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

December 20, 2016

Mr. Bryan C. Hanson
Senior Vice President
Exelon Generation Company, LLC
President and Chief Nuclear Officer (CNO)
Exelon Nuclear
4300 Winfield Road
Warrenville, IL 60555

SUBJECT: BYRON STATION, UNIT NOS. 1 AND 2 – REQUEST I4R-01, RELIEF FROM THE REQUIREMENTS OF THE ASME CODE (CAC NOS. MF7639 AND MF7640)

Dear Mr. Hanson:

By letter dated April 15, 2016 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML16106A116), as supplemented by letter dated October 6, 2016 (ADAMS Accession No. ML16281A146), Exelon Generation Company, LLC (Exelon) submitted relief request I4R-01 to the U.S. Nuclear Regulatory Commission (NRC), requesting approval for alternate risk-informed selection and examination criteria for Categories B-F, B-J, C-F-1, and C-F-2 pressure retaining piping welds in accordance with American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, 2007 Edition with the 2008 Addenda, Code Case N-578-1, "Risk-Informed Requirements for Class 1, 2, or 3 Piping, Method B, Section XI, Division 1" (Reference 11) The request is applicable to Byron Station (Byron), Unit Nos. 1 and 2. Other relief requests included in the April 15, 2016, letter will be addressed under separate correspondence.

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR) 50.55a(z)(1), the licensee requested to use the proposed alternative on the basis that the alternative provides an acceptable level of quality and safety.

The NRC staff has reviewed request I4R-01 and concludes, as set forth in the enclosed safety evaluation, that the proposed alternative provides an acceptable level of quality and safety. Accordingly, the NRC staff concludes that Exelon has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(1). Therefore, the NRC authorizes the use of the alternate risk-informed-inservice inspection (RI-ISI) program (I4R-01) at Byron for the fourth 10-year ISI interval, which commenced on July 16, 2016, and is scheduled to end on July 15, 2026.

If you have any questions, please contact the Senior Project Manager, Joel S. Wiebe at 301-415-6606 or via e-mail at Joel S. Wiebe@nrc.gov.

Sincerely,

David J. Wrona, Chief
Plant Licensing Branch III
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos.: STN 50-454, STN 50-455

Enclosure:
Safety Evaluation

cc w/encl: Distribution via ListServ

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RISK-INFORMED INSERVICE INSPECTION PROGRAM

RELIEF REQUEST I4R-01

EXELON GENERATING COMPANY, LLC

BYRON STATION UNITS 1 AND 2

DOCKET NOS. STN 50-454 AND STN 50-455

1.0 INTRODUCTION

By letter dated April 15, 2016 (Agencywide Document Access and Management System (ADAMS) Accession No. ML16106A116, Reference 1), as supplemented by letter dated October 6, 2016 (ADAMS Accession No. ML16281A146, Reference 2), Exelon Generating Company, LLC (EGC, the licensee), submitted a request to the U.S. Nuclear Regulatory Commission (NRC or Commission) for relief from certain American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, requirements at Byron Station, Unit Nos. 1 and 2 (Byron). EGC requested authorization from NRC to continue use of its risk-informed inservice inspection (RI-ISI) program for the fourth 10-year inservice inspection (ISI) interval. The Byron's third 10-year RI-ISI program was approved by NRC letter dated September 25, 2007 (ADAMS Accession No. ML072610510, Reference 3).

Specifically, pursuant to Title 10 of the *Code of Federal Regulations* (10 CFR), 50.55a(z)(1), the licensee requested to use the proposed alternative on the basis that the alternative would provide an acceptable level of quality and safety.

2.0 REGULATORY EVALUATION

In its review of the proposed RI-ISI program, the NRC staff used the guidance provided in the safety evaluation (SE) for the Electric Power Research Institute (EPRI) Topical Report (TR)-112657, Revised Risk-Informed Inservice Inspection Evaluation Procedure," Revision B-A (ADAMS Accession No. ML013470102) (Reference 4), along with the guidance provided in the following NRC guidance documents:

Regulatory Guide (RG) 1.174, "*An Approach for Using Probabilistic Risk Assessment In Risk-Informed Decisions On Plant-Specific Changes to the Licensing Basis*" (ADAMS Accession No. ML100910006) (Reference 12),

RG 1.178, "*An Approach for Plant-Specific Risk-Informed Decisionmaking - Inservice Inspection of Piping*" (ADAMS Accession No. ML032510128) (Reference 13),

Standard Review Plan (SRP), Section 3.9.8, "*Risk-Informed Inservice Inspection*," NUREG-0800 (ADAMS Accession No. ML032510135) (Reference 14).

