Thomas D. Ray, P.E.
Site Vice President
McGuire Nuclear Station

Duke Energy
MG01VP | 12700 Hagers Ferry Road
Huntersville, NC 28078

o: 980.875.4805
f: 980.875.4809
Tom.Ray@duke-energy.com

July 1, 2019
Serial No: RA-19-0291

10 CFR 50.73

U.S. Nuclear Regulatory Commission
Washington, D.C. 20555
ATTENTION: Document Control Desk

Subject: Duke Energy Carolinas, LLC
McGuire Nuclear Station, Unit 1
Docket No. 50-369
Renewed License No. NPF-9
Licensee Event Report 369/2019-01, Revision 0
Nuclear Condition Report Number 02271181

Pursuant to 10 CFR 50.73 Sections (a) (1) and (d), attached is Licensee Event Report (LER) 369/2019-01, Revision 0, regarding valid actuations of Unit 1 Reactor Protection System and Auxiliary Feedwater System.

This report is being submitted for Unit 1 in accordance with 10 CFR 50.73 (a) (2) (iv) (A), "Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a) (2) (iv) (B)." The 10 CFR 50.73 (a) (2) (iv) (B) systems to which the requirements of paragraph (a) (2) (iv) (A) applied were the Reactor Protection System and the Auxiliary Feedwater System.

This event is considered to have no significance with respect to the health and safety of the public. There are no regulatory commitments contained in this LER.

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

Sincerely,

Thomas D. Ray

Thomas D. Ray, P.E.
Site Vice President
McGuire Nuclear Station

IE22
NRR

Attachment

cc: Laura A. Dudes
Administrator, Region II
U.S. Nuclear Regulatory Commission
Marquis One Tower
245 Peachtree Center Ave.
NE Suite 1200, 30303-1257

Mike Mahoney
Project Manager (McGuire)
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Rockville, MD 20852-2738
Mail Stop 0-8 G9A

Andy Hutto
NRC Senior Resident Inspector
McGuire Nuclear Station

bxc:

Ed Pigott (MG01VP)
Norm Kunkel (MG01VP)
Shawn Gibby (MG01IE)
Jason Rogers (MG01SR)
Brent Bare (MG01OP)

NSRB Support Staff (EC05N)
INPO

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NRC FORM 366 (04-2017) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 03/31/2020

LICENSEE EVENT REPORT (LER)

(See Page 2 for required number of digits/characters for each block)

(See NUREG-1022, R.3 for instruction and guidance for completing this form http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/)

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4. TITLE

Valid Actuation of the Unit 1 Reactor Protection System and Auxiliary Feedwater System

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
05	03	2019	2019	- 01	- 00	06	27	2019	FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: *(Check all that apply)*			
1	☐ 20.2201(b)	☐ 20.2203(a)(3)(i)	☐ 50.73(a)(2)(ii)(A)	☐ 50.73(a)(2)(viii)(A)
	☐ 20.2201(d)	☐ 20.2203(a)(3)(ii)	☐ 50.73(a)(2)(ii)(B)	☐ 50.73(a)(2)(viii)(B)
	☐ 20.2203(a)(1)	☐ 20.2203(a)(4)	☐ 50.73(a)(2)(iii)	☐ 50.73(a)(2)(ix)(A)
	☐ 20.2203(a)(2)(i)	☐ 50.36(c)(1)(i)(A)	☒ 50.73(a)(2)(iv)(A)	☐ 50.73(a)(2)(x)
10. POWER LEVEL	☐ 20.2203(a)(2)(ii)	☐ 50.36(c)(1)(ii)(A)	☐ 50.73(a)(2)(v)(A)	☐ 73.71(a)(4)
100	☐ 20.2203(a)(2)(iii)	☐ 50.36(c)(2)	☐ 50.73(a)(2)(v)(B)	☐ 73.71(a)(5)
	☐ 20.2203(a)(2)(iv)	☐ 50.46(a)(3)(ii)	☐ 50.73(a)(2)(v)(C)	☐ 73.77(a)(1)
	☐ 20.2203(a)(2)(v)	☐ 50.73(a)(2)(i)(A)	☐ 50.73(a)(2)(v)(D)	☐ 73.77(a)(2)(i)
	☐ 20.2203(a)(2)(vi)	☐ 50.73(a)(2)(i)(B)	☐ 50.73(a)(2)(vii)	☐ 73.77(a)(2)(ii)
		☐ 50.73(a)(2)(i)(C)	☐ OTHER Specify in Abstract below or in NRC Form 366A	

