



REGIS T. REPKO
Vice President
McGuire Nuclear Station

Duke Energy
MG01VP /-12700 Hagers Ferry Rd.
Huntersville, NC 28078

980-875-4111
980-875-4809 fax
regis.repko@duke-energy.com

10 CFR 50.73

December 20, 2010

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

Subject: Duke Energy Carolinas, LLC
McGuire Nuclear Station, Unit 2
Docket Nos. 50-370
Licensee Event Report (LER) 370/2010-02, Revision 0
Problem Investigation Process (PIP) M-10-05982

Pursuant to 10 CFR 50.73 Sections (a) (1) and (d), attached is Licensee Event Report 370/2010-02, Revision 0, regarding the past inoperability of the Unit 2 "A" Train Nuclear Service Water System.

This report is being submitted in accordance with 10 CFR 50.73 (a) (2) (i) (B), an Operation Prohibited by Technical Specifications, and 10 CFR 50.73 (a) (2) (v) (B), any Event or Condition That Could Have Prevented Fulfillment of the Safety Function needed to remove residual heat. The LER is not complete, and will be supplemented upon completion of the root cause analysis.

At this time, this event is considered to be of no significance with respect to the health and safety of the public.

There are no regulatory commitments contained in this report other than the commitment to submit a supplement to the LER. Duke Energy expects to supply that supplement within 60 days, but does not consider that time frame to be a commitment.

If questions arise regarding this LER, contact Rick Abbott at 980-875-4685.

Very truly yours,

Regis T. Repko

Attachment

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NRR

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

J. H. Thompson
Project Manager
U.S. Nuclear Regulatory Commission
11555 Rockville Pike
Mail Stop O-8 G9A
Rockville, MD 20852-2738

J. B. Brady
NRC Senior Resident Inspector
McGuire Nuclear Station

W. L. Cox III, Section Chief
North Carolina Department of Environment and Natural Resources
Division of Environmental Health
Radiation Protection Section
1645 Mail Service Center
Raleigh, NC 27699-1645

LICENSEE EVENT REPORT (LER)

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

1. FACILITY NAME McGuire Nuclear Station, Unit 2	2. DOCKET NUMBER 05000- 0370	3. PAGE 1 of 7
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4. TITLE
Unit 2 Nuclear Service Water System "A" Train Past Inoperable due to failed strainer differential pressure instrument.

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
10	22	2010	2010	002	0	12	20	2010	None	
									FACILITY NAME	DOCKET NUMBER
									None	05000

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

12. LICENSEE CONTACT FOR THIS LER

NAME Richard Abbott, Regulatory Compliance	TELEPHONE NUMBER (Include Area Code) 980-875-4685
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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
A	BI	PDI	K143	YES					

14. SUPPLEMENTAL REPORT EXPECTED				15. EXPECTED SUBMISSION DATE		
<input checked="" type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)		<input type="checkbox"/> NO		MONTH	DAY	YEAR
				02	19	2011

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

On October 22, 2010, it was determined air in-leakage past a threaded fitting on the low pressure side of the Differential Pressure (DP) loop affected the past operability of the Unit 2 "A" (2A) Train of Nuclear Service Water System (NSWS).

A fitting was disconnected and reconnected during preventive maintenance performed July 24, 2010 which resulted in air in-leakage through the low pressure side of the DP loop and caused an error in the differential pressure indication at high flow conditions when the strainer operates at a vacuum.

Action was taken to repair the fitting and restore 2A NSWS Train to operable. Actions are identified in the site's Problem Identification Process to revise the retest (post maintenance testing) necessary to validate operability of the RN strainer DP instruments at vacuum conditions.

This LER will be supplemented when the root cause evaluation is finalized.

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17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

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 unique system and component identifiers are contained within parentheses.

The principal safety related function of the Nuclear Service Water System [BI] (RN) is the removal of decay heat from the reactor.

The Nuclear Service Water System [BI] (RN) provides assured cooling water for various Auxiliary Building and Reactor Building heat exchangers during all phases of station operation. Each unit has two redundant "essential headers" serving two trains of equipment necessary for safe station shutdown, and a "nonessential header" serving equipment not required for safe shutdown.

The [BI] (RN) system is further designed to tolerate a single failure following a Loss of Coolant Accident (LOCA) on one unit with a controlled shutdown on the alternate unit concurrent with a loss-of-offsite power on each unit, or a seismic event causing loss of Lake Norman resulting in controlled shutdown on both units concurrent with a loss-of-offsite power on both units.

