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GNRO-2011/00028

May 12, 2011

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

SUBJECT: LER 2011-001-00 High Pressure Core Spray (HPCS) Inoperability - Failure Due To Failed Test Equipment
Grand Gulf Nuclear Station, Unit 1
Docket No. 50-416
License No. NPF-29

Dear Sir or Madam:

Attached is Licensee Event Report (LER) 2011-001-00 which is a final report. This report is submitted in accordance with 10 CFR 73(a)(2)(v)(D).

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

Respectfully,

CLP/JAS

Attachments: 1. Licensee Event Report (LER) 2011-001-00

cc: Mr. Elmo Collins
Regional Administrator, Region IV
U. S. Nuclear Regulatory Commission
612 E. Lamar Blvd., Suite 400
Arlington, TX 76011-4125

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

U. S. Nuclear Regulatory Commission
ATTN: Mr. A. B. Wang, NRR/DORL (w/2)
ATTN: ADDRESSEE ONLY
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Mail Stop OWFN/8 B1
11555 Rockville Pike
Rockville, MD 20852-2378

Attachment
To
GNRO-2011/00028

Licensee Event Report (LER) 2011-001-00

NRC FORM 366 (10-2010) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB: NO. 3150-0104 EXPIRES: 10/31/2013

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@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)

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4. TITLE

High Pressure Core Spray (HPCS) Failure Due To Failed Test Equipment

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
03	19	2011	2011	001	00	05	12	2011	FACILITY NAME N/A	DOCKET NUMBER N/A

9. OPERATING MODE

1

10. POWER LEVEL

096 percent

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 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
X	BG	BKR	P309	Y					

14. SUPPLEMENTAL REPORT EXPECTED

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

15. EXPECTED SUBMISSION DATE

MONTH	DAY	YEAR
N/A	N/A	N/A

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

On March 19, 2011 at 2236, with the plant operating at 96 percent power, the high pressure core spray (HPCS) pump was declared inoperable following the discovery of a degraded breaker that supplied power to the HPCS Minimum Flow Valve. The cause of the degraded breaker was the breaker's instantaneous overcurrent trip setpoint found out of tolerance during testing. The investigation of this event determined that the cause of the degradation was the result of a loss of power to a current calibrator installed for the performance of the HPCS System Flow Rate Low (Bypass) Functional Test. The loss of power caused repeated cycling of the valve and the resulting surge currents created excessive heat in the circuit breaker instantaneous trip and overload circuits. This degraded the instantaneous overcurrent trip setpoint which resulted in the breaker tripping at a setpoint that was out of tolerance.

The breaker was replaced and the HPCS system was restored to its standby condition on March 20, 2011 at 0700. The functional test procedure was updated to require either new batteries to be utilized or the test equipment to be used with AC power.

This condition is being reported in accordance with 10 CFR 50.73(a)(2)(v)(D) as the loss of a system needed to mitigate the consequences of an accident. No other safety-related systems were out of service during the time that the HPCS system was inoperable. This event was of minimal significance with respect to the health and safety of the public.

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NARRATIVE

A. Reportable Occurrence

The High Pressure Core Spray (HPCS) system [BG] was declared inoperable due to discovery of HPCS Minimum Flow Valve (1E22F012) breaker (52-170109) instantaneous overcurrent trip set point to be out of tolerance, resulting in a single train failure.

B. Initial Conditions

The reactor was in OPERATIONAL MODE 1 with reactor power at approximately 96 percent. There were no additional inoperable structures, systems, or components that contributed to this event.

C. Description of Occurrence

On March 18, 2011 Instrument and Control (I&C) technicians were in the process of performing Surveillance 06-IC-1E22-Q-0004, HPCS System Flow Rate Low (Bypass) Functional Test. The HPCS system was inoperable at this time for the scheduled maintenance. The I&C surveillance required installing a current calibrator into the control circuit for 1E22F012, HPCS Minimum Flow Valve. While connected, the current calibrator failed due to loss of battery power. This caused a repeated cycling of the HPCS Minimum Flow Valve (1E22F012). 1E22F012 power was lost and it was identified that 1E22F012 feeder breaker, 52-170109 had tripped. Breaker 52-170109 was tested, the current calibrator was replaced and the surveillance was completed successfully. On March 18, 2011, at 1127 the HPCS system was declared operable.

