NRC Form 366
(9-83)

U.S. NUCLEAR REGULATORY COMMISSION
APPROVED OMB NO. 3150-0104
EXPIRES: 8/31/88

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Brunswick Steam Electric Plant Unit 1	0 5 0 0 0 3 2 5	1 OF 1 5

TITLE (4)
Bolt Head Failures of 5/16-Inch x 1 1/2-Inch Silicon Bronze Carriage Bolts In Bus/Bar Connections of Electrical Switchboards

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)
										Brunswick Unit 2	0 5 0 0 0 3 2 4
0 2	1 9	8 8	8 8	–	0 0 6	– 0 0	0 3	2 1	8 8		0 5 0 0 0

OPERATING MODE (9)		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)			
	4	20.402(b)	20.405(c)	50.73(a)(2)(iv)	73.71(b)
POWER LEVEL (10)	0 0 0	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)	X 50.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)
		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
M. J. Pastva Jr., Regulatory Compliance Specialist	AREA CODE 9 1 9 4 5 7 – 2 3 1 5

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	
X	E J	*	G 0 8 0	Y							

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
X YES (If yes, complete EXPECTED SUBMISSION DATE)	NO		0 6	3 0	8 8

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

During a scheduled Unit 1 maintenance outage concurrent with the Unit 2 1988 refuel/maintenance outage, several failures of the 5/16-inch x 1 1/2-inch silicon bronze carriage bolts in the units' 125/250 volt (V) direct current (dc) motor control centers (MCCs) were found during scheduled inspections. Each failure consisted of a cracked or separated bolt head at a bus/bar connection. On 2/19/88, an Engineering assessment determined a common mode failure mechanism involving the bolts existed. This failure mechanism could affect structural/electrical integrity of the subject bus/bar connections during a design event if both bolts at a connection were failed. The significance of these failures has not been conclusively determined.

The failures are currently attributed to overtorquing of the bolts, due to an error in plant vendor drawing and/or plant procedures. Historical data indicates that some overtorquing took place during original construction. Failed bolts were replaced with similar bolts and the bolts inspected were properly torqued. One Unit 2 125/250 Vdc MCC not inspected to date, will be inspected prior to the subsequent Unit 2 startup. The mechanical integrity of both damaged and undamaged bolts is being evaluated. By 6/30/88 a supplement to this report will be submitted reflecting additional findings and corrective actions.

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Initial Conditions

Unit 1 was shutdown in a scheduled maintenance outage, concurrent with the Unit 2 1988 refueling/maintenance outage, for modification activities involving electrical power supplies common to both units. Inspections of each unit's Class 1 electrical (1E) and balance-of-plant (BOP) 125/250 volt (V) direct current (dc) switchboards and motor control centers (MCCs) (EIIS/EJ/BYBD) and 480V alternating current (ac) MCCs (EIIS/ED/MCC) were in progress. These inspections are conducted in accordance with Maintenance Instruction (MI)-10-2K1 for the checkout of 480 Vac General Electric (GE) MCCs, and MI-10-2I1 for the checkout of 125/250 Vdc electrical buses (EIIS/EJ/BU).

The inspections revealed random failures of the 5/16-inch x 1 1/2-inch silicon bronze carriage bolts (Everdur Hardware - GE part No. 205A5357P17) which secure electrical bus/bar connections in MCCs. The bolt heads were found cracked or separated from the bolt body. In each case, the failed bolts were replaced. An inspection of MCC-1XA (EIIS/ED/MCC) on January 28, 1988, revealed bolt failures in 19 of the 120 bolts. In each case, no more than one broken bolt was found at each bus/bar connection, which is made up of two bolts.

Event Description

On February 13, 14, 16, and 17, 1988, carriage bolt failures were discovered while inspecting the 125/250 vdc electrical switchboards, where both bolts were found broken at a bus/bar connection. Following an evaluation of these findings, a determination was made on February 19, 1988, that a common mode failure mechanism existed involving the subject bolts. With both bolts broken at a given connection, the structural/electrical integrity of the involved bus/bar at that connection could not be assured during and following a design event. Table 1 is a list of the Class 1E or BOP plant equipment powered from these switchboards (SWBD) compartments (compts) which may have been rendered inoperable as a result of both bolts failing at a connection.

