

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) McGuire Nuclear Station, Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 3 6 9	PAGE (3) 1 OF 0 8
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TITLE (4): Unit 1 entered Tech Spec 3.0.3 when two Vital Battery Chargers were deenergized when Diesel Generator 2A tripped due to oil leak from diesel governor valve

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)																																					
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAMES		DOCKET NUMBER(S)																																			
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<table border="1" style="width:100%; border-collapse: collapse;"> <tr> <td style="width:15%;">OPERATING MODE (9) 1</td> <td colspan="11">THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)</td> </tr> <tr> <td rowspan="5">POWER LEVEL (10) 1100</td> <td>20.402(b)</td> <td>20.406(e)</td> <td>50.73(a)(2)(iv)</td> <td>73.71(b)</td> </tr> <tr> <td>20.406(a)(1)(i)</td> <td>50.36(e)(1)</td> <td>50.73(a)(2)(v)</td> <td>73.71(c)</td> </tr> <tr> <td>20.406(a)(1)(ii)</td> <td>50.36(e)(2)</td> <td>50.73(a)(2)(vi)</td> <td rowspan="3">OTHER (Specify in Abstract below and in Text, NRC Form 366A)</td> </tr> <tr> <td>20.406(a)(1)(iii)</td> <td>50.73(a)(2)(i)</td> <td>50.73(a)(2)(viii)(A)</td> </tr> <tr> <td>20.406(a)(1)(iv)</td> <td>50.73(a)(2)(ii)</td> <td>50.73(a)(2)(viii)(B)</td> </tr> <tr> <td>20.406(a)(1)(v)</td> <td>50.73(a)(2)(iii)</td> <td>50.73(c)(2)(x)</td> <td></td> </tr> </table>												OPERATING MODE (9) 1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)											POWER LEVEL (10) 1100	20.402(b)	20.406(e)	50.73(a)(2)(iv)	73.71(b)	20.406(a)(1)(i)	50.36(e)(1)	50.73(a)(2)(v)	73.71(c)	20.406(a)(1)(ii)	50.36(e)(2)	50.73(a)(2)(vi)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)	20.406(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	20.406(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	20.406(a)(1)(v)	50.73(a)(2)(iii)	50.73(c)(2)(x)	
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LICENSEE CONTACT FOR THIS LER (12)	
NAME Steven E. LeRoy, Licensing	TELEPHONE NUMBER AREA CODE: 7 0 1 4 3 7 3 1 - 6 2 1 3 3

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)										
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRDS	
X	E, K	D, G, 6, 5	W, 2, 9, 0	Y						

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

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

On 06/01/88 at 1919, Diesel Generator (D/G) 2A started and loaded when normal power was purposefully failed to Train 2A during an ESF Blackout (B/O) test. D/G 2A tripped on engine overspeed at 1933 prior to the end of the B/O test. Unit 1 then entered (TS) 3.0.3 because the emergency power supply to the shared Vital Battery Chargers EVCA and EVCC was from D/G 2A (alignment required by B/O test procedure), and the two chargers deenergized when D/G 2A tripped. Operations (OPS) restored normal power to Train 2A and restarted EVCA and EVCC Chargers. Unit 1 exited TS 3.0.3. at 1936. Upon investigation, Maintenance (MNT) determined that D/G 2A tripped because the oil had drained out of the D/G governor causing the governor to supply excess fuel to the D/G. The oil leak occurred because a new governor actuator had been installed on an old governor oil cooler tubing manifold block with an incomplete seal between the actuator and oil cooler tubing manifold block. MNT replaced the governor actuator on 06/02/88. This event is assigned a cause of Other because of several possible causes. Due to a lack of requirement in the spare parts program for a vendor to inform Duke of design changes and a possible fabrication error in the manufacture of one of the bolts or actuator bolt holes, the two parts of the governor assembly, which were used together were not completely compatible. MNT will evaluate the components involved and request future notification from the vendor when design tolerances are changed.

