

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) LaSalle County Station Unit 1										DOCKET NUMBER (2) 0 5 0 0 0 3 7 3				PAGE (3) 1 OF 0 4		
TITLE (4) Reactor Scram resulting from loss of vacuum																
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 2	1 3	8 4	8 4	0 1 1	0 0 0	3 1	4	8 4	LaSalle County Unit 2				0 5 0 0 0 3 7 4			
THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more of the following) (11)																
OPERATING MODE (9)		1		20.402(b)		20.405(e)		XX		60.73(a)(2)(iv)		73.71(b)				
POWER LEVEL (10)		0 18 6		20.405(a)(1)(i)		60.36(a)(1)				60.73(a)(2)(v)		73.71(e)				
				20.405(a)(1)(ii)		60.36(a)(2)				60.73(a)(2)(vi)		OTHER (Specify in Abstract below and in Text, NRC Form 365A)				
				20.405(a)(1)(iii)		60.73(a)(2)(i)				60.73(a)(2)(vii)(A)						
				20.405(a)(1)(iv)		60.73(a)(2)(ii)				60.73(a)(2)(vii)(B)						
				20.405(a)(1)(v)		60.73(a)(2)(iii)				60.73(a)(2)(x)						
LICENSEE CONTACT FOR THIS LER (12)																
NAME Baron S. Westphal ext. 247										TELEPHONE NUMBER						
										AREA CODE 8 1 5 3 5 7 - 6 7 6 1						
COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)																
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC						
X	SIG	SEAL	ZI9I9I9	N												
B	SIE	BILILI	TIIIIJ	N												
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)

A Unit 1 scram resulted when the Turbine Generator tripped from loss of condenser vacuum. There was no testing or maintenance in progress that caused the trip. The reactor isolated on a Group 1 PCIS signal due to the loss of vacuum. RCIC and SRV's were used to control reactor water level and pressure. The Turbine Generator lost vacuum because an expansion joint in the 14A low pressure heater extraction steamline failed, rupturing the boot seal between the turbine and condenser. The expansion joint liner was redesigned to reduce vibration which is thought to be the failure mechanism and new expansion joints were installed in extraction steamlines to the 14A/B/C low pressure heaters. The boot seal in the A condenser hood was also repaired.

A loss of service air resulted in a Unit 2 scram because scram air header pressure reduced to a point that allowed the scram valves to open. Unit 2 reactor was in cold shutdown recently having completed initial fuel load. The Service air header was crossconnected between the Units and the U-1 Service Air Compressor surged and would not reload shortly after the Unit 1 scram. The only other running air compressor could not maintain system pressure.

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LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104

EXPIRES: 8/31/85

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LaSalle County Station Unit 1	0 5 0 0 0 3 7 3	8 4	— 0 1 1	— 0 0	0 2	OF	0 4

TEXT IF more space is required, use additional NRC Form 365A's (17)

I. EVENT DESCRIPTION:

Unit One reactor scrammed from a 'Turbine Stop Valve Not Open' Reactor Protection Signal (JC, RPS) when Unit One Turbine Generator (TA) tripped on low vacuum. The reactor was in steady state conditions at 85% power prior to the scram. A Group 1 Primary Containment Isolation (JM, PCIS) properly closed the Main Steam Isolation Valves (SB, MSIV) and main steam drain valves when condenser vacuum reached 7" Hg shortly after the scram. Reactor pressure then increased to a maximum of about 1050 PSIG automatically actuating a Safety Relief Valve (SB, SRV). The SRV was manually operated two more times to help control pressure until Reactor Core Isolation Cooling (BN, RCIC) which was also manually started, could control reactor pressure and level. Reactor water initially dropped to 0" as indicated by wide range water level monitoring and was quickly recovered to normal level using RCIC. Approximately 15 minutes after the scram, a Group 5 isolation of Reactor Water Cleanup (CE, RWCU) on area hi differential temperature occurred, because reactor blowdown flow via RWCU was maximized to reduce reactor water level after a high water level (54.5") tripped RCIC. Blowdown flow was reduced and both RWCU and RCIC were restarted. All control rods were verified full in and no ECCS actuations were required.

Unit 2 scrammed 13 minutes after the Unit 1 scram on low scram air header pressure. Unit 2 was in cold shutdown prior to the scram.

II. CAUSE:

A. Unit 1 Loss of Vacuum

There was no maintenance, testing, or abnormal lineups that caused or inhibited operator actions on the Unit 1 scram. The cause of the scram was failure of the 16" expansion joint, 1ES017M, in the 14A low pressure heater extraction steam supply line (SE, ES). This failure resulted in steam impinging upon the 'A' condenser hood boot seal which is a rubber expansion joint between the 'A' low pressure turbine and the 'A' condenser hood. The boot seal overheated and ruptured resulting in a loss of turbine vacuum.

