

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1) Brunswick Steam Electric Plant Unit 1	DOCKET NUMBER (2) 0 5 0 0 0 3 2 5	PAGE (3) 1 OF 0 6
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TITLE (4) Loss of Secondary Containment During Irradiated Fuel Sipping due to the Isolation of the Air Supply to the Reactor Building Isolation Dampers

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)
1	2	1	6	8	8	3	8	8	BSEP Unit 2			0 5 0 0 0 3 2 4
1	2	1	6	8	8	3	8	8				0 5 0 0 0 3 2 4

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)

OPERATING MODE (9) 5	20.402(b)	20.405(e)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10) 0 0 0	20.405(a)(1)(i)	50.36(a)(1)	X 50.73(a)(2)(v)	73.71(c)
	20.405(a)(1)(ii)	50.36(a)(2)	X 50.73(a)(2)(vii)	X OTHER (Specify in Abstract below and in Text, NRC Form 366A) 10CFR21
20.405(a)(1)(iii)	X 50.73(a)(2)(ii)	50.73(a)(2)(viii)(A)		
20.405(a)(1)(iv)	X 50.73(a)(2)(iii)	50.73(a)(2)(viii)(B)		
20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(ix)		

LICENSEE CONTACT FOR THIS LER (12)

NAME T. Harris, Regulatory Compliance Specialist	TELEPHONE NUMBER 9 1 9 4 5 7 - 2 0 3 8
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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)

<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH DAY YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

Unit 1 was in a scheduled refuel outage. On 12/16/88 it was determined that a condition existed which could have prevented the secondary containment isolation dampers from operating as required. On 12/9/88, a clearance unintentionally removed instrument air to the isolation dampers. Investigations revealed these valves fail as is upon loss of air supply, and due to system air leakage, the dampers may not have isolated upon receipt of an isolation signal during irradiated fuel movement for fuel sipping evolutions from 12/11/88 to 12/14/88.

Root cause of the event is multiple design deficiencies for the operation of the Reactor Building isolation dampers. Personnel error was a contributing factor. Corrective actions include the issuance of a standing instruction for manually closing the valves on the loss of instrument air and the connection of a temporary diesel powered air compressor in the event of a loss of air. The Unit 1 dampers have been modified, restoring the dampers to operable status. Modifications to the Unit 2 dampers will be completed during the upcoming refueling/maintenance outage. This event was assessed concurrent with the SBTG inoperability (LER 1-88-032) versus a fuel bundle drop accident in the spent fuel pool. Calculated releases to the environment are within the guideline values of 10CFR100.

This event has been determined to be reportable per 10CFR PART 21.

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

Event

Loss of secondary containment during irradiated fuel sipping due to isolation of air supply to the Reactor Building dampers.

Initial Conditions

Unit 1 was in day 36 of a scheduled 70 day refuel outage. Operations personnel were attempting to restore air to a portion of the Reactor Building Noninterruptible Air System (EIIS/LD) following acceptance testing for a plant modification. No fuel movement or any other event that would require secondary containment was in progress. Irradiated fuel sipping had begun on 12/11/88 at 1535 and had ended on 12/14/88 at 1000 per the HP refuel floor log book.

Event Description

On 12/16/88 at 1400, it was determined that a condition had existed that could alone have prevented the fulfillment of the safety function of structures of systems that are needed to control the release of radioactive material. A clearance had been hung on the drywell instrument air system which could have prevented the secondary containment isolation dampers (EIIS/JM/ISV) from operating as required.

Clearance 1-1928 was hung on 12/9/88 at 0440 on portions of the drywell instrument air system to allow for the tie-in of the nitrogen pneumatic system (EIIS/LK) for plant modification (PM) 87-169. At this time, it was not identified by the Operations staff that the clearance, as initiated, also secured the air supply to the Reactor Building secondary containment isolation dampers. The plant was not in a mode at this time which required these dampers to be operable. At 1535 on 12/11/88, with the air system still under clearance, activities were begun to move irradiated fuel in the spent fuel pool for the purpose of testing the bundles for leakage (sipping). This activity required the dampers to be operable. Fuel movements were concluded on 12/14/88 at 1000.

