



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

January 14, 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: CLINTON POWER STATION, UNIT NO. 1; DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3; NINE MILE POINT NUCLEAR STATION, UNIT 2; PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3; AND QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2 — PROPOSED ALTERNATIVES TO EXTEND THE SAFETY RELIEF VALVE TESTING INTERVAL (EPID L-2020-LLR-0014 THROUGH -0018)

Dear Mr. Rhoades:

By application dated February 4, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20036D962), as supplemented by letter dated June 12, 2020 (ADAMS Accession No. ML20164A188), Exelon Generation Company, LLC (the licensee) submitted a request in accordance with paragraph 50.55a(z)(1) of Title 10 of the *Code of Federal Regulations* (10 CFR) for proposed alternatives to the requirements of 10 CFR 50.55a and the American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (OM Code) at Clinton Power Station, Unit No. 1 (Clinton); Dresden Nuclear Power Station, Units 2 and 3 (Dresden); Nine Mile Point Nuclear Station, Unit 2 (NMP-2); Peach Bottom Atomic Power Station, Units 2 and 3 (Peach Bottom); and Quad Cities Nuclear Power Station, Units 1 and 2 (Quad Cities). The proposed alternatives would allow the licensee to extend the safety relief valve test interval at these facilities.

The U.S. Nuclear Regulatory Commission (NRC) staff has reviewed the subject request and concludes, as set forth in the enclosed safety evaluations, that Exelon has adequately addressed the regulatory requirements set forth in 10 CFR 50.55a(z)(1). Therefore, the NRC staff authorizes Exelon to use proposed alternative No. 2205 at Clinton, RV-02D at Dresden, MSS-VR-02 at NMP-2, 01A-VRR-5 at Peach Bottom, RV-08 at Quad Cities, and RV-09 at Quad Cities, as described in its application, as supplemented. This authorization is for the remainder of the current 10-year inservice testing interval for each of these facilities.

All other ASME Code requirements for which relief was not been specifically requested and approved remain applicable.

If you have any questions, please contact Blake Purnell at 301-415-1380 or via e-mail at Blake.Purnell@nrc.gov.

Sincerely,

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

Docket Nos. 50-461, 50-237, 50-249, 50-410,
50-277, 50-278, 50-254, and 50-265

Enclosures:

1. Safety Evaluation for Clinton Proposed Alternative No. 2205
2. Safety Evaluation for Dresden Proposed Alternative RV-02D
3. Safety Evaluation for NMP-2 Proposed Alternative MSS-VR-02
4. Safety Evaluation for Peach Bottom Proposed Alternative 01A-VRR-5
5. Safety Evaluation for Quad Cities Proposed Alternative RV-08
6. Safety Evaluation for Quad Cities Proposed Alternative RV-09

cc: Listserv



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

PROPOSED ALTERNATIVE NO. 2205 REGARDING

EXTENSION OF THE SAFETY RELIEF VALVE TESTING INTERVAL

EXELON GENERATION COMPANY, LLC

CLINTON POWER STATION, UNIT NO. 1

DOCKET NO. 50-461

1.0 INTRODUCTION

By application dated February 4, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20036D962), as supplemented by letter dated June 12, 2020 (ADAMS Accession No. ML20164A188), Exelon Generation Company, LLC (Exelon, the licensee) submitted a request in accordance with paragraph 50.55a(z)(1) of Title 10 of the *Code of Federal Regulations* (10 CFR) for a proposed alternative to specific requirements of 10 CFR 50.55a for Clinton Power Station, Unit No. 1 (Clinton); Dresden Nuclear Power Station, Units 2 and 3 (Dresden); Nine Mile Point Nuclear Station, Unit 2 (NMP-2); Peach Bottom Atomic Power Station, Units 2 and 3 (Peach Bottom); and Quad Cities Nuclear Power Station, Units 1 and 2 (Quad Cities). The licensee's June 12, 2020, letter was provided in response to a U.S. Nuclear Regulatory Commission (NRC) staff request for additional information issued on May 14, 2020 (ADAMS Accession No. ML20135H197). This safety evaluation (SE) provides the NRC staff's review of proposed alternative No. 2205 for Clinton, as described in the application, as supplemented. The NRC staff's review of the proposed alternative for the other facilities is described in separate SEs.

The proposed alternative would allow the licensee to extend the testing intervals for main steam line safety/relief valves (SRVs) at Clinton during the fourth 10-year inservice testing (IST) interval. The requirements for the SRV testing interval are described in the American Society of Mechanical Engineers (ASME), *Operation and Maintenance of Nuclear Power Plants*, Division 1, Section IST (OM Code).

2.0 REGULATORY EVALUATION

The regulations in 10 CFR 50.55a(f)(4) state, in part, that throughout the service life of a boiling or pressurized water-cooled nuclear power facility, pumps and valves that are within the scope of the ASME OM Code must meet the inservice test requirements (except design and access provisions) set forth in the ASME OM Code and addenda that become effective subsequent to editions and addenda specified in 10 CFR 50.55a(f)(2) and (3) and that are incorporated by reference in 10 CFR 50.55a(a)(1)(iv), to the extent practical within the limitations of design, geometry, and materials of construction of the components.

The regulations in 10 CFR 50.55a(z) state, in part, that alternatives to the requirements in paragraphs (b) through (h) of 10 CFR 50.55a may be authorized by the NRC if the licensee demonstrates that: (1) the proposed alternative provides 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 2012 edition of the ASME OM Code, as incorporated by reference in 10 CFR 50.55a with conditions, is applicable to the fourth 10-year IST interval at Clinton, which began on July 1, 2020, and is scheduled to end on June 30, 2030.

3.0 TECHNICAL EVALUATION

3.1 Licensee's Request

The licensee requested an alternative to the valve testing requirements in Mandatory Appendix I, "Inservice Testing of Pressure Relief Devices in Light-Water Reactor Nuclear Power Plants," of the ASME OM Code (2012 edition). Subparagraph I-1320(a) of Mandatory Appendix I states:

Class 1 pressure relief valves shall be tested at least once every 5 yr [years], starting with initial electric power generation. No maximum limit is specified for the number of valves to be tested within each interval; however, a minimum of 20% of the valves from each valve group shall be tested within any 24-mo [month] interval. This 20% shall consist of valves that have not been tested during the current 5-yr interval, if they exist. The test interval for any installed valve shall not exceed 5 yr. This 5-yr test interval shall begin from the date of the as-left set pressure test for each valve.

The licensee has requested to use the proposed alternative at Clinton for the valves listed in Table 1 below.

Table 1: List of Valves at Clinton Affected by the Proposed Alternative

Component	Description	Class	Category
1B21-F041A	Main Steam Line SRV	1	C
1B21-F041B	Main Steam Line SRV	1	C
1B21-F041C	Main Steam Line SRV	1	C
1B21-F041D	Main Steam Line SRV	1	C
1B21-F041F	Main Steam Line SRV	1	C
1B21-F041G	Main Steam Line SRV	1	C
1B21-F041L	Main Steam Line SRV	1	C
1B21-F047A	Main Steam Line SRV	1	C
1B21-F047B	Main Steam Line SRV	1	C
1B21-F047C	Main Steam Line SRV	1	C
1B21-F047D	Main Steam Line SRV	1	C
1B21-F047F	Main Steam Line SRV	1	C
1B21-F051B	Main Steam Line SRV	1	C
1B21-F051C	Main Steam Line SRV	1	C
1B21-F051D	Main Steam Line SRV	1	C
1B21-F051G	Main Steam Line SRV	1	C

Reason for Request

At Clinton, there are 16 Dikkers Model G-471 main steam SRVs installed on the main steam lines inside the primary containment. These valves are all in the same IST program valve group. Subparagraph I-1320(a) of the ASME OM Code, Mandatory Appendix I, requires each installed SRV to be pressure tested within 5 years from the date of the as-left set pressure test. The licensee has implemented ASME Code Case OMN-17, "Alternative Rules for Testing ASME Class 1 Pressure Relief/Safety Valves," which extends this 5-year test interval to 6 years, with the potential use of a 6-month grace period. The use of this Code Case allows the licensee to test all the SRVs in Table 1 over three refueling outages, instead of two, which could reduce the number of SRVs tested over three refueling outages by seven SRVs.

The licensee conducted a performance assessment of the valves listed in Table 1, and determined that there is reasonable assurance that these valves will retain their set pressure within the required drift tolerances if the test interval is extended from 6 years to 8 years. Reducing the number of valves tested every refueling outage would also reduce occupational radiological exposures.

Proposed Alternative and Basis for Use

For the testing of valves listed in Table 1, the licensee proposes to use the ASME Code Case OMN-17, with two modifications, as an alternative to the requirements in subparagraph I-1320(a) of the ASME OM Code, Mandatory Appendix I. The first modification to Code Case OMN-17 is to extend the test interval specified in the code case from 6 years to 8 years from the date of the as-left pressure test for each valve. With the 6-month grace period allowed by Code Case OMN-17, the test interval will not exceed 8.5 years. The second modification to Code Case OMN-17 is to change the minimum number of SRVs from each valve group to be tested from 20 percent within any 24-month interval to 40 percent within any 48-month interval, with the 40-percent population consisting of SRVs which have not been tested during the previous 96-month interval, if they exist. All other requirements of Code Case OMN-17 will be retained and implemented, including the requirement to disassemble and inspect all valves prior to as-left testing and installation.

Exelon stated that it implemented an SRV Best Practices Maintenance program at Clinton in 2010, and it has made several enhancements to the program since implementation. The program consists of methods and philosophies concerning maintenance, inspection, and techniques which uses the valve manufacturer's recommended maintenance practices and enhancements identified by the licensee. In its June 12, 2020, letter, Exelon described its SRV Best Practices Maintenance program. The elements of this program include spring testing, lapping techniques and tools, set pressure adjustment methodology precision, average delay time trending, and internal component condition variations.

