



Carolina Power & Light Company

Brunswick Nuclear Project  
P. O. Box 10429  
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FEB 5 1982

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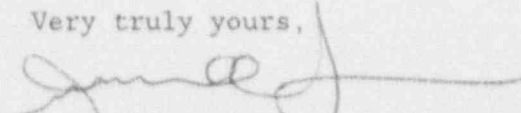
U.S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Washington, D. C. 20555

BRUNSWICK STEAM ELECTRIC PLANT UNIT 1  
DOCKET NO. 50-325  
LICENSE NO. DRP-71  
SUPPLEMENTAL LICENSEE EVENT REPORT 1-91-003-03

Gentlemen:

In accordance with Title 10 of 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. W. Spencer, General Manager  
Brunswick Nuclear Project

TMJ/

Enclosure

cc: Mr. S. D. Ebnetter  
Mr. N. B. Le  
BS?? NRC Resident Office

9202110308 920205  
PDR ADOCK 05000325  
S PDR

*Handwritten initials: JEB 1/1*

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-530), 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) Brunswick Steam Electric Plant Unit 1

DOCKET NUMBER (2)

05000325

PAGE (3)

01 OF 06

TITLE (4) FAIL AS-IS POSITION OF CBEAF SYSTEM INLET AND OUTLET DAMPERS NOT EVALUATED WITH RESPECT TO A CHLORINE EVENT.

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		
01	31	91	91	-	003	-	03	02	05	92	BSEP UNIT 2	05000324
OPERATING MODE (9)		4		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)								
POWER LEVEL (10)		000		20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)					
				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)(vi)	OTHER (Specify in Abstract and Text)					
				20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(vii)(A)						
				20.405(a)(1)(iv)	X	50.73(a)(2)(ii)	50.73(a)(2)(vii)(B)					
				20.405(a)(1)(v)		50.73(a)(2)(iii)	50.73(a)(2)(x)					

LICENSEE CONTACT FOR THIS LER (12)

NAME Theresa M. Jones, Regulatory Compliance Senior Specialist

TELEPHONE NUMBER

(919) 457-2039

COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRJS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPRJS

SUPPLEMENTAL REPORT EXPECTED (14)

EXPECTED SUBMISSION

MONTH

DAY

YEAR

YES (If yes, complete EXPECTED SUBMISSION DATE)

X

NO

DATE (15)

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

A condition that was discovered to be outside the design basis was reported on January 31, 1991 at 4:02 p.m. This condition involves the inlet and outlet dampers for the Control Building Emergency Air Filtration (CBEAF) trains which fail as-is on loss of power. When the CBEAF system is operating in the recirculating mode, a single electrical failure will cause the dampers to remain open. This will result in an airflow path to the Control Room environment that has not been previously evaluated for its effect on control room habitability relative to chlorine protection.

This condition resulted from a failure to evaluate the fail as-is position (in combination with a single failure) of the CBEAF dampers with respect to a chlorine event. On January 31, 1991, at approximately 6:11 p.m., the chlorine tank car was removed from the site pending an engineering evaluation of CBEAF single failures. The evaluation determined the chlorine tank car could be returned to the site provided the most limiting condition of operation (LCO) is entered when the CBEAF is in operation. A tracking LCO was established to ensure implementation of the LCO requirements and the chlorine tank car was returned to the site on February 10, 1991. A project (PCN 00187A) has been initiated to make the Inlet and Outlet dampers automatically close on loss of power. Additionally, the Nuclear Engineering Department (NED) has performed a validation of the chlorine isolation system functional design basis as well as reviewed the failure positions of safety related dampers against the design basis failure position. The safety significance of this condition is considered minimal. Previous occurrences are reported in LERs 2-82-24, 2-82-84, 2-82-099, 1-84-033, 1-86-033, 1-88-034 and 1-90-007.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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		91	-	003	-	

TEXT (IF MORE SPACE IS REQUIRED, USE ADDITIONAL NRC FORM 866A'S) (17)

### EVENT

When the Control Building Emergency Air Filtration (CBEAF) system (EIIS/VI) is operating in the recirculating mode, a single electrical failure will cause inlet and outlet dampers (EIIS/VI/DMP) to remain open. This will result in an airflow path to the control room environment that has not been previously evaluated for its effect on control room habitability relative to chlorine protection.

