C. Green (NRC) to B.C. Hanson (EGC), "Quad Cities Nuclear Power Station, Units 1 and 2 – Supplemental Information Needed for Acceptance of License Amendment Request to Increase Main Steam Isolation Valve Allowable Leakage Rates (EPID L-2019-LLA-0045)," dated May 15, 2019 (ML19134A279)

In the Reference 1 letter, Exelon Generation Company, LLC, (EGC) requested an amendment to the Technical Specifications (TS) for Quad Cities Nuclear Power Station (QCNPS), Units 1 and 2. The proposed change would revise TS 3.6.1.3, "Primary Containment Isolation Valves (PCIVs)," Surveillance Requirement (SR) 3.6.1.3.10 by revising the combined Main Steam Isolation Valve (MSIV) leakage rate limit for all four steam lines; add a new TS 3.6.2.6, "Residual Heat Removal (RHR) Drywell Spray" to reflect the crediting of drywell spray for fission product removal; and revise TS 3.6.4.1, "Secondary Containment," SR 3.6.4.1.1 to address short-duration conditions during which the secondary containment pressure may not meet the SR pressure requirement.

In response to Reference 2, supplemental information is being provided to support the NRC's review of the EGC licensing request submitted on March 5, 2019. Attachment 1 provides the response to the request for supplemental information. Attachment 2 provides an updated mark-up of the proposed drywell spray TS, which is revised in response to the request for supplemental information. The other TS mark-ups previously provided in Reference 1 are unchanged. Attachment 3 provides corresponding revision to the drywell spray TS Bases

pages and is provided for information only. The other TS Bases mark-ups previously provided in Reference 1 are unchanged.

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 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 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.

EGC is notifying the State of Illinois of this supplement to a previous application for a change to the operating license by sending a copy of this letter and its attachment to the designated State Official in accordance with 10 CFR 50.91, "Notice for public comment; State consultation," paragraph (b).

Approval of the proposed amendment continues to be requested by March 5, 2020.

There are no regulatory commitments contained in this letter. Should you have any questions concerning this letter, please contact Ms. Rebecca L. Steinman at (630) 657-2831.

I declare under penalty of perjury that the foregoing is true and correct. Executed on the 23rd day of May 2019.

Respectfully,

Patrick R. Simpson
Manager – Licensing
Exelon Generation Company, LLC

Attachments:
1 Response to NRC Request for Supplemental Information
2. Revised Mark-up of QCNPS, Units 1 and 2 Technical Specifications Pages
3. Revised Mark-up of QCNPS, Units 1 and 2 Technical Specifications Bases Pages – For Information Only

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

ATTACHMENT 1
Response to NRC Request for Supplemental Information

NRC Request 1

Proposed TS 3.6.2.6 Condition C, does not propose to exit the mode of applicability, and instead requests a Mode 3 end state. In the STS this end state was established by TSTF-423 which includes licensee commitments. Because a loss-of-coolant accident (LOCA) is probable in Mode 3 and the RHR drywell spray system is credited for fission product removal following a design basis loss of coolant accident, a technical evaluation is necessary that explains why Mode 3 end state should be applied to TS 3.6.2.6 Condition C. Any licensee commitments should also be discussed in your response. Provide a technical evaluation explaining why a Mode 3 end state should be applied to TS 3.6.2.6, Condition C.

EGC Response 1

As described in Section 2.2 of the March 5, 2019 license amendment request (LAR), the proposed drywell spray TS, Limiting Condition of Operation (LCO), applicability, action statements, and SRs were patterned after existing TS 3.6.2.4, "Residual Heat Removal (RHR) Suppression Pool Spray." The TSTF-423 change to Condition C of TS 3.6.2.4 which allows remaining in MODE 3 was inadvertently applied to proposed TS 3.6.2.6 Condition C. However, MODE 3 is not the lowest overall plant risk for the drywell spray function of removing fission products from the drywell atmosphere under post-LOCA conditions. Therefore, as shown in Attachment 2 proposed Condition C is revised such that the plant must be brought to least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Times are reasonable based on operating experience, and consistent with Completion Times for the same Condition in existing drywell spray TS at Edwin Hatch Units 1 and 2, Monticello, Nine Mile Point 2, Peach Bottom Units 2 and 3, and Browns Ferry Units 1, 2, and 3.

