

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 8708240317 DOC. DATE: 87/08/17 NOTARIZED: NO  
 FACIL: 50-270 Oconee Nuclear Station, Unit 2, Duke Power Co.  
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 TUCKER, H. B. Duke Power Co.  
 RECIP. NAME RECIPIENT AFFILIATION

DOCKET #  
05000270

SUBJECT: LER 87-006-00: on 870717, Valve 2BS-2 declared inoperable due to design engineering calculations. Caused by mgt deficiency. Increase torque switch setting on 2BS-2 to 3.0 & review by nuclear maint of switches. W/870817 ltr.

DISTRIBUTION CODE: IE22D COPIES RECEIVED: LTR L ENCL 1 SIZE: 8  
 TITLE: 50.73 Licensee Event Report (LER), Incident Rpt, etc.

NOTES: AEOD/Ornstein: 1cy.

05000270

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	PASTIS, H	1 1		
INTERNAL:	ACRS MICHELSON	1 1	ACRS MOELLER	2 2
	AEOD/DOA	1 1	AEOD/DSP/NAS	1 1
	AEOD/DSP/ROAB	2 2	AEOD/DSP/TPAB	1 1
	DEDRO	1 1	NRR/DEST/ADS	1 0
	NRR/DEST/CEB	1 1	NRR/DEST/ELB	1 1
	NRR/DEST/ICSB	1 1	NRR/DEST/MEB	1 1
	NRR/DEST/MTB	1 1	NRR/DEST/PSB	1 1
	NRR/DEST/RSB	1 1	NRR/DEST/SGB	1 1
	NRR/DLPQ/HFB	1 1	NRR/DLPQ/GAB	1 1
	NRR/DOEA/EAB	1 1	NRR/DREP/RAB	1 1
	NRR/DREP/RPB	2 2	NRR/PMAS/ILRB	1 1
	REG FILE 02	1 1	RES DEPY GI	1 1
	RES TELFORD, J	1 1	RES/DE/EIB	1 1
	RGN2 FILE 01	1 1		
EXTERNAL:	EG&G GROH, M	5 5	H ST LOBBY WARD	1 1
	LPDR	1 1	NRC PDR	1 1
	NSIC HARRIS, J	1 1	NSIC MAYS, G	1 1
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TITLE (4)  
T.S. 3.3.6 VIOLATION DUE TO A MANAGEMENT DEFICIENCY

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)
0 7	1 7	8 7	8 7	0 0 6	0 0	0 8	1 7	8 7			0 5 0 0 0

OPERATING MODE (9) N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)											
POWER LEVEL (10) 1 8 7	20.402(b)	20.406(c)	50.73(a)(2)(iv)	73.71(b)								
	20.406(a)(1)(i)	50.38(e)(1)	50.73(a)(2)(v)	73.71(c)								
	20.406(a)(1)(ii)	50.38(e)(2)	50.73(a)(2)(vi)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)								
	20.406(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(vii)(A)									
	20.406(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(vii)(B)									
	20.406(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)									

LICENSEE CONTACT FOR THIS LER (12)

NAME PHILIP J. NORTH, LICENSING	TELEPHONE NUMBER AREA CODE 7 0 4 3 7 3 - 7 4 5 6
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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
E	B, E	V		N					

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE)  NO

EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR

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

**ABSTRACT:**

Valve 2BS-2 has been declared to have been inoperable from September 20, 1986 until July 17, 1987. It was first determined to be inoperable, based on Design Engineering calculations, on July 17, 1987 and actions were taken to make the valve operable on that same day. The valve was inoperable because torque switch settings on the valve operator were too low and it was made operable by increasing the settings.

The erroneous calculations had been obtained by Design Engineering from the valve operator manufacturer. These were forwarded to Nuclear Maintenance without informing them that the information was incorrect, assuming that they were to be used for reference and comparative use only. Nuclear Maintenance assumed that the data was correct and forwarded it to ONS where it was used.

