Constellation

4300 Winfield Road
Warrenville, IL 60555
630 657 2000 Office

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10 CFR 50.55a

RS-22-030

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: Submittal of Relief Request Associated with the Sixth Inservice Inspection Interval

In accordance with 10 CFR 50.55a, "Codes and standards," paragraph (z)(2), Constellation Energy Generation (CEG), LLC requests NRC approval of the attached relief request associated with the Sixth Inservice Inspection (ISI) Interval for Quad Cities Nuclear Power Station (QCNPS), Units 1 and 2. The Sixth Interval of the QCNPS, Units 1 and 2, ISI Program will comply with the 2017 Edition of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (BPV) Code.

The Sixth ISI Interval at QCNPS will begin on April 2, 2023, and is currently scheduled to end April 1, 2033. Accordingly, CEG requests approval of this request by March 31, 2023, to support the Sixth ISI Interval.

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

Respectfully,

Patrick R. Simpson
Sr. Manager – Licensing
Constellation Energy Generation, LLC

Attachment: Relief Requests Associated with the QCNPS Sixth Inservice Inspection Interval

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

ATTACHMENT

Relief Requests Associated with the QCNPS Sixth Inservice Inspection Interval

A listing of the relief requests associated with the sixth inservice inspection interval for Quad Cities Nuclear Power Station, Units 1 and 2 is provided below.

Designator	Description	Comments
I6R-01	Relief for Inspection of Standby Liquid Control Nozzle Inner Radius	Approved for Fifth ISI Interval

Relief for Inspection of Standby Liquid Control Nozzle Inner Radius in Accordance with 10 CFR 50.55a(z)(2), "Hardship or Unusual Difficulty Without Compensating Increase in the Level of Quality and Safety"

1. ASME Code Component(s) Affected

Code Class:	1
Reference:	IWB-2500, Table IWB-2500-1
Examination Category:	B-D
Item Number:	B3.100
Description:	Inspection of Standby Liquid Control Nozzle Inner Radius
Component Number:	Unit 1: N10 Unit 2: N10
Drawing Number:	Unit 1: M-3106, Sheet 1 Unit 2: M-3116, Sheet 1

2. Applicable Code Edition

The Sixth Interval of the Quad Cities Nuclear Power Station (QCNPS), Units 1 and 2 Inservice Inspection (ISI) Program is based on the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel (BPV) Code, Section XI, 2017 Edition.

3. Applicable Code Requirement

IWB-2500 states that components shall be examined and tested as specified in Table IWB-2500-1.

Table IWB-2500-1 requires a volumetric examination to be performed on the inner radius section of all reactor pressure vessel nozzles each inspection interval.

4. Reason for Request

In accordance with 10 CFR 50.55a(z)(2), relief is requested on the basis that compliance with the specified Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

The Standby Liquid Control (SBLC) nozzle, as shown in Figure I6R-01.1, is designed with an integral socket to which the boron injection piping is welded. The SBLC nozzle is located in the upper segment of the lower head of the reactor pressure vessel in an area that is inaccessible for examination from the inside of the reactor pressure vessel. Therefore, the examination must be performed from the outside surface of the lower reactor pressure vessel head.

An examination from the outside surface is conducted from either the nozzle-to-head outer blend radius or the head (plate) surface near the nozzle. Both examination areas provide a unique approach and are discussed separately.

Because of the small diameter of the SBLC nozzle (i.e., nominal two (2) inches) and the thickness of the lower reactor vessel head (i.e., nominal 6.25 inches), the ratio of the nozzle diameter to the head thickness prevents a meaningful examination from the nozzle-to-head outer blend radius. The inside surface inspection angle, utilizing specialized/contoured

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wedges or shoes, needs to be a mid-range tangential angle (i.e., 30 degrees – 60 degrees) to adequately detect flaws at the inside radius area of interest while scanning from the outer blend. Given the small diameter nozzle and utilizing specialized / contoured wedges or shoes, the angle will be in the low-range of 0 degrees – 15 degrees (i.e., essentially a straight beam) when focused to tangentially coincide with the inner radius area of interest. This low angle will not provide sufficient reflectivity for detection of inservice induced defects.

