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

January 31, 2018

Mr. Thomas D. Ray
Vice President
McGuire Nuclear Station
Duke Energy Carolinas, LLC
12700 Hagers Ferry Road
Huntersville, NC 28078-8985

SUBJECT: MCGUIRE NUCLEAR STATION, UNITS 1 AND 2 – ISSUANCE OF AMENDMENTS TO EXTEND THE CONTAINMENT TYPE A LEAK RATE TEST FREQUENCY TO 15 YEARS AND TYPE C LEAK RATE TEST FREQUENCY TO 75 MONTHS (CAC NOS. MF9020 AND MF9021; EPID L-2016-LLA-0032)

Dear Mr. Ray:

The U.S. Nuclear Regulatory Commission has issued the enclosed Amendment No. 306 to Renewed Facility Operating License No. NPF-9 and Amendment No. 285 to Renewed Facility Operating License No. NPF-17 for the McGuire Nuclear Station, Units 1 and 2 (McGuire), respectively. The amendments are in response to your application dated December 19, 2016, as supplemented by letters dated May 25 and December 12, 2017.

The amendments revise McGuire Technical Specification (TS) 5.5.2, "Containment Leakage Rate Testing Program." Specifically, the amendments increase the exising Type A integrated leak rate test from 10 years to 15 years; adopt an extension of the containment isolation valves leakage test (i.e., Type C tests) frequency from its current 60-month frequency to 75 months; and replace the reference to Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program," with a reference to Nuclear Energy Institute (NEI), Topical Report NEI 94-01, Revision 3-A, "Industry Guideline for Implementing Performance-Based Option of 10 CFR [Title 10 of the *Code of Federal Regulations*] Part 50, Appendix J," and the conditions and limitations specified in NEI 94-01, Revision 2-A, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J."

A copy of the related Safety Evaluation is also enclosed. A Notice of Issuance will be included in the Commission's biweekly *Federal Register* notice.

Sincerely,

Michael Mahoney, Project Manager
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. 50-369 and 50-370

Enclosures:
1. Amendment No. 306 to NPF-9
2. Amendment No. 285 to NPF-17
3. Safety Evaluation

cc w/enclosures: Listserv

DUKE ENERGY CAROLINAS, LLC

DOCKET NO. 50-369

MCGUIRE NUCLEAR STATION, UNIT 1

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 306
Renewed License No. NPF-9

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment to the McGuire Nuclear Station, Unit 1 (the facility), Renewed Facility Operating License No. NPF-9, filed by Duke Energy Carolinas, LLC (the licensee), dated December 19, 2016, as supplemented by letters dated May 25 and December 12, 2017, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations as set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-9 is hereby amended to read as follows:

    (2) Technical Specifications

    The Technical Specifications contained in Appendix A, as revised through Amendment No. 306, are hereby incorporated into this renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 120 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Audrey L. Klett, for

Michael T. Markley, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to Renewed License No. NPF-9
and Technical Specifications

Date of Issuance: January 31, 2018

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

DUKE ENERGY CAROLINAS, LLC

DOCKET NO. 50-370

MCGUIRE NUCLEAR STATION, UNIT 2

AMENDMENT TO RENEWED FACILITY OPERATING LICENSE

Amendment No. 285
Renewed License No. NPF-17

1. The Nuclear Regulatory Commission (the Commission) has found that:

   A. The application for amendment to the McGuire Nuclear Station, Unit 2 (the facility), Renewed Facility Operating License No. NPF-17, filed by the Duke Energy Carolinas, LLC (the licensee), dated December 19, 2016, as supplemented by letters dated May 25 and December 12, 2017, complies with the standards and requirements of the Atomic Energy Act of 1954, as amended (the Act), and the Commission's rules and regulations as set forth in 10 CFR Chapter I;

   B. The facility will operate in conformity with the application, the provisions of the Act, and the rules and regulations of the Commission;

   C. There is reasonable assurance (i) that the activities authorized by this amendment can be conducted without endangering the health and safety of the public, and (ii) that such activities will be conducted in compliance with the Commission's regulations set forth in 10 CFR Chapter I;

   D. The issuance of this amendment will not be inimical to the common defense and security or to the health and safety of the public; and

   E. The issuance of this amendment is in accordance with 10 CFR Part 51 of the Commission's regulations and all applicable requirements have been satisfied.

2. Accordingly, the license is hereby amended by page changes to the Technical Specifications as indicated in the attachment to this license amendment, and paragraph 2.C.(2) of Renewed Facility Operating License No. NPF-17 is hereby amended to read as follows:

   (2) <u>Technical Specifications</u>

   The Technical Specifications contained in Appendix A, as revised through Amendment No. 285, are hereby incorporated into this renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications.

3. This license amendment is effective as of its date of issuance and shall be implemented within 120 days of issuance.

FOR THE NUCLEAR REGULATORY COMMISSION

Audrey L. Klett, for

Michael T. Markley, Chief
Plant Licensing Branch II-1
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Attachment:
Changes to Renewed License No. NPF-17
and Technical Specifications

Date of Issuance: January 31, 2018

ATTACHMENT

MCGUIRE NUCLEAR STATION, UNITS 1 AND 2

LICENSE AMENDMENT NO. 306

RENEWED FACILITY OPERATING LICENSE NO. NPF-9

DOCKET NO. 50-369

AND

LICENSE AMENDMENT NO. 285

RENEWED FACILITY OPERATING LICENSE NO. NPF-17

DOCKET NO. 50-370

Replace the following pages of the Renewed Facility Operating Licenses with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove	Insert
NPF-9, page 3	NPF-9, page 3
NPF-17, page 3	NPF-17, page 3

Replace the following pages of the Appendix A Technical Specifications (TSs) with the attached revised pages. The revised pages are identified by amendment number and contain marginal lines indicating the areas of change.

Remove	Insert
TS 5.5-1	TS 5.5-1
TS 5.5-2	TS 5.5-2

(4) Pursuant to the Act and 10 CFR Parts 30, 40 and 70, to receive, possess and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components;

(5) Pursuant to the Act and 10 CFR Parts 30, 40 and 70, to possess, but not separate, such byproducts and special nuclear materials as may be produced by the operation of McGuire Nuclear Station, Units 1 and 2, and;

(6) Pursuant to the Act and 10 CFR Parts 30 and 40, to receive, possess and process for release or transfer such byproduct material as may be produced by the Duke Training and Technology Center.

C. This renewed operating license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or hereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) Maximum Power Level

The licensee is authorized to operate the facility at a reactor core full steady state power level of 3469 megawatts thermal (100%).

(2) Technical Specifications

The Technical Specifications contained in Appendix A, as revised through Amendment No. 306, are hereby incorporated into this renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications.

(3) Updated Final Safety Analysis Report

The Updated Final Safety Analysis Report supplement submitted pursuant to 10 CFR 54.21(d), as revised on December 16, 2002, describes certain future activities to be completed before the period of extended operation. Duke shall complete these activities no later than June 12, 2021, and shall notify the NRC in writing when implementation of these activities is complete and can be verified by NRC inspection.

The Updated Final Safety Analysis Report supplement as revised on December 16, 2002, described above, shall be included in the next scheduled update to the Updated Final Safety Analysis Report required by 10 CFR 50.71(e)(4), following issuance of this renewed operating license. Until that update is complete, Duke may make changes to the programs described in such supplement without prior Commission approval, provided that Duke evaluates each such change pursuant to the criteria set forth in 10 CFR 50.59 and otherwise complies with the requirements in that section.

(4) Pursuant to the Act and 10 CFR Parts 30, 40, and 70, to receive, possess and use in amounts as required any byproduct, source or special nuclear material without restriction to chemical or physical form, for sample analysis or instrument calibration or associated with radioactive apparatus or components;

(5) Pursuant to the Act and 10 CFR Parts, 30, 40 and 70, to possess, but not separate, such byproducts and special nuclear materials as my be produced by the operation of McGuire Nuclear Station, Units 1 and 2; and,

(6) Pursuant to the Act and 10 CFR Parts 30 and 40, to receive, possess and process for release or transfer such by product material as may be produced by the Duke Training and Technology Center.

C. This renewed operating license shall be deemed to contain and is subject to the conditions specified in the Commission's regulations set forth in 10 CFR Chapter I and is subject to all applicable provisions of the Act and to the rules, regulations, and orders of the Commission now or thereafter in effect; and is subject to the additional conditions specified or incorporated below:

(1) <u>Maximum Power Level</u>

The licensee is authorized to operate the facility at a reactor core full steady state power level of 3469 megawatts thermal (100%).

(2) <u>Technical Specifications</u>

The Technical Specifications contained in Appendix A, as revised through Amendment No. 285, are hereby incorporated into this renewed operating license. The licensee shall operate the facility in accordance with the Technical Specifications.

(3) <u>Updated Final Safety Analysis Report</u>

The Updated Final Safety Analysis Report supplement submitted pursuant to 10 CFR 54.21(d), as revised on December 16, 2002, describes certain future activities to be completed before the period of extended operation. Duke shall complete these activities no later than March 3, 2023, and shall notify the NRC in writing when implementation of these activities is complete and can be verified by NRC inspection.

The Updated Final Safety Analysis Report supplement as revised on December 16, 2002, described above, shall be included in the next scheduled update to the Updated Final Safety Analysis Report required by 10 CFR 50.71(e)(4), following issuance of this renewed operating license. Until that update is complete, Duke may make changes to the programs described in such supplement without prior Commission approval, provided that Duke evaluates each such change pursuant to the criteria set forth in 10 CFR 50.59, and otherwise complies with the requirements in that section.

The following programs shall be established, implemented, and maintained.

5.5.1 Offsite Dose Calculation Manual (ODCM)

The ODCM shall contain the methodology and parameters used in the calculation of offsite doses resulting from radioactive gaseous and liquid effluents, in the calculation of gaseous and liquid effluent monitoring alarm and trip setpoints, and in the conduct of the radiological environmental monitoring program.

Licensee initiated changes to the ODCM:

a. Shall be documented and records of reviews performed shall be retained. This documentation shall contain:

    1. sufficient information to support the change(s) together with the appropriate analyses or evaluations justifying the change(s), and

    2. a determination that the change(s) do not adversely impact the accuracy or reliability of effluent, dose, or setpoint calculations;

b. Shall become effective after the approval of the Plant Manager or Radiation Protection Manager; and

c. Shall be submitted to the NRC in the form of a complete, legible copy of the entire ODCM as a part of or concurrent with the Radioactive Effluent Release Report for the period of the report in which any change in the ODCM was made. Each change shall be identified by markings in the margin of the affected pages, clearly indicating the area of the page that was changed, and shall indicate the date (i.e., month and year) the change was implemented.

5.5.2 Containment Leakage Rate Testing Program

A program shall be established to implement the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, as modified by approved exemptions. This program shall be in accordance with the guidelines contained in NEI 94-01, "Industry Guideline for Implementing Performance-Based Option of 10 CFR 50, Appendix J," Revision 3-A, dated July 2012, and the limitations and conditions specified in NEI 94-01, Revision 2-A, dated October 2008.

The peak calculated containment internal pressure for the design basis loss of coolant accident, P_a, is 14.8 psig. The containment design pressure is 15 psig. The maximum allowable containment leakage rate, L_a, at P_a, shall be 0.3% of containment air weight per day.

