

## LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (MNBB 7714), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20540-0001, AND TO THE PAPERWORK REDUCTION PROJECT (9-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1):

LaSalle County Station, Unit 2

DOCKET NUMBER

5000374

PAGE (3)

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TITLE (4) Unit 2 "B" Reactor Protection System Motor-Generator  
Failure In MG Set Protective Circuitry

Set Trip D Subcomponent

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 NAME	DOCKET NUMBER		
01	06	98	98	001	00	02	05	98	FACILITY NAME	DOCKET NUMBER		
OPERATING MODE (9)		N		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)								
POWER LEVEL (10)		000										
			<input type="checkbox"/> 20.2203(b)	<input type="checkbox"/> 20.2203(a)(3)(i)			<input type="checkbox"/> 50.73(a)(2)(iv)			<input type="checkbox"/> 73.71(b)		
			<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2003(a)(3)(ii)			<input checked="" type="checkbox"/> 50.73(a)(2)(iv)			<input type="checkbox"/> 73.71(c)		
			<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 20.2003(a)(4)			<input type="checkbox"/> 50.73(a)(2)(v)			<input type="checkbox"/> OTHER		
			<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)			<input type="checkbox"/> 50.73(a)(2)(vii)			(Specify in Abstract below and in Text, NRC Form 366A)		
			<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)			<input type="checkbox"/> 50.73(a)(2)(viii)(A)					
			<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)			<input type="checkbox"/> 50.73(a)(2)(vii)(B)					
			<input type="checkbox"/> 20.2003(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(ii)			<input type="checkbox"/> 50.73(a)(2)(x)					
LICENSEE CONTACT FOR THIS LER (12)												
NAME								TELEPHONE NUMBER (Include Area Code)				
Larry Bukantis, System Engineer								(815) 357-6761 Extension 2576				
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		
B	JC	59	G080	YES								
SUPPLEMENTAL REPORT EXPECTED (14)												
YES (If yes, complete EXPECTED SUBMISSION DATE)				<input checked="" type="checkbox"/> NO				EXPECTED SUBMISSION DATE (15)		MONTH	DAY	YEAR

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

At 0852, January 6, 1998, numerous Reactor Protection System (RPS) and Primary Containment Isolation System (PCIS) isolations/half isolations and alarms occurred on LaSalle Unit 2. This was accompanied by the "B" RPS MG SET TROUBLE alarm and loss of indication for "B" RPS Generator Feed and Output Indicating lights. These indications, isolations and alarms were caused by the trip of the 2B RPS MG set output breaker, and concurrent tripping of the Electrical Protection Assembly (EPA) breakers. On January 7, 1998, at 0916, 2B RPS MG set output breaker tripped again, this time in an off line and unloaded condition (EPA Breakers were open and RPS bus was being fed from the alternate source). The trips were caused by a broken solder joint causing an intermittent and/or high resistance connection to the overvoltage relay (59) located on a circuit board inside the MG set cabinet (mounted on the MG set). The circuit board containing the relay was replaced. The safety significance of this event is minimal, as the breakers failed in the conservative position as designed.

This event is being reported in accordance with the requirements of 10 CFR 50.73(a)(2)(iv) due to an automatic actuation of engineered safety features (ESF).

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**PLANT AND SYSTEM IDENTIFICATION**

General Electric - Boiling Water Reactor

Energy Industry Identification System (EIIS) codes are identified in the text as [XX].

**A. CONDITION PRIOR TO EVENT**

Unit(s): 2	Event Date: 01/06/98	Event Time: 0852 Hours
Reactor Mode(s): N	Power Level(s): 0%	RCS [AB] Temperature: 80°F
Mode(s) Name: Defueled		RCS [AB] Pressure: 0 PSIG

**B. DESCRIPTION OF EVENT**

At 0852 hours, January 6, 1998, with Unit 1 in Cold Shutdown and Unit 2 in a defueled condition, Unit 2 Reactor Protection System (RPS) [JC] and Primary Containment Isolation System (PCIS) [JM] isolations / half isolations and alarms occurred. These isolations included: Drywell Pneumatic to Drywell (EPN 2IN017), Drywell Pneumatic to Drywell (EPN 2IN031), Reactor Water Clean Up Inboard Isolation Valve (EPN 2G33-F001), Reactor Water Clean Up Outboard Isolation Valve (EPN 2G33-F004), Panel 2PL77J DW Sample Inlet Stop Valve (EPN 2CM021B), Panel 2PL76J Sample Outlet Stop Valve (EPN 2CM025A) and Panel 2PL77J Sample Outlet Stop Valve (EPN 2CM026B). This was accompanied by the "B" RPS MG SET TROUBLE alarm and loss of indication for "B" RPS Generator Feed and Output indicating lights. These indications, isolations and alarms were caused by the trip of the 2B RPS MG set output breaker, and concurrent tripping of the Electrical Protection Assembly (EPA) breakers. Prompt investigation by an Operations Department Equipment Operator discovered that the 2B RPS MG Set Output Breaker (EPN 2AP080E-B3) was tripped, and the two RPS EPA Breakers (EPN 2C71-S003B and 2C71-S003D) were also tripped. There was no known work being performed in, around, or on RPS components at the time of this event. All Half Scram, Alarms and Isolations expected upon loss of the 2B RPS 120V AC bus were received and acknowledged. EPA breaker 2C71-S003D was found to be in a tripped condition, however, apparently due to mechanical binding of the handle, the trip lever appeared to be in an "untripped" position. Power to the "B" RPS bus was restored via the alternate source, since there was no indication of a bus / system fault. 2B RPS MG set was examined, and appeared to be fully operational, with no abnormal fluctuations in output voltage or frequency. There were no additional alarms or indications for either the input or output of the MG set. All protective devices functioned properly, although failure of an EPA circuit breaker (2C71-S003D) indication mechanism requires that this breaker be replaced. This did not affect the operation or diminish the protective function of the breaker.