### INITIAL CONDITIONS

Unit 1 was in a refueling outage (cold shutdown) and Unit 2 was in power operation at 25% power. The Control Building Emergency Air Filtration system was in normal lineup.

### DESCRIPTION OF EVENT

The Control Building, Heating, Ventilation, and Air-Conditioning (CBHVAC) systems (EIIS/VI) are designed to permit continuous occupancy of the control room, computer rooms, and the electronic workrooms (EIIS/NA) under normal and accident conditions. Outside air is taken into the Control Building through supply dampers (tornado pressure check valves). The air is filtered and used for pressurizing the Control Building, for make-up ventilation air to air-conditioned spaces, and for ventilation of other spaces in the Control Building. In a radiation event the normal outside make-up air duct to the air conditioning system is closed and 1000 scfm of outside make-up air from an emergency make-up air supply damper is shunted through one of the two activated charcoal High Efficiency Particulate Air (HEPA) filter trains capable of removing smoke and airborne radioactivity. Also, during a radiation event 1000 scfm of recirculated air is taken from the return air duct of the air conditioning system and mixed with the 1000 scfm of outside air prior to its entering the HEPA filter train. The filtering of recirculated air through this filter will act as cleanup for the conditioned spaces. In the event a high chlorine level is detected, the ventilation system normal make-up air and emergency make-up air supply ducts are automatically isolated.

On January 23, 1991, the certified CBHVAC system engineer identified three potential design problems with the habitability protection system (Engineering Safety Feature). These issues were sent to the Nuclear Engineering Department (NED) for evaluation and comparison to the system design basis. NED's evaluation, as a part of the ongoing Design Basis Reconstitution project, led to the resolution of the three potential problems; however, during research activities two new issues were discovered. The new issues concern single active failures that can affect the availability of the Control Building Ventilation system safety function. It was determined that one of the new issues met the criteria for a one hour Non-Emergency report under 10CFR50.72 (b)(ii)(B) [Outside Design Basis] and was reported on January 31, 1991, at 4:02 p.m. The other issue was not considered reportable; however, it is addressed in the "Additional Information" section of this report.

Ongoing research within the Design Basis Reconstitution project has identified a third issue, which was also determined not to be reportable, but is included in the "Additional Information" section of this report.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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TEXT (IF MORE SPACE IS REQUIRED, USE ADDITIONAL NRC FORM 366A'S) (17)

The reportable condition involves the inlet and outlet dampers (2-VA-2A,B,C,D-EAD-CB) for the CBEAF trains which fail as-is on loss of power. During normal plant operation these dampers are closed and the CBEAF trains are shut down. In the radiation or smoke isolation modes, if power to the dampers fails, the dampers will remain open and the associated fan will shut down. Since the pressure at the return plenum is highly negative and supply plenum pressure is less negative, air will be drawn through the idle filter into the control room. The air will be passing through a HEPA and charcoal filter; therefore, the failed dampers will not introduce contaminated air into the control room. If either CBEAF train is in operation (surveillance testing or any voluntary start in a non-accident condition) and a power failure occurs causing the isolation dampers to fail simultaneously with a design basis chlorine event, the flow path will still be through the filter; however, since the charcoal filters do not remove chlorine, cleanup will not occur. Allowable response time for operator action to isolate the control room by manually closing the dampers may be short; therefore, operator action to mitigate the consequences of a chlorine spill in these circumstances is not credible.

### CAUSE OF EVENT

The detailed design of the chlorine isolation feature was not adequately implemented. The fail-safe position for safety related dampers was incorrectly specified. Both of these shortcomings resulted from there being no review of the failure position of the CBEAF dampers, since these dampers are typically open during CBEAF system testing.

### ANALYSIS OF EVENT

The initial design of the Control Building Ventilation system, as provided by the Architect/Engineer, was intended to meet General Design Criterion 19 of Appendix A to 10CFR50 (GDC-19) for a radiation event. During the licensing process, CP&L committed to incorporate protection from a proposed chlorine event into the design system. The dampers (2-VA-2A,B,C,D,-EAD-CB) were specified as part of the Control Building Emergency Filtration system. The dampers were specified as capable of manual operation and fail as-is on loss of power. The last revision of the specification was prior to the addition of the Chlorine Detection system as a licensing requirement. Subsequently, NUREG-0737, TMI Item III.D.3.4, required utilities to re-evaluate each power plant control rooms capability to meet the habitability requirements of GDC-19 and Regulatory Guide 1.95. In response to this item, CP&L developed and revised an evaluation between 1980 and 1983. The CBEAF train inlet and outlet dampers failure position was not analyzed with respect to a chlorine event in this evaluation.

