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June 30, 2016

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

Subject: Duke Energy Carolinas, LLC (Duke Energy)
McGuire Nuclear Station, Units 1 and 2
Docket Numbers 50-369 and 50-370
Renewed Facility License Numbers NPF-9 and NPF-17
License Amendment Request for Technical Specification 3.6.14, "Divider Barrier Integrity"

Pursuant to 10 CFR 50.90, enclosed is a Duke Energy License Amendment Request (LAR) for the McGuire Nuclear Station Renewed Facility Operating Licenses and Technical Specifications (TS). This LAR modifies TS 3.6.14 to allow a steam generator enclosure hatch or a pressurizer enclosure hatch to be open for up to 48 hours to facilitate potential inspections and maintenance and to enhance personnel and radiation safety. This request builds upon a LAR previously approved for McGuire Nuclear Station¹.

The Enclosure provides a description of the proposed change, the technical justification, an evaluation of significant hazards consideration pursuant to 10 CFR 50.92(c), a statement of environmental consideration, and the following attachments:

- Attachment 1 provides the existing TS pages marked to show the proposed changes for the McGuire Nuclear Station.
- Attachment 2 provides existing TS Bases pages marked to show the proposed changes for the McGuire Nuclear Station. These pages are provided for information only.

Implementation of this proposed amendment to the McGuire FOLs and TS will not require revision to the plants Updated Final Safety Analysis Report (UFSAR). Duke Energy is requesting NRC review and approval of this LAR by July 1, 2017. To accommodate the need to train licensed operators on the license amendment, Duke Energy requests a 90 day implementation period for this LAR.

There are no additional regulatory commitments contained in this submittal.

¹ NRC Letter and Safety Evaluation dated April 5, 2005, McGuire Nuclear Station, Units 1 and 2 Re: Issuance of Amendments 228/210.

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In accordance with Duke administrative procedures and the Quality Assurance Program Topical Report, the changes contained in this LAR have been reviewed and approved by the McGuire Plant Operations Review Committee. Pursuant to 10 CFR 50.91, a copy of this LAR is being sent to the appropriate official of the state of North Carolina.

Please direct any questions you may have in this matter to Brian Richards at (980) 875-5171.

I declare under penalty of perjury that the foregoing is true and correct. Executed on
June 30, 2016.

Sincerely,

A handwritten signature in black ink, appearing to read "SD Capps", written in a cursive style.

Steven D. Capps

Enclosure 1: Evaluation of the proposed change

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Enclosure 1

Evaluation of the Proposed Change

Subject: License Amendment Request to Revise Technical Specification 3.6.14, "Divider Barrier Integrity"

1. SUMMARY DESCRIPTION
2. DETAILED DESCRIPTION
3. TECHNICAL EVALUATION
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 - 4.2 Precedents
 - 4.3 No Significant Hazards Consideration Determination
 - 4.4 Conclusion
5. ENVIRONMENTAL CONSIDERATIONS
6. REFERENCES

ATTACHMENTS:

1. McGuire Units 1 and 2 Technical Specification Page Markups
2. McGuire Units 1 and 2 Technical Specification Bases Page Markups
(pages included for information only)

1. SUMMARY DESCRIPTION

This evaluation supports a request to amend Renewed Facility Operating Licenses NPF-9 and NPF-17 for McGuire Nuclear Station (MNS) Units 1 and 2.

The proposed change would revise the McGuire TS 3.6.14, "Divider Barrier Integrity," to allow one pressurizer enclosure hatch or one steam generator (SG) enclosure hatch to be open or inoperable for up to 48 hours.

During plant operation, situations arise where it is necessary to enter a pressurizer or SG enclosure to perform inspections and maintenance. Entries are made during startup and shutdown to check for leaks. During operation, it may be necessary to open the associated hatch to perform an inspection and make repairs.

