



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 10, 2017

Mr. Bryan C. Hanson
President and Chief Nuclear Officer
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: THREE MILE ISLAND NUCLEAR STATION, UNIT 1 – RELIEF FROM THE
REQUIREMENTS OF THE ASME CODE (CAC NO. MF7753)

Dear Mr. Hanson:

By letter dated May 27, 2016, as supplemented by letter dated September 8, 2016 (Agencywide Documents and Access Management System Accession Nos. ML16148A109 and ML16252A427, respectively), Exelon Generation Company, LLC (the licensee) submitted Relief Request RR-16-01, Revision 1, to the U.S. Nuclear Regulatory Commission (NRC) for the use of alternatives to certain American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI requirements at the Three Mile Island Nuclear Station (TMI), Unit 1.

Pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(2), the licensee requested to use an alternative on the basis that complying with the specified requirement would result in hardship or unusual difficulty, without a compensating increase in the level of quality and safety. Specifically, the licensee requested to remove 52 nozzle-to-adapter welds from the examination scope of N-722-1, as specified in the TMI inservice inspection (ISI) program.

The NRC staff has determined, as set forth in the enclosed safety evaluation, that complying with the ASME Code requirement would result in hardship or unusual difficulty, without a compensating increase in the level of quality and safety. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(2), and is in compliance with the ASME Code's requirements. Therefore, the NRC staff authorizes the proposed alternative in Relief Request RR-16-01, Revision 1, in accordance with 10 CFR 50.55a(z)(2) for TMI, Unit 1, for the remaining fourth ISI interval, which ends on April 19, 2022.

This authorization is for the requested relief at TMI, Unit 1, and does not imply or infer the NRC's approval of ASME Code Case N-722-2.

All other ASME Code, Section XI requirements for which relief was not specifically requested and approved remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

B. Hanson

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If you have any questions, please contact the Project Manager, Justin Poole, at 301-415-2048 or by e-mail at Justin.Poole@nrc.gov.

Sincerely,

A handwritten signature in black ink, appearing to read "Stephen S. Koenick". The signature is fluid and cursive, with a large, stylized initial "S" and "K".

Stephen S. Koenick, Acting Chief
Plant Licensing Branch 1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-289

Enclosure:
Safety Evaluation

cc w/enclosure: Distribution via Listserv



UNITED STATES
NUCLEAR REGULATORY COMMISSION
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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELIEF REQUEST RR-16-01, REVISION 1, REGARDING

ALTERNATE EXAMINATION OF WELDS AT BOTTOM OF REACTOR VESSEL

EXELON GENERATION COMPANY, LLC

THREE MILE ISLAND NUCLEAR STATION UNIT 1

DOCKET NO. 50-289

1.0 INTRODUCTION

By letter dated May 27, 2016, (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16148A109), as supplemented by letter dated September 8, 2016, (ADAMS Accession No. ML16252A427), Exelon Generation Company, LLC (the licensee) requested relief from Code Case N-722-1 (N-722-1), "Additional Examinations for PWR Pressure Retaining Welds in Class 1 Components Fabricated with Alloy 600/82/182 Materials, Section XI, Division 1," of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) at the Three Mile Island Nuclear Station (TMI), Unit 1. The licensee submitted Relief Request RR-16-01, Revision 1, to remove 52 nozzle-to-adapter welds from the examination scope of N-722-1, as specified in the TMI inservice inspection (ISI) program.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(2), the licensee requested to use the proposed alternative on the basis that complying with the specified requirement would result in hardship or unusual difficulty, without a compensating increase in the level of quality and safety.

2.0 REGULATORY EVALUATION

The regulation at 10 CFR 50.55a(g)(4) states, in part, that ASME Code Class 1, 2, and 3 components (including supports) shall meet the requirements, except the design and access provisions and the preservice examination requirements, set forth in ASME Code, Section XI, to the extent practical, within the limitations of design, geometry, and materials of construction of components. TMI, Unit 1, complies with ASME Code, Section XI, 2004 Edition, no addenda.

