

**LICENSEE EVENT REPORT (LER)**

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Limerick Generating Station, Unit 1	0   5   0   0   0   3   5   2	1   OF   0   8

TITLE (4)  
Refuel Floor Secondary Containment Isolation Due to Low Negative Differential Pressure  
as a Result of a Loss of Auxiliary Steam

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)									
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OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §. (Check one or more of the following) (11)									
5		20.402(b)		20.405(c)	<input checked="" type="checkbox"/>	50.73(a)(2)(iv)		73.71(b)			
POWER LEVEL (10)	01010	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 Abstract below and in Text, NRC Form 365A)			
		20.405(a)(1)(iii)		50.73(a)(2)(i)		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)(x)					

LICENSEE CONTACT FOR THIS LER (12)					
NAME	TELEPHONE NUMBER				
C. R. Endriss, Regulatory Engineer	<table border="1"> <tr> <td>AREA CODE</td> <td></td> </tr> <tr> <td>2   1   5</td> <td>3   2   7   -   1   2   0   0</td> </tr> </table>	AREA CODE		2   1   5	3   2   7   -   1   2   0   0
AREA CODE					
2   1   5	3   2   7   -   1   2   0   0				

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)											
CAUSE	SYSTEM	COMPONENT	MANUFAC- TURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFAC- TURER	REPORTABLE TO NPRDS	

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE)	<input checked="" type="checkbox"/> NO				

**ABSTRACT** (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

On February 16, 1989, at 1658 hours, isolation of the Refuel Floor (RF) Secondary Containment and initiation of the Standby Gas Treatment System (SGTS), Engineered Safety Features (ESF), occurred on low negative differential pressure between the RF Secondary Containment and the outside environment. A trip of the Auxiliary Boilers due to a boiler malfunction caused a loss of steam to the RF Ventilation supply fan heating coils and, consequently, cold air was supplied to the RF area. The cold air expanded causing the RF negative differential pressure to decrease to the isolation setpoint of negative 0.1 inches H<sub>2</sub>O. The RF Secondary Containment System and the SGTS operated as designed to restore the required differential pressure between the RF Secondary Containment and the outside environment. Due to low flow trips, both trains of SGTS operated alternately to maintain the required differential pressure throughout the event. Both trains of SGTS were declared inoperable due to operational difficulties and the system operation continued utilizing the 'A' fan and the 'B' filter train. The boilers were restarted and, following correction of the operational difficulties, both SGTS trains were declared operable. The RF Secondary Containment isolation was reset and normal RF Ventilation restored. There were no adverse consequences and no radioactive material was released as a result of this event. The boiler controls will be adjusted during the next boiler outage to prevent recurrence of the malfunction and an investigation to increase boiler reliability is in progress.

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

Unit Conditions Prior to the Event:

Operating Mode: 5 (Refuel Outage)

Reactor Power: 0%

The Limerick Generating Station (LGS) Standby Gas Treatment System (SGTS) consists of two redundant trains ('A' and 'B'). Each train has a fan and a filter train. Each fan has two low flow switches designed to respond during a system problem. One flow switch (FSL-76-341A,B) trips the fan and its associated train; the second flow switch (FSL-76-340A,B) starts the opposite fan when its associated train is in standby. During the LGS First Refueling Outage a plant modification was installed which increased the SGTS fan capacity; the flow switches were installed with an initial setting to be determined during initial flow-testing. FSL-76-341A,B were set at approximately 300 scfm and FSL-76-340A,B were set at approximately 240 scfm. During testing of the modification, the FSL-76-341A setpoint was changed to approximately 24 scfm due to 'A' fan low flow tripping problems even though there was sufficient air flow. The 'B' fan did not experience these problems at that time and therefore FSL-76-341B was not changed from the original setpoint of 300 scfm.

Description of the Event:

On February 16, 1989, at 1658 hours, a Refuel Floor (RF) Secondary Containment (EIIS:JM) isolation and initiation of the SGTS (EIIS:BH), Engineered Safety Features (ESF), occurred due to low negative differential pressure between the RF Secondary Containment and the outside environment. The RF Secondary Containment System and the SGTS operated as designed to restore the required negative differential pressure.