Adherence to Section XI of the ASME Code is mandated by 10 CFR 50.55a(g)(4), which states, in part, that ASME Code Class 1, 2, and 3 components (including supports) will meet the requirements, except the design and access provisions and the pre-service examination requirements, set forth in the ASME Code, Section XI.

As stated in 10 CFR 50.55a(z)(1), the licensee must demonstrate that the proposed alternative(s) would provide an acceptable level of quality and safety.

Based on the above, and subject to the following technical evaluation, the NRC staff finds that there is a regulatory basis for the licensee to request and the NRC to authorize the proposed alternative.

3.0 TECHNICAL EVALUATION

3.1 Background

The licensee requested approval to continue use of the RI-ISI program as an alternative to the requirements of 10 CFR 50.55a, concerning the fourth 10-year ISI program at Byron. The fourth 10-year RI-ISI program was developed in accordance with the methodology contained in EPRI TR-112657 (Reference 4), which was reviewed and approved by the NRC staff. Byron's third 10-year RI-ISI program was submitted to the NRC by letter dated February 14, 2006 (ADAMS Accession No. ML063530333, Reference 5), and supplemented by letters dated April 3, 2006 (ADAMS Accession Nos. ML070940193, Reference 6), and September 7, 2007 (ADAMS Accession No. ML072530024, Reference 7), and approved for use in the third 10-year ISI interval by NRC letter dated September 25, 2007 (ADAMS Accession No. ML072610510, Reference 3).

3.2 Applicable ASME Code Requirements

In its submittal dated April 15, 2016, the licensee requests NRC authorization to continue the implementation of its RI-ISI program for the fourth 10-year ISI interval at Byron. The scope of the RI-ISI program is limited to the inspection of ASME Code Class 1 and 2 pressure retaining piping welds; specifically, ASME Code, Examination Categories B-F, B-J, C-F-1, and C-F-2, for Item Nos. B5.10, B.5.40, B5.70, B9.11, B9.21, B9.22, B9.31, B9.32, B9.40, C5.11, C5.21, C5.30, C5.41, C5.51, C5.61, C5.70, and C5.81. The examination requirements (i.e., examination methods, acceptance, standards, extent and frequency of examinations, etc.) for these components are delineated in ASME Code Section XI, Tables IWB-2500-1, and IWC-2500-1. The applicable code of record for the fourth 10-year ISI interval for Byron is the ASME Code, Section XI, 2007 Edition through the 2008 Addenda. The fourth 10-year interval began on July 16, 2016, and is scheduled to end on July 15, 2026.

Table IWB-2500-1, Examination Category B-F, requires volumetric and surface examinations on all welds for Item Nos. B5.10, B5.40, and B5.70. Table IWB-2500-1, Examination Category B-J, requires volumetric and surface examinations on a sample of welds for Item Nos. B9.11 and B9.31, volumetric examinations on a sample of welds for Item No. B9.22, and surface examinations on a sample of welds for Item Nos. B9.21, B9.32, and B9.40. The weld population selected for inspection includes the following:

1. All terminal ends in each pipe or branch run connected to vessels.

2. All terminal ends and joints in each pipe or branch run connected to other components where the stress levels exceed either of the following limits under loads associated with specific seismic events and operational conditions:

    a. primary plus secondary stress intensity range of $2.4S_m$ for ferritic steel and austenitic steel.
    b. cumulative usage factor U of 0.4.

3. All dissimilar metal welds not covered under Examination Category B-F.

4. Additional piping welds so that the total number of circumferential butt welds, branch connections, or socket welds selected for examination equals 25 percent of the circumferential butt welds, branch connection, or socket welds in the reactor coolant piping system. This total does not include welds exempted by IWB-1220 or welds in Item No. B9.22. For pressurized-water reactor (PWR) plants these additional welds may be located as follows:

    a. one hot-leg and one cold-leg in one reactor coolant piping loop,
    b. one branch, representative of an essentially symmetric piping configuration among each group of branch runs that are connected to reactor coolant loops and that perform similar system functions, and
    c. each piping and branch run exclusive of the categories of loop and runs that are part of system piping of a. and b. above.