The regulation at 10 CFR 50.55a(z) states, in part, that alternatives to the requirements of 10 CFR 50.55a(g) may be used when authorized by the U.S. Nuclear Regulatory Commission (NRC) if the licensee demonstrates that (1) the proposed alternatives would provide an acceptable level of quality and safety or (2) compliance with the specified requirements would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

Enclosure

The regulation at 10 CFR 50.55a(g)(6)(ii)(E), "Augmented ISI requirements: Reactor coolant pressure boundary visual inspections," requires pressurized-water reactor (PWR) plants to augment their ISI program by implementing N-722-1, with conditions, for Class 1 components that are fabricated from Alloy 600/82/182 materials.

Based on the above, and subject to the following technical evaluation, the NRC staff finds that regulatory authority exists for the licensee to request the use of the alternative and the NRC to authorize the proposed alternative.

3.0 TECHNICAL EVALUATION

3.1 Licensee's Proposed Alternative

There are 52 nozzle penetrations at the bottom of the reactor vessel allowing incore instrumentation piping (guide tubes) to extend into the reactor vessel. Each nozzle penetration is attached to the reactor vessel bottom shell with a J-groove weld. At the bottom of the reactor vessel shell, the incore instrumentation piping is joined to the downstream piping with a nozzle-to-adapter weld. There are 52 J-groove welds and 52 nozzle-to-adapter welds. The weld identifier, RCT0001INCORENOZZLES, applies to all J-groove welds and nozzle-to-adapter welds.

The affected components of the relief request are the 52 nozzle-to-adapter welds. The subject welds are (1) classified as Examination Item B15.80 in accordance with N-722-1 in the TMI ISI program, (2) located below the reactor vessel insulation, (3) less than 1-inch in diameter, (4) made of nickel-based Alloy 82/182 filler metal, and (5) not insulated.

In lieu of required examinations of N-722-1 (per 10 CFR 10 CFR 50.55a(g)(6)(ii)(E)), the licensee proposed to remove the nozzle-to-adapter welds from the examination scope of N-722-1 for the fourth ISI interval, which ends on April 19, 2022. Under the proposed alternative, the licensee will no longer perform the bare metal visual examinations of the subject welds, as required by N-722-1.

The licensee stated that inspection of the 52 incore nozzle-to-adapter welds is conducted in a substantive radiation field and that not inspecting the subject welds would eliminate the radiological hardship and overall station personnel exposure, without an adverse reduction in the level of quality and safety.

The licensee believes that no longer performing the bare metal visual examinations of the subject welds does not create an adverse reduction in the level of quality and safety because the subject welds are less susceptible to primary water stress corrosion cracking (PWSCC), since they experience lower temperatures than those that would cause PWSCC. The licensee noted that N-722-1 was revised to N-722-2 in 2010 with a note that excludes butt welds with an operating temperature less than 525 degrees (°F) from bare metal visual examinations. The licensee further stated that the exclusion of welds that experience 525 °F or less from bare metal visual examinations is consistent with the requirements of ASME Code Case N-770-1, "Additional Examinations for PWR Pressure Retaining Welds in Class 1 Components Fabricated with Alloy 600/82/182 Materials, Section XI, Division 1," that has removed welds at operating temperatures less than 525 °F from the examination scope.

The licensee noted that it will continue to perform visual inspection (VT-2) of the subject welds as part of reactor vessel system leakage (pressure) testing conducted at normal operating temperature and pressure during each refueling outage. The licensee stated that leakage from the subject welds would be visible during the reactor coolant system leakage test, as no insulation is installed over the subject welds.

3.2 NRC Staff Evaluation

The NRC staff notes that it has not approved N-722-2. However, the NRC staff recognizes that Note 2 of N-722-2 states, in part, that the butt welds having an operating temperature less than 525 °F are not required to be examined.

The NRC has approved the use of ASME Code Case N-770-1. Paragraph 1100(c) of N-770-1 excludes the examination of Alloy 82/182 welds that experience temperature that is equal to or less than 525 °F. The licensee stated that the operating temperature at the subject welds is less than 525 °F. Therefore, the NRC staff finds it acceptable that the subject welds are excluded from the bare metal visual examinations, as required by N-722-1.