Reasons for an unplanned entry into a pressurizer or a SG enclosure include (but are not limited to):

1. Suspected instrument tubing leak affecting pressurizer level indication
2. Suspected leakage of pressurizer safety valve(s) or PORV
3. Malfunctioning hydrogen igniters
4. PORV block valve indication

If repairs are to be made, or if the inspections are time-consuming, the hatch may need to remain open for longer durations, thus requiring enforcement discretion from the current requirements of TS 3.6.14. More importantly, the increase in Completion Time enhances personnel safety and radiation exposure during these periods of repair and inspection by minimizing the movement of the hatch and allowing the areas to be entered from upper containment.

In precedent licensing actions, the NRC previously approved increasing the TS completion time for closing a pressurizer enclosure hatch from one hour to six hours for both McGuire and Catawba Nuclear Stations.

2. DETAILED DESCRIPTION

The proposed LAR would revise TS 3.6.14 Condition A and D by inserting "or one steam generator enclosure" between "pressurizer" and "hatch." Required Action D.1 would be changed to state "affected hatch." Finally, the completion time for Condition D would be changed from six hours to 48 hours. Entry into Condition D would be allowed for only one hatch (pressurizer enclosure or SG enclosure) at a time. Revised, TS 3.6.14 Conditions A and D read as follows:

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>A. -----NOTE----- For this action, separate Condition entry is allowed for each personnel access door or equipment hatch. -----</p> <p>One or more personnel access doors or equipment hatches (other than one pressurizer or one steam generator enclosure hatch addressed by Condition D) open or inoperable, other than for personnel transit entry.</p>	<p>A.1 Restore personnel access doors and equipment hatches to OPERABLE status and closed positions.</p>	<p>1 hour</p>
<p>D. One pressurizer or one steam generator enclosure hatch open or inoperable.</p>	<p>D.1 Restore affected hatch to OPERABLE status and closed position.</p>	<p>48 hours</p>

The TS Bases would require corresponding changes.

3. TECHNICAL EVALUATION

3.1 Background

The ice condenser containment at McGuire Nuclear Station is divided into three major compartments: the upper compartment, the lower compartment, and the ice condenser compartment. A high-energy line break inside the containment, such as a loss-of-coolant accident (LOCA) or main steam line break, would occur in the lower compartment. The resultant high pressure would be relieved into the ice condenser compartment and then into the upper compartment. Air and steam would be cooled and the steam condensed by the ice bed prior to entering the upper compartment. The ice acts to keep the peak containment pressure below design pressure during an accident.

If steam should bypass the ice condenser and pass directly from the lower to upper compartments, it would not be condensed by the ice as designed. Too much steam bypass could cause the peak containment pressure to exceed the containment design capability. Therefore, the ice condenser bypass area (the total area of openings between the upper and lower compartments) must not exceed a certain limit during plant operation. McGuire is designed with necessary openings between the upper and lower compartments, such as the refueling canal drains, and a total bypass flow area of 5.0 square feet is assumed.

The boundary between the upper and lower compartments is called the divider barrier or operating deck. For the most part, it is horizontal and flat, but the tops of the steam generators (SGs) and the pressurizer are considerably higher than the main part of the operating deck. The divider barrier bulges upward to cover the SGs and pressurizer such that the enclosures essentially conform to the shapes of the components. These enclosures place the components in the lower compartment to provide assurance that any high-energy break occurs in the lower compartment and that the released steam and heat are directed through the ice condenser.

3.2 Pressurizer Enclosure Hatch

Unit 1 has a single pressurizer enclosure hatch plug, and Unit 2 has three hatch plugs. These hatch plugs can be removed using the polar crane located inside upper containment. As previously documented in a license amendment request approved by the NRC (Reference 4), lifting these plugs with the polar crane has been evaluated in accordance with NUREG-0612. No loss of required safe shutdown function due to a postulated drop of the largest pressurizer hatch plug exists.

3.3 Steam Generator Enclosure Hatch

For both units, each of the four SG enclosures in Upper Containment contains a hatch for personnel access into a SG cavity area in the event repairs or troubleshooting activities are necessary. Each hatch cover (30 inch nominal pipe size blind flange) can be removed from the cavity and is held safely in place by a device called a davit arm. This robust device is continuously secured to the hatch cover, even when the cover is bolted to the SG enclosure, and allows the cover to swing out of the way when the flange bolting is removed. No crane or rigging is needed to remove the hatch cover. The davit arm consists of 2 inch schedule 80 pipe and secures the hatch cover with a 5/8 inch eyebolt and heavy hex nuts, and removal of the hatch cover is always preceded by inspecting the davit arm. As such, the possibility of dropping the hatch cover once the bolting is removed is negligible. In addition, the weight of the hatch cover is less than 300 pounds and would not be considered a heavy load as defined by NUREG-0612. Regardless, there is no safety-related equipment directly under these hatch covers, so in the unlikely event that one fell, no damage is expected to be caused.