Based on the inadequate communication between the Design and Maintenance groups, this incident's root cause was determined to be a Management Deficiency. A contributing cause is the incorrect vendor-supplied information.

As a result of this incident, there were no releases of radioactive materials, radiation exposures or personnel injuries.

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APPROVED FOR RELEASE  
EXPIRES 03/21/88

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

Background

The Reactor Building Spray (RBS) system is designed for long term removal of heat energy from containment following an accident by spraying borated water from nozzles at the top of containment. The RBS system consists of two independent trains, each with its own pump, nozzles, associated valves and piping. Valves 2BS-1 and 2BS-2 serve as throttle valves for the RBS pumps.

The system initially pulls suction from the Borated Water Storage Tank (BWST) through an interconnection with the Low Pressure Injection (LPI) system. As the BWST level is depleted, the RBS suction is switched to the containment building emergency sump by placing the LPI system in the recirculation mode.

In 1986, Duke Power Company began a verification program for the operability of motor operated valves (MOV's) in response to NRC bulletin 85-03. Part of the program is the Motor Operated Valve Analysis and Testing (MOVAT's) system of testing inservice valve operation. Prior to the operability program, MOV's were generally set up based on calculations by the operator manufacturer who in turn performed the calculations based on the particular valve being used. When the Duke program began, it was a combined effort in the General Office of Design Engineering and Nuclear Maintenance personnel.

A valve operator is selected for a particular valve based on the calculated thrust required to open and close the valve. In order to protect the valve and operator from being overstressed and damaged, torque switches are adjusted on the operator to stop it when a predetermined torque is encountered by the valve and operator while either opening or closing. The torque switches are set at some margin above the normal operating torque required to operate the valve. Since a greater torque is required to unseat a valve, a bypass switch is provided to disengage the torque switch at this point. Both torque and bypass switches may be adjusted in the field.

Description of Occurrence

The first step in the operability program was to obtain thrust calculations from the valve operator manufacturer. Design Engineering had the lead for obtaining and providing this information to Nuclear Maintenance. Limitorque was first contacted in March of 1986 for calculating and providing thrust data for safety related motor operated valves. Limitorque began calculating and compiling the data in April, 1986. Information for specific valves was requested by the order number under which the valves were originally purchased. Valves 3BS-1, 3BS-2 and 2BS-2 of the Reactor Building Spray (RBS) Systems were purchased under one order number. Valve 1BS-1, 1BS-2 and 2BS-1 were purchased under a separate order number.

On July 2, 1986 Limitorque requested more information regarding several different valves including the RBS valves. At this time it was noted that the

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RBS valves were listed as gate valves and it was requested by Limatorque that Design Engineering contact the valve manufacturer to insure that the data was accurate. Design Engineering sent Limatorque on-hand information on July 8, 1986 including a Duke drawing originally obtained from B&W that listed the valve as a gate valve. In August 1986, Limatorque sent valve operation data sheets to Design Engineering, including sheets for the three RBS valves. In a cover letter accompanying the data sheets, Limatorque recommended that the information on the valves be verified with the valve manufacturer. Design Engineering subsequently requested data from the valve manufacturer on August 22, 1986.

Calculations for the RBS valves were based on gate valve factors. During this time, design engineering personnel had realized that the valves were globe valves. They were also aware that misclassifying the valves made the thrust calculations inaccurate. The Design engineering personnel involved had the impression that the Limatorque data was to be used only as reference data. It was believed that the data was to be used only for comparing the thrust calculations used for originally setting up the valves to what was actually required in the field in order to insure that the valves were operable. Design Engineering sent the data sheets for the RBS valves to Nuclear Maintenance and did not inform maintenance of the mislabeled valves or the incorrect calculations.

When nuclear maintenance received the data, it was assumed to be based on correct information. It was reviewed, to the extent of running through Limatorque's calculations using their initial values, and it was noted that the valve operator appeared to be oversized based on the thrust calculations. However this was not investigated any further. In August, nuclear maintenance sent work sheets showing the required thrust settings to the Instrument and Electrical (I&E) group at ONS to be used with the MOVATs program. The work sheets listed the valves as gate valves.