Leakage Rate acceptance criteria are:

a. Containment leakage rate acceptance criterion is ≤ 1.0 L_a. During the first plant startup following testing in accordance with this program, the leakage rate acceptance criteria are ≤ 0.75 L_a for Type A tests and < 0.6 L_a for Type B and Type C tests.

b. Airlock testing acceptance criteria for the overall airlock leakage rate is ≤ 0.05 L_a when tested at ≥ P_a. For each door, the leakage rate is ≤ 0.01 L_a when tested at ≥ 14.8 psig.

The provisions of SR 3.0.3 are applicable to the Containment Leakage Rate Testing Program.

Nothing in these Technical Specifications shall be construed to modify the testing frequencies required by 10CFR50, Appendix J.

5.5.3 <u>Primary Coolant Sources Outside Containment</u>

This program provides controls to minimize leakage from those portions of systems outside containment that could contain highly radioactive fluids during a serious transient or accident to levels as low as practicable. The systems include Containment Spray, Safety Injection, Chemical and Volume Control, Nuclear Sampling, RHR, Boron Recycle, Refueling Water, Liquid Waste, and Waste Gas. The program shall include the following:

a. Preventive maintenance and periodic visual inspection requirements; and

b. Integrated leak test requirements for each system at refueling cycle intervals or less.

5.5.4 <u>Deleted</u>

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

SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

RELATED TO

AMENDMENT NO. 306 TO RENEWED FACILITY OPERATING LICENSE NO. NPF-9

AND

AMENDMENT NO. 285 TO RENEWED FACILITY OPERATING LICENSE NO. NPF-17

DUKE ENERGY CAROLINAS, LLC

DOCKET NOS. 50-369 AND 50-370

1.0 INTRODUCTION

By letter to the U. S. Nuclear Regulatory Commission (NRC, Commission) dated December 19, 2016, as supplemented by letters dated May 25 and December 12, 2017, (Agencywide Documents Access and Management System (ADAMS) Accession Nos. ML16363A349, ML17156A563, and ML17353A208, respectively), Duke Energy Carolinas, LLC (Duke Energy, the licensee) submitted an application to seek approval to change the Technical Specifications (TSs) for the McGuire Nuclear Station, Units 1 and 2 (McGuire).

The supplements dated May 25 and December 12, 2017, provided additional information that clarified the application, did not expand the scope of the application as originally noticed, and did not change the NRC staff's original proposed no significant hazards consideration determination as published in the *Federal Register* (FR) on May 9, 2017 (82 FR 21557).

The amendments revise McGuire TS 5.5.2, "Containment Leakage Rate Testing Program." Specifically, the amendments increase the exising Type A integrated leak rate test from 10 years to 15 years; adopt an extension of the containment isolation valves leakage test (i.e., Type C tests) frequency from its current 60-month frequency to 75 months; replace the reference to NRC Regulatory Guide (RG) 1.163, "Performance-Based Containment Leak-Test Program," dated September 1995 (ADAMS Accession No. ML003740058) with a reference to Nuclear Energy Institute (NEI), Topical Report NEI 94-01, Revision 3-A, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," and the conditions and limitations specified in NEI 94-01, Revision 2-A, "Industry Guideline for Implementing Performance-Based Option of 10 CFR [Title 10 of the *Code of Federal Regulations]* Part 50, Appendix J."

The licensee's proposed changes are consistent with the McGuire performance-based leakage testing program based on Option B of 10 CFR 50, Appendix J. The NRC had previously approved authorizing the implementation of 10 CFR Part 50, Appendix J, Option B, for Types A, B, and C tests by a safety evaluation (SE) dated September 4, 2002 (ADAMS Accession No. ML022540102).

Based on the currently required frequency of 10.5 years, the next McGuire containment ILRT performances are due to be completed during Spring 2019 for Unit 1 and during Fall 2018 for Unit 2.

2.0 REGULATORY EVALUATION

2.1 Description of Containment

In Section 3.1.4, "Containment Building Description," of Enclosure 1 to its letter dated December 19, 2016, the licensee provided the following description of containment:

> The Containment consists of a Containment Vessel and a separate Reactor Building enclosing an annulus.
>
> The containment vessel is a freestanding welded steel structure with a vertical cylinder, hemispherical dome and a flat base. The Containment shell is anchored to the Reactor Building foundation by means of anchor bolts around the circumference of the cylinder base. The base of the Containment is 1/4 inch liner plate encased in concrete and anchored to the Reactor Building foundation. The base liner plate functions only as a leak-tight membrane and is not designed for structural capabilities. The Containment Vessel has a nominal inside diameter of 115 feet, overall height of 171 feet 3 inches, nominal wall thickness of 0.75 inch, nominal dome thickness of 0.6875 inch, nominal bottom thickness of 0.25 inch, and net free volume of 1.2 x 10^6 cubic feet.
>
> The ice condenser region is an insulated cold storage area contained within the annulus formed by the containment wall and the crane wall circumferentially over a 300-degree arc. This area is 74 feet high and is maintained at 15 to 27 °F [degrees Fahrenheit] by the glycol refrigeration system. Around 2 million pounds of ice is contained in an array of 1944 steel baskets (81 baskets per bay, 24 bays) resting on a lower support structure and positioned laterally by horizontal lattice frames installed at various elevations.
>
> The Reactor Building is a reinforced concrete structure composed of a right cylinder with a shallow dome roof and flat circular foundation slab. The cylinder has an inside radius of 63 feet 6 inches and a wall thickness of 3 feet. The dome has an inside spherical radius of 87 feet and is 2 feet 3 inches thick. The foundation slab is 137 feet in diameter and 6 feet thick.
>
> The Reactor Building houses the steel containment vessel and is designed to provide environmental as well as missile protection for the steel shell.
>
> A five-foot annular space is provided between the steel containment vessel and the Reactor Building for control of the containment external temperatures and pressures. The annular space also provides a controlled air volume for filtering

and provides access to penetrations for testing and inspection. Following a loss-of-coolant accident (LOCA), the annular space is kept at a slightly negative pressure to control and filter radioactive leakage, if any, from the containment vessel and penetrations.

2.2 Licensee's Proposed Changes

TS 5.5.2, "Containment Leakage Rate Testing Program," currently states, in part:

> A program shall be established to implement the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, as modified by approved exemptions. This program shall be in accordance with the guidelines contained in Regulatory Guide 1.163, "Performance-Based Containment Leak-Test Program," dated September 1995, as modified by the following exceptions:
>
> a. NEI 94-01-1995, Section 9.2.3: The first Type A test performed after the October 21, 2008 (Unit 1) and March 31, 2008 (Unit 2) Type A test shall be performed no later than plant restart after the End Of Cycle 26 Refueling Outage (Unit 1) and no later than plant restart after the End Of Cycle 25 Refueling Outage (Unit 2), and
>
> b. The containment visual examinations required by Regulatory Position C.3 shall be conducted 3 times every 10 years, including during each shutdown for SR 3.6.1.1 Type A test, prior to initiating the Type A test.

The licensee proposed to revise TS 5.5.2 by replacing the above text with the following:

> A program shall be established to implement the leakage rate testing of the containment as required by 10 CFR 50.54(o) and 10 CFR 50, Appendix J, Option B, as modified by approved exemptions. This program shall be in accordance with the guidelines contained in NEI 94-01, "Industry Guideline for Implementing Performance-Based Option of 10 CFR 50, Appendix J," Revision 3-A, dated July 2012, and the limitations and conditions specified in NEI 94-01, Revision 2-A, dated October 2008.

2.3 Applicable Regulations and Guidance

The regulations in 10 CFR 50.54(o) require that the primary reactor containments for water cooled power reactors shall be subject to the requirements set forth in 10 CFR Part 50, Appendix J, "Primary Reactor Containment Leakage Testing for Water-Cooled Power Reactors." 10 CFR Part 50, Appendix J, includes two options: "Option A – Prescriptive Requirements," and "Option B – Performance-Based Requirements," either of which can be chosen for meeting the requirements of Appendix J.

The testing requirements in 10 CFR Part 50, Appendix J ensure that: (a) leakage through containments or systems and components penetrating containments does not exceed allowable leakage rates specified in the TSs; and (b) integrity of the containment structure is maintained during the service life of the containment. McGuire has adopted and implemented Option B for meeting the requirements of 10 CFR Part 50, Appendix J.

Option B of 10 CFR Part 50, Appendix J specifies performance-based requirements and criteria for preoperational and subsequent leakage-rate testing. These requirements are met by performing a Type A test to measure the containment system overall integrated leakage rate of the primary containments; Type B consistenting of a pneumatic test to detect and measure local leakage rates across pressure-retaining leakage-limiting boundaries; and Type C consistening of a pneumatic test to measure containment insolation valve (CIV) leakage rates. After the preoperational tests, these tests are required to be conducted at intervals based on the historical performance of the overall containment system (for Type A tests), and based on the safety significance and historical performance of each boundary and isolation valve (for Type B and C tests) to ensure integrity of the overall containment system as a barrier to fission product release.

The leakage rate test results must not exceed the allowable leakage rate (L_a) as specified in the TSs. Option B also requires that a general visual inspection of the accessible interior and exterior surfaces of the containment system, for structural deterioration which may affect the containment leak-tight integrity, must be conducted prior to each Type A test and at a periodic interval between tests.

Section V.B.3 of 10 CFR 50, Appendix J, Option B requires that the RG or other implementation document used by a licensee to develop a performance-based leakage testing program must be included, by general reference, in the plant TSs. Furthermore, the submittal for TS revisions must contain justification, including supporting analyses, if the licensee chooses to deviate from methods approved by the NRC and endorsed in a RG.

The NRC staff's final SE for NEI 94-01, Revision 2, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," and Electric Power Research Institute (EPRI) Report No. 1009325, Revision 2, August 2007, "Risk Impact Assessment of Extended Integrated Leak Rate Testing Intervals," June 25, 2008 (ADAMS Accession No. ML081140105) was incorporated into NEI 94-01, Revision 2-A, November 2008. NEI 94-01, Revision 2-A describes an NRC-approved approach for implementing the optional performance-based requirements of Option B described in 10 CFR Part 50, Appendix J, which includes provisions for extending Type A ILRT intervals to up to 15 years, and incorporates the regulatory positions stated in RG 1.163. NEI 94-01, Revision 2-A delineates a performance-based approach for determining Type A, Type B, and Type C containment leakage rate surveillance testing frequencies. This method uses industry performance and plant-specific data and risk insights in determining the appropriate testing frequency, and also discusses the performance factors that licensees must consider in determining test intervals. NEI 94-01, Revision 2-A includes six specific limitations and conditions listed in Section 4.1 of the SE.

The NRC's staff's final SE dated June 8, 2012 (ADAMS Accession No. ML121030286), of NEI 94-01, Revision 3, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," was incorporated into NEI 94-01, Revision 3-A, dated July 2012. NEI 94-01, Revision 3-A, documents the NRC's evaluation and acceptance of NEI 94-01, Revision 3, and includes two specific limitations and conditions listed in Section 4.0 of the SE.

Regulation 10 CFR 50.55a "Codes and Standards," contains the Containment In-Service Inspection (CISI) requirements that, in conjunction with the requirements of Appendix J, ensure the continued leak-tight and structural integrity of the containment during its service life.

Regulation 10 CFR 50.65(a), "Requirements for monitoring the effectiveness of maintenance at nuclear power plants," requires that the licensee shall monitor the performance or condition of structures, systems, or components, against licensee-established goals, in a manner sufficient to provide reasonable assurance that these structures, systems, and components, as defined in paragraph (b) of this section, are capable of fulfilling their intended functions. These goals shall be established commensurate with safety and, where practical, take into account industrywide operating experience.