In addition, the NRC staff notes that the ASME Code, Section XI, IWB-2500, does not require inspections of pipes or tubing that are 1-inch or smaller in diameter. Therefore, the NRC staff finds that the licensee is not required to examine the nozzle-to-adapter welds in accordance with the ASME Code, Section XI.

Notwithstanding the above, as part of the system leakage test required by the ASME Code, Section XI, IWA-5000, licensees are required to perform VT-2 visual examinations of components prior to plant startup after each refueling outage. The licensee stated that it will perform the required reactor coolant system leakage test with associated VT-2 visual examination every refueling outage.

With regard to the VT-2 visual examination, the licensee stated that the bottom of the reactor vessel area includes the incore monitoring piping (guide tubes) and the exposed subject nozzle-to-adapter welds. The welds are located several feet overhead, with configuration preventing short distance direct sight inspection. Plant personnel enter the area under the reactor vessel to perform VT-2 visual examination of various components in accordance with the ASME Code, Section XI, IWA-5241 (including IWA-5241 (b)), including insulation on the bottom of the reactor vessel, accessible areas of incore monitoring guide tubes, and the cavity floor and walls below the reactor vessel. The licensee has station procedures that focus on finding water or steam leakage from any pressure retaining boundary or insulation surrounding that boundary, evidence of leakage such as water or moisture collecting/flowing on walls/structures (e.g., puddles on the floor), boric acid residue, areas of general corrosion on pressure retaining components, or evidence of structural distress.

The NRC staff has determined that the licensee's VT-2 visual examinations will detect potential leakage occurring on the subject welds. Therefore, the NRC staff finds that the VT-2 visual examinations of uninsulated subject welds are acceptable to monitor the structural integrity and leak tightness of the subject welds.

The NRC staff finds that the bare metal visual examination of the subject welds in accordance with N-722-1 does lead to substantial radiological dose for the plant personnel because the welds are located at the bottom of the reactor vessel. The NRC staff has determined that performing required examinations per N-722-1 does not provide a compensating increase in the level of quality and safety, considering that the licensee will perform a VT-2 examination of the subject welds every refueling outage.

The NRC staff finds that removal of the 52 nozzle-to-adaptor welds from the examination scope of N-722-1 is acceptable. The NRC staff is basing its finding on the fact that the welds have an operating temperature less than 525 °F and that as part of every refueling outage, the licensee will still perform the VT-2 visual examination of uninsulated subject welds. The NRC staff has determined that the proposed alternative will provide reasonable assurance of the structural integrity and leak tightness of the subject welds.

4.0 CONCLUSION

As set forth above, NRC staff has determined that complying with the ASME Code requirement would result in hardship or unusual difficulty, without a compensating increase in the level of quality and safety. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(2) and is in compliance with the ASME Code's requirements. Therefore, the NRC staff authorizes the proposed alternative in Relief Request RR-16-01, Revision 1, in accordance with 10 CFR 50.55a(z)(2), for TMI, Unit 1, for the remaining fourth ISI interval, which ends on April 19, 2022.

This authorization is for the requested relief at TMI, Unit 1, and does not imply or infer the NRC's approval of ASME Code Case N-722-2.

All other ASME Code, Section XI, requirements for which relief was not specifically requested and approved remain applicable, including third-party review by the Authorized Nuclear Inservice Inspector.

Principal Contributor: J. Tsao

Date: January 10, 2017

B. Hanson

- 2 -

If you have any questions, please contact the Project Manager, Justin Poole, at 301-415-2048 or by e-mail at Justin.Poole@nrc.gov.

Sincerely,

/RA/

Stephen S. Koenick, Acting Chief
Plant Licensing Branch 1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket No. 50-289

Enclosure:
Safety Evaluation

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*by memorandum dated

OFFICE	NRR/DORL/LPL1/PM	NRR/DORL/LPL1/LA	NRR/DE/EPNB/BC*	NRR/DORL/LPL1/(A)BC
NAME	JPoole	LRonewicz	DAlley	SKoenick
DATE	12/19/2016	12/19/2016	9/19/2016	1/10/2017

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