CP&L

Carolina Power & Light Company

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September 11, 1992

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SERIAL: BSEP-92-0018

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

BRUNSWICK STEAM ELECTRIC PLANT UNIT 1
DOCKET NO. 50-325
LICENSE NO. DRP-71
LICENSEE EVENT REPORT 1-92-018

Gentlemen:

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

Very truly yours,

J. W. Spencer, General Manager
Brunswick Nuclear Project

TMJ/

Enclosure

cc: Mr. S. D. Ebneter
Mr. R. H. Lo
BSEP NRC Resident Office

150098

IE22

NRC FORM 366 U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104
EXPIRES: 4/30/92
ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-630), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Brunswick Steam Electric Plant Unit 1	05000325	1

TITLE (4) FAILURE OF THE CBEAF SYSTEM TO MEET SINGLE FAILURE CRITERIA FOR RADIATION AND FIRE EVENTS

EVENT DATE (5)			LER NUMBER (6)					REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MONTH	DAY	YEAR	YEAR		SEQ. NO.		REV. NO.	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
08	12	92	92	-	018	-	00	09	11	92	BSEP U-2	50-~~324~~ 325

OPERATING MODE (9)	4	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)							
			20.402(b)		20.405(c)		[illegible](2)(iv)		73.71(b)
POWER LEVEL (10)	000		20.405(a)(1)(i)		50.36(c)(1)		50.73(a)(2)(iv)		73.71(c)
			20.405(a)(1)(ii)		50.36(c)(2)	X	50.73(a)(2)(vii)		OTHER (Specify in Abstract and Text)
			20.405(a)(1)(iii)		50.73(a)(2)(i)		50.73(a)(2)(viii)(A)		
			20.405(a)(1)(iv)	X	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
Theresa M. Jones, Regulatory Compliance Specialist	(919) 457-2039

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
X	YES (If yes, complete EXPECTED SUBMISSION DATE)		NO		10	31	92

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

Units [illegible] were in day 112 of a dual unit outage. On August 12, 1992, a review of Operating Experience (OE) report #5366 revealed that a loss of power to the control logic for the "preferred" Control Building Emergency Air Filtration (CBEAF) train would prevent it or the "standby" train from automatically starting upon radiation or smoke detection. Further review of the control logic drawings revealed: (1) Loss of 2A CBEAF control logic power will prevent automatic or manual starting of both train 2A and 2B CBEAF; (2) Loss of 2B CBEAF control logic power when 2B is in "preferred" will prevent automatic starting of either train; however, train 2A could be started manually; (3) A single failure in the chlorine detection system logic prevents both CBEAFs from starting. The cause of this event is design error. Corrective actions have not been determined. The failure of past design/safety reviews to identify the design error will be investigated further to determine what the implications are for other similar reviews and what corrective actions should be taken to prevent this in the future. Chlorine is the limiting event for Control Room habitability. The current design of the CBEAF system logic in relation to the chlorine event is acceptable for the single failure criterion. The current design of the CBEAF logic in relation to a radiation or smoke event is not acceptable for single failures. Preliminary results of an analysis to determine the control room thyroid dose during a radiation event, co-incident with a single failure causing the CBEAF trains to isolate and remain shut down, indicate that the 30 rem thyroid dose limit to Control Room personnel would be approached within seven hours of the event but would not be exceeded for the duration of the event. Previous events related to the design of the CBEAF/HVAC system have been reported in LERs 1-91-003, 1-90-007, 1-88-034, 1-84-033, 2-82-024 and 2-82-084.

TITLE

FAILURE OF THE CBEAF SYSTEM TO MEET SINGLE FAILURE CRITERIA FOR RADIATION AND FIRE EVENTS

INITIAL CONDITIONS

Units 1 & 2 were in COLD SHUTDOWN, in day 112 of a dual unit outage initiated because of seismic concerns with the Diesel Generator building walls. In accordance with the Operating Experience Feedback program, Technical Support System Engineers were reviewing Operating Experience (OE) report #5366. The OE addressed a concern with the preferred/standby logic for Standby Gas Trains. The review had been expanded to include the 2A and 2B Control Building Emergency Air Filtration (CBEAF) heating, ventilating, and air conditioning (HVAC) system trains.