NRC Request 2

STS LCO 3.6.2.4, allows an 8-hour completion time, when a loss of safety function occurs, based upon the presence of alternative methods to perform the lost safety function. Proposed TS 3.6.2.6, Condition B, allows a loss of system function for 8 hours. However, the NRC staff cannot find a technical evaluation that explains the alternative methods to perform the function which supports this request in the LAR. Therefore, provide a technical evaluation that explains the alternative methods to perform the function which supports a loss of safety function in TS 3.6.2.6, Condition B.

EGC Response 2

The "information only" TS Bases 3.6.2.6 provided in Attachment 4 to the March 5, 2019 LAR indicate that the proposed 8-hour Completion Time for proposed TS 3.6.2.6 Condition B is based on the low probability of a DBA occurring during the short-period that the drywell spray function is lost. This time frame is unchanged from the current Technical Requirements Manual (TRM) Condition B Completion Time of 8-hours, which had been part of the TS prior to the implementation of the Improved Standard Technical Specifications at QCNPS. Unlike the corresponding Bases for the suppression pool spray TS 3.6.2.4, there is no mention of alternative methods in the proposed Bases for the proposed drywell spray TS because there are no alternative methods for scrubbing fission products from primary containment.

NRC Request 3

The regulation 10 CFR 50.36 states that SRs assure that the necessary quality of systems and components is maintained, that facility operation will be within safety limits, and that the LCO will be met. However, the NRC staff did not find a technical evaluation that explains how the proposed SRs assure that the system design requirements will be maintained (e.g., flow rates assumed in the radiological consequence analysis will be maintained). Therefore, provide a technical evaluation that explains each SR that is necessary to meet the LCO and discuss how the SR maintains the system and its components consistent with the safety functions credited in the new LOCA analysis.

EGC Response 3

Surveillance Requirements (SRs) ensure that the drywell spray flow rate of 2,352 gpm used to calculate the spray removal coefficient in the LOCA dose technical evaluation QDC-0000-N-1481 remains valid. The conservative drywell spray flow rate of 2,352 gallons per minute (gpm) is based on each of the 160 drywell spray nozzles providing 14.7 gpm.

UFSAR Section 6.2.1.3.3 states that the design basis drywell spray flow is 4,750 gpm and wetwell spray flow rate is 250 gpm. Existing SR 3.6.2.3.2 requires that each required RHR pump develops a flow rate greater than or equal to 5000 gpm while operating in the suppression pool cooling mode, which is substantially greater than the 2,352 gpm assumed for the spray removal coefficient.

SR 3.6.2.6.1 ensures that a flow path exists between the residual heat removal (RHR) pumps and the drywell spray nozzles so that the flow path is available following a LOCA. SR 3.6.2.6.2 ensures that there are no blockages that would affect the spray pattern which would invalidate the radionuclide removal coefficients calculated in the QCNPS LOCA dose technical evaluation QDC-0000-N-1481. SR 3.6.2.6.3 ensures that the normally water-filled lines of the residual heat removal system do not have gas accumulation to prevent water hammer damage to residual heat removal components.

NRC Request 4

The SR frequencies in proposed TS 3.6.2.6 all state, “In accordance with the Surveillance Frequency Control Program.” However, the following information is missing from the LAR:

a. The new SRs base surveillance frequency intervals for inclusion into the surveillance frequency control program.
b. Discussion of whether the new surveillance test intervals can be modeled in the plant specific PRA.
c. A discussion of the request to include the new SRs into the previously approved surveillance frequency control program (ADAMS Accession No. ML102920260).

Provide a technical evaluation that discusses the above information.