10 CFR 50.36, "Technical specifications," states that the TSs include items in five specific categories. These categories include: (1) safety limits, limiting safety system settings, and limiting control settings; (2) Limiting Condition for Operations; (3) surveillance requirements; (4) design features; and (5) administrative controls. NUREG-1431, "Standard Technical Specifications - Westinghouse Plants," Revision 4.0, (ADAMS Accession No. ML12100A222) incorporated the Standard Technical Specification Task Force Traveler 52, Revision 3 (ADAMS Accession No. ML040400371), which includes guidance for specific changes to TSs for implementation of 10 CFR 50, Appendix J, Option B.

The EPRI Report No. 1009325, Revision 2-A, "Risk Impact Assessment of Extended Integrated Leak Rate Testing Intervals," dated October 2008 (ADAMS Accession No. ML14024A045), provides a risk impact assessment for optimized ILRT intervals of up to 15 years, utilizing current industry performance data and risk-informed guidance, primarily Revision 2 of RG 1.174, "An Approach for using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis" dated May 2011 (ADAMS Accession No. ML100910006). EPRI Report No. 1009325, Revision 2-A determined that there is very little risk associated with extension of ILRT intervals to 15 years.

The implementation document that is currently referenced in the McGuire TSs is RG 1.163, dated September 1995, which endorsed NEI 94-01, Revision 0, "Industry Guideline for Implementing Performance-Based Option of 10 CFR Part 50, Appendix J," dated July 26, 1995, as a document that provides methods acceptable to the NRC staff for complying with the provisions of Option B of 10 CFR Part 50, Appendix J, subject to four regulatory positions delineated in Section C of the RG. NEI 94-01, Revision 0 includes provisions that allow the performance-based Type A test interval to be extended to up to 10 years, based upon two consecutive successful tests.

3.0 TECHNICAL EVALUATION

3.1 ILRT Technical Evaluation

The licensee's proposed to revise TS 5.5.2 by replacing the reference to RG 1.163 with a reference to NEI 94-01, Revision 3-A and the conditions and limitations specified in NEI 94-01, Revision 2-A. Versions of NEI 94-01 topical reports would provide for:

- adopting the use of American National Standards Institute/American Nuclear Society (ANSI/ANS) 56.8-2002, "Containment System Leakage Testing Requirements"; and
- adopting a more conservative grace interval of 9 months for Type A, Type B, and Type C leakage tests in accordance with NEI 94-01, Revision 3-A.

In its letter dated December 19, 2016, the licensee provided Table 3.2.4-1, "MNS [McGuire Nuclear Station] ILRT Test Results," and Table 3.2.4-2, "MNS ILRT Test Results – Verification of Current Extended ILRT Interval," as follows.

Table 3.2.4-1, MNS ILRT Test Results

Test Date	Leakage weight % per day
Unit 1	
April 1983	0.1446
August 1986	0.1533
May 1990	0.1965
Unit 2	
May 1986	0.0837
August 1989	0.1138

Table 3.2.4-2, MNS ILRT Test Results
Verification of Current Extended ILRT Interval

Test Date	Test Pressure[1] (PSIG) / Atmospheric Pressure (PSIA)	Upper 95% Confidence Level (wt.%/day)	Total Leakage As Found (wt.%/day)	Total Leakage As Left[5] (wt.%/day)	Acceptance Criteria	Test Method / Data Analysis Techniques
Unit 1						
May 1993	14.99 PSIG 14.346 PSIA	0.2063	0.2064 Note 2	0.2064	<0.75La, 0.2250 wt.%/day	Total Time Note 3
October 2008	14.99 PSIG 14.39 PSIA	0.1060	0.1065 Note 2	0.1065	<0.75La, 0.2250 wt.%/day	Mass Point Note 4
Unit 2						
August 1993	15.11 PSIG 14.378 PSIA	0.1964	0.2009 Note 2	0.2009	<0.75La, 0.2250 wt.%/day	Total Time Note 3
March 2008	14.725 PSIG 14.577 PSIA	0.1237	0.1242 Note 2	0.1242	<0.75La, 0.2250 wt.%/day	Mass Point Note 4

The notes referenced in the above Table 3.2.4-2 are explained in the licensee's application dated December 19, 2016, and are as follows:

1. P_a is 14.8 pouns per square inch gauge (psig). The minimum allowed test pressure is 13.8 psig.
2. No preparatory repairs and adjustments were made to any pentrations. Therefore, the total leakage savings for this test is equal to zero and the "As Found" leakage rate is equal to the "As Left" leakage rate.
3. Total Time (per BN-TOP-1, 1972). Mass Point (for information only per ANSI/ANS 56.8-1987).
4. Extended ANSI Method specified in AND 56.8-1994.
5. Total Leakage, As Left = Upper 95% Confidence Level + Pentrations Not Exposed to Test Pressure

3.1.1 Type A Integrated Leak Rate Test History

McGuire Unit 1

The Unit 1 containment was designed for a maximum allowable containment leakage rate L_a of 0.3 percent by weight of containment air weight per day at the calculated peak pressure (P_a). TS 5.5.2 indicates that the peak calculated peak containment internal pressure for the design basis loss-of-coolant accident (DBLOCA) – P_a – is 14.8 psig. Since 1983, a total of three ILRTs have been performed on the Unit 1 containment. All three ILRTs had satisfactory leakage rate results. These three ILRT's test results were documented in Table 3.2.4-1 of the licensee's letter datd December 19, 2016.

The NRC staff notes that the last sentence of Section 9.2.3, "Extended Test Intervals," of NEI 94-01 Revision 3-A states, "In the event where previous Type A tests were performed at reduced pressure (as described in 10 CFR 50, Appendix J, Option A), at least one of the two consecutive periodic Type A tests shall be performed at peak accident pressure (P_a)." Section 9.1.2 of the same document states, in part, "The elapsed time between the first and the last tests in a series of consecutive passing tests used to determine performance shall be at least 24 months."

The NRC staff confirmed that the P_a requirement in Section 9.2.3 has been satisfied as the last two McGuire Unit 1 historical ILRTs were performed at or above P_a. As can be seen in the licensee's Table 3.2.4-1, the last two Unit 1 Type A tests were performed in May 1993 and in October 2008. Both Type A tests were performed at a pressure higher than the peak calculated design basis internal accident pressure for the DBLOCA (P_a), which per TS 5.5.2 for Unit 1 is equal to 14.8 psig. Therefore, the above requirements of both NEI 94-01 Revision 3-A, Sections 9.1.2 and 9.2.3 have been satisfied.

TS 5.5.2 references RG 1.163. Regulatory Position C of RG 1.1.63 states that NEI 94-01, Revision 0 provides methods acceptable to the NRC staff for complying with the provisions of Option B in Appendix J to 10 CFR Part 50. The third paragraph of Section 9.2.3, "Extended Test Intervals," of NEI 94-01, Revision 0, states, in part:

> In reviewing past performance history, Type A test results may have been calculated and reported using computational techniques other than the Mass Point method from ANSI/ANS-56.8–1994 (e.g., Total Time or Point–to–Point). Reported test results from these previously acceptable Type A tests can be used to establish the performance history. Additionally, a licensee may recalculate past Type A Upper Confidence Limit (UCL) (using the same test intervals as reported) in accordance with ANSI/ANS-56.8–1994 Mass Point methodology and its adjoining Termination criteria in order to determine acceptable performance history.

NEI 94-01, Revision 3-A is nearly identical except the test standard invoked is ANSI/ANS-56.8-2002. The NRC staff notes that NEI 94-01, Revision 3-A, Section 9.2.3 does not mandate that a licensee recalculate past Type A test results to demonstrate conformance with the definition of "performance leakage rate" contained in NEI 94-01, Revision 3-A. The staff also notes that the Unit 1 ILRT results since May 1993 demonstrated ample margin (i.e., greater than or equal to (≥) 31 percent) between each "As-found" ILRT value and L_a. Therefore, the staff did not request that the licensee reconstitute the Unit 1 Type A test results from before the ILRT of May 1993.

The requirement of TS 5.5.2a (i.e., leakage rate acceptance criteria) establishes the maximum limit for the Unit 1 "As-Left" Leakage Rate for Unit startup following completion of Type A testing at less than or equatl to (≤) 0.75 L_a, which equals 0.225 percent of containment air weight per day. The Unit 1 containment was designed for a leakage rate L_a not to exceed 0.3 percent by weight of containment air per day at the calculated peak pressure, P_a. As shown in the licensee's Table 3.2.4-2, there has been adequate margin to the performance limit as described in TS 5.5.2 of L_a for all historical ILRTs spanning a period of time greater than 25 years.

The past three Unit 1 ILRT results dating back to 1983 have confirmed that the containment leakage rates are acceptable with respect to the design criterion leakage of containment air weight (L_a) per day at the design basis loss of coolant accident pressure (P_a). Because the last two Type A tests for McGuire Unit 1 had "as found" test results of less than 1.0 L_a, a test frequency of 15 years in accordance with NEI 94-01, Revision 3-A and the conditions and limitations of NEI 94-01, Revision 2-A is acceptable for Unit 1. The NRC staff finds that the last two McGuire Unit 1 ILRT test results satisfy the requirements of Sections 9.1.2 and 9.2.3 of NEI 94-01, Revision 3-A.

McGuire Unit 2

Since May 1986, a total of two ILRTs have been performed on the Unit 2 containment. These two Unit 2 ILRTs all had satisfactory leakage rate results. These two ILRTs' test results were documented in in Table 3.2.4-1 of the licensee's letter dated December 19, 2016. The ILRT of August 1993 was performed at a pressure higher than the peak calculated design basis internal accident pressure for the DBLOCA (P_a), which per TS 5.5.2 for Unit 2 is equal to 14.8 psig. Therefore, the requirement of Section 9.2.3 of NEI-94-01, Revision 3-A is satisfied. Furthermore, the NRC staff notes that while the recorded test pressure during ILRT of March 2008 was less than P_a, this is acceptable in accordance with the test methodology of ANSI/ANS 56.8-1994, Section 3.2.11, which allows a minimum test pressure of 13.8 psig for Unit 2. Accordingly, the above requirements of both NEI-94-01, Revision 3-A, Sections 9.1.2 and 9.2.3 have been satisfied.

The NRC staff notes that the Unit 2 ILRT results since 1993 demonstrated ample margin (i.e., ≥ 33%) between each "Total Leakage As-found" ILRT value and L_a. Accordingly, the staff did not request that the licensee reconstitute the Unit 2, Type A test results from before the ILRT of August 1993. The Unit 2 containment was designed for a leakage rate L_a not to exceed 0.3 percent by weight of containment air per day at the calculated peak pressure (P_a). As shown in the licensee's Table 3.2.4-2, there has been adequate margin to the performance limit as described in TS 5.5.2 of L_a for all historical ILRTs spanning a period of time greater than 21 years.

The past two Unit 2 ILRT results dating back to 1986 have confirmed that the containment leakage rates are acceptable with respect to the design criterion leakage of containment air weight (L_a) per day at the DBLOCA accident pressure (P_a). Because the last two Type A tests for McGuire Unit 2 had "as found" test results of less than 1.0L_a, a test frequency of 15 years in accordance with NEI 94-01, Revision 3-A and the conditions and limitations of NEI 94-01, Revision 2-A, are acceptable for McGuire Unit 2. The NRC staff finds that the last two McGuire Unit 2 ILRT test results satisfy the requirements of Sections 9.1.2 and 9.2.3 of NEI 94-01, Revision 3-A.