5. A 10 percent sample of PWR high pressure safety injection system circumferential welds in piping ≥ NPS [nominal pipe size] 1½ and < NPS 4 shall be selected for examination. This sample shall be selected from locations determined by the Owner as most likely to be subject to thermal fatigue. Thermal fatigue may be caused by conditions such as valve leakage or turbulence effects.

Table IWC-2500-1, Examination Categories C-F-1 and C-F-2 require volumetric and surface examinations on a sample of welds for Item Nos. C5.11, C5.21, C5.51, and C5.61, and surface examinations on a sample of welds for Item Nos. C5.30, C5.41, C5.70, and C5.81. The weld population selected for inspection includes the following:

1. Welds selected for examination shall include 7.5 percent, but not less than 28 welds, of all dissimilar metal, austenitic stainless steel or high alloy welds (Examination Category C-F-1) or of all carbon and low alloy steel welds (Examination Category C-F-2) not exempted by IWC-1220. (Some welds not exempted by IWC-1220 are not required to be

nondestructively examined per Examination Categories C-F-1 and C-F-2. These welds, however, shall be included in the total weld count to which the 7.5 percent sampling rate is applied.) The examinations shall be distributed as follows:

a. among the Class 2 systems prorated, to the degree practicable, on the number of nonexempt dissimilar metal, austenitic stainless steel or high alloy welds (Examination Category C-F-1) or nonexempt carbon and low alloy steel welds (Examination Category C-F-2) in each system;
b. within a system, per the applicable Examination Category, among terminal ends, dissimilar metal welds, and structural discontinuities prorated, to the degree practicable, on the number of nonexempt terminal ends, dissimilar metal welds, and structural discontinuities in that system; and
c. within each system, between line sizes prorated to the degree practicable.

3.3 Proposed Alternative and Basis for Use

The licensee stated that the initial Byron RI-ISI program was submitted during the second period of the second 10-year interval for Unit No. 1, and during the first period of the second 10-year interval of Unit No. 2. The licensee stated that this initial RI-ISI program was developed using the guidance provided in EPRI TR-112657, Revision B-A, and was supplemented by ASME Code Case N-578-1, "Risk-Informed Requirements for Class 1, 2, or 3 Piping, Method B, Section XI, Division 1" (Reference 11). The licensee also stated the initial RI-ISI program was approved for use at Byron by NRC letter dated February 5, 2002 (ADAMS Accession No. ML020030027, Reference 8). The licensee further stated that the same RI-ISI program was submitted again for Byron during the Third 10-year ISI interval and was approved by NRC letter dated September 25, 2007 (ADAMS Accession No. ML072610510) (Reference 3). The licensee stated that with the exception of weld locations that may have changed due to maintenance or modification activities, and the addition of Alloy 600 Augmented Examination Program, the proposed alternative RI-ISI program for Byron's fourth 10-year Interval is the same as the one for the third 10-year Interval.

The licensee stated that as with the prior ISI updates, it completed a Risk Impact Assessment to determine the change in risk from prior to implementation of the RI-ISI program to the proposed current program for the Byron fourth 10-year interval. The licensee stated that the increase in risk was within the 1.00E-06/yr [year] and 1.00E-07/yr acceptance criteria for delta-core damage frequency (Delta-CDF) and delta-large early release frequency (Delta-LERF) as described in Regulatory Guide (RG) 1.174, "An Approach to Using Probabilistic Risk Assessment (PRA) in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis." These values are provided in the following table. It is noted that negative values represent an improvement in plant risk.

Change in Risk From Byron Pre RI-ISI ASME Code, Section XI ISI Program to Fourth 10-Year Interval RI-ISI Program		
Unit No.	**Delta-CDF**	**Delta-LERF**
Unit 1	1.77E-08	3.95E-10
Unit 2	-1.52E-08	-1.54E-10

During its review of Exelon's submittal, the NRC staff found that additional information was needed to support its review of RR I4R-01. By letter dated August 3, 2016, and August 25,

2016 (ADAMS Accession Nos. ML16216A131 and ML16242A005, References 9 and 10), the NRC staff requested additional information (RAI). By letter dated October 6, 2016 (ADAMS Accession No. ML16281A146, Reference 2), the licensee responded to the staff's RAIs and provided supplemental information.

