

## PHILADELPHIA ELECTRIC COMPANY

LIMERICK GENERATING STATION

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J. DOERING, JR.  
PLANT MANAGER  
LIMERICK GENERATING STATION

April 16, 1992  
Docket No. 50-352  
License No. NPF-39

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

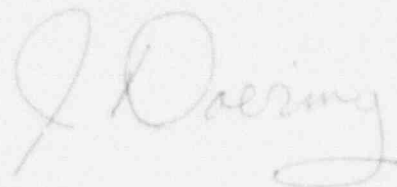
SUBJECT: Licensee Event Report  
Limerick Generating Station - Unit 1

This LER reports the opening of a Reactor Enclosure (RE) Secondary Containment blowout panel that alone could have prevented the fulfillment of the safety function of Secondary Containment that is needed to control the release of radioactive material. The blowout panel opening was caused by the failure of a RE supply fan to trip during RE ventilation system shutdown.

Reference:	Docket No. 50-352
Report Number:	1-92-004
Revision Number:	00
Event Date:	March 21, 1992
Report Date:	April 16, 1992
Facility:	Limerick Generating Station P.O. Box 2300, Sanatoga, PA 19464-2300

This LER is being submitted pursuant to the requirements of 10 CFR 50.73(a)(2)(v)(C).

Very truly yours,



KOS:cah

cc: T. T. Martin, Administrator, Region I, USNRC  
T. J. Kenny, USNRC Senior Resident Inspector, LGS

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Limerick Generating Station, Unit 1

DOCKET NUMBER (2) 0 5 0 0 0 3 5 2 1 OF 0 7

PAGE (3) 1 OF 0 7

TITLE (4) Loss of Reactor Enclosure Secondary containment Integrity due to a Reactor Enclosure Overpressurization Transient causing a blowout panel to open.

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)
03	21	92	92	004	00	04	16	92			05000
THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)											

OPERATING MODE (9) 4	20 402(b)	20 405(a)	50 731(a)(2)(iv)	73 71(a)
POWER LEVEL (10) 0, 0, 0	20 405(a)(1)(iv)	50 731(a)(1)	X 50 731(a)(2)(iv)	73 73(a)
	20 405(a)(1)(v)	50 731(a)(2)	50 731(a)(2)(iv)	OTHER (Specify in Addendum and in Text NRC Form 3064)
	20 405(a)(1)(vi)	50 731(a)(2)(i)	50 731(a)(2)(iv)(A)	
	20 405(a)(1)(vii)	50 731(a)(2)(ii)	50 731(a)(2)(iv)(B)	
	20 405(a)(1)(viii)	50 731(a)(2)(iii)	50 731(a)(2)(iv)(C)	

LICENSEE CONTACT FOR THIS LER (12)

NAME: C. J. Madsen, Regulatory Engineer, Limerick Generating Station

TELEPHONE NUMBER: 215 327-1200

AREA CODE: 215

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	V	A	B	K	R				

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If per complete EXPECTED SUBMISSION DATE)  NO

EXPECTED SUBMISSION DATE (15): MONTH DAY YEAR

ABSTRACT (Limit to 7400 characters, i.e., approximately fifteen single-space typewritten lines) (16)

On March 21, 1992, the normal Reactor Enclosure (RE) Heating, Ventilation, and Air Conditioning (HVAC) system was being secured to support a D13 Safeguard Bus outage. However, one of the RE Supply Fans failed to trip resulting in a high RE differential pressure (dp). An operator investigating the high dp condition discovered smoke coming from the cubicle containing the closed 1C RE supply fan breaker and immediately manually tripped the breaker and secured the fan. The failure of the supply air fan breaker to trip resulted in actuation of a RE blowout panel, minor Refuel Floor (RF) airborne radioactive material contamination levels and minor contamination on Elevation 313' of the RE. The consequences of this event were minimal, in that contamination levels and exposures to personnel were low and the release to the environment was limited to less than .01 percent of regulatory limits. The cause of the malfunctioning 1C RE HVAC supply fan breaker was due to a burned out power supply breaker trip coil. An investigation of the trip coil failure is ongoing and no apparent cause has been identified. While the investigation continues, a change has been made to the operating procedure for securing RE HVAC which will remain in effect until the cause of the failure of supply fans to trip has been determined and corrected. A modification is being implemented to increase the pressure setpoint on all RE blowout panels. Additional procedure revisions will be made to prevent RE HVAC events from causing contamination on the RF.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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Limerick Generating Station, Unit 1	05000352	92	04	00	2	07

