



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

July 28, 2021

Mr. David P. Rhoades  
Senior Vice President  
Exelon Generation Company, LLC  
President and Chief Nuclear Officer (CNO)  
Exelon Nuclear  
4300 Winfield Road  
Warrenville, IL 60555

SUBJECT: LASALLE COUNTY STATION, UNIT 2 - PROPOSED ALTERNATIVE,  
I4R-12, REVISION 2 FROM CODE SURFACE EXAMINATIONS FOR  
VALVES 2B33-F060A and 2B33-F060B REPAIRS (EPID L-2021-LLR-0016)

Dear Mr. Rhoades:

By letter dated March 7, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21067A000), as supplemented by letter dated March 9, 2021 (ADAMS Accession Nos. ML21068A442), and two letters dated March 26, 2021 (ADAMS Accession Nos. ML21085A000, and ML21085A874, respectively), Exelon Generation Company, LLC (the licensee) submitted a request to the U.S. Nuclear Regulatory Commission (NRC) for the use of an alternative to certain requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) for LaSalle County Station (LSCS), Unit 2.

Specifically, 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 for the repair of LSCS, Unit 2, reactor recirculation flow control valves 2B33-F060A and 2B33-F060B without a compensating increase in the level of quality and safety.

The NRC staff has reviewed the subject request and as set forth enclosed safety evaluation, has determined that complying with the specified requirements described in the licensee's request referenced above would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety. The proposed alternative provides reasonable assurance of structural integrity and leak tightness for the reactor recirculation flow control valves 2B33-F060A and 2B33-F060B. Accordingly, the NRC staff concludes that the licensee has adequately addressed the regulatory requirements set forth in 10 CFR 50.55a(z)(2). The NRC staff authorizes the use of proposed alternative I4R-12, Revision 2 at LSCS, Unit 2, for the repairs of valves 2B33-F060A and 2B33-F060B.

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

If you have any questions, please contact the Project Manager Bhalchandra K. Vaidya by email at [Bhalchandra.Vaidya@nrc.gov](mailto:Bhalchandra.Vaidya@nrc.gov), or by telephone at 301-415-3308.

Sincerely,

**Nancy L.  
Salgado**

Digitally signed by Nancy L.  
Salgado  
Date: 2021.07.28 10:07:15 -04'00'

Nancy L. Salgado, Chief  
Plant Licensing Branch III  
Division of Operating Reactor Licensing  
Office of Nuclear Reactor Regulation

Docket No. 50-374

Enclosure:  
Safety Evaluation

cc: Listserv



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

PROPOSED ALTERNATIVE I4R-12, REVISION 2

FROM CERTAIN REQUIREMENTS OF THE AMERICAN SOCIETY OF MECHANICAL

ENGINEERS BOILER AND PRESSURE VESSEL CODE

EXELON GENERATION COMPANY, LLC

LASALLE COUNTY STATION, UNIT 2

DOCKET NO 50-374

1.0 INTRODUCTION

By letter dated March 7, 2021 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML21067A000), as supplemented by letter dated March 9, 2021 (ADAMS Accession Nos. ML21068A442), and two letters dated March 26, 2021 (ADAMS Accession Nos. ML21085A000, and ML21085A874, respectively), Exelon Generation Company, LLC (the licensee) requested the use of an alternative to certain requirements of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code) for LaSalle County Station (LSCS), Unit 2.

Specifically, pursuant to Title 10 of the Code of Federal Regulations (10 CFR), Section 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.

On March 29, 2021, as documented in ADAMS Accession No. ML21089A056, the U.S. Nuclear Regulatory Commission (NRC) staff verbally authorized the use of proposed alternative I4R-12, Revision 2 for the repairs of the reactor recirculation flow control valves 2B33-F060A and 2B33-F060B, for LSCS, Unit 2.