3.1.2 <u>Types B and C Leak Rate Test History</u>

McGuire Unit 1

TS 5.5.2, "Containment Leakage Rate Testing Program," states, in part:

> Leakage Rate acceptance criteria are:
>
> Containment leakage rate acceptance criterion is $\leqslant$ 1.0 L_a. During the first plant startup following testing in accordance with this program, the leakage rate acceptance criteria are $\leqslant$ 0. 75 L_a for Type A tests and < 0.6 L_a for Type B and Type C tests.

The NRC staff reviewed the local leak rate summaries contained in Table 3.3-1, "MNS Unit 1 Type B and C LLRT Trend Summary," of the licensee's letter dated December 19, 2016. In Section 3.3 of its letter dated Decebmer 19, 2016, the licensee states, *"... L_a equals 140,379 sccm* [standard cubic centimeter per minute]*."* Therefore, 0.6L_a equals 84,277.4 sccm.

With the use of these L_a values and the data contained in Table 3.3-1, the NRC staff confirmed the accuracy of the "Fraction of L_a" values contained in the Table and concluded that: the Unit 1 "As-Found" minimum pathway leakage rates for the last six refueling outages since 2008 have an average of 6.195 percent of L_a with a high of 7.884 percent L_a, and the Unit 1 "As-Left" maximum pathway leakage rates for the last six refueling outages since 2008 have an average of 7.179 percent of L_a with a high of 8.416 percent L_a.

As conveyed in Section 3.3, "Containment Leakage Rate Testing Program, Type B and Type C Testing," of the licensee's letter dated December 19, 2016, the total domain of Unit 1 Type B components tested equals 99 penetrations. The percent of this total domain that are on a 120-month extended performance-based test interval is approximately 77 percent. Similarly, as conveyed in Section 3.3, the total domain of Unit 1 Type C components tested equals 86 CIV penetrations. The percent of this total domain that are on a 60-month extended performance-based test interval is approximately 45 percent.

In the NRC staff's request for additional information (RAI)-1 dated April 28, 2017 (ADAMS Accession No. ML17121A005), the staff requested additional information about all Type C test failures of "Administrative Limits" and the associated corrective actions taken during the two most recent Unit 1 refueling outages as displayed in Table 3.3-3, "MNS Type B and C LLRT Program Implementation Review As-Found Failures of Components on Extended Intervals," of the licensee's letter dated December 19, 2016. In its letter dated May 25, 2017, the licensee responded to the RAI and provided comprehensive tabular listings of CIVs that had failed LLRT administrative limits during the two most refueling outages (1EOC23 and 1EOC24). The footnotes that accompanied these listings adequately explained the cause of each failure and any follow-up corrective actions that transpired during the subsequent refueling outage.

The NRC staff also inquired in RAI-1 as to whether there had been repetitive failures of "Administrative Limits" for any LLRTs associated with any Type C tests since the last ILRT of October 2008. In its letter dated May 25, 2017, the licensee stated, "... A review of Type C leak rate test failures since the last ILRTs of 2008 for both Units was conducted. For Unit 1, eight valves were noted as having more than one administrative failure ...." The licensee provided historical information about the cause of failure and all corrective actions associated with three of the worst-performing Unit 1 CIVs since the ILRT of 2008. These CIVs were associated with containment penetrations 1M-221, 1M-327, and 1M-372.

In addition, the licensee provided supplemental information pertaining to 86 Unit 1 penetrations subject to 10 CFR 50, Appendix J, Option B Type C testing. Of these 86 penetrations, 30 penetrations are not currently eligible for an extended test frequency of 60 months per the guidance of RG 1.163, Regulatory Position C.2 and NEI 94-01, Revision 0. Therefore, only 56 Type C penetrations are eligible for Option B extended interval testing. There are currently 39 Type C penetrations on an Option B extended test interval. Therefore, 69.6 percent of the eligible Unit 1 penetration population are on extended test intervals.

Based on the NRC staff's review of the supplemental and historical information provided in the response to RAI-1, the staff observed that there was no indication of the licensee's failure to adequately implement the requirements of its10 CFR 50, Appendix J, Option B performance-based testing program. The licensee provided a comprehensive response about the cause of each of the LLRT failures and explained the corrective actions performed to prevent repetitive and common cause failures. From the review of the information contained in Section 3.3 of the licensee's letter dated December 19, 2016, and a review of the information provided in the licensee's response to RAI-1, the NRC staff finds that the licensee satisfied the guidance in Section 10.2.1, "Type B Test Intervals," and Section 10.2.3, "Type C Test Interval," of NEI 94-01, Revision 0. Furthermore, based on this review, the staff concluded that the aggregate results of the "As-Found Pathway" for all Unit 1 Types B and C tests from 2008 through 2016 demonstrate a history of adequate maintenance because the aggregate test results at the end of each operating cycle were all well below (i.e., with greater than 86 percent margin) the Type B and Type C test TS leakage rate acceptance criteria of < 0.60 L_a contained in TS 5.5.2a.

Based on the above and the licensee's RAI-1 response, the NRC staff finds that the percentage of Type B and Type C components on extended frequencies satisfy 10 CFR 50, Appendix J, Option B. This conclusion supports allowing an extended test interval of up to 75 months for the McGuire Unit 1 Type C tested CIVs in accordance with the guidance of NEI 94-01, Revision 3-A.

McGuire Unit 2

The NRC staff reviewed the local leak rate summaries contained in Table 3.3-2, "MNS Unit 2 Type B and C LLRT Trend Summary," of the licensee's letter dated December 19. 2016. With the use of these L_a values and the data contained in Table 3.3-2, the NRC staff confirmed the accuracy of the "Fraction of L_a" values contained in the Table and concluded that: the Unit 2 "As-Found" minimum pathway leakage rates for the last five refueling outages since 2009 have an average of 1.402 percent of L_a with a high of 2.603 percent L_a and the Unit 2 "As-Left" maximum pathway leakage rates for the last six refueling outages since 2009 have an average of 2.029 percent of L_a with a high of 3.188 percent of L_a.

As conveyed in Section 3.3 of the licensee's letter dated December 19, 2016, the total domain of Unit 2 Type B components tested equals 89 penetrations. The percent of this total domain that are on a 120-month extended performance-based test interval is approximately 86 percent. Similarly, as conveyed in Section 3.3, the total domain of Unit 2 Type C components tested equals 88 CIV penetrations. The percent of this total domain that are on a 60-month extended performance-based test interval is approximately 45 percent.

In RAI-1, the NRC staff requested additional information about all Type C test failures of "Administrative Limits" and the associated corrective actions taken during the two most recent Unit 2 refueling outages as displayed in Table 3.3-3. The licensee responded to this RAI by providing a tabular listing of the two CIVs that had failed LLRT administrative limits during the two most refueling outages (2EOC23 and 2EOC24). The footnotes that accompanied these listings adequately explained the cause of each failure and any follow-up corrective actions that transpired during the subsequent refueling outage.

The NRC staff also inquired in RAI-1 as to whether there had been repetitive failures of "Administrative Limits" for any LLRTs associated with any Type C tests since the last ILRT of March 2008. In tis response, the licensee stated that a review of Type C leak rate test failures since the last ILRTs of 2008 for both Units was conducted. For Unit 1, eight valves were noted as having more than one administrative failure. For Unit 2, one valve was noted as having more than one administrative failure. The licensee provided neither the historical information pertaining to the cause of failure nor the corrective actions associated with the sole poor-performing (i.e., repetitive administrative failures) Unit 2 valve. However, because the licensee demonstrated that its Unit 1 10 CFR Part 50, Appendix J, Option B performance-based testing program satisfies the guidance of NEI 94-01, Revision 0, the staff finds the licensee's RAI response for Unit 2 acceptable.

In addition, the licensee provided supplemental information pertaining to 88 Unit 2 penetrations subject to 10 CFR 50, Appendix J, Option B, Type C testing. Of these 88 penetrations, 32 penetrations are not currently eligible for an extended test frequency of 60 months per the guidance of RG 1.163, Regulatory Position C.2, and NEI 94-01, Revision 0. Therefore, only 56 Type C penetrations are eligible for Option B extended interval testing. There are currently 40 Type C penetrations on an Option B extended test interval. Therefore, 71.4 percent of the eligible Unit 2 penetration population are on extended test intervals.

Based on the NRC staff's review of the supplemental information provided in the response to RAI-1, the NRC staff finds that the license satisfies the requirements of its 10 CFR 50, Appendix J, Option B performance-based testing program. The licensee provided a sufficient response about the causes of the LLRT failures and explained the corrective actions performed to prevent repetitive and common cause failures. From the review of the information contained in the Section 3.3 of the licensee's application and a review of the supplemental information provided in the licensee's response to RAI-1, the NRC staff finds that the licensee satisifes the guidance in Sections 10.2.1 and 10.2.3 of NEI 94-01, Revision 0. Furthermore, based on this review, the staff concluded that the aggregate results of the "As-Found Pathway" for all McGuire Unit 2 Types B and C tests from 2009 through 2015 demonstrate a history of adequate maintenance because the aggregate test results at the end of each operating cycle were all well below (i.e., with greater than 95 percent margin) the Type B and Type C test TS leakage rate acceptance criteria of less than 0.60 L_a contained in TS 5.5.2a.

Based on the above and the licensee's RAI-1 response, the NRC staff concludes that the percentage of Type B and Type C components on extended frequencies satisifes 10 CFR 50, Appendix J, Option B. This conclusion supports allowing an extended test interval of up to 75 months for the McGuire Unit 2 Type C tested CIVs in accordance with the guidance of NEI 94-01, Revision 3-A.

Type B and Type C Test Program Assessment – McGuire Units 1 and 2

In summary, the NRC staff concludes that: in its letter dated May 25, 2017, the licensee adequately explained any lack of information or ambiguities contained in the licensee's letter dated December 19, 2016; the licensee satisfied the guidance of RG 1.163 and Sections 10.2.1, 10.2.3, 11.3.1, and 11.3.2, of NEI 94-01, Revision 0; the cumulative Type B and C test results were within the acceptance limit of TS 5.5.2a; and the licensee's corrective action program appropriately addresses poor performing valves and penetrations. Therefore, the NRC staff concludes that the licensee satisifes the McGuire Units 1 and 2 Types B and Type C leakage rate test program, as required by Option B of 10 CFR 50, Appendix J.

3.1.3 Containment Inservice Inspection (CISI) Program (American Society of Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Section XI, Subsections IWE and IWL)

The McGuire CISI program was previously reviewed and evaluated by the NRC staff in its SE for the amendments dated September 26, 2016 (ADAMS Accession No. ML16236A053). The McGuire CISI program described in Section 3.2.2 of the the licensee's license amendment request (LAR) dated December 19, 2016, does not differ substantively from the program described in Section 3.2.2 of the licensee's previous submittal dated February 18, 2016 (ADAMS Accession No. ML16076A413), as supplemented by letter dated June 30, 2016 (ADAMS Accession No. ML16193A657). This past review is sufficiently recent enough such that no additional relevant inspection history would have transpired, and no additional degradation is expected. Based on the previous findings, the NRC staff finds that the licensee's CISI program and inspection history are adequate to support the requested extension of the ILRT interval.

