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February 5, 1996

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

Subject: Oconee Nuclear Station Unit
Docket Nos. 5-269, -270, -287
Licensee Event Report 269/95-07, Revision 1
Problem Investigation Process No.: 1-O95-1396

Gentlemen:

Pursuant to 10 CFR 50.73 Sections (a) (1) and (d), attached is Licensee Event Report 269/95-07, Revision 1, concerning the Low Pressure Injection System being technically inoperable.

This report is being submitted in accordance with 10 CFR 50.73 (a) (2) (ii)(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

/fts

Attachment

cc: Mr. S.D. Ebneter
Administrator, Region II
U.S. Nuclear Regulatory Commission
101 Marietta St., NW, Suite 2900
Atlanta, GA 30323

INPO Records Center
700 Galleria Parkway
Atlanta, GA 30339-5957

Mr. P. D. Milano
U.S. Nuclear Regulatory Commission
Office of Nuclear Reactor Regulation
Washington, D.C. 20555

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

IE22

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

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), 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)

(See reverse for required number of digits/characters for each block)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Oconee Nuclear Station, Unit One	05000 269	1 OF 7

TITLE (4) The Low Pressure Injection System Was Technically Inoperable Due To A Deficient Design Change

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
										05000
11	06	95	95	07	01	02	05	96	FACILITY NAME	DOCKET NUMBER 05000

OPERATING MODE (9)	N	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)			
POWER LEVEL (10)	0	20.2201(b)	20.2203(a)(2)(v)	50.73(a)(2)(i)	50.73(a)(2)(viii)
		20.2203(a)(1)	20.2203(a)(3)(i)	X 50.73(a)(2)(ii) (A)	50.73(a)(2)(x)
		20.2203(a)(2)(i)	20.2203(a)(3)(ii)	50.73(a)(2)(iii)	73.71
		20.2203(a)(2)(ii)	20.2203(a)(4)	50.73(a)(2)(iv)	OTHER
		20.2203(a)(2)(iii)	50.36(c)(1)	50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
		20.2203(a)(2)(iv)	50.36(c)(2)	50.73(a)(2)(vii)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
L. V. Wilkie, Safety Review Manager	(803) 885-3518

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	B1	V	F130	YES						

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

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On November 2, 1995, Unit 1 was shutdown for a refueling outage. On November 6, 1995, at 2030 hours, during the performance of Unit 1's Low Pressure Injection (LPI) Cooler Test, Low Pressure Service Water (LPSW) flow would not increase beyond approximately 2500 gpm through the 1A LPI Cooler as required by the test. An investigation revealed that the 1A LPI Cooler LPSW Outlet Manual block valve (a butterfly valve) had failed. The key that locks the manual operator to the valve stem vibrated out of the keyway allowing the disc to partially close and restrict flow. On December 6, 1995, Engineering could not assure that the valve would have performed its intended function during a design basis accident. Therefore, one train of the LPI system was declared technically past inoperable. As a result, the LPI system may not have performed its intended function, if a single failure occurred on the operable train during a design basis Loss of Cooling Accident. The root cause of this event was determined to be a deficient Design Change, original problem not resolved by design change. Corrective actions included a modification that mechanically prevents the key from vibrating out of the keyway.

BACKGROUND

The Low Pressure Injection (LPI) [EIIS:BP] System is an Engineered Safeguard System (ES) [EIIS:JE] designed to maintain core cooling for large break Loss of Coolant Accidents. LPI is accomplished through two separate flow paths. Each header includes one pump, one heat exchanger, associated piping, valves, and instrumentation and terminates directly in the reactor vessel through nozzles located on opposite sides of the vessel. A third pump (Non ES) which can be shared by both headers is also available and is normally used to remove decay heat during normal shutdowns.

The Low Pressure Service Water System (LPSW) [EIIS:BI] provides cooling for components in the Turbine Building [EIIS:NM], the Auxiliary Building (AB) [EIIS:NF] and the Reactor Building (RB) [EIIS:NH]. Engineering Safeguards [EIIS:JE] equipment located in the AB and RB (such as the LPI Coolers and Reactor Building Cooling Units) is cooled by the LPSW System. The LPSW System is a support system for LPI and is required to be operable per Technical Specification 3.3.2.

The 1A LPI Cooler LPSW Outlet block valve is a 10 inch butterfly, 150 pound class valve and the model number is A31A.

EVENT DESCRIPTION

On November 6, 1995, at approximately 2200 hours, during the performance of a routine Low Pressure Injection System (LPI) Cooler Test on Unit 1, the Control Room Operator attempted to increase Low Pressure Service Water (LPSW) flow from approximately 2500 gpm to approximately 5100 gpm. Flow would not increase as the control valve was opened. As the valve was throttled shut, the flow would decrease to zero. After several cycles of the control valve, flow could only be increased to approximately 1800 gpm. As a result, the 1A LPI Cooler LPSW Flow Control Valve was inspected and the flow controller calibration was checked. No problems were found. The Cooler Test was terminated and the 1B LPI Cooler was placed in service to remove decay heat. Efforts continued through out the night shift to determine why flow could not be increased.