In its response to RAI No. 2, the licensee stated that the reason for Unit No. 2 having a negative delta-risk as compared to Unit No. 1 are: (1) that only 247 welds are selected for inspection at Unit No. 1 while 272 are inspected at Unit No. 2, and (2) that the welds that yield the negative change in risk values are those that have been selected for RI inspections but were not selected under the previous ASME Code, Section XI, program. For Unit No. 1 these welds number 122 and at Unit No. 2, the number is greater at 130 welds. Looking at the delta-risk at the system level can also explain the difference between units. The biggest difference between the two units is the delta-risk estimate for the chemical and volume control (CV) system and feedwater (FW) system, as shown in Tables 6 and 7 within the response to NRC RAIs. On Unit No. 2, there is a larger risk benefit coming from the CV system. The reason for this is there are two welds on Unit No. 2 with a high delta-risk benefit while there is only one weld on Unit No. 1. These particular welds have a large risk benefit coming from two factors: (1) the welds were not previously selected for inspection in the previous ASME Code, Section XI, program; and (2) there are high conditional core damage probably (CCDP) and CLERP (conditional large early release probability) values for these welds. Since the CCDP and CLERP values are high, there is a greater benefit to risk by selecting these welds for inspection. There is an additional risk benefit from the FW system. For Unit No. 1 there are 32 welds selected for RI inspection while on Unit No. 2 there are 61 welds. The FW welds have lower CCDP and CLERP values compared to the CV welds so, as a consequence, their risk benefit is about an order of magnitude lower.

The license stated that the "evaluation and ranking" procedure along with the "consequence evaluation and degradation mechanism assessment" processes of the current RI-ISI program remain unchanged and are continually applied to the "risk categorization" and "element selection" methods describe in EPRI TR-112657, Revision B-A. EGC further stated that these parts of the RI-ISI program will continue to be re-evaluated and revised as major revisions to the probabilistic risk assessment (PRA) occur and as plant modifications are made.

In its response to RAI No. 1, the licensee stated that the RI-ISI program is required to be, and has been maintained as, a "living program," assessing component and configuration changes and major PRA model revisions throughout the third 10-year ISI interval. As a "living program," the RI-ISI program methodology requires on-going revisions due to changes that occur after the original implementation. The final RI-ISI evaluation for the previous third ISI interval was Revision 6, dated September 2013. The latest evaluation, Revision 7, dated April 2016, is the current evaluation developed as part of the RI-ISI program for the fourth 10-year ISI interval. The changes in inspections by Risk Category significance from the initial third 10-year interval RI-ISI program, Revision 5, dated April 2006, to the fourth 10-year interval RI-ISI program are summarized in Tables 4 and 5 within the licensee's response. In addition, the licensee describes three situations where the initially selected welds were replaced, added, or deleted due to changes in the RI-ISI program, or where unacceptable scanning limitations were determined at the time of the weld examination: (1) limited examination coverage, (2) plant/component modifications, and (3) RI-ISI category reclassification/PRA model revisions.

Licensee's RAI response No. 3 stated that the RI-ISI programs do not utilize the upper bound estimate criteria. In accordance with Section 3.7.2 of the EPRI RI-ISI TR, the Markov piping reliability analysis method was used to estimate the change in risk due to adding and removing locations from the inspection program. The actual CCDP and CLERP values calculated for each element in the consequence assessment were used in the risk impact calculation.

The licensee stated that the PRA BB011b version of the model was peer reviewed in July 2013, for internal events and internal flooding. The assessment of the current peer review Not-Met and Capability Category (CC) I Supporting Requirements (SRs) relative to the RI-ISI relief request is provided in Table 1 (Reference 1). The 6 that were Not-Met and 10 attaining only CC I are justified to have low impact on the PRA model or its ability to support a full range of PRA applications. These items will be reviewed for consideration during the next PRA model update, as appropriate.

The licensee's RAI response No. 4 for SR DA-C5 and C6 stated that neither the base nor the adjusted PRA model was modified to address the Not-Met CCs during the RI-ISI delta-risk calculations. The conservatism is present in both models and associated cases used to estimate the risk increase.

The licensee's RAI response No. 5 for SR-IE-A7 stated that: (1) plant events taking place at times other than at power were collected, reviewed and considered for applicability to initiating events at power; and (2) plant events were reviewed and considered during model maintenance upgrade this year none were found that would be applicable to any new initiating events.

