Duke Power Company
McGuire Nuclear Generation Department
12700 Hagers Ferry Road (MG01VP)
Huntersville, NC 28078-9340

T. C. McMeekin
Vice President
(704)875-4800
(704)875-4809 Fax

DUKE POWER

DATE: June 21, 1996

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

Subject: McGuire Nuclear Station Unit 2
Docket No. 50-370
Licensee Event Report 370/96-04, Revision 0
Problem Investigation Process No.: 2-M96-1528

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a) (1) and (d), attached is Licensee Event Report 370/96-04, concerning the automatic starting of Emergency Diesel Generator 2A on May 24, 1996. This report is being submitted in accordance with 10 CFR 50.73 (a) (2) (iv). This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

FOR T.C. McMeekin

JWP/bcb

Attachment

cc: Mr. S.D. Ebneter
Administrator, Region II
U.S. Nuclear Regulatory Commission
101 Marietta St., NW, Suite 2900
Atlanta, GA 30323

INPO Records Center
Suite 1500
1100 Circle 75 Parkway
Atlanta, GA 30339

Mr. Victor Nerses
U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D.C. 20555

Mr. George Maxwell
NRC Resident Inspector
McGuire Nuclear Station

IE22

bxc: B. L. Walsh (EC11C)
Z. L. Taylor (CNS)
G. A. Copp (EC050)
J. I. Glenn (MG02ME)
P. R. Herran (MG01VP)
C. B. Davis (MG01CP)
J. E. Burchfield (ONS Reg Compliance)
G. H. Savage (EC06E)
G. B. Swindlehurst (EC11-0842)
C. M. Misenheimer (EC08I)
R. F. Cole (EC05N)
J. M. Frye (EC05N)
T. G. Becker (PB02L)
P. M. Abraham (EC08I)
R. B. White (MG01VP)
L. V. Wilkie (ON03SR)
D. P. Kimball (CN05SR)
K. L. Crane (MG01RC)
R. N. Casler (EC05N)
NSRB Support Staff (EC05N)

NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
McGuire Nuclear Station, Unit 2	05000 370	1 Of 5

TITLE (4)
A Lightning Strike Initiated A Fault Resulting In An Automatic Start Of Emergency Diesel Generator 2A

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 NAME	DOCKET NUMBER(S)
										05000
05	24	96	96	- 04	- 00	06	21	96	N/A	05000

OPERATING MODE (9)	5	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR (Check one or more of the following) (11)			
POWER LEVEL (10)	0%	20.402(b)	20.405(c)	X 50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER	
	AREA CODE	
J. W. Pitesa	(704)	875-4788

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	

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

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

Unit Status: Mode 5 (Cold Shutdown), with Reactor Coolant system temperature at approximately 107 degrees F.

Event Description: On May 24, 1996, at 23:22:44, the Unit 2A Emergency Diesel Generator (EDG) automatically started. The EDG 2A start was due to a loss of voltage on 4160V Essential Bus 2ETA which resulted when power was lost to Transformer 2A, following a lightning strike on a transmission line. Following an automatic slow bus transfer Bus 2ETA voltage recovered. EDG 2A was not required to supply power and did not load.

Event Cause: This event is assigned a cause of Lightning Strike, which initiated a fault in the 525KV switchyard. A cause of Change Management, System Interactions Not Considered, is also assigned because a change in grounding requirements for breaker maintenance had been implemented and had not been re-evaluated for compatibility with existing breaker maintenance practices. This resulted in establishing a complete electrical circuit through Circuit Breaker (CB) 52 and the Current Transformer (CT) to the switchyard ground mat which conducted the lightning surge at the time of the event. This surge was detected by switchyard protective relaying, causing a lockout of the 525KV Yellow Bus which was supplying 2A Busline.

Corrective Action: Practices for breaker maintenance will be evaluated to determine methods to facilitate proper grounding and prevention of further events of this nature.

EVALUATION:

Description of Event

Unit 2 was in Mode 5, Cold Shutdown, with NC system temperature at approximately 107 degrees F at the time of the event.