3.1.4 Conditions and Limitations in NEI 94-01, Revision 2-A

In its safety evaluation for NEI 94-01, Revision 2, the NRC staff concluded that the guidance in NEI 94-01, Revision 2 is acceptable for reference by licensees proposing to amend their TSs in regards to containment leakage rate testing, subject to six conditions and limitations. The requirements of NEI 94-01 stayed essentially the same from the original version through Revision 2 except that the regulatory positions of RG 1.163 were incorporated, and the maximum ILRT interval was extended to 15 years. Table 3.6-1 of the licensee's letter dated December 19, 2016, described the licensee's response to the six conditions and limitations identified in the NRC's SE dated June 25, 2008. The NRC staff evaluated the licensee's application to determine whether the licensee adequately addressed these conditions.

NEI 94-01, Revision 2-A, Condition 1

Condition 1 is derived from Sections 3.1.1.1 and 4.1 of the NRC's SE dated June 25, 2008, and stipulates that for calculating the Type A leakage rate, the licensee should use the definition in NEI 94-01, Revision 2-A in lieu of the definition in ANSI/ANS-56.8-2002. In Table 3.6-1, "NEI 94-01, Revision 2-A, Limitations and Conditions," in Section 3.6.1 of its letter dated December 19, 2016, letter, the licensee stated, "MNS will utilize the definition in NEI 94-01 Revision 2-A, Section 5.0." The staff notes that the definition in NEI 94-01 Revision 2-A, Section 5.0 remained the same in NEI 94-01, Revision 3-A. Therefore, the staff concludes that this definition is acceptable and that the licensee has sufficiently addressed Condition 1.

NEI 94-01, Revision 2-A, Condition 2

Condition 2 is derived from Sections 3.1.1.3 and 4.1 of NRC's SE dated June 25, 2008, and stipulates that the licensee submits a schedule of containment inspections to be performed prior to and between Type A tests. In Table 3.6-1 of its application, the licensee stated "Reference Tables 3.2.2-1, 3.2.2-2, 3.2.2-3, 3.2.2-4, 3.2.2-5, and 3.2.2-6, and Section 3.5 of this submittal."

As indicated by the figures and the description contained in Chapters 3, "Design Criteria – Structures, Components, Equipment and Systems," and 6, "Engineered Safety Features," of McGuire's Updated Final Safety Analysis Report, McGuire has no inservice inspection (ISI) Class Concrete Containment (CC) components that meet the criteria of Subarticle IWL-1100. Accordingly, no requirements to perform examinations in accordance with Subsection IWL are incorporated into the CISI Plan. Consistent with the requirements of paragraph 50.55a(g), and as modified and supplemented by paragraph 50.55a(b)(2)(ix) of 10 CFR Part 50, the ISI of Class MC (metal containment) is performed in accordance with the ASME Code, Section XI, Division 1, 2007 Edition with the 2008 Addenda (hereafter referred to as Section XI).

The McGuire CISI plan includes ASME Code, Section XI ISI Class MC pressure retaining components and their integral attachments that meet the criteria of Subarticle IWE-1200. Programmatically, each 10-year CISI interval is divided into three successive inspection periods as determined by calendar year of plant service within the inspection interval. Currently, both McGuire Units 1 and 2 are in the first period of the third CISI interval. For both units, this first period started September 1, 2014, and concluded on July 15, 2017.

For Unit 1, Table 3.2.2-1, "Second Containment Inservice Inspection Interval," and Table 3.2.2-2, "Third Containment Inservice Inspection Interval," identify the start and end dates for the first, second, and third periods of the second and third CISI intervals, as defined by the licensee's ISI program plan. Review of these two tables indicates that the last Unit 1 Type A test was performed after the EOC19 during the second period of the second interval. A review of these two tables indicates granting a test interval extension to 15 years will allow the occurrence of the next Unit 1 Type A during October 2023, which occurs during the third period of the third CISI interval between July 15, 2021, and July 15, 2024. Consistent with Section XI, LAR Table 3.2.2-5, "Category E-A: Containment Surfaces," and LAR Table 3.2.2-6, "Category E-C: Containment Surfaces Requiring Augmented Examination," indicate 100 percent visual inspections of the relevant "Items" for each period of each Interval. Because there will be three entire CISI program periods without a completed Type A test between October 2008 and the next required ILRT of October 2023, the NRC staff finds that the licensee can satisfy Section 3.1.1.3, of the NRC staff's SE dated June 25, 2008, for NEI 94-01, Revision 2, as reflected in NEI 94-01, Revision 3-A, Section 9.2.3.2, for Unit 1.

Similarly for Unit 2, LAR Table 3.2.2-3, "Second Containment Inservice Inspection Interval," and LAR Table 3.2.2-4, "Third Containment Inservice Inspection Interval," respectively identifies the start and end dates for first, second, and third periods of the second and third CISI intervals, as defined by the licensee's ISI program plan. Review of these two tables indicates that the last Unit 2, Type A, test was performed after the end of EOC18 during the first period of the second interval. A review of these two tables indicates granting a test interval extension to 15 years will allow the occurrence of the next Unit 2 Type A during March 2023, which occurs during the third period of the third CISI interval between July 15, 2021, and July 15, 2024. Consistent with Section XI, LAR Table 3.2.2-5, "Category E-A: Containment Surfaces," and LAR Table 3.2.2-6 indicate 100 percent visual inspections of the relevant "Items" for each period of each Interval. Because there will be four entire CISI program periods without a completed Type A test between March 2008 and the next required ILRT of March 2023, the NRC staff finds that the licensee can satisfy Section 3.1.1.3 of the NRC's SE dated June 25, 2008, for NEI 94-01, Revision 2, as reflected in NEI 94-01, Revision 3-A, Section 9.2.3.2, for Unit 2.

Based on the above, the NRC staff concludes that the licensee can satisfy the guidance in NEI 94-01, Revision 3-A, Sections 9.2.1 and 9.2.3.2, and the provisions in Section 3.1.1.3 of the NRC's SE dated June 25, 2008. Accordingly, the NRC staff finds that the licensee has adequately addressed NEI 94-01, Revision 2-A, Condition 2.

NEI 94-01, Revision 2-A, Condition 3

Condition 3 is derived from Sections 3.1.3 and 4.1 (in Enclosure, page 19) of the NRC SE dated June 25, 2008, and stipulates that the licensee addresses the areas of the containment structure potentially subjected to degradation. In Table 3.6-1 of its application, the licensee states, in part, "Reference Section 3.2.2, Inaccessible Class MC Areas, of this submittal. Reference Section 3.2.2, Table 3.2.2-6, Category E-C: Containment Surfaces Requiring Augmented Examination, and LAR Section 3.2.2, Owner Specified Examination Requirements, of this submittal."

The NRC staff reviewed the information contained in LAR Sections 3.2.2, "Inservice Inspection Program for Containment – IWE." The NRC's SE for NEI 94-01, Revision 2 states in part:

> In approving for Type A tests the one-time extension from 10 years to 15 years, the NRC staff has identified areas that need to be specifically addressed during the IWE and IWL inspections including a number of containment pressure-retaining boundary components (e.g., seals and gaskets of mechanical and electrical penetrations, bolting, penetration bellows) and a number of the accessible and inaccessible areas of the containment structures (e.g., moisture barriers, steel shells, and liners backed by concrete, inaccessible areas of ice condenser containments that are potentially subject to corrosion).

General visual examinations of the accessible surfaces of containment are performed to assess the general condition of the containment surfaces. The McGuire CISI program is based on ASME Code, Section XI, Subsection IWE, and applies to the containment vessel.

AUGMENTED EXAMINATIONS

Table 3.2.2-6, "Containment Surfaces Requiring Augmented Examination," identifies each specific containment examination by an item number. Each item number is similar to those listed in Table IWE-2500-1 of Section XI, plus an additional number to uniquely identify that examination (e.g., E04.011.001). As shown in Table 3.2.2-6, the containment "Visible Surfaces" subjected to 100 percent visual examinations for the population of entities defined by the McGuire item E4.11 are performed during the three periods of each CISI interval. The scope of these augmented examinations for the McGuire containments are defined by Section XI, Subsection IWE-1240, "Surface Areas Requiring Augmented Examination." Similarly, containment "Surface Area Grid" surfaces are subjected to 100 percent volumetric (i.e., ultrasonic thickness measurements) examinations for the population of entities defined by the McGuire item E4.12 are performed during the three periods of each CISI interval.

The licensee noted that the term, "Augmented Examinations," is not used in the McGuire CISI program plan to describe examinations that are above and beyond those required by the ASME Code. An alternative term, "Owner Specified Examinations," is used to alleviate confusion with Subsection IWE, Category E-C, Augmented Examinations. The NRC staff notes that the basic premise of IWE-1240 is: (a) containment surfaces that are subject to accelerated corrosion with no or minimal corrosion allowance or areas where the absence or repeated loss of protective coatings has resulted in substantial corrosion and pitting, and (b) containment surfaces subjected to excessive wear from abrasion or erosion that causes a loss of protective coatings, deformation, or material loss. The areas described in IWE-1240 were considered for their applicability at McGuire. Attachment 6 of the licensee's letter dated December 19, 2016, lists two augmented inspection findings from the refueling outage of 2014 that followed McGuire Unit 2 (i.e., EOC 22).

INACCESSIBLE AREAS

The programmatic requirements for Class MC application inaccessible areas as specified in 10 CFR 50.55a(b)(2)(ix)(A) are: (1) the applicant or licensee must evaluate the acceptability of inaccessible areas when conditions exist in accessible areas that could indicate the presence of or could result in degradation to such inaccessible areas; and (2) for each inaccessible area identified for evaluation, the licensee must provide the following in the ISI summary report as required by IWA-6000: (i) a description of the type and estimated extent of degradation, and the conditions that led to the degradation; (ii) an evaluation of each area, and the result of the evaluation; and (iii) a description of necessary corrective actions.

ASME Code, Section XI, defines "Accessible Surface Areas" in accordance with IWE-1231, which states, in part, "(a) As a minimum, the following portions of Class MC containment vessels, parts and appurtenances, and Class CC metallic shell and penetration liners shall remain accessible for either direct or remote visual examination, from at least one side of the vessel, for the life of the plant: (1) openings and penetrations; (2) structural discontinuities; (3) 80 percent of the pressure-retaining boundary (excluding attachments, structural reinforcement, and areas made inaccessible during construction); and (4) surface areas identified in IWE-1240.

Section 3.2.2 of the licensee's letter dated December 19, 2016, under the subheading "Inaccessible Surface Area," indicates that the McGuire Units 1 and 2 containment inspections during the first and second Intervals of the CISI plan did not identify a significant number of inaccessible surface areas, despite that additional inaccessible surface areas may be documented during the inspection intervals. If additional inaccessible areas are identified during the third ISI Interval, the ISI plan would be updated to demonstrate continued compliance with IWE-1231(a)(3). Data on the location and extent of inaccessible surface areas would be of sufficient detail as to allow these areas to be identified and located on applicable ISI drawings referenced in the McGuire CISI plan.

BELLOWS

The NRC staff notes that mechanical process piping penetrations and subassemblies classified as ASME Code Class 2 (NC), including bellows assemblies (except surfaces of connecting welds to penetration sleeves) are exempt from IWE examination requirements.

Section 3.2.2, under the subheading "Examination Boundaries," indicates that Section 2 of the unit-specific CISI plan contains a listing of drawings that identify examination areas subject to IWE examination. These drawings also show Class MC component supports subject to examination and include portions of Class NC bellows surfaces which the licensee has elected to include in this program. Revisions to drawings are reviewed for additions and changes to the ISI boundaries. These additions and changes are incorporated into the CISI Plan as necessary. The controlled drawings are maintained in accordance with applicable McGuire procedures and directives.

