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ACCESSION NBR: 9208250169/ DOC. DATE: 92/08/18 NOTARIZED: NO
 FACIL: 50-269 Oconee Nuclear Station, Unit 1, Duke Power Co.
 AUTH. NAME: BENSOLE, S. G. AUTHOR AFFILIATION: Duke Power Co.
 HAMPTON, J. W. Duke Power Co.
 RECIP. NAME: RECIPIENT AFFILIATION

DOCKET #
05000269

SUBJECT: LER 92-009-00: on 920722, determined that unit experienced TS required shutdown on 920525 to correct excessive reactor coolant pump 1A2 leakage. Caused by degradation of obsolete seal parts. Outdated seals removed. W/920818 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 9
 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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INTERNAL:	ACNW		2	2		ACRS		2	2	
	AEOD/DOA		1	1		AEOD/DSP/TPAB		1	1	
	AEOD/ROAB/DSP		2	2		NRR/DET/EMEB 7E		1	1	
	NRR/DLPQ/LHFB10		1	1		NRR/DLPQ/LPEB10		1	1	
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	<u>REG FILE</u> 02		1	1		RES/DSIR/EIB		1	1	
	RGN2 FILE 01		1	1						
EXTERNAL:	EG&G BRYCE, J. H		2	2		L ST LOBBY WARD		1	1	
	NRC PDR		1	1		NSIC MURPHY, G. A		1	1	
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APR 11

Duke Power Company
Oconee Nuclear Generation Department
P.O. Box 1439
Seneca, SC 29679

J.W. HAMPTON
Vice President
(803)885-3499 Office
(704)373-5222 Fax



DUKE POWER

August 18, 1992

U. S. Nuclear Regulatory Commission
Document Control Desk
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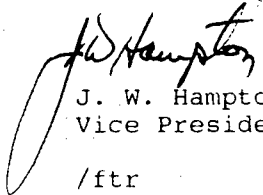
Subject: Oconee Nuclear Site
Docket Nos. 50-269, -270, -287
LER 269/92-09

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a)(1) and (d), attached is Licensee Event Report (LER) 269/92-09, concerning excessive reactor coolant pump seal leakage.

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

Very truly yours,


J. W. Hampton
Vice President

/ftr

Attachment

xc: Mr. S. D. Ebner
Regional Administrator, Region II
U.S. Nuclear Regulatory Commission
101 Marietta St., NW, Suite 2900
Atlanta, Georgia 30323

Mr. L. A. Wiens
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

INPO Records Center
Suite 1500
1100 Circle 75 Parkway
Atlanta, Georgia 30339

Mr. P. E. Harmon
NRC Resident Inspector
Oconee Nuclear Site

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LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-530), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1) Oconee Nuclear Station, Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 2 6 9				PAGE (3) 1 OF 08								
TITLE (4) Excessive Reactor Coolant Pump Seal Leakage Due To A Management Deficiency Results In A Technical Specification Required Shutdown																						
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	2	2	9	2	9	2	0	0	9	0	0	0	8	1	8	9	2	0 5 0 0 0			
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)		1 0 0				20.405(a)(1)(i)				50.38(c)(1)				50.73(a)(2)(v)				73.71(c)				
		20.405(a)(1)(ii)				50.38(c)(2)				50.73(a)(2)(vii)				OTHER (Specify in Abstract below and in Text, NRC Form 366A)								
		20.405(a)(1)(iii)				X 50.73(a)(2)(i) (A)				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)(ix)												
LICENSEE CONTACT FOR THIS LER (12)																						
NAME S. G. Benesole, Safety Review Manager										TELEPHONE NUMBER												
										AREA CODE												
										8 0 3		8 8 5 - 3 5 1 8										
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												
F	A B	P	W	1 2 0	Yes																	
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)

ABSTRACT

On July 22, 1992, with Unit 1 at 100 percent full power, it was determined that the unit had experienced a Technical Specification required shutdown on May 25, 1992. This forced shutdown was performed to correct excessive 1A2 Reactor Coolant Pump seal leakage caused by the installation and premature degradation of obsolete seal parts. The root cause for this event was a management deficiency (inadequate program) during 1982, which has been subsequently corrected. Corrective actions taken included; 1) removal of all outdated seals from the warehouse inventory and 2) revision to maintenance procedures to require seal design verification prior to installation.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

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TEXT (If more space is required, use additional NRC Form 368A's) (17)

BACKGROUND

The Reactor Coolant System (RCS) [EIIS:AB] consists of two parallel heat transfer loops connected to the reactor vessel. Each loop contains two Reactor Coolant Pumps (RCP) [EIIS:P]. During operation, the RCPs circulate reactor coolant through the reactor vessel and the steam generators. Unit 1 RCPs were supplied by Westinghouse and incorporate a three stage seal series arrangement to limit coolant flow up the pump shaft. If the hot reactor coolant were to reach the seals during RCP operation, seal integrity cannot be guaranteed, which may result in a loss of coolant accident. Each stage consists of a primary and several secondary seals. The secondary sealing mechanisms of the no. 1 and no. 2 seals include a double delta channel seal.