The June 12, 2020, letter states that Exelon has been collecting, trending, and analyzing SRV test, maintenance, inspection and performance data since 2014 for Clinton, Dresden, NMP-2, Peach Bottom, Quad Cities, and Limerick Generating Station, Units 1 and 2. Prior to implementation of this proposed alternative, Exelon stated that it will establish an Exelon SRV Best Practices Fleet Engineering program document to provide governance over Exelon-approved vendor SRV maintenance procedures, to define the program elements, and to establish fleetwide performance tracking and trending guidelines. This program document and Exelon-approved vendor procedures are updated to incorporate advances in technology and

operating experience from the Exelon fleet, the original equipment manufacturer, and the industry.

In its application, the licensee stated that it recently performed an assessment of the SRVs at Clinton. This assessment reviewed as-left and as-found set pressure data since 2002. The application states that the setpoint drift performance of the SRVs at Clinton has improved as a result of the SRV Best Practices Maintenance program. The licensee's assessment concluded that there is reasonable assurance that each SRV will retain the set pressure, within the required drift tolerances, through an 8-year interval.

3.2 NRC Staff's Evaluation

The NRC staff has unconditionally approved Code Case OMN-17 for voluntary use by licensees in NRC Regulatory Guide 1.192, Revision 3, "Operation and Maintenance Code Case Acceptability, ASME OM Code" (ADAMS Accession No. ML19128A261), which is incorporated by reference in 10 CFR 50.55a. As an alternative to the requirements in Section I-1320 in Mandatory Appendix I of the ASME OM Code (2001 edition through 2006 addenda), Code Case OMN-17 allows licensees to extend the test interval for SRVs to 6 years, with the potential use of a 6-month grace period, provided that additional maintenance requirements are met. Licensees on newer editions and addenda of the ASME OM Code are not allowed to use this code case without prior NRC approval because these newer editions and addenda are not listed in the *Inquiry* section of Code Case OMN-17. However, the NRC staff has authorized licensees to use Code Case OMN-17 provided that all requirements in the code case are met. By letter dated September 5, 2019 (ADAMS Accession No. ML19241A188), the NRC staff authorized the licensee to use ASME OM Code Case OMN-17 at Clinton for the fourth 10-year IST interval on the basis that this code case provides an acceptable level of quality and safety.

In its February 4, 2020, application, as supplemented, the licensee proposed to continue the use of the ASME Code Case OMN-17 at Clinton with two modifications. The NRC staff's review of this application focused on the proposed modifications to Code Case OMN-17. The first proposed modification to Code Case OMN-17 is to extend the test interval specified in the code case from 6 years to 8 years from the date of the as-left pressure test for each valve, while retaining the allowed 6-month grace period. The second proposed modification is to change the minimum number of valves to be tested from each group. Code Case OMN-17 specifies selecting 20 percent of the valves from each valve group to be tested within any 24-month interval. The licensee is requesting to change this provision to allow it to select 40 percent of the valves from each valve group to be tested within any 48-month interval, with the 40 percent population consisting of SRVs which have not been tested during the previous 96-month interval, if they exist. Although the number of SRVs tested in any 24-month interval could be reduced, the number of SRVs tested over any 48-month interval would not change with this proposed alternative.

As discussed above, the Exelon SRV Best Practices Maintenance program has been in place at Clinton since 2010. The elements of the program include spring testing, lapping techniques and tools, set pressure adjustment methodology precision, average delay trending, and internal component condition variations. The licensee disassembles and inspects the SRVs after as-found set pressure testing and before as-left set pressure testing.

In its application, the licensee stated that it recently performed an assessment of the SRVs at Clinton. This assessment reviewed as-left and as-found set pressure data since 2002. Based on the time between the as-left and as-found set pressure test for each SRV, the set pressure

drift was linearly extrapolated to determine whether the SRV's set pressure would still be within the ± 3.0 percent tolerance following an 8-year interval. A linear extrapolation was used because the licensee determined that it provided the best mathematical approach. Since 2015, 12 SRVs were removed and as-found tested, and all the valves were projected to have lift setpoints within the ± 3.0 percent tolerance for more than 8 years. The application states that the setpoint drift performance of the SRVs at Clinton has improved as a result of the SRV Best Practices Maintenance program. The licensee's assessment concluded that there is reasonable assurance that each SRV will retain the set pressure, within the required drift tolerances, through an 8-year interval.

The licensee's June 12, 2020, letter states that the maximum time between SRV tests at Clinton would be 48 months. The letter also states that Exelon has been collecting, trending, and analyzing SRV test, maintenance, inspection and performance data since 2014 for Clinton, Dresden, NMP-2, Peach Bottom, Quad Cities, and Limerick Generating Station, Units 1 and 2. Clinton and NMP-2 both use Dikkers Model G-471 SRVs. The licensee stated that trending and analyzing test data between stations which have the same SRV model would reduce the effective maximum elapsed time between SRV tests for the same model. Prior to implementing this alternative request, the licensee will establish an SRV Best Practices Fleet Engineering program to define program elements and will establish fleetwide performance tracking and trending guidelines.

Based on its review of the licensee's application, as supplemented, the NRC staff finds that the proposed alternative No. 2205 for Clinton provides an acceptable level of quality and safety, because:

1. Exelon will continue to meet the provisions of ASME Code Case OMN-17 which are not being modified by this proposed alternative, including the requirement to disassemble and inspect all valves prior to as-left testing and installation;
2. Exelon's SRV Best Practices Maintenance program has been implemented for the SRVs affected by the proposed alternative;
3. Exelon's SRV Best Practices Fleet Engineering program, which includes the sharing of applicable SRV test data between Exelon nuclear power plant units, will be established prior to implementation of this proposed alternative; and
4. the results of the as-left and as-found set pressure test data for the Clinton SRVs indicate that the SRV set pressures will remain within acceptable tolerance levels for more than 8 years.

4.0 CONCLUSION

As set forth above, the NRC staff has determined that proposed alternative No. 2205 for Clinton provides an acceptable level of quality and safety for the valves listed in Table 1. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(1). Therefore, the NRC staff authorizes the use of proposed alternative No. 2205, as described in the licensee's application, as supplemented, for the remainder of the fourth 10-year IST program interval at Clinton, which is currently scheduled to end on June 30, 2030.

All other ASME OM Code requirements for which relief or an alternative was not specifically requested and approved as part of this request remain applicable.

Principal Contributor: Robert Wolfgang, NRR/DEX/EMIB

Date: January 14, 2021



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

PROPOSED ALTERNATIVE RV-02D REGARDING

EXTENSION OF THE SAFETY RELIEF VALVE TESTING INTERVAL

EXELON GENERATION COMPANY, LLC

DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3

DOCKET NOS. 50-237 AND 50-249

1.0 INTRODUCTION

By application dated February 4, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20036D962), as supplemented by letter dated June 12, 2020 (ADAMS Accession No. ML20164A188), Exelon Generation Company, LLC (Exelon, the licensee) submitted a request in accordance with paragraph 50.55a(z)(1) of Title 10 of the *Code of Federal Regulations* (10 CFR) for a proposed alternative to specific requirements of 10 CFR 50.55a for Clinton Power Station, Unit No. 1 (Clinton); Dresden Nuclear Power Station, Units 2 and 3 (Dresden); Nine Mile Point Nuclear Station, Unit 2 (NMP-2); Peach Bottom Atomic Power Station, Units 2 and 3 (Peach Bottom); and Quad Cities Nuclear Power Station, Units 1 and 2 (Quad Cities). The licensee's June 12, 2020, letter was provided in response to a U.S. Nuclear Regulatory Commission (NRC) staff request for additional information issued on May 14, 2020 (ADAMS Accession No. ML20135H197). This safety evaluation (SE) provides the NRC staff's review of proposed alternative RV-02D for Dresden, as described in the application, as supplemented. The NRC staff's review of the proposed alternative for the other facilities is described in separate SEs.

The proposed alternative would allow the licensee to extend the testing intervals for main steam line safety/relief valves (SRVs)¹ at Dresden during the fifth 10-year inservice testing (IST) interval. The requirements for the SRV testing interval are described in the American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (OM Code).

2.0 REGULATORY EVALUATION

The regulations in 10 CFR 50.55a(f)(4) state, in part, that throughout the service life of a boiling or pressurized water-cooled nuclear power facility, pumps and valves that are within the scope of the ASME OM Code must meet the inservice test requirements (except design and access provisions) set forth in the ASME OM Code and addenda that become effective subsequent to editions and addenda specified in 10 CFR 50.55a(f)(2) and (3) and that are incorporated by

¹ At Dresden, the subject valves are referred to as main steam relief/safety valves.

reference in 10 CFR 50.55a(a)(1)(iv), to the extent practical within the limitations of design, geometry, and materials of construction of the components.

The regulations in 10 CFR 50.55a(z) state, in part, that alternatives to the requirements in paragraphs (b) through (h) of 10 CFR 50.55a may be authorized by the NRC if the licensee demonstrates that: (1) the proposed alternative provides 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 2004 edition through the 2006 addenda of the ASME OM Code, as incorporated by reference in 10 CFR 50.55a with conditions, is applicable to the fifth 10-year IST interval at Dresden, which began on November 1, 2013, and is scheduled to end on October 31, 2023.

3.0 TECHNICAL EVALUATION

3.1 Licensee's Request

The licensee requested an alternative to the valve testing requirements in Mandatory Appendix I, "Inservice Testing of Pressure Relief Devices in Light-Water Reactor Nuclear Power Plants," of the ASME OM Code (2004 edition through the 2006 addenda). Subparagraph I-1320(a) of Mandatory Appendix I states:

Class 1 pressure relief valves shall be tested at least once every 5 years, starting with initial electric power generation. No maximum limit is specified for the number of valves to be tested within each interval; however, a minimum of 20% of the valves from each valve group shall be tested within any 24-month interval. This 20% shall consist of valves that have not been tested during the current 5-year interval, if they exist. The test interval for any individual valve shall not exceed 5 years.

The licensee has requested to use the proposed alternative at Dresden for the valves listed in Table 1 below.

