

February 29, 2024

10 CFR 50.55a

RS-24-015

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, D.C. 20555-0001Quad 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: Submittal of RP-01 Relief Request Associated with the Sixth Inservice Testing Interval

The purpose of this letter is to request approval of a proposed relief request in accordance with 10 CFR 50.55a, *Codes and standards*, paragraph (z)(2) for a hardship or unusual difficulty without a compensating increase in level of quality or safety. The attached relief request is associated with the sixth 10-year inservice testing (IST) interval for Quad Cities Nuclear Power Station (QCNPS). The sixth 10-year interval began on August 18, 2023 and is required by 10 CFR 50.55a(f)(4) to comply with the requirements of the American Society of Mechanical Engineers (ASME) Operation and Maintenance (OM) Code (2017 Edition, no Addenda).

Relief is requested due to the hardship of satisfying the requirements of the ASME OM Code, Division 1, Mandatory Appendix V-2000, due to the extensive modification required to perform a pump periodic verification test (PPVT) on core spray pumps at their highest design basis accident flow rate of 5650 gpm without injecting into the reactor pressure vessel (RPV).

The performance of the PPVT for the core spray system is due August 18, 2025; however, ideally this test would be performed during a refueling outage. Therefore, CEG seeks authorization of this request by September 1, 2024, to allow time to scope this test into an outage if the request is not approved.

There are no regulatory commitments contained within this letter. Should you have any questions concerning this letter, please contact Mr. Nicholas Lien at 779-231-6283.

Respectfully,

Humphrey, Digitally signed by
Humphrey, Mark D.
Mark D. Date: 2024.02.29
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Mark Humphrey
Sr. Manager Licensing
Constellation Energy Generation, LLC

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Attachments:

1. 10 CFR 50.55a Relief Request RP-01, Revision 0, Proposed Alternative in Accordance with 10 CFR 50.55a(z)(2), Hardship or Unusual Difficulty without Compensating Increase in Level of Quality or Safety

cc: Regional Administrator – NRC Region III
NRC Senior Resident Inspector – Quad Cities Nuclear Power Station

ATTACHMENT 1
10 CFR 50.55a Relief Request RP-01, Revision 0
Proposed Alternative in Accordance with 10 CFR 50.55a(z)(2)
--Hardship or Unusual Difficulty without
Compensating Increase in Level of Quality or Safety--

1. ASME Code Component(s) Affected

The following core spray pumps are affected:

Component	Description	Class	Group
1-1401A	U1A Core Spray Pump	2	B
1-1401B	U1B Core Spray Pump	2	B
2-1401A	U2A Core Spray Pump	2	B
2-1401B	U2B Core Spray Pump	2	B

2. Applicable Code Edition and Addenda

ASME OM Code, *Operation and Maintenance of Nuclear Power Plants*, 2017 Edition with no Addenda.

3. Applicable Code Requirements

Division 1, Mandatory Appendix V, *Pump Periodic Verification Test Program*, requires the owner to perform a pump periodic verification test (PPVT) at least once every two years.

Mandatory Appendix V, V-2000, *Definitions*, defines the PPVT as a test that verifies a pump can meet the required (differential or discharge) pressure as applicable, at its highest design basis accident flow rate.

4. Reason for Request

In accordance with 10 CFR 50.55a, *Codes and standards*, paragraph (z)(2), an alternative is proposed to the pump test requirements of ASME OM-2017 Appendix V. With the adoption of the ASME OM-2017 Code on August 18, 2023 at the Quad Cities Nuclear Power Station (QCNPS), a new requirement was added to perform periodic verification testing at the pump's highest design basis accident flow rate. The current system test flowpath design is not capable of testing these pumps at these conditions. The only option for achieving the ASME test flow rate is to inject into the reactor pressure vessel (RPV) with water from the torus or condensate storage tank. The basis for the relief request is that compliance with the Code requirements results in hardship or unusual difficulty with no compensating increase in the level of quality and safety.

The core spray system (CSS) is a low-pressure emergency core cooling system (ECCS) designed to inject above the core via a ring header at a flow of 4500 gpm and pressure of 90 psig.

The highest required design basis accident flow rate for the CSS is 5650 gpm at 0 psig for each CSS pump based on Loss of Coolant Accident (LOCA) fuel analysis. Thus, per ASME OM Code Appendix V, this is the CSS design flowrate that is required for PPVT purposes.

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The CSS test return line for each CSS pump is designed to conduct routine system testing at a lesser flowrate of approximately 4500 gpm. This is 80% of the highest design basis accident flowrate. This design allows for testing at a representative point on the pump's performance curve to allow for demonstrating pump performance, but not at the highest design basis accident flowrate.