12. LICENSEE CONTACT FOR THIS LER

LICENSEE CONTACT	TELEPHONE NUMBER *(Include Area Code)*
Joseph F. Hussey	(980) 875-5045

13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO				

ABSTRACT *(Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)*

16. ABSTRACT

At 1554 [EST] hours on May 3, 2019, with Unit 1 in Mode 1 at approximately 100 percent power, the reactor automatically tripped on Over Temperature Delta Temperature following a pressure transient in the Reactor Coolant System. The trip was uncomplicated with all systems responding normally post-trip. Operations manually started the motor driven auxiliary feedwater pumps.

The cause was determined to be: The Control Room Supervisor and Reactor Operators involved failed to adhere to established administrative standards.

The Control Room Supervisor and Reactor Operators involved failed to perform the correct level of pre-job brief in accordance with administrative standards. Adherence to the administrative standards would have ensured proper consideration of human factors and contingency actions prior to performing manual manipulations of the pressurizer pressure master controller. The licensed operators involved were removed from duty and are being remediated.

Planned Action: Complete remediation of the licensed operators.

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NARRATIVE

BACKGROUND

The following information is provided to assist readers in understanding the event described in this LER. Applicable Energy Industry Identification [EIIS] system and component codes are enclosed within brackets. McGuire Nuclear Station unique system and component identifiers are contained within parentheses.

Reactor Protection System [JC] (IPE):

The Reactor Protection System keeps the Reactor operating within a safe operating range by automatically shutting down the Reactor whenever the limits of the operating range are approached by monitoring process variables. Whenever a direct or calculated process variable exceeds a setpoint the Reactor is automatically tripped to protect against fuel cladding damage or loss of Reactor Coolant System (NC) integrity. Station operators may elect to manually actuate the reactor trip switchgear (manual reactor trip) using either of two control board switches.

Reactor Coolant System [AB] (NC), Pressurizer Pressure and Level Control System (ILE):

The reactor coolant pressurizer is connected to the circulation piping to accommodate coolant expansion/contraction and regulate the system's operating pressure through an arrangement of spray nozzles and electric heaters which alternately condense and generate steam inside the pressurizer as required in order to maintain the system's operating pressure.

The Pressurizer Pressure and Level Control System (ILE) maintains the system pressure during normal operation and limits pressure transients by controlling electrical heaters and water sprays to maintain water and steam in equilibrium and by controlling charging/letdown flow to adjust the pressurizer liquid level.

Pressurizer Pressure Control

The Reactor Coolant (NC) System pressure is controlled by using either the heaters (in the water region) or the spray (in the steam region) of the pressurizer plus steam relief through Power Operated Relief Valves (PORVs) for large transients. The electrical immersion heaters are located near the bottom of the pressurizer. A portion of the heater group is proportionally controlled to correct for small pressure variations. These variations are due to heat losses, including heat losses due to a small continuous spray. The remaining (backup) heaters are turned on when the pressurizer pressure controlled signal demands approximately 100 percent proportional heater power. Two spray nozzles are located on the top of the pressurizer. Spray is initiated when the pressure controller spray demand signal is above a given setpoint. The spray rate increases proportionally with increasing spray demand signal until it reaches a maximum value. Steam condensed by the spray reduces the pressurizer pressure. PORVs 1NC-32B, 1NC-34A, and 1NC-36B limit system pressure for large positive pressure transients. PORV 1NC-34A can be opened by the pressure controller.