Table 1: List of Valves at Dresden Affected by the Proposed Alternative

Component	Description	Class	Category
2-0203-3A	3A Target Rock Main Steam SRV	1	C
3-0203-3A	3A Target Rock Main Steam SRV	1	C

Reason for Request

At Dresden, there is one Target Rock (Model 67F) 3-stage SRV installed on the main steam lines inside the drywell of each unit. The one valve for each unit is classified into an IST program valve group of one. Subparagraph I-1320(a) of the ASME OM Code, Mandatory Appendix I, requires each installed SRV to be pressure tested at least once every 5 years. However, the Dresden SRVs must be tested every refueling outage in order to comply with the requirement in subparagraph I-1320(a) that at least 20 percent of the valves are tested every 24 months. Currently, the Dresden units operate on a 24-month refueling cycle.

The licensee conducted a performance assessment of the valves listed in Table 1, and determined that there is reasonable assurance that these valves will retain their set pressure

within the required drift tolerances if the test interval is extended from 24 months to 48 months. Reducing the number of valves tested every refueling outage would also reduce occupational radiological exposures.

Proposed Alternative and Basis for Use

For the valves listed in Table 1, the licensee proposed to extend the test interval from 24 months to 48 months from the date of the as-left set pressure test for each valve as an alternative to the requirements in subparagraph I-1320(a) of the ASME OM Code, Mandatory Appendix I.

Exelon stated that it implemented an SRV Best Practices Maintenance program at Dresden in 2010, and it has made several enhancements to the program since implementation. The program consists of methods and philosophies concerning maintenance, inspection, and techniques which uses the valve manufacturer's recommended maintenance practices and enhancements identified by the licensee. In its June 12, 2020, letter, Exelon described its SRV Best Practices Maintenance program. The elements of this program include spring testing, lapping techniques and tools, set pressure adjustment methodology precision, average delay time trending, and internal component condition variations.

The June 12, 2020, letter states that Exelon has been collecting, trending, and analyzing SRV test, maintenance, inspection and performance data since 2014 for Clinton, Dresden, NMP-2, Peach Bottom, Quad Cities, and Limerick Generating Station, Units 1 and 2. Prior to implementation of this proposed alternative, Exelon stated that it will establish an Exelon SRV Best Practices Fleet Engineering program document to provide governance over Exelon-approved vendor SRV maintenance procedures, to define the program elements, and to establish fleetwide performance tracking and trending guidelines. This program document and Exelon-approved vendor procedures are updated to incorporate advances in technology and operating experience from the Exelon fleet, the original equipment manufacturer, and the industry.

In its application, the licensee stated that it recently performed an assessment of the SRVs at Dresden. This assessment reviewed as-left and as-found set pressure data since 1998. The application states that the setpoint drift performance of the SRVs at Dresden has improved as a result of the SRV Best Practices Maintenance program. The licensee's assessment concluded that there is reasonable assurance that each SRV will retain the set pressure, within the required drift tolerances, through a 48-month interval.

3.2 NRC Staff's Evaluation

In its February 4, 2020, application, as supplemented, the licensee proposed to extend the SRV test interval at Dresden from 24 months to 48 months from the date of the as-left set pressure test for each valve.

As discussed above, the Exelon SRV Best Practices Maintenance program has been in place at Dresden since 2010. The elements of the program include spring testing, lapping techniques and tools, set pressure adjustment methodology precision, average delay trending, and internal component condition variations. The June 12, 2020, letter states, in part, that the licensee applies tighter tolerances to the pilot abutment and preload gaps for the valves listed in Table 1, which reduce the likelihood of vibration-induced seat leakage caused by pressure transients. The time between the pilot valve opening and the main disk opening is measured and trended

to determine if additional maintenance should be performed on the valves. The licensee also disassembles and inspects the SRVs after as-found set pressure testing and before as-left set pressure testing.

In its application, the licensee stated that it recently performed an assessment of the SRVs at Dresden. This assessment reviewed as-left and as-found set pressure data since 1998. Based on the time between the as-left and as-found set pressure test for each SRV, the set pressure drift was linearly extrapolated to determine whether the SRV's set pressure would still be within the ± 3.0 percent tolerance following a 48-month interval. A linear extrapolation was used because the licensee determined that it provided the best mathematical approach. Since 2014, five SRVs were removed and as-found tested, and four of these valves were projected to have lift setpoints within the ± 3.0 percent tolerance for more than 48 months. The fifth valve was disassembled, inspected, and tested in 2014 before being re-installed in 2015. This valve was as-found tested when removed in 2017, and the test results indicated that the setpoint performance projection was just above the 48-month performance criteria. The application states that the setpoint drift performance of the SRVs at Dresden has improved as a result of the SRV Best Practices Maintenance program. The licensee's assessment concluded that there is reasonable assurance that each SRV will retain the set pressure, within the required drift tolerances, through a 48-month interval.

The licensee's June 12, 2020, letter states that the maximum time between SRV tests at the two Dresden units would be 36 months. The letter also states that Exelon has been collecting, trending, and analyzing SRV test, maintenance, inspection and performance data since 2014 for Clinton, Dresden, NMP-2, Peach Bottom, Quad Cities, and Limerick Generating Station, Units 1 and 2 (Limerick). Dresden Units 2 and 3, Limerick Units 1 and 2, Peach Bottom Units 2 and 3, and Quad Cities Units 1 and 2 all use the same base model Target Rock SRVs. The licensee stated that trending and analyzing test data between stations which have the same SRV model would reduce the effective maximum elapsed time between SRV tests for the same model. Prior to implementing this alternative request, the licensee will establish an SRV Best Practices Fleet Engineering program to define program elements and will establish fleetwide performance tracking and trending guidelines.

Based on its review of the licensee's application, as supplemented, the NRC staff finds that the proposed alternative RV-02D for Dresden provides an acceptable level of quality and safety, because:

1. Exelon will disassemble and inspect all valves prior to as-left testing and installation;
2. Exelon's SRV Best Practices Maintenance program has been implemented for the SRVs affected by the proposed alternative;
3. Exelon's SRV Best Practices Fleet Engineering program, which includes the sharing of applicable SRV test data between Exelon nuclear power plant units, will be established prior to implementation of this proposed alternative; and
4. the results of the as-left and as-found set pressure test data for the Dresden SRVs indicate that the SRV set pressures will remain within acceptable tolerance levels for more than 48 months.

4.0 CONCLUSION

As set forth above, the NRC staff has determined that proposed alternative RV-02D for Dresden provides an acceptable level of quality and safety for the valves listed in Table 1. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(1). Therefore, the NRC staff authorizes the use of proposed alternative RV-02D, as described in the licensee's application, as supplemented, for the remainder of the fifth 10-year IST program interval at Dresden, which is currently scheduled to end on October 31, 2023.

All other ASME OM Code requirements for which relief or an alternative was not specifically requested and approved as part of this request remain applicable.

Principal Contributor: Robert Wolfgang, NRR/DEX/EMIB

Date: January 14, 2021



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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

PROPOSED ALTERNATIVE MSS-VR-02 REGARDING

EXTENSION OF THE SAFETY RELIEF VALVE TESTING INTERVAL

EXELON GENERATION COMPANY, LLC

NINE MILE POINT NUCLEAR STATION, UNIT 2

DOCKET NO. 50-410

1.0 INTRODUCTION

By application dated February 4, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20036D962), as supplemented by letter dated June 12, 2020 (ADAMS Accession No. ML20164A188), Exelon Generation Company, LLC (Exelon, the licensee) submitted a request in accordance with paragraph 50.55a(z)(1) of Title 10 of the *Code of Federal Regulations* (10 CFR) for a proposed alternative to specific requirements of 10 CFR 50.55a for Clinton Power Station, Unit No. 1 (Clinton); Dresden Nuclear Power Station, Units 2 and 3 (Dresden); Nine Mile Point Nuclear Station, Unit 2 (NMP-2); Peach Bottom Atomic Power Station, Units 2 and 3 (Peach Bottom); and Quad Cities Nuclear Power Station, Units 1 and 2 (Quad Cities). The licensee's June 12, 2020, letter was provided in response to a U.S. Nuclear Regulatory Commission (NRC) staff request for additional information issued on May 14, 2020 (ADAMS Accession No. ML20135H197). This safety evaluation (SE) provides the NRC staff's review of proposed alternative MSS-VR-02 for NMP-2, as described in the application, as supplemented. The NRC staff's review of the proposed alternative for the other facilities is described in separate SEs.

The proposed alternative would allow the licensee to extend the testing intervals for main steam line safety/relief valves (SRVs) at NMP-2 during the fourth 10-year inservice testing (IST) interval. The requirements for the SRV testing interval are described in the American Society of Mechanical Engineers (ASME), *Operation and Maintenance of Nuclear Power Plants*, Division 1, Section IST (OM Code).

2.0 REGULATORY EVALUATION

The regulations in 10 CFR 50.55a(f)(4) state, in part, that throughout the service life of a boiling or pressurized water-cooled nuclear power facility, pumps and valves that are within the scope of the ASME OM Code must meet the inservice test requirements (except design and access provisions) set forth in the ASME OM Code and addenda that become effective subsequent to editions and addenda specified in 10 CFR 50.55a(f)(2) and (3) and that are incorporated by reference in 10 CFR 50.55a(a)(1)(iv), to the extent practical within the limitations of design, geometry, and materials of construction of the components.

The regulations in 10 CFR 50.55a(z) state, in part, that alternatives to the requirements in paragraphs (b) through (h) of 10 CFR 50.55a may be authorized by the NRC if the licensee demonstrates that: (1) the proposed alternative provides 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 2012 edition of the ASME OM Code, as incorporated by reference in 10 CFR 50.55a with conditions, is applicable to the fourth 10-year IST interval at NMP-2, which began on January 1, 2019, and is scheduled to end on December 31, 2028.

3.0 TECHNICAL EVALUATION

3.1 Licensee's Request

The licensee requested an alternative to the valve testing requirements in Mandatory Appendix I, "Inservice Testing of Pressure Relief Devices in Light-Water Reactor Nuclear Power Plants," of the ASME OM Code (2012 edition). Subparagraph I-1320(a) of Mandatory Appendix I states:

Class 1 pressure relief valves shall be tested at least once every 5 yr [years], starting with initial electric power generation. No maximum limit is specified for the number of valves to be tested within each interval; however, a minimum of 20% of the valves from each valve group shall be tested within any 24-mo [month] interval. This 20% shall consist of valves that have not been tested during the current 5-yr interval, if they exist. The test interval for any installed valve shall not exceed 5 yr. This 5-yr test interval shall begin from the date of the as-left set pressure test for each valve.