To meet the PPVT highest required design basis accident flowrate, without major modification to the testing flowpath, the system would have to be lined up to discharge to the reactor pressure vessel (RPV) at 0 psig. This flowpath has potential to introduce unwanted contaminants into the RPV and Reactor Coolant System (RCS), which is contrary to existing NRC, industry, and Constellation guidelines for reactor coolant chemistry controls, thus it has not been used since 2019. However, when this testing was still performed, the pumps were able to achieve 5650 gpm at 0 psig. Table 1 below shows the most recent data.

Table 1: Data from 2013-2019 Demonstrating Core Spray Design Basis Accident Flowrate

Core Spray Pump	Date	Flow (gpm)	Work Order
U1A	3/27/17	5650	01817554-01
U1A	3/02/15	5700	01631385-01
U1A	3/11/13	5700	01444458-01
U1B	3/18/19	5650	4682305-01
U1B	3/27/17	5650	01817554-01
U1B	3/02/15	5700	01631385-01
U2A	3/19/18	5700	01914393-01
U2A	3/21/16	5700	01737384-01
U2A	4/4/14	5800	01528172-01
U2B	3/19/18	5700	01914393-01
U2B	3/21/16	5700	01737384-01
U2B	4/4/14	5650	01528172-01

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Compliance to the new PPVT required flow rate using the CSS test line would require an extensive system redesign and modification that would include installation of additional or larger diameter piping and isolation valves, new hydraulic and seismic evaluations, and likely new supports and snubbers. These modifications would also impact multiple safety systems as a portion of the test line is shared with RHR, HPCI, and RCIC. This would require extended outage time to install. Such a major modification is costly and burdensome with no compensating increase in the level of quality or safety. Performing these modifications is not warranted since there will be no improvement in the ability to detect pump degradation. Testing for the PPVT at an alternate flow rate is proposed and would provide a reasonable assurance of pump operational readiness and an acceptable level of quality and safety.

5. Proposed Alternative and Basis for Use

All core spray pumps have been and will continue to be tested using quarterly and comprehensive test methods in accordance with the ASME OM Code section ISTB-5100, *Centrifugal Pumps (Except Vertical Line Shaft Centrifugal Pumps)*. Pump flow testing of a CSS pump is conducted with pump suction from the torus with water return to the torus. This CSS pump operability and performance testing is currently being performed in accordance with Quad Cities Technical Specification 3.5.1, *ECCS - Operating*.

Data on the pump flow rates and pressures at various points for each CSS loop are obtained at least every two years for comparison with the previously established normal conditions in accordance with the Inservice Testing (IST) program. Testing and baselining of the pump performance test acceptance criteria is reperformed following major maintenance of the CSS pumps in accordance with ISTB-3300, *Reference Values*. Testing of the CSS pumps at a flow rate of approximately 4500 gpm utilizing the existing test return line flow path provides for substantial flow testing in a stable region of the pump curve.

Additional pump performance monitoring conducted for the CSS pumps includes pump-motor bearing temperature monitoring, vibration monitoring performed by CMO, and periodic sampling of the lube oil. Performance monitoring of the CSS pumps indicates the pumps remain capable of meeting their design function and have no indication of degradation. If measured parameters are found to be outside the normal operating range or determined to be trending toward an unacceptable degraded state, then appropriate actions are taken. These actions include monitoring additional parameters, review of specific information to identify cause, and potential removal of the pump from service to perform necessary maintenance. Continued testing in a stable flow range combined with the additional pump performance monitoring provides reliable performance monitoring beyond the requirement prescribed in Appendix V. This reliably validates the ability of each pump to meet the design basis accident flow rates. The testing is also effective for detecting mechanical and hydraulic degradation as required by Subsection ISTB.

Relief is requested pursuant to 10 CFR 50.55a(z)(2) based on the determination that compliance with the PPVT cannot be accomplished without major system modifications. Such a significant change to the system is a hardship or unusual difficulty without a

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compensating increase in the level of quality and safety. The proposed alternative provides reasonable assurance of pump operational readiness and provides an acceptable level of quality and safety.

6. Duration of Proposed Alternative

This request, upon approval, will be applied to the Quad Cities sixth 10-year interval, which began on August 18, 2023, and is scheduled to end on July 17, 2033.

7. Precedents

The following similar hardship relief requests have been previously authorized by the NRC:

- Seabrook Station - Letter from J. Dana (U.S. Nuclear Regulatory Commission) to D. Moul (NextEra), "Seabrook Station, Unit No. 1 – Relief from the Requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code," dated March 17, 2020 (ML20073E434)
- Nine Mile Point - Letter from James G. Danna (Plant Licensing Branch I Division of Operating Reactor Licensing, Office of Nuclear Reactor Regulation) to Mr. David P. Rhoades (Senior Vice President Exelon Generation Company), "Safety evaluation by the Office of the Nuclear Reactor Regulation Alternative Requests CTNSP-PR-01, Rev.0 and CS-PR-01, Rev 0, Related to the Inservice Testing Program Fifth 10 Year Interval, Exelon Generation Company LLC, Nine Mile Point Nuclear Station Unit 1," dated April 22, 2021 (ML21109A216)