Strainers [STR] are installed immediately upstream of the [BI] (RN) pumps. The related support function of the [BI] (RN) strainer is to ensure adequate suction pressure and flow rate are maintained during normal and accident conditions. Each strainer [STR] can be backwashed either automatically or manually.

The strainers [STR] are of the automatic back flush type, and normally each will back flush with Nuclear Service Water from the [BI] (RN) pump discharge when the pressure drop across the strainer reaches a predetermined value. The strainer differential pressure instrumentation is safety related. Strainer back flush drive motors are powered by normal and emergency sources. A safety injection signal will fail closed the backwash return valve and a loss of instrument air will fail closed the backwash supply and return valve. In these cases, backwash will be controlled manually based on strainer differential pressure. In addition, the manual control of the return valve prevents unnecessary loss of water from the system when aligned to the Standby Nuclear Service Water Pond (SNSWP).

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EVENT DESCRIPTION:

On September 15, 2010, to perform required periodic testing, the Unit 2 "A" (2A) [BI] (RN) Train was declared inoperable and the suction was realigned to the Standby Nuclear Service Water Pond (SNSWP). The periodic test places the 2A [BI] (RN) Train in the emergency alignment to flush stagnant and seldom used piping associated with 2A [BI] (RN) Train supply and return headers.

While aligned to the SNSWP for performing a flush of the suction header piping, the 2A [BI] (RN) Strainer differential pressure (DP) indicator failed low after flush flow rates were achieved for the 1A [BI] (RN) and 2A [BI] (RN) Trains. As flow is increased, it is expected that the DP indicator will show an increase in pressure differential. Also when significant clogging in the strainer occurs, the associated DP pressure indication is expected to reflect an increase in pressure differential. Failure of the D/P transmitter to properly function could compromise the ability to recognize that a high strainer DP condition exists, which could fail the initiation of backwash, to eliminate strainer clogging, when it may be required during an event.

During the September 15, 2010 testing, the DP decreased as [BI] (RN) system flow was increased. This is an unexpected condition and action was taken to secure from the test. A work request was written to investigate the abnormal DP reading and the event was entered into the site's Problem Identification Process for evaluation and corrective actions. Subsequent action was taken to place the system into an alignment in which continuous backwash could be assured to the affected strainer and 2A [BI] (RN) was returned to operable.

Investigation discovered that a leaking fitting on the low pressure side of the DP loop caused the DP reading to reach a value below zero at high system flows. The instrument line was repaired.

The draft root cause failure analysis report preliminarily determined the root causes to be the improper assembly of a tube fitting at the elbow above the low side manifold and an inadequate functional verification which failed to detect air in-leakage across the fitting.

The leak manifested as a result of the maintenance activity completed 7/24/2010 which included a calibration of the 2A [BI] (RN) Pump strainer pressure instrumentation used for local indication, control of strainer backwash and alarms. The fitting was galled during assembly and provided a

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leak path during vacuum conditions. The galled condition was not discovered during the functional verification completed after the maintenance activity. The functional verification performed after the maintenance activity verified no leakage at pressure but did not include verification at high flow conditions where DP instrumentation readings can be affected by vacuum conditions.

It was subsequently determined that air in-leakage from the galled condition affected the past operability of the 2A [BI] (RN) Train between July 24, 2010 through September 15, 2010. The duration of past operability exceeded the 72 hour completion time allowed by Technical Specifications (TS) 3.7.7 and is reported as a condition prohibited by plant TS in accordance with 10 CFR 50.73(a)(2)(i)(B). In addition, scheduled maintenance or testing performed during these periods rendered Unit 2 "B" Train NSWS inoperable resulting in two trains being simultaneously inoperable for a total period of approximately 22 hours; however, the "B" Train was always available during the inoperable time period. Two trains simultaneously inoperable is reported as an event or condition that could have prevented the fulfillment of a safety function in accordance with 10 CFR 50.73(a)(2)(v)(B).

The effect of this vacuum condition was not completely evaluated with respect to the effects on issues such as post maintenance/modification testing. This was entered into the site's Problem Identification Process and is being evaluated to determine the effects of the vacuum condition. Following completion of the evaluation, this LER will be supplemented, as necessary, to convey the results of the study.