Applicable Code Requirements:

The weld repairs of LSCS, Unit 2 reactor recirculation flow control valves 2B33-F060A and 2B33-F060B must meet the requirements of ASME Code, Section XI, IWA-4411, "Welding, Brazing, Fabrication, and Installation," which require that the welds be performed in accordance with the construction code. ASME Code, Section III, NB-2570, "Repair of Statically and Centrifugally Cast Products," requires that the internal surface be examined using magnetic particle testing (MT) or penetrant testing (PT) after machining. ASME Code, Section III, NB-2578, "Elimination of Defects," requires the use of NB-2538, "Elimination of Surface Defects," which requires the use of PT to assure that the defect has been removed or reduced

to an acceptable size. ASME Code, Section III, NB-2539.4, "Examination of Repair Welds," requires either a PT or MT examination. Additionally, ASME Code, Section III, NB-2539.4, requires a radiographic test (RT) on repair welds over 3/8 of an inch or 10 percent of the section thickness.

Applicable Code Edition and Addenda:

The applicable codes and addenda for LSCS, Unit 2, are the 1971 Edition, Summer through 1972 Addenda for Section III and the 2007 Edition, through 2008 Addenda for Section XI.

Brief Description of the Proposed Alternative:

The licensee is proposing to use remote visual testing VT-1 using enhanced visual testing (EVT) cameras in lieu of PT for the various stages of the repair for both the pressure-retaining weld buildup on the valve body as well as for the installation of a fillet weld to fix the anti-rotation device in place. The licensee is also proposing to not perform the RT examination.

Specific details are provided in the March 7, 2021, application, and supplemental letters dated March 9 and March 26, 2021.

2.0 REGULATORY EVALUATION

Paragraph 10 CFR 50.55a(z)(2) states, in part, that alternatives to the requirements of 10 CFR 50.55a(b)-(h) may be used, when authorized by the Director, Office of Nuclear Reactor Regulation, if (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.

The licensee has submitted the request on the basis that compliance with the specified requirements of 10 CFR 50.55a would result in hardship or unusual difficulty without a compensating increase in the level of quality and safety.

3.0 TECHNICAL EVALUATION

During refueling outage L2R18 in February 2021, inspections of the reactor recirculation flow control valves 2B33-F060A (the "A" valve) and 2B33-F060B (the "B" valve) discovered damage to each valve's internals and lower body. The unusual wear of the valve bodies is believed to have occurred as the result of an atypical low-power operating condition that occurred in 2015. The licensee conducted repairs to restore the valves to an acceptable condition. These repairs consisted of machining and grinding the inside surface of the valves and building up the inner surface with weld metal to restore the minimal wall thicknesses of the valves, installing the new valve internals, and welding an anti-rotation device into place.

While the wear on the inside surface of the valves did not go below the minimum wall thicknesses of 2.418 inches, the surface conditioning of the valves will reduce the total thickness to below the minimum by an estimated 0.135 inches and 0.095 inches for the "A" and "B" valves, respectively. The weld buildup on these valves will be on the inner surface and will be pressure-retaining in that it will restore the valves to over their minimum wall thickness required for structural integrity. The valve internals will be replaced using a 316 stainless steel Stellite-overlaid lower plug guide with a 304L stainless steel anti-rotation device welded into

place. The Stellite will not be in contact with the repaired area to reduce wear of the repaired surfaces.

The licensee is proposing to use EVT in lieu of PT for the various stages of the repair for both the pressure-retaining weld buildup on the valve body as well as for the installation of a fillet weld to fix the anti-rotation device in place. EVT is an examination technique that uses remote camera equipment to perform visual inspections of components.

The effectiveness of EVT has been extensively evaluated by the NRC. This research is summarized in NUREG/CR-7246 "Reliability Assessment of Remote Visual Examination" (ADAMS Accession No. ML18228A516). The research found that EVT provides generally reliable detection (80 percent point of discharge (POD) at 95 percent confidence) for flaws with cracks with openings wider than approximately 25 microns (0.001 in.). EVT is not considered to be equivalent to PT, however, as EVT is more sensitive to issues such as lighting angle, viewing angle, and surface scratches, any of which can hide small cracks. The use of EVT as opposed to PT could result in small cracks being left in the welds. While not as effective as PT, the use of EVT provides reasonable assurance that significant cracking would be detected in the welded surfaces if such cracks were present.