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TEXT (If more space is required, use additional NRC Form 366A) (17)

INTRODUCTION:

On June 1, 1988 at 1919, Diesel Generator (D/G) 2A started and loaded as designed when normal power was purposefully failed to Train 2A during an Engineered Safety Features (ESF) Blackout test. However, D/G 2A tripped on engine overspeed at 1933 prior to the termination of the Blackout test. Unit 1 then entered the Action Statement of Technical Specification (TS) 3.0.3 because the emergency power supply to the shared Vital Battery Chargers EVCA and EVCC was from D.G 2A (an alignment required by the ESF Train 2A Blackout test procedure), and the two chargers deenergized when D/G 2A tripped.

Operations (OPS) immediately restored normal power to Train 2A and restarted EVCA and EVCC Chargers. Unit 1 then exited the Action Statement of TS 3.0.3 at 1936 on June 1.

During the subsequent investigation, Mechanical Maintenance (MNT) determined that D/G 2A tripped on overspeed because all of the oil has drained out of the D/G governor causing the governor to supply excess fuel to the D/G. The oil leak occurred because a new governor actuator has been installed on an old governor oil cooler tubing manifold block on May 31, 1988. The four new bolts which were used to join the two parts were approximately one-eighth inch longer than the old bolts, and one of the bolts had bottomed out, creating an incomplete seal between the actuator and oil cooler tubing manifold block. MNT replaced the governor actuator using the older shorter bolts to correct the problem by 0219 on June 2, 1988. The trip of D/G 2A was classified as a Valid Failure.

Unit 1 was in Mode 1, Power Operation, at 100% power, and Unit 2 was in Mode 5, Cold Shutdown, at the time of this event.

This event has been assigned a Cause of Other because there are several possible causes of the event. MNT personnel were following an accepted practice, which is supported by their management, in replacing only the malfunctioning portion of a component. However, because of a lack of a requirement in the spare parts program for a vendor to inform Duke Power Company of design changes, and a possible fabrication error in the manufacture of one of the bolts or actuator bolt holes, the two parts of the governor assembly which were used together were not completely compatible.

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TEXT (If more space is required, use additional NRC Form 366A (9-83))

EVALUATION:

Background

The 125 volt direct current (VDC) Vital Instrumentation and Control Power system is a shared system which provides power to all class 1E 125 VDC loads that are essential to reactor control and instrumentation. The system consists of four normally independent channels of power, each consisting of a 125 VDC bus, a 125 VDC battery [EIIS:BTY], and a full capacity charger. The four batteries and associated chargers are EVCA, EVCB, EVCC, and EVCD. The associated buses are EVDA, EVDB, EVDC, and EVDD, respectively. The battery charger [EIIS:CHR] on each channel is independent and supplies power for both normal bus operation and battery float charging. A standby charger (EVCS) is provided to replace an inoperable charger during testing or maintenance.

TS 3/4.8.2 requires that the four direct current channels be operable and energized in Modes 1 (Power Operation), 2 (Startup), 3 (Hot Standby), and 4 (Hot Shutdown). With one 125 VDC battery and/or its normal and standby chargers inoperable or not energized, the TS requires that the associated bus must be energized from an operable battery bank within 2 hours in order to allow continued operation for up to 72 hours. With more than one battery and/or normal and standby charger inoperable, the Action Statement of TS 3.0.3 applies.

The normal power supply for EVCA Charger is bus 1ETA through incoming feeder 1EMXA, and the emergency power supply is from D/G [EIIS:DG] 1A. The alternate power supply for EVCA Charger is from bus 2ETA through alternate incoming feeder 2EMXA, and the emergency power supply for this alignment is from D/G 2A. The normal power supply for EVCC Charger is from bus 2ETA through incoming feeder 2EMXA, and the emergency power supply is from D/G 2A. The ESF Actuation Periodic Test procedure PT/2/A/4200/09A, is performed in Mode 5 (Cold Shutdown) or Mode 6 (Refueling) during each refueling outage to test the ability of the D/Gs to start and load as designed in response to a manually initiated Blackout or Safety Injection signal. The Train 2A Blackout test portion requires EVCA Charger power to be aligned from its alternate feeder 2EMXA and EVCC Charger power to be aligned from its normal feeder 2EMXA in order to test the worst case alignment of Vital Battery Charge power in the event of a Train 2A Blackout.

