

NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES: 8/31/85

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Grand Gulf Nuclear Station - Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 4 1 6 1 OF 0 8				PAGE (3) 1 OF 0 8	
TITLE (4) Turbine Trip and Scram on Loss of Condenser Vacuum															
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 NA				DOCKET NUMBER(S) 0 5 0 0 0		
0 2 1 0	8 5	8 5	0 0 7	0 1	0 8 2 3 8 5					0 5 0 0 0					
OPERATING MODE (9) 1		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 8: (Check one or more of the following) (11)													
POWER LEVEL (10) 0 4 9		20.402(b)				20.405(c)				<input checked="" type="checkbox"/> 50.73(a)(2)(iv)				73.71(b)	
		20.405(a)(1)(i)				50.36(c)(1)				<input type="checkbox"/> 50.73(a)(2)(v)				73.71(c)	
		20.405(a)(1)(ii)				50.36(c)(2)				<input type="checkbox"/> 50.73(a)(2)(vii)				<input checked="" type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 366A)	
		20.405(a)(1)(iii)				50.73(a)(2)(ii)				<input type="checkbox"/> 50.73(a)(2)(viii)(A)				10 CFR 21	
		20.405(a)(1)(iv)				50.73(a)(2)(iii)				<input type="checkbox"/> 50.73(a)(2)(viii)(B)					
		20.405(a)(1)(v)				50.73(a)(2)(iii)				<input type="checkbox"/> 50.73(a)(2)(ix)					
LICENSEE CONTACT FOR THIS LER (12)															
NAME E. Boyd Shingleton/Licensing Engineer										TELEPHONE NUMBER 6 0 1 9 6 9 - 2 4 0 4					
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	JIM	ISOIL	A41919	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)

While Steam Jet Air Ejectors (SJAES) were being transferred from the "B" train to the "A" train, condenser vacuum decreased to the turbine trip setpoint, tripping the turbine and causing a reactor scram. Subsequent to the scram, while shutting Main Steam Isolation Valves (MSIVs) to limit the cooldown rate, three of the MSIVs failed to close normally.

The failure of the MSIVs to close normally was due to failure of the dual solenoid valves to transfer when de-energized. The ASCO Model HTX832320V solenoid valve failures were determined reportable under the provisions of 10CFR21 for GGNS Unit 1 and were initially reported to the NRC in AECM-85/0096 [identified as Reportable Deficiency (RD) 85/03]. An interim 10CFR21 report was provided in AECM-85/0142.

The first section of this report describes the operational event which was previously reported in AECM-85/0080 and contains updated information required by 10CFR50.73. The second section specifically addresses the associated failure of the ASCO solenoid valves and contains additional information required by 10CFR21.

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TEXT (If more space is required, use additional NRC Form 365A's) (17)

A. OPERATIONAL EVENT (Final 10CFR50.73 Report)

1. Description of Reportable Occurrences

On February 10, 1985 at 0650 the operators were in the process of swapping the Steam Jet Air Ejectors (SJAEs) when the reactor scrambled due to a turbine trip on loss of condenser vacuum.

2. Initial Conditions

The plant was operating at approximately 49% reactor power. The "B" SJAE was not able to maintain condenser vacuum. The breaker for suction valve F003B on the "B" train was tagged open for maintenance work.

3. Status of Redundant or Backup Systems

Not Applicable

4. Nature of Occurrence

SJAE "A" was being placed in service due to apparent intercondenser fouling of SJAE "B". However, with the "A" train supply valve, F505A, fully open, the steam supply pressure to the SJAE "A" was only about 60 psig. In order to increase the steam supply pressure, the "B" SJAE supply valve, F505B, was throttled closed. The steam supply pressure increased to 115 psig. At this time, the operators noticed that condenser vacuum was decreasing. The F003A valve, which needed to be open to increase the vacuum, was found to have dual indication. The valve was given an open signal both locally and remotely, however, the valve did not respond. An operator was sent to open the "A" train suction valve while another was sent to clear the tag and close the SJAE "B" suction valve F003B. During this time condenser vacuum decreased to the turbine trip setpoint and a turbine trip occurred followed by a reactor scram.

At approximately 0804 the MSIVs were slow closed to limit the cooldown rate. Upon taking the associated handswitches to close following the slow closure of the MSIVs, B21-F028A, B21-F028C, and B21-F022D re-opened. Several attempts were made to close the valves before they were successfully closed.

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5. Immediate Corrective Actions Taken

The applicable Off-Normal-Event Procedures were carried out and the scram was reset. MSIVs F028A, F028C, and F022D were declared inoperable.

6. Apparent Cause

The F003A valve would not respond because it had tripped on thermal overload (possibly due to valve cycling). If this had not occurred the turbine may not have tripped on low vacuum. It appears that the thermal overload trip was caused by excessive automatic cycling of the valve on low steam flow due to undersized piping to the SJAES.