In the process of restoring portions of the air system to service and acceptance testing for PM 87-165 (Group 1 isolation setpoint change from low level 2 to low level 3) on 12/15/88 and 12/16/88, it was identified that clearance 1-1928 had isolated the Reactor Building isolation dampers. These dampers are provided with accumulators to ensure that a supply of air is available to shut the valves on an auto close initiation signal with a loss of air. On 12/16/88 at 0830, it was identified that these dampers might fail as is on a total loss of air (supply and accumulators).

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NOTE: If more space is required, use additional NRC Form 388A's (17)

Following an assessment of the event and design material by Engineering and Regulatory Compliance, the event was determined to be reportable at 1400 on 12/16/88. Several tests were initiated to investigate the damper design. On 12/18/88, a leak test was performed on the check valves that serve as the boundary for each accumulator tank. During performance of these tests, it was discovered that while the A, B, and D accumulator check valves did not exhibit measurable leakage and the C valve had minimal leakage, all four containment isolation valves had leakage in the compression fittings in the tubing between the accumulator tanks and the actuators. Leaks in the C valve tubing were determined quantitatively to be significant. This test also concluded that the valves fail as is.

On 12/19/88, pressure drop tests were performed on all four accumulator tanks. Calculations made as a result of these tests determined that both exhaust isolation dampers would have been inoperable approximately 2 1/2 days after the air had been isolated. Thus, in the event of an accident during fuel movements for the fuel sipping evolution of 12/11/88 through 12/14/88, it is believed the dampers would not have closed on an initiation signal. This meant that secondary containment integrity could not have been assured during the course of the fuel sipping.

Event Cause

The root cause of this event was multiple design deficiencies for the operation of the Reactor Building ventilation dampers. Personnel error, the Senior Reactor Operator (SRO) not recognizing during clearance review that the air supply to the Reactor Building ventilation isolation dampers would be isolated, was a contributing factor.

The following design deficiencies have been noted for the Reactor Building ventilation isolation dampers:

1. The original system design had all four secondary containment isolation valves supplied by the same instrument air supply, thus not meeting the single failure criteria.
2. The original design of the dampers did not allow for the loss of air for an extended period of time. The damper actuators can be purchased with a handwheel or a spring return (failed closed) mechanism. Because the original specifications requested manual operation, a return spring was not provided. The system could also have been provided with a positive closure system that would have caused the air operator to close the valves on low instrument air pressure. Because of the existence of redundant air compressors, large receiver tanks and the existence of a connection from the containment atmospheric dilution (CAD) (EIIS/BB) nitrogen storage vessel for long term supply, the original system design

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

did not address the loss of instrument air as a credible event. Plant Modifications 80-133 and 80-134 removed the tie-in from CAD to instrument air without considering the backup function of the CAD for the loss of instrument air to the dampers. The original damper design was supplied by United Engineers and Constructors (UE&C).

- An evaluation (TAR 81-018) had been performed in 1981-1983 regarding the downgrading of the Reactor Building Noninterruptible Instrument Air System to identify the scope of BSEP's commitment to NRC IEB 79-01B. Modifications were implemented as a result of this evaluation to ensure that safety related components performed their safety function. The damper isolation valves were incorrectly identified by TAR 81-018 as being fail-closed valves. The air supply to these actuators was downgraded to interruptible, based upon the requirement that they were single function valves which fulfill their safety function by failing to their required position (closed) on loss of power and remaining in that position during and following a design basis accident (DBA). It is not known why these valves were identified as fail closed.
- During the course of the evaluations, a question arose concerning the dampers ability to remain in a closed position following loss of air, since there is no spring to hold the valves in place. Because testing of this concern cannot be readily accomplished at this time, CP&L conservatively decided that these valves would not remain tightly sealed following loss of air (both supply and accumulators).

The personnel error contributing to the event was a failure of the SRO involved in researching the air system clearance 1-1928 to identify the secondary containment isolation valves as a load off this portion of the Reactor Building/Drywell Instrument Air System. Contributing to this failure was the complexity of having to review 7 instrument air drawings in order to identify the secondary containment isolation valves as a load.