TS 3.8.1.2 requires one offsite power source and one D/G be operable in Modes 5 and 6. A surveillance requirement of the TS requires that any Valid or Invalid Failure of a D/G be reported to the Nuclear Regulatory Commission within 30 days.

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TEXT (If more space is required, use additional NRC Form 366A (9/17))

Description of Event

On May 31, 1988 at 0933, OPS personnel started D/G 2A for an operability test and ESF test (Start No. 626). OPS personnel terminated the run after 36 minutes and classified it as an Invalid Test. During the test, while the D/G was idling, OPS personnel noted that the D/G frequency was oscillating approximately 0.6 Hertz. OPS personnel could not resolve the frequency problems during two subsequent Invalid Test runs for troubleshooting and requested MNT to investigate.

After extensive troubleshooting and discussions with the governor supplier, Woodward Governor Company, MNT personnel determined that the governor actuator was faulty and should be replaced. MNT personnel obtained an unused governor assembly from the warehouse. The governor assembly, model number EG-B35C, as received from the Woodward Governor Company contains a governor actuator and a tubing manifold block to connect the actuator to the oil cooler. Because there was no apparent problem in the installed oil cooler or tubing manifold block, and it was known to be time consuming to remove the tubing attached to the oil cooler tubing manifold block, MNT Supervisory personnel decided to install only the new governor actuator and attach it to the previously installed oil cooler tubing manifold block. Also, MNT personnel were aware that a new governor actuator had been installed on an old oil cooler tubing manifold block during maintenance on two other D/G governors with no apparent problems. Therefore, MNT personnel installed the new governor actuator and o-rings with the old oil cooler tubing manifold block, using the four bolts from the new governor assembly to connect the two parts.

OPS personnel then started D/G 2A eleven times between 2101 and 2338 on May 31, 1988 to troubleshoot the new governor actuator. All of these starts were classified as Invalid Tests. At 0159 on June 1, 1988, D/G 2A was started to perform a final test of the new governor actuator. The run was terminated due to unrelated complications. Two subsequent runs were performed for troubleshooting and all three of these runs were also classified as Invalid Tests. At 1635, D/G 2A was started for the operability test and ran for 131 minutes. After this run, OPS personnel declared D/G 2A operable. At 1919, D/G 2A started successfully on an undervoltage signal when bus 2ETA was deenergized to perform the ESF Train 2A Blackout test. D/G 2A loaded successfully but tripped 14 minutes into the test. OPS personnel classified this D/G 2A start (Start No. 644) as a Valid Failure.

Because of the required alignment of the shared Vital Battery Chargers for the Blackout test, both EVCA and EVCC Chargers were deenergized when D/G 2A tripped. Therefore, OPS personnel entered Unit 1 into the Action Statement of TS 3.0.3 at 1933, the time of the D/G 2A trip. OPS personnel immediately restored normal power to the two chargers by reenergizing bus 2ETA. The EVCA and EVCC Chargers were restarted by 1936, and OPS personnel exited Unit 1 from the Action Statement of TS 3.0.3.

