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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 2	05000 270	1 OF 7

TITLE (4) Equipment Failure May Result In A Loss Of Containment Integrity During A Postulated Event

EVENT DATE (5)			LER NUMBER (6)			REPORT NUMBER (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
									Oconee, Unit 3	05000 287
06	10	93	93	-- 02 --	00	07	12	93	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	20.402(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
		20.405(a)(1)(iii)	X	50.73(a)(2)(i) (B)		50.73(a)(2)(viii)(A)	(Specify in Abstract below and in Text, NRC Form 366A)
		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 (Include Area Code)
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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

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 15 single-spaced typewritten lines) (16)

In May 1993 an Engineer was reviewing a procedure which was generated as a result of Generic Letter 88-14 (Instrument Air Supply System Problems Affecting Safety-Related Equipment) to test air operated valves (AOV) with backup accumulators. He questioned the test method and acceptance criteria of the procedure and initiated an evaluation of air leakage from backup accumulators on AOVs associated with containment integrity. The evaluation revealed that containment integrity could be lost during a postulated Loss of Instrument Air coincident with a Small Break Loss of Coolant Accident because Unit 2 and 3's HP-21 valves may return to the open position due to accumulator leakage. This evaluation was completed on June 10, 1993 with Unit 3 at 100% full power and Unit 2 shutdown for refueling. These valves were determined to have been inoperable in the past and currently conditionally operable based on a change to the Abnormal Procedure (AP) for Loss of Instrument Air (LOIA). The changes to Unit 2 and 3's APs require the operators to close HP-21 manually within three hours following a LOIA. The root cause of this event is Equipment Failure. Oconee Engineering will perform an evaluation to determine the long range plans for these valves, including a possible replacement for Unit 2 and 3's HP-21.

BACKGROUND

The High Pressure Injection System [EIIS:BQ] controls the Reactor Coolant System (RCS)[EIIS:AB] inventory, provides the seal water for the Reactor Coolant Pumps (RCP)[EIIS:P], and recirculates RCS letdown for water quality maintenance and reactor coolant boric acid concentration control.

2HP-21 and 3HP-21 (Seal Return Block) are air operated valves outside containment whose purpose is containment isolation for the Unit 2 and Unit 3 RCP Seal Return lines. These valves have an air accumulator backup which drives the valves closed if the normal air supply (Instrument Air) is lost. Additionally, Auxiliary Instrument Air is available, although this system is not safety-related, it would be available during a loss of power. The Seal Return line is isolated by low RCS pressure or high Reactor Building pressure actuation of the Engineered Safeguards System.

One of the purposes of procedure IP/0/A/0310/015 (Reactor Building Pneumatic Isolation and EQ Valve Check) is to verify that air operated valves HP-5 and HP-21 fail closed upon a Loss of Instrument Air. The procedure is required to be performed during each refueling outage. The acceptance criteria requires less than 5 psi leakage in 15 minutes.

Technical Specification 3.6.3c states that a containment isolation valve may be inoperable provided either:

1) The inoperable valve is restored to operable status within four hours.
2) The affected penetration is isolated within four hours by the use of a deactivated automatic valve secured and locked in the isolation position.
3) The affected penetration is isolated within four hours by the use of a closed manual valve or blind flange.
4) The reactor is in the hot shutdown condition within 12 hours and cold shutdown within 24 hours.

EVENT DESCRIPTION

A System Engineer (SE) began a review of Significant Operating Experience Report (SOER) 88-1 to ensure that our testing of Air Operated Valves (AOV) having backup accumulators met the intent of the SOER. The SE questioned if the current test method met the intent of the SOER and if the acceptance criteria of procedure IP/0/A/0310/015 was adequate. On May 31, 1993 he initiated a Problem Investigation Process (PIP) report. The SE continued the review and discovered that during Unit 1's last refueling outage which ended on March 7, 1993, both HP-5 and HP-21 initially failed to meet the

acceptance criteria of the procedure. The accumulator check valves were replaced, retested and the acceptance criterion was met. Unit 3's HP-5 and HP-21 had been tested on September 27, 1992 and met the acceptance criteria.

On June 2, 1993 during Unit 2's refueling outage, 2HP-5 and 2HP-21 were tested for the first time in accordance with procedure IP/0/A/0310/015. 2HP-5 failed to meet the acceptance criteria of the procedure and 2HP-21 met the criteria. 2HP-5 was repaired, retested and met the acceptance criteria.