EGC Response 4

As described in the LAR dated March 5, 2019, the TS for drywell spray currently resides in the TRM because the current licensing basis does not credit the system for accident mitigation. The surveillance frequencies that presently exist in TRM 3.6.a will be duplicated in the Surveillance Frequency Control Program (SFCP) at the same time the proposed amendment, if approved, is implemented at the site. This was partially described at the top of Attachment 1, page 6 of the March 6, 2019 submittal which states: "EGC will separately make supporting changes to the TRM for RHR Drywell Spray and for Surveillance Frequency Control Program information; these mark-ups are not included in this document and will be made in accordance with approved plant change processes for these documents." This means that TRM TLCO 3.6.a will be deleted when the new drywell spray TS is implemented, and the associated SR frequencies will be added to TRM Appendix I, which is the QCNPS SFCP list of controlled frequencies.

In terms of specific surveillance frequencies, the SR 3.6.2.6.1 frequency for valve positions will remain 31 days, consistent with the current TRM surveillance. Similarly, the SR 3.6.2.6.2 frequency for the Spray Nozzles will remain 10 years. The new SR 3.6.2.6.3 checking for gas accumulation will match the corresponding RHR suppression pool spray SR frequency of 184 days. These surveillance frequencies are consistent with suppression pool cooling and suppression pool spray surveillance frequencies.

Motor-operated valves 1(2)-1001-23A(B) and 1(2)-1001-26A(B), A(B)Containment Spray Loop Upstream and Downstream Stop Valves respectively, are explicitly modeled in the Quad Cities Full Power Internal Events Level 1 and Level 2 PRA fault trees and the Quad Cities Fire PRA fault trees, capturing the drywell spray function for primary containment cooling. The drywell spray function for fission product scrubbing is implicitly modeled, where successful spray implies successful scrubbing. The drywell spray nozzles are not explicitly modeled in the PRA. However, the proposed Surveillance Requirement test intervals for Residual Heat Removal Drywell Spray (31 days for SR 3.6.2.6.1, 10 years for SR 3.6.2.6.2, and 184 days for SR 3.6.2.6.3) can be represented in the Quad Cities PRA either explicitly or implicitly.

NRC Request 5

An implementation schedule (e.g., the first performance is due at the end of the first surveillance interval, which begins on the date of implementation of this amendment) for the new SRs intervals in TS 3.6.2.6 was not included in the license amendment request. Provide the implementation schedule for the new SRs intervals and why it is appropriate.

EGC Response 5

The TRM frequencies will not change when the requirements are moved back to the TS. The due dates for the existing surveillances will determine the next applicable due date for SR 3.6.2.6.1 (valve position) and SR 3.6.2.6.2 (spray nozzles). SR 3.6.2.6.2 surveillances are scheduled for completion within the current grace period which ends on 11/10/2021 for Unit 1 and 9/16/2020 for Unit 2.

The gas accumulation surveillance, SR 3.6.2.6.3, is new for drywell spray, but it will be bundled into the existing RHR related surveillance for gas accumulation, and thus be tied to the existing due dates.

ATTACHMENT 2

QUAD CITIES NUCLEAR POWER STATION
UNITS 1 AND 2

Docket Nos. 50-254 and 50-265

Facility Operating License Nos. DPR-29 and DPR-30

REVISED MARK-UP OF QCNPS, UNITS 1 AND 2
TECHNICAL SPECIFICATIONS PAGES

3.6 CONTAINMENT SYSTEMS

3.6.2.6 Residual Heat Removal (RHR) Drywell Spray

LCO 3.6.2.6 Two RHR drywell spray subsystems shall be OPERABLE.

APPLICABILITY: MODES 1, 2, and 3.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
A. One RHR drywell spray subsystem inoperable.	A.1 Restore RHR drywell spray subsystem to OPERABLE status.	7 days
B. Two RHR drywell spray subsystems inoperable.	B.1 Restore one RHR drywell spray subsystem to OPERABLE status.	8 hours
C. Required Action and associated Completion Time not met.	C.1 Be in MODE 3. AND C.2 Be in MODE 4.	12 hours 36 hours