Prior to the event, the 'A', 'B', and 'C' Auxiliary Boilers (EIIS:BLR) were operating with the 'A' boiler in the process of being removed from service by an auxiliary operator for routine burner cleaning. On February 16, 1989, at approximately 1650 hours, the Auxiliary Boiler local panel trouble alarm annunciated in the Main Control Room (MCR). An auxiliary operator was present in the Auxiliary Boiler Enclosure and reported that the 'B' boiler had tripped due to excessive smoke. This trip resulted in a sudden reduction in Auxiliary Steam header pressure and the 'C' boiler then tripped on low atomizing steam pressure. With all 3 boilers offline, the Auxiliary Steam header pressure decayed, resulting in a loss of steam to the RF Ventilation supply fan heating coils and, consequently, cold air was supplied to the RF area. MCR operators

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observed a gradual decrease of RF area differential pressure, using MCR indicators PDI-76-099 A & B. The 'B' channel was indicating slightly lower differential pressure than the 'A' channel due to indication instrumentation calibration tolerances. At approximately 1653 hours, the differential pressure sensed by the 'B' channel reached the negative 0.2 inches H<sub>2</sub>O alarm setpoint resulting in annunciation in the MCR indicating RF low negative differential pressure. At approximately 1656 hours, the differential pressure sensed by the 'B' channel reached the negative 0.1 inches H<sub>2</sub>O isolation setpoint. At 1658 hours, following the designed 100-second time delay, the RF Secondary Containment Channel 'B' isolation signal occurred.

Subsequent to the isolation signal, the following events occurred:

- The 'B' SGTS train initiated as designed and operated to restore the required negative differential pressure between the RF Secondary Containment and the outside environment.
- Proper isolation of RF Secondary Containment was verified by Operations personnel in accordance with System procedure S76.9.A, "Verification of Reactor Enclosure or Refueling Floor Secondary Containment Isolation".
- At 1701 hours, the 'B' SGTS fan tripped on low flow (less than 300 scfm) as sensed by the low flow switch FSL-76-341B, as a result of low air in-leakage to the RF Secondary Containment.
- The 'B' SGTS fan was restarted by the MCR operator and operated normally. The 'A' SGTS fan did not start automatically because the RF Secondary Containment Channel 'A' isolation signal had not been received.
- A manual initiation of the RF Secondary Containment Channel 'A' isolation logic was implemented by the MCR operators per System procedure S76.8.B, "Manual Initiation of Reactor Enclosure or Refueling Floor Secondary Containment Isolation", initiating the 'A' SGTS train. This manual initiation is required by System procedure S76.9.A when only one RF Secondary Containment Channel isolates. The 'B' SGTS train was then placed in standby.
- At approximately 1730 hours, the 'A' SGTS experienced low flow (less than 240 scfm) as sensed by FSL-76-340A, sending a start signal to the 'B' SGTS fan.

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- . The 'B' SGTS fan started, 'B' filter train dampers opened, and the 'A' SGTS train was manually placed in standby by the MCR operators.
- . At 1800 hours, the 'B' SGTS fan tripped due to low flow, as sensed by FSL-76-341B, subsequently sending a start signal to the 'A' SGTS fan at less than 240 scfm as sensed by FSL-76-340B.
- . The 'A' SGTS fan started as designed and operated normally.
- . At 1805 hours both trains of SGTS were declared inoperable; the 'B' train due to low flow tripping, the 'A' train due to heater trouble described below. The system remained in service utilizing the 'A' fan and the 'B' filter train.

