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10 CFR 50.4

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

Subject: Duke Energy Carolinas, LLC
McGuire Nuclear Station, Units 1
Docket Numbers. 50-369
Renewed License Nos. NPF-9
Post Accident Monitoring Report 369-2020-01

Pursuant to McGuire Nuclear Station Unit 1 Technical Specification (TS) 3.3.3, Post Accident Monitoring (PAM) Instrumentation, Required Action C.1 and TS 5.6.7, PAM Report, attached is PAM Report 369-2020-01 concerning an event where the required Unit 1 A Train Reactor Vessel Water Level (Dynamic Head Range), Function 5, and A Train Reactor Vessel Water Level (Lower Range), Function 6, have remained inoperable for a period greater than 30 days.

There are no new regulatory commitments contained in this letter or its attachment.

This event is considered to be of no significance with respect to the health and safety of the public.

Questions regarding this submittal should be directed to Joseph Hussey, McGuire Regulatory Affairs, at (980) 875-5045.

Sincerely,

A handwritten signature in blue ink that reads "James M. Smith".

James M. Smith
Manager, Nuclear Support Services
McGuire Nuclear Station

Attachment

U.S. Nuclear Regulatory Commission

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cc:

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Post Accident Monitoring (PAM) Report 2020-01

Requirement

McGuire Nuclear Station Unit 1 Technical Specification (TS) 3.3.3, Post Accident Monitoring (PAM) Instrumentation, contains requirements for the Reactor Vessel Water Level (Dynamic Head Range), Function 5, and Reactor Vessel Water Level (Lower Range), Function 6. TS 3.3.3 Limiting Condition For Operation (LCO) requires two channels of Reactor Vessel Level Indicating System (RVLIS) instrumentation to be Operable while in MODES 1, 2, and 3. LCO 3.3.3 ACTIONS is modified by a NOTE stating "Separate Condition entry is allowed for each Function". With one of the required Function 5 and one of the required Function 6 RVLIS instruments inoperable for more than 30 days, Required Action C.1 specifies, "Initiate action in accordance with TS 5.6.7."

TS 5.6.7, PAM Report, states: "When a report is required by LCO 3.3.3, "Post Accident Monitoring (PAM) Instrumentation," a report shall be submitted within the following 14 days. The report shall outline the preplanned alternate method of monitoring, the cause of the inoperability, and the plans and schedule for restoring the instrumentation channels of the Function to OPERABLE status.

Background

Reactor Vessel Level System is designed to monitor the water level in the reactor vessel, or the approximate void content under forced circulation conditions, during certain postulated accident conditions. Included is equipment to monitor both the upper plenum (head) level, as well as the entire height of the reactor vessel.

The system instrumentation permits vessel level measurement from the bottom to the top of the reactor vessel, utilizing taps off an existing spare head penetration and a tap off a thimble tube at the seal table. Two sets of differential pressure transmitters are provided which have differing measurement ranges to cover different flow behavior with and without pump operations. The lower range cells indicate water level when no reactor coolant pumps are operating. Under natural circulation or no-circulation conditions, these pressure drops will provide indication of the collapsed liquid level or relative void content in the reactor vessel above and below the hot legs. The dynamic range cells indicate the combined core and internals pressure drop for any combination of operating reactor coolant pumps. Under forced-flow conditions, the pressure drops will provide indication of the relative void content of the circulating primary coolant system fluid. The upper range measurement is taken by two differential pressure transmitters between the same spare head penetration, and taps off two hot legs.

To minimize containment post-accident environment effects in measurement accuracy, the system design is based upon locating the transmitters outside the containment. Hydraulic isolators in the impulse lines provide the required double barrier protection between the RCS and outside containment. Reference leg temperature measurements, together with the existing RCS temperature and pressure, are utilized to automatically compensate for difference in coolant and reference leg temperature effects.

Summary of PAM Instrument Inoperability

10/02/20 - During the McGuire Unit 1 fall 2020 outage (M1R27) Maintenance successfully completed calibration and static pressure testing of the Unit 1 Train A (1A) and Unit 1 Train B (1B) RVLIS Technical Specification (TS) required ranges.

10/12/20 - At 0142, Operations notes that RVLIS 1A indications for Lower Range (LR) Reactor Vessel Level (1NCLP6640) and Dynamic Range (DR) D/P (1NCLP6650) began decreasing. Both of these 1A RVLIS indications continued to decrease at their respective, uniform rates before going off scale low approximately 6 minutes later at 0% LR level and 0% Dynamic DP. Work Request 20185908 was written on the 1A RVLIS system on 10/12/20 based on a failure of indication in the control room. Work Order 20428875 was generated from the Work Request for investigation of the instruments failing off scale low.

10/12/20 - Subsequent, non-invasive troubleshooting and analysis performed found no obvious signs of leakage, capillary tubing damage, or seal table sensor damage; but determined the issue was on the bellows side of hydraulic isolator 1NCPS6650 - U1 RVLIS SEAL TABLE HYDRAULIC ISOLATOR TRN A (1LIS1312)), as opposed to the transmitter side. 1NCLT6640 and 1NCLT6650 share a common capillary line, which connect the 1A seal table bellows sensor and its associated hydraulic isolator (1NCPS6650). The general location determination was confirmed by observation that the 1A LR and DR indications returned to their on-scale values during periods of reduced inventory (lower water head in reactor vessel to process line at the bottom of the reactor vessel). The vendor (Westinghouse) who possesses an in-depth knowledge of the Reactor Vessel Level Indication system, and has considerable experience in servicing and maintaining proper operability of this system agreed with the McGuire conclusion that there was a loss of fill somewhere on the 1A seal table bellows sensor side of the hydraulic isolator (1NCPS6650), given the description of the symptoms.

Based on the general location of loss of fill volume, options for invasive troubleshooting and repair were considered and discussed by members from Operations, Maintenance, Engineering and leaders in the Outage Command Center (OCC). Invasive troubleshooting and repair would require breaking into the seal table sensor bellows and into the bellows side capillary line to hydraulic isolator 1NCPS6650 in M1R27. After deliberation it was determined there was no clear success path for repairing this issue in M1R27 and while the unit is at power via WO 20428875 as all repair options would require extensive planning, parts procurement, the use of a vendor for the specialized work and working with only a single isolation valve isolating the work from primary system pressure.

Preplanned Alternate Method of Monitoring

An alternate means of monitoring, as described in TS 3.3.3 Bases, is provided by monitoring the core exit thermocouples, pressurizer level indication, and Reactor Coolant System subcooling monitor indication. These three parameters provide diverse information for verifying adequate core cooling.

Attachment

Cause of the Inoperability

As noted above the portion of the RVLIS containing the cause of the inoperability of the 1A Lower Range (LR) Reactor Vessel Level and 1A Dynamic Range (DR) D/P has been identified but the exact failure mechanism has not been identified.

Plans and Schedule for Restoring the Instrumentation Channel to OPERABLE status

Project Work Order planning, procurement of parts, and contracting for the specialized resources for restoring 1A Lower Range (LR) Reactor Vessel Level and 1A Dynamic Range (DR) D/P to Operable status are underway. Once the project plan is completed the WO will be scoped into the next available Unit 1 outage of sufficient duration to implement the plan.