Entergy

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Christina L. Perino
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GNRO-2009/00034

July 02, 2009

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

Subject: LER 2009-002-00 – Emergency Diesel Actuation Caused by Degraded DC Control Battery

Grand Gulf Nuclear Station, Unit 1
Docket No. 50-416
License No. NPF-29

Dear Sir or Madam:

Attached is Licensee Event Report (LER) 2009-002-00 which is a final report.

This letter does not contain any commitments. Should you have any questions regarding this report, please contact Christina L. Perino at 601-437-6299.

Sincerely,

CLP/MJL

attachment: LER 2009-002-00

cc: (See Next Page)

cc: NRC Senior Resident Inspector
Grand Gulf Nuclear Station
Port Gibson, MS 39150

U. S. Nuclear Regulatory Commission
ATTN: Mr. Elmo E. Collins (w/a)
Regional Administrator, Region IV
612 East Lamar Drive, Suite 400
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U.S. Nuclear Regulatory Commission
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NRC FORM 366 (9-2007) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 08/31/2010

Estimated burden per response to comply with this mandatory 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 and FOIA/Privacy Service Branch (T-5 F52), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects@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 an 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
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4. TITLE Emergency Diesel Generator Actuation Caused by a Degraded DC Control Battery

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									N/A	N/A
05	05	2009	2009	- 002 -	00	07	02	2009	FACILITY NAME: N/A	DOCKET NUMBER: N/A

9. OPERATING MODE

1

10. POWER LEVEL

100

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

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

12. LICENSEE CONTACT FOR THIS LER

FACILITY NAME	TELEPHONE NUMBER (Include Area Code)
Christina L. Perino, Licensing Manager	601-437-6299

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
		N/A							

14. SUPPLEMENTAL REPORT EXPECTED

☐ YES *(If yes, complete 15. EXPECTED SUBMISSION DATE)* ☒ NO

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR

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

On May 5, 2009 at 2327 hours Central Daylight Time, Grand Gulf Nuclear Station was in Mode 1 operating at approximately 100 percent power when a valid Engineered Safety Feature (ESF) actuation of the Division 1 Emergency Diesel Generator and Standby Service Water A occurred. The actuation occurred due to a degraded voltage condition on ESF Transformer 12 which initiated a Load Shed and Sequence on the 15AA bus, which required the EDG to start and supply AC power to the bus. The cause of the ESF actuation was a 90% bus undervoltage condition that lasted for greater than nine seconds due to feeder breaker 5X01 and main breaker 5X22 failing to open and clear a fault on over current in the required 3 to 5 cycles. The feeder breaker and main breaker did not open due to low DC control voltage which was caused by a degraded 48 VDC battery bank. The battery bank (24 cells) was inspected and found to have visual cell damage in one cell. Additional cell testing was performed on the battery bank and two of the tested cells were found to have unsatisfactory results. The degraded 48 VDC battery bank was replaced with a new 48 VDC battery bank on May 11, 2009 and the new battery is working properly. Additionally, breaker maintenance and testing was performed on breakers 5X01 and 5X22.

A. REPORTABLE OCCURRENCE

On May 5, 2009 at 2327 hours Central Daylight Time (CDT), Grand Gulf Nuclear Station was in Mode 1 operating at approximately 100 percent power when a valid Engineered Safety Feature (ESF) actuation of the Division 1 Emergency Diesel Generator (EDG) [EK] and Standby Service Water (SSW) [BS] A occurred. The actuation occurred due to a degraded voltage condition on ESF Transformer 12 [XFMR] which initiated a Load Shed and Sequence (LSS) on the 15AA bus [EB], which required the EDG to start and supply AC power to the bus. The following occurrences were considered reportable:

- ESF actuation of Emergency Diesel Generator (Reference: 10 CFR 50.73(a)(2)(iv) (A) & (B)(8))
- ESF actuation of SSW A (Reference: 10 CFR 50.73(a)(2)(iv) (A) & (B)(9))

Notification was made to the NRC's Emergency Notification System (ENS) reporting this condition pursuant to 10 CFR 50.72(b)(3)(iv)(A) and 10CFR50.72(b)(3)(iv)(B)(8) and this event is reported under 10 CFR 50.73(a)(2)(iv)(A).