B. Unit 2 Loss of Service Air

There was no maintenance or testing in progress that caused or inhibited operator actions on the Unit 2 scram. The U-1 Service Air Compressor (SAC) surged shortly after the Unit 1 scram and would not reload which resulted in the U-0 SAC trying to supply normal air pressure to both units. The service air (LF, SA) header is normally crossconnected between units. The U-0 SAC couldn't keep up with the air demand and eventually, the U-2 scram air header pressure which is supplied from service air decreased low enough to allow the scram valves to open.

III. PROBABLE CONSEQUENCES:

A. Unit 1 Scram

SRV actuation and RCIC operation maintained control of reactor pressure and water level as well as removing decay heat to the suppression pool. All ECCS systems were available for normal operation.

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TEXT (if more space is required, use additional NRC Form 306A's) (17)

B. Unit 2 Scram

Unit 2 was in cold shutdown with all control rods full in with the initial critical not yet performed. All ECCS systems were available for operation. If the reactor had been in condition 1 or 2 when SA was lost either of 2 sequences might have occurred:

1. The SA crossconnected valve between the units could be closed in time to prevent the scram. It was greater than 10 minutes following the loss of U-1 SAC that the scram air header pressure on Unit 2 decreased enough to scram control rods. This is enough time to dispatch an operator to close the valve.
2. If the SA crossconnect valve wasn't closed, manual scram would have been initiated when control rods began to scram individually.

IV. CORRECTIVE ACTION:

A. Unit 1 Low Vacuum Trip

This is not the first failure of this type at LaSalle. Feedwater heating consists of 3 strings each with 5 stages of low pressure heating and each with identical system configuration. On 1/16/84, the 16" expansion joint in the extraction steam line to the 14B low pressure heater failed in a similar manner as the 16" expansion joint to the 14A low pressure heater (See Sec. V of this report). The first event was considered an isolated case, and a new expansion joint of the same design was ordered, but could not be obtained for several weeks. As an interim fix, this extraction steam line was capped with an allowance for moisture removal from the turbine. The new expansion joint would be installed during a future outage. The second failure resulted in an extensive investigation to determine the mechanism of failure. Participating in this investigation were LaSalle Station Engineers, CECO Station Nuclear Engineering Department, LaSalle Station Architectural Engineers Sargent and Lundy, and engineers from the manufacturer of the expansion joint, Temp-Flex. This group concluded that it was excessive vibration of the inner liner and its subsequent failure that resulted in both expansion joint failures. It was found that the liner was designed for steamflow less than that occurring through the expansion joint and that there were irregularities in the design of the liner that could cause vibration.

The expansion joint design has been changed to correct the problems noted by the investigation team, however, the manufacturing time required is extensive so the following short term actions have been taken:

1. The liner of the current expansion joint design was changed to reduce the vibration effects. The liner was thickened to give added strength and the irregularities of the liner itself were reduced. Replacements for the 16" expansion joints to 14A/B/C low pressure heaters were ordered in Jan. 1984 after the first failure and were readily available. The liners were replaced with the modified design and these expansion joints were installed.
2. The 14A heater extraction line has been instrumented for vibration monitoring.

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3. Other expansion joints in the extraction steam lines were analyzed for proper design and it was determined that no further repairs were required.

4. The boot seal in the 'A' condenser hood was repaired.

The above action is expected to be adequate until the first Refuel at which time the redesigned expansion joint incorporating the investigation group findings will be installed. Heater pressures provide a good indication of expansion joint condition and will enable evaluation of the short term fix during operations. The permanent solution and installation is tracked by AIR 01-84-67037.

B. Unit 2 Loss of Service Air

No corrective action was taken. The U-1 SAC was cycled OFF-ON whereupon it loaded and began pressurizing the SA system along with the U-0 SAC to restore normal pressure. A loss of service air coincident with a unit scram has not occurred in the past, consequently, no change to split out the Unit Service Air Systems was deemed necessary. The benefit from a crossconnected system is high, since SA loads change quite a lot depending upon the maintenance in progress on a given unit.

V. PREVIOUS OCCURRENCES:

LER 84-005: Loss of Vacuum resulting in a unit scram.

VI. NAME AND TELEPHONE NUMBER OF PREPARER:

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March 14, 1984

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

Dear Sir:

Reportable Occurrence Report #84-011-00, Docket #050-373 is being submitted to your office in accordance with 10 CFR 50.73.

G. J. Diederich
Superintendent
LaSalle County Station

GJD/GW/sjc

Enclosure

cc: NRC, Regional Director
INPO-Records Center
File/NRC

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