TEXT (if more space is required, use additional NRC Form 366A) (17)

Unit Conditions Prior to the Event:

Unit 1 was in Operational Condition (OPCON) 4 (Cold Shutdown) at 0% Power Level. There were no structures, systems, or components out of service or being tested which contributed to this event.

Description of the Event:

On March 21, 1992 at 1934 hours, operations personnel were in the process of securing the Unit 1 Reactor Enclosure (RE) Heating, Ventilation, and Air Conditioning (HVAC) system (EIIS:VA) to support a D13 Safeguard Bus outage, in accordance with System (S) operating procedure S76.2.B, "Shutdown of Reactor Enclosure HVAC." While securing normal RE HVAC system, a non-licensed operator placed the operating RE exhaust fan handswitches (EIIS:HS) to OFF in accordance with procedure S76.2.B, which trips the RE exhaust and supply fans. A second non-licensed operator, stationed at the RE supply fan panel, believed that he observed that local indicator lights for all supply fans indicated that they had shutdown. All exhaust fans had properly tripped. One of the operators then observed that it sounded as if a supply fan was still operating. The operators then took actions to identify and shutdown the running RE supply fan.

A third operator heard radio communications concerning the high RE dp conditions and investigated whether the RE supply fan breakers (EIIS:BKR) had tripped. The operator discovered smoke coming from the cubicle containing the closed 1C supply fan breaker and immediately tripped the breaker using the manual trip pushbutton and secured the fan. Several events resulted from the failure of the 1C RE supply fan breaker to trip and are described as follows.

One event that occurred following the failure of the supply air fan to trip was the actuation of the blowout panel in the Unit 1 Safeguard System Access Area (see Figure 1). The blowout panel opened as designed, and therefore this was not an equipment malfunction. This was identified by operations personnel at 1945 hours. MCR Operations personnel notified Maintenance personnel to re-install the blowout panel. MCR personnel also notified Health Physics (HP) personnel to monitor the blowout panel penetration for contamination. Air sample and survey results taken from the blowout panel area indicated no detectable level of contamination.

A second event that occurred was air flow into the Refuel Floor (RF). Since the shield plugs above the reactor well cavity were removed, and the RF HVAC system was secured, RE air was forced into the RF via the deflated reactor well seals. This air flow agitated the loose contamination contained in the reactor well seal cavity and caused elevated RF airborne contamination levels. After the 1C supply air fan breaker was manually tripped at the breaker, the RF depressurized into the RE back through the reactor well seals, contaminating the RE Elevation 313'. A total of 15 people were contaminated as a result of this event, none resulting in personnel exposures greater than regulatory limits. Minimal efforts were required to decontaminate the personnel involved. A total

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TEXT (If more space is required, use additional NRC Form 366A's) (7)

estimated skin dose of 2 mrem was received by the four (4) individuals who received skin contamination. All affected general access areas were decontaminated to levels below the requirements of a Radiation Work Permit on the next day.

No TS Actions were required to be entered as a result of this event since neither RE nor RF Secondary Containment Integrity is required in OPCON 4, and North and South Stack exhaust radiation levels remained below TS limits. Personnel involved in the event on March 21, 1992, concluded that this event was not reportable since RE Secondary Containment Integrity was not required. However, following further review by site personnel, a four hour notification was made to the NRC at 1844 hours on March 23, 1992, in accordance with the requirements of 10CFR50.72(b)(2)(iii)(C), since this event could have occurred when Secondary Containment would be required and therefore resulted in a condition that alone could have prevented the fulfillment of the safety function of Secondary Containment that is needed to control the release of radioactive material. This LER is being submitted in accordance with the requirements of 10CFR50.73(a)(2)(v)(C).