3.4 Containment Analysis

The analysis for steam bypassing the ice condenser apply to the removal of one pressurizer or SG enclosure hatch at a time. Westinghouse analyzed the effects of divider deck leakages for bypass areas up to 50 ft². The results are presented in the McGuire Updated Final Safety Analysis Report (UFSAR). The results of this analysis show that the pressure peaks are below the design pressure.

The calculation of the new peak compression pressure consists of an extrapolation of Westinghouse results found in the McGuire UFSAR, Section 6.2.1.1.3.1. The compression peak pressure during the blowdown phase of the accident was calculated by Westinghouse to be 7.8 psig. This includes 0.4 psig for the effect of the containment deck bypass area, which is assumed to be 5 ft².

The effect of the potential deck leakage is expressed by the following equation, which was derived by Westinghouse based on the Waltz Mill test results:

$$\Delta P_{\text{deck}} = \text{Bypass Flow Area} \times 0.080 \text{ (psi/ft}^2\text{)}$$

Substituting an additional area of 7.5 ft² (which conservatively bounds the opening of either a pressurizer enclosure hatch or a SG enclosure hatch) in the above equation, the following increase in peak pressure is obtained:

$$\Delta P_{\text{deck}} = 7.5 \text{ ft}^2 \times 0.080 = 0.6 \text{ psi}$$

As a conservative assumption, known deck leakage (associated with the open pressurizer or SG enclosure hatch) is considered separate from the unknown deck leakage (associated with the 5 ft² containment deck bypass area assumed in the UFSAR); therefore, their effects are cumulative. Hence, the new compression pressure is 8.4 psig, which is well below the containment design pressure of 15 psig.

The open pressurizer enclosure hatch or SG enclosure hatch will not increase the long term containment peak pressure of 13.87 psig (UFSAR Section 6.2.1.1.3.1). During the transient, once the ice in the first set of ice bays completely melts, the additional leakage area provided by the open hatch is inconsequential. The effect of the open hatch on the containment peak pressure, which occurs after the ice bed has completely melted, would be insignificant because containment spray flow would be available to condense the steam in upper containment and prevent containment pressure from exceeding the design limit. Containment spray would be manually initiated prior to the time of ice bed meltout in this limiting scenario.

The limiting case for containment temperature is a steam line break with the peak occurring in the lower containment. Additional bypass area would result in a lower temperature peak by directing part of the steam into the upper containment. However, the upper containment temperature is not a concern since it is below the peak in lower containment. The peak containment pressure from a steam line break is bounded by the response of the Loss of Coolant Accident. The removal of one pressurizer enclosure hatch or one SG enclosure hatch at a time for the purpose of performing work would not result in exceeding the containment design pressure should a LOCA occur while the associated hatch is removed.

Although the analysis shows that increased deck leakage associated with an open hatch would not result in exceeding the containment's design pressure limits, allowing a hatch to remain open indefinitely is not conservative. Instead, a finite time of 48 hours is requested to balance the need to perform inspections and maintenance with the need for maintaining design margin. This time period aligns with the completion time for Condition C of TS 3.6.13 "Ice Condenser Doors," which requires the doors to be returned to operable status and closed within 48 hours if TS 3.6.13 Required Actions B.1 or B.2 are not met. The completion time is based on the fact that a significant amount of ice would not melt within a 48 hour period. Since the ice condenser is the mechanism by which containment pressure is limited, applying a 48 hour limit to an open hatch in the divider barrier (similar to the limit found in TS 3.6.13 Condition C) is justified.