The licensee has requested to use the proposed alternative at NMP-2 for the valves listed in Table 1 below.

Table 1: List of Valves at NMP-2 Affected by the Proposed Alternative

Component	Description	Class	Category
2MSS*PSV120	Main Steam SRV	1	C
2MSS*PSV121	Main Steam SRV (Automatic Depressurization System (ADS) function)	1	C
2MSS*PSV122	Main Steam SRV	1	C
2MSS*PSV123	Main Steam SRV	1	C
2MSS*PSV124	Main Steam SRV	1	C
2MSS*PSV125	Main Steam SRV	1	C
2MSS*PSV126	Main Steam SRV (ADS function)	1	C
2MSS*PSV127	Main Steam SRV (ADS function)	1	C
2MSS*PSV128	Main Steam SRV	1	C
2MSS*PSV129	Main Steam SRV (ADS function)	1	C
2MSS*PSV130	Main Steam SRV (ADS function)	1	C
2MSS*PSV131	Main Steam SRV	1	C
2MSS*PSV132	Main Steam SRV	1	C
2MSS*PSV133	Main Steam SRV	1	C
2MSS*PSV134	Main Steam SRV (ADS function)	1	C

Component	Description	Class	Category
2MSS*PSV135	Main Steam SRV	1	C
2MSS*PSV136	Main Steam SRV	1	C
2MSS*PSV137	Main Steam SRV (ADS function)	1	C

Reason for Request

At NMP-2, there are 18 Dikkers Model G-471 main steam SRVs installed on the main steam lines inside the drywell. These valves are all in the same IST program valve group.

Subparagraph I-1320(a) of the ASME OM Code, Mandatory Appendix I, requires each installed SRV to be pressure tested within 5 years from the date of the as-left set pressure test. The licensee has implemented NMP-2 alternative request MSS-VR-01 (ADAMS Accession No. ML17354A837), which extends this 5-year test interval to 6 years, with the potential use of a 6-month grace period. The use of alternative request MSS-VR-01 allows the licensee to test all the SRVs in Table 1 over three refueling outages, instead of two, which could reduce the number of SRVs tested over three refueling outages by six SRVs.

The licensee conducted a performance assessment of the valves listed in Table 1, and determined that there is reasonable assurance that these valves will retain their set pressure within the required drift tolerances if the test interval is extended from 6 years to 8 years. Reducing the number of valves tested every refueling outage would also reduce occupational radiological exposures.

Proposed Alternative and Basis for Use

For the testing of valves listed in Table 1, the licensee proposes to use the ASME Code Case OMN-17, "Alternative Rules for Testing ASME Class 1 Pressure Relief/Safety Valves," with two modifications, as an alternative to the requirements in subparagraph I-1320(a) of the ASME OM Code, Mandatory Appendix I. The first modification to Code Case OMN-17 is to extend the test interval specified in the code case from 6 years to 8 years from the date of the as-left pressure test for each valve. With the 6-month grace period allowed by Code Case OMN-17, the test interval will not exceed 8.5 years. The second modification to Code Case OMN-17 is to change the minimum number of SRVs from each valve group to be tested from 20 percent within any 24-month interval to 40 percent within any 48-month interval, with the 40-percent population consisting of SRVs which have not been tested during the previous 96-month interval, if they exist. All other requirements of Code Case OMN-17 will be retained and implemented, including the requirement to disassemble and inspect all valves prior to as-left testing and installation.

Exelon stated that it implemented an SRV Best Practices Maintenance program at NMP-2 in 2015, and it included several enhancements from the previous Exelon program. The program consists of methods and philosophies concerning maintenance, inspection, and techniques which uses the valve manufacturer's recommended maintenance practices and enhancements identified by the licensee. In its June 12, 2020, letter, Exelon described its SRV Best Practices Maintenance program. The elements of this program include spring testing, lapping techniques and tools, set pressure adjustment methodology precision, average delay time trending, and internal component condition variations.

The June 12, 2020, letter states that Exelon has been collecting, trending, and analyzing SRV test, maintenance, inspection and performance data since 2014 for Clinton, Dresden, NMP-2, Peach Bottom, Quad Cities, and Limerick Generating Station, Units 1 and 2. Prior to implementation of this proposed alternative, Exelon stated that it will establish an Exelon SRV

Best Practices Fleet Engineering program document to provide governance over Exelon-approved vendor SRV maintenance procedures, to define the program elements, and to establish fleetwide performance tracking and trending guidelines. This program document and Exelon-approved vendor procedures are updated to incorporate advances in technology and operating experience from the Exelon fleet, the original equipment manufacturer, and the industry.

In its application, the licensee stated that it recently performed an assessment of the SRVs at NMP-2. This assessment reviewed as-left and as-found set pressure data since 1998. The application states that the setpoint drift performance of the SRVs at NMP-2 has improved as a result of the SRV Best Practices Maintenance program. The licensee's assessment concluded that there is reasonable assurance that each SRV will retain the set pressure, within the required drift tolerances, through an 8-year interval.

3.2 NRC Staff's Evaluation

The NRC staff has unconditionally approved Code Case OMN-17 for voluntary use by licensees in NRC Regulatory Guide 1.192, Revision 3, "Operation and Maintenance Code Case Acceptability, ASME OM Code" (ADAMS Accession No. ML19128A261), which is incorporated by reference in 10 CFR 50.55a. As an alternative to the requirements in Section I-1320 in Mandatory Appendix I of the ASME OM Code (2001 edition through 2006 addenda), Code Case OMN-17 allows licensees to extend the test interval for SRVs to 6 years, with the potential use of a 6-month grace period, provided that additional maintenance requirements are met. Licensees on newer editions and addenda of the ASME OM Code are not allowed to use this code case without prior NRC approval because these newer editions and addenda are not listed in the *Inquiry* section of Code Case OMN-17. However, the NRC staff has authorized licensees to use Code Case OMN-17 provided that all requirements in the code case are met.

By letter dated November 13, 2018 (ADAMS Accession No. ML18275A139), the NRC staff authorized the licensee to use alternative request MSS-VR-01 at NMP-2 for the fourth 10-year IST interval on the basis that alternative request MSS-VR-01 provides an acceptable level of quality and safety. Consistent with Code Case OMN-17, alternative request MSS-VR-01 allows the licensee to extend the test interval for the valves listed in Table 1 to 6 years, with the potential use of a 6-month grace period. In the SE for alternative request MSS-VR-01, the NRC staff determined that the licensee would perform maintenance on these valves consistent with the additional maintenance requirements in Code Case OMN-17.

In its February 4, 2020, application, as supplemented, the licensee proposed to use the ASME Code Case OMN-17 at NMP-2 with two modifications. The NRC staff's review of this application focused on the proposed modifications to Code Case OMN-17. The first proposed modification to Code Case OMN-17 is to extend the test interval specified in the code case from 6 years to 8 years from the date of the as-left pressure test for each valve, while retaining the allowed 6-month grace period. The second proposed modification is to change the minimum number of valves to be tested from each group. Code Case OMN-17 specifies selecting 20 percent of the valves from each valve group to be tested within any 24-month interval. The licensee is requesting to change this provision to allow it to select 40 percent of the valves from each valve group to be tested within any 48-month interval, with the 40 percent population consisting of SRVs which have not been tested during the previous 96-month interval, if they exist. Although the number of SRVs tested in any 24-month interval could be reduced, the number of SRVs tested over any 48-month interval would not change with this proposed alternative.

As discussed above, the Exelon SRV Best Practices Maintenance program has been in place at NMP-2 since 2015. The elements of the program include spring testing, lapping techniques and tools, set pressure adjustment methodology precision, average delay trending, and internal component condition variations. The licensee disassembles and inspects the SRVs after as-found set pressure testing and before as-left set pressure testing.

In its application, the licensee stated that it recently performed an assessment of the SRVs at NMP-2. This assessment reviewed as-left and as-found set pressure data since 1998. Based on the time between the as-left and as-found set pressure test for each SRV, the set pressure drift was linearly extrapolated to determine whether the SRV's set pressure would still be within the ± 3.0 percent tolerance following an 8-year interval. A linear extrapolation was used because the licensee determined that it provided the best mathematical approach. Since 2014, 18 SRVs were removed and as-found tested, and 16 valves were projected to have lift setpoints within the ± 3.0 percent tolerance for more than 8 years. The two valves that were out of tolerance were maintained and tested in 2010, which was prior to the addition of a seat leak-tightness test that was added to the SRV Best Practices Maintenance program in 2015. The additional seat leak-tightness test was performed on the valves during their refurbishment, and the licensee expects increased valve performance. The application states that the setpoint drift performance of the SRVs at NMP-2 has improved as a result of the SRV Best Practices Maintenance program. The licensee's assessment concluded that there is reasonable assurance that each SRV will retain the set pressure, within the required drift tolerances, through an 8-year interval.

The licensee's June 12, 2020, letter states that the maximum time between SRV tests at NMP-2 would be 48 months. The letter also states that Exelon has been collecting, trending, and analyzing SRV test, maintenance, inspection and performance data since 2014 for Clinton, Dresden, NMP-2, Peach Bottom, Quad Cities, and Limerick Generating Station, Units 1 and 2. Clinton and NMP-2 both use Dikkers Model G-471 SRVs. The licensee stated that trending and analyzing test data between stations which have the same SRV model would reduce the effective maximum elapsed time between SRV tests for the same model. Prior to implementing this alternative request, the licensee will establish an SRV Best Practices Fleet Engineering program to define program elements and will establish fleetwide performance tracking and trending guidelines.

Based on its review of the licensee's application, as supplemented, the NRC staff finds that the proposed alternative MSS-VR-02 for NMP-2 provides an acceptable level of quality and safety, because:

1. Exelon will meet the provisions of ASME Code Case OMN-17 which are not being modified by this proposed alternative, including the requirement to disassemble and inspect all valves prior to as-left testing and installation;
2. Exelon's SRV Best Practices Maintenance program has been implemented for the SRVs affected by the proposed alternative;
3. Exelon's SRV Best Practices Fleet Engineering program, which includes the sharing of applicable SRV test data between Exelon nuclear power plant units, will be established prior to implementation of this proposed alternative; and

4. the results of the as-left and as-found set pressure test data for the NMP-2 SRVs indicate that the SRV set pressures will remain within acceptable tolerance levels for more than 8 years.