On November 7, 1995, at approximately 0800 hours, staff personnel arriving for day shift recalled that a similar problem had occurred in 1994 during the previous Unit 1 refueling outage which involved the 1A LPI Cooler LPSW Outlet block valve. As a result of this information, an inspection of the 1A LPI Cooler Outlet block valve was performed. The inspection found that a key had slipped out of position allowing the disc to go to the partially closed position. The key maintains the valve position aligned with the operator position. A longer temporary key from stock was installed to make

the 1A LPI train functional. A compensatory action plan was put in place to inspect the key once every 24 hours. Engineering began an evaluation for past and present operability. At 1307 hours, the 1A LPI train was returned to service. At 1400 hours, Operations swapped from the B train to the A train and the LPI Cooler Test was completed and no flow control problems were noted.

On November 8, 1995, Engineering completed the present operability evaluation based on the following considerations:

(1) The key had been replaced and the valve was operating as designed.
(2) The failure occurred while the Reactor Coolant System was below 350 psig and 250 degrees F, therefore, the Technical Specification associated with the LPI system is not applicable.
(3) Selected Licensee Commitment 16.9.5 imposes a 24 hour time limit if the backup decay heat removal train becomes unavailable. The 24 hour time limit was not exceeded.
(4) Engineering evaluated the LPI Cooler LPSW Outlet block valves on Unit 1 B train and Units 2 and 3 and found no problems.

Therefore, the LPI System was determined to be presently operable. The past operability evaluation continued.

On November 9, 1995, after a planned inspection of the 1A LPI Cooler LPSW Outlet block valve, it was concluded that the longer temporary key had maintained the valve in the open position. The longer key was then replaced with a vendor key and staked in place and the 24 hour key inspection continued.

On November 9, 1995, at 1305 hours, Operations began filling the Transfer Canal in preparation for defueling.

On November 10, 1995, at 1442 hours, defueling operations began.

On November 12, 1995, at 1703 hours, defueling was complete.

On November 15, 1995, an inspection of the 1A LPI Cooler LPSW Outlet block valve found that the vendor key had slipped out of the keyway. As a result, a temporary change was made to fix the valve as before, until a modification could be implemented to prevent recurrence.

On November 18, 1995, Unit 1's Low Pressure Injection Cooler LPSW Outlet block valves were permanently modified. The modification installed a key cut to fit the keyway and bolted a washer plate to the end of the shaft to prevent the key from vibrating out of the keyway. Following the

modification the valve was inspected periodically while the LPSW System was in use during startup and no problems were noted.

On December 6, 1995, Engineering completed the past operability evaluation. The evaluation concluded that if an Engineered Safeguards actuation had occurred concurrently with a single failure of the 1B LPI train, the 1A LPI train would have been required to mitigate a Loss of Coolant Accident. However, due to repeatable failures of the 1A LPI Cooler LPSW Outlet block valve, the required LPSW flow (approximately 5500 gpm) could not be guaranteed. Engineering determined that the key in the 1A LPI Cooler LPSW Outlet block valve had failed due to flow induced vibration in the 1A LPI Cooler Flow Valve. Engineering also determined that Unit 1's Low Pressure Injection Cooler LPSW Outlet block valve had been susceptible to this type of failure since December 3, 1992 when this valve was replaced. Therefore, the 1A LPI Train was considered to be technically inoperable between December 3, 1992 and November 2, 1995.

Vibration data indicated vibration levels were much lower on Unit 2 and 3 versus Unit 1. No similar failures have occurred on Unit 2 or 3 LPI Cooler LPSW Outlet block valves. However, a conservative decision was made to modify Unit 2 and 3's LPI Cooler LPSW Outlet block valves in the same manner as Unit 1. The valves were modified on December 8, 1995.

On December 7, 1995, a management meeting was held to make a determination on past operability and reportability requirements for the failure of the 1A LPI Cooler LPSW Outlet block valve. Based on a technical evaluation from Engineering which resulted in an indeterminate conclusion, Management concluded that 1A LPI train was technically past inoperable. Based on a review of the Duke Power procedure addressing NRC reporting requirements per 10CFR50.72, it was concluded that this event was not reportable. During this review of NRC documents, Regulatory Compliance inadvertently used NUREG 1022, Revision 1, Draft 1 instead of NUREG 1022, Revision 1, Draft 2 to assist in the reportability determination.

On December 11, 1995, following NRC Resident questions regarding reportability, another review of reportability requirements for this event was conducted by Regulatory Compliance. Additionally, NUREG 1022, Revision 1, Draft 2 was reviewed for NRC reportability requirements. This review concluded that this event should be reported per 10CFR50.72 requirements. As a result, at 1633 hours, this event was reported to the NRC.