3.5 Conclusion

This LAR proposes a change to TS 3.6.14 to allow a pressurizer enclosure hatch or a SG enclosure hatch to be open or inoperable for 48 hours. This represents an increase from the current allowable time (one hour for an open SG enclosure hatch and six hours for an open pressurizer enclosure hatch). Since it has been shown above that this increase in time does not have a significant effect on safety, Duke is requesting that the NRC approve the proposed changes to McGuire TS 3.6.14 contained in this LAR.

4. REGULATORY EVALUATION

4.1 Applicable Regulatory Requirements/Criteria

McGuire will remain in compliance with the applicable regulations and requirements. These are: 10CFR50, Appendix A, General Design Criterion (GDC) 16, "Containment Design," which requires that the reactor containment and associated systems provide an essentially leak-tight barrier against the uncontrolled release of radioactivity to the environment; GDC 38, "Containment Heat Removal," which requires that a system be provided to remove heat from the reactor containment; and GDC 50, "Containment Design Basis," which requires that the reactor containment structure be designed with conservatism to accommodate applicable design parameters (pressure, temperature, leakage rate).

4.2 Precedents

The NRC previously approved similar TS changes at both Catawba (Reference 3) and McGuire Nuclear Stations (Reference 4). These changes were made to allow a pressurizer enclosure hatch to be open for six hours. The size of a SG enclosure hatch is bounded by that of the pressurizer enclosure hatch.

4.3 No Significant Hazards Consideration Determination

The proposed LAR would revise the McGuire TS 3.6.14, "Divider Barrier Integrity," to allow one pressurizer enclosure hatch or one SG enclosure hatch to be open or inoperable for 48 hours. This change is an increase to the current allowance of one hour for a SG enclosure hatch and of six hours for a pressurizer enclosure hatch.

Duke Energy has concluded that operation of the McGuire Nuclear Station Units 1 and 2 in accordance with the proposed changes to the TS does not involve a significant hazards consideration. Duke Energy's conclusion is based on its evaluation, in accordance with 10CFR50.91(a)(1), of the three standards set forth in 10CFR50.59(c) as discussed below:

1. Does the proposed amendment involve a significant increase in the probability or consequences of an accident previously evaluated?

Response: No.

Implementation of this amendment will not involve a significant increase in the probability or consequences of an accident previously evaluated. Removal of the SG enclosure hatch or the pressurizer enclosure hatch will not cause an increase in the probability of an accident that has been previously evaluated because the hatches are not accident initiators.

The consequences of an accident, which have been previously evaluated, will not be significantly increased by removal of the pressurizer enclosure or SG enclosure hatch. As discussed in the technical justification supporting this amendment request, the new containment compression peak pressure will remain well below the acceptance criteria.

Additionally, the long term containment peak pressure will not be adversely affected due to the delay time in melting of the ice.

The removal of the pressurizer enclosure hatch itself has been previously evaluated in Modes 1 through 4 in accordance with the analytical method described in NUREG-0612 and the NRC's December 22, 1980, letter regarding the control of heavy loads at nuclear power plants. Because the SG enclosure hatch weighs less than 300 pounds, it would not be considered a heavy load as defined by NUREG-0612. As such, it is not subject to heavy lift considerations. Regardless, there is no safety-related equipment directly under these hatch covers, so in the unlikely event that one fell, no damage is expected to be caused. The changes proposed in this LAR have no adverse effect on the procedures used for the handling of heavy loads at McGuire.

In summary, the proposed changes will not involve any increase in the probability or consequences of an accident previously evaluated.

2. Does the proposed amendment create the possibility of a new or different kind of accident from any accident previously evaluated?

Response: No.

Operation in accordance with the proposed amendment does not create a new plant configuration and does not adversely affect how the plant is operated, so implementation of this amendment would not create the possibility of a new or different kind of accident from any accident previously evaluated. No new accident causal mechanisms are created as a result of the NRC approval of this license amendment request. As discussed above, extending the time that the pressurizer enclosure hatch or SG enclosure hatch is allowed to be open or inoperable does not create any new or different accidents from those previously evaluated.

