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Duke Energy Carolinas, LLC (Duke Energy)
McGuire Nuclear Station (MNS), Units 1 and 2
Docket Nos. 50-369 and 50-370
Renewed License Nos. NPF-9 and NPF-17

Subject: Supplement to McGuire Nuclear Station, Units 1 and 2 Final Notification of Full Compliance with Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design Basis External Events" and with Order EA-12-051, "Order to Modify Licenses With Regard To Reliable Spent Fuel Pool Instrumentation", dated December 7, 2015, ADAMS Accession No. ML15343A010.

References:

1. Nuclear Regulatory Commission (NRC) Order Number EA-12-049, Order Modifying Licensees With Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events, Revision 0, dated March 12, 2012, Agencywide Documents Access and Management System (ADAMS) Accession No. ML12054A735.

2. McGuire Nuclear Station, Units 1 and 2 Final Notification of Full Compliance with Order EA-12-049, "Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design Basis External Events" and with Order EA-12-051, "Order to Modify Licenses With Regard To Reliable Spent Fuel Pool Instrumentation", Dated December 7, 2015, ADAMS Accession No. ML15343A010.

3. McGuire Nuclear Station, Units 1 and 2 Fifth Six-Month Status Report in Response to March 12, 2012, Commission Order Modifying Licenses With Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049), Dated August 26, 2015, ADAMS Accession no. ML15253A198.

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On November 18, 2014, Duke Energy notified the NRC staff that McGuire Unit 1 had met the requirements of Attachment 2 of Order EA-12-049 (Reference 1). On December 7, 2015, Duke notified the NRC staff that McGuire Nuclear Station was in full compliance with the Order for both Units 1 and 2 and accordingly provided the Final Integrated Plan (FIP) and the RCP Seal Leakage ELAP Margin Assessment for the McGuire FLEX Mitigation Strategies (Reference 2).

On January 19, 2016, March 1, 2016, and March 24, 2016, phone conferences were held between Duke and the NRC staff to discuss various elements of McGuire's responses to the Initial Staff Evaluation (ISE) Confirmatory Items 3.2.4.9.A, 3.2.4.10.A, Overall Integrated Plan (OIP) Open Item 19-C and Combined SE Template Technical Review Item 8-E (Reference 3). Additionally, Westinghouse Technical Bulletin TB-15-1 relating to the RCP #2 seal was included in the discussions that occurred during the calls.

Many items were resolved or clarified during the phone conferences based on previously submitted information. However, via follow-up e-mails the NRC staff identified additional information that was needed to supplement the previously provided responses to Combined SE Template Technical Review Item 8-E. The enclosure with this correspondence identifies the additional information requested and provides McGuire's response as a supplement to the Final Integrated Plan and the RCP Seal Leakage ELAP Margin Assessment. The McGuire Final Integrated Plan and the RCP Seal Leakage ELAP Margin Assessment will be updated as appropriate to reflect the supplemental information contained in the enclosure.

This letter contains no new Regulatory Commitments and no revision to existing Regulatory Commitments.

Should you have any questions regarding this submittal, please contact George Murphy at (980) 875-5715.

I declare under penalty of perjury that the foregoing is true and correct. Executed on May 5, 2016.

Sincerely,

Steven D. Capps

Enclosure:

- McGuire Nuclear Station, Units 1 and 2 Supplemental Information Regarding FLEX Mitigating Strategies

xc:

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McGuire Nuclear Station, Units 1 and 2
Supplemental Information Regarding FLEX Mitigating Strategies

Overall Integrated Plan (OIP) Open Item 8-E: ELAP RCP Seal Leakage Rates

The following NRC request for additional information related to Combined SE Template Technical Review Item 8-E is based on the teleconference with McGuire on 3/24/16, where the NRC staff discussed with McGuire the need for some additional clarifying information relative to RCP seal leakage:

Please provide a timeline of an RCS cooldown during an ELAP, following the steps of ECA-0.0 and applicable FSGs. The timeline should be based on the expected times using the current procedures. The timeline should start at zero at the time the event occurs (the ELAP) during full power operations. Identify the expected start of the cooldown, and the expected time to reach a SG pressure of 290 psig (420 degrees in the cold legs). Then identify the expected time to resume the cooldown (after accumulator isolation, etc.) and the expected time to reach 158 psig (370 degrees in the cold legs). If the procedure directs a cooldown to 350 degrees in the cold legs, the time for that could be identified instead of 370 degrees, and we could interpolate as necessary.