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NARRATIVE

BACKGROUND (continued)

Reactor Coolant System [AB] (NC), (continued)

Pressure Control Logic

Pressurizer pressure control is based on a proportional plus integral plus derivative controller (part of the Ovation digital control system) driven by an error signal between measured pressure and a reference pressure setpoint of 2235 psig. The integral of the controller functions to integrate the pressure error signal with respect to time. A gain is applied to the output of the integral block prior to the addition of the output of the proportional block. The pressurizer error signal, after the appropriate voltage gain is applied, must span a minimum range of 125 psi to accommodate the full range of pressurizer pressure control setpoints. The control setpoints range between the pressurizer backup heater banks is at the low end of the range (-25 psi) and the pressurizer PORV 1NC-34A is at the high end of the range (+100 psi). High and Low limits are incorporated in the pressure controller to prevent the integral feature from winding up to excessive values which would slow the controller response. When the pressure controller output voltage reaches either end of its 3.5 V to 9.0 V range (corresponding to pressure error signals of -48 to +128 psi), the input signal to the integral portion of the controller is blocked and the integral value remains constant until the pressure error signal returns to the range. The proportional feature is allowed to continue to vary unless its output voltage is also at the range limit of either 3.5 or 9 V.
Note: The Pressurizer Pressure Controller is on the Ovation Distributed Control System (DCS) computer screen. The controller High and Low limits are NOT in effect during manual controller operation. They apply to automatic only.

Engineering Safety Feature Actuation System [JE] (ISE):

The Engineering Safety Feature Actuation System is a functionally defined system that consists of all components from the field-mounted process instrumentation to the output of the device that actuates an engineered safety feature when required. The ESFAS includes portions of:

System EIA - NSSS Process Control System; and
System EYA - SSPS Test Cabinets
System ISE - ESF Actuation (SSPS).

Auxiliary Feedwater System [BA] (CA):

The CA System automatically supplies feedwater to the steam generators (S/Gs) to remove decay heat from the NC System upon the loss of normal feedwater supply. The CA System mitigates the consequences of any event with loss of normal feedwater. The design basis of the CA System is to supply water to the S/Gs to remove decay heat and other residual heat by delivering at least the minimum required flow rate to the steam generators.

The CA system is designed to start automatically for any event requiring emergency feedwater.

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NARRATIVE

BACKGROUND (continued)

The CA System Motor Driven Pumps will automatically provide feedwater when initiated on any of the following conditions:

- Trip of both main feedwater pumps
- AMSAC Actuation (AMSAC - Anticipated Transient Without Scram (ATWS) Mitigation System Activation Circuitry)
- Two out of four (2/4) low-low level alarms in any one steam generator
- Initiation of a safety injection signal
- Loss of power to the 4160V essential bus (Blackout)

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EVENT DESCRIPTION

On May 3, 2019 at 1547 the control room operators were placing Unit 1 Pressurizer (PZR) heaters in their normal alignment following forced outage M1F27A. This required securing 1A and 1D PZR Heater groups per OP/1/A/6100/003 (Controlling Procedure for Unit Operation) Enclosure 4.6 (Operation of PZR Heaters). This procedure enclosure operates the DCS manual/auto station for U1 PZR Pressure Master controller in Manual. The control room operators operated the U1 PZR Pressure Master controller in the incorrect direction. This caused an increased positive pressure error, creating an increased demand signal for Unit 1 PZR Spray valves 1NC-27C and 1NC-29C. Only 1C PZR Heater group was available to respond as 1A and 1D PZR Heater groups were secured per earlier steps in the procedure and 1B PZR heater was off prior to the start of the evolution. The manual input increased the positive pressure error signal coming from the PZR Pressure Master controller causing an increase in Unit 1 PZR Spray valve open demand signal. Since 1C PZR heater group operates off this same PZR Pressure Master controller pressure error signal, it did not receive a demand to energize. With the PZR Pressure Master controller in manual, there were effectively no PZR Heater groups available to automatically respond to the decreasing Unit 1 PZR pressure as Unit 1 PZR Spray valves opened further. This resulted in Unit 1 PZR pressure lowering to the Over Temperature Delta T (OTDT) runback setpoint, followed by the OTDT Reactor Trip setpoint. Unit 1 PZR Spray valves 1NC-27C and 1NC-29C were closed following completion of EP/1/A/5000/E-0 (Reactor Trip or Safety Injection) Immediate Actions prior to reaching the Safety Injection setpoint.