The MCR operators received an alarm indicating a high differential temperature across the 'A' SGTS filter train heater. The MCR operators then observed that the 'A' SGTS heater outlet temperature indicator, TI-76-003A, was falsely indicating 130°F (approximately 60°F greater than the inlet temperature indicator, TI-76-001A) thereby rendering the filter train heater inoperable. The heater is designed to maintain the relative humidity below 70%, for proper charcoal absorber operation, by maintaining a constant temperature differential of 15°F across the heater. With a valid RF Secondary Containment isolation signal, and the heater differential temperature already exceeding 15°F, the heater would not have increased above the minimum setting to establish a true 15°F differential temperature. At 1805 hours the 'A' SGTS filter train was declared inoperable due to the temperature indicator problem and the 'B' SGTS fan was declared inoperable due to the low flow trip problem. With both trains of SGTS inoperable, Technical Specification Section 3.6.5.3. action 'B' was followed and, although none of the following activities were in progress, all core alterations, handling of irradiated fuel, and activities with the potential to drain the vessel were suspended. The SGTS system operation continued utilizing the 'A' fan and the 'B' filter train. No problems were experienced with this configuration, however both trains remained inoperable due to their inability to fulfill their design functions independently.

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U.S. NUCLEAR REGULATORY COMMISSION

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On February 17, 1989, at 0015 hours, the 'B' SGTS train was declared operable after an adjustment of the low flow trip switch FSL-76-341B setpoint. At 0130 hours, the SGTS was secured, the RF Secondary Containment isolation was reset, and normal RF Ventilation was returned to service. The SGTS was in service for a total of 8 hours, 30 minutes. At 2235 hours, the 'A' SGTS train was declared operable following replacement of a faulty temperature indicating transmitter.

A four (4) hour notification to the NRC was made on February 16, 1989, at 2050 hours in accordance with the requirements of 10 CFR 50.72(b)(2)(ii), since this event resulted in the automatic actuation of an ESF.

Consequences of the Event:

There were no adverse consequences and no radioactive material was released to the environment as a result of this event. The RF Secondary Containment isolation system and SGTS responded as designed following the receipt of a low negative differential pressure signal. Even though the SGTS fans experienced low flow trips, both trains operated alternately to maintain the required negative differential pressure throughout the event. Since there were no core alterations, movement of irradiated fuel or operations with a potential for draining the reactor vessel during this event, RF Secondary Containment integrity and SGTS operability were not required per TS Sections 3.6.5.1.2, 3.6.5.2.1, and 3.6.5.3. If any fuel handling accident had occurred during this event, the adverse consequences would have been minimal since the required RF Secondary Containment negative differential pressure and a monitored, elevated, and filtered release path were maintained throughout the event.

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Cause of the Event:

The initiating cause of this event was a trip of the Auxiliary Boilers as a result of a boiler malfunction. A subsequent investigation by the system engineer has revealed that, prior to the event, the boilers were aligned with the 'A' and 'B' boiler controls in automatic and the 'C' boiler control in manual at their local control panels. An auxiliary operator removed the 'A' boiler from service to perform routine weekly cleaning. The 'B' boiler automatically increased output, to make up for the lost output of the 'A' boiler. At approximately 60% of its capacity the 'B' boiler experienced excessive smoke which caused the 'B' boiler to trip as part of a protective interlock. The Auxiliary Steam header drawdown from the sudden loss of the 'B' boiler supply resulted in the loss of atomizing steam to the 'C' boiler causing the 'C' boiler to trip as part of a protective interlock.

An additional causal factor of this event was insufficient communication between the system engineer and the auxiliary operators. Several weeks prior to the event it was entered into the auxiliary operator's log that the 'B' boiler experienced excessive smoke when operated above 60% capacity. However, this turned out to be insufficient notification of this problem to the auxiliary operators.

With the loss of Auxiliary Steam supply to the RF Ventilation supply fan heating coils, and the normal ventilation and exhaust fans running, the RF area was receiving cold supply air which, upon contacting the warm air inside, immediately expanded. This expansion caused the RF negative differential pressure to decrease steadily until, at 1656 hours, the RF low negative differential pressure isolation setpoint of negative 0.1 inches H<sub>2</sub>O was reached as sensed by the Channel 'B' isolation logic differential pressure transmitter PDT-76-399B. Following the designed 100-second time delay, with negative differential pressure less than 0.1 inches H<sub>2</sub>O, RF Secondary Containment isolated and the 'B' train of SGTS initiated as designed, prior to the 'A' train receiving its start signal, and returned the RF to the required negative differential pressure.