The licensee's RAI response No. 6 for SRs LE-F1 and G3 stated that the significant contributors to LERF were provided to the reviewers from other perspectives such as release category and initiating event.

The licensee's RAI response No. 7 stated that the NRC safety evaluation (SE) on EPRI TR 1021467-A requires that SRs AS-A9 and SC-B2 achieve CC-II or better (i.e: (1) realistic thermal hydraulic model analyses be used to determine accident progression parameters and (2) expert judgment not be used except where information is lacking on the condition or response of a modeled structures, system and component (SSC) or there is a lack of analytical methods upon which to base prediction of SSC condition or response). The licensee stated that as a result of the July 2013, PRA peer view both SRs, AS-A9 and SC-B2, achieved CC-II or better.

The licensee stated that the proposed alternative, along with the two enhancements which were first implemented during the second 10-year ISI interval, and are being currently implemented for the third 10-year interval, provide an acceptable level of quality. The licensee further stated that the fourth 10-year interval RI-ISI program will be a continuation of the current program, which included the following two enhancements to EPRI TR-112657, Revision B-A.

1. In lieu of the evaluation and sample expansion requirements in EPRI TR-112657, Section 3.6.6.2, "RI-ISI Selected Examinations," Byron will use the requirements of ASME B&VP Code Case N-578-1, Subsubarticle -2430, "Additional Examinations." The criteria for additional examinations contained in Code Case N-578-1 provide a more refined alternate methodology for implementing necessary additional examinations, when examinations

performed reveal flaws or relevant conditions exceeding the acceptance standards. In addition the criteria for additional examination in ASME Code Case N-578-1 are structured similar to that provided in ASME Code, Section XI, Subsubarticles IWB-2430 and IWC-2430. Furthermore, Byron intends to perform the required additional examinations during the same outage when the flaws are identified, similar to the current requirements of ASME Code, Section XI.

2. Byron will supplement the requirements listed in EPRI TR-112657, Table 4-1, "Summary of Degradation-Specific Inspection Requirements and Examination Methods," utilizing the provisions listed in Code Case N-578-1, Table 1, Examination Category R-A, "Risk-Informed Piping Examinations." To implement Note 10 of this table, paragraphs and figures from the 2007 Edition with the 2008 Addenda of ASME Section XI (Byron code of record for fourth 10-year ISI interval) will be used, which parallel those referenced in the code case. Table 1 of Code Case N-578-1 will be used as it provides a detailed breakdown for examination method and categorization of parts to be examined. Based on these methods and categorization, the examination figures specified in EPRI TR-112657, Section 4, will be used to define the examination volume and/or area

The licensee stated that based on this RI evaluation, selection, and examination procedure, all ASME Code, Section XI, piping components, regardless of risk classification, will continue to receive code-required pressure testing as part of the current ASME Code, Section XI, program. VT-2 visual examinations are scheduled in accordance with the Byron pressure testing program, which remains unaffected by the RI-ISI program.

The licensee stated that the RI-ISI program in the present relief request maintains the RI-ISI methodology which was approved by the NRC for the second and third ISI intervals. Since the fourth 10-year RI-ISI program uses an identical RI-ISI methodology as was previously approved, it will provide an acceptable level of quality and safety and should be authorized pursuant to 10 CFR 50.55a(z)(1). The licensee requested the relief for the duration of the fourth 10-year ISI interval, which began on July 16, 2016, and is scheduled to end on July 15, 2026.

3.4 NRC Staff Evaluation

The licensee's proposed alternate RI-ISI program was developed using the methodology described in the EPRI TR-112657, Revision B-A. NRC staff's safety evaluation (SE) approving the methodology described in the EPRI TR-112657 concluded that the methodology conforms to guidance provided in RGs 1.174 and RG 1.178, and that no significant risk increase should be expected from the changes to the ISI program resulting from applying this methodology. The NRC staff has reviewed and evaluated the licensee's proposed RI-ISI program, including those portions related to the applicable methodology and processes, based on guidance and acceptance criteria provided in RG 1.174, RG 1.178, and SRP, Chapter 3.9.8. An acceptable RI-ISI program plan is expected to meet the five key principles discussed in RG 1.178, SRP Chapter 3.9.8, and EPRI TR-112657, Revision B-A, as stated below:

1. The proposed change meets the current regulations unless it is explicitly related to a requested exemption or rule change.