4.0 CONCLUSION

As set forth above, the NRC staff has determined that proposed alternative MSS-VR-02 for NMP-2 provides an acceptable level of quality and safety for the valves listed in Table 1. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(1). Therefore, the NRC staff authorizes the use of proposed alternative MSS-VR-02, as described in the licensee's application, as supplemented, for the remainder of the fourth 10-year IST program interval at NMP-2, which is currently scheduled to end on December 31, 2028.

All other ASME OM Code requirements for which relief or an alternative was not specifically requested and approved as part of this request remain applicable.

Principal Contributor: Robert Wolfgang, NRR/DEX/EMIB

Date: January 14, 2021



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

PROPOSED ALTERNATIVE 01A-VRR-5 REGARDING

EXTENSION OF THE SAFETY RELIEF VALVE TESTING INTERVAL

EXELON GENERATION COMPANY, LLC

PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3

DOCKET NOS. 50-277 AND 50-278

1.0 INTRODUCTION

By application dated February 4, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20036D962), as supplemented by letter dated June 12, 2020 (ADAMS Accession No. ML20164A188), Exelon Generation Company, LLC (Exelon, the licensee) submitted a request in accordance with paragraph 50.55a(z)(1) of Title 10 of the *Code of Federal Regulations* (10 CFR) for a proposed alternative to specific requirements of 10 CFR 50.55a for Clinton Power Station, Unit No. 1 (Clinton); Dresden Nuclear Power Station, Units 2 and 3 (Dresden); Nine Mile Point Nuclear Station, Unit 2 (NMP-2); Peach Bottom Atomic Power Station, Units 2 and 3 (Peach Bottom); and Quad Cities Nuclear Power Station, Units 1 and 2 (Quad Cities). The licensee's June 12, 2020, letter was provided in response to a U.S. Nuclear Regulatory Commission (NRC) staff request for additional information issued on May 14, 2020 (ADAMS Accession No. ML20135H197). This safety evaluation (SE) provides the NRC staff's review of proposed alternative 01A-VRR-5 for Peach Bottom, as described in the application, as supplemented. The NRC staff's review of the proposed alternative for the other facilities is described in separate SEs.

The proposed alternative would allow the licensee to extend the testing intervals for main steam line safety/relief valves (SRVs) at Peach Bottom during the fifth 10-year inservice testing (IST) interval. The requirements for the SRV testing interval are described in the American Society of Mechanical Engineers (ASME), *Operation and Maintenance of Nuclear Power Plants*, Division 1, Section IST (OM Code).

2.0 REGULATORY EVALUATION

The regulations in 10 CFR 50.55a(f)(4) state, in part, that throughout the service life of a boiling or pressurized water-cooled nuclear power facility, pumps and valves that are within the scope of the ASME OM Code must meet the inservice test requirements (except design and access provisions) set forth in the ASME OM Code and addenda that become effective subsequent to editions and addenda specified in 10 CFR 50.55a(f)(2) and (3) and that are incorporated by reference in 10 CFR 50.55a(a)(1)(iv), to the extent practical within the limitations of design, geometry, and materials of construction of the components.

The regulations in 10 CFR 50.55a(z) state, in part, that alternatives to the requirements in paragraphs (b) through (h) of 10 CFR 50.55a may be authorized by the NRC if the licensee demonstrates that: (1) the proposed alternative provides 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 2012 edition of the ASME OM Code, as incorporated by reference in 10 CFR 50.55a with conditions, is applicable to the fifth 10-year IST interval at Peach Bottom, which began on November 16, 2018, and is scheduled to end on August 14, 2028.

3.0 TECHNICAL EVALUATION

3.1 Licensee's Request

The licensee requested an alternative to the valve testing requirements in Mandatory Appendix I, "Inservice Testing of Pressure Relief Devices in Light-Water Reactor Nuclear Power Plants," of the ASME OM Code (2012 edition). Subparagraph I-1320(a) of Mandatory Appendix I states:

Class 1 pressure relief valves shall be tested at least once every 5 yr [years], starting with initial electric power generation. No maximum limit is specified for the number of valves to be tested within each interval; however, a minimum of 20% of the valves from each valve group shall be tested within any 24-mo [month] interval. This 20% shall consist of valves that have not been tested during the current 5-yr interval, if they exist. The test interval for any installed valve shall not exceed 5 yr. This 5-yr test interval shall begin from the date of the as-left set pressure test for each valve.

The licensee has requested to use the proposed alternative at Peach Bottom for the valves listed in Table 1 below.

Table 1: List of Valves at Peach Bottom Affected by the Proposed Alternative

Component	Description	Class	Category
RV-2-02-071A	Main Steam SRV	1	C
RV-2-02-071B	Main Steam SRV	1	C
RV-2-02-071C	Main Steam SRV	1	C
RV-2-02-071D	Main Steam SRV	1	C
RV-2-02-071E	Main Steam SRV	1	C
RV-2-02-071F	Main Steam SRV	1	C
RV-2-02-071G	Main Steam SRV	1	C
RV-2-02-071H	Main Steam SRV	1	C
RV-2-02-071J	Main Steam SRV	1	C
RV-2-02-071K	Main Steam SRV	1	C
RV-2-02-071L	Main Steam SRV	1	C
RV-3-02-071A	Main Steam SRV	1	C
RV-3-02-071B	Main Steam SRV	1	C
RV-3-02-071C	Main Steam SRV	1	C
RV-3-02-071D	Main Steam SRV	1	C
RV-3-02-071E	Main Steam SRV	1	C

Component	Description	Class	Category
RV-3-02-071F	Main Steam SRV	1	C
RV-3-02-071G	Main Steam SRV	1	C
RV-3-02-071H	Main Steam SRV	1	C
RV-3-02-071J	Main Steam SRV	1	C
RV-3-02-071K	Main Steam SRV	1	C
RV-3-02-071L	Main Steam SRV	1	C

Reason for Request

At Peach Bottom, there are 11 Target Rock (Models 73-67F and 74-67F) 3-stage SRVs installed on the main steam lines inside the drywell in each unit. These valves are all in the same IST program valve group. Subparagraph I-1320(a) of the ASME OM Code, Mandatory Appendix I, requires each installed SRV to be pressure tested within 5 years from the date of the as-left set pressure test. The licensee has implemented ASME Code Case OMN-17, "Alternative Rules for Testing ASME Class 1 Pressure Relief/Safety Valves," which extends this 5-year test interval to 6 years, with the potential use of a 6-month grace period. The use of this Code Case allows the licensee to test all the SRVs in Table 1 over three refueling outages, instead of two, which could reduce the number of SRVs tested over three refueling outages by six SRVs.

The licensee conducted a performance assessment of the valves listed in Table 1, and determined that there is reasonable assurance that these valves will retain their set pressure within the required drift tolerances if the test interval is extended from 6 years to 8 years. Reducing the number of valves tested every refueling outage would also reduce occupational radiological exposures.

Proposed Alternative and Basis for Use

For the testing of valves listed in Table 1, the licensee proposes to use the ASME Code Case OMN-17, with two modifications, as an alternative to the requirements in subparagraph I-1320(a) of the ASME OM Code, Mandatory Appendix I. The first modification to Code Case OMN-17 is to extend the test interval specified in the code case from 6 years to 8 years from the date of the as-left pressure test for each valve. With the 6-month grace period allowed by Code Case OMN-17, the test interval will not exceed 8.5 years. The second modification to Code Case OMN-17 is to change the minimum number of SRVs from each valve group to be tested from 20 percent within any 24-month interval to 40 percent within any 48-month interval, with the 40-percent population consisting of SRVs which have not been tested during the previous 96-month interval, if they exist. All other requirements of Code Case OMN-17 will be retained and implemented, including the requirement to disassemble and inspect all valves prior to as-left testing and installation.

Exelon stated that it implemented an SRV Best Practices Maintenance program at Peach Bottom in 2010, and it has made several enhancements to the program since implementation. The program consists of methods and philosophies concerning maintenance, inspection, and techniques which uses the valve manufacturer's recommended maintenance practices and enhancements identified by the licensee. In its June 12, 2020, letter, Exelon described its SRV Best Practices Maintenance program. The elements of this program include spring testing, lapping techniques and tools, set pressure adjustment methodology precision, average delay time trending, and internal component condition variations.

The June 12, 2020, letter states that Exelon has been collecting, trending, and analyzing SRV test, maintenance, inspection and performance data since 2014 for Clinton, Dresden, NMP-2, Peach Bottom, Quad Cities, and Limerick Generating Station, Units 1 and 2. Prior to implementation of this proposed alternative, Exelon stated that it will establish an Exelon SRV Best Practices Fleet Engineering program document to provide governance over Exelon-approved vendor SRV maintenance procedures, to define the program elements, and to establish fleetwide performance tracking and trending guidelines. This program document and Exelon-approved vendor procedures are updated to incorporate advances in technology and operating experience from the Exelon fleet, the original equipment manufacturer, and the industry.

In its application, the licensee stated that it recently performed an assessment of the SRVs at Peach Bottom. This assessment reviewed as-left and as-found set pressure data since 2011. The application states that the setpoint drift performance of the SRVs at Peach Bottom has improved as a result of the SRV Best Practices Maintenance program. The licensee's assessment concluded that there is reasonable assurance that each SRV will retain the set pressure, within the required drift tolerances, through an 8-year interval.