SURVEILLANCE REQUIREMENTS

SURVEILLANCE		FREQUENCY
SR 3.6.2.6.1	Verify each RHR drywell spray subsystem manual and power operated valve in the flow path that is not locked, sealed, or otherwise secured in position, is in the correct position or can be aligned to the correct position.	In accordance with the Surveillance Frequency Control Program
SR 3.6.2.6.2	Verify each drywell spray nozzle is unobstructed.	In accordance with the Surveillance Frequency Control Program
SR 3.6.2.6.3	Verify RHR drywell spray subsystem locations susceptible to gas accumulation are sufficiently filled with water.	In accordance with the Surveillance Frequency Control Program

ATTACHMENT 3

QUAD CITIES NUCLEAR POWER STATION
UNITS 1 AND 2

Docket Nos. 50-254 and 50-265

Facility Operating License Nos. DPR-29 and DPR-30

REVISED MARK-UP OF QCNPS, UNITS 1 AND 2
TECHNICAL SPECIFICATIONS BASES PAGES – FOR INFORMATION ONLY

B 3.6 CONTAINMENT SYSTEMS

B 3.6.2.6 Residual Heat Removal (RHR) Drywell Spray

BASES

BACKGROUND

The RHR drywell spray system is operated post-loss-of-coolant accident (LOCA) to remove inorganic iodines and particulates from the drywell atmosphere by washing, or scrubbing, them into the suppression pool.

Each of the two RHR drywell spray subsystems contains two pumps, one heat exchanger, drywell spray valves, and a spray header inside the drywell. Each RHR drywell spray subsystem is capable of recirculating water from the RHR suppression pool through a heat exchanger and dispersed through the RHR drywell spray nozzles. The spray then effects a scrubbing or washing of the drywell atmosphere.

The LOCA radiological dose analysis credits the RHR drywell spray system for scrubbing radionuclides from the drywell air space.

The drywell spray mode of RHR is described in the UFSAR, Reference 1.

APPLICABLE SAFETY ANALYSES

The RHR drywell spray is credited post-LOCA for scrubbing inorganic iodines and particulates from the drywell atmosphere. This function reduces the amount of airborne activity available for leakage from the drywell to ensure that the radiological consequences from the accident remain within the limits of 10 CFR 50.67 (Ref. 4). The RHR drywell spray can also be used to reduce the temperature and pressure in the drywell, which reduces the leak rate of airborne activity from primary containment. However, RHR drywell spray is not required to maintain the drywell temperatures and pressures below the design limits.

Reference 2 contains the results of the analysis used to predict the effects of drywell spray on the post-accident primary containment atmosphere.

The RHR drywell spray system satisfies Criterion 3 of 10 CFR 50.36(c)(2)(ii).

(continued)

BASES (continued)

LCO

In the event of a Design Basis Accident (DBA), a minimum of one RHR drywell spray subsystem using one RHR pump is required to adequately scrub the inorganic iodines and particulates from the primary containment atmosphere. To ensure that these requirements are met, two RHR drywell spray subsystems must be OPERABLE with power from two safety related independent power supplies. Therefore, in the event of an accident, at least one subsystem is OPERABLE assuming the worst case single active failure. An RHR drywell spray subsystem is OPERABLE when one of the pumps and associated piping, valves, instrumentation, and controls are OPERABLE. Management of gas voids is important to RHR drywell spray system OPERABILITY.

APPLICABILITY

In MODES 1, 2, and 3, a DBA could release fission products into the primary containment. In MODES 4 and 5, the probability and consequences of these events are reduced due to the pressure and temperature limitations in these MODES. Therefore, maintaining RHR drywell spray subsystems OPERABLE is not required in MODE 4 or 5.

ACTIONS

A.1

With one RHR drywell spray subsystem inoperable, the inoperable subsystem must be restored to OPERABLE status within 7 days. In this condition, the remaining OPERABLE RHR drywell spray subsystem is adequate to perform the primary containment fission product scrubbing function. However, the overall reliability is reduced because a single failure in the OPERABLE subsystem could result in the loss of the scrubbing capability of the RHR drywell spray system. The 7-day Completion Time was chosen in light of the redundant RHR drywell spray capabilities afforded by the OPERABLE subsystem and the low probability of a DBA occurring during this period.

