



ENTERGY

Entergy Operations, Inc.
P.O. Box 766
Fort Gibson, MO 64501
Tel 601 437 6425

W. T. Cottle
Vice President
Operations
Grand Gulf Nuclear Station

May 15, 1992

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

Attention: Document Control Desk

SUBJECT: Grand Gulf Nuclear Station
Unit 1
Docket No. 50-416
License No. NPF-29
Voluntary Report on Suppression Pool Makeup System
LER 92-002-00

GNRO-92/00044

Gentlemen:

Attached is Licensee Event Report (LER) 92-002 which is a final report.

Yours truly,

WTC/WBA/cg
attachment

- cc: Mr. D. C. Hintz (w/a)
- Mr. J. L. Mathis (w/a)
- Mr. R. B. McGehee (w/a)
- Mr. N. S. Reynolds (w/a)
- Mr. H. L. Thomas (w/o)

Mr. Stewart D. Ebnetter (w/a)
Regional Administrator
U.S. Nuclear Regulatory Commission
Region II
101 Marietta St., N.W., Suite 2900
Atlanta, Georgia 30323

Mr. P. W. O'Connor, Project Manager (w/a)
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Mail Stop 13H3
Washington, D.C. 20555

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NRC Form 365
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES 8-31-86

LICENSEE EVENT REPORT (LER)

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TITLE (4)

Voluntary Report on Suppression Pool Makeup 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		
0 3	2 0	9 2	9 2	0 0 2	0 0	0 5	1 5	9 2	DOCKET NUMBER (8)		
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OPERATING MODE (9)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5. (Check one or more of the following) (11)																							
POWER LEVEL (10)	1 0 0	20 402(b)	20 405(a)(1)(i)	20 405(a)(1)(ii)	20 405(a)(1)(iii)	20 405(a)(1)(iv)	20 405(a)(1)(v)	20 405(a)(1)(vi)	20 405(a)(1)(vii)	20 405(a)(1)(viii)	20 405(a)(1)(ix)	20 405(a)(1)(x)	20 405(a)(1)(xi)	20 405(a)(1)(xii)	50 73(a)(2)(iv)	50 73(a)(2)(v)	50 73(a)(2)(vi)	50 73(a)(2)(vii)(A)	50 73(a)(2)(vii)(B)	50 73(a)(2)(viii)	50 73(a)(2)(ix)	73 71(b)	73 71(c)	<input checked="" type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 365A)
Voluntary																								

LICENSEE CONTACT FOR THIS LER (12)												TELEPHONE NUMBER		
NAME												AREA CODE		
William B. Abraham / Engineering Assistant												6 0 1 4 3 7 +2 3 1 9		

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)											
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	M. FAC. T. NER	REPORTABLE TO NRC		

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)

On March 20, 1992, during the review of motor-operated valves in accordance with Generic Letter 89-10, GGNS determined that the actuators for the SPMU dump valves were undersized. This could result in a torque up to 200% of rated on the actuator. During startup testing, these actuators had been overtorqued several times. Limitorque states that the actuators are capable of surviving a one time overtorque of two times the rated torque without sacrifice to the actuator qualification. The overtorqued actuators were replaced with identical actuators already onsite that had never been overtorqued. Since the valves are only required to stroke open one time to perform their safety function, continued operation until the current refueling outage was justified.

Additionally, a design change was initiated to replace these actuators with properly-sized actuators during the current refueling outage which began April 17, 1992. The occurrence posed no adverse affects on plant safety or the ability to perform their intended functions. This event is being reported as a Voluntary Report.

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

A. Reportable Occurrence

On March 20, 1992 an evaluation was completed to establish the required torques/thrusts to open and close certain safety related motor operated valves. This evaluation revealed that the actuators on the Suppression Pool Makeup Dump Valves (Q1E30F001A/B and Q1E30F002A/B) had operated at overtorqued conditions prior to plant startup. Due to industry interest, this event is being reported as a Voluntary Report.

B. Initial Conditions

The reactor was in Operational Condition 1, at full power, with reactor water at approximately 529 degrees F and 1022 psig.

C. Description of Occurrence

The Suppression Pool Makeup System (SPMU) [BT] consists of two redundant subsystems, each of which is capable of dumping the makeup volume from the upper containment pool to the suppression pool by gravity flow. Two 30 inch lines are routed from the upper containment pool, down opposite sides of the steam tunnel, and terminate at elevation 133 ft. (i.e., approximately 21 ft. above the suppression pool). Each line has two series mounted normally closed motor operated butterfly valves. Both valves in each line are powered from the same divisional power source (i.e., the valves in the "A" line are Division I powered and the valves in the "B" line are Division II powered). The design safety function of the SPMU System is to transfer water from the upper containment pool to the suppression pool under the following accident conditions:

- o following a large-break LOCA, when a low suppression pool level is sensed, in order to insure post-LOCA drywell vent coverage of at least two feet above the top of the top row of vents so that long-term steam condensation is maintained, or
- o following a small-break LOCA after a thirty (30) minute time delay, to add additional water to the suppression pool in order to satisfy the long-term suppression pool heat sink requirements.

Generic Letter 89-10 requests that licensees establish:

- o the torque/thrust required to open/close all safety related motor operated valves against the maximum expected design differential pressure and flow rate.