3.2 NRC Staff's Evaluation

The NRC staff has unconditionally approved Code Case OMN-17 for voluntary use by licensees in NRC Regulatory Guide 1.192, Revision 3, "Operation and Maintenance Code Case Acceptability, ASME OM Code" (ADAMS Accession No. ML19128A261), which is incorporated by reference in 10 CFR 50.55a. As an alternative to the requirements in Section I-1320 in Mandatory Appendix I of the ASME OM Code (2001 edition through 2006 addenda), Code Case OMN-17 allows licensees to extend the test interval for SRVs to 6 years, with the potential use of a 6-month grace period, provided that additional maintenance requirements are met. Licensees on newer editions and addenda of the ASME OM Code are not allowed to use this code case without prior NRC approval because these newer editions and addenda are not listed in the *Inquiry* section of Code Case OMN-17. However, the NRC staff has authorized licensees to use Code Case OMN-17 provided that all requirements in the code case are met. By letter dated February 7, 2018 (ADAMS Accession No. ML18036A156), the NRC staff authorized the licensee to use ASME OM Code Case OMN-17 at Peach Bottom for the fifth 10-year IST interval on the basis that this code case provides an acceptable level of quality and safety.

In its February 4, 2020, application, as supplemented, the licensee proposed to continue the use of this Code Case OMN-17 at Peach Bottom with two modifications. The NRC staff's review of this application focused on the proposed modifications to Code Case OMN-17. The first proposed modification to Code Case OMN-17 is to extend the test interval specified in the code case from 6 years to 8 years from the date of the as-left pressure test for each valve, while retaining the allowed 6-month grace period. The second proposed modification is to change the minimum number of valves to be tested from each group. Code Case OMN-17 specifies selecting 20 percent of the valves from each valve group to be tested within any 24-month interval. The licensee is requesting to change this provision to allow it to select 40 percent of the valves from each valve group to be tested within any 48-month interval, with the 40 percent population consisting of SRVs which have not been tested during the previous 96-month interval, if they exist. Although the number of SRVs tested in any 24-month interval could be reduced, the number of SRVs tested over any 48-month interval would not change with this proposed alternative.

As discussed above, the Exelon SRV Best Practices Maintenance program has been in place at Peach Bottom since 2010. The elements of the program include spring testing, lapping techniques and tools, set pressure adjustment methodology precision, average delay trending, and internal component condition variations. The June 12, 2020, letter states, in part, that the licensee applies tighter tolerances to the pilot abutment and preload gaps for the valves listed in Table 1, which reduce the likelihood of vibration-induced seat leakage caused by pressure transients. The time between the pilot valve opening and the main disk opening is measured and trended to determine if additional maintenance should be performed on the valves. The licensee disassembles and inspects the SRVs after as-found set pressure testing and before as-left set pressure testing.

In its application, the licensee stated that it recently performed an assessment of the SRVs at Peach Bottom. This assessment reviewed as-left and as-found set pressure data since 2011. Based on the time between the as-left and as-found set pressure test for each SRV, the set pressure drift was linearly extrapolated to determine whether the SRV's set pressure would still be within the ± 3.0 percent tolerance following an 8-year interval. A linear extrapolation was used because the licensee determined that it provided the best mathematical approach. Since 2014, 21 SRVs were removed and as-found tested, and 20 valves were projected to have lift setpoints within the ± 3.0 percent tolerance for more than 8 years. The one valve that was out of tolerance was maintained and tested in 2012, which was prior to the refinement of the upgraded lapping, pilot abutment, and preload gap settings optimization techniques that were added to the SRV maintenance best practices in 2014. The SRV maintenance best practices will be completed during the valve refurbishment prior to re-installation, and the licensee expects increased valve performance. The application states that the setpoint drift performance of the SRVs at Peach Bottom has improved as a result of the SRV Best Practices Maintenance program. The licensee's assessment concluded that there is reasonable assurance that each SRV will retain the set pressure, within the required drift tolerances, through an 8-year interval.

The licensee's June 12, 2020, letter states that the maximum time between SRV tests at the two Peach Bottom units would be 36 months. The letter also states that Exelon has been collecting, trending, and analyzing SRV test, maintenance, inspection and performance data since 2014 for Clinton, Dresden, NMP-2, Peach Bottom, Quad Cities, and Limerick Generating Station, Units 1 and 2 (Limerick). Dresden Units 2 and 3, Limerick Units 1 and 2, Peach Bottom Units 2 and 3, and Quad Cities Units 1 and 2 all use the same base model Target Rock SRVs. The licensee stated that trending and analyzing test data between stations which have the same SRV model would reduce the effective maximum elapsed time between SRV tests for the same model. Prior to implementing this alternative request, the licensee will establish an SRV Best Practices Fleet Engineering program to define program elements and will establish fleetwide performance tracking and trending guidelines.

Based on its review of the licensee's application, as supplemented, the NRC staff finds that the proposed alternative 01A-VRR-5 for Peach Bottom provides an acceptable level of quality and safety, because:

1. Exelon will continue to meet the provisions of ASME Code Case OMN-17 which are not being modified by this proposed alternative, including the requirement to disassemble and inspect all valves prior to as-left testing and installation;
2. Exelon's SRV Best Practices Maintenance program has been implemented for the SRVs affected by the proposed alternative;

3. Exelon's SRV Best Practices Fleet Engineering program, which includes the sharing of applicable SRV test data between Exelon nuclear power plant units, will be established prior to implementation of this proposed alternative; and
4. the results of the as-left and as-found set pressure test data for the Peach Bottom SRVs indicate that the SRV set pressures will remain within acceptable tolerance levels for more than 8 years.

4.0 CONCLUSION

As set forth above, the NRC staff has determined that proposed alternative 01A-VRR-5 for Peach Bottom provides an acceptable level of quality and safety for the valves listed in Table 1. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(1). Therefore, the NRC staff authorizes the use of proposed alternative 01A-VRR-5, as described in the licensee's application, as supplemented, for the remainder of the fifth 10-year IST program interval at Peach Bottom, which is currently scheduled to end on August 14, 2028.

All other ASME OM Code requirements for which relief or an alternative was not specifically requested and approved as part of this request remain applicable.

Principal Contributor: Robert Wolfgang, NRR/DEX/EMIB

Date: January 14, 2021



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

PROPOSED ALTERNATIVE RV-08 REGARDING

EXTENSION OF THE SAFETY RELIEF VALVE TESTING INTERVAL

EXELON GENERATION COMPANY, LLC

QUAD CITIES NUCLEAR POWER STATION, UNITS 2 AND 3

DOCKET NOS. 50-254 AND 50-265

1.0 INTRODUCTION

By application dated February 4, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20036D962), as supplemented by letter dated June 12, 2020 (ADAMS Accession No. ML20164A188), Exelon Generation Company, LLC (Exelon, the licensee) submitted a request in accordance with paragraph 50.55a(z)(1) of Title 10 of the *Code of Federal Regulations* (10 CFR) for a proposed alternative to specific requirements of 10 CFR 50.55a for Clinton Power Station, Unit No. 1 (Clinton); Dresden Nuclear Power Station, Units 2 and 3 (Dresden); Nine Mile Point Nuclear Station, Unit 2 (NMP-2); Peach Bottom Atomic Power Station, Units 2 and 3 (Peach Bottom); and Quad Cities Nuclear Power Station, Units 1 and 2 (Quad Cities). The licensee's June 12, 2020, letter was provided in response to a U.S. Nuclear Regulatory Commission (NRC) staff request for additional information issued on May 14, 2020 (ADAMS Accession No. ML20135H197). This safety evaluation (SE) provides the NRC staff's review of proposed alternative RV-08 for Quad Cities, as described in the application, as supplemented. The NRC staff's review of the proposed alternative for the other facilities is described in separate SEs.

The proposed alternative would allow the licensee to extend the testing intervals for main steam line safety/relief valves (SRVs)¹ at Quad Cities during the fifth 10-year inservice testing (IST) interval. The requirements for the SRV testing interval are described in the American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (OM Code).

2.0 REGULATORY EVALUATION

The regulations in 10 CFR 50.55a(f)(4) state, in part, that throughout the service life of a boiling or pressurized water-cooled nuclear power facility, pumps and valves that are within the scope of the ASME OM Code must meet the inservice test requirements (except design and access provisions) set forth in the ASME OM Code and addenda that become effective subsequent to editions and addenda specified in 10 CFR 50.55a(f)(2) and (3) and that are incorporated by

¹ At Quad Cities, the subject valves are referred to as main steam relief/safety valves.

reference in 10 CFR 50.55a(a)(1)(iv), to the extent practical within the limitations of design, geometry, and materials of construction of the components.

The regulations in 10 CFR 50.55a(z) state, in part, that alternatives to the requirements in paragraphs (b) through (h) of 10 CFR 50.55a may be authorized by the NRC if the licensee demonstrates that: (1) the proposed alternative provides 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 2004 edition through the 2006 addenda of the ASME OM Code, as incorporated by reference in 10 CFR 50.55a with conditions, is applicable to the fifth 10-year IST interval at Quad Cities, which began on February 18, 2013, and is scheduled to end on February 17, 2023.

3.0 TECHNICAL EVALUATION

3.1 Licensee's Request

The licensee requested an alternative to the valve testing requirements in Mandatory Appendix I, "Inservice Testing of Pressure Relief Devices in Light-Water Reactor Nuclear Power Plants," of the ASME OM Code (2004 edition through the 2006 addenda). Subparagraph I-1320(a) of Mandatory Appendix I states:

Class 1 pressure relief valves shall be tested at least once every 5 years, starting with initial electric power generation. No maximum limit is specified for the number of valves to be tested within each interval; however, a minimum of 20% of the valves from each valve group shall be tested within any 24-month interval. This 20% shall consist of valves that have not been tested during the current 5-year interval, if they exist. The test interval for any individual valve shall not exceed 5 years.

The licensee has requested to use the proposed alternative at Quad Cities for the valves listed in Table 1 below.

Table 1: List of Valves at Quad Cities Affected by the Proposed Alternative

Component	Description	Class	Category
1-0203-003A	MS-3A Target Rock SRV	1	C
2-0203-003A	MS-3A Target Rock SRV	1	C

Reason for Request

At Quad Cities, there is one Target Rock (Model 74-67F) 3-stage SRV installed on the main steam lines inside the drywell of each unit. The one valve for each unit is classified into an IST program valve group of one. Subparagraph I-1320(a) of the ASME OM Code, Mandatory Appendix I, requires each installed SRV to be pressure tested at least once every 5 years. However, the Quad Cities SRVs must be tested every refueling outage in order to comply with the requirement in subparagraph I-1320(a) that at least 20 percent of the valves are tested every 24 months. Currently, the Quad Cities units operate on a 24-month refueling cycle.