The failure of the MSIVs to stay closed after being shut with the test circuit and their inability to be closed normally indicated a failure of the dual solenoid valve to transfer when de-energized. The vendor (ASCO) and General Electric conducted investigative tests/analyses in an effort to determine root cause (details provided in Section B.7.a below). The results of these tests were inconclusive. The plant replaced all eight solenoid valves.

7. Supplemental Corrective Action

The B intercondenser was cleaned. Design Change Package (DCP) 83/542 has been implemented to increase the size of the SJAE steam supply piping to provide more flow to the SJAES.

An NRC approved compensatory action schedule for exercising the MSIVs was implemented prior to startup. The MSIV solenoid valves were replaced. Further details on corrective actions related to the solenoid valves are described in section B.7.a below.

8. Safety Assessment

There are no safety consequences associated with the loss of vacuum, resultant turbine trip and reactor scram. The MSIVs were not performing their containment isolation safety function at the time of failure (i.e., being closed to control reactor cooldown rate) and the affected Main Steam Lines were isolated by redundant valves.

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B. REPORTABLE DEFICIENCY (Final 10CFR21 REPORT)

1. Name and address of the individual informing the commission:

J. B. Richard
 Senior Vice President, Nuclear
 P. O. Box 1640
 Jackson, Mississippi 39205

2. Identification of the facility . . . which . . . contains a defect:

Grand Gulf Nuclear Station (GGNS) Unit 1
 Port Gibson, Mississippi 39150

3. Identification of the firm . . . supplying the basic component which . . . contains a defect:

The Main Steam Isolation Valves were supplied to GGNS by General Electric Company, San Jose, California. The valve actuators were manufactured by Hiller-Sheffer Corporation and the solenoid valves which are installed on these actuators were supplied by the Automatic Switch Company (ASCO), Florham Park, New Jersey.

4. Nature of defect . . . and the safety hazard which . . . could be created by such a defect . . .

a. Description of the Defect

On February 10, 1985, following a reactor scram, the Main Steam Isolation Valves (MSIVs) were manually slow closed in the "Test" position to limit the reactor cooldown rate. Following the slow closure procedure, the associated handswitches were placed in the "CLOSED" position. At this point, three MSIVs (one inboard B21-F022D and two outboard B21-F028 A & C) re-opened.

One set of solenoid valves, single solenoid ASCO model HTX832020V is utilized to slowly close the MSIVs and the other set of solenoid valves, dual solenoid ASCO Model HTX832320V, which are the fast closure solenoid valves used in an accident, hold the MSIVs closed. The cause of the failure of the MSIVs to close has been attributed to the second set of solenoid valves, ASCO Model HTX 832320V, which failed to actuate when energized.

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The purpose of the MSIVs is to isolate the Main Steam Lines to limit the release of radioactivity to less than the specifications of 10CFR100 in the event of a steam line break outside the primary containment.

b. Analysis of Safety Implications:

It should be noted that only one MSIV in three steam lines (A, C, & D) failed to remain closed. However, the failures have been attributed to the ASCO Model HTX832320V solenoid valves which failed to transfer when de-energized. Therefore, based on the redundant basic component guidelines, as defined in NUREG-0302, it is conservatively postulated that a failure of both MSIVs in a steam line could potentially exist. This failure coincident with a postulated Main Steam Line break outside the primary containment, and absence of operator action, could result in a reduction in the degree of protection provided to public health and safety.

5. The date on which the information of such defect . . . was obtained:

Mississippi Power & Light received information of the deficiency on February 10, 1985. An evaluation under the guidelines of 10CFR21 was concluded on March 20, 1985.

6. In case of the basic component . . . the number and location of all such components:

There were eight ASCO Model HTX832320V dual solenoid valves installed on the MSIVs at GGNS Unit 1. A review of GGNS safety-related documentation has identified another area of concern where a ASCO Model HTX832320V dual solenoid valve is utilized. This solenoid valve is located in the CRD system (C11F009).

7. The corrective action which has been taken . . . the name of the individual responsible for the action; and the length of time that has been . . . taken to complete the action:

a. Corrective Actions Taken

Material Nonconformance Report MNCR #0070-85 was issued to document the condition.

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As noted in MP&L's previous submittals, tests/analyses were being conducted by General Electric (GE) and the Automatic Switch Company (ASCO) to determine the cause and any further corrective actions, if required. The testing has since been completed. The following is a summary of the GE and ASCO tests/analyses results:

Two of the three solenoid valves which failed at GGNS also sporadically failed to transfer during testing at elevated temperatures. These two valves were the only valves that failed during these tests. However, these failures were not predictable. Subsequently, five valves from Grand Gulf service were disassembled and inspected. This inspection identified a microscopic foreign substance on the lower core/plug nut interfaces on all five valves.