Table 3.2.2-9, "Owner Specified Examinations," of the licensee's letter dated December 19, 2016, for item number E1.11, "Part to be Examined," states, "Accessible

Surfaces of Process Piping Penetration Assemblies Classified as ASME Code Class NC as shown on in service inspection drawings." Note 1 to this Table indicates that penetration subassemblies (i.e., bellows) are classified as Code Class NC at their welded connection to the first outboard circumferential weld on the containment vessel sleeve. However, the CISI Plan drawings indicate that pressure retaining penetration subassembly surfaces are included within the scope of IWE Examination from the containment sleeve circumferential weld to the bellows assembly seal weld at the flued head connection. These are licensee-specified examinations and need not comply with applicable provisions of IWE or 10 CFR 50.55a.

In addition, Section 3.3, "Containment Leakage Rate Testing Program, Type B and Type C Testing," of the licensee's application indicates that McGuire Types B and C testing program currently requires testing of bellows in accordance with 10 CFR Part 50, Appendix J, Option B. The results of the test program are used to demonstrate that proper maintenance and repairs are made on these components throughout their service life.

BOLTING AND ELECTRICAL PENETRATIONS

Item E8.10, "Bolted Connections," as listed in Table 3.2.2-7, "Category E-G: Pressure Retaining Bolting," requires the completion of 100 percent VT-1 visual examination of pressure retaining bolted connections before the end of each CISI Interval. The NRC staff notes the 100 percent examination per CISI interval requirement, with deferral of inspection to the end of the interval, is consistent with ASME Code, Section XI, Table IWE-2500-1, "Examination Category E-G: Pressure Retaining Bolting." Section 3.1.4 "Containment Building Description," under the subheading "Electrical Penetrations," states, in part, "All electrical penetrations have been designed to maintain containment integrity for Design Basis Accident conditions including pressure, temperature and radiation. Double barriers permit testing of each assembly as required to verify that containment integrity is maintained." Section 3.3, "Containment Leakage Rate Testing Program, Type B and Type C Testing," indicates that the McGuire Type B test program currently requires testing of electrical penetrations in accordance with 10 CFR Part 50, Appendix J, Option B. The results of the test program are used to demonstrate that proper maintenance and repairs are made on these components throughout their service life.

ICE CONDENSERS

The NRC staff notes that ASME Code, Section XI does not address the subject of containment ice condensers. The licensee states in Section 3.2.2, "Inservice Inspection Program for Containment- IWE," of its application that the term, "Owner Specified Examinations," is used to alleviate confusion with Subsection IWE, Category E-C, Augmented Examinations. In its application, the licensee stated, "Owner specified examinations may include those which are the result of regulatory commitments, those required solely by regulation, and may include other examinations deemed appropriate by the Owner for inclusion in this program."

With respect to the McGuire containment ice condensers, in the listing of owner-specified examinations in Section 3.2, the licensee stated, in part:

> Ultrasonic Thickness Measurements on selected surfaces opposite the ice condenser areas once every ten-year interval. The number and extent of these examinations shall be determined by Engineering. At a minimum, some examinations should be performed every ten years opposite the Ice Condenser Floor Slab/containment vessel interface. Additional UT examinations may be warranted at locations near the Ice Condenser Top Deck Doors where

> condensation has been occasionally observed on the Annulus side of the vessel during scheduled examinations. If conditions are detected during the performance of these examinations, a determination shall be made as to whether the conditions warrant examination of the affected surfaces under Category E-C, Item E4.12.

MOISTURE BARRIERS

As displayed in Table 3.2.2-5 of the licensee's application, the containment "Moisture Barriers" are subjected to 100 percent general visual examinations for the population of entities defined by item E1.30, and are performed during the three periods of each CISI interval. The licensee states that the examination boundaries for the McGuire containments are defined by Section 2 of the unit-specific CISI plan, which contains a listing of drawings that identify moisture barrier areas subject to IWE examination.

In summary, the NRC staff finds that based on the information contained in Section 3.2.2 of the licensee's letter dated December 19, 2016, the licensee has established that it can satisfy the issues in Section 3.1.3 of the NRC's SE dated June 25, 2008. Accordingly, the NRC staff concludes that the licensee has adequately addressed NEI 94-01, Revision 2-A, Condition 3.

NEI 94-01, Revision 2-A, Condition 4

Condition 4 is derived from Sections 3.1.4 and 4.1 (in the Enclosure page 19) of the NRC SE dated June 25, 2008, and stipulates that the licensee addresses any tests and inspections performed following major modifications to the containment structure, as applicable. In Table 3.6-1 of its application, the licensee states, in part, "The MNS Unit 1 steam generators were replaced in 1EOC11 (2/14/97 - 5/25/97). The Unit 2 steam generators were replaced in 2EOC11 (10/2/97 - 12/31/97). The equipment hatches were utilized for these modifications. There are no planned modifications for MNS that will require a Type A test prior to the next scheduled Type A test proposed under this LAR. There are no anticipated additions or removal of plant hardware within the containment building, which could affect its leak-tightness."

The NRC SE for NEI 94-01, Revision 2, states:

> Section 9.2.4 of NEI TR [Topical Report] 94-01, Revision 2, states that: "Repairs and modifications that affect the containment leakage integrity require LLRT or short duration structural tests as appropriate to provide assurance of containment integrity following the modification or repair. This testing shall be performed prior to returning the containment to operation." Article IWE-5000 of the ASME Code, Section XI, Subsection IWE (up to the 2001 Edition and the 2003 Addenda), would require a Type A test after major repair or modifications to the containment.
>
> In general, the NRC staff considers the cutting of a large hole in the containment for replacement of steam generators or reactor vessel heads, replacement of large penetrations, as major repair or modifications to the containment structure.

This condition is intended to verify any major modification or maintenance repair of the primary since the last ILRT has been appropriately accompanied by a either a structural integrity test or ILRT and that any plans for such major modification also includes appropriate pressure testing. As stated in the licensee's response to Limitation/Condition 4, the containment equipment hatch for both units at McGuire was utilized during the respective refueling outages of 1997 to support the major plant modification of steam generator replacement. Accordingly, no Type A test was required to reestablish containment operability at the conclusion of these two refueling outages. The last Type A test for both Unit 1 and Unit 2 containments was performed in 2008. Furthermore, the licensee indicated that there are no major modifications (e.g., anticipated additions or removal of plant hardware) planned that could affect its leak-tightness and subsequently require either a structural integrity test or ILRT. Therefore, the NRC staff concludes that the licensee has adequately addressed the issues related to Condition 4, as described in the NRC's SE for NEI 94-01, Revision 2.

NEI 94-01, Revision 2-A, Condition 5

Condition 5 is derived from Sections 3.1.1.2 and 4.1 of NRC's SE dated June 25, 2008, and stipulates that the normal Type A test interval should be less than 15 years. If a licensee has to utilize the provision of Section 9.1 of NEI 94-01, Revision 2 related to extending the ILRT interval beyond 15 years, then the licensee must demonstrate to the NRC staff that it is an unforeseen emergent condition. In Table 3.6-1 of its application, the licensee states that it will follow the requirements of NEI 94-01 Revision 2-A, Section 9.1, and in accordance with the requirements of NEI 94-01 Revision 2-A, SE Section 3.1.1.2, it will also demonstrate to the NRC staff that an unforeseen emergent condition exists in the event an extension beyond the 15-year interval is required.

The NRC staff notes that NEI 94-01, Revision 2-A, Section 9.1, "Introduction," contains the relevant passage from the NRC staff SE for NEI 94-01 Revision 2, and, states, "Required surveillance intervals for recommended Type A testing given in this section may be extended by up to 9 months to accommodate unforeseen emergent conditions, but should not be used for routine scheduling and planning purposes." The licensee has demonstrated its understanding that any extension of the Type A test interval beyond the upper-bound performance-based limit of 15 years should be infrequent and that any requested permission (i.e., for such an extension) will demonstrate to the NRC staff that an unforeseen emergent condition exists. Based on the above review, the NRC staff finds that the licensee has adequately addressed NEI 94-01, Revision 2-A, Condition 5.

NEI 94-01, Revision 2-A, Condition 6

Condition 6 is derived from Section 4.1 of the NRC's SE June 25, 2008, and stipulates that for plants licensed under 10 CFR Part 52, applicants requesting a permanent extension of the ILRT surveillance interval to 15 years should be deferred until after the construction and testing of containments for that design have been completed and applicants have confirmed the applicability of NEI 94-01, Revision 2-A, and Electric Power Research Institute (EPRI) Report No. 1009325, Revision 2, including the use of past containment ILRT data. The licenses stated in Table 3.6-1 of its application that this is not applicable because McGuire was not licensed under 10 CFR Part 52. The NRC staff is in agreement that NEI 94-01, Revision 2-A, Condition 6 is not applicable to McGuire.

Summary of Condition and Limitations in NEI 94-01, Revision 2-A

Based on the above evaluation of each condition of NEI 94-01, Revision 2-A, the NRC staff has determined that the licensee has adequately addressed the six conditions identified in Section 4.1 of the NRC's SE for NEI 94-01, Revision 2. Therefore, the NRC staff concludes it is acceptable for McGuire to adopt the six conditions of NEI 94-01, Revision 2-A as part of the implementation documents in TS 5.5.2 for McGuire Units 1 and 2.

3.1.5 Conditions and Limitations in NEI 94-01, Revision 3-A

In its safety evaluation dated June 8, 2012, for NEI 94-01, Revision 3, the NRC staff concluded that the guidance in NEI 94-01, Revision 3 is acceptable for reference by licensees proposing to amend their TSs in regards to containment leakage rate testing, subject to the following two conditions and limitations.

NEI 94-01, Revision 3-A, Condition 1: NEI 94-01, Revision 3, is requesting that the allowable extended interval for Type C LLRTs be increased to 75 months, with a permissible extension (for non-routine emergent conditions) of nine months (84 months total). The staff is allowing the extended interval for Type C LLRTs be increased to 75 months with the requirement that a licensee's post-outage report include the margin between the Type B and Type C leakage rate summation and its regulatory limit. In addition, a corrective action plan shall be developed to restore the margin to an acceptable level. The staff is also allowing the non-routine emergent extension out to 84-months as applied to Type C valves at a site, with some exceptions that must be detailed in NEI 94-01, Revision 3. At no time shall an extension be allowed for Type C valves that are restricted categorically (e.g., BWR MSIVs), and those valves with a history of leakage, any valves held to either a less than maximum interval or to the base refueling cycle interval. Only non-routine emergent conditions allow an extension to 84 months.

NEI 94-01, Revision 3-A, Condition 2: When routinely scheduling any LLRT valve interval beyond 60-months and up to 75-months, the primary containment leakage rate testing program trending or monitoring must include an estimate of the amount of understatement in the Type B & C total, and must be included in the post-outage report. The report must include the reasoning and determination of the acceptability of the extensions, demonstrating that the LLRT totals calculated represent the actual leakage potential of the penetrations.