Previous corrective action, as part of the response to LER 1-90-007, was to identify if potential generic issues exist. This action was taken since LER 1-90-007 referenced other LERs that had common root cause implications. The root cause investigation was completed and the corrective action to prevent recurrence determined. This corrective action stated that NED would perform a validation of the as-designed system to the design basis and determine the correct failure position for safety related dampers and compare the as-designed configuration to the correct failure positions. It was this effort, in conjunction with the Design Basis Reconstitution effort, that identified these discrepancies. During the analysis of the radiation effort described above, a third condition was discovered which is addressed in the "Additional Information" section of this report.

## LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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### CORRECTIVE ACTION

(Recovery Action) On January 31, 1991, at approximately 6:11 p.m., the chlorine tank car was removed from the site (protected area). Additionally, a replacement tank car that was located behind Warehouse H (within the Exclusion Area) was also removed. Both tank cars were transported to the designated location outside the Exclusion Area to ensure continued margin of safety pending an engineering evaluation on CBEAF system single failures.

(Compensatory Action) An Engineering Evaluation (EER-91-0041) determined that, based on design and accident probability, the chlorine tank car could be returned to the site and normal operation could continue provided the most limiting condition of operation (LCO) is entered when the CBEAF is in operation. The chlorine tank car was returned to the protected area on February 10, 1991, and a tracking LCO was established to ensure implementation of the LCO requirements. In order to cancel the LCO, either the chlorine tank car must be removed from the site, or the train must be shut down (dampers closed). The replacement chlorine tank car was also returned to Warehouse H.

(Remedial Action) A project (PCN G0187A) has been initiated to make Inlet and Outlet Dampers (2-VA-2A,B,C,D-EAD-CB) automatically close on loss of power while retaining the ability to manually operate them. This will be accomplished by replacing the current ASCO NP8342B20E dual solenoid operated 4-way valve with a single solenoid operated 4-way valve, ASCO model NP8342B1E or equivalent. Bleed valves will also be installed in the air supply lines between the solenoid operated valve and the damper to allow for manual operation. Implementation of this modification is expected to be completed by May 31, 1992.

(Corrective Action To Preclude Repetition) NED has completed two design validation efforts. The first involved development and validation of the chlorine detection/isolation system functional design basis; the second involved reviewing the failure positions of safety related dampers against the design basis failure position. It was the second of these efforts that identified the condition in this report.

### EVENT ASSESSMENT

The safety significance of this condition is considered minimal. Infiltration of chlorine into the Control Room would only be a concern for a design basis chlorine event, which involves a rupture of the 55 ton chlorine tank car while the weather conditions are in Stability Class "G", concurrent with the loss of power to the dampers, and the CBEAF system being in the recirculating mode. The system is typically only operated in the recirculating mode during an actual radiation event or during system testing. A Probabilistic Risk Assessment (PRA) was performed on the events that need to occur simultaneously for the single failure to cause a violation of GDC-19 single failure criteria. Assuming that the trains are always in test, the overall probability is  $4.85 \text{ E}(-8)$  per year. Previous occurrences that have common root cause implications are reported in LERs 2-82-24, 2-82-84, 2-82-099, 1-84-033, 1-86-033, 1-88-034, and 1-90-007.

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### ADDITIONAL INFORMATION - SEPTEMBER, 1991

The "Description Of Event" identifies two issues that concern single active failures that can affect the availability of the Control Building Ventilation system safety function. One of the issues was determined to be reportable under 10CFR50.72 (b)(11)(B) and is included in this report. The other issue involved a single relay which, upon failure to meet its design function, would prevent automatic initiation of the radiation isolation mode of the CBEAF system. This relay is required to energize to isolate the control room envelope; therefore, on loss of power or on a failure of this relay to energize, the control room would not isolate and the EAF trains would not start. An initiating event of high radiation in the control room will cause the Area Rad Control Room High annunciator to alarm. Operators responding to the annunciator will ensure automatic initiation of the radiation isolation mode has occurred or, as in this case, will initiate the system manually from the Reactor Turbine Generator Board (RTGB). Engineering calculations indicate that the control room habitability design basis will be maintained by the expected operator actions; therefore, this issue was not considered to be reportable under 10CFR50.72 (b)(11)(B).

