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SUBJECT: LER 90-003-00:on 880104,engineered safeguards MOVs declared inoperable due to restraints od available technology.

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DUKE POWER

March 13, 1990

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
LER 269/90-03

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report (LER) 269/90-03 concerning engineerd safeguards motor operated valves declared inoperable due to restraints of available technology.

This report is being submitted in accordance with 10 CFR 50.73 (a)(2)(vii). This event is considered to be of no significance with respect to the health and safety of the public.

Very truly yours,

H. B. Barron
Station Manager

RSM/ftr

Attachment

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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)	DOCKET NUMBER (2)	PAGE (3)
Oconee Nuclear Station, Unit 1	0 5 0 0 0 2 6 9	1 OF 0 7

TITLE (4) Engineered Safeguards Motor Operated Valves Declared Inoperable Due to Restraints of Available Technology

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	DOCKET NUMBER(S)
									Oconee, Unit 2	0 5 0 0 0 2 7 0
0 1	0 4	8 8	9 0	0 0 3	0 0	0 3	1 3	9 0	Oconee, Unit 3	0 5 0 0 0 2 8 7

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)			
N		20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
1 0 0		20.405(a)(1)(ii)	50.36(c)(2)	X 50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	
		20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER
	AREA CODE
Henry R. Lowery, Chairman Oconee Safety Review Group	8 0 3 8 8 5 - 3 0 3 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	

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On November 15, 1985 the NRC issued IE Bulletin (IEB) 85-03, "MOTOR-OPERATED VALVE COMMON MODE FAILURES DURING PLANT TRANSIENTS DUE TO IMPROPER SWITCH SETTINGS". In response to this IEB Duke Power Company (DPC) developed a program to test safety related Motor Operated Valves (MOVs) using MOVATS (Motor Operated Valve Analysis Test System). Between November 1986 and October 1987, Oconee Nuclear Station (ONS) discovered six MOVs that were not producing the specified thrust values, potentially preventing the valves from closing against system differential pressure across the valve seat. Corrective action, at the time of each valve inspection, was to adjust the respective torque switches to produce the design engineering specified thrust values. In January 1988, during the preparation of the ONS Final Response to IEB 85-03, DPC Nuclear Maintenance questioned the "past" operability status of the six MOVs. DPC Design Engineering evaluated the "past" operability status and on February 1, 1990, declared that five of the six MOVs had been inoperable. All three Units at ONS have operated in all modes since the MOVs were initially installed. The Root Cause is classified as Other: lack of available technology to address the industry wide problems as described in IEB 85-03.

☆U.S.GPO:1984-0-454-461/18759

BACKGROUND

Engineered Safeguards (ES)[EIIS:JE] are those systems and components designed to function under accident conditions to prevent or minimize the severity of an accident or to mitigate the consequences of an accident. During accident conditions when reactor coolant is lost, the ES system acts to provide emergency cooling to assure structural integrity of the core, to maintain the integrity of the Reactor Building [EIIS:NH], and to collect and filter potential Reactor Building penetration leakage. Separate and independent engineered safeguards are provided for each of the three units at Oconee.

MOVATS (Motor Operated Valve Analysis and Test System) is a portable evaluation device designed to analyze the mechanical and electrical condition of Motor Operated Valves (MOV)[EIIS:V] in operating plants. Information (stem thrust, time sequence and actuation of all control switches and motor current) is both displayed for on-the-spot analysis and stored permanently for a later, more detailed examination. MOVATS allows technicians to discover faulty valve settings, mechanical degradations and even to predict impending failure of apparently healthy MOVs.

Prior to MOVATS, MOVs were set up by procedure IP/0/A/3001/10 (Maintenance of Limitorque Valve Operators). MOV torque switch settings were adjusted as low as possible, assuring tight shutoff and proper valve travel. The valve was then cycled and proper torque switch operation verified. For safety related MOVs a performance test was scheduled based on the type of maintenance performed and in accordance with the ONS Inservice Inspection Program. This program had been developed in accordance with 10CFR50.55a(g)(4) which refers to Section XI of the ASME Boiler and Pressure Vessel Code and applicable addenda. The performance tests were performed under routine conditions so that in performing subsequent tests, degradation of the valve or operator could be determined. At the time, there were no instructions available or equipment provided to determine whether the valve would shut under accident conditions and with a differential pressure across the valve seat.

DESCRIPTION OF EVENTS

On November 15, 1985, the NRC issued IE Bulletin (IEB) 85-03 as a result of numerous Motor Operated Valve (MOV) failures and degradations experienced throughout the industry. The report cited torque, torque bypass and position limit switches that had been set incorrectly due to deficiencies in station set up procedures, inadequate training for technicians, design deficiencies, or an unrecognized phenomenon pertaining to valves operating under flow and differential pressure conditions. The intent of IEB 85-03 was to develop a program to ensure certain MOVs in the

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Oconee Nuclear Station, Unit 1	0 5 0 0 0 2 6 9	9 0	— 0 0 3	— 0 0	0 3 OF 0 7

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

High Pressure Injection (HPI)[EIIS:BG] and Emergency Feedwater [EIIS:BA] systems were properly selected, set, and maintained operable for the maximum expected design basis conditions.

