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November 25, 2002

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

Subject: McGuire Nuclear Station, Unit 1
Docket No. 50-369
Licensee Event Report (LER) 369/02-02, Revision 0
Problem Investigation Process M-02-5013

Pursuant to 10 CFR 50.73(a)(1) and (d), attached is LER 369/02-02, Revision 0.

On October 1, 2002, while conducting Engineered Safety Features (ESF) testing on Diesel Generator (DG) 1B, the DG output breaker unexpectedly tripped open, causing a blackout on the 4kV Essential 1ETB bus. The load sequencer and DG 1B responded accordingly to re-energize the bus and connect the blackout loads to the bus. The redundant 4kV Essential 1ETA bus remained operable during the event. See the attached LER for additional details.

This LER is being submitted as per the requirements of 10 CFR 50.73(a)(2)(iv)(A). This event did not compromise the health and safety of the public. There are no regulatory commitments contained in this LER.

D. M. Jamil

Attachment

IE22

cc: Mr. L. A. Reyes
U.S. Nuclear Regulatory Commission
Region II
Atlanta Federal Center
61 Forsyth St., SW, Suite 23T85
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Mr. R. E. Martin
U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D.C. 20555

INPO Records Center
700 Galleria Parkway
Atlanta, GA 30339

Mr. S. M. Shaeffer
NRC Resident Inspector
McGuire Nuclear Station

NRC FORM 366 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

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

1. FACILITY NAME	2. DOCKET NUMBER	3. PAGE
McGuire Nuclear Station, Unit 1	05000 369	1 OF 6

4. TITLE
Automatic Actuation of Diesel Generator 1B due to Cutler-Hammer Model E30 Control Switch Failure.

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	01	2002	2002	- 002 -	00	11	25	2002	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE	6
10. POWER LEVEL	000

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

	20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)
	20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)
	20.2203(a)(1)		50.36(c)(1)(i)(A)	X	50.73(a)(2)(iv)(A)		73.71(a)(4)
	20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		50.73(a)(2)(v)(A)		73.71(a)(5)
	20.2203(a)(2)(ii)		50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)		
	20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)		
	20.2203(a)(2)(v)		50.73(a)(2)(i)(B)		50.73(a)(2)(vii)		
	20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)		
	20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)		

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
P. T. Vu, Regulatory Compliance	(704) 875-4302

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
B3b	EK	Bistable/ Switch	C770	Yes	X	EK	Circuit Breaker	B455	Yes

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

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

Unit Status: At the time of the event, Unit 1 was in Mode 6 (Refueling) and Unit 2 was in Mode 1 (Power Operation) at 100 percent power.

Event Description: On October 1, 2002, while conducting Engineered Safety Features (ESF) testing on DG 1B, the DG output breaker unexpectedly tripped open, causing a blackout on the 4kV Essential 1ETB bus. The load sequencer and DG 1B responded accordingly to re-energize the bus and connect the blackout loads to the bus. The redundant 4kV Essential 1ETA bus remained operable during the event. This event did not compromise the health and safety of the public.

Event Cause: The root cause of the blackout event was failure of the Cutler-Hammer (C-H) pushbutton control switch for the DG output breaker due to its contact block plunger stuck in the depressed position.

Corrective Action: The failed switch was replaced. Other Category "A" (high safety significant and/or critical to production) C-H Model E30 control switches that are constructed with dual-circuit contact blocks with at least one normally-closed contact will be replaced with contact blocks manufactured after 1979.

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

BACKGROUND

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

Each unit of the McGuire Station has two redundant and independent 4kV [EB] and 600V [ED] Engineered Safety Features (ESF) distribution systems which normally receive power from the station power distribution system through the unit auxiliary transformers [XFMR].

During a blackout (BO) condition, power to each of the redundant 4kV ESF distribution systems, (ETA) and (ETB), is provided by a completely independent diesel generator system [EK]. Under normal operating conditions, 4kV 1ETB bus is powered from 7kV/4kV transformer 1ATD through normal incoming breaker 1ETB-1. An alternate source of power for 1ETB bus is from 7kV/4kV transformer SATB through alternate incoming breaker 1ETB-2. Upon loss of the normal or alternate power to 1ETB bus, all loads are shed from the bus via the load sequencing system [EK], the Diesel Generator [DG] automatically starts, DG output breaker 1ETB-14 closes to supply power to the bus, and loads required for a BO condition are sequenced on by the load sequencer.

ESF testing is performed to demonstrate the DG's ability to start and load following a Safety Injection (SI) and/or BO condition as required by Technical Specifications. This test is performed in Mode 5 (Cold Shutdown), Mode 6 (Refueling), or No Mode. During the SI/BO actuation portion of the test, SI and BO signals are initiated to start the DG to operate SI loads for at least 10 minutes. Normal power is restored to the 7kV/4kV transformer, the DG is synchronized, load is transferred, and the DG is returned to standby status. As part of this test, it is verified that DG output breaker 1ETB-14 can not be opened from the Control Room (C/R) or from the local DG control panel while the SI/BO condition still exists (response to NRC Generic Letter 96-01).

During the SI actuation portion of the ESF test, the DG is paralleled with offsite power and a SI signal is initiated. DG output breaker 1ETB-14 automatically trips and the DG returns to

standby status while sequencing of SI loads onto the bus progresses. During the BO actuation portion of the ESF test, power to the 7kV/4kV transformer is tripped, initiating a BO condition. The DG automatically starts, load shed occurs, load sequencing progresses, and the DG carries BO loads for at least 6 minutes.