Corrective Actions

A Standing Instruction was initiated that requires that the secondary containment dampers be manually closed on a loss of instrument air. When the valves are manually closed, the manual closing mechanism assures that the valve remains seated independent of the instrument air system. In addition, a caution tag has been hung on those Unit 2 instrument air valves which, if shut, could cause a loss of the air supply to the damper without an alarm. This has been done to ensure control of these valves until the air system is modified during the next refueling outage.

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

In the event of a loss-of-coolant (LOCA) with a loss of off-site power, a temporary diesel powered air compressor has been established to allow Operations personnel the ability to reestablish instrument air within two hours, which is prior to the accumulators on the dampers bleeding down to an inoperable level. This time requirement was determined for both Unit 1 and Unit 2 by system leak testing.

The design for the Unit 1 dampers was modified during the recent refueling/maintenance outage to restore the dampers to operable status. The modification separates the instrument air to the dampers into divisions to prevent a single active failure and provides a latching mechanism to ensure that the dampers remain seated.

Modifications to the Unit 2 secondary containment dampers will be completed during the upcoming refueling/maintenance outage, scheduled to begin in September 1989.

Administrative Instruction (AI)-58, Equipment Clearance Procedure, has been revised to require that clearance reviews of this type receive a second assessment by a licensed individual. In addition, two task forces have been established in an effort to resolve clearance problems. One task force is made up of Operations personnel and is to report to the Manager - Operations. The other task force is to report to the plant General Manager and is comprised of unit managers or supervisors from Operations, Maintenance, Technical Support, and Outage Management. The results of the two clearance task forces will be completed by May 31, 1989. These results will also provide a schedule for completing any required actions.

The plant General Manager conducted a briefing for each of the Operations shifts concerning this violation in December 1988. Each briefing lasted 30 to 45 minutes and typically included the Shift Operating Supervisor, the Shift Foremen, the Senior Control Operators, the Control Operators, the Auxiliary Operators, and other shift support personnel. The briefing included discussions on: 1) A review of this event, 2) that plant performance is directly dependent on its personnel performance, 3) the need to take the time to do the job right, 4) plant professionalism and self discipline to high personal standards, 5) the need to always question indications/activities in the field that do not appear correct.

Activities being conducted in accordance with Generic Letter 88-14 identified this design problem in parallel with this event. In accordance with that generic letter, other safety-related air-operated actuators have been or are being tested and field verified to ensure that they fulfill their intended safety functions.

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

Event Assessment

CP&L has assessed the inoperability of the dampers in conjunction with the SBTG inoperability noted in LER 1-88-032 against activities (fuel sipping) being conducted at the time of this combined inoperability. The assessment assumed a release of radioactivity to the environment based on a fuel bundle drop accident in the spent fuel pool with both SBTG and secondary containment isolation dampers inoperable. The assessment concluded that the whole body dose at the site boundary from such a release would be 0.3 millirem and the site boundary thyroid dose would be 1776 millirem, which are within the guideline values of 10CFR100.



Carolina Power & Light Company

Brunswick Nuclear Project  
P. O. Box 10429  
Southport, NC 28461-0429

April 28, 1989

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10CFR50.73

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

BRUNSWICK STEAM ELECTRIC PLANT UNIT 1  
DOCKET NO. 50-325  
LICENSE NO. DPR-71  
SUPPLEMENT TO LICENSEE EVENT REPORT 1-88-034

Gentlemen:

In accordance with Title 10 to the Code of Federal Regulations, the enclosed Supplemental Licensee Event Report is submitted. The original report fulfilled the requirement for a written report within thirty (30) days of a reportable occurrence and was submitted in accordance with the format set forth in NUREG-1022, September 1983.

Very truly yours,

J. L. Harness, General Manager  
Brunswick Nuclear Project

TH/mcg

Enclosure

cc: Mr. S. D. Ebnetter  
Mr. E. G. Tourigny  
BSEP NRC Resident Office

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