As part of the PIP response, Oconee Engineering (OE) evaluated several scenarios with respect to the effect of accumulator leakage on the performance of HP-5 and HP-21 as containment isolation valves. The valves are periodically tested to assure proper operation when supplied with instrument air pressure. Accumulator leakage within the existing acceptance criteria only affects operation after a postulated Loss of Instrument Air (LOIA) coincident with a Loss of Coolant Accident (LOCA). Both HP-5 and HP-21 are outside containment, and are not challenged unless the redundant isolation valve(s) inside containment fails to function. The HP-5 valves are designed and installed with flow over the disc. Therefore, post accident pressure would maintain HP-5 closed during the postulated scenario and maintain containment integrity.

Unit 1, 2, and 3's HP-21 valves are designed and installed in the system such that the high pressure side of the valve is under the valve disk, providing a force that would tend to cause the valve to open. During a Large Break Loss of Coolant Accident, the resulting system pressure would be too small to provide enough pressure under the disk to overcome the stem/packing friction. Therefore, these valves would remain closed during this postulated scenario and maintain containment integrity.

During a Small Break Loss of Coolant Accident (SBLOCA), the Reactor Coolant System (RCS) pressure would remain elevated for several hours. Seal leakage would pressurize the seal return line and pressure under the disk could open the valve. Unit 1's HP-21 was determined to be operable because a relief valve in the system would maintain RCS pressure below that which would cause the valve to open. Therefore, this valve would remain closed during the postulated scenario and maintain containment integrity.

On June 10, 1993, the evaluation also determined that Unit 2 and 3's HP-21 AOVs would remain closed for a minimum of three hours due to the accumulator pressure and stem/packing friction, during the postulated SBLOCA scenario. After this time the valve may begin to open, due to high system pressure as a result of a SBLOCA and the accumulator pressure continuing to drop, resulting in a loss of Containment Integrity. The Unit

2 and 3 valves were declared conditionally operable after implementation of procedure changes to Unit 2 and 3's Abnormal Procedures for Loss of Instrument Air. The changes instructed Operators to manually close HP-21 within three hours following a LOIA. These changes were implemented on June 10, 1993, for Unit 3 (which was operating at 100 % full power) and on June 16, 1993, for Unit 2 (which had a refueling outage in progress).

On June 23, 1993, OE determined that Unit 2 and 3's HP-21 were past inoperable. The date on which the valves became inoperable is indeterminate because it could not be determined when the backup accumulator system began leaking.

An investigation revealed that these valves were functionally tested in accordance with procedure TI/0/A/0100/002 (Failure Position Test of Active/Passive Air Operated Valves) between 1991 and 1992. The functional testing verified the fail safe position of the valve on a LOIA. On August 8, 1992, HP-5 and HP-21 were added to procedure IP/0/A/0310/015 and procedure TI/0/A/0100/002 was deleted. The original accumulator leakage criterion was based on normal valve preventive maintenance practices and not on design basis.

This testing occurred as a result of recommendations from SOER 88-1 and Generic Letter (GL) 88-14. SOER 88-1 recommended that Duke Power verify that accumulators and associated check valves provided for safety-related equipment are capable of performing their intended function during a LOIA. In response to the SOER, Duke Design Engineering (DE) performed an evaluation and stated that the accumulator capacity was checked and was sufficient to operate the valve. GL 88-14 requested that Duke Power verify that backup accumulators are properly designed to perform their intended function. In response to GL 88-14 Duke Power DE and the valve manufacturers performed a design verification that determined the accumulators were properly sized to perform their intended function. Also in response to the SOER and GL the valves would be functionally tested.

CONCLUSIONS

The root cause of this event is Equipment Failure. Due to leakage in the backup accumulator system associated with Unit 2 and 3's HP-21, the accumulator may not have maintained HP-21 closed during a postulated event. Testing has proved that these valves will close on a Loss of Instrument Air (LOIA). Recent testing has shown the backup accumulator system to be leaking. If the backup accumulator system did not leak, HP-21 would remain closed during the postulated scenario of LOIA simultaneously with a Small Break Loss of Coolant Accident and a single failure of the redundant isolation valve.