The following is a breakdown of the bolt failures within the subject compartments where both bolts were found failed. The remaining failures within each panel consisted of one of the two bolts at a connection failing.

1. In Switchboard 1A (EIIS/EJ/BYBD), 12 of 54 bolts were found to have the carriage bolt head cracked or separated from the bolt body. Both bolts were found broken on the negative (N) bus (EIIS/EJ/BU) and on the positive (P) bus (EIIS/EJ/BU) above compartment GK2.

2. In Switchboard 1B (EIIS/EJ/BYBD), 12 of 54 bolts were found to have the carriage bolt head cracked or separated from the bolt body. Both bolts were found broken on the P/N bus above compartment GLB.

3. In Switchboard 2A (EIIS/EJ/BYBD), 10 of 54 bolts were found to have the carriage bolt head cracked or separated from the bolt body. Both bolts were found broken on the N bus above compartment GK1.

4. In Switchboard 2B (EIIS/EJ/BYBD), 19 of 54 bolts were found to have the carriage bolt head cracked or separated from the bolt body. Both bolts were found broken on the P/N bus above compartment GM3.

Event Investigation

(Bolt Failure History)

On May 19, 1986, seven of 54 bolts in 125/250 Vdc MCC-1XDA were found to be broken during a routine performance of MI-10-2I1. On June 20, 1986, Electrical Field Report (EFR) 86-317 was initiated by the plant Quality Assurance/Quality Control (QA/QC) group based upon a concern regarding the integrity of the MCC bus bar bolts. The plant Technical Support group investigated the problem and determined that the bolt failures did not involve a generic implication. This determination was based upon an inspection of 125/250 Vdc MCC-1TDA and MCC-1TDB which did not reveal broken or cracked bolts. The problem was determined to be the result of a procedural deficiency in that MI-10-2K1 (revision 3) and MI-10-2I1 (revision 5) did not provide torque values for the 5/16-inch silicon bronze bolts. These procedures did not provide torque values for the 5/16-inch bolts but did for the other size bolts within the panels. These procedures were performed on approximately 60% of the site MCCs prior to this time. The maintenance procedures were revised and the bolts were replaced in MCC-1XDA on June 19, 1986, and in MCC-1XDB (EIIS/ED/MCC) on July 18, 1986.

On July 2, 1986, 125/250 Vdc Switchboard 1A (EIIS/EJ/BYBD) was inspected while energized. Two bolts were identified to have the heads broken off. A work Request/Job Order (WR/JO) was initiated to correct the identified problem when plant conditions permitted the repairs.

November 6, 1986, a supplemental response was made to EFR 86-317, based upon additional findings of broken bolts. At this time, an extensive investigation was performed which included a review of available construction and maintenance procedure torque value history. A correlation of the data was unsuccessful in establishing a root cause or trend with respect to known bolt failures. Based upon this investigation, a recommendation was made to replace the 5/16-inch silicon bronze carriage bolts in Class 1E MCCs during the next scheduled unit outages. A recommendation was also made to complete inspections of the BOP MCCs as permitted by plant conditions.

Between November 1986 and January 2, 1988, a number of the BOP MCCs were inspected per MI-10-2K1. A failure rate of approximately 1% was identified during these inspections. During the inspections, the 5/16-inch x 1 1/2-inch carriage bolts were replaced.

The dc switchboards and MCCs are GE 7700-line motor control centers. The standard 7700-line MCC vertical section is 20 inches wide by 90 inches high by 20 inches deep. Sections are fabricated from sheet steel, shaped, and reinforced to form a rigid enclosed structure in multiple section lineups. The main horizontal bus is located at the top of the section and is accessible by opening the glass polyester isolating panel which isolates the main bus from the top horizontal wiring compartment. The vertical bus is bolted to the main horizontal bus using two 5/16-inch x 1 1/2-inch silicon bronze carriage bolts. At the location of the battery input breaker, the main horizontal bus is bolted to the battery input breaker 500 MCM cables using two 5/16-inch x 1 1/2-inch silicon bronze carriage bolts.

The phase relation of the main and vertical bus is 1-2-3 top to bottom and left to right respectively. (For the dc switchboards, this means that Bus 1 is the P Bus, Bus 2 is the P/N bus, and Bus 3 is the N Bus.)