B. INITIAL CONDITIONS

At the time of the event, the reactor was in OPERATIONAL MODE 1 with reactor power at approximately 100 percent. There were no additional inoperable structures, systems, or components at the start of the event that contributed to initiation of the event. At the time of the event, Service Transformer 21 was removed from service for planned maintenance, but did not contribute to the initiation of the event.

C. DESCRIPTION OF OCCURRENCE

A valid Engineered Safety Feature actuation for Division 1 Emergency AC power for the 15AA bus occurred at 2327 hours CDT on May 5, 2009 due to a degraded voltage condition on ESF Transformer 12. A simplified drawing is provided to assist with explanation of the event in Figure 1. ESF Transformer 12 was supplying power to the 15AA bus due to Service Transformer 21 being out of service for maintenance. A fault occurred on the site power loop at switch 389-2901S initiating trip signals to breakers 5X01 and 5X22. When power switch 389-2901S faulted, both breakers failed to trip at the prescribed settings. These breakers should have cleared the fault in 3 to 5 cycles. However, about 21 seconds later, the site power loop 115 kV/13.8 kV transformer high over current backup circuitry responded and caused the transformer differential lockout relay to activate, sending trips to main breaker 5X22 and the motor operated air breaker switch J3872 at which point the fault cleared.

During the fault condition, the voltage on the incoming 115 kV offsite power circuit from Port Gibson degraded to 101.5 KV (approximately 0.883 Percent Undervoltage-PU or 88.3%) and persisted for approximately 21 seconds until the fault cleared. Since the Division 1 ESF 15AA bus was aligned to receive power from the ESF Transformer 12 and the 115 kV line offsite power circuit from Port Gibson, the protective settings for the 15AA bus Division 1 Load Shed and Sequencing panel were met for the sustained (21 seconds) degraded grid values of 0.9 PU for 9 seconds. This resulted in the LSS panel tripping the incoming feeder breaker (152-1511) to the 15AA bus from ESF Transformer 12, stripping the loads from the bus, starting the Division 1 EDG, connecting the EDG to the 15AA bus when voltage and frequency were stable, and sequencing the required loads to the bus.

C. DESCRIPTION OF OCCURRENCE (cont.)

Additionally the SSW A system automatically started due to the Division 1 EDG starting. It provided the required cooling water to support EDG operation.

Operators implemented appropriate off normal event procedures to mitigate the transient and all systems, following the event, responded as designed. The faulted electrical switch 389-2109S was found smoldering and emitting smoke. The onsite fire brigade was dispatched but no extinguishing agents were administered due to the fire self-extinguishing.

D. APPARENT CAUSE

The cause of the ESF actuation was a 90% bus undervoltage condition that lasted for greater than nine seconds due to feeder breaker 5X01 and main breaker 5X22 failing to open and clear a fault on over current in the required 3 to 5 cycles. The 5X01 and 5X22 breakers did not open in the required 3 to 5 cycles due to low DC control voltage, which was caused by a degraded 48 VDC battery bank [BTRY]. The battery bank (24 cells) was inspected and found to have visual cell damage in one cell. Additional cell testing was performed on the battery bank and two of the tested cells were found to have unsatisfactory results. The battery bank in question is 13 years old, located in an outside metal building, and maintained by Entergy, Mississippi personnel.

E. CORRECTIVE ACTIONS

Immediate Corrective Actions – The degraded 48 VDC battery bank was replaced with a new 48 VDC battery bank on May 11, 2009 and the new battery is working properly. Additionally, breaker maintenance and testing was performed on breakers 5X01 and 5X22.

Long Term Corrective Actions - Condition Report GGN-2009-2347 was written and will address any additional actions.

F. SAFETY ASSESSMENT

This event did not prevent the fulfillment of a safety function and there were no safety system functional failures. The Division 1 LSS initiation, EDG start to supply AC power to the 15AA bus, and start of the Standby Service Water A system to cool the EDG, all responded as expected. Based on the discussion provided, the health and safety of the public was not compromised by this event.

G. ADDITIONAL INFORMATION

Previous Similar Events - There has not been any occurrence of the same underlying concern in the past five years at Grand Gulf Nuclear Station.

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Figure 1 – Simplified Drawing