McGuire Supplemental Response:

As discussed on the 3/24/16 telecon, the current FLEX response to a full power ELAP event as written in the McGuire Final Integrated Plan (FIP) Attachment 6, dated 12/07/15 was developed based on endorsed PWROG/NEI guidance initially generated following the issuance of the Fukushima Orders. Recent (and ongoing) industry/OEM information regarding RCP seal behavior during a Loss of Seal Cooling (LOSC) event has required some adjustment to timelines, evaluations and strategies in order to address the impact of this recent information on the original FLEX response.

Best Estimate Timeline for McGuire ELAP cooldown (all times are from event initiation):
Current procedures:

1. Stabilize SG pressure between 1000 psig and 1100 psig using secondary PORVs by approximately 30 minutes after plant trip.

   Basis:

   - Action is completed in Step 14 of 1,2-ECA-0.0. Step location is before step 15 which was validated on simulator to be completed by 32 minutes (References 2, 3, and 4).

   - Immediately after plant trip (prior to this 30 minutes), the secondary PORVs will be cycling in automatic, holding SG pressures between actuation and reset values of 1125 psig and 1092 psig, respectively. The step 14 intent is to minimize depletion of the FLEX air tanks, but it will also initiate a small RCS cooldown.

   - The new FLEX air tanks provide assured air source to SG secondary PORVs. This capability facilitates control and prevents heat-up of RCS cold leg temperatures to saturation temperature for the SG safety valve setpoint of 1170 psig.

2. Cooldown to SG pressure of 290 psig initiated at approximately 70 minutes based on simulator observations of ELAP event. Cooldown will take less than 2 hours.

   Basis:
   - Simulator validation showed operator dispatched to open SG secondary PORVs by 70 minutes per Step 31.f RNO (right column--References 2, 3 and 4). The validations were performed on a simulator prior to having the FLEX Assured Air Tanks installed (two crew response times of 66 minutes and 70 minutes recorded). With the FLEX Assured Air Tank modification completed, Control Room action to open SG secondary PORVs will occur a few minutes before this time.

   - Generic and Duke ELAP analysis assumes RCS cooldown is initiated by 2 hours to be conservative and to bound plants that must operate SG secondary PORVs locally. McGuire's FLEX Assured Air Tanks allow SG secondary PORVs to be opened from the Control Room.

   - 1,2-ECA-0.0 RCS cooldown limit is 100°F/hr. Cooldown is from ~553°F (saturation temperature for mid-range of action 1 above, or about 1050 psig) to 420°F (saturation temperature for 290 psig), which will take less than 2 hours.

3. Required boration to maintain subcriticality xenon-free at 350°F will be completed by 24 hours (References 1 and 2).

   Basis:
   - FLEX boration (per 1,2-FSG-08) will be initiated by 13 hours (References 2, 3 and 4).

   - Revision 3 to the McGuire ELAP boration calculation was completed to evaluate a planned concurrent boration and second RCS cooldown, as recommended in the draft TB-15-1 guidance revision. On page D-52 of the ELAP boration calculation, a conservative case was analyzed (Case 2) with zero RCP seal leakage and a larger CLA injection, which slows boration (letdown is via RV head vents). The cooldown at 22 hours avoids one cycle of the FLEX boration pump (reference Figure 16, page D-55; downward slope on the saw tooth profile later in the transient is when FLEX High Pressure pump injection flow is secured due to high pressurizer level), and required boration (Figure 25, page D-64) was completed at 22.7 hours. Without the concurrent second RCS cooldown starting at 22.7 hours, the time to finish the required boration is 24 hours after plant trip.