The relevant sequence of events was taken from the Control Room Logs, Operator Aid Computer (OAC) alarms and DCS and is as follows (all times approximate, where time is the same the event or action is occurring within fractions of seconds):

Reactor Operator at the Controls - OATC
Reactor Operator Balance of Plant - BOP
Control Room Supervisor - CRS

15:47:14 – U1 OATC secures 1D PZR Heater Group per OP/1/A/6100/003
15:52:24 – U1 OATC secures 1A PZR Heater Group per OP/1/A/6100/003
15:52:33 – U1 OATC places PZR Pressure Master controller in Manual per OP/1/A/6100/003.
15:52:33 – U1 PZR Spray demand is 35.7%. U1 DCS PZR Pressure Ch-1: 2234psig
15:52:42 – U1 OATC clicks the 'UP' arrow head on the PZR Pressure Master controller 1 click per OP/1/A/6100/003
15:52:46 – U1 OATC clicks the 'UP' arrow head on the U1 PZR Pressure Master controller 1 additional click.

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NARRATIVE

EVENT DESCRIPTION (continued)

15:52:49 – U1 PZR Press I LOW OAC alarm received (M1A1118, 2224.17 psig).
15:52:55 – U1 OATC clicks the 'UP' arrow head on the U1 PZR Pressure Master controller increasing PZR Spray demand from 38.7% to 52.2%.
15:53:05 – U1 PZR Press IV LOW OAC alarm received (M1A0979, 2223.0 psig).
15:53:05 – U1 PZR Press III LOW OAC alarm received (M1A0968, 2222.0 psig)
15:53:05 - U2 BOP informs U1 OATC and CRS of U1 PZR Low Pressure OAC alarm received.
15:53:06 – U1 OATC clicks the up arrow on the U1 PZR Pressure Master controller
15:53:21 - U1 PZR Spray valve demand increases from 53.7% to 67.4 %.
15:53:26 - CRS directs re-energizing 1A and 1D PZR Heater Groups
Between 15:53:21 and 15:53:31, annunciators 1AD6-A6 (PZR LO PRESS PORV NC34 BLOCKED) and 1AD6-B6 (PZR LO PRESS PORV NC32 & 36 BLOCKED) come into alarm (alarm setpoint is 2185psig). U1 BOP becomes engaged based on these alarms and proceeds to the U1 OATC DCS workstation
15:53:31 – U1 Approaching Loss of Adequate Subcooling OAC alarm received (M1L5096)
15:53:33 – 1A PZR Heater Group is re-energized. U1 DCS PZR Pressure Ch-1: 2168psig
15:53:37 – 1D PZR Heater Group is re-energized. U1 DCS PZR Pressure Ch-1: 2159psig
15:53:38 – U1 PZR Press Low Tech Spec DNB Limit OAC alarm received (M1L4364).
15:53:49 – U1 BOP realized the crew was manipulating the U1 PZR pressure master in the incorrect direction.
15:53:49 - U1BOP with concurrence from the CRS clicks the 'DOWN' arrow head on the U1 PZR Pressure Master controller 2 clicks. U1 PZR Spray demand is 64.4%.
15:54:01 – U1 BOP clicks the 'DOWN' arrow head on the U1 PZR Pressure Master controller 1 additional click. U1 PZR Spray demand is 62.9%.
15:54:02 – U1 BOP clicks the 'DOWN' arrow head on the U1 PZR Pressure Master controller 1 additional click. U1 PZR Spray demand is 61.4%.
15:54:04 – U1 BOP clicks the 'DOWN' arrow head on the U1 PZR Pressure Master controller 1 additional click. U1 PZR Spray demand is 59.9%.
15:54:05 – U1 BOP clicks the 'DOWN' arrow head on the U1 PZR Pressure Master controller 1 additional click. U1 PZR Spray demand is 58.4%.
15:54:06 – U1 BOP clicks the 'DOWN' arrow head on the U1 PZR Pressure Master controller 1 click. U1 PZR Spray demand is 56.9%. U1 DCS PZR Pressure Ch-1: 2096 psig. U1 BOP pauses U1 PZR Pressure Master controller adjustments to monitor the effect of his previous adjustments