During the debrief of the electrical technician who had completed the retest and reinstalled the breaker, it was discovered that the breaker testing was inadequate. The retest instructions specified in the work order were not clear as to the intent and did not adequately check the breaker overcurrent instantaneous trip setpoint. Preparations were started to retest breaker 52-17019. On March 19, 2011, at 0330 the HPCS system was declared inoperable to allow the breaker to be removed for testing.

On March 19, 2011, at 2236 breaker 52-170109 was tested and it tripped at an instantaneous setting of 58 amps. The breaker tripping at 58 amps which is below the manufacturer's tolerance for the existing setting of 107 amps. This rendered the single train system incapable of fulfilling its safety function.

The HPCS system being incapable of fulfilling its safety function met the criteria of 10 CFR 50.72(b)(3)(v)(D) for an 8 hour Nuclear Regulatory Commission (NRC) required report. The time of discovery was March 19, 2011 at 2236.

On March 20, 2011, at 0700 following successful post maintenance testing, HPCS was declared operable.

NARRATIVE

D. Cause of Occurrence

The repeated cycling of the valve open and closed and the resulting surge currents created excessive heat in the circuit breaker instantaneous trip and overload circuits. The condition caused the failure of the motor overload relay circuit to trip and also resulted in breaker setpoint drift. This resulted in the single train system being inoperable.

The root cause of the failure was a power failure in the current calibrator test equipment used in performance of the HPCS System Flow Rate Low (Bypass) Functional Test. The loss of power was due to exhaustion of the batteries powering the unit.

The contributing factor was the lack of procedural guidance requiring new batteries or use of the AC power source.

Corrective Actions

Immediate Actions

1) A replacement breaker was obtained, tested and installed.
2) Valve 1E22F012 was retested after breaker replacement.

The corrective actions for the contributing cause are:

- Procedure 06-IC-1E22-Q-0004 was revised to require either use of new batteries or A/C power when using the current calibrators
- Clarify what value of milliamp direct current (madc) to input when using the current calibrator

The corrective actions were completed as required by the GGNS Corrective Action Program under CR-GGN-2011-1902.

E. Safety Assessment

According to the GGNS Technical Specification Bases, the High Pressure Core Spray (HPCS) is part of the Emergency Core Cooling Systems (ECCS). The ECCS is designed, in conjunction with the primary and secondary containment, to limit the release of radioactive materials to the environment following a loss of coolant accident (LOCA). The ECCS uses two independent methods (flooding and spraying) to cool the core during a LOCA. The ECCS network is composed of the High Pressure Core Spray (HPCS) System, the Low Pressure Core Spray (LPCS) System, and the low pressure coolant injection (LPCI) mode of the Residual Heat Removal (RHR) System. The ECCS also consists of the Automatic Depressurization System (ADS). The suppression pool provides the required source of water for the ECCS. The design basis of the HPCS System is to provide core cooling over a wide range of RPV pressures (0 psid to 1177 psid, vessel to suction source). Upon receipt of an initiation signal, the HPCS pump automatically starts approximately 10 seconds after AC power is available and valves in the flow path begin to open. Since the HPCS System is designed to operate over the full range of expected RPV pressures, HPCS flow begins as soon as the necessary valves are open. The TS Bases also states that the ECCS System satisfies Criterion 3 of the NRC Policy Statement. This means that it is considered to be a part of the primary success path which functions to mitigate a design basis accident or transient that either assumes the failure of or presents a challenge to the integrity of a fission product barrier.

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NARRATIVE

F. Safety Assessment (continued)

The HPCS system was inoperable and incapable of performing its design function for approximately 15.5 hours. The GGNS UFSAR states that in the event of a HPCS system failure such that HPCS cannot maintain the reactor water level, the automatic depressurization system, which is independent of any other ECCS, reduces the reactor pressure so that flow from LPCI and LPCS systems enters the reactor vessel in time to cool the core and limit fuel cladding temperature. Additionally, high pressure makeup was available from the reactor core isolation cooling (RCIC) system. Two of three divisions of emergency core cooling systems (ECCS) are required for the GGNS loss of coolant accident analyses. While HPCS was out of service, Division 1 and Division 2 ECCS systems and the automatic depressurization system were operable, and would have met the ECCS performance criteria of 10CFR50.46. The out of service time was maintained within the limits of GGNS technical specifications, thereby minimizing any safety significance of this event.

G. Additional Information

Previous Occurrences - There has not been any occurrence of an HPCS event or condition in the past two years at Grand Gulf Nuclear Station involving reportability under 10CFR50.73(a)(2)(D) or involving these same conditions. The corrective action response addressed the extent of the cause of this event. HPCS is a single train system.