2. The proposed change is consistent with the defense-in-depth philosophy.

3. The proposed change maintains sufficient safety margins.

4. When proposed changes result in an increase in CDF or risk, the increases should be small and consistent with the intent of the Commission's Safety Goal Policy Statement.

5. The impact of the proposed change should be monitored by using performance measurement strategies.

The first principle is met in this relief request because an alternative ISI program may be authorized pursuant to 10 CFR 50.55a(z)(1) and, therefore, an exemption request is not required.

The second and third principles require assurance that the alternative program is consistent with the defense in depth philosophy and that sufficient safety margins are maintained, respectively. Assurance that the second and third principles are met is based on the application of the approved methodology and not on the particular inspection locations selected. The licensee stated that no changes to the evaluation methodology as currently implemented under EPRI TR-112657, Revision B-A, are required as part of this interval update, and the methodology used for the calculation of the risk impact assessment for the fourth 10-year ISI interval has not changed. Since the methodology used to develop the RI-ISI program for the fourth 10-year interval is unchanged from the methodology approved for development of the prior RI-ISI programs at Byron, the second and third principles are met.

The fourth principle, that any increase in core damage frequency and risk are small and consistent with the Commission's Safety Goal Policy Statement, requires an estimate of the change in risk, and the change in risk estimate is dependent on the location of inspections in the proposed ISI program compared to the location of inspections that would be inspected using the requirements of ASME Code, Section XI, and the technical adequacy of the PRA. As discussed in RG 1.178, an acceptable change in risk evaluation (and risk-ranking evaluation used to identify the most risk significant locations) requires the use of a PRA of appropriate technical quality that models the as-built and as-operated and maintained plant.

The licensee estimated that the change in CDF is 1.77E-08/year and the change in LERF is 3.95E-10/year for Byron, Unit No. 1, and are -1.52E-08/yr and -1.54E-10/yr, respectively, for Byron, Unit No. 2. These values meet the RG 1.174 acceptance guidelines for increase in CDF of 1.00E-06/yr and LERF of 1.00E-07/yr. The licensee stated that the change-in-risk analysis was done at a system level, and the system acceptance criteria in EPRI-TR 112657 were not exceeded for any individual system within the RI-ISI program as evidenced in the RAI responses.

Therefore, the NRC staff concludes that the implementation of the RI-ISI program as described in the licensee's submittal is acceptable and, based on the reported quantitative results, any increase in risk associated with the implementation of the RI-ISI program is small and consistent with NRC RGs. Therefore, the staff concludes that the fourth principle has been met.

The fifth principle of risk-informed decision making requires that the impact of the proposed change be monitored by using performance measurement strategies. As described in the relief

request and the RAI responses, the RI-ISI program is a living program that requires periodic updating and that, as a minimum, risk ranking of piping segments will be reviewed on an ASME Code period basis. In its submittal, the licensee provided a summary of the updates since the prior implementation of the RI-ISI program, which includes:

1. Transition from the 2001 Edition through the 2003 Addenda of ASME Code, Section XI, to the 2007 Edition through the 2008 Addenda

2. Limited examination coverage which resulted in modifications of previously selected locations in order to optimize code coverage

3. Changes in selection due to plant and component modifications incorporated into the updated RI-ISI program

4. Changes in selection due to reclassification into different categories based on the latest revision to the PRA model.

As a result of the changes and updates, the number of EPRI "High" risk category weld examinations at Unit No. 1 was revised from 111 to 82 and the number of EPRI "Medium" risk examinations changed from 221 to 165, with the total count of 247 welds selected to be examined during the fourth 10-year ISI interval. At Unit No. 2, the number of EPRI "High" risk category weld examinations were revised from 127 to 109, while the number of EPRI "Medium" risk examinations changed from 191 to 163, with the total count of 272 welds selected to be examined in the fourth 10-year ISI interval. The analyses and changes reported by the licensee in its submittal demonstrate that the RI-ISI program is a living program that is being periodically updated and, therefore, the NRC staff concludes that the fifth key principle, which provides that risk-informed applications should include performance monitoring and feedback provisions, is met.

As discussed above and based on the staff's review of the licensee's submittal and response to the staff's RAIs, the NRC staff finds that the five key principles of risk-informed decision making are ensured by the licensee's proposed use of RI-ISI program and therefore, the guidance provided by the NRC staff's SE for EPRI TR-112657, along with the guidance in RG 1.174, RG 1.178, and SRP Chapter 3.9.8 is met. Based on the above, the NRC staff determined that the proposed program for the Fourth 10-year ISI interval at Byron is acceptable.