Removal of the pressurizer enclosure hatch to perform inspections or maintenance has been previously evaluated and determined to be acceptable. The analysis contained in the technical justification for this license amendment request provides results concluding that the containment compression peak pressure and the long term containment peak pressure are acceptable with either a pressurizer enclosure hatch or a SG enclosure hatch open. This proposed amendment does not impact any plant systems that are accident initiators; therefore, no new accident types are being created.

3. Does the proposed amendment involve a significant reduction in the margin of safety?

Response: No.

Implementation of this amendment would not involve a significant reduction in a margin of safety. Margin of safety is related to the confidence in the ability of the fission product barriers to perform their design functions during and following an accident situation. These barriers include the fuel cladding, the reactor coolant system, and the containment system.

The pressurizer enclosure hatch and the SG enclosure hatch, as well as their performances, have a direct impact on the containment boundary since peak

containment pressure due to an accident could be affected. However, the analysis supporting this amendment request concludes that the containment compression peak pressure and the long term containment peak pressure continue to be acceptable with the increased time a single hatch is open. Thus, the performance of the fission product barriers will not be significantly impacted by implementation of this amendment, and no safety margins will be significantly impacted.

4.4 Conclusion

Based upon the above evaluation, Duke Energy concludes that the proposed amendment presents no significant hazards consideration under the standards set forth in 10 CFR 50.92(c), and accordingly, a finding of "no significant hazards consideration" is justified.

In conclusion, based on the considerations discussed above, (1) there is reasonable assurance that the health and safety of the public will not be endangered by operation in the proposed manner, (2) such activities will be conducted in compliance with NRC regulations, and (3) the issuance of the amendment will not be inimical to the common defense and security or to the health and safety of the public.

5. ENVIRONMENTAL CONSIDERATIONS

The proposed amendment does not involve (i) a significant hazards consideration, (ii) a significant change in the types or significant increase in the amounts of any effluent that may be released onsite, or (iii) a significant increase in individual or cumulative occupational radiation exposure. Accordingly, the proposed amendment meets the eligibility criterion for categorical exclusion set forth in 10 CFR 51.22(c)(9).

Therefore, pursuant to 10 CFR 51.22(b), no environmental impact statement or environmental assessment need be prepared in connection with the proposed amendment.

6. REFERENCES

1. McGuire Nuclear Station Units 1 and 2 Technical Specifications, Amendments 270/250, Technical Specification 3.6.14, "Divider Barrier Integrity"
2. McGuire Nuclear Station Updated Final Safety Analysis Report, Revision 18, Section 6.2
3. NRC Letter and Safety Evaluation dated June 26, 1992, Issuance of Amendments – Catawba Nuclear Station, Units 1 and 2, Amendment Nos. 98/92
4. NRC Letter and Safety Evaluation dated April 5, 2005, McGuire Nuclear Station, Units 1 and 2 Re: Issuance of Amendments 228/210
5. McGuire Nuclear Station Units 1 and 2 Technical Specifications, Amendments 261/241, Technical Specification 3.6.13, "Ice Condenser Doors"

ATTACHMENT 1

McGuire Units 1 and 2 Technical Specification Page Markups

3.6 CONTAINMENT SYSTEMS

3.6.14 Divider Barrier Integrity

LCO 3.6.14 Divider barrier integrity shall be maintained.

APPLICABILITY: MODES 1, 2, 3, and 4.

ACTIONS

CONDITION	REQUIRED ACTION	COMPLETION TIME
<p>A. -----NOTE----- For this action, separate Condition entry is allowed for each personnel access door or equipment hatch. ----- One or more personnel access doors or equipment hatches (other than one pressurizer enclosure hatch addressed by Condition D) open or inoperable, other than for personnel transit entry.</p>	<p>A.1 Restore personnel access doors and equipment hatches to OPERABLE status and closed positions.</p> <p>or one steam generator</p>	<p>1 hour</p> <p>affected</p>
<p>B. Divider barrier seal inoperable.</p>	<p>B.1 Restore seal to OPERABLE status.</p>	<p>1 hour</p>
<p>C. Required Action and associated Completion Time not met.</p>	<p>C.1 Be in MODE 3. <u>AND</u> C.2 Be in MODE 5.</p>	<p>6 hours 36 hours</p>
<p>D. One pressurizer enclosure hatch open or inoperable.</p>	<p>D.1 Restore pressurizer enclosure hatch to OPERABLE status and closed position.</p>	<p>6 hours</p> <p>48</p>

ATTACHMENT 2

**McGuire Units 1 and 2 Technical Specification Bases Page Markup
(Provided for information only)**

BASES

LCO (continued)

assumption that, for personnel transit, the time during which a door is open will be short (i.e., shorter than the Completion Time of 1 hour for Condition A). The divider barrier functions with the ice condenser to limit the pressure and temperature that could be expected following a DBA.