One possible cause of the failure of the 5/16 x 1 1/2 carriage bolts in the dc switchboards and in other MCCs is overtorquing which occurred during plant construction. An overtorquing condition during plant construction cannot be conclusively verified by available construction information; however, it may have existed based upon the following documentation:

a. A letter from General Electric Company (GE) to United Engineers and Constructors, Inc., dated May 4, 1983, indicates than an overtorquing problem was experienced during plant construction which was the result of an error in GE Drawing 205A7742 (CP&L Drawing FP 9527-30160). Documentation from the time of plant construction indicates this problem may have been corrected; however, the extent that corrective actions were taken cannot be substantiated.

b. Many of the 5/16-inch lock washers used with the silicon bronze carriage bolts were flattened and spread open indicating the washers may have been overtorqued.

c. The Carolina Power & Light Company, Harris Environmental and Energy Center, Metallurgical Department, has performed a preliminary failure analysis on some of the silicon bronze bolts removed from the dc switchboards. The preliminary analysis indicates that one probable failure mechanism for the bolts is an overtorquing condition; however, additional testing is required to substantiate this conclusion.

The bus structure in the dc switchboards has a continuous current rating of 1200 amperes for the main horizontal bus work and a current rating of 600 amperes for the vertical bus work. The normal loading on the switchboards is

approximately 20 to 40 amperes. The typical maximum loading on the horizontal bus work is approximately 375 amperes, which occurs for short periods of time during the recharging of discharged batteries after testing. Consequently, based on the low current loading experienced by these bus connections, it is felt the bolt failures are not the result of thermal expansion of the copper bus structure nor the bolts.

Overtorquing of the bolts may increase the tensile stress at the fillet of the bolt head to body to the point where the tensile strength of the bolt can be exceeded resulting in a static failure. The static failure can result in the carriage bolt head cracking and/or separating from the bolt body. The effect of both bolts failing at either the connection of the main horizontal bus to the vertical bus or at the connection of the main horizontal bus to the battery breaker cables, was to create a possible bad electrical joint at these points; thereby, possibly affecting the electrical operability of affected equipment. In addition, both bolt failures at one location may have allowed the joints to become separated during a seismic event.

Corrective Action

The 5/16-inch x 1 1/2-inch bolts were replaced in the Units 1 and 2 Class 1E and balance-of-plant (BOP) (those which were inspected) 480 Vac MCCs, Class 1E 250 Vdc MCCs, and Class 1E 125/250 Vdc switchboards. The bolts were replaced with a similar type bolt as originally installed; however, the bolts were torqued to 8.5 to 9.5 ft-lbs per vendor recommendations. This torque value satisfies the compression requirements for the Belleville washers and does not place an excessive preload on the silicon bronze bolts. Table 2 reflects the Class 1E MCC and the approximate dates that the bolts were replaced.

The only remaining Class 1E MCC which has not had the bolts replaced is 250 Vdc MCC-2XDB. This MCC will be inspected and the 5/16-inch bolts will be replaced prior to Unit 2 startup, tentatively scheduled for April 10, 1988.

The final results from the CP&L Harris Environmental & Energy Center (HE&EC) analysis on the bolt failure mechanism and the mechanical integrity of bolts which have been in service but show no visible sign of damage has not been received as of the date of this response.

Event Assessment

There were no automatic actions nor identified power losses which occurred due to the event. In addition, there were no operator actions which affected the course of the event.

The following plant equipment could have been rendered inoperable during a design event as a result of the bolt failures (see Tables 3A and 3B):

a. Emergency Diesel Generator No. 1

b. The Unit 1 HPCI System

c. The Unit 2 RCIC System

d. Emergency Switchgear E1 control power

e. Emergency Unit Substation E5 control power

f. BOP switchgears 2B, 2C, 2D, and Common B control power

g. The Unit 2 core spray pump 2B relay logic power

h. Automatic starting of Unit 2 nuclear and conventional service water pumps on low pressure

i. The Unit 2 RHR pump 2B relay logic power

The loss of control power to 4.16 kV BOP switchgear 2C and 2D will prevent the tripping of the 4.16 kV emergency switchgear E4 and E3 master/slave breakers on a loss of the BOP bus, or on loss of off-site power. On the loss of off-site power or a loss of the BOP bus, the degraded voltage relays for emergency switchgear E4 and E3 will detect the undervoltage condition and will trip the slave breakers. Additionally, the relays will start and allow the loading of Diesel Generators 3 and 4. This will reenergize the units' common emergency ac buses emergency switchgear E3 and E4.