In 1982, Westinghouse communicated a design change for the no. 2 seal, double delta channel seal, which was applicable to all Duke Power Company's Westinghouse RCPs. This transmittal, DL-82-04, was sent to all three Duke Power nuclear stations. This information identified that the seal material was changed from a carbon reinforced teflon (black in color) to a Tetralon 720 material (tan in color). The part number for the seal design remained the same. The new material improved the friction characteristics of the seal.

The Reactor Coolant Makeup System (RCMU) is provided to supply makeup to the RCS in the event normal systems are inoperable due to any Standby Shutdown Facility (SSF) event (fire, flood, sabotage, or station blackout). The RCMU is designed to deliver a minimum of 26 gpm to recover RCS shrinkage from cooldown to hot shutdown and normal RCS leakage. A minimum of 5 gpm of the makeup is supplied to each of the RCPs to ensure that the hot RCS does not reach their seals and damage them. There is approximately 55 gallons of cool seal injection water in each pump seal housing. Assuming 10 minutes to activate the SSF and the RCMU pump and a 0.5 gpm instrument error, an operability limit of 4.5 gpm seal leakoff per RCP was established.

Technical Specification 3.18.4 requires the RCMU to be operable when the unit is above 250 degrees F. It also provides a Limiting Condition for Operation that states that if the RCMU is inoperable, it shall be restored to operable status within 7 days or the unit shall be in hot shutdown conditions within the next 12 hours, and below 250 degrees F within the following 72 hours.

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

EVENT DESCRIPTION

On August 9, 1991, during the Unit 1 end of cycle 13 refueling outage, the 1A1 and 1A2 Reactor Coolant Pumps' (RCP) seals were replaced as a part of regular preventive maintenance. This work activity was performed under work order number 92032015, using maintenance procedure, MP/1/A/1310/04A (Seals, RCP- Westinghouse Controlled Leakage- Removal, Installation, and Inspection) and included the replacement of the double delta channel seals.

On May 13, 1992, Unit 1 returned to 100 percent power following a trip that occurred on May 8, 1992. At this time Operators noticed that the 1A2 RCP seal performance had degraded. The no. 1 seal behavior was characterized by an erratic leakoff flow rate indication. Abnormal Quench Tank level increases and frequent 1A2 RCP standpipe statalarms indicated that the no. 2 seal leakoff was higher than normal. The no. 1 seal leakoff flow was less than 4.5 gpm.

On May 19, 1992, at 1900 hours, Unit 1 entered a seven day Limiting Condition for Operation (LCO) as required by Technical Specification 3.18.4. The Reactor Coolant Makeup (RCMU) System was declared inoperable due to a greater than 4.5 gpm leakoff flow from the 1A2 RCP's no. 1 seal. At 1920 hours, the LCO was exited after the 1A2 RCP no. 1 seal leakoff flow decreased to less than 4.5 gpm due to Operator actions.

On May 21, 1992, at 1451 hours, with Unit 1 at 100 percent power, it's RCMU was declared inoperable due the 1A2 RCP having an indicated seal leakage of greater than 4.5 gpm. Unit 1 entered a seven day LCO for RCMU inoperability. An engineering evaluation was made to determine if an increased RCP seal leakage rate would be acceptable if continuous staffing of the Standby Shutdown Facility (SSF) was implemented. Westinghouse was contacted for recommendations on operating the RCP with seal leak rates of up to 6.5 gpm. Operator actions were not successful in lowering the no. 1 seal leakage.

On May 22, 1992, a reply was received from Westinghouse stating that the 1A2 RCP seal flow may be increased to 6.5 gpm, but be prepared for unpredictable and sudden degradation of the no. 1 seal. Also, the Operators should be prepared for a total loss of the no. 2 seal.

From May 22, 1992, up through May 24, 1992, the 1A2 RCP seal leakage averaged an approximate daily flow rate of 5.33 gpm, with a maximum rate of approximately 6.3 gpm. Operations closely monitored and trended the 1A2 RCP seal leakage during this time.