APPLICABILITY

In MODES 1, 2, 3, and 4, a DBA could cause an increase in containment pressure and temperature requiring the integrity of the divider barrier. Therefore, the LCO is applicable in MODES 1, 2, 3, and 4.

The probability and consequences of these events in MODES 5 and 6 are low due to the pressure and temperature limitations of these MODES. As such, divider barrier integrity is not required in these MODES.

ACTIONS

A.1

If one or more personnel access doors or equipment hatches (other than one pressurizer enclosure hatch addressed by Condition D) are open or inoperable, except for personnel transit entry, 1 hour is allowed to restore the door(s) and equipment hatches to OPERABLE status and the closed position. The 1 hour Completion Time is consistent with LCO 3.6.1, "Containment," which requires that containment be restored to OPERABLE status within 1 hour. Personnel access doors or equipment hatches open or inoperable in accordance with Condition A are not included in the ice condenser steam bypass analysis that provides the basis for Condition D. Conditions A and D are each implemented independently.

or one steam generator

Condition A has been modified by a Note to provide clarification that, for this LCO, separate Condition entry is allowed for each personnel access door or equipment hatch.

B.1

If the divider barrier seal is inoperable, 1 hour is allowed to restore the seal to OPERABLE status. The 1 hour Completion Time is consistent with LCO 3.6.1, which requires that containment be restored to OPERABLE status within 1 hour.

C.1 and C.2

If divider barrier integrity cannot be restored to OPERABLE status within the required Completion Time, the plant must be brought to a MODE in

BASES

ACTIONS (continued)

which the LCO does not apply. To achieve this status, the plant must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required plant conditions from full power conditions in an orderly manner and without challenging plant systems.

D.1

If a pressurizer enclosure hatch is open or inoperable, 6 48 hours are allowed to restore the hatch to OPERABLE status and in the closed position. The 6 48 hour completion time is based on the need to perform inspections and maintenance in the pressurizer compartment during power operation, as well as for personnel safety and radiation safety considerations. An analysis has been performed that shows an open hatch of 7.5 ft² bypass area during a DBA does not impact the design pressure or temperature of the containment. The 7.5 ft² bypass is in addition to the total operating deck leakage discussed in Ref. 1 (approximately 5 ft² for Unit 2 and 4.6 ft² for Unit 1). There is one pressurizer enclosure hatch on Unit 1 and there are three on Unit 2. These hatches are concrete plugs which must be removed with a crane to access the pressurizer cavity. The analyses supporting Condition D for steam bypassing the ice condenser and the heavy load drop apply to the removal of one pressurizer enclosure hatch at a time. The analyses were both done in a manner that bounds the largest of the hatches. The analysis supporting Condition D for steam bypassing the ice condenser does not include the personnel access doors or equipment hatches open or inoperable in accordance with Condition A. Conditions A and D are each implemented independently.

or steam generator

Each unit has four steam generator enclosure hatches that are removed by using the attached davit arm.

SURVEILLANCE
REQUIREMENTS

SR 3.6.14.1

Verification, by visual inspection, that all personnel access doors and equipment hatches between the upper and lower containment compartments are closed provides assurance that divider barrier integrity is maintained prior to the reactor being taken from MODE 5 to MODE 4. This SR is necessary because many of the doors and hatches may have been opened for maintenance during the shutdown.

SR 3.6.14.2

Verification, by visual inspection, that the personnel access door and equipment hatch seals, sealing surfaces, and alignments are acceptable provides assurance that divider barrier integrity is maintained. This