On a loss of the BOP bus or loss of off-site power, Diesel Generator No. 1 and emergency switchgear E1 will be inoperable until the control power is restored by closing the alternate source breakers from battery 2A-2. This is performed locally at the diesel generator control panel and at switchgear E1. This will also restore RHR pump 1C, RHR service water pump 1C, core spray pump 1A, CRD hydraulic pump 1A, RHR service water pump 2C, RHR pump 2C, CSW pump 2C, NSW pump 1A, and RHR pump 2A to an operable status. A loss of off-site power accompanied with the loss of emergency switchgear E1 is evaluated in Chapter 8 of the FSAR. This section of the FSAR demonstrates that both units can be shut down during a loss of off-site power with only three diesel generators.

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Brunswick Steam Electric Plant Unit 1	0 5 0 0 0 3 2 5	8 8	— 0 0 6	— 0 0	0 7 OF 1 5

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

The preliminary review of equipment required to be operable to mitigate the consequences of reasonable and credible alternative conditions indicates that sufficient equipment was available to ensure that each unit can be safely shut down. A follow-up response to this report providing the results of the continuing investigation will be provided on or before 6/30/88.

TABLE 1

Equipment	Description	1E/BOP Equipment
SWBD 1A Compt GK2 (EIIS/EJ/PL)	Unit 1 125V DC Electrical Battery 1A-2 (EIIS/EJ/BTRY)*	1E
SWBD 1A Compt GI8 (EIIS/EJ/PL)	Distribution Panel 5A (EIIS/EJ/PL) (normal source)	BOP
SWBD 1B Compt GL8 (EIIS/EJ/PL)	Emergency Lighting Contactor (EIIS/FH/CNTR) Unit 1 Turbine Building	BOP
SWBD 1B Compt GL7 (EIIS/EJ/PL)	Emergency Lighting Contactor (EIIS/FH/CNTR) Unit 1 Reactor Building	BOP
SWBD 1B Compt GHO (EIIS/EJ/PL)	Makeup Water Treatment Bldg Main Panel (EIIS/KJ/PL)	BOP
SWBD 2B Compt GM3 (EIIS/EJ/PL)	Unit 2 125V DC Electrical Battery 2B-2 (EIIS/EJ/BTRY)**	1E
SWBD 2B Compt GK8 (EIIS/EJ/PL)	Distribution Panel 6A (EIIS/EJ/PL) (alternate source)	BOP

*See Table 3A
**See Table 3B

TABLE 2

Unit	Equipment	WR/JO	Date Completed
1	MCC-1XA	88-JGV021	1/28/88
1	MCC-1XA-2	88-JGW021	1/28/88
1	MCC-1XB	88-JGX021	2/7/88
1	MCC-1XB-2	88-JGY021	2/9/88
1	MCC-1XC	88-JGZ021	1/28/88
1	MCC-1XD	88-JHA021	2/7/88
1	MCC-1XE	88-JHB021	1/28/88
1	MCC-1XF	88-JHC021	2/7/88
1	MCC-1XG	88-JHD021	1/28/88
1	MCC-1XH	88-JHE021	2/7/88
1	MCC-1XL	88-JHF021	1/28/88
1	MCC-1XM	88-JHG021	2/7/88
1	MCC-1PA	88-KAD021	1/29/88
1	MCC-1PB	88-KAE021	2/7/88
1	MCC-1CA	88-JHU051	1/25/88
1	MCC-1CB	88-JHV051	2/7/88
1	MCC-10G	88-KAC021	1/28/88
1	SWBD-1A	88-PSA021	2/13/88
1	SWBD-1B	88-PSB021	2/14/88
1	MCC-1XDA	86-BALB1	6/19/86
1	MCC-1XDB	86-BCWD1	7/18/86
2	MCC-2XA	88-HBO021	1/28/88
2	MCC-2XA-2	88-HBN021	1/26/88
2	MCC-2XB	88-HCM021	2/11/88
2	MCC-2XB-2	88-HCI021	2/7/88
2	MCC-2XC	88-HBM021	1/28/88
2	MCC-2XD	88-HBP021	2/24/88
2	MCC-2XE	88-HBF021	1/29/88
2	MCC-2XF	88-HBQ021	2/9/88
2	MCC-2XG	88-HBU021	1/29/88
2	MCC-2XH	88-HBW021	1/29/88
2	MCC-2XL	88-HCA021	1/28/88
2	MCC-2XM	88-HCC021	2/9/88
2	MCC-2PA	88-HBR021	1/28/88
2	MCC-2PB	88-HBS021	2/9/88
2	MCC-2CA	88-HAS021	1/28/88
2	MCC-2CB	88-HAU021	2/12/88
2	MCC-2OG	88-MES021	2/6/88
2	SWBD-2A	88-RWF021	2/17/88
2	SWBD-2B	88-RWG021	2/16/88
2	MCC-2XDA	88-HHF021	2/19/88