The licensee is also proposing to not perform the RT examination. Performing the RT of the final repair would detect possible subsurface weld defects such as porosity, lack of fusion, and slag. Not performing the RT examinations would increase the probability that such weld defects will remain in the repair. The EVT may be able to detect surface-breaking flaws but would be unable to detect embedded flaws.

Performing the required PT examinations would result in an additional radiological dose of 10.3 person-Rem and performing the required RT would result in an additional radiological dose of approximately 11.8 person-Rem. These doses are significant, and the NRC staff finds that they represent a hardship to the licensee consistent with the provisions of 10 CFR 50.55a(z)(2).

The weld buildups and final repairs for the "A" and "B" valves will restore the required minimum wall thickness, with possible small weld defects left in place. The primary damage mechanism in the repaired area is wear, and the presence of small cracks or weld defects such as porosity and slag would not significantly increase risk of structural failure of the repaired areas. The wear damage that necessitated these repairs was associated with a sustained low-power operating condition in 2015, which is not the normal mode for plant operation. Additionally, the lower plug guide is constructed of 316 stainless steel, and an anti-rotation device is to be welded into place, so additional wear of the repaired areas is not expected. The licensee has performed wear rate calculations to demonstrate that the valve body is not expected to experience thinning due to wear below the minimum wall thickness for current licensed life of the facility. Therefore, the NRC staff concludes that, given the nature of the subject repair, EVT is sufficient to provide reasonable assurance of the structural integrity of the repaired valves.

Therefore, based on the above, the NRC staff finds that: (1) there is reasonable assurance that the licensee's proposed alternative I4R-12, Revision 2 at LSCS, Unit 2, has a minimal impact on safety; and (2) the licensee's hardship justification is acceptable.

#### 4.0 CONCLUSION

As set forth above, the NRC staff has determined that complying with the specified requirements described in the licensee's request referenced above would result in hardship or

unusual difficulty without a compensating increase in the level of quality and safety. The proposed alternative provides reasonable assurance of structural integrity and leak tightness for the reactor recirculation flow control valves 2B33-F060A and 2B33-F060B. Accordingly, the NRC staff concludes that the licensee has adequately addressed the regulatory requirements set forth in 10 CFR 50.55a(z)(2). The NRC staff authorizes the use of proposed alternative I4R-12, Revision 2 at LSCS, Unit 2, for the repairs to valves 2B33-F060A and 2B33-F060B.

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

Principal Contributor: Stephen Cumblidge

Date: July 28, 2021

SUBJECT: LASALLE COUNTY STATION, UNIT 2 - PROPOSED ALTERNATIVE, I4R-12, REVISION 2 FROM CODE SURFACE EXAMINATIONS FOR VALVES 2B33-F060A and 2B33-F060B REPAIRS (EPID L-2021-LLR-0016) DATED JULY 28, 2021

DISTRIBUTION:

PUBLIC

PM File Copy

RidsACRS\_MailCTR Resource

RidsNrrDorlLpl3 Resource

RidsNrrDnlnRnphp Resource

RidsNrrLASRohrer Resource

RidsNrrPMLaSalle Resource

RidsRgn3MailCenter Resource

MMcCoppin, OEDO

SCumblidge, NRR/NPHP

Region Contact

**ADAMS Accession No. ML21188A019**

**\* by email**

OFFICE	NRR/DORL/LPL3/PM *	NRR/DORL/LPL3/LA *	NRR/DNRL/NPHP/BC *	NRR/DORL/LPL3/BC *
NAME	BVaidya	SRohrer	MMitchell	NSalgado
DATE	07/14/2021	07/14/2021	07/19/2021	07/28/2021

**OFFICIAL RECORD COPY**