On September 19, MOVAT's procedure for testing valve 2BS-2 was performed. The procedure requires that the "MOVATs Test Data Sheet" be filled out as much as possible prior to actually testing the valve. Section 1 of the procedure consists of basic information about the valve including type (globe or gate), a step was signed off as complete, when in fact, the individual had not completed it to the fullest extent possible. This included leaving the valve type blank. The individual involved stated that he had been using Section 1.0 as a means of verifying his records by letting the MOVATs crew fill in the blanks with "as found" data. At this time, the individual was unaware of how the required thrust for a valve was calculated and did not know that the valve type affected thrust calculations. MOVAT's analysis on 2BS-2 was performed September 20, 1986. The torque switches were set based on the calculated thrust and what was measured in the field. The settings were less than the minimum settings that were determined in July, 1987. Thus 2BS-2 was considered inoperable from this point until July 17, 1987. While performing the analysis on 3BS-2, the I&E crew did not fully complete Section 1.0 of the MOVATs

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procedure. When this procedure was reviewed, Section 1.0 was completed. At this time it was determined that 2BS-2 was a globe valve, based on an ONS flow diagram. Valves 3BS-1 and 3BS-2 were MOVATs tested in a similar fashion on January 23 and March 5, 1987 respectively.

On March 4 Design Engineering received the requested information from the valve manufacturer (Aloyco) and forwarded it to Limitorque. During this time, a valve group for ONS valves had been formed in design engineering. On May 14, Limitorque sent the corrected thrust calculations back to Design Engineering with the calculations using the factor for globe valves. At no time, had the nuclear maintenance engineer been made aware of the fact that the data for 2BS-2, 3BS-1 and 3BS-2 was in error. As part of the ongoing study of valve operability, Design Engineering requested that the nuclear maintenance obtain actual field data on motor operated valves.

While reviewing the data on July 14, nuclear maintenance noticed that the thrust calculations for valves 2BS-2 and 2BS-1 were significantly different although they were basically the same type of valve serving the same function. Further investigation revealed the misclassification of 2BS-2 as a gate valve. On July 15, nuclear maintenance informed Design Engineering that valves 2BS-2, 3BS-1 and 3BS-2 were misclassified and requested an operability determination.

On July 17, Design Engineering determined that valve 2BS-2 was inoperable while valve 3BS-1 and 3BS-2 could be considered operable. The Unit 3 valves were deemed operable because, based on the MOVAT's data, the torque bypass switch kept the torque switch inoperable until the valve was completely unseated. Valve 2BS-2 has the same bypass, however the bypass disengaged 4 milliseconds after the valve unseated. Design Engineering calculations determined that the time interval was insufficient to assure operability. The 3BS valves' time intervals were about a factor of 10 higher. Design Engineering had determined how high the torque switch setting had to be in order for the valve to be operable. I&E personnel adjusted 2BS-2 torque switch to the recommended setting on July 17 making the valve operable.

Cause of Occurrence:

It is concluded that the root cause of this incident was the failure of Design Engineering to inform the Nuclear Maintenance of the errors in the thrust calculation that was had provided. Design engineering had the impression that the Limitorque supplied data was for reference only and that valve operation would not be set up by it. This was in fact erroneous, as nuclear maintenance forwarded the calculations to Oconee after only verifying the calculations. It is also concluded that the vendor-supplied data contributed to the incident because of its inaccuracies. The contributing cause of the inaccurate vendor - supplied information is a manufacturing deficiency.

It was noted during the incident investigation that 3 opportunities existed that could have possibly prevented or mitigated the incident.