TABLE 2 (Cont'd)

2	MCC-2XDB	88-HHG021	
0	MCC-DGA	88-KAA021	1/25/88
0	MCC-DGB	88-KAB021	2/6/88
0	MCC-DGC	88-HCP021	1/27/88
0	MCC-DGD	88-HCR021	2/9/88

TABLE 3A

Plant Consequences of Event
(Battery 1A-2 Inoperable)

Inoperability of battery 1A-2 (EIIS/EJ/BTRY) due to two broken bolts at the horizontal bus bar connection to the battery output breaker in Switchboard 1A will result in the following equipment being inoperable:

a. Distribution panel 1A (EIIS/EJ/PL) will be inoperable. Distribution panel 1A is a Class 1E panel which supplies control power to the common 4160V emergency (E) ac electrical bus (E1) breakers (EIIS/EK/BKR), control power to unit substation E5 compartment FB5 and FM9 (EIIS/EK/PL), control power to unit substation E5 tie breaker (EIIS/EK/BKR) to emergency bus E6, control power to unit substation E5 main breaker (EIIS/EK/BKR), power to emergency Diesel Generator (DG) No. 1 start and sequential loading logic. This will result in an inability to change the position of the breakers and will make DG No. 1 inoperable. The breakers cannot be repositioned nor the DG made operable until the alternate source breakers are closed. This will supply power from a different battery.

b. Distribution panel 7A (EIIS/EJ/PL) will be inoperable. Distribution panel 7A is a BOP panel which supplies control power to the Unit 1 230 kV power circuit breakers (PCBs) (EIIS/FK/52) and motor-operated disconnects (MODs) (EIIS/FK/MOD), the Unit 1 230 kV primary and interposing relays (EIIS/FK/3). and various other Unit 1 230 kV recorders (EIIS/FK/IR) and line carrier transmitter-receiver assemblies (EIIS/FK/IT-RCV). This would prevent the repositioning of the Unit 1 PCBs and MODs. Panel 7A would be inoperable until the panel was transferred to its alternate source which is from panel 7B. Distribution panel 7B (EIIS/EJ/PL) is supplied by battery 1B-1 (EIIS/EJ/BTRY) which was not inoperable due to the bolt problems.

c. The alternate source to distribution panel 3AB (EIIS/EJ/PL) will be inoperable; however, this will not affect the normal operation of the distribution panel.

d. One half of 250 Vdc MCC-1TDA (EIIS/EJ/MCC) will be inoperable. MCC-1TDA is a BOP MCC which supplies power to the Unit 1 reactor recirculation pump 1A MG set 1A emergency lube oil pump (EIIS/AD/P), the Unit 1 Reactor Feedwater System reactor feed pump turbine (RFPT) 1A emergency oil pump (EIIS/SJ/P) and the Unit 1 turbine/generator emergency seal oil pump (EIIS/TI/P).

TABLE 3A (Cont'd)

e. The normal dc power source to the Unit 1 primary UPS (EIIS/JE) will be inoperable. The dc source normally does not supply any UPS system loads. The dc source would only supply loads in the event of a failure of the tracking rectifier or power from 480 Vac MCC-1CA (EIIS/EJ/MCC). A failure of the dc source to the Unit 1 primary UPS would not prevent the UPS from supplying system loads unless a loss of off-site power should occur.

f. One half of 250 Vdc MCC-1XDA (EIIS/EJ/MCC) will be inoperable. MCC-1XDA is a Class 1E MCC which supplies power to the Unit 1 High Pressure Coolant Injection System (E41) valves (EIIS/BJ/V). This will result in the Unit 1 HPCI System being inoperable.

g. Augmented Off-Gas (AOG) System distribution panel AOG-1 (EIIS/WF/PL) will be inoperable. Distribution panel AOG-1 is a BOP panel which supplies power to the AOG alarm panel (EIIS/WF/PL). A failure of the AOG alarm panel would not result in plant safety concerns.