The licensee indicated in its application that the McGuire post-outage reports will include the margin between the Type B and Type C minimum pathway leak rate summation value adjusted for understatement and the acceptance criterion. Should the Type B and Type C combined totals exceed an administrative limit of 0.5 L_a but be less than the TS acceptance value (performance criterion) of 0.6 L_a, then an analysis will be performed and a corrective action plan prepared to restore and maintain the leakage summation margin to less than the administrative limit. The licensee acknowledges these two conditions and the likelihood that longer test intervals would increase the understatement of actual leakage potential given the method by which the totals are calculated, and will assign additional margin for monitoring acceptability of results via administrative limits and understatement contribution adjustments. Therefore, the NRC staff concludes that the licensee has sufficiently addressed Conditions 1 and 2 of NEI 94-01, Revision 3-A.

3.2. Probablistic Risk Assessment (PRA) Review

Section 9.2.3.1, "General Requirements for ILRT Interval Extensions beyond Ten Years," of NEI 94-01, Revision 2-A states that plant-specific confirmatory analyses are required when extending the Type A ILRT interval beyond ten years. Section 9.2.3.4, "Plant-Specific Confirmatory Analyses," of NEI 94-01, Revision 2-A states that the assessment should be performed using the approach and methodology described in EPRI Techincal Report (TR) 1009325, Revision 2-A, "Risk Impact Assessment of Extended Integrated Leak Rate Testing Intervals." The analysis is to be performed by the licensee and retained in the plant documentation and records as part of the basis for extending the ILRT interval.

In its SE dated June 25, 2008, the NRC staff found the methodology in EPRI TR-1009325, Revision 2 acceptable for referencing by licensees proposing to amend their TSs to permanently extend the ILRT interval to 15 years, provided certain conditions are satisfied. These conditions, which are set forth in Section 4.2 of the SE for EPRI TR-1009325, Revision 2, stipulate that:

1. The licensee submits documentation indicating that the technical adequacy of its PRA is consistent with the requirements of RG 1.200, "An Approach for Determining the Technical Adequacy of Probabilistic Risk Assessment Results for Risk-Informed Activities," dated March 2009 (ADAMS Accession No. ML090410014) relevant to the ILRT extension application.

2. The licensee submits documentation indicating that the estimated risk increase associated with permanently extending the ILRT surveillance interval to 15 years is small and consistent with the clarification provided in Section 3.2.4.6 of the SE for EPRI TR-1009325, Revision 2.

3. The methodology in EPRI TR-1009325, Revision 2 is acceptable provided the average leak rate for the pre-existing containment large leak accident case (i.e., accident case 3b) used by licensees is assigned a value of 100 times the maximum allowable leakage rate (L_a) instead of 35 L_a.

4. An LAR is required in instances where containment over-pressure is relied upon for emergency core cooling system (ECCS) performance.

3.2.1 <u>Plant-Specific Risk Evaluation</u>

The licensee performed a risk impact assessment for extending the Type A and Type C containment ILRT intervals. The risk analyses for McGuire was provided in Attachment 5 of the letter dated December 16, 2016. In Section 1.0 of Attachment 5 to the letter dated December 16, 2016, the licensee stated that the plant-specific risk assessment follows the guidance from:

- NEI 94-01, Revision 3-A.

- EPRI TR-104285, "Risk Impact Assessment of Revised Containment Leak Rate Testing Intervals," dated August 1994.

- NEI document, "Interim Guidance for Performing Risk Impact Assessments in Support of One-Time Extensions for Containment Integrated Leakage Rate Test Surveillance Intervals," dated November 2001.

- RG 1.174, "An Approach for Using Probabilistic Risk Assessment in Risk-Informed Decisions on Plant-Specific Changes to the Licensing Basis," Revision 2, May 2011 (ADAMS Accession No. ML100910006).

- Calvert Cliffs Nuclear Plant liner corrosion analysis described in a letter to the NRC dated March 27, 2002 (ADAMS Accession No. ML020920100).

- EPRI 1009325, Revision 2-A (also known as EPRI 1018243).

The licensee addressed each of the four conditions for the use of EPRI TR-1009325, Revision 2-A. A summary of how each condition has been met is provided in the sections below.

3.2.2 Technical Adequacy of the PRA

The first condition stipulates that the licensee submits documentation indicating that the technical adequacy of its PRA is consistent with the requirements of RG 1.200 that are relevant to the ILRT extension application.

In Regulatory Issue Summary 2007-06, "Regulatory Guide 1.200 Implementation" (ADAMS Accession No. ML090410014), the NRC clarified that for all risk-informed applications received after December 2007, the NRC staff will use Revision 1 of RG 1.200 (ADAMS Accession No. ML070240001) to assess technical adequacy of the PRA used to support risk-informed applications. Revision 2 of RG 1.200 will be used for all risk-informed application received after March 2010. In Section 3.2.4.1 of the SE for EPRI TR-1009325, Revision 2, and the NRC staff stated, in part:

> [L]icensee requests for a permanent extension of the ILRT surveillance interval to 15 years pursuant to NEI TR 94-01, Revision 2, and EPRI Report No. 1009325, Revision 2, will be treated by NRC staff as risk-informed license amendment requests. Consistent with information provided to industry in Regulatory Issue Summary 2007-06, "Regulatory Guide 1.200 Implementation," the NRC staff will expect the licensee's supporting Level 1/LERF [large early release frequency] PRA to address the technical adequacy requirements of RG 1.200, Revision 1. Any identified deficiencies in addressing this standard shall be assessed further in order to determine any impacts on any proposed decreases to surveillance frequencies. If further revisions to RG 1.200 are issued which endorse additional standards, the NRC staff will evaluate any application referencing NEI TR 94-01, Revision 2, and EPRI Report No. 1009325, Revision 2, to examine if it meets the PRA quality guidance per the RG 1.200 implementation schedule identified by the NRC staff.

In the same section of the SE, the NRC staff stated that Capability Category (CC) I, of ASME PRA standard shall be applied as the standard for assessing PRA quality for ILRT extension applications, as approximate values of core damage frequency (CDF) and LERF and their distribution among release categories are sufficient to support the evaluation of changes to ILRT frequencies.

As discussed in Section 4.0 of Attachment 5 to the letter dated December 16, 2016, the McGuire risk assessment performed to support the ILRT application uses the current Level 1 and LERF internal events PRA model of record. The current internal events PRA model does not contain a full Level 2 PRA; however, previous models contain a full Level 2 PRA. The licensee states where detail is needed from a Level 2 PRA, the results from previous revisions are scaled using the current revision's total risk. The licensee further states that this scaling does not significantly affect the conclusions of the analysis. Although McGuire has two units, there is only one internal events PRA model. The justification for this is that the McGuire units are very similar, such that one internal events PRA model accurately models both units. The licensee has a process for continued PRA maintenance and update to represent the as-built, as-operated plant, including procedures that evaluate and prioritizes changes in PRA input as well as addressing discovery of new information that could affect the PRA. The licensee performed a review of the plant modifications and changes and concluded that there are no plant changes that have not yet been incorporated in those PRA models that would affect the application.

As described in Attachment 5 of the letter dated December 16, 2016, and in the letter dated December 12, 2017 (i.e., the licensee's response to the NRC's request for additional information dated November 13, 2017 (ADAMS Accession No. ML17317B093)), the McGuire internal events PRA received a peer review in June 2015. The peer review was performed against the ASME/ANS PRA standard RA-Sa-2009, as clarified by RG 1.200, Revision 2. The LERF PRA model received a focused-scope peer review in December 2012, and this review was performed against the ASME/ANS PRA Standard RA-Sa-2009. The internal flood PRA model received a focused-scope peer review in September 2011, and this peer review was performed against the ASME/ANS PRA Standard RA-Sa-2009. The 2015 internal events peer review resulted in three findings that remain open. The 2012 LERF peer review resulted in seven findings, all of which are closed. The 2011 internal flood review resulted in two findings that remain open.

In September 2015 and February 2016, the licensee had an independent assessment team facts and observations (F&Os) closure review of the high level requirements under internal flooding and select LERF supporting requirements, and the internal events supporting requirements respectively. As a result, McGuire "closed out" a number of F&Os that were not included in the submittal. The licensee noted that the F&O closure independent assessment teams relied on insights from the peer review processes identified in NEI 05-04. However, the review pre-dated, and was therefore not completed in accordance with, the acceptable process identified in "U.S. Nuclear Regulatory Commission Acceptance on Nuclear Energy Institute Appendix X to Guidance 05-04, 07-12, and 12-13, Close-Out of Facts And Observations (F&Os)," Revision 0, November 2006 (ADAMS Accession No. ML17079A427). The NRC had not accepted the independent closure process at the time the licensee made use of it and the gaps between the closure review and the accepted guidance were significant enough to warrant an audit.

From September 26 to 27, 2017, NRC staff from the Office of Nuclear Reactor Regulation, Division of Risk Assessment and Division of Operator Reactor Licensing conducted a regulatory audit at the Duke Energy Offices in Charlotte, North Carolina. The audit summary is dated November 17, 2017, and is in ADAMS at Accession No. ML17303A471. The NRC staff performed a detailed review of the F&O closure process. During the audit, the NRC staff confirmed that the independent assessment team's basis for closure of each finding included an assessment of the resolution being an upgrade versus update, the independent assessment team verification that each F&O's resolution was met at CC II or met if there was no separate CC II, and the independent assessment team closed-out F&Os that had the appropriate documentation and incorporation into the PRA model prior to closure.

Based on the confirmation of the F&O closure report following the accepted process during the audit, the NRC staff concludes that the licensee has adequately addressed the NRC staff's concerns regarding the implementation of F&O closure process.

For the internal events, LERF, and internal flood findings, the NRC staff reviewed each F&Os and associated dispositions and determined that they have no impact on the ILRT application.

In its letters dated December 16, 2017, and December 12, 2017, the licensee stated that the McGuire Fire PRA model received a peer review in September 2009. This peer review was performed against ASME/ANS RA-Sa-2009, as clarified by RG 1.200 Revision 2. The 2009 peer review resulted in twenty-two findings that are open. The NRC staff requested additional information in regards to F&O SF-A5-01.

F&O SF-A5-01 stated that fire brigade training requirements with respect to seismic/fire interactions could not be located. The licensee stated in its disposition that seismic/fire interactions are qualitative and have no impact on the quantification of the fire PRA. While the NRC staff agrees that seismic/fire interactions are not quantitative, a qualitative risk still exists and therefore training requirements for seismic/fire interactions was requested to be addressed. In its letter dated December 12, 2017, the licensee stated that the McGuire fire brigade is trained and equipped to combat fire events in all areas of the plant during all modes of operation. Its fire brigade training program consists of procedures and fire plans. The fire brigade have training and practice sessions to allow the fire brigade to practice in a variety of conditions and hazards. Furthermore, fire brigade training and McGuire provides knowledge and techniques that can be applied to large scale conditions, such as fires resulting from seismic events. Based on this information, the NRC finds the licensee provided adequate detail of the fire brigade's training requirements for seismic/fire interactions.

In its letter dated December 12, 2017, the licensee also stated that the McGuire high winds PRA received a peer review in October 2014, and this peer review was performed against ASME/ANS PRA standard RA-Sb-2013. A gap assessment was performed by the licensee between ASME/ANS RA-Sa-2009, as clarified and endorsed by RG 1.200 Revision 2, and ASME/ANS RA-Sb-2013. No gaps were identified by the licensee between the high winds PRA peer review and the requirements of RG 1.200. The 2014 peer review resulted in eight findings that are open. Of the eight open findings, the NRC staff requested additional information in regards to F&O WPR A3-1.