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TEXT (If more space is required, use additional NRC Form 3054's) (17)

- o a program to set/verify the torque switch settings based on the calculated torque/thrust requirements.
- o a testing program under which the safety related MOVs are actually stroked against the design flow rate and differential pressure

During implementation of the Generic Letter (GL) 89-10 program, an evaluation revealed a nonconformance with SPMU Dump Valve design specifications.

The torque required to stroke a butterfly valve is dependent on both the flow rate and differential pressure across the valve; therefore, as a part of the GL implementation, Design Engineering performed an evaluation to establish the maximum expected differential pressure and flow rate (i.e., design conditions) which the valve would be expected to stroke against (i.e., open) to perform its design safety function.

The manufacturer of the valves, Henry Pratt Company, was contracted to evaluate the valves at the maximum expected differential pressure and flow rate, which Design Engineering had established, and provide the torque required to stroke the valve.

The valves were then evaluated to determine:

- o if the required torque exceeded the maximum torque which could be applied to the valve without overstressing the weak link, and
- o if the actuator was capable, considering torque switch settings and spring pack ratings, of delivering the torque required to stroke the valve.

This evaluation revealed that the actuators on the SPMU Dump Valves (Q1E30F001A, Q1E30F001B, Q1E30F002A & Q1E30F002B) were undersized and would be required to operate at torque values which were in excess of the manufacturer's published torque rating.

Limitorque states that their SMB actuators are capable of surviving a one-time overtorque of two (2) times the published torque rating without sacrifice to the actuator qualification; however, Limitorque does recommend that the gearing in the actuators, which have been overtorqued, be visually inspected for cracks and/or excessive wear.

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TEXT (If more space is required, use additional NRC Form 385A's) (17)

Therefore, since the actuators on the SPMU Dump Valves had been overtorqued during startup testing and no inspections had been performed as recommended by Limitorque, a Material Nonconformance Report was initiated to document and resolve the condition.

D. Apparent Cause

An investigation was performed to identify the cause and circumstances surrounding the condition. It was concluded that the actuators were undersized because the flow rate specified in the design specification for the valves, which was used by the valve manufacturer to size the actuators, was the minimum required flow rate (i.e., 45,500 gpm) to ensure a post-LOCA drywell vent coverage of at least two feet above the top of the top row of vents with maximum ECCS pumpdown of the suppression pool. The valves should have been sized using maximum expected flow rate (i.e., approximately 65,000 gpm) based on the actual configuration of the system.

During startup testing of the SPMU valves, problems associated with the sizing of the actuators were encountered with the installed SMB-000-5 actuators.

When these valves were initially stroked during preoperational testing, under design basis conditions (from the closed to the open position with the upper containment pool full of water), problems such as torque switches tripping or chattering and motor overload relays tripping were observed. Subsequent to observing these occurrences, personnel verified valve orientation and packing tightness in an effort to determine what was causing the problems with the actuators torquing out.

On September 3, 1981, correspondence was sent to the valve manufacturer requesting information on the adequacy of the SMB-000-5 actuators for the SPMU Dump Valve application. The response from the manufacturer stated that the size of the actuators was adequate and suggested that the torque switch settings be increased to eliminate the problems with the torque switches chattering and tripping.

The torque switch settings were set at the highest possible setting (i.e. 5), which due to the configuration of the installed spring packs essentially bypassed the torque switches. With the torque switches set at 5, the valves stroked with no noted problems. The decision was made to bypass or take the torque switches out of the circuit due to the problems which had been encountered during preoperational testing.

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During the design basis review for MOV's it was discovered that the flow rate specified in the valve specification was developed using non-conservative assumptions. The technique used was an average flow rate (45,000 GPM) required to support draining the upper pools in the required time. Actual flow rate experienced (approx. 62,000 GPM) peaks above this value then falls below the average value as the upper pool level drops. The difference in the two calculation methods resulted in the actual peak flow rate being approximately 1.4 times the average value used by the the AE in the valve specification. This error had gone undiscovered since the end result is the same (i.e. the total volume is transferred in the required time), until a review of the valve actuator capability was undertaken as a result of the current MOV program.

E. Corrective Actions

As an interim solution the existing SMB-000-5 actuators, which were undersized, were replaced with refurbished SMB-000-5 actuators obtained from Unit 2 stock. This interim measure was justified for operation until RF05 based on:

- o Limatorque stating that the SMB-000 actuators can survive a one time overtorque of 200% without sacrifice of the actuator qualification.
- o the refurbished Unit 2 actuators have never been overtorqued.
- o the valves are only required to stroke open one time to perform their safety function.

A Design Change will be implemented during RF05 to replace the existing SMB-000-5 actuators which are undersized, with SMB-00-10 actuators which are properly sized for the application.

F. Safety Assessment

The SMB-000-5 actuators, which were removed and replaced with the refurbished SMB-000-5 actuators from Unit 2, were disassembled and the gearing was inspected in accordance with the recommendations specified by Limatorque. No cracks or excessive wear were found in any of the actuators. All of the components were found to be in good condition. Therefore, it was concluded, based on the inspection results, that the actuators were capable of performing their design safety function.

NRC Form 305A
(9-83)

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G. Additional Information

Energy Industry Identification System (EIIS) codes are identified in the text within [].

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