The DG can be operated in "Auto", "C/R" or "Local" (DG control panel) mode via the 1B Mode Select Switch (EG101) in the C/R. The switch is usually placed in "Auto" to prevent inadvertent manual control of the DG and associated breakers (1ETB-1, 1ETB-2, and 1ETB-14). When the switch is placed in "C/R" or "Local", the DG and associated breakers can be manually controlled from the C/R or DG control panel, respectively. C/R switch EG85 is the open/closed pushbutton control switch for DG output breaker 1ETB-14.

EVENT DESCRIPTION

At the time of the event on October 1, 2002, Unit 1 was in Mode 6 (Refueling) with DG 1A operable. Unit 2 was in Mode 1 (Power Operation) at 100 percent power with DGs 2A and 2B operable. At approximately 03:37, Train 1B SI/BO actuation portion of the ESF test was initiated. DG 1B was automatically started and supplying power to 1ETB bus. With the SI/BO condition still present, manual operation of DG output breaker 1ETB-14 was demonstrated. The 1B Mode Select Switch EG101 was placed in "C/R" mode and C/R switch EG85 was depressed to open DG output breaker 1ETB-14. This breaker remained closed as expected. During the operation of C/R switch EG85, the plunger in the switch's contact block unknowingly stuck in the depressed position. At the end of this portion of the ESF test, Mode Select Switch EG101 was returned to "Auto" position, the load sequencer and SI signal were reset, and normal power was restored to 1ETB bus. The DG remained connected to 1ETB bus in preparation for the SI actuation portion of the ESF test.

On October 1, 2002, at approximately 05:25, Train 1B SI actuation portion of the ESF test was initiated. When the SI signal was initiated, DG output breaker 1ETB-14 automatically opened as expected, and DG 1B remained running in standby condition (not tied to 1ETB bus). The load sequencer sequenced loads required for the SI condition onto the bus. At the end of this portion of the ESF test, the load sequencer and SI signal were reset and the DG was secured.

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On October 1, 2002, at approximately 09:16, Train 1B BO actuation portion of the ESF test was initiated. When the BO signal was initiated, the DG started, load shed occurred, and BO loads were sequenced onto 1ETB bus accordingly. At the end of this portion of the ESF test, the load sequencer and BO signal were to be reset and normal power was to be restored to 1ETB bus. In preparation for restoring normal power to 1ETB bus, the 1B Mode Select Switch EG101 was turned from "Auto" to "C/R" position to allow manual control of breakers 1ETB-1, 1ETB-2 and 1ETB-14. With the plunger in control switch EG85 contact block stuck in the depressed position earlier in the SI/BO actuation portion of the test, DG output breaker 1ETB-14 unexpectedly opened causing a BO condition on 1ETB bus. The load sequencer and DG 1B responded accordingly to re-energize the bus and connect the BO loads to the bus. The ESF test was suspended and troubleshooting began.

Pursuant to the requirements of 10 CFR 50.73(a)(2)(iv)(A), this event is being reported to the NRC as a valid actuation of DG 1B.

CAUSAL FACTORS

The root cause of the event is the failure of C/R switch EG85 due to its plunger stuck in the depressed position. Duke's Metallurgy Laboratory determined that the insulators inside the switch's contact block became displaced which interfered with the operation of the plunger. The insulators became displaced due to the cover of the switch's contact block not being attached properly, most likely during the manufacturing process. The clearance beneath the cover allowed the insulators to move over time and get into the pathway of the plunger. These insulators were installed in Cutler-Hammer (C-H) Model E30 control switches with dual-circuit contact blocks (at least one of which is a normally-closed contact block) manufactured prior to 1979.

CORRECTIVE ACTIONS

Immediate:

1. ESF testing was suspended.

2. C/R switch EG85 was replaced and ESF testing was completed satisfactorily.

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Subsequent:

1. Metallurgy laboratory analysis of the failed switch was performed, and the root cause of the switch failure was identified.

2. The root cause of the switch failure and other previous switch failures were discussed with the manufacturer. The manufacturer stated that this type of switch was redesigned in 1979, and the new design no longer uses insulators.

Planned:

1. Category "A" (high safety significant and/or critical to production) C-H Model E30 control switches that are constructed with dual-circuit contact blocks with at least one normally-closed contact will be replaced with contact blocks manufactured after 1979.

SAFETY ANALYSIS

At the time of this event, 4kV ESF Bus 1ETA remained energized, DG 1A was operable, both offsite buslines were available, and each 4kV ESF bus could be cross-tied to Unit 2 offsite power if needed. The load sequencer and DG 1B responded as expected in accordance with ESF testing.

The loss of power (LOP) DG start instrumentation is required for the ESF systems to function in any accident with a loss of offsite power (LOOP). Its design basis is that of the ESF Actuation System (ESFAS).

Accident analyses credit the loading of the DG based on the LOOP during a loss of coolant accident (LOCA). The actual DG start has historically been associated with the ESFAS actuation. The DG loading has been included in the delay time associated with each safety system component requiring DG supplied power following a LOOP. The analyses assume a non-mechanistic DG loading, which does not explicitly account for each individual component of loss of power detection and subsequent actions.

The LOP DG start instrumentation, in conjunction with the ESF systems powered from the DG, provide unit protection in the event of any of the analyzed accidents discussed in the UFSAR, in which a LOOP is assumed.

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

The health and safety of the public and plant personnel were not affected as a result of this event. Therefore, this event is not considered significant.

ADDITIONAL INFORMATION

A three-year search of the McGuire corrective action database (PIP) and LER database revealed no other automatic DG start due to Cutler-Hammer control switch failures; therefore, this event is not recurring. Cutler-Hammer Model E30 control switch failures have been identified as an emerging trend at McGuire. Previous failures include bent plungers and hardening of the lubricant in and around the control switch operator plunger area, which caused the operator plungers to bind. The sticking problem of the contact block plunger identified in this LER is considered isolated.