F&O WPR A3-1 stated that the licensee did not model or evaluate the impact of the failure of the Main Steam and Feedwater lines due to wind pressure or missile which would result in failure of both emergency diesel generators (EDGs). The licensee the stated in its disposition that a re-evaluation provided significantly higher wind loading which reduced the calculated CDF and LERF risk. The NRC staff requested clarification on how a re-evaluation significantly higher wind loading would result in reduced CDF and LERF risk. In its letter dated December 12, 2017, the licensee stated that the Main Steam and Feedwater lines were originally combined into a single high wind pressure screening fragility. The re-evaluation modeled separate wind pressure fragilities, and in doing so, there are now separate failure modes for the main steam line and the feedwater line relative to the initial modeling which required only one failure mode for both lines. Having separate failure modes reduces the likelihood of events to occur that would result in the failure of both EDGs. The re-evaluation also refined the capacity of these lines to resist a higher wind pressure, resulting in events that fail these lines to require higher wind speeds and therefore a reduced likelihood of occurrence. Based on separate modeling and increased capacity of the lines to resist wind pressure, the results of the re-evaluation demonstrate a reduction in CDF and LERF when compared to modeling both lines as a single fragility. Based on the licensee's response in its letter dated December 12, 2017, the NRC staff finds the licensee's disposition of F&O WPR A3-1 acceptable.

Although the emphasis of the quantitative evaluation is on the risk impact from internal events, the guidance in EPRI Report No. 1009325, Revision 2, Section 4.2.7, "External Events," states, "Where possible, the analysis should include a quantitative assessment of the contribution of external events (e.g., fire and seismic) in the risk impact assessment for extended ILRT intervals."

In a sensitivity study, the licensee performed an assessment of the impact of external events as it applies to its application. To estimate the seismic risk, the licensee used the conclusions based on the NRC staff's Generic Issue (GI) 199 study (ADAMS Accession No. ML100270756), which contains the postulated CDF using the updated 2008 U.S. Geological Survey seismic hazard curves. The average model for McGuire resulted in a seismic CDF of 2.18E-05/year. The NRC staff noted that based on the seismic hazard re-evaluation performed in response to recommendation 2.1 of the Near-Term Task Force, the staff concluded that a seismic risk re-evaluation is not merited (ADAMS Accession No. ML15194A015). Therefore, the GI-199 analysis represents the most recent available estimate of the seismic risk for McGuire. Based on these considerations, the NRC staff finds that the licensee's use of this seismic CDF provides a sufficient estimate to support the evaluation of the acceptance criteria discussed in Section 3.2.1.2 of this SE. The licensee used the values in its Individual Plant Examination for External Events to report an external flood CDF of 5.0E-09/year. As previously mentioned, the licensee has a fire PRA and a high winds PRA that have both been peer reviewed. Therefore, the NRC staff concludes that the licensee has appropriately provided a quantitative assessment of the contribution of external events in the risk impact assessment for this application.

In summary, the licensee has evaluated its internal events and fire PRAs against the currently endorsed ASME PRA standard (i.e., ASME/ANS RA-Sa-2009) and the currently implemented version of RG 1.200 (i.e., Revision 2), resolved or dispositioned the findings developed during the peer review of its internal events PRA for applicability to the ILRT interval extension, and included a quantitative assessment of the contribution of external events. The NRC staff reviewed the internal events and fire PRA peer review findings and agrees that the findings have been adequately dispositioned for this application. Furthermore, the NRC staff concludes that the impact from external events is appropriately considered for this application. Based on the above, the NRC staff concludes that the PRA used by the licensee is of sufficient technical adequacy to support the evaluation of changes to ILRT frequency. Accordingly, the first condition is met.

3.2.3 Estimated Risk Increase

The second condition stipulates that the licensee submit documentation indicating that the estimated risk increase associated with permanently extending the ILRT interval to 15 years is small, and consistent with the guidance in RG 1.174 and the clarification provided in Section 3.2.4.6 of the NRC SE for NEI 94-01, Revision 2. Specifically, a small increase in population dose should be defined as an increase in population dose of less than or equal to either 1.0 person-rem per year or 1 percent of the total population dose, whichever is less restrictive. In addition, a small increase in conditional containment failure probability (CCFP) should be defined as a value marginally greater than that accepted in previous one-time 15-year ILRT extension requests. This would require that the increase in CCFP be less than or equal to 1.5 percent. Additionally, for plants that rely on containment over-pressure for net positive suction for ECCS injection, both CDF and LERF will be considered in the ILRT evaluation and compared with the risk acceptance guidelines in RG 1.174. As discussed further in Section 3.2.5 of this SE, McGuire does not rely on containment overpressure for ECCS performance. Thus, for this application, the associated risk metrics include LERF, population dose, and CCFP.

The licensee reported the results of the plant-specific risk assessment in Section 3.1.6.3 of Enclosure 1 to it sapplication. Details of the risk assessment for McGuire are provided in Attachment 5 of the licensee's letter dated December 12, 2016. The reported risk impacts are risk impact from baseline, which estimates the impact of a change in test frequency from three tests in 10 years (the test frequency under 10 CFR 50 Appendix J, Option A) to one test in 15 years for both units. The following conclusions can be drawn based on the licensee's analysis associated with extending the Type A ILRT frequency:

1. The reported increase in LERF for internal events is 4.99E-08/year for both units. The increase in LERF for combined internal and external events is 6.54E-07/year for Unit 1 and 7.13E-07/year for Unit 2. The risk contribution from external events includes the effects of internal fires, high winds, and seismic, as discussed in Section 3.2.1 of this Safety Evaluation. This change in risk is considered to be "small" (i.e., between 1E-06/year and 1E-07/year) per the acceptance guidelines in RG 1.174. In Section 3.1.6.3 of Enclosure 1 of the licensee's application, the licensee stated that this change is "very small," while the acceptance guidelines in RG 1.174 define this change to be "small." In its letter dated December 12, 2017, the licensee stated the appropriate term in the application is "small" and not "very small." The NRC staff agrees that this change to the application is appropriate. An assessment of LERF is required to demonstrate that the total LERF is less than 1E-05/year. The licensee estimated the total LERF for internal and external events as 7.83E-06/year for Unit 1 and 8.59E-06/year for Unit 2. The total LERF, given the increase in ILRT interval, is below the acceptance guideline of 1E-05/year in RG 1.174 for a "small" change.

2. The increase in population dose risk from changing Type A ILRT frequency to once in 15 years is reported as 0.032 person-rem/year. The reported increase in total population dose is below the value of 1.0 person-rem/year provided in EPRI TR-1009325, Revision 2-A, and defined in Section 3.2.4.6 of the NRC SE for NEI 94-01, Revision 2. Thus, this increase in the total population dose for the proposed change is considered small and supportive of the proposed change.

3. The increase in CCFP caused by a change in test frequency from three in 10 years to once in 15 years is 0.891 percent for McGuire. This value is below the acceptance guideline of 1.5 percentage points for a small increase in CCFP in Section 3.2.4.6 of the NRC SE for NEI 94-01, Revision 2.

Based on the risk assessment results, the NRC staff concludes that for McGuire, the increase in CDF and LERF is small and consistent with the acceptance guidelines of RG 1.174, and the increase in the total population dose and the magnitude of the change in the CCFP for the proposed change are small and supportive of the proposed change. The defense-in-depth philosophy is maintained as the independence of barriers will not be degraded as a result of the requested change, and the use of quantitative risk metrics collectively ensures that the balance between prevention of core damage, prevention of containment failure, and consequence mitigation is preserved. Accordingly, the second condition is met.

3.2.4 Leak Rate for the Large Pre-Existing Containment Leak Rate Case

The third condition stipulates that in order to make the methodology in EPRI TR-1009325, Revision 2, acceptable, the average leak rate for the pre-existing containment large leak rate accident case (i.e., accident case 3b) used by the licensees shall be 100 L_a instead of 35 L_a. As noted by the licensee in Section 3.1.6 of Enclosure 1 and Section 4.0 of Attachment 5 of its letter dated December 12, 2017, the methodology in EPRI TR-1009325, Revision 2-A, incorporates the use of 100 L_a as the average leak rate for the pre-existing containment large leak rate accident case, and this value has been used in the McGuire plant-specific risk assessments. Accordingly, the third condition is met.

3.2.5 Applicability if Containment Over-Pressure is Credited for ECCS Performance

The fourth condition stipulates that in instances where containment over-pressure is relied upon for ECCS performance, an amendment request is required to be submitted. In Section 3.1.6 of Enclosure 1 in the letter dated December 16, 2016, the licensee stated that containment overpressure is not relied upon for ECCS performance at McGuire. Accordingly, the fourth condition is not applicable. Based on the above, the NRC staff concludes that the licensee has met the four Limitations and Conditions for EPRI Report No. 1009325, Revision 2. The NRC staff concludes that the PRA used by the licensee is sufficient and that the risk impact for extending the integrated leak rate testing intervals is consistent with the acceptance guidelines of RG 1.174.

3.3 Technical Evalaution Summary

Based on the preceding regulatory and technical evaluations, the NRC staff concludes that the licensee has adequately implemented its primary containment leakage rate testing program consisting of ILRT and LLRT. The results of the recent ILRTs and the LLRT (Type B and Type C tests) combined totals demonstrate acceptable performance and support a conclusion that the structural and leak-tight integrity of the primary containment vessel is adequately managed and will continue to be periodically monitored and managed effectively. The NRC staff concludes that the licensee has addressed the NRC conditions to demonstrate acceptability of adopting TR NEI 94-01, Revision 3-A, and the limitations and conditions identified in the staff's SE that was incorporated into NEI 94-01, Revision 2-A. The NRC staff concludes that the risk impact for extending the integrated leak rate testing intervals is consistent with the acceptance guidelines of RG 1.174. Therefore, the NRC staff concludes that the proposed changes to TS 5.5.2 regarding the primary containment leakage rate testing program are acceptable.

4.0 STATE CONSULTATION

In accordance with the Commission's regulations, NRC staff notified the North Carolina State official of the proposed issuance of the amendments on December 20, 2017. The State official confimed on January 10, 2018, that the State of North Carolina had no comments.

5.0 ENVIRONMENTAL CONSIDERATION

The amendments change a requirement with respect to the installation or use of facility components located within the restricted area as defined in 10 CFR Part 20. The NRC staff has determined that the amendments involve no significant increase in the amounts and no significant change in the types of any effluents that may be released offsite and that there is no significant increase in individual or cumulative occupational radiation exposure. The Commission has previously issued a proposed finding that the amendments involve no significant hazards consideration, and there has been no public comment on this finding (82 FR 21557: May 9, 2017). Accordingly, the amendments meet the eligibility criteria for categorical exclusion set forth in 10 CFR 51.22(c)(9). Pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the issuance of the amendments.

6.0 CONCLUSION

The Commission has concluded, based on the considerations discussed above, that: (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) there is reasonable assurance that such activities will be conducted in compliance with the Commission's regulations, and (3) the issuance of the amendments will not be inimical to the common defense and security or to the health and safety of the public.

Principal Contributors: D. Nold, NRR
B. Hartle, NRR
I. Tseng, NRR

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SUBJECT: MCGUIRE NUCLEAR STATION, UNITS 1 AND 2 – ISSUANCE OF AMENDMENTS TO EXTEND THE CONTAINMENT TYPE A LEAK RATE TEST FREQUENCY TO 15 YEARS AND TYPE C LEAK RATE TEST FREQUENCY TO 75 MONTHS (CAC NOS. MF9020 AND MF9021; EPID L-2016-LLA-0032) DATED JANUARY 31, 2018

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