NRC Form 366 (9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Grand Gulf Nuclear Station - Unit 1	0 5 0 0 0 4 1 6	1 OF 0 4

TITLE (4)
Reactor Scram Induced by Lightning Strikes Affecting Neutron Monitoring System

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)
0 8	1 5	8 8	8 8	0 1 2	0 1	1 1	3 0	8 8	NA	0 5 0 0 0
										0 5 0 0 0

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)	1 0 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
Paul M. Different/Licensing Engineer	6 0 1 4 3 7 - 2 1 6 7

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
X YES (If yes, complete EXPECTED SUBMISSION DATE)	NO		0 6	3 0	8 9

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

On August 15, 1988 at 1553 hours the plant tripped on Average Power Range Monitors (APRM) Neutron Flux High signal. An electrical storm with lightning strikes was occurring in the general site area. Several APRM channels momentarily spiked high due to an inherent condition within the APRMs and/or the plant electrical grounding system which transmitted the voltage spikes to the APRMs.

All plant systems responded as designed. The APRM cabinets were visually inspected for general condition and for the presence of grounding straps. No obvious discrepancies were observed.

An engineering task force was assembled to investigate the root cause and recommend corrective actions to eliminate the problem. Preliminary results of a General Electric inspection team attributed the spike to a grounding strap for the plant security fence located on the roof of the Turbine and Control Buildings. The grounding strap was routed across the roof and down the side of the Control Building and then across the roof of the Auxiliary Building in close proximity to the signal cables of the APRM channels that spiked. It then tied in with another grounding strap which is tied to the plant grounding mat. The grounding strap has been relocated to a non-sensitive area to prevent interference with the APRMs. Further study of the cause and corrective actions is required and the results will be provided in a followup to this report by June 30, 1989.

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NRC Form 366A (9-83)

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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

A. REPORTABLE OCCURRENCE

On August 15, 1988 at 1553 hours the plant tripped on Average Power Range Monitors (APRM) Neutron Flux High signal. This event is reported pursuant to 10CFR50.73 (a)(2)(iv).

B. INITIAL CONDITION

The plant was in Operational Condition 1 at 100 percent of rated thermal power. A seasonal electrical storm was occurring in the general site area.

C. DESCRIPTION OF OCCURRENCE

On August 15, 1988 at 1553 hours the plant tripped on an APRM (EIIS System Code IG) Neutron Flux High signal. An electrical storm with lightning strikes was occurring onsite. Several actual lightning strikes were observed by plant personnel at the approximate time of the plant trip. The APRM spikes recorded at the time of the event were as follows:

APRM Channel	Division	Peak Indicated Flux (percent)
A	1	No spike
B	2	105
C	3	122
D	4	132
E	1	No spike
F	2	106
G	3	127
H	4	131

A full scram signal requires a trip of Division 1 or 3 in conjunction with a trip of Division 2 or 4. APRM channels C, D, G, and H exceeded their trip setpoints of 118 percent. The duration of the spikes was less than one-tenth of a second.

An examination of recorded reactor pressure, core flow and control rod status shows no evidence that actual neutron flux increased. No potential causes for a rapid reactivity insertion to produce such a neutron flux spike could be identified. Thus, it was concluded that a voltage spike was induced by the electrical storm and transmitted to the APRM channels causing the plant trip.

The APRM cabinets and associated cables were visually inspected for general conditions and for the presence of grounding straps. No obvious discrepancies were observed. The Local Power Range Monitors (LPRM) which provide the flux signals to the APRMs were monitored during the restart to check for proper sensitivity and response after the voltage spike. No unusual conditions associated with the LPRMs were observed.

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The APRMs have a history of spurious high trips attributed to problems with the grounding system. Previous lightning storms have caused similar events on July 12, 1982 and July 27, 1983. Another event occurred on June 8, 1988 when APRM channels D and H tripped on Neutron Flux High giving a half-scram. A ground fault trip of a large fan was believed to have caused a voltage spike that was sensed by the APRMs.

D. APPARENT CAUSE

An inspection team from General Electric (GE) was on-site the week of November 7, 1988 to determine the root cause of the APRM grounding problems. Preliminary results of their inspection determined the cause to be the location of a grounding strap for the plant security fence on the roof of the Control and Turbine Buildings separating Unit 1 and Unit 2. GE engineers suspect that a lightning strike on or near the fence could create enough current in the grounding strap to create spikes in nearby cables.

The grounding strap was routed across the roof and down the side of the Control Building and then across the roof of the Auxiliary Building in close proximity to conduit runs containing Division 3 and 4 APRM signal cables. It then tied in with another grounding strap which is tied to the plant grounding mat.

Division 2 cables were located a little further away from the grounding strap while Division 1 cables were too far away to be affected by the grounding strap. This is consistent with the spikes recorded for each of the APRM channels during the event.

E. SUPPLEMENTAL CORRECTIVE ACTIONS

An engineering task force was assembled to investigate the root cause and recommend corrective action to eliminate the problem. Walkdowns of LPRM cable runs, APRM cabinet common grounds, and a review of past improvements to the plant grounding system were begun.

As a result of the preliminary recommendations and findings from the GE team, the grounding strap for the fence has been relocated to prevent interference with the APRMs. Additional corrective actions may be necessary when the final, approved GE report is received.

Lightning protection for the plant will be investigated in conjunction with the GE report to determine the final corrective actions needed. The current security fence might be removed entirely from the Turbine and Control Building roofs when the revised Security Plan is approved and implemented in early 1989 incorporating Unit 2 into the Protected Area. A followup to this report will be provided by June 30, 1989.

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F. SAFETY ASSESSMENT

A review of plant data shows that actual neutron flux did not increase. The APRMs tripped the plant on a Neutron Flux High signal induced by lightning strikes from an electrical storm.

This condition did not prevent the APRMs from performing their intended safety function, but did result in an unnecessary challenge to plant safety systems. All plant systems responded as designed. At no time was the health or safety of the public affected.

SYSTEM ENERGY RESOURCES, INC.

JOHN G. CESARE, JR.
Director
Nuclear Licensing

November 30, 1988

U. S. Nuclear Regulatory Commission
Mail Station P1-137
Washington, D. C. 20555

Attention: Document Control Desk

Gentlemen:

SUBJECT: Grand Gulf Nuclear Station
Unit 1
Docket No. 50-416
License No. NPF-29
Reactor Scram Induced by
Lightning Strikes Affecting
Neutron Monitoring System
LER 88-012-01
AECM-88/0234

Attached is Licensee Event Report (LER) 88-012-01 which is an interim report.

Yours truly,

JGC:aly
Attachment

cc: Mr. W. T. Cottle (w/a)
Mr. T. H. Cloninger (w/a)
Mr. R. B. McGehee (w/a)
Mr. N. S. Reynolds (w/a)
Mr. H. L. Thomas (w/o)
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