On May 24, 1992, at approximately 1000 hours, the decision was made to shutdown the unit for repair of the seals based on Westinghouse's recommendations to prevent further seal degradation. The engineering evaluation of the RCMU system was still in progress. However, preliminary results of the evaluation indicated that decreasing seal injection temperature and reducing the response time to man the SSF would provide

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sufficient compensatory action to protect the RCP seals if an SSF event should occur. Based on the preliminary results, it was believed, at this time, that the LCO could be exited by means other than by a unit shutdown.

On May 24, 1992, at 2010 hours, the Unit 1 shutdown was initiated.

On May 25, 1992, at 2040 hours, Unit 1's Reactor Coolant System temperature was less than 250 degrees F.

On May 29, 1992, during inspection of the 1A1 and 1A2 RCP seals it was discovered that an obsolete (black) no. 2 double delta channel seal on each RCP had been previously installed. These seals were removed and the proper seals (tan) installed.

On June 9, 1992, at 0535 hours, Unit 1 was returned to 100 percent power.

On June 30, 1992, all of the obsolete (black) no. 2 seal, double delta channel seals were removed from the warehouse inventory. Applicable maintenance procedures were revised to assure proper seal selection prior to installation.

On July 22, 1992, it was determined that the Unit 1 shutdown was a Technical Specification required action and reportable to the NRC. This evaluation analyzed the flow split of the RCMU seal injection water to each of the four RCPs and considered the effect of seal injection water temperature on seal performance. This evaluation concluded that the only acceptable method for exiting the LCO would have been a unit shutdown.

CONCLUSIONS

The root cause of the Unit 1 shutdown, on May 25, 1992, was a management deficiency (inadequate program), because obsolete no. 2 seal, double delta channel seals, were installed in the 1A2 Reactor Coolant Pump (RCP) during Unit 1's previous refueling outage (End of Cycle 13).

The basis for this determination was the fact that Westinghouse provided the necessary information, on the design change to the double delta channel seal, to all three Duke nuclear stations, but at Oconee, this information was not properly communicated to prevent the inadvertent use of the obsolete seal. This Westinghouse design change did not include a part number change for the seal. Without a part number change, the only method to identify the desired seal to be used was the seal material color (obsolete seal color is black and new seal color is tan). Results of the inadequate communication of the Westinghouse information was that the obsolete seals were not removed from the Oconee stock and appropriate maintenance procedures were not revised to reflect the change. These two results led to the inability of the Maintenance Technicians to identify the desired seals to be installed.

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It could not be determined where the communication breakdown occurred due to the many organizational, personnel, and policy changes since 1982.

Currently, the Operating Experience Program (OEP) should prevent the deficient communication that caused this event. Product change notices are entered into the OEP. Through the OEP, the change is evaluated for applicability to each nuclear station. If it is determined that the change affects operation of the station, a commitment item for action will be generated. This commitment item will be tracked to ensure that the determined action(s) are completed. At the time of this particular information transfer, the OEP was not effectively implemented.

Appropriate corrective actions to repair the failed seals and prevent inadvertent use of the obsolete seals have been completed. Also, the performance of the 1B1 and 1B2 RCP seals were evaluated and found to be acceptable for continued use based on their past performance. The 1B1 and 1B2 RCP seals will be inspected and replaced, as necessary, as a part of next scheduled preventive maintenance program for the RCPs. Based on the function of the OEP to ensure that vendor information is communicated properly and the already completed corrective actions, no further corrective actions are necessary for the cause of this event.

Prior to the unit shutdown, it was not recognized that the shutdown would be required by Technical Specification (T.S.) 3.18.4. On May 24, 1992, although the evaluation of RCMU operability was continuing, the preliminary evaluation results indicated that the T.S. Limiting Condition for Operation (LCO) could be exited by taking Operator actions to lower the seal injection temperature and reducing the time to man the Standby Shutdown Facility. However, with the higher than normal leakage rates through the no. 2 seal and the erratic indication of the no. 1 seal, the decision was made to shutdown the unit to repair the 1A2 RCP seals. At this time, based on the preliminary indications of the evaluation, it was believed that the LCO could be exited by means other than a unit shutdown. A memorandum to that affect was prepared on May 26, 1992. The unit was shutdown and when the reactor coolant temperature decreased below 250 degrees F, the LCO was exited within the associated seven day time period, on May 25, 1992. On July 22, 1992, it was concluded that the only acceptable way to have exited the subject LCO was by a unit shutdown.

The incomplete information, concerning RCMU operability in relation to RCP leakage, led to a time delay in meeting the reportability requirements for the initiation of T.S. required unit shutdown and for the completion of the shutdown. A required one hour phone notification was not made to the NRC and the required LER was not initiated upon the completion of the unit shutdown.