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TEXT (if more space is required, use additional NRC Form 366A's) (17)

MNT personnel investigating the cause of the D/G 2A trip on engine overspeed discovered that all of the oil had leaked out of the D/G Governor causing the governor to supply excess fuel and trip the D/G on engine overspeed. They determined that one of the bolts used to connect the new governor actuator to the old oil cooler tubing manifold block had bottomed out, allowing incomplete sealing at the o-ring between the two components. Further investigation revealed that the new bolts were approximately one-eighth inch longer than the old bolts and that the oil cooler tubing manifold block which was originally attached to the new governor actuator was approximately one-eighth inch thicker than the old oil cooler tubing manifold block. After discussion with a Woodward representative, MNT personnel decided to replace the governor actuator with another new one as a precaution since the installed actuator had operated without oil. A new actuator was connected to the old oil cooler tubing manifold block, using the older shorter bolts which had originally been supplied with the old oil cooler tubing manifold block to connect the two components. D/G 2A was then started three more times for troubleshooting and testing between 0219 and 0815 on June 2, 1988. At 0820, OPS personnel started D/G 2A (Start No. 648) for the operability test and declared it operable 72 minutes later.

Conclusion

The Valid Failure of D/G 2A on June 1, 1988 at 1933 was the sixth Valid Failure in the last 100 valid starts of the Unit 2 D/Gs. It was the fifth Valid Failure in the last 100 valid starts and the second Valid Failure in the last 20 starts of D/G 2A.

This event has been assigned a Cause of Other because there are several possible causes for this event. The difference in the old and new oil cooler tubing manifold block and bolts was so slight that it is uncertain whether eliminating any one of the causes could have prevented the event.

MNT personnel who installed the new governor actuator on the old oil cooler tubing manifold block were following an accepted practice in replacing only the malfunctioning portion of the component. They made an incorrect evaluation of the compatibility of the two parts for several reasons. They had no reason to suspect that the two parts would be incompatible, since the part number had not changed and the same method had been used on at least two other occasions. It was not visually evident from any normal vantage point that one of the bolts had bottomed out in the actuator bolt hole. The bolts were all torqued to the specified value in the Diesel Engine Governor, Governor Oil Cooler and Booster Servo Motor Removal And Replacement procedure, MP/O/A/7400/1. Quality Assurance (QA) personnel also visually verified that the form and fit of the new parts were correct as directed in the Quality Control Procedures Manual, Section QC-F4, Mechanical Equipment Inspection Procedure and the torque was performed according to the MNT procedure.

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TEXT (If more space is required, use additional NRC Form 366A's) (17)

Although Woodward Governor Company has not yet been able to provide specific information on the differences in the two involved oil cooler tubing manifold blocks, a Woodward representative has acknowledged that several design changes have been made to the tubing manifold block and oil cooler design since 1976 when one of these two governors was purchased. The representative also stated that Woodward would not have informed Duke Power Company of these design changes because they would not have considered the changes to affect the function if the component was used intact. Until recently there was no requirement for a vendor supplying a Standard Stock item to inform Duke Power Company of design changes. The Standard Stock safety related components fall under the more stringent Commercial Grade program instituted in 1987. Under the new program, Duke Design Engineering personnel attempt to assure, either by inspection or with acceptable certification from a vendor, that no changes have been made in the design of a part which would affect the form, fit, or function.

Until Woodward provides more information, it cannot be determined if only one of the four bolts bottomed out in the governor actuator due to differences in the depth of the four bolt holes in the actuator from an out of tolerance fabrication error or from the allowable manufacturing tolerance.

Operations personnel verified the governor oil level to be satisfactory prior to the D/G 2A start at 1635 on June 1, 1988 as documented in a completed copy of procedure PT/2/A/4350/02A, D/G "2A" Operability Test. The governor oil level was also checked prior to other times that D/G 2A was started between the governor actuator replacement and the D/G 2A trip and was documented in the Diesel Generator Operating procedure, OP/2/A/6350/02; however, all completed copies of this procedure are not retained. The OPS Engineer responsible for the Unit 2 D/Gs remembers checking the governor oil level prior to the start of D/G 2A at 1919 on June 1, 1988. Two OPS nuclear equipment operators on routine rounds also verified the governor oil level to be satisfactory between the governor actuator replacement and the D/G trip. Therefore, the oil in the governor (approximately 1 quart) evidently leaked out suddenly during the D/G 2A run began at 1919, probably due to pressure buildup in the governor during the extended run from 1635 to 1846.