4. Cold Leg Accumulator Isolation valves closed at 28 hours.

   Basis:
   - FLEX Electrical Power supply distribution is already in place by 14 hours (Reference 2), but must be aligned to Cold Leg Accumulator Isolation valves. This is initiated at 24 hours after plant trip via 1,2-FSG-10 (step 41.b, 1,2-ECA-0.0, References 3 and 4).

   - Time to energize valves and prepare for CLA isolation is 2 hours (Reference 2).

   - Two hours margin added to accommodate communication and time to initiate actions from procedure.

5. Second RCS cooldown to SG pressure of 160 psig (saturation for 371°F) initiated at 28 hours. Cooldown will take less than 1 hour (steps 41.c - j of 1,2-ECA-0.0, References 3 and 4), putting completion at 29 hours after plant trip.

   Basis:
   - Step 41.g of 1,2-ECA-0.0 stated cooldown limit is 100°F/hour; an hour to perform a 50°F cooldown is conservative.

   - Second RCS cooldown is not initiated until Cold Leg Accumulators are isolated.

(NOTE: The RCP number one seal return header relief valve (set at a nominal 150 psig) is expected to close as a result of the cooldown and depressurization in actions 6 or 7 following, stopping RCP seal leakage. Seal return header containment isolation valve was closed previously per 1,2-ECA-0.0, step 23. McGuire is not crediting the closure of the RCP number one seal return header relief valve as part of the ELAP response evaluation; FLEX procedure 1/2-FSG-23 directs Operators and TSC to target/facilitate closure of this relief valve during the event by expediting further RCS depressurization beyond the second cooldown.)

6. Further RCS cooldown will be initiated by 1,2-FSG-23, step 7 and Enclosure 2 (References 5 and 6) to a SG pressure of 80 psig to 100 psig. A specific time limit is not stated in FSG-23 to complete this cooldown, but it is reasonable to expect that it can be performed within the next 12 hours, or by 41 hours after plant trip. Actions that must be completed prior to performing this cooldown include setting up a Pressurizer PORV for LTOP protection, and swapping from the TDAFW pump to the FLEX Medium Pressure (SG feedwater) pump.

7. Further cooldown to fully open the SG secondary PORVs and cooldown as far as possible will be initiated by 1,2-FSG-23, Enclosure 2, step 16 (References 5 and 6). A specific time limit is not stated in FSG-23 to complete this cooldown, but it is reasonable to expect that it can be completed by 54 hours after plant trip. Significant action that must be completed prior to performing this further RCS cooldown is running Lower Containment Ventilation Unit fans and a Containment Air Return fan for 2 hours to ensure SG Enclosures and Pressurizer compartment (location of level instrument reference legs) are cooled. LCVU fans are required to be started within 48 hours and Containment Air Return fans by 52 hours (1,2-FSG-23, Enclosure 1, step 2).

McGuire Nuclear Station, Units 1 and 2
Supplemental Information Regarding FLEX Mitigating Strategies

References:

1. DPC-1552.08-00-0278, revision 3; Boration Analysis for Extended Loss of AC Power at MNS/CNS

2. Memo-to-file 1499.02, and AR 01903925, task 11; McGuire Nuclear Station FLEX Strategy Timing Study

3. EP/1/A/5000/ECA-0.0 (Loss of All AC Power), Rev 38

4. EP/2/A/5000/ECA-0.0 (Loss of All AC Power), Rev 42

5. FG/1/A/FLEX/FSG-23 (Long Term FLEX Strategies), Rev 1

6. FG/2/A/FLEX/FSG-23 (Long Term FLEX Strategies), Rev 0

Note: References 1 through 6 above have previously been provided to the NRC staff on the Duke SharePoint and are available for their review.