EVENT NARRATIVE

The CBEAF/HVAC system was designed by United Engineers and Constructors Inc. to provide for pressurization and ventilation of the Control Building, and to protect the Operators during a radiation, smoke, or chlorine event.

The current design of the CBEAF/HVAC system results in:

1. Starting one of the two CBEAF trains upon detection of smoke or radiation.

2. Isolation of the Control Room upon detection of chlorine, which includes preventing either CBEAF train from starting and shutting down a CBEAF train if it is running.

The system is required to meet the single active failure criterion of IEEE 279-1971.

On August 12, 1992, the referenced OE review revealed that a loss of power to the control logic for the "preferred" CBEAF train would prevent it or the "standby" train from automatically starting upon radiation or smoke detection. This occurs because the standby train is initiated by a ten second time delay relay, within the "preferred" train's control logic, which requires power to activate. Further review of the control logic drawings revealed:

1. Loss of 2A CBEAF control logic power will prevent automatic or manual starting of both the 2A and 2B CBEAF trains upon a smoke or radiation detection initiation signal.

2. Loss of 2B CBEAF control logic power when the 2B control switch is in "preferred" position will prevent automatic starting of either train upon a smoke or radiation detection initiation signal. However, manual start of train 2A is possible via operator selection of the 2A control switch to either the "on" or "preferred" positions.

The difference between scenario one and two above is the result of the chlorine detection logic being powered from the 2A CBEAF logic. When power to the 2A CBEAF logic is lost, the power to the chlorine detection logic is also lost. Chlorine logic is designed to isolate the control room on single failure/loss of power, and the control room would therefore isolate and the trains not be permitted to start by automatic or manual means.

3. A single failure in the chlorine detection system/logic prevents both CBEAFs from starting.

Chlorine is the limiting event for Control Room habitability. The current design of the CBEAF system logic in relation to the chlorine event is acceptable for the single failure criterion. The current design of the CBEAF logic in relation to a radiation or smoke event is not acceptable concerning the single failure criterion.

The pre-operational testing performed on the CBEAF system in 1975 simulated an emergency chlorine, radiation, and fire/smoke signal, but did not test the system response resulting from a loss of power to either CBEAF train's control logic.

CAUSE OF EVENT

The cause of this event is design error combined with pre-operational testing that did not verify operation upon a loss of power/single failure. The logic has been modified subsequent to the pre-operational testing; however, the involved design/safety reviews, including the CBEAF/HVAC design basis (DB) reconstitution validation effort, did not reveal the design error prior to this OE review.

CORRECTIVE ACTIONS

Technical Specifications require that two independent CBEAF trains be OPERABLE in CONDITIONS 1, 2, and 3. The units are currently in OPERATING CONDITION 4. Corrective actions have not been determined. Prior to returning to OPERATING CONDITION 1, 2, or 3, corrective actions will be finalized.

The failure of past design/safety reviews, including the CBEAF/HVAC design basis (DB) reconstitution validation effort, to identify the single failure criterion design error will be investigated further to determine what the implications are for other similar reviews and what corrective actions should be taken to prevent this in the future.

SAFETY ASSESSMENT

Chlorine is the limiting event for Control Room habitability. The current design of the CBEAF system logic in relation to the chlorine event is acceptable for the single failure criterion.

In accordance with 10CFR Part 50, Appendix A, General Design Criterion 19, the whole body dose to an individual in the Control Room should not exceed 5 rem, or its equivalent to any part of the body, for the duration of the accident. The Standard Review Plan section 6.4, Control Room Habitability System, equates the 5 rem whole body dose to a 30 rem thyroid dose. Preliminary results of an analysis to determine the Control Room thyroid dose during the BSEP limiting radiation event (i.e., main steam line break) co-incident with a single failure causing the CBEAF trains to isolate and remain shut down (i.e., a chlorine event or chlorine logic power failure) indicate that the 30 rem thyroid dose limit to Control Room personnel would be approached within seven hours of the event but would not be exceeded for the duration of the event.

PREVIOUS SIMILAR EVENTS

Previous events related to the design of the CBEAF/HVAC system have been reported in LERs 1-91-003, 1-90-007, 1-88-034, 1-84-033, 2-82-024 and 2-82-084.

EIIS COMPONENT IDENTIFICATION

System/Component	EIIS Code
CBEAF/HVAC	VI