On May 16, 1986, Duke Power Company (DPC), in accordance with IEB 85-03, submitted a report to the NRC outlining a plan to accomplish a program to test selected MOVs by November 15, 1987. Prior to this time, all 3 Units at Oconee Nuclear Station (ONS) operated in all modes.

At ONS, a total of 14 MOVs per unit (42 total) were identified as falling within the scope of IEB 85-03. The following action items were performed on 39 MOVs equipped with Limitorque actuators, model SMB-00:

1. Design Engineering review of MOV design basis. Thrust values were established for field set up of actuator torque switches.
2. Field verification of basic valve and actuator data.
3. Complete actuator refurbishment.
4. Testing to ensure proper torque, torque bypass and position limit switch settings.

For the remaining 3 Rotork actuated valves, the above steps were performed with the exception that the actuators received a preventative maintenance check instead of refurbishment and they were tested to the degree possible using commercially available equipment.

During the design review it was determined that all 14 MOVs on each unit were designed to perform in conditions greater than or equal to accident conditions.

During unit outages between August 1986 and October 1987, MOV evaluations were conducted using MOVATS and IP/0/A/3001/11 (Testing of Limitorque and Rotork Operators). The following reactor building isolation valves were discovered not producing the design engineering specified thrust values:

DATE	Valve #	Valve Description
8/12/86	1HP-20	Unit 1 Reactor Coolant Pump Seal Return
9/7-8/86	2HP-3	Unit 2 Letdown Cooler "A" Outlet
9/8/86	2HP-4	Unit 2 Letdown Cooler "B" Outlet
1/9/87	3HP-20	Unit 3 Reactor Coolant Pump Seal Return
9/29/87	1HP-4	Unit 1 Letdown Cooler "B" Outlet
9/29/87	1HP-3	Unit 1 Letdown Cooler "A" Outlet

Using the same procedure, MOVATS was used to adjust the torque switches to produce the design engineering specified thrust value.

In January 1988, during preparation of the Final Response to IEB 85-03 for

ONS, the past operability status of these six MOVs was questioned by the General Office Nuclear Maintenance (NM) personnel. At the request of Design Engineering (DE), NM sent a letter, dated January 22, 1988, requesting information from DE on the past operability status. Six months later while organizing files, NM discovered that DE had not responded. On July 20, 1988, after another discussion with DE, Problem Investigation Report (PIR) 4-088-0145 was written. On July 27, 1988, ONS Compliance requested that DE perform an operability evaluation.

The operability evaluation for PIR 4-088-0145 was given a low priority by DE because it was a "past" operability concern. Attention to evaluations with higher priorities delayed the completion of the PIR 4-088-0145 operability evaluation.

Then, an extended absence of the Station PIR Coordinator caused uncertainty as to the status of outstanding PIRs. In November of 1989, ONS Compliance conducted a review of outstanding PIRs and discovered that the operability evaluation for PIR 4-088-0145 had not been completed. On November 7, 1989, ONS Compliance informed DE that PIR 4-088-0145 was past due and requested resolution as soon as possible.

DE completed the operability evaluation November 22, 1989. The Design Engineering Operability Evaluation was approved February 1, 1990 resulting in the following "past" operability status:

Operable----1HP-3
Inoperable--1HP-4, 2HP-4, 2HP-3, 3HP-20, 1HP-20

On February 12, 1990, ONS Compliance determined that PIR 4-088-0145 was reportable.

As a result of IEB 85-03, a program was implemented by ONS Maintenance using MOVATS to ensure the correct switch settings are maintained.

CONCLUSION

Prior to IE Bulletin (IEB) 85-03 and MOVATS (Motor Operated Valve Analysis and Test System), the Maintenance Department at Oconee Nuclear Station (ONS) did not have the equipment nor the direction to set up the Motor Operated Valve (MOV) torque switches with respect to the necessary thrust values. Even though ONS operated and maintained MOVs according to industry standards and the manufacturer's instructions, there was a lack of available technology to address the industry wide problems as addressed in IEB 85-03. The Root Cause of this event is classified as Other: lack of available technology to address the industry wide problems as described in IEB 85-03.

This calls into question the technical operabilities of the other IEB 85-03 safety related MOVs during ONS's past operating history. In accordance with industry standards and manufacturers instructions, the only requirements were that:

1) After maintenance on a MOV operator, the torque switch was set to ensure a "tight seat".
2) With respect to the type of maintenance on the MOV, performance tests were conducted to:
   a) Leak Rate test and/or,
   b) Timed Stroke test

Over the past operating history at ONS, the torque switch could have been set so as to prevent the MOV from operating properly during accident conditions. But with the advent of MOVATS and IEB 85-03, these MOVs were determined operable at the time of the inspection.