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EVENT DESCRIPTION (continued)

Between 15:54:06 and 15:54:11, U1 OTDT Runback occurs. U1 BOP performs AP-03 Immediate Actions
15:54:11 – U1 Reactor Trip and Turbine Trip on OTDT. U1 DCS PZR Pressure Ch-1: 2088psig.
15:54:11 - U1 OATC and U1 BOP perform E-0 Immediate Actions
15:56 - U1 BOP places Pressurizer Pressure Master in auto following completion of reactor trip Immediate Actions

REPORTABILITY DETERMINATION

The Unit 1 Reactor Protection System actuation while critical was a valid actuation and initially reported, as required, under 10 CFR 50.72 (b)(2)(iv)(B), "Any event or condition that results in actuation of the Reactor Protection System (RPS) when the reactor is critical except when the actuation results from and is part of a pre-planned sequence during testing or reactor operation." The event also resulted in the valid actuation of the Motor Driven Auxiliary Feedwater pumps and was initially reported, as required, under 10 CFR 50.72(b)(3)(iv)(A), and this LER will satisfy the corresponding reporting criteria 10 CFR 50.73 (a)(2)(iv)(A), "Any event or condition that resulted in manual or automatic actuation of any of the systems listed in paragraph (a)(2)(iv)(B)." The applicable 10 CFR 50.73(a)(2)(iv)(B) systems include the Reactor Protection System and the Auxiliary Feedwater System.

CAUSAL FACTOR

The cause was determined to be: The Control Room Supervisor (CRS) and Reactor Operators (RO's) involved failed to adhere to established administrative standards.

CORRECTIVE ACTIONS

Immediate Actions:

1. Control Room Supervisor and Reactor Operators removed from duty.
2. Conducted McGuire Operations Department stand down to discuss lessons-learned from this event.
3. A Prompt Investigation Response Team (PIRT) was formed and investigation performed.

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CORRECTIVE ACTIONS (continued):

Interim and Subsequent Actions:

1. Develop remediation plans for Control Room Supervisor and Reactor Operators. (Complete)
2. Coach and counsel individuals involved in the event. (Complete)
3. Conducted Control Room Supervisors (CRS) all-hands meeting to present lessons-learned from this event and to reinforce standards adherence and supervisory oversight requirements with every CRS. (Complete)
4. Conducted MNS Operations Shift Manager all-hands meeting to present lessons-learned from this event and reinforce standards adherence and oversight requirements with every Shift Manager. (Complete)
5. Implemented interim job certification process with Operators to ensure an independent validation of readiness to execute work. (Complete).
6. Implement monthly OPS Shift Management Review Meetings to focus on shift leadership in identifying performance gaps through self-criticality and aggressively closing these gaps in administrative standards through Gap Closure Worksheets. (Complete)
7. The operating procedure for the PZR Pressure Control was changed to add a Caution prior to the appropriate steps in the procedure. (Complete)

Planned Actions:

1. Complete licensed operator remediation plan actions. (In progress)

SAFETY ANALYSIS:

At 1554 [EST] hours on May 3, 2019, with Unit 1 in Mode 1 at approximately 100 percent power, the reactor tripped when the Reactor Protection System OTDT Trip setpoint was reached. The trip was uncomplicated with all systems responding normally post-trip. Operations manually started the motor driven auxiliary feedwater pumps. Operations stabilized Unit 1. Unit 2 was not affected.

The reactor tripped due to the Reactor Protection System OTDT Trip setpoint being reached and the plant safety systems responded as designed. There is no safety consequence to this aspect of the event and resulted in no significant impact to the health and safety of the public.

ADDITIONAL INFORMATION

A search of the Corrective Action Program (NCR) database was conducted, based on the cause, to determine if this event was recurring at McGuire, (i.e., similar significant event, reactor trip, with the same cause, failure to adhere to established administrative standards). NCR 02185409, LER 369-2018-01-01, documents a McGuire Nuclear Station Unit 1 Reactor Trip with the same cause.

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LICENSEE EVENT REPORT (LER)
CONTINUATION SHEET

(See NUREG-1022, R.3 for instruction and guidance for completing this form http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/)

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 3/31/2020

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