An examination from the head (plate) surface near the nozzle is also difficult, since the forged nozzle has a stainless steel cladding welded to the inside surface with increased weldment applied at the inner radius area for construction of an engineered socket configuration. After final machining, this engineered socket receives an austenitic internal pipe, which is integrally welded to form a complex cladding / socket configuration. The geometry and change in grain structures at the dissimilar material interface prohibit a timely (i.e., short duration) and meaningful ultrasonic examination of the inside radius section of the nozzle.

Even if a meaningful examination could be completed, the change in grain structure result in mode conversion and angle changes resulting in a significantly longer examination duration being required to resolve a variety of reflective signals. Examination of this unique design is estimated to require a minimum of two hours with a two-person team (i.e., four man-hours) while a typical nozzle inner radius examination will require up to one man-hour with a two-person team.

A review of current ultrasonic techniques was conducted including discussions with the Electric Power Research Institute (EPRI). The long ultrasonic metal path and potential for multiple geometric and dissimilar material reflectors inherent in the nozzle design prevent a meaningful examination from being performed on the inner radius of the SBLC nozzle.

Ultrasonic examination of this configuration will require the use of multiple techniques, modes, angles, and an extensive amount of time on the component for best effort signal discrimination between geometrical and flaw type signals. This unique design is not typical for designs referenced in ASME Section XI, but is more closely related to a dissimilar metal component. The industry currently has a qualified technique for dissimilar metal piping welds, but has not addressed this unique design.

The dose exposure to the technicians performing the examination is a relevant concern. While actions would be taken to provide protection against the inherent radiation field, the large dose rates in the lower head region near the SBLC nozzle present a unique challenge. Dose rates in this region are typically 40 millirem (mrem) per hour. As such, radiation exposure for this examination could easily exceed 160 mrem, based on the general area dose and examination duration.

The proposed relief request will not compromise the level of quality and safety. The inner radius socket attaches to piping that delivers the boron solution far away from the nozzle inside radius. Therefore, the SBLC nozzle inner radius section is not subjected to turbulent mixing conditions that are a concern with other penetrations. In addition, a VT-2 visual

Relief for Inspection of Standby Liquid Control Nozzle Inner Radius in Accordance with 10 CFR 50.55a(z)(2), "Hardship or Unusual Difficulty Without Compensating Increase in the Level of Quality and Safety"

examination of the SBLC nozzle is part of the Class 1 system leakage test scheduled during each refueling outage. This VT-2 visual examination is an ASME Section XI-required examination that verifies structural integrity and leak tightness for the entire Class 1 boundary. During reactor operation, the SBLC nozzle is inaccessible for direct visual observation based on its location in the Drywell. This does not preclude the nozzle from being monitored. Potential leakage from the nozzle would be collected in the drywell sumps, prompting action from the station. Technical Specifications (TS) requirements ensure Reactor Coolant System (RCS) leakage is regularly monitored (i.e., every 12 hours), and specify prudent actions, up to and including reactor shutdown, should predetermined limits be exceeded. These actions ensure that the overall level of plant quality and safety will not be compromised. Historically, no leakage from this nozzle has ever been observed at QCNPS from this location.

Relief is requested in accordance with 10 CFR 50.55a(z)(2) since compliance with the applicable Code requirements would require an ultrasonic examination to be performed on the outside diameter of the reactor pressure vessel. Geometric and material reflectors would prevent a meaningful examination, resulting in inaccurate data. Based on this, the specified Code requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety in accordance with 10 CFR 50.55a(z)(2).

5. Proposed Alternative and Basis for Use

A VT-2 visual examination of the SBLC nozzles at QCNPS, Units 1 and 2, will be part of the scheduled Class 1 system leakage test performed each refueling outage. In addition, the TS Surveillance Requirement (SR) for RCS leakage will be satisfied during plant operation (i.e., TS SR 3.4.4.1). These actions ensure that the overall level of plant quality and safety will not be compromised.

6. Duration of Proposed Alternative

Relief is requested for the Sixth ISI Interval for QCNPS, Units 1 and 2.