The licensee conducted a performance assessment of the valves listed in Table 1, and determined that there is reasonable assurance that these valves will retain their set pressure

within the required drift tolerances if the test interval is extended from 24 months to 48 months. Reducing the number of valves tested every refueling outage would also reduce occupational radiological exposures.

Proposed Alternative and Basis for Use

For the valves listed in Table 1, the licensee proposed to extend the test interval from 24 months to 48 months from the date of the as-left set pressure test for each valve as an alternative to the requirements in subparagraph I-1320(a) of the ASME OM Code, Mandatory Appendix I.

Exelon stated that it implemented an SRV Best Practices Maintenance program at Quad Cities in 2010, and it has made several enhancements to the program since implementation. The program consists of methods and philosophies concerning maintenance, inspection, and techniques which uses the valve manufacturer's recommended maintenance practices and enhancements identified by the licensee. In its June 12, 2020, letter, Exelon described its SRV Best Practices Maintenance program. The elements of this program include spring testing, lapping techniques and tools, set pressure adjustment methodology precision, average delay time trending, and internal component condition variations.

The June 12, 2020, letter states that Exelon has been collecting, trending, and analyzing SRV test, maintenance, inspection and performance data since 2014 for Clinton, Dresden, NMP-2, Peach Bottom, Quad Cities, and Limerick Generating Station, Units 1 and 2. Prior to implementation of this proposed alternative, Exelon stated that it will establish an Exelon SRV Best Practices Fleet Engineering program document to provide governance over Exelon-approved vendor SRV maintenance procedures, to define the program elements, and to establish fleetwide performance tracking and trending guidelines. This program document and Exelon-approved vendor procedures are updated to incorporate advances in technology and operating experience from the Exelon fleet, the original equipment manufacturer, and the industry.

In its application, the licensee stated that it recently performed an assessment of the SRVs at Quad Cities. This assessment reviewed as-left and as-found set pressure data since 1998. The application states that the setpoint drift performance of the SRVs at Quad Cities has improved as a result of the SRV Best Practices Maintenance program. The licensee's assessment concluded that there is reasonable assurance that each SRV will retain the set pressure, within the required drift tolerances, through a 48-month interval.

3.2 NRC Staff's Evaluation

In its February 4, 2020, application, as supplemented, the licensee proposed to extend the SRV test interval at Quad Cities from 24 months to 48 months from the date of the as-left set pressure test for each valve.

As discussed above, the Exelon SRV Best Practices Maintenance program has been in place at Quad Cities since 2010. The elements of the program include spring testing, lapping techniques and tools, set pressure adjustment methodology precision, average delay trending, and internal component condition variations. The June 12, 2020, letter states, in part, that the licensee applies tighter tolerances to the pilot abutment and preload gaps for the valves listed in Table 1, which reduce the likelihood of vibration-induced seat leakage caused by pressure transients. The time between the pilot valve opening and the main disk opening is measured

and trended to determine if additional maintenance should be performed on the valves. The licensee also disassembles and inspects the SRVs after as-found set pressure testing and before as-left set pressure testing.

In its application, the licensee stated that it recently performed an assessment of the SRVs at Quad Cities. This assessment reviewed as-left and as-found set pressure data since 1998. Based on the time between the as-left and as-found set pressure test for each SRV, the set pressure drift was linearly extrapolated to determine whether the SRV's set pressure would still be within the ± 3.0 percent tolerance following a 48-month interval. A linear extrapolation was used because the licensee determined that it provided the best mathematical approach. Since 2014, five SRVs were removed and as-found tested, and all five valves were projected to have lift setpoints within the ± 3.0 percent tolerance for more than 48 months. The application states that the setpoint drift performance of the SRVs at Quad Cities has improved as a result of the SRV Best Practices Maintenance program. The licensee's assessment concluded that there is reasonable assurance that each SRV will retain the set pressure, within the required drift tolerances, through a 48-month interval.

The licensee's June 12, 2020, letter states that the maximum time between SRV tests at the two Quad Cities units would be 36 months. The letter also states that Exelon has been collecting, trending, and analyzing SRV test, maintenance, inspection and performance data since 2014 for Clinton, Dresden, NMP-2, Peach Bottom, Quad Cities, and Limerick Generating Station, Units 1 and 2 (Limerick). Dresden Units 2 and 3, Limerick Units 1 and 2, Peach Bottom Units 2 and 3, and Quad Cities Units 1 and 2 all use the same base model Target Rock SRVs. The licensee stated that trending and analyzing test data between stations which have the same SRV model would reduce the effective maximum elapsed time between SRV tests for the same model. Prior to implementing this alternative request, the licensee will establish an SRV Best Practices Fleet Engineering program to define program elements and will establish fleetwide performance tracking and trending guidelines.

Based on its review of the licensee's application, as supplemented, the NRC staff finds that the proposed alternative RV-08 for Quad Cities provides an acceptable level of quality and safety, because:

1. Exelon will disassemble and inspect all valves prior to as-left testing and installation;
2. Exelon's SRV Best Practices Maintenance program has been implemented for the SRVs affected by the proposed alternative;
3. Exelon's SRV Best Practices Fleet Engineering program, which includes the sharing of applicable SRV test data between Exelon nuclear power plant units, will be established prior to implementation of this proposed alternative; and
4. the results of the as-left and as-found set pressure test data for the Quad Cities SRVs indicate that the SRV set pressures will remain within acceptable tolerance levels for more than 48 months.

4.0 CONCLUSION

As set forth above, the NRC staff has determined that proposed alternative RV-08 for Quad Cities provides an acceptable level of quality and safety for the valves listed in Table 1. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the

regulatory requirements set forth in 10 CFR 50.55a(z)(1). Therefore, the NRC staff authorizes the use of proposed alternative RV-08, as described in the licensee's application, as supplemented, for the remainder of the fifth 10-year IST program interval at Quad Cities, which is currently scheduled to end on February 17, 2023.

All other ASME OM Code requirements for which relief or an alternative was not specifically requested and approved as part of this request remain applicable.

Principal Contributor: Robert Wolfgang, NRR/DEX/EMIB

Date: January 14, 2021



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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

PROPOSED ALTERNATIVE RV-09 REGARDING

EXTENSION OF THE SAFETY RELIEF VALVE TESTING INTERVAL

EXELON GENERATION COMPANY, LLC

QUAD CITIES NUCLEAR POWER STATION, UNITS 2 AND 3

DOCKET NOS. 50-254 AND 50-265

1.0 INTRODUCTION

By application dated February 4, 2020 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML20036D962), as supplemented by letter dated June 12, 2020 (ADAMS Accession No. ML20164A188), Exelon Generation Company, LLC (Exelon, the licensee) submitted a request in accordance with paragraph 50.55a(z)(1) of Title 10 of the *Code of Federal Regulations* (10 CFR) for a proposed alternative to specific requirements of 10 CFR 50.55a for Clinton Power Station, Unit No. 1 (Clinton); Dresden Nuclear Power Station, Units 2 and 3 (Dresden); Nine Mile Point Nuclear Station, Unit 2 (NMP-2); Peach Bottom Atomic Power Station, Units 2 and 3 (Peach Bottom); and Quad Cities Nuclear Power Station, Units 1 and 2 (Quad Cities). The licensee's June 12, 2020, letter was provided in response to a U.S. Nuclear Regulatory Commission (NRC) staff request for additional information issued on May 14, 2020 (ADAMS Accession No. ML20135H197). This safety evaluation (SE) provides the NRC staff's review of proposed alternative RV-09 for Quad Cities, as described in the application, as supplemented. The NRC staff's review of the proposed alternative for the other facilities is described in separate SEs.

The proposed alternative would allow the licensee to extend the testing intervals for main steam line safety/relief valves (SRVs)¹ at Quad Cities during the fifth 10-year inservice testing (IST) interval. The requirements for the SRV testing interval are described in the American Society of Mechanical Engineers (ASME) Code for Operation and Maintenance of Nuclear Power Plants (OM Code).

2.0 REGULATORY EVALUATION

The regulations in 10 CFR 50.55a(f)(4) state, in part, that throughout the service life of a boiling or pressurized water-cooled nuclear power facility, pumps and valves that are within the scope of the ASME OM Code must meet the inservice test requirements (except design and access provisions) set forth in the ASME OM Code and addenda that become effective subsequent to editions and addenda specified in 10 CFR 50.55a(f)(2) and (3) and that are incorporated by

¹ At Quad Cities, the subject valves are referred to as main steam safety valves.

reference in 10 CFR 50.55a(a)(1)(iv), to the extent practical within the limitations of design, geometry, and materials of construction of the components.

The regulations in 10 CFR 50.55a(z) state, in part, that alternatives to the requirements in paragraphs (b) through (h) of 10 CFR 50.55a may be authorized by the NRC if the licensee demonstrates that: (1) the proposed alternative provides 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 2004 edition through the 2006 addenda of the ASME OM Code, as incorporated by reference in 10 CFR 50.55a with conditions, is applicable to the fifth 10-year IST interval at Quad Cities, which began on February 18, 2013, and is scheduled to end on February 17, 2023.

3.0 TECHNICAL EVALUATION

3.1 Licensee's Request

The licensee requested an alternative to the valve testing requirements in Mandatory Appendix I, "Inservice Testing of Pressure Relief Devices in Light-Water Reactor Nuclear Power Plants," of the ASME OM Code (2004 edition through the 2006 addenda). Subparagraph I-1320(a) of Mandatory Appendix I states:

Class 1 pressure relief valves shall be tested at least once every 5 years, starting with initial electric power generation. No maximum limit is specified for the number of valves to be tested within each interval; however, a minimum of 20% of the valves from each valve group shall be tested within any 24-month interval. This 20% shall consist of valves that have not been tested during the current 5-year interval, if they exist. The test interval for any individual valve shall not exceed 5 years.

The licensee has requested to use the proposed alternative at Quad Cities for the valves listed in Table 1 below.

