CATEGORY 1

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ACCESSION NBR:9704220065 DOC.DATE: 97/04/16 NOTARIZED: NO DOCKET #
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RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 97-003-00:on 970317,post LOCA boron dilution design bases were not met due to deficient design analysis. Corrective action:restricted change was made to low pressure injection sys procedure to introduce voids in piping.

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DUKE POWER

April 16, 1997

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

Subject: Oconee Nuclear Station
Docket Nos. 50-269, -270, -287
Licensee Event Report 269/97-03
Problem Investigation Process No.: 0-097-0279

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a) (1) and (d), attached is Licensee Event Report 269/97-03, concerning the post LOCA boron dilution design basis not being met.

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

Very truly yours,

B W Pulk for

J. W. Hampton, Vice President
Oconee Nuclear Site

/fts

Attachment 220015

IE22

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NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMD NO. 3150-0104
EXPIRES: 04/30/98
ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Oconee Nuclear Station, Unit One	05000 269	1 OF 5

TITLE (4) Post LOCA Boron Dilution Design Bases Not Met Due To Deficient Design Analysis

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 NAME	DOCKET NUMBER(S)
											Oconee, Unit Two	05000 270
03	17	97	97	-	03	-	00	04	16	97	Oconee, Unit Three	05000 287

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)	100	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
		20.405(a)(1)(i)	50.36(c)(1)	50.73(a)(2)(v)	73.71(c)
		20.405(a)(1)(ii)	50.36(c)(2)	50.73(a)(2)(vii)	OTHER (Specify in
		20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	Abstract below and
		20.405(a)(1)(iv)	X 50.73(a)(2)(ii) (B)	50.73(a)(2)(viii)(B)	in Text, NRC Form
		20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	366A)

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER	
	AREA CODE	
R. T. Bond, Safety Review Manager	(864)	885-3043

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)

While Oconee Units 1, 2, and 3 were in an extended outage, Engineering began an evaluation of Generic Letter 96-06. To eliminate present operability concerns related to thermal overpressurization in post-Loss of Coolant Accident (LOCA) boron dilution flow paths, procedures were revised to partially drain between valves LP-1 and LP-2 and between 3LP-103 and 3LP-104 during unit startup. On March 17, 1997, Units 1 and 2 were operating at 100 percent and Unit 3 was at 63 percent, an operability evaluation concluded that calculations could not prove that these valves could be opened post-LOCA with the lines full. The post-LOCA boron dilution flow paths using these valves were declared technically inoperable from the original installation in 1975 until October, 1996 when the recent outages began. The root cause is a Deficient Design Analysis, unanticipated interaction of components. Additional corrective actions include developing and implementing future modifications.

BACKGROUND

One of the design functions of the Low Pressure Injection (LPI) [EIIS:BP] System is to limit the concentration of boric acid in the reactor vessel following a Loss Of Coolant Accident (LOCA). The boron dilution flow path ensures that unacceptable boron concentrations do not develop in the core, resulting in boron precipitation and loss of heat transfer capability following a LOCA. There are three redundant boron dilution flow paths provided in the design of the LPI System. Two of these flow paths are available by positioning LPI System valves to establish the flow (active flow paths). One active path includes LP-1 and LP-2, the second active flow includes LP-103 and LP-104. The third path is available via reactor vessel internal flow (passive flow path). The Oconee Updated Final Safety Analysis Report requires at least two of these three boron dilution flow paths to be available following a LOCA.

EVENT DESCRIPTION

In response to Generic Letter 96-06 (Assurance of Equipment Operability and Containment Integrity during Design-Basis Accident Conditions) issued on September 30, 1996, Engineering began a review for applicability to Oconee Nuclear Station.

On January 21, 1997, during a three unit outage, Engineering determined that a potential existed for thermal over-pressurization of the line between valves LP-1 and 2 and LP-103 and 104 on all three units. A restricted change was implemented to the Low Pressure Injection procedure to assure that thermal over-pressurization between valves LP-1 and 2 and LP-103 and 104 would not occur. Prior to startup of each unit, the fluid between LP-1 and 2 on all three Units and LP-103 and 104 on Unit 3 were partially drained, creating a void that will allow the fluid to expand without over-pressurizing the line. These changes make the LP-1 and 2 flow paths for all three units and the LP-103 and 104 flow path for Unit 3 presently operable. A past operability evaluation was initiated by Engineering.

The flow path through LP-103 and LP-104 had been previously determined to be inoperable for all three units due to Generic Letter 95-07 issues (pressure locking and thermal binding). On December 11, 1996, Unit 3 was modified to correct pressure locking and thermal binding. Similar modifications are planned on Units 1 and 2.

On March 17, 1997, with Units 1 and 2 at 100 percent full power and Unit 3 at 63 percent full power Engineering completed the past operability evaluation. The evaluation concluded that valves LP-1, LP-2, LP-103 and LP-104 may not have been capable of opening following a Loss of Coolant Accident (LOCA). As a result, both active boron dilution flow paths on all three units had been technically inoperable since original installation (in 1975).

CONCLUSIONS

The root cause of this event is determined to be a Deficient Design Analysis, unanticipated interaction of components. During the original design of the Low Pressure Injection System it was not recognized that thermal over-pressurization could occur during a Loss of Coolant Accident. This was not clear until the issuance of Generic Letter 96-06. It is concluded that, if this information had been known at the time this system was designed, proper design could have corrected the problem or proper guidance could have been provided.

This event is considered to be non-recurring. No corrective action can be taken to assure that industry operating experience, improving technology, testing methods, and/or analytical models do not reveal previously unknown problems. Duke Power's Operating Experience Program is intended to assure evaluation of new industry information for potential impact on equipment/systems at Duke's Nuclear Power Stations.

This event did not involve an equipment failure and is not NPRDS reportable. There were no radiological overexposures, radioactive releases, or personnel injuries associated with this event.

CORRECTIVE ACTIONS

Immediate

None

Subsequent

1. A restricted change was made to the Low Pressure Injection System procedure for all three units to introduce voids in the piping between LP-1 and 2 and Unit 3's LP-103 and 104.

Planned

1. Develop and implement the appropriate modification to eliminate this problem on all three units.

2. Revise the appropriate procedures for Units 1 and 2 to introduce voids in the piping between LP-103 and 104.

Planned corrective action # 1 is considered to be an NRC Commitment Item. This is the only NRC Commitment item contained in this LER.

SAFETY ANALYSIS

The Final Safety Analysis Report Section 6.3 requires at least two of the three boron dilution flow paths to be available. Two active boron dilution flow paths have been past inoperable since the original design.

It should be noted for Loss of Coolant Accidents involving the hot leg side of the Reactor Coolant System, boron precipitation is not a concern since forced flow through the core and out through the break should occur for such breaks.

A passive flow path through the Reactor vessel internals was available. Since it is passive, it is not susceptible to single failure. Therefore,

system function was never lost, core cooling should not be affected, and no core damage would be expected.

The health and safety of the public was not affected by this event.