TABLE 3B

(Battery 2B-2 Inoperable)

Inoperability of battery 2B-2 (EIIS/EJ/BTRY) due to two broken bolts at the horizontal bus bar connection to the battery output breaker in Switchboard 2B will result in the following equipment being inoperable:

a. The alternate power supply source to distribution panel 6A will be inoperable; however, this will not affect the normal operation of distribution panel 6A.

b. Distribution panel 10A (EIIS/EJ/PL) will be inoperable. Distribution panel 10A is a BOP panel which supplies control power to switchgear breakers of electrical buses 2B, 2C, 2D, and common B (EIIS/EA/BU), and control power to the Unit 2 generator excitation (EIIS/TL) and stator cooling (EIIS/TJ) circuitry, and power to the Fire Protection System deluge valve control panels (EIIS/KP/PL) for the main transformer (EIIS/EA/XPT), startup auxiliary transformer (EIIS/EA/XPT), Caswell Beach the units' common ocean discharge pumping station power supply transformer (EIIS/KE/XPT), Reactor Feedwater System feed pump (EIIS/SJ/P) reactor recirculation MG set, main turbine lube oil (EIIS/TD), and the hydrogen seal oil (EIIS/TI). This equipment will be inoperable until the alternate source breaker to panel 10A is closed. The alternate source to panel 10A is closed. The alternate source to panel 10A is from battery 2A-1 (EIIS/EJ/BTRY) which was not inoperable due to the bolt problems.

c. The dc power source to the emergency lighting (EIIS/FH/CNTR) in the Radwaste Building (EIIS/NE) and in the Unit 2 Turbine Building (EIIS/NM) will be inoperable. This will result in the emergency lighting in these buildings being inoperable. This should not create any plant safety concerns.

d. The normal dc power source to the Unit 2 standby UPS (EIIS/EF) will be inoperable. The dc source normally does not supply any UPS system loads. The dc source would only supply loads in the event of a failure of the primary UPS and a failure or the loss of power from MCC-2CB (EIIS/EF/MCC) or a failure of the standby UPS tracking rectifier (EIIS/EF/RECT). A failure of the dc source to the Unit 2 standby UPS should not prevent the UPS from supplying system loads.

TABLE 3B (Cont'd)

e. The normal dc power source to the Unit 2 UPS for lighting (EIIS/FF) and communication system (EIIS/FI) will be inoperable. The dc source normally does not supply any UPS system loads. The dc source would only supply loads in the event of a failure of the cracking rectifier or power from MCC-2CA (EIIS/ED/MCC). A failure of the dc source to the Unit 2 UPS for lighting and communications should not prevent the UPS from supplying system loads. An alternate source of dc power can be provided to the UPS for lighting and communication from dc switchboard 1B, which was not inoperable due to the bolt problem.

f. The alternate dc power source to the Unit 1 UPS for lighting and communication system will be inoperable. This will not affect the operation of the Unit 1 UPS for lighting and communication system.

g. One half of 250 Vdc MCC-2XDB (EIIS/EJ/MCC) will be inoperable. MCC-2XDB is a Class 1E MCC which supplies power to the Unit 2 Reactor Core Isolation Cooling (RCIC) System valves (EIIS/BN/V). The Unit 2 Reactor Water Cleanup (RWCU) System (G31) isolation valve 2-G31-F004 (EIIS/CE/ISV), the Unit 2 Residual Heat Removal (RHR) System (EIIS/BO)(E11) suction from Reactor Recirculation System (EIIS/AD), discharge to the radwaste and reactor head spray isolation valves (2-E11-F008, F023, and F040) (EIIS/BO/ISV), and the Unit 2 main steam line (B21) drain valve 2-B21-F019 (EIIS/WK/ISV).