Subsequent investigation found that a Design Study (Completed on June 20, 1991) was performed as a result of a Station Problem Report (SPR) initiated in 1988. The SPR indicated that the original 1A LPI Cooler Flow Control Valve had failed due to cavitation and flow induced vibration. The Design

Study presented several options to correct the premature valve failures. Based on a review of the options, station management elected to utilize one of the options and the modification was installed during a refueling outage in December of 1992.

CONCLUSIONS

The root cause of this event is determined to be a deficient Design Change, original problem not resolved by design change. The Design Study recommended solutions to correct the cavitation and vibration problems associated with the Low Pressure Service Water piping problem. The approach taken did not correct the problem.

A review of LERs written within the last two years revealed that no reportable events had occurred with similar root causes. However, a Problem Investigation Process (1-094-0815) report was written on a previous failure of the 1A LPI Cooler LPSW Outlet block valve. The corrective actions for the failure identified above included replacing the key, performing visual inspections of similar valves on the other units and addressing vibration concerns on the decay heat removal trains. The corrective actions were still in the process of being implemented and the immediate corrective actions were not adequate to prevent reoccurrence. Therefore, the event is considered to be recurring.

The failure of the 1A Low Pressure Injection Cooler Outlet Block Valve is NPRDS reportable. The valve is a 10 inch butterfly manufactured by Fisher/Posi-seal and the model number is A31A.

There were no radiological overexposures, radioactive releases or personnel injuries associated with this event.

CORRECTIVE ACTIONS

Immediate

1. The 1A Low Pressure Injection Cooler flow test was terminated and the 1B Low Pressure Injection Cooler was placed in service to remove decay heat.

Subsequent

1. Unit 1, 2 and 3's Low Pressure Injection Cooler Outlet Block Valves were modified to prevent the key from vibrating out of the keyway.

2. Work Orders were written to inspect Unit 1's Low Pressure Injection Cooler Outlet Block Valves once every twenty four hours until the unit was returned to 100 % Full Power.

Planned

1. System Engineering will lead an effort to evaluate the Low Pressure Service Water System vibration problems on the 1A LPI train.

SAFETY ANALYSIS

The Low Pressure Injection (LPI) System provides emergency coolant injection which is necessary during a Design Basis Loss of Coolant Accident. After the Borated Water Storage Tank (BWST) is depleted, the Reactor Building (RB) emergency sump becomes the long-term LPI suction supply for cooling the core. In the sump recirculation mode of operation, the LPI Coolers remove decay heat from containment. In addition to the LPI Coolers, the Reactor Building Cooling Units (RBCU) also reject heat from the RB. The heat removal capabilities of the LPI Coolers and RBCUs assure that the containment temperature and pressure response remain within the Equipment Qualification (EQ) envelope. The Low Pressure Service Water System provides cooling water to the LPI Coolers. Following certain single failures, there will only be one LPI cooler available. For this situation, the Abnormal Procedure for Loss of LPI directs the operator to increase LPSW flow to approximately 5500 gpm to the available LPI cooler. Due to a potential failure of the 1A LPI Cooler Outlet Block Valve, the operator would have been unable to increase LPSW flow and may have insufficient LPSW flow to the available LPI cooler. An evaluation of the safety significance of this situation follows.

It is possible that following the failure of the 1A LPI Cooler Outlet Block Valve, the flow rate (approximately 2500 gpm) could have remained constant. If this had occurred, analyses indicate that adequate core cooling would have been available and with the available LPSW flow rate EQ requirements would have been met. These analyses assume a large break in the pump discharge region of the cold leg. This is the limiting break location with respect to the long term containment response. Worst case assumptions are made with regard to RBCU fouling and the LPSW temperature. The analyses are performed using methodology outlined in the Duke topical report DPC-NE-3003-P (Mass and Energy Release and Containment Response Methodology).

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
	05000	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	7 OF 7
Oconee Nuclear Station, Unit One	269	95	07	01	

TEXT *(If more space is required, use additional copies of NRC Form 366A)* (17)

It is also possible that the 1A LPI Cooler Outlet Block Valve might have gone to a more throttled position or eventually closed. If this had occurred, analyses indicate that adequate core cooling would have been available with LPI flow. However, with no heat removal by LPI cooling, the EQ temperature envelope would have been exceeded after 10 hours. The impact of the higher containment temperature response on equipment to mitigate a Loss of Coolant Accident has been evaluated. This evaluation concluded, due to severe conditions to which EQ equipment is tested, the EQ equipment could have performed its intended safety function following an accident.

During the period of time that the LPI System was technically inoperable, no event occurred which required long term core cooling. Therefore, the health and safety of the public was not affected by this event.