Analysis of the Event:

The consequences of this event were minimal in that the offsite radioactive material release, contamination levels and exposures to personnel were extremely low. HP surveys and monitoring results after the event indicated that an insignificant amount of radioactive material consisting of noble gases probably existed in the area of the open blowout panel, and would have released to the environment during the time period when the blowout panel was open. The calculated radioactive release was limited to less than 0.01 percent of the Offsite Dose Calculation Manual (ODCM) limits.

If the blowout panel had actuated due to the RE supply fan breaker malfunction during power operation and an accident had occurred after the blowout panel opened, the required RE Secondary Containment negative differential pressure would not have been maintained by the Standby Gas Treatment System (SGTS, EIIS:BH) and the Reactor Enclosure Recirculation System (RERS, EIIS:AD). Therefore, if the accident resulted in elevated radioactive material release to the RE, an unmonitored release of the radioactive material to the environment could have occurred with the blowout panel open. In response to this type of equipment malfunction during an accident, the operators would have initiated Off-Normal (ON) procedure ON-111, "Loss of Secondary Containment," and Transient Response Implementing Plan (TRIP) procedures T-103, "Secondary Containment Control," and T-104, "Radioactivity Release Control," for directions to mitigate a radioactive material release. Licensed operators receive requalification training to review and practice responses to simulated plant transients of this type. The procedures, operator training, and operator actions would have mitigated the consequences of this type of accident.

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TEXT OF THIS REPORT IS REQUIRED. USE ADDITIONAL NRC FORM 366A (S) (17)

Cause of the Event:

The cause of the RE overpressurization and opening of the blowout panel was due to the failure of the 1C RE HVAC system supply fan to properly shutdown after operations personnel secured the RE HVAC system. The supply fan failed to shutdown as a result of a burned out circuit breaker trip coil. The cause of the trip coil failure is being investigated by Philadelphia Electric Company (PECo) and the manufacturer; however, no apparent cause has been determined to date. A review of five Nuclear Plant Reliability Data System (NPRDS) events reporting similar failures of identical circuit breakers supplied by the same manufacturer, revealed that two events were caused by failed trip coils as a result of unknown causes.

Previous failures of the RE supply fan breakers to trip occurred on January 8, 1991, and May 8, 1991. Following these previous failures, the Preventive Maintenance (PM) procedure to inspect/overhaul 480 volt load center power supply breakers was revised to check for signs of trip mechanism degradation and to make the proper adjustments. The previous events and the most recent event involved different individual breakers. The applicable steps of the PM procedure have been performed on 10 of the 16 frequently operated load center power supply breakers targeted for the increased PM performance. No signs of trip mechanism degradation had been identified during these PM tasks. The PM procedure was not performed on the 1C supply fan breaker prior to its failure on March 21, 1992. However, since the mode of failure of the breaker trip coil has not yet been determined, it is not assured that the PM procedure would have identified the potential for failure. Additionally, the breaker trip coil was replaced in May, 1991 and failure following 10 months of operation was not expected.

A complicating situation during this event was that the second operator believed that he observed that local indicator lights for all RE supply fans indicated that they had shutdown. Implementation of procedure S76.2.B was continued. The fan breaker control and indication circuitry was subsequently reviewed and tested and found to be functioning per design. However, the indicator lights for the 1C RE supply fan breaker were most likely extinguished with this type of trip coil failure. Additionally, the revision to procedure S76.2.B, performed as a corrective action for a similar previous event, was identified as difficult to perform as written.

Corrective Actions:

A task team was formed to investigate the failure of the breaker trip coil which included site personnel from system engineering, maintenance, and operations, corporate engineering and a contractor specializing in breaker testing. Troubleshooting was performed, including:

- o The trip control and indication circuitry was reviewed, inspected and found to meet design.