A problem was identified in that Design Engineering (DE) had several operability evaluations that were past due at the time that PIR 4-088-0145 was identified as past due. DE had recognized the problem and developed some guidelines to assure that evaluations are completed in a more timely manner. They are currently working closely with Compliance to assure that this problem is not recurring.

A review of events occurring during the past 24 months revealed no other events with the same root cause. Therefore, this event is classified as nonrecurring. There were no personnel injuries, radiation exposures, or release of radioactive materials as a result of this event. The health and safety of the public were not compromised. This event did not involve any component failure; therefore, it is not NPRDS reportable.

Corrective actions taken upon discovery of the incorrect torque switch setting are believed to be adequate to prevent similar future events.

CORRECTIVE ACTION

Immediate

None

Subsequent

1) As each MOV was discovered not producing the Design Engineering specified thrust values, the torque switch was subsequently adjusted to produce the specified thrust values.

2) All corrective actions planned per this program, in response to IE Bulletin 85-03, have been completed.

Planned

None

SAFETY ANALYSIS

Problem Investigation Report (PIR) 4-088-0145 describes a problem with High Pressure Injection (HPI) system valves 1HP-3, 1HP-4, 1HP-20, 2HP-3, 2HP-4, and 3HP-20 not producing enough thrust to operate against a differential pressure (dp) equivalent to the line design pressure. The purpose of the evaluation was to determine the worst case dp for which these valves must be qualified in order to be operable.

The design basis for containment isolation valves is that these valves are to close such that leakage is minimized by a double barrier. The double barrier minimizes the possibility that a single failure or malfunction of a containment isolation valve could result in loss-of-isolation or intolerable containment leakage.

For a design basis event of a secondary side pipe break inside the Reactor Building (RB), Engineering Safeguards (ES) channels 1&2 would be actuated on a high RB pressure with an existing Reactor Coolant System (RCS) pressure above the normal operating RCS pressure. Valves HP-3, HP-4, and HP-5 (letdown isolation) would experience a dp equivalent to the full RCS pressure less the Letdown Storage Tank (LDST) pressure upon approaching the closed position after an ES actuation. Minimum LDST pressure is negligible. The valves are required to be capable of closing under a dp equivalent to the maximum expected RCS pressure of 2500 psig.

Valves HP-20 and HP-21 (Reactor Coolant Pump seal return isolation) normally will experience a dp equivalent to seal return pressure (approximately 100 psig) upon approaching the closed position. However, if a design basis event of a RCP seal failure occurred, the dp could be equivalent to the existing RCS pressure. It is reasonable to assume that valve HP-20 or HP-21 would be manually closed upon indication of a RCP seal failure. Therefore, valves HP-20 and HP-21 should be capable of closing with a dp equivalent to RCS operating pressures which we conservatively assign as 2500 psig.

If an initiation to close the valve produced a dp greater than the valve's capability, a MOV would trip on high torque with no guarantee of resetting. This would render the valve inoperable to perform its ES function. Therefore, valves HP-3, HP-4, HP-5, HP-20, and HP-21 must be

capable of closing under a differential pressure of at least 2500 psia to be considered operable to perform their intended function of containment isolation. The design study, with the information received from the MOVATS testing, determined that the maximum dp against which these MOVs could shut was between 1365 psig and 1980 psig.

The consequence of any of these valves being inoperable is that during actuation of ES channels 1&2, the inability of these valves to close at the assigned dp, could cause these valves to allow excessive leakage. This leakage would be contained within the HPI system to be reinjected to the RCS. This leakage would only occur with an active failure of the redundant containment isolation valve:

HP-5 for HP-3 and HP-4
HP-21 for HP-20

Valves HP-5 and HP-21 are air operated and therefore not related to the problems discussed by IEB 85-03. Also, other non-safety related valves are available which could be used to isolate the leak.

The potential radiological consequences of valves HP-3, HP-4, and HP-20 having the maximum operable dp described is minimized by the length of their stroke time. Before the MOV can reach the closed position a Design Basis Accident (DBA), Large Break (LB) LOCA, would depressurize the RCS within the dp capabilities of the MOV, therefore the MOV would successfully isolate the letdown line. LOCA cases which exceed fuel cladding temperatures of 1700 degrees Fahrenheit (F), all depressurize the RCS to within the dp capabilities of the MOVs in less time than is required to electrically shut the valve. The specific radiological consequences contributed by a LB LOCA occurring with the maximum operable valve dp, would be a small fraction of the limits described in 10CFR100 and an insignificant fraction of the total previously reported DBA release values.

Additional containment leakage would occur only in Small Break (SB) LOCAs which result in a peak clad temperature of less than or equal to 1700 degrees F. These SB LOCAs that do not depressurize the RCS quick enough to allow the MOV to completely close. Since fuel damage would be small for these events, release would be a small fraction of 10CFR100 values and an insignificant fraction of DBA values already analyzed.

No events as described above have occurred at ONS. Therefore, the health and safety of the public has not been affected.