h. Distribution panel 12B (EIIS/EJ/PL) will be inoperable. Distribution panel 12B is a Class 1E panel which supplies power to Unit 2 extraction steam (EX) valves 2-EX-V11, V12, V13, V14, V19, V20, V23V, and V24 (EIIS/SE/ISV), reactor recirculation pumps 2A and 2B breakers 4A and 4B trip and close circuits (EIIS/AD/JA), Unit 2 main generator backup and differential relays (EIIS/JJ/87), Unit 2 Standby Gas Treatment System fire detection relays CR4 and CR6 (EIIS/IC/83), Unit 2 reactor recirculation solenoid valve 2-SOV-B32-V14 (EIIS/AD/SMV), Unit 2 Service Water System (SW) pressure switches (PS) 2SW-PS-3213 and 2-SW-PS-3214 (EIIS/KE/PS), and Unit 2 RWCU System instrument rack G31-Z002-25. Inoperability of PS-3213 and 3214 will prevent automatic starting of the Unit 2 Nuclear (EIIS/KE) and Conventional (EIIS/KG) service water pumps due to low pressure.

TABLE 3B (Cont'd)

i. One half of 250 Vdc MCC-2TDB (EIIS/EJ/MCC) will be inoperable. MCC-2TDB is a BOP MCC which supplies power to the Unit 2 reactor recirculation pump 2B MG set 2B emergency lube oil pump (EIIS/AD/P) and the Unit 2 RFPT 2B emergency oil pump (EIIS/SJ/P). This equipment is not safety related and the loss of the equipment should not create any safety concerns.

j. Distribution panel 4B (EIIS/EJ/PL) will be inoperable. Distribution panel 4B is a Class 1E panel which supplies power to Unit 2 HPCI (E41) and RCIC (E51) drain valves E41-F025 and E41-F029 (EIIS/BJ/ISV), E51-F004, E51-F026, and E51-F054 (EIIS/BN/ISV), Unit 2 Control Rod Drive (CRD) System (C12) backup scram valve C12-F110B (EIIS/AA/SH). Unit 2 Nuclear Steam Supply System shutoff valves 2-B21-F028A, F028B, F028C, and F028D air-operated solenoids (EIIS/LO/SOL), Unit 2 torus drain (TD) valve 2-TD-V5 (EIIS/BS/ISV), Unit 2 torus drain solenoid valve 2-TD-SV-3598 (EIIS/BJ/SOL), Unit 2 RCIC System (EIIS/BN/CBD) a vertical board 2-H12-P601 (EIIS/BN/CBD). Unit 2 RHR relay logic B cabinet 2-H12-P618 (EIIS/BO/PL), Unit 2 Core Spray System (E21) Division II relay logic cabinet 2-H12-P627 (EIIS/BM/PL), Unit 2 RCIC control and relay logic cabinet 2-H12-P621 (EIIS/BN/PL), Unit 2 nuclear boiler system Automatic Depressurization System (ADS) logic A and B cabinet 2-H12-P628 (EIIS/*/PL), Unit 2 Nuclear Steam Supply System (NSSS) outboard isolation valve logic cabinet 2-H12-P623 (EIIS/SB/PL), alternate source to Diesel Generator No. 2 start and sequential loading logic circuits (EIIS/EK/CBL), Diesel Generator No. 4 annunciator logic cabinet XU-45 (EIIS/EK/PL), emergency switchgear E4 74GX ground fault alarm relay cabinet XU-42 (EIIS/EK/PL), Unit 2 nuclear boiler steam leak detection inverter B21B-K801B (EIIS/IJ/INVT), Unit 2 feedwater control (C32) inverter 2-C32-K6B (EIIS/SJ/INVT), and Unit 2 reactor feed pump turbine RFPT 2B main terminal box EH (EIIS/SJ/JBX).

k. The dc power source to the Unit 2 turbine/generator emergency bearing oil pump (EIIS/TD/P) would be inoperable. The turbine/generator emergency bearing oil pump is balance-of-plant equipment and a failure of this equipment will not create any plant safety concerns.

*EIIS System Code Description not provided.

CP&L
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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
LICENSEE EVENT REPORT 1-88-006

Gentlemen:

In accordance with Title 10 to 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 in accordance with the format set forth in NUREG-1022, September 1983.

Very truly yours,

C. R. Dietz, General Manager
Brunswick Steam Electric Plant

MJP/mcg

Enclosure

cc: Dr. J. N. Grace
Mr. E. D. Sylvester
BSEP NRC Resident Office

IE22
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