7. Precedents

- Letter from T.L. Tate (U.S. NRC) to MJ. Pacillio (Exelon Generation, Company, LLC), "Quad Cities Nuclear Power Station, Units 1 and 2 Safety Evaluation in Support of Request for Relief Associated with the Fifth 10 Year Interval Inservice Inspection Program," dated September 30, 2013 (ADAMS Accession No. ML13267A097)

- Letter from T.L. Tate (U.S. NRC) to MJ. Pacillio (Exelon Generation, Company, LLC), "Dresden Nuclear Power Station, Units 2 and 3 – Safety Evaluation in Support of Request for Relief Associated with the Fifth 10 Year Inservice Inspection Interval Program," dated September 30, 2013 (ADAMS Accession No. ML13260A585)

Relief for Inspection of Standby Liquid Control Nozzle Inner Radius in Accordance with 10 CFR 50.55a(z)(2), "Hardship or Unusual Difficulty Without Compensating Increase in the Level of Quality and Safety"

8. References

None

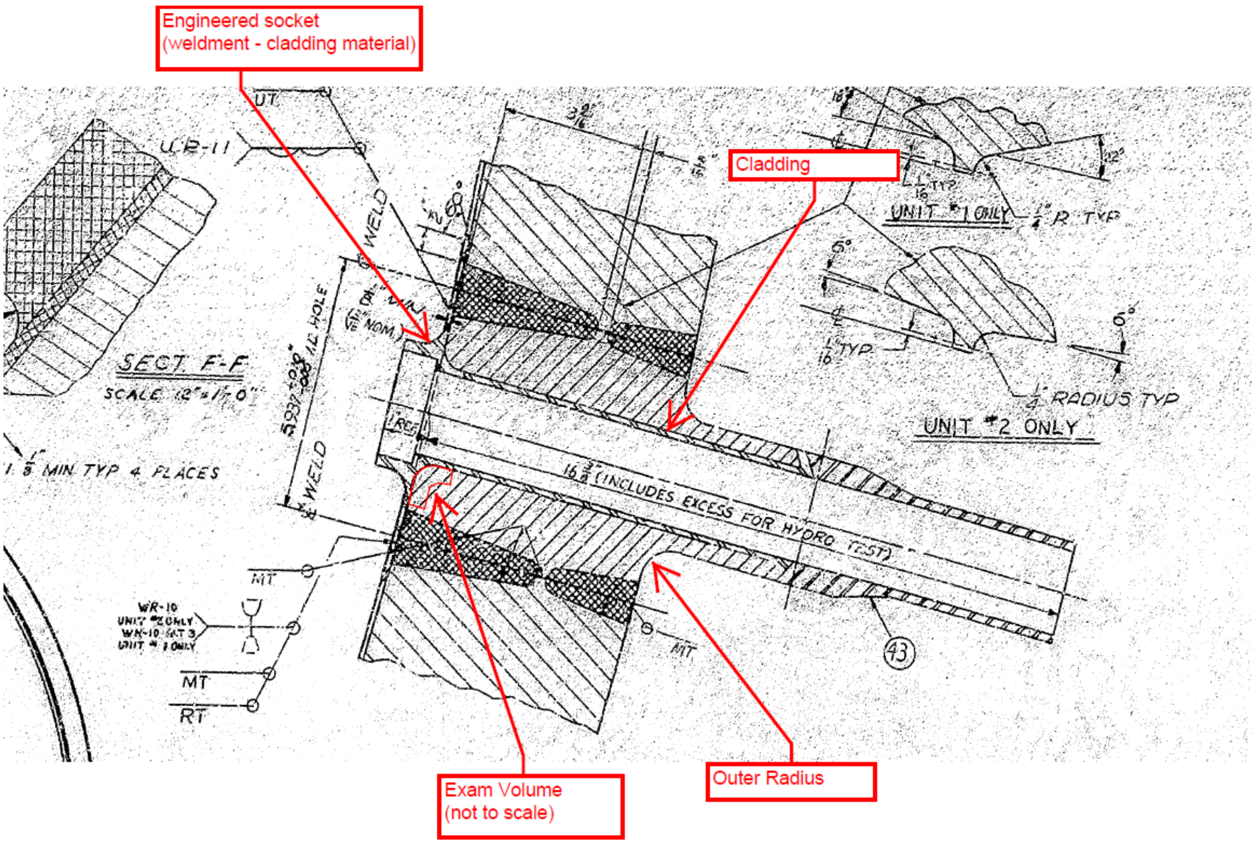

FIGURE I6R-01.1: 2 INCH STANDBY LIQUID CONTROL NOZZLE