As a result of recommendations from SOER 88-1 and Generic Letter 88-14 selective air operated valves were tested. During the preparation of the initial test procedures emphasis was placed on ensuring that these valves failed to their required position on a loss of instrument air. It was also recognized that leakage of the accumulator system may result in these valves opening, however the appropriate acceptance criterion was not established at this time. Otherwise this event may have been discovered earlier.

A review of Oconee's Problem Investigation Process over the last two years revealed that several events had occurred which involved equipment failures. However, none of these equipment failures involved backup accumulators systems. Therefore, this event is considered non-recurring.

This event involved an equipment failure which could have affected containment integrity during a postulated event. However, the failure does not affect the normal operation of the valve. Therefore, this failure is not NPRDS reportable. This event did not involve radioactive releases, exposures to radiation, or personnel injuries.

CORRECTIVE ACTIONS

Immediate

1. On June 10, 1993 Unit 3's AP for Loss of Instrument Air (LOIA) was changed to require Operators to close HP-21 within three hours upon LOIA.

Subsequent

1. On June 16, 1993 Unit 2's AP for LOIA was changed to require Operators to close HP-21 within three hours upon LOIA.

Planned

1. Oconee Engineering will perform an evaluation to determine the long range plans for this valve, including a possible replacement of Unit 2 and 3's HP-21.

SAFETY ANALYSIS

Valve HP-21 is an air operated valve which serves as a containment isolation valve for the Reactor Coolant Pump (RCP) seal return line. It has a backup accumulator to drive the valve to the closed position if the

normal air supply, the Instrument Air (IA) System, is lost. Additionally, an auxiliary Instrument Air System is also available, although the system is not safety-related. Under a postulated scenario, a high containment pressure Engineered Safeguards (ES) signal causes HP-21 to close. If a coincident loss of IA were to occur, then the backup air accumulator would continue to hold the valve in the closed position. However, if air accumulator leakage occurs (which is the failure mode of concern), then the valve would return to the open position. An evaluation of HP-21 has concluded that it would remain closed for approximately three hours due to accumulator pressure and stem/packing friction, and would leak once the seal return line pressure is greater than 280 psi.

The safety concern for this event is the potential loss of containment integrity with a resulting release from the post-accident Reactor Building (RB) atmosphere into the environment. The issue of current operability is addressed as follows: This issue has been resolved through corrective actions to include steps in Abnormal Procedures (AP) to manually close containment isolation valve HP-21 within three hours following a Loss of Instrument Air (LOIA). This action ensures no loss of containment integrity. The issue of past operability is addressed as follows: After approximately three hours following the scenario of concern, the containment isolation valve HP-21 could potentially open, thus resulting in a loss of containment integrity. Large break Loss of Coolant Accidents (LOCA) cannot challenge the valve due to the Reactor Coolant System (RCS) pressure being insufficient. Therefore, the scenarios of concern are small break LOCAs.

The Final Safety Analysis Report (FSAR) small break LOCA analyses do not result in fuel failures since the core remains covered for all break locations and sizes. Therefore, the leakage through the RCP seal return line does not have a high activity level. In addition, the leakage flow will be recirculated back to the RCS via the Letdown Storage Tank (LDST), similar to the High Pressure Injection (HPI) minimum flow. Since the leakage is contained, the doses are minimal and are bounded by the FSAR large break LOCA analysis. A special type of small break LOCA which does result in fuel failure is a rod ejection accident. After three hours the leakage would drain the LDST and be recirculated back to the RCS. The FSAR LOCA analysis assumes 100% failed fuel, which is more than fails in a rod ejection accident. Therefore, the consequences would be less than the large break LOCA analysis. A third type small break LOCA would be failure of the seal return line downstream of HP-21. Isolation of this break could potentially be lost after three hours. Similar to most small break LOCAs, the absence of any fuel failure limits the dose consequences, and the FSAR large break LOCA dose results are bounding.

In summary, the loss of containment isolation at three hours by opening of HP-21 has been determined to have consequences that are bounded by the FSAR large break LOCA analysis. Furthermore, the leakage outside of the containment will be confined within the HPI System, and the source term for offsite doses will be limited to the leakage from the Emergency Core Cooling System assumed in the FSAR. Consequently, the failure mode of concern can only develop into a containment leak path for a low probability scenario. If this were to occur, the resulting dose consequences would be bounded by the existing FSAR analyses. Therefore, it is concluded that this event would not constitute a significant risk to the health and safety of the public.