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

- o Resistance readings of the trip control circuit logic were taken and found to meet specifications.
- o The design of this trip control logic was reviewed and it was determined to be acceptable and identical to other breakers throughout the site which have not displayed failure to trip concerns.
- o Field testing of the trip control and indication circuit wiring was performed that verified that the breaker was correctly wired.
- o Voltage readings were taken to investigate the possibility of a voltage drop to the trip coil and normal readings were found.
- o The IC RE HVAC supply fan power supply breaker was sent to the manufacturer for failure mode analysis and investigation of generic concerns. The trip coil adjustment was verified to be correct, and after the failed trip coil was replaced, the suspect breaker was tripped approximately 20 times successfully and inspection and testing did not reveal the specific cause of the failure nor any generic concerns.
- o A transient analysis recorder was installed on the trip control circuit logic with the breaker racked in the test position. The breaker was tripped via the trip control logic and voltage and trip coil current draw were recorded. This data is presently being analyzed.

The cause of the failure of the breaker to trip has not been determined and the investigation is continuing. A supplement to this LER will be issued if the cause of the trip coil failure is determined.

The IC RE HVAC supply air fan power supply breaker was repaired by replacing the trip coil. The breaker was satisfactorily tested on April 6, 1992 and remains in an "Emergency Use Only" status to support continued troubleshooting.

To prevent the possibility of RE overpressurization following failure of a supply fan breaker to trip, the following corrective actions are being taken.

- o Procedure S76.2.B was temporarily revised on March 23, 1992, and is expected to be permanently revised by May 15, 1992. The revision will address the additional concerns identified as a result of this event. This procedure revision will remain in effect until the cause of the failure of the RE supply fans to trip has been determined and corrected.
- o A modification which had been planned prior to this event is being implemented during the current refueling outage for Unit 1 and will be implemented during the next refueling outage for Unit 2, to increase the pressure setpoint on all RE blowout panels. The new setpoint is above the static pressure of the RE supply fan and will prevent the blowout panels

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TEXT (If more space is req. use additional NRC Form 266A's) (7)

from actuating if one supply fan continues to run with all exhaust fans tripped.

To prevent future RE HVAC events from causing contamination of the refuel floor through the cavity seals, the following corrective actions have been taken:

- o The reactor well seals were inflated on March 22, 1991.
- o Procedures S76.1.A, "Startup of Refuel Floor HVAC", S76.1.B, "Startup of Reactor Enclosure HVAC," S76.2.A, "Shutdown of Refuel Floor HVAC", and S76.2.B are expected to be revised by May 15, 1992, to add an additional precaution to operators performing startup and shutdown of RE and RF HVAC systems when the reactor shield lugs are removed regarding the potential for contamination due to air flow via the deflated reactor well seals.
- o The appropriate maintenance and operations procedures for reactor disassembly and reassembly will be temporarily changed prior to reassembly and permanently changed prior to the next refueling outage. These revisions will add a step to ensure that the reactor well seals must be inflated when the shield lugs are removed.

In order to clarify the basis of the reportability for this event, a letter outlining this event will be issued to all personnel responsible for evaluating reportable events by April 30, 1992. The letter will discuss the reporting requirements of conditions that alone could have prevented the fulfillment of the safety functions of a system, even if found when the plant is in an operating condition where the system is not required. The letter will be included in the Licensed Operator Requalification training program by June 1, 1992.