B.1

With both RHR drywell spray subsystems inoperable, at least one subsystem must be restored to OPERABLE status within 8 hours. In this condition, there is a substantial loss of the fission product scrubbing function of the RHR drywell

(continued)

BASES

ACTIONS

B.1 (continued)

spray system. The 8-hour Completion Time is based on this loss of function and is considered acceptable due to the low probability of a DBA.

C.1 and C.2

If any Required Action and associated Completion Time cannot be met, the plant must be brought to a MODE in which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 12 hours and to MODE 4 within 36 hours. The allowed Completion Time is reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

SURVEILLANCE REQUIREMENTS

SR 3.6.2.6.1

Verifying the correct alignment for manual and power operated valves in the RHR drywell spray mode flow path provides assurance that the proper flow path exists for system operation. This SR does not apply to valves that are locked, sealed, or otherwise secured in position since these valves were verified to be in the correct position prior to locking, sealing, or securing. A valve is also allowed to be in the non-accident position provided it can be aligned to the accident position within the time assumed in the accident analysis. This is acceptable since the RHR drywell spray mode is manually initiated. This SR does not require any testing or valve manipulation; rather, it involves verification that those valves capable of being mispositioned are in the correct position. This SR does not apply to valves that cannot be inadvertently misaligned, such as check valves.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

SR 3.6.2.6.2

This surveillance is performed to verify that the spray nozzles are not obstructed and that spray flow will be provided when required. The Surveillance Frequency is controlled under the Surveillance Frequency Control Program.

SR 3.6.2.6.3

RHR drywell spray system piping and components have the potential to develop voids and pockets of entrained gases. Preventing and managing gas intrusion and accumulation is necessary for proper operation of the RHR drywell spray subsystems and may also prevent water hammer and pump cavitation.

Selection of RHR drywell spray system locations susceptible to gas accumulation is based on a review of system design information, including piping and instrumentation drawings, isometric drawings, plan and elevation drawings, and calculations. The design review is supplemented by system walk downs to validate the system high points and to confirm the location and orientation of important components that can become sources of gas or could otherwise cause gas to be trapped or difficult to remove during system maintenance or restoration. Susceptible locations depend on plant and system configuration, such as stand-by versus operating conditions.

The RHR drywell spray system is OPERABLE when it is sufficiently filled with water. Acceptance criteria are established for the volume of accumulated gas at susceptible locations. If accumulated gas is discovered that exceeds the acceptance criteria for the susceptible location (or the volume of accumulated gas at one or more susceptible locations exceeds an acceptance criteria for gas volume at the suction or discharge of a pump), the Surveillance is not met. If it is determined by subsequent evaluation that the RHR drywell spray system is not rendered inoperable by the accumulated gas (i.e., the system is sufficiently filled with water), the Surveillance may be declared met. Accumulated gas should be eliminated or brought within the acceptance criteria limits.

(continued)

BASES

SURVEILLANCE REQUIREMENTS

SR 3.6.2.6.3 (continued)

RHR drywell spray system locations susceptible to gas accumulation are monitored and, if gas is found, the gas volume is compared to the acceptance criteria for the location. Susceptible locations in the same system flow path which are subject to the same gas intrusion mechanisms may be verified by monitoring a representative subset of susceptible locations. Monitoring may not be practical for locations that are inaccessible due to radiological or environmental conditions, the plant configuration, or personnel safety. For these locations alternative methods (e.g., operating parameters, remote monitoring) may be used to monitor the susceptible location. Monitoring is not required for susceptible locations where the maximum potential accumulated gas void volume has been evaluated and determined to not challenge system OPERABILITY. The accuracy of the method used for monitoring the susceptible locations and trending of the results should be sufficient to assure system OPERABILITY during the Surveillance interval.

The Surveillance Frequency is controlled under the Surveillance Frequency Control Program. The Surveillance Frequency may vary by location susceptible to gas accumulation.

REFERENCES

1. UFSAR, Section 6.2.2.2.

2. UFSAR, Section 15.6.5.

3. 10 CFR 50.36(c)(2)(ii).

4. 10 CFR 50.67, "Accident Source Term."