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The purpose of the one hour phone notification, required by 10 CFR 50.72, is to make the NRC aware of the initiation of any Technical Specification required shutdown while the shutdown is taking place. Since the RCMU operability determination occurred approximately two months after the initiation of the unit shutdown, it was determined that the phone call was not necessary.

The initiation and completion time of a LER is also dependent on the determination date of a reportable event. It was determined that the unit shutdown would have been T.S. required on July 22, 1992, and it was determined that this event was reportable on that same date.

As a part of a design basis documentation upgrade, an evaluation of the design requirements for the RCMU is already underway. Upon completion, it will develop adequate long term guidance for determining RCMU operability in relation to RCP seal leakage. Interim guidance has been provided for RCMU operability determination until the design study has been completed.

A review, spanning the past two years of documented events, involving T.S. required plant shutdowns, indicated that this is not a recurring event.

The seal failure of the 1A2 RCP, Westinghouse Type 93AS and Duke Power Equipment Number ON1RC PU0002, is NPRDS reportable.

This event did not result in the release of any radioactive materials, uncontrolled radiation exposures, or personnel injuries.

CORRECTIVE ACTIONS

Immediate

- 1) The obsolete double delta channel seals were removed and the proper seals were installed.

Subsequent

- 1) All obsolete double delta channel seals were removed from the warehouse inventory.
- 2) Applicable maintenance procedures were revised to assure proper seal selection to be verified before seal installation.
- 3) Interim guidance was provided for the Reactor Coolant Makeup System (RCMU) operability determination.

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Planned

- 1) An evaluation of the parameters that affect the RCMU operability will be performed. Upon completion, the results of this evaluation will provide long term guidance to determine RCMU operability.

SAFETY ANALYSIS

The High Pressure Injection (HPI) [EIIS:CB] and Component Cooling (CC) [EIIS:CC] Systems provide cooling flows to the Reactor Coolant Pump (RCP) [EIIS:P] seals during normal plant operation. If these systems are unable to provide seal cooling, the Reactor Coolant Makeup (RCMU) System can be used to provide RCP seal cooling, in addition to replenishing the Reactor Coolant System (RCS) to offset seal leakage and RCS shrinkage during cooldown to hot shutdown. Each RCP contains about 55 gallons of relatively cool (130-150 degrees F.) water in the seal housing. The cool water acts as a buffer between the hot RCS water and the RCP seals. If this cool water leaks off before seal flow can be reestablished, the RCP seals may degrade and the seal leakage rates may increase. By conservatively assuming that the RCP seals degrade once all the cool water has leaked off, limits have been established on the maximum permissible seal leakage rates during normal operations. The 4.5 gpm limit is intended to ensure that the Standby Shutdown Facility (SSF) can be manned and the RCMU flow established before the cool water supply is depleted and seal damage could occur.

The RCP 1A2 seal leakage rates exceeded the 4.5 gpm limit (at times reaching 6.3 gpm) between May 21 and May 24, 1992. The leakage rate removed the assurance that the RCP seals would not fail before the RCMU flow could be established. If the normal RCP seal cooling systems had failed, then the degradation of the RCP 1A2 seals was possible. The resulting unisolable leakage from the RCS would be greater than the makeup capacity of the RCMU pump, resulting in a RCP seal loss of coolant accident (LOCA). However, the probability that all normal seal cooling would have been lost during this time has been evaluated and found to be small (on the order of 10 E-5 or lower). Thus, it was highly improbable that the SSF would have been necessary to provide RCP seal cooling during the time that excessive seal leakage was present.

The Oconee Nuclear Station Final Safety Analysis Report (FSAR) analyzes LOCA events, for a spectrum of break sizes that envelope RCP seal LOCA's. The FSAR analyses demonstrate that the core will remain covered and radiological releases within 10CFR100 limits, for seal LOCAs with HPI safety injection. RCP seal LOCA events without HPI safety injection are not analyzed in the FSAR, because no plausible single failure would fail the HPI and CC Systems. However, this type of accident has been analyzed in support of safety evaluations for a station blackout (SBO). For a SBO of 4 hours duration with a postulated 25 gpm seal leakage per RCP, the core

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will remain covered. With the core remaining covered, the radiological consequences of a RCP seal LOCA are expected to be bounded by the FSAR Chapter 15 LOCA analyses.

In conclusion, it has been determined that the health and safety of the public was not compromised by this event. Also, this event did not result in the release of any radioactive materials, uncontrolled radiation exposures, or personnel injuries.