An investigation by the system engineer revealed that the cause of the 'B' SGTS fan tripping was due to a high Low Flow trip setpoint of 300 scfm. The 'A' SGTS fan low flow trip setpoint is 24 scfm and this setpoint allows proper operation of the 'A' fan as well as providing an 'A' fan trip on low flow caused by a valid system problem.

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After troubleshooting, the 'A' SGTS filter train heater high outlet temperature indication was determined to be caused by a faulty temperature indication transmitter, TIT-76-003A, which resulted in the high temperature reading on TI-76-003A.

Corrective Action:

After the 'B' and 'C' Auxiliary Boilers tripped, the auxiliary operator at the Auxiliary Boiler Enclosure restored all 3 boilers to service at 1810 hours, on February 16, 1989.

Following the isolation of RF Secondary Containment the MCR operator verified proper isolation and initiation of SGTS in accordance with system procedure S76.9.A, "Verification of Reactor Enclosure or Refueling Floor Secondary Containment Isolation".

After both trains of SGTS were declared inoperable, the system was aligned utilizing the 'A' fan and the 'B' filter train and operated to maintain the required negative differential pressure between the RF Secondary Containment and outside atmosphere. A TCA was applied to lower the 'B' SGTS fan low flow trip setpoint to 24 scfm, matching that of the 'A', and the 'B' SGTS train was declared operable on February 17, 1989, at 0015 hours. An Interim Setpoint Change Request has been initiated to make the TCA of the 'B' SGTS fan low flow trip setpoint permanent. At 0130 hours, the SGTS was secured, the RF Secondary Containment Isolation was reset, and normal RF Ventilation returned to service. The 'A' SGTS filter train heater outlet temperature indicating transmitter, TIT-76-003A was replaced and the 'A' SGTS train was declared operable at 2235 hours.

Actions Taken to Prevent Recurrence:

The 'B' boiler combustion controls are scheduled to be adjusted after the Second Refueling Outage. An investigation of methods to increase Auxiliary Boiler reliability is in progress. An Operator Aid has been placed at the 'B' boiler local control panel to alert the operators of the excessive smoke problem.

An investigation is underway to determine the acceptability of increasing the time delay between receipt of the low negative differential pressure signal and isolation of the RF Secondary Containment and the results of this investigation will be reported in a supplement to LGS LER 89-010, expected to be issued by May 31, 1989.

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

Previous Similar Occurrences:

LGS Unit 1 LERS 85-089, 87-001, 87-056, 87-058, 87-064 and 87-065 reported Reactor Enclosure Secondary Containment isolations due to loss of Auxiliary Steam, (i.e., similar cause). LERS 87-024 and 89-010 reported Refuel Floor Secondary Containment isolations due to different causes, (i.e., similar results). This LER reports the first RF Secondary Containment isolation due to loss of Auxiliary Steam.

## Tracking Codes:

A7 - Failure to Properly Communicate

B3 - Component Out of Calibration

**PHILADELPHIA ELECTRIC COMPANY**

LIMERICK GENERATING STATION

P. O. BOX A

SANATOGA, PENNSYLVANIA 19464

March 20, 1989

Docket No. 50-352  
License No. NPF-39

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555

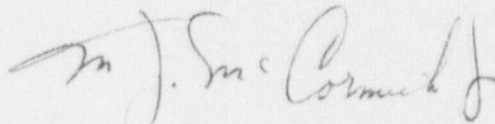
SUBJECT: Licensee Event Report  
Limerick Generating Station - Unit 1

This LER reports a Refuel Floor Secondary Containment isolation and Standby Gas Treatment System initiation, Engineered Safety Features, due to low negative differential pressure as a result of a loss of Auxiliary Steam.

Reference:	Docket No. 50-352
Report Number:	89-014
Revision Number:	00
Event Date:	February 16, 1989
Report Date:	March 20, 1989
Facility:	Limerick Generating Station P.O. Box A, Sanatoga, PA 19464

This LER is being submitted in accordance with the requirements of 10 CFR 50.73(a)(2)(iv).

Very truly yours,



M. J. McCormick, Jr.  
Plant Manager

DCS/sc

cc: W. T. Russell, Administrator, Region I, USNRC  
T. J. Kenny, USNRC Senior Resident Inspector, LGS-1

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