



Carolina Power & Light Company

Brunswick Nuclear Project
P. O. Box 10429
Southport, NC 28461-0429
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10CFR21

Mr. Thomas E. Murley, Director
Office of Nuclear Reactor Regulation
1 White Flint North
11555 Rockville Pike
Rockville, Maryland 20852

BRUNSWICK STEAM ELECTRIC PLANT UNITS 1 AND 2
DOCKET NO. 50-325 AND 50-324
LICENSE NO. DPR-71 AND DPR-62
NOTIFICATION OF A 10CFR21 REPORTABLE OCCURRENCE

Dear Mr. Murley:

This confirms the telephone conversation at 1505 hours on April 26, 1991 between Mr. Robert Pettis (of your staff) and Mr. Michael Foss (of my staff) which satisfied the requirements of 10CFR21 reporting criteria. It reported an apparent deviation in the software used to test Limitorque SMB-00 actuators, that was supplied by Limitorque Corporation for use with its Motor Actuator Characterization (MAC) Systems.

Very truly yours,

J. W. Spencer, General Manager
Brunswick Nuclear Project

GMT/gmt

Enclosure

cc: Mr. S. D. Ebnetter
Mr. N. B. Le
Mr. R. L. Prevatte

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SUMMARY

During Carolina Power & Light's (CP&L) review of motor operated valve testing per Generic Letter 89-10, a 10-CFR-21 reportable issue was identified. A discrepancy between data obtained utilizing our two Motor Actuator Characterization (MAC) Systems supplied by the Limitorque Corporation, and the BSEP Limitorque Actuator Test Stand led to an investigation of the accuracy of the testing performed on Limitorque SMB-00 actuators. This investigation on SMB-00 actuators showed there is an evident difference between the torque indicated by the MAC System and the output torque measured at the BSEP Limitorque Actuator Test Stand. The variation is explained as a possible software error resulting from the differences in assumed worm-gear diameter. Due to this difference in diameter, the two systems are expected to disagree by about 14%. This is supported by the limited amount of test data (several test runs) gathered during the MAC System Accuracy Testing performed between January 5, 1991 to January 20, 1991. In the context of the overall Motor Operator Valve program, a difference of 14% should have minimal impact, due to the conservatism applied when calculating differential pressure, required thrust, and the required torque range. A potential error of 14% will not, in most cases, produce a concern for valve operability. However Engineering Evaluation Report (EER) 91-0056 completed on February 15, 1991 evaluated each safety-related valve (10 on Unit 1 and 17 on Unit 2) that had been set up using the MAC System, and revealed one valve with an operability concern. The 2-B21-F016, Main Steam Line (MSL) Drain Line Inboard Isolation valve, had been adjusted on January 14, 1990 using the MAC System, and it may have a torque setting as low as 20.9 foot-pounds versus a required minimum of 21.8 foot-pounds evaluated for a realistic maximum DP of 1020 psid. Therefore, this Group 1 Primary Containment Isolation System (PCIS) valve may not close against a 1000 psid as required to isolate a break in the MSL Drain Line. As a result of this evaluation, on Feb. 19, 1991 a Caution Tag (2-3405) was hung to maintain the 2-B21-F016 valve closed, unless the outboard isolation valve (2-B21-F019) is closed or pressure is less than 850 psig.

A similar software problem was reported by LER 2-89-005 on Limitorque Corporation's MAC System as used for SMB-3 motor actuators. This was reported by Limitorque 10-CFR-21 notification on MAC Software Errors for SMB/SB/SBD-3 Actuators on October 20, 1989.

INITIAL CONDITIONS

On April 24, 1991, when this item was determined to be 10CFR21 reportable, Unit 1 and 2 were in Cold Shutdown for Diesel Generator repairs.

EVENT DESCRIPTION

In early January, 1991 a discrepancy between data obtained utilizing the Motor Actuator Characterization (MAC) diagnostic test equipment and the BSEP Limitorque test stand led to investigation of the accuracy of the testing performed on Limitorque SMB-00 actuators.

EVENT INVESTIGATION

The investigation into MAC System accuracy performed between January 5 and January 20 of 1991 noted that the output torque indicated in operating a SMB-00 actuator against design differential pressure, as indicated by the MAC System, was higher than that indicated by testing on the BSEP Limitorque Actuator Test Stand. The investigation into the variation revealed that the worm-gear effective radius is approximately 0.16 feet versus 0.1827 feet used by the MAC System. The difference in radius used would cause the data to disagree by about 14%. This is supported by the limited amount of test data (several test runs) gathered during the MAC System Accuracy Testing. The MAC System may also measure the input torque at the drive sleeve rather than the output torque of the actuator. This could result in mechanical losses in the actuator totaling about 5 foot-pounds not being accounted for in the MAC System software.