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This first occurred in 1972 when 2 B&W drawings were approved that erroneously stated that the valve used for 3BS1,2 and 2BS-2 were gate valves. One of the drawings showed the outside dimensions of the Limatorque operator used on the valve while the other showed a wiring diagram for the operator. On both drawings, a table of valve data was in the margin of the drawing listing the valve as a gate. As Duke Power Co. purchased the operators and valves from Limatorque through B&W it is concluded the errors on the drawings are related to the Limatorque files being in error. Had this discrepancy been recognized and corrected on the drawings, it may have resulted in Limatorque's files being corrected.

The second chance for identification occurred when the Nuclear Maintenance Engineer noted that the operator for 2BS-2 appeared to be oversized for the valve, based on the thrust calculations. If this situation was investigated, the error in the calculations may have been discovered. However, it was not considered to be significant enough to warrant immediate investigation. In view of the fact that this investigation noted other instances where Limatorque specifications or data appeared at first inconsistent but were later verified correct, it cannot be concluded that the Nuclear Maintenance acted in error by not performing an immediate investigation.

The third opportunity lay with the I&E Engineer reviewing the data and completing the MOVAT's procedure. Had he completed the procedure properly, he may have noticed that 2BS-2 was mislabelled as a gate valve. However, when 2BS-2 was tested in September, he had not seen the equations for calculating thrust and was unaware that the calculations were dependent on valve classification. When Nuclear Maintenance was sent the data sheets for 3BS-1 and 3BS-2, they were modified to show the equations. The I&E engineer could have recognized the error if he had noticed the mislabelling of the valve while filling in Section 1.0 of the MOVATs procedure and that there were different calculation factors for globe and gate valves.

Corrective Actions:

There were no immediate corrective actions.

Subsequent corrective actions were to:

- o Increase the torque switch setting on 2BS-2 to 3.0.
- o Inform Limatorque that 2BS-2, 3BS-1 and 3BS-2 were globe valves.
- o Have Nuclear Maintenance review how bypass switches are set on motor operated globe valves.

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Planned corrective actions are to:

- o MOVATs test valves 3BS-1 and 3BS-2 in the next available outage and change torque switches to a setting of 3.0.

The verification program for the operability of MOV's in response to IE Bulletin 85-03 should prevent recurrence.

Analysis of Occurrence:

The reactor building spray system is designed to provide for post accident long term cooling by operating redundantly with the Reactor Building Cooling Units (RBCU's). Either system is capable of independently supplying 100% of the required heat removal capacity as calculated in the FSAR.

As stated in FSAR Section 15.14-5, if both spray trains should be out of service, and all RBCU's were inoperable, the pressure in the reactor building would still be below design pressure during the most severe pressurization accident scenario where a reactor coolant system break of 5.0 ft<sup>3</sup> or greater occurred. The cooling capacity of either the RBS trains, the RBCU's or a combination of the two is necessary to protect containment equipment for long term accident mitigation.

It is important to note that valve 2BS-2 was rendered inoperable by a switch setting which was designed to prevent overstressing of the component. At no time was there a component failure associated with 2BS-2's inoperability. 2BS-2 is not located within the containment building, it is in a penetration room. If the penetration room could be entered after an accident, 2BS-2 would only require adjustment of the torque switch to be made operable.

Because of the mutual redundancy of the Reactor Building spray system, the Reactor Building Cooling Units, and the fact that the peak building pressure would remain below containment design with no spray or coolers operable it is concluded that the health and safety of the public were not affected by this event.

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HAL B. TUCKER  
VICE PRESIDENT  
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August 17, 1987

U.S. Nuclear Regulatory Commission  
~~Document Control Desk~~  
Washington, D.C. 20555

Subject: Oconee Nuclear Station  
Docket No. 50-269, -270, -289  
LER 270/87-06

Gentlemen:

Pursuant to 10CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report (LER) 270/87-06 concerning a Technical Specification violation due to inoperability of a reactor building spray train.

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

Very truly yours,

*Hal B. Tucker*  
Hal B. Tucker

PJN/220/jgc

Attachment

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Document Control Desk

August 17, 1987

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