4.0 CONCLUSION

As set forth above, the NRC staff determines that the proposed alternative provides an acceptable level of quality and safety. Accordingly, the NRC staff concludes that EGC has adequately addressed all of the regulatory requirements set forth in 10 CFR 50.55a(z)(1). Therefore, the NRC authorizes the use of the alternate RI-ISI program at Byron for the fourth 10-year ISI interval, which commenced on July 16, 2016, and is scheduled to end on July 15, 2026.

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

5.0 REFERENCES

1. Letter from D. M. Gullott, EGC to NRC, "Relief Requests Associated with the Fourth Inservice Inspection Interval," dated April 15, 2016 (ADAMS Accession No. ML16106A116).

2. Letter from D.M. Gullott, EGC to NRC, "Supplemental Information for the Byron Station Fourth Inservice Inspection Interval Relief Request I4R-01," dated October 6, 2016 (ADAMS Accession No. ML16281A146).

3. Letter from Russel Gibbs, NRC to Christopher M. Crane, EGC, "Byron Station, Unit Nos. 1 and 2 – Evaluation of Proposed Risk-Informed Request for an Inservice Inspection Program for the Third 10-Year Inspection Interval (TAC Nos. MD3885 and MD3856)," September 25, 2007 (ADAMS Accession No. ML072610510).

4. Electric Power Research Institute (EPRI) Topical Report (TR) 112657, "Revised Risk-Informed Inservice Inspection Evaluation Procedure," Rev. B-A, dated December 1999 (ADAMS Accession No. ML013470102).

5. Letter from David Hoots, EGC to NRC, "Byron Station Units, 1 and 2, Transmittal of Inservice Inspection Program Plan for Third Ten Year Inspection Interval," February 14, 2006 (ADAMS Accession No. ML063530333).

6. Letter from Darin M. Benyak, EGC to NRC, "Additional Information Supporting Risk-Informed Inservice Inspection Relief Request," April 3, 2007 (ADAMS Accession No. ML070940193).

7. Letter from Patrick R. Simpson, EGC to NRC, "Additional Information Supporting Risk-Informed Inservice Inspection Relief Request," September 7, 2007 (ADAMS Accession No. ML072530024).

8. Letter from Anthony J. Mendiola, NRC to Oliver D. Kingsley, EGC, "Approval of Relief Request I2R-40 for Application of Risk-Informed Inservice Inspection Program as an Alternative to the ASME B&PV Code Section XI Requirements for Class 1 and Class 2 Piping Welds for Byron Station, Units 1 and 2 (TAC Nos. MB0567 and MB0568)'" February 5, 2002 (ADAMS Accession No. ML020030027).

9. Email from Joel Wiebe, NRC to Mitchel Mathews, EGC, "Request for Additional Information Regarding Relief Request I4R-01," August 3, 2016 (ADAMS Accession No. ML16216A131).

10. Email from Joel Wiebe, NRC to Mitchel Mathews, EGC, "Preliminary Request for Additional Information Regarding Risk Informed Aspects of Relief Request I4R-01," August 25, 2016 (ADAMS Accession No. ML16242A005).

11. ASME Code Case N-578-1, "Risk-Informed Requirements for Class 1,2, or 3 Piping, Method B, Section XI, Division 1," dated March 28, 2000.

12. Regulatory Guide (RG) 1.174, "An Approach for Using Probabilistic Risk Assessment In Risk Informed Decisions On Plant Specific Changes to the Licensing Basis" (ADAMS Accession No. ML100910006).

13. RG 1.178, "An Approach for Plant Specific Risk Informed Decisionmaking Inservice Inspection of Piping" (ADAMS Accession No. ML032510128).

14. Standard Review Plan (SRP), Section 3.9.8, "Risk-Informed Inservice Inspection," NUREG-0800 (ADAMS Accession No. ML032510135).

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Date: December 20, 2016

If you have any questions, please contact the Senior Project Manager, Joel S. Wiebe at 301-415-6606 or via e-mail at Joel S. Wiebe@nrc.gov.

Sincerely,

/RA/

David J. Wrona, Chief
Plant Licensing Branch III
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

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