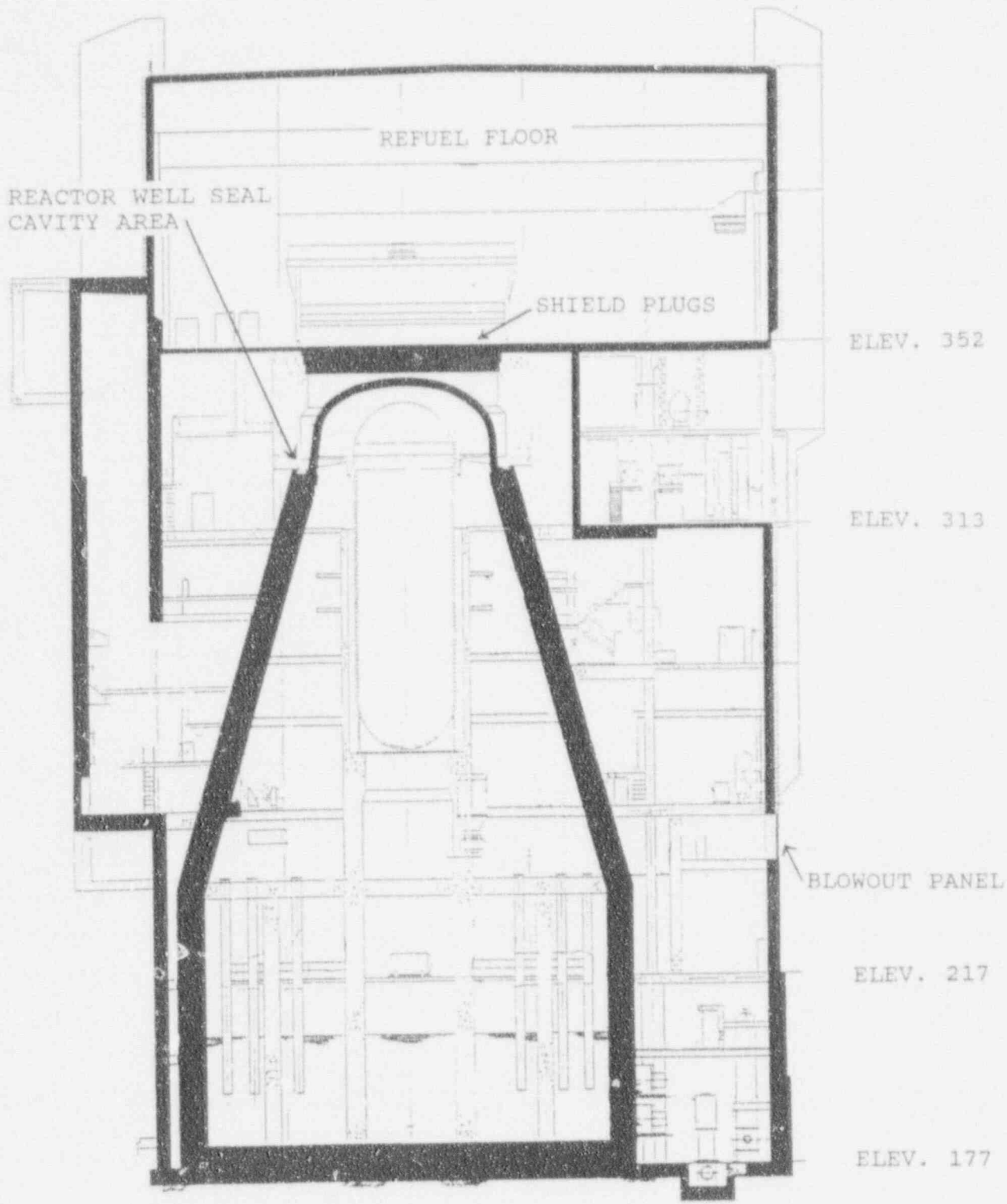
Previous Similar Occurrences:

LERs 1-91-001 and 1-91-012 reported events where the Unit 1 RE overpressurized causing a blowout panel to actuate and open. Both events resulted from a RE HVAC supply air fan that failed to shutdown when its power supply breaker trip coil malfunctioned. Corrective Actions planned as a result of these previous events and their effectiveness are discussed in the "Cause of the Event" section.

Tracking Codes: X1 (failure with unknown cause)

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



UNIT 1 REACTOR ENCLOSURE  
FIGURE 1