- Prior to this event, Circuit Breaker (CB) [EIIS: 52] number 52 had been removed from service to permit preventive maintenance on the breaker.
- In support of the preventive maintenance activities, the breaker was electrically isolated from the Unit 2 (525KV) switchyard [EIIS: FK] using the motor operated disconnects [EIIS: MOD].
- The breaker was grounded to the switchyard ground mat on both sides per breaker grounding requirements.
- The current transformers (CT) [EIIS: ICT] for CB 52 were inside the grounding boundaries.
- On May 23, 1996, breaker timing testing was in progress on CB 52 in accordance with procedure SI/0/B/2400/006, Substation 230KV/525KV SFA Breaker/CT Inspection and Maintenance.
- At the end of the work day on May 23, 1996, testing of the Y phase pole of CB 52 had not been completed and the pole was left closed.
- On the evening of May 24, 1996, a lightning strike occurred on the X phase of the Woodchuck line, approximately 17.8 miles from the McGuire switchyard.
- The fault was initially cleared as expected by the opening of CBs 57 and 58 and the discharge of the lightning surge to the switchyard ground mat.
- Differential relaying [EIIS: 87] for the yellow bus [EIIS: BU] Y phase subsequently initiated a yellow bus lockout, resulting in the opening of CBs 56, 59, and 62; thereby de-energizing 2A Busline.
- The loss of 2A Busline resulted in a loss of voltage on all 3 phases of 4160V Essential Bus [EIIS: EB] 2ETA at 23:22:44.672.
- The load sequencer for Emergency Diesel Generator (EDG) [EIIS: EK] 2A initiated an automatic start of EDG 2A at 23:22:44.674.
- Approximately 2.8 seconds after the initial loss of voltage on 2ETA, voltage was restored due to an automatic slow bus transfer to the standby breakers.
- EDG 2A was manually shutdown at 23:47.

Conclusion

- **There were no personnel injuries, radiation overexposures, or uncontrolled releases of radioactive material resulting from this event. This event is not Nuclear Plant Reliability Data System (NPRDS) reportable.**

This event is assigned a cause of Lightning Strike.

- The lightning strike on the evening of May 24, 1996, initiated a fault that was discharged to the switchyard ground mat.
- The lightning surge fed back into CB 52 via the switchyard ground mat, traveled through the breaker and was discharged back to ground.
- As the surge traveled thru CB 52, Y phase, the CT and differential relays detected the surge, resulting in the opening of CBs 56, 59, and 62.
- The subsequent loss of power to the 2A busline caused by the opening of the CBs was detected and EDG 2A started as required, but was not required to supply power and did not load.

A cause of Change Management, System Interactions Not Considered is also assigned.

- Prior to 1995, the work practice for electrical isolation and grounding of switchyard breakers for maintenance consisted of opening the motor operated disconnects on each side of the breaker and connecting a static discharge lead to the breaker. This grounding practice was evaluated and no conflicts were identified between the grounding practice and breaker maintenance practices.
- In early 1995, the grounding practice was changed to improve grounding practices from a personnel safety perspective.
- The new grounding requirement specifies the use of a ground on each side of the breaker. The grounds are also a larger size than previously used, such that they are now sufficiently sized to carry an electrical fault.
- The new grounding requirements were not re-evaluated for compatibility with existing breaker maintenance practices.
- Breaker maintenance procedures require phase poles to be closed to conduct breaker timing tests. There is no procedural requirement to re-open phase poles if testing is suspended prior to completion.

- This condition, in conjunction with the new grounding requirement, allowed an electrical path to be completed from one point on the switchyard ground mat, through the CB 52 Y phase, and back to a different point on the switchyard ground mat.

A search of the Operating Experience Program (OEP) revealed several events resulting from lightning strikes. However none of these events were associated with either grounding practices for breaker maintenance or actual breaker maintenance. A search of the Problem Investigation Process database for the past 24 months revealed no other Engineered Safety Features (ESF) actuations due to a cause of Lightning Strike or Change Management. This event is not considered to be recurring.

CORRECTIVE ACTION:

Immediate:

1. OPS personnel were dispatched to check alarms and restart equipment which tripped as a result of the loss of 2A Busline.

2. OPS personnel entered procedures AP/2/A/5500/22, Loss Of Instrument Air, and AP/2/A/5500/07, Loss Of Electrical Power.

Subsequent:

1. OPS personnel secured EDG 2A, as it was not needed following recovery of voltage on 2ETA.

2. OPS personnel notified Engineering of the need to evaluate the loss of 2A Busline.

3. The Failure Investigation Process was implemented to determine the cause of the loss of 2A Busline.

4. Engineering, Maintenance and Switchyard personnel conducted a walkdown of the relays, CBs and associated bus work.

5. Maintenance personnel verified current readings and setpoints in all 525KV bus differential relays and found all relays to be within limits and specifications.

Planned:

1. Practices for breaker maintenance will be evaluated to determine required procedure changes to facilitate proper grounding and prevention of further events of this nature.

SAFETY ANALYSIS:

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.

- This event resulted in the loss of 2A Busline and an automatic start of the EDG 2A.
- At the time of the event, Unit 2 was in Mode 5 with core cooling being provided by the Train 2B Residual Heat Removal (ND) [EIIS: BP] system.
- Throughout the event, 2B Busline and 4160V Essential Bus 2ETB remained energized and core cooling was never interrupted.
- Following the lightning strike, protective relaying in the McGuire Nuclear Station 525KV switchyard responded as expected to clear the fault.
- Response of EDG 2A upon receipt of the automatic start signal from the load sequencer was as expected, with the EDG reaching the required voltage and frequency within the specified time limit.
- An automatic slow bus transfer resulted in the restoration of voltage to 2ETA within approximately 2.8 seconds.
- Loading of the EDG 2A was not required and did not occur.