The Engineering Evaluation Report (EER) 91-0056 completed February 15, 1991 determined there are presently 10 Unit 1 safety related valves and 17 Unit 2 safety related valves that had their torque switch settings set using the Limitorque MAC Systems (see attachment 1). It evaluated each valve and has shown them to be operable except for the 2-B21-F016 (Main Steam Line Drain Inboard Isolation Valve). This is a PCIS Group 1 Isolation valve that is normally closed above 500 psig except to support maintenance, draining or equalizing activities on the Main Steam Isolation Valves. It has a specified torque switch setting range of 27.9 to 35 foot-pounds. The as-left torque switch setting was 29.6 foot-pounds, as indicated by the MAC System, but this could be an actual torque setting as low as 20.9 foot-pounds. The EER evaluated a realistic torque required to close the actuator to be 21.8 foot-pounds, which is above the 20.9 foot-pounds that may be available. Therefore, the valve may not close against 1000 psid as required to isolate a break in the Main Steam Line Drain line. However, the present setting will close the valve against a DP of up to 966 psid. Accordingly, until the torque switch setting can be adjusted within the allowable range, a Caution Tag (2-3405) has been hung to insure the 2-B21-F016 will not be opened above a conservative value of 850 psig unless the outboard isolation 2-B21-F019 is closed. The

open torque switches of these valves are bypassed by jumpers and so are not at issue.

CORRECTIVE ACTIONS

EER 91-0056 evaluated the operability of all SMB-00 Actuators whose torque switches are presently set using the MAC System. (completed 2/15/91) and established corrective action items to:

- 1). Re-adjust the torque switches of Unit 1 MOV's to comply with the allowable torque ranges by 11/31/92.
- 2). Re-adjust the torque switches of Unit 2 MOV's to comply with the allowable torque ranges by 12/31/91.
- 3). Evaluate 10CFR21 reportability for the MAC System potential error. (Performed by this letter)
- 4). Review the MAC System to determine if potential problems or errors may be present on actuators other than SMB-00 by 12/31/91.
- 5). Take actions to assure that 2-B21-F016 will not be opened above 850 psig, unless the 2-B21-F019 is closed.
(Completed on 2/19/91)

Additionally, the two BSEP MAC Systems will not be used to adjust torque switches on SMB-00 actuators until the potential errors with the MAC System can be corrected, or further evaluated and compensated for (Technical Support Memo 91-204). Limitorque Corporation has been contacted about the potential software problem.

EVENT ASSESSMENT

If the closing torque switches of SMB-00 actuators were set below the design values using the MAC System, the valves would not fully close under design basis differential pressure conditions. Failure of a MAC System adjusted containment isolation valve to fully close in conjunction with a single failure of the redundant isolation valve, could result in a breach of primary containment. If this containment isolation valve failed to completely close due to a low torque setting, it is possible that the actual valve disk travel may stop below the 4% open limit switch setting. This condition would result in the valve indicating closed on the Control Room Reactor Turbine Gauge Board (RTGB) even though it would not be fully seated. Consequently, the fact that the valve did not fully seat may not be detected by Operations.

With compensatory action taken to insure the 2-B21-F016 remains shut under conditions where the actual torque setting may not be adequate, operability of all adjusted valves has been evaluated to exist.

ATTACHMENT 1

Safety-Related SMB-00 Motor Operator Valves Set Up Using The MAC System

<u>COMPONENT</u>		<u>DESCRIPTION</u>
<u>Unit 1</u>	<u>Unit 2</u>	
1-E21-F001A	2-E21-F001A	Core Spray Pump A Suppression Pool Suction Valve
1-E21-F001B	2-E21-F001B	Core Spray Pump B Suppression Pool Suction Valve
1-E41-F004	2-E41-F004	High Pressure Coolant Injection (HPCI) Condensate Storage Tank Suction Valve
1-E41-F041	2-E41-F041	HPCI Suppression Pool Suction Valve
1-E41-F042	2-E41-F042	HPCI Suppression Pool Suction Valve
NA	2-E51-F007	Reactor Coolant Isolation Cooling (RCIC) Steam Supply Inboard Isolation Valve
NA	2-E51-F008	RCIC Steam Supply Outboard Isolation Valve
NA	2-E51-F010	RCIC Condensate Storage Tank Suction Valve
1-E51-F012	2-E51-F012	RCIC Pump Discharge Valve
NA	2-E51-F013	RCIC Injection Valve
1-E51-F029	2-E51-F029	RCIC Suppression Pool Suction Valve
1-E51-F031	2-E51-F031	RCIC Suppression Pool Suction Valve
1-E51-F045	2-E51-F045	RCIC Turbine Steam Supply Valve
1-E11-F049	NA	Residual Heat Removal (RHR) to Radwaste Inboard Isolation Valve
NA	2-B21-F016	MSL Drain Inboard Isolation Valve
NA	2-B21-F019	MSL Drain Outboard Isolation Valve
NA	2-G31-F001	Reactor Water Cleanup (RWCU) Inlet Inboard Isolation Valve
NA	2-G31-F004	RWCU Inlet Outboard Isolation Valve