The relevant sequence of events includes:

- 7/24/10: Preventive Maintenance (PM) performed on 2A [BI] (RN) Pump Strainer DP backwash control instruments. The PM includes calibration, instrument venting, and instrument line flushing.
- 9/15/10: The 2A [BI] (RN) Train was declared inoperable to perform periodic testing. An abnormal DP reading was identified during 2A [BI] (RN) Train Periodic Test (PT). DP indication decreased unexpectedly when RN 2A [BI] (RN) flow increased above 9000 GPM and decreased to zero when flow approached 10,000 GPM. The abnormal condition was entered into the site Problem Identification Process to investigate the unexpected DP indication.

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- 9/16/10: Operations took action in accordance with station Test Acceptance Criteria (MCTC-1574-RN.V049-01) necessary to restore and maintain 2A [BI] (RN) Train operability when RN strainer back wash supply is incapable of automatically opening. The train was placed in an alignment that allowed backwash to be continuously supplied to the strainer.
- 9/17/10: Vacuum decay test showed excessive in-leakage at a fitting above the low side manifold at the elbow and tubing connection. The tubing and fitting were replaced. A vacuum test was rerun and passed successfully after replacement.
- 9/20/10: The station resumed periodic testing, which also served as the retest (post maintenance test). The "A" Train [BI] (RN) flush was successfully completed and RN strainer DP instrumentation did not unexpectedly decrease to zero at high flow rates. The test also identified an unexpected bias between indicated and expected flow which was documented in site's Problem Identification Process. The unexpected bias is currently being evaluated and will be included in a supplement to this LER if necessary.
- On October 22, 2010, it was determined air in-leakage past a threaded fitting on the low pressure side of the Differential Pressure (DP) loop affected the past operability of the Unit 2 "A" (2A) Train of Nuclear Service Water System (NSWS).

CAUSAL FACTORS:

The draft root cause evaluation preliminarily identified two root causes. The first root cause was the improper assembly of a tube fitting at the elbow above the low side manifold. The second root cause was an inadequate functional verification completed after preventive maintenance. The functional verification was performed under normal system operating pressure and did not detect the air in-leakage. The post maintenance test should have verified the function of DP instrumentation at high flow conditions (vacuum operating conditions).

This section will be updated as part of the supplement to the LER.

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CORRECTIVE ACTIONS:

Immediate:

1. Testing was terminated and action was taken to restore 2A RN Train to operable.
2. Placed maintenance procedures that could make the remaining trains vulnerable to the same problem on hold and took action to verify proper DP loop indication on the other loops when performing testing at a vacuum condition.

Subsequent:

1. Identified and corrected a fitting leak on the low side of instrument loop.
2. Performed post maintenance testing to demonstrate acceptable performance of the 2A [BI] (RN) strainer DP loop under all design basis conditions. Test was performed at high system flow rates using RN system flush procedure and test instruments were installed to validate assumptions on expected strainer DP.

Planned:

The following corrective actions are preliminary and will be updated as part of the supplement to the LER.

1. Develop post maintenance/ modification testing that addresses the vacuum condition seen during Nuclear Service Water SNSWP Supply & Return Header Flush at high flow conditions after restoring disconnected field process tubing or after a suspected field process tubing leak.
2. Update the retest list to require the use of testing that addresses the vacuum condition seen during Nuclear Service Water SNSWP Supply & Return Header Flush at high flow conditions anytime invasive maintenance is performed on 1A, 2A, 1B and 2B RN Strainer D/P

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instrumentation loops after restoring disconnected field process tubing or after a suspected field process tubing leak.

- Review the effect of this vacuum condition with respect to the effects on issues such as post maintenance/modification testing on other components in the RN suction path which could be vulnerable to the vacuum condition.

SAFETY ANALYSIS:

Engineering analysis was used to make a quantitative assessment of the safety significance for the 2A [BI] (RN) DP indication failure. Using a conservative strainer clogging probability, a Conditional Core Damage Probability (CCDP) was calculated considering the duration of the LCO non-compliance and was determined to be less than 1E-06. This would be considered to be of no significance to the health and safety of the public.

ADDITIONAL INFORMATION:

This section will be updated as part of the supplement to the LER:

Nuclear Energy Institute (NEI) 99-02, "Regulatory Assessment Performance Indicator Guideline", defines a Safety System Function Failure identical to 10 CFR 50.73(a) (2) (v) criteria. Consequently, reporting an event as an event or condition that could have prevented the fulfillment of the safety function of structures, systems and components constitutes a Safety System Function Failure for the same basis used to deem the reporting criteria was met. This event is being reported under 10 CFR 50.73(a) (2) (v) because the Unit 2 "B" [BI] (RN) Train was declared inoperable for short durations to perform work activities within the period of time that the 2A Train [BI] (RN) was inoperable.