Further evaluations of this microscopic substance were inconclusive because of the small foreign substance sample size. After cleaning and reassembly of these valves, tests were conducted on four of these five valves at elevated temperatures. These four valves functioned normally. ASCO felt certain that the valve failures resulted from high-temperature sticking of the lower core-to-plug nut faces due to a foreign substance or combination of substances collected at this interface.

A detailed dimensional analysis and comparison among the valves returned from Grand Gulf indicated that all parts were within allowable limits and differences were not enough to cause a failure-to-shift. Therefore, this examination relieved any concerns relating to a generic design/manufacturing defect.

In the interim report, it was noted that MP&L was in the process of sending to GE the remaining two HTX 832320V solenoid valves that had been in MSIV service at GGNS. GE was attempting to locate additional foreign substance from these valves to determine how the foreign substance got in the valve, or where it originated. GE was able to scrape some small amounts of foreign substance from the lower core-to-plug nut interface. However, there was not enough residue to make a definitive identification of the nature of the foreign substance.

As a result of these tests, GE recommended that MP&L replace the potentially contaminated MSIV solenoid valves and institute a periodic examination and cleaning of the MSIV solenoid valves. MP&L concurs in part with GE's recommendation. MP&L has

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replaced the eight MSIV HTX832320V dual solenoid valves with fully environmentally qualified ASCO Model NP8323A20E dual solenoid valves. However, MP&L does not believe that the periodic examination and cleaning of the MSIV solenoid valves is warranted. Rationale in support of MP&L's position is: (a) during testing, only two of five valves known to contain the foreign substance failed (the same two valves that failed at GGNS, therefore, it can not be definitely concluded that the foreign substance was the cause of failure), (b) the air system has previously been cleaned (flushed the copper portions as a result of a separate issue), (c) the air system is regularly inspected for contaminants, (d) during testing, no valves exhibited failures below 150°F, implying a temperature dependent failure mode, and (e) replacement of the eight MSIV dual solenoid valves with fully environmentally qualified valves.

A review of GGNS safety-related documentation has identified another area of concern where a dual solenoid valve (HTX832320V) is utilized. This solenoid valve is located in the CRD system(C11F009). This solenoid valve had been scheduled to be replaced during the first refueling outage with a VALCOR solenoid valve per Design Change Package (DCP) 81/5007 prior to discovery of this defect. Delay of DCP implementation is justified since the design of the C11 system is such that should this valve fail to function during a scram, sufficient redundancy exists to provide the same function.

Verification that the newly installed NP8323A20E dual solenoid valves are functioning properly is being accomplished during the MSIV closure time testing in accordance with Technical Specification 4.4.7, i.e., closure of the MSIV within the required 3-5 seconds will indicate that the dual solenoid valve is functioning properly. These valves are also used during normal closure and during plant shutdowns. Improper functioning of the valves would be detected at that time.

b. Responsible Individual

J. B. Richard
Senior Vice President, Nuclear
Mississippi Power & Light Company

c. Length of Time to Complete Actions

1. Replacement of the eight MSIV solenoid valves has been completed. The replacement of CRD solenoid valve C11F009 is scheduled to be completed prior to restart from the first refueling outage.

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2. Tests will be conducted in accordance with Technical Specification 4.4.7.

8. Any advice related to the defect . . . that has been, is being, or will be given to purchasers or licensees:

MP&L has no other advice to offer



MISSISSIPPI POWER & LIGHT COMPANY

Helping Build Mississippi

P. O. BOX 1640, JACKSON, MISSISSIPPI 39215-1640

August 23, 1985

NUCLEAR LICENSING & SAFETY DEPARTMENT

Document Control Desk

U. S. Nuclear Regulatory Commission

Washington, D. C. 20555

Gentlemen:

SUBJECT: Grand Gulf Nuclear Station
Units 1 and 2
Docket Nos. 50-416 and 50-417
License No. NPF-29
File: 0260/L-835.0/0511/0512
Turbine Trip and Scram on Loss of
Condenser Vacuum
LER 85-007-1
AECM-85/0260

References: (1) AECM-85/0080, March 12, 1985
(2) AECM-85/0096, March 26, 1985
(3) AECM-85/0142, April 30, 1985

Attached is Licensee Event Report (LER) 85-007-1 which is a final report. Revision 1 includes a final 10CFR21 report for Unit 1 concerning the ASCO Model HTX832320V dual solenoid valve deficiency previously reported separately from the LER in References (2) and (3). An evaluation to determine 10CFR50.55(e) and 10CFR21 applicability to Unit 2 will be conducted upon resumption of normal Unit 2 construction activities.

Yours truly,

L. F. Dale
Director

EBS/SHH:vog
Attachment

cc: (See Next Page)

IF22
1/1

cc: Mr. J. B. Richard (w/a)
Mr. O. D. Kingsley, Jr. (w/a)
Mr. R. B. McGehee (w/a)
Mr. N. S. Reynolds (w/a)
Mr. H. L. Thomas (w/o)
Mr. R. C. Butcher (w/a)

Mr. James M. Taylor, Director (w/a)
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