Table 1: List of Valves at Quad Cities Affected by the Proposed Alternative

Component	Description	Class	Category
1-0203-004A	MS-4A Safety Valve	1	C
1-0203-004B	MS-4B Safety Valve	1	C
1-0203-004C	MS-4C Safety Valve	1	C
1-0203-004D	MS-4D Safety Valve	1	C
1-0203-004E	MS-4E Safety Valve	1	C
1-0203-004F	MS-4F Safety Valve	1	C
1-0203-004G	MS-4G Safety Valve	1	C
1-0203-004H	MS-4H Safety Valve	1	C
2-0203-004A	MS-4A Safety Valve	1	C
2-0203-004B	MS-4B Safety Valve	1	C
2-0203-004C	MS-4C Safety Valve	1	C
2-0203-004D	MS-4D Safety Valve	1	C
2-0203-004E	MS-4E Safety Valve	1	C
2-0203-004F	MS-4F Safety Valve	1	C

Component	Description	Class	Category
2-0203-004G	MS-4G Safety Valve	1	C
2-0203-004H	MS-4H Safety Valve	1	C

Reason for Request

At Quad Cities, there are eight Dresser Model 3777Q main steam SRVs installed on the main steam lines inside the drywell of each unit. These valves are all in the same IST program valve group. Subparagraph I-1320(a) of the ASME OM Code, Mandatory Appendix I, requires each installed SRV to be pressure tested at least once every 5 years. The licensee has implemented ASME Code Case OMN-17, "Alternative Rules for Testing ASME Class 1 Pressure Relief/ Safety Valves," which extends this 5-year test interval to 6 years, with the potential use of a 6-month grace period. The use of this Code Case allows the licensee to test all the SRVs in Table 1 over three refueling outages, instead of two, which could reduce the number of SRVs tested over three refueling outages by four SRVs per unit.

The licensee conducted a performance assessment of the valves listed in Table 1, and determined that there is reasonable assurance that these valves will retain their set pressure within the required drift tolerances if the test interval is extended from 6 years to 8 years. Reducing the number of valves tested every refueling outage would also reduce occupational radiological exposures.

Proposed Alternative and Basis for Use

For the testing of valves listed in Table 1, the licensee proposes to use the ASME Code Case OMN-17, with two modifications, as an alternative to the requirements in subparagraph I-1320(a) of the ASME OM Code, Mandatory Appendix I. The first modification to Code Case OMN-17 is to extend the test interval specified in the code case from 6 years to 8 years from the date of the as-left pressure test for each valve. With the 6-month grace period allowed by Code Case OMN-17, the test interval will not exceed 8.5 years. The second modification to Code Case OMN-17 is to change the minimum number of SRVs from each valve group to be tested from 20 percent within any 24-month interval to 40 percent within any 48-month interval, with the 40-percent population consisting of SRVs which have not been tested during the previous 96-month interval, if they exist. All other requirements of Code Case OMN-17 will be retained and implemented, including the requirement to disassemble and inspect all valves prior to as-left testing and installation.

Exelon stated that it implemented an SRV Best Practices Maintenance program at Quad Cities in 2010, and it has made several enhancements to the program since implementation. The program consists of methods and philosophies concerning maintenance, inspection, and techniques which uses the valve manufacturer's recommended maintenance practices and enhancements identified by the licensee. In its June 12, 2020, letter, Exelon described its SRV Best Practices Maintenance program. The elements of this program include spring testing, lapping techniques and tools, set pressure adjustment methodology precision, average delay time trending, and internal component condition variations.

The June 12, 2020, letter states that Exelon has been collecting, trending, and analyzing SRV test, maintenance, inspection and performance data since 2014 for Clinton, Dresden, NMP-2, Peach Bottom, Quad Cities, and Limerick Generating Station, Units 1 and 2. Prior to implementation of this proposed alternative, Exelon stated that it will establish an Exelon SRV Best Practices Fleet Engineering program document to provide governance over Exelon-

approved vendor SRV maintenance procedures, to define the program elements, and to establish fleetwide performance tracking and trending guidelines. This program document and Exelon-approved vendor procedures are updated to incorporate advances in technology and operating experience from the Exelon fleet, the original equipment manufacturer, and the industry.

In its application, the licensee stated that it recently performed an assessment of the SRVs at Quad Cities. This assessment reviewed as-left and as-found set pressure data since 1998. The application states that the setpoint drift performance of the SRVs at Quad Cities has improved as a result of the SRV Best Practices Maintenance program. The licensee's assessment concluded that there is reasonable assurance that each SRV will retain the set pressure, within the required drift tolerances, through an 8-year interval.

3.2 NRC Staff's Evaluation

The NRC staff has unconditionally approved Code Case OMN-17 for voluntary use by licensees in NRC Regulatory Guide 1.192, Revision 3, "Operation and Maintenance Code Case Acceptability, ASME OM Code" (ADAMS Accession No. ML19128A261), which is incorporated by reference in 10 CFR 50.55a. As an alternative to the requirements in Section I-1320 in Mandatory Appendix I of the ASME OM Code (2001 edition through 2006 addenda), Code Case OMN-17 allows licensees to extend the test interval for SRVs to 6 years, with the potential use of a 6-month grace period, provided that additional maintenance requirements are met. In its February 4, 2020, application, as supplemented, the licensee proposed to continue the use of Code Case OMN-17 at Quad Cities with two modifications. The NRC staff's review of this application focused on the proposed modifications to Code Case OMN-17.

The first proposed modification to Code Case OMN-17 is to extend the test interval specified in the code case from 6 years to 8 years from the date of the as-left pressure test for each valve, while retaining the allowed 6-month grace period. The second proposed modification is to change the minimum number of valves to be tested from each group. Code Case OMN-17 specifies selecting 20 percent of the valves from each valve group to be tested within any 24-month interval. The licensee is requesting to change this provision to allow it to select 40 percent of the valves from each valve group to be tested within any 48-month interval, with the 40 percent population consisting of SRVs which have not been tested during the previous 96-month interval, if they exist. Although the number of SRVs tested in any 24-month interval could be reduced, the number of SRVs tested over any 48-month interval would not change with this proposed alternative.

As discussed above, the Exelon SRV Best Practices Maintenance program has been in place at Quad Cities since 2010. The elements of the program include spring testing, lapping techniques and tools, set pressure adjustment methodology precision, average delay trending, and internal component condition variations. The licensee disassembles and inspects the SRVs after as-found set pressure testing and before as-left set pressure testing.

In its application, the licensee stated that it recently performed an assessment of the SRVs at Quad Cities. This assessment reviewed as-left and as-found set pressure data since 1998. Based on the time between the as-left and as-found set pressure test for each SRV, the set pressure drift was linearly extrapolated to determine whether the SRV's set pressure would still be within the ± 3.0 percent tolerance following an 8-year interval. A linear extrapolation was used because the licensee determined that it provided the best mathematical approach. Since 2014, 13 SRVs were removed and as-found tested, and 10 valves were projected to have lift

setpoints within the ± 3.0 percent tolerance for more than 8 years. The three valves that were out of tolerance were disassembled, inspected, tested, and re-installed in 2009 and 2010, which was prior to the refinements made to the SRV Best Practices Maintenance program in 2014. The Exelon SRV maintenance best practices were completed during the refurbishment of these three valves, and the licensee expects increased valve performance. The application states that the setpoint drift performance of the SRVs at Quad Cities has improved as a result of the SRV Best Practices Maintenance program. The licensee's assessment concluded that there is reasonable assurance that each SRV will retain the set pressure, within the required drift tolerances, through an 8-year interval.

The licensee's June 12, 2020, letter states that the maximum time between SRV tests at the two Quad Cities units would be 36 months. The letter also states that Exelon has been collecting, trending, and analyzing SRV test, maintenance, inspection and performance data since 2014 for Clinton, Dresden, NMP-2, Peach Bottom, Quad Cities, and Limerick Generating Station, Units 1 and 2. Quad Cities Units 1 and 2 use the same model Dresser SRVs. The licensee stated that trending and analyzing test data between stations which have the same SRV model would reduce the effective maximum elapsed time between SRV tests for the same model. Prior to implementing this alternative request, the licensee will establish an SRV Best Practices Fleet Engineering program to define program elements and will establish fleetwide performance tracking and trending guidelines.

Based on its review of the licensee's application, as supplemented, the NRC staff finds that the proposed alternative RV-09 for Quad Cities provides an acceptable level of quality and safety, because:

1. Exelon will continue to meet the provisions of ASME Code Case OMN-17 which are not being modified by this proposed alternative, including the requirement to disassemble and inspect all valves prior to as-left testing and installation;
2. Exelon's SRV Best Practices Maintenance program has been implemented for the SRVs affected by the proposed alternative;
3. Exelon's SRV Best Practices Fleet Engineering program, which includes the sharing of applicable SRV test data between Exelon nuclear power plant units, will be established prior to implementation of this proposed alternative; and
4. the results of the as-left and as-found set pressure test data for the Quad Cities SRVs indicate that the SRV set pressures will remain within acceptable tolerance levels for more than 8 years.

4.0 CONCLUSION

As set forth above, the NRC staff has determined that proposed alternative RV-09 for Quad Cities provides an acceptable level of quality and safety for the valves listed in Table 1. Accordingly, the NRC staff concludes that the licensee has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(1). Therefore, the NRC staff authorizes the use of proposed alternative RV-09, as described in the licensee's application, as supplemented, for the remainder of the fifth 10-year IST program interval at Quad Cities, which is currently scheduled to end on February 17, 2023.

All other ASME OM Code requirements for which relief or an alternative was not specifically requested and approved as part of this request remain applicable.

Principal Contributor: Robert Wolfgang, NRR/DEX/EMIB

Date: January 14, 2021

SUBJECT: CLINTON POWER STATION, UNIT NO. 1; DRESDEN NUCLEAR POWER STATION, UNITS 2 AND 3; NINE MILE POINT NUCLEAR STATION, UNIT 2; PEACH BOTTOM ATOMIC POWER STATION, UNITS 2 AND 3; AND QUAD CITIES NUCLEAR POWER STATION, UNITS 1 AND 2 — PROPOSED ALTERNATIVES TO EXTEND THE SAFETY RELIEF VALVE TESTING INTERVAL (EPID L-2020-LLR-0014 THROUGH -0018) DATED JANUARY 14, 2021

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