The third issue referred to in both the "DESCRIPTION OF EVENT" and the "ANALYSIS OF EVENT" involves the Emergency Recirculation Damper, which serves to recirculate air from the Control Room through an Emergency Filtration Train while it is in operation. During normal operation or Chlorine Isolation, this damper is closed. During operation in a High Radiation or Smoke Removal mode, the damper is open.

This damper was identified as non-redundant in the Control Room Habitability Evaluation (submitted 3/2/89); however, the evaluation of its acceptability for Chlorine Isolation simply stated that the damper is already closed prior to receiving a chlorine isolation signal. This is true during normal plant operation. During operation of an Emergency Filtration Train, such as during testing, this damper would be open. Failure of the Emergency Recirculation damper is acceptable under these conditions since there is no differential pressure across the damper when in the Chlorine Isolation mode and, therefore, no motive force for introduction of contaminants. Due to lack of motive force, the failure of this damper to close would be less severe than the failure of the normal make-up damper or the control room exhaust damper, which are also not redundant components. These dampers were evaluated in the Habitability Evaluation for design basis events and accepted in the NRC Safety Evaluation (SE) dated October 18, 1983. Since a more severe case has already been evaluated and found acceptable, the lack of redundancy of this damper for the Chlorine Isolation mode is considered acceptable. This evaluation has been documented in a formal analysis.

This information is being provided for clarification and amplification of the single failure analysis in the Control Room Habitability Evaluation. The non-redundancy of the Emergency Recirculation damper was identified and accepted as part of the response to NUREG-0737, III.D.3.4.

As issues are identified via the Design Basis Reconstitution effort, we will continue to provide clarification, amplification, or correction, as appropriate.

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### ADDITIONAL INFORMATION - NOVEMBER, 1991

The following discrepancy was identified as part of the Design Basis Reconstitution (DBR) Project. This discrepancy involves the emergency ventilation damper position indication for the Control Room dampers and is as follows:

Regulatory Guide 1.97, Revision 2 requires that indication be made available in the Control Room to allow operators to monitor critical parameters during and following an accident. Among the Category D variables defined in Reg. Guide 1.97 are emergency ventilation damper positions. In the Brunswick Steam Electric Plant's "Position Paper on Regulatory Guide 1.97", CP&L concurred with the Reg. Guide 1.97 position and stated that this variable was interpreted to be "those dampers which could release radiation to the environment or expose Control Room personnel to radiation". In the "Brunswick Response to NUREG 737, Supplement 1 - Regulatory Guide 1.97 - Application to Emergency Response Facilities", the variables were defined by equipment tag number and description. The dampers listed in the Brunswick response were specified as having positive open-closed indication from a position switch.

During a review of the damper position indication configuration, CP&L DBR personnel discovered that some of the CBHVAC dampers do not have positive "open/closed" indication, but rather have "open/not open" or "closed/not closed" indication in the control room. This is due to the fact that only one limit switch which is mechanically actuated by an arm attached to the damper shaft is provided. Considering the "open/not open" indication, when the damper reaches (nears) the full open position a contact closes that illuminates the "open" indication. As the damper closes, the limit switch spring returns to the shelf state which closes a contact that illuminates the "closed" indication. If the damper stops (sticks, etc.) at a position less than full open, the "closed" indication will be illuminated. Regarding the "closed/not closed" indication the former scenario would be reversed.

### EVALUATION:

From an operability standpoint, the CBHVAC dampers that indicate the safe position (ie; position required during a radiation event) are acceptable, since failure of the damper in mid position would cause an unsafe position indication allowing the operator the opportunity to take compensatory actions. An evaluation was performed for the CBHVAC dampers which do not indicate the safe position in the control room. The evaluation determined that no operability concern existed because the failure of a damper was within the bounds of previously analyzed events. Dampers other than the CBHVAC dampers defined as part of the referenced category D variable were verified to have positive position indication for open, closed, and mid positions.