A review of McGuire Licensee Event Reports for the past three years revealed no entries into TS 3.0.3 due to similar root causes; therefore, this event is not considered to be recurring.

This event is reportable to the Nuclear Plant Reliability Data System (NPRDS). A search of the NPRDS revealed many problems with diesel governors out of adjustment and a few lube problems, but no other failures exactly like the one during this event.

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TEXT: If more space is required, use a Additional NRC Form 366A (1/17)

CORRECTIVE ACTIONS:

- Immediate: MNT personnel replaced the governor actuator and used the older shorter bolts to attach the new actuator to the old oil cooler tubing manifold block by 0219 on June 2, 1988.
- Subsequent: Design Engineering personnel are currently refining the mechanics of the Commercial Grade program to increase assurance that Commercial Grade parts are inspected by Design Engineering or that certification is provided from the vendor to ensure no changes have been made to the design which will affect the form, fit, or function.
- Planned:
- 1) MNT personnel will change the Diesel Engine Governor, Governor Oil Cooler and Booster Servo Motor Removal and Replacement procedure to require MNT personnel to measure and evaluate the length of the bolts to be used to connect the governor oil cooler tubing manifold block and actuator.
 - 2) MNT personnel will request that a change be made to the Woodward Governor Company manual to include a correct drawing of the oil cooler tubing manifold block. A Station Problem Report will be submitted to request this change.
 - 3) MNT personnel will send the governor actuator removed from service on May 31, 1988 to a vendor for failure analysis.
 - 4) MNT personnel will request in writing that Woodward Governor Company provide a written description of changes in the design of the governor and manufacturing tolerances which may have contributed to this event.
 - 5) MNT management personnel will cover this event with appropriate MNT personnel to emphasize the need to take whatever steps necessary to assure compatibility when replacing parts of a component.

SAFETY ANALYSIS:

Unit 1 was in TS 3.0.3 for approximately 3 minutes on June 1, 1988 because EVCA and EVCC Chargers were deenergized. Normal power was restored well within the one hour allotted in the TS 3.0.3 Action Statement. EVCA and EVCC Batteries were operable during this time period to provide power for the EVDA and EVDC buses. The minimum duty cycle required for the batteries is one hour according to the McGuire Final Safety Analysis Report (FSAR); however, each battery actually can carry its normal load and that of another battery for three hours. Also, EVCB and EVCD Chargers were fully operable during this time period with normal power from Train 1B and Train 2B, respectively.

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Unit 2 was in Mode 5 during the initiation of the ESF Train 2A Blackout test. Only one D/G and one offsite power source is required by TSS to be available during Mode 5, and D/G 2B and one offsite power source were operable when D/G 2A tripped.

No personnel injuries, radiation overexposures, or releases of radioactive material occurred as a result of this incident.

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

DUKE POWER COMPANY

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CHARLOTTE, N.C. 28242

HAL B. TUCKER
VICE PRESIDENT
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TELEPHONE
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July 1, 1988

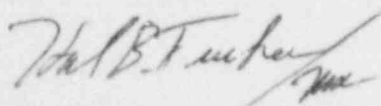
U.S. Nuclear Regulatory Commission
Document Control Desk
Washington, D.C. 20555

Subject: McGuire Nuclear Station, Units 1 and 2
Docket No. 50-369, -370
Licensee Event Report 369/88-11

Gentlemen:

Pursuant to 10CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report 369/88-11 concerning Unit 1 entering Tech Spec 3.0.3 when two vital battery chargers were deenergized when Diesel Generator 2A tripped because of an oil leak from a diesel governor valve on June 1, 1988. This report is being submitted in accordance with 10CFR 50.73(a)(2)(1)(B) and Tech Spec 6.9.2 as directed by Tech Spec 4.8.1.1.3. This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,



Hal B. Tucker

SEL/292/bhp

Attachment

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Regional Administrator, Region II
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