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After a check to insure there was no equipment damage, or potential for personnel injury, the 2B RPS MG set was restarted for the purpose of troubleshooting, and the MG set output circuit breaker was closed at 1302 hours, January 6, 1998, in an unloaded condition and allowed to run. On January 7, 1998, at 0916 hours, 2B RPS MG set output circuit breaker tripped again. As before, there was no known work being performed in, around, or on RPS components at the time of the event. The 2B RPS MG Set Output Breaker (EPN 2AP080E-B3) was closed, and both EPA breakers (EPN 2C71-S003B and 2C71-S003D) were in the "open" position. The "B" RPS MG SET TROUBLE alarm was received, along with loss of indication for "B" RPS Generator Feed and Output indicating lights. Loads on the "B" RPS bus were unaffected, as the alternate supply for the bus was providing power per LaSalle Operating Procedure, LOP-RP-01, "Reactor Protection System MG Set Start-Up and Operation." Investigation revealed that the 2B RPS MG Set output breaker had tripped.

Indications for voltage and frequency were observed and found to be stable, with no additional alarms. The MG set was then secured in accordance with applicable station procedure. The 2B RPS MG set output breaker tripped due to a failed solder joint for the overvoltage relay (internal to the MG set) (EPN 2159-RP001B). The failed solder joint appeared as a high resistance (open) contact in the MG set protective circuitry, and caused the MG set generator output breaker and Electrical Protection Assemblies (EPA) to trip as expected. This failed solder joint was detected as a part of NWR 980001799-01, performed jointly by Electrical Maintenance Department (EMD) and Operations Analysis Department (OAD), who detected the high resistance connection during troubleshooting and circuit evaluation. A new circuit board was issued, installed, calibrated and tested successfully. The EPA circuit breaker (EPN 2C71-S003D) was also replaced with a new circuit breaker which was calibrated, installed and successfully tested.

This event . . . being reported in accordance with the requirements of 10 CFR 50.73(a)(2)(iv) due to an automatic actuation of engineered safety features (ESF).

**C. CAUSE OF EVENT**

The initiating cause of this event was the loss of the "B" RPS bus as a result of the failure of a solder joint that electrically and mechanically connected the overvoltage relay to a circuit board located inside an enclosure mounted on the MG set. The failure of the solder joint presented an intermittent high resistance connection that was seen as an intermittent "open" in the trip circuit for the MG set output circuit breaker. The intermittent "open" appeared as would be expected in an overvoltage condition. Testing of the relay and associated circuitry while mounted on the MG set showed varying resistance levels. Upon removal for further evaluation, it was observed that the soldered pin connection of the relay to the circuit board did not appear to be an "original" factory soldering job (there was no epoxy-like coating on the solder joints, whereas the other solder joints on the board did) and the solder joint was movable, resulting in resistance varying from near zero ohms to near infinite resistance between

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terminals 1 and 3 of the relay. It could not be determined how the solder joint failed. Maintenance History did not reveal any information regarding a maintenance activity for the overvoltage relay (EPN 2159-RP001B) where the soldered connection may have been changed. As such, the actual cause of the solder joint failure cannot be determined.

**D. SAFETY ANALYSIS**

RPS MG set protective device functions performed as designed during this event, and Engineered Safety Feature (ESF) actuations occurred. The Reactor Protection System has a "fail safe" design, and on loss of power (as in this case due to MG set trip) protective devices actuate. Tripping of the MG set had no impact on the design requirements of the Reactor Protection System. The EPA units (EPN 2C71-S003B and 2C71-S003D) are connected in series, so that a single failure of either unit would continue to provide protection for the RPS bus. The "B" RPS bus supply was transferred from the RPS MG set to restore power to the "B" RPS bus.

**E. CORRECTIVE ACTIONS**

1. The circuit board containing the overvoltage relay, which was the initial cause of the event, was replaced by LaSalle EMD, and calibrated as required by OPD. (WR 980001799-01 completed January 10, 1998)
2. The MG Set output circuit breaker was removed, trip tested, verified to operate satisfactorily and re-installed. (WR 980001799-01 completed January 10, 1998)
3. EMD and OPD will perform an inspection of Unit 1 and Unit 2 RPS MG set overvoltage relays and their associated circuit boards and circuitry to insure that the solder joint anomaly is an isolated event. (NTS # 374-180-98-SCAQ00001.01)
4. The component failure has been captured by LaSalle's Maintenance Rule Program.

**F. PREVIOUS OCCURRENCES**

LER NUMBER	TITLE
93-018-00	Unit 1 "A" RPS Power Lost Due To A Failed Logic Card

Corrective Actions from LER 93-018-00 were unable to prevent this event. The previous LER addressed the failure of a controller card in an Electrical Protection Assembly (EPA). The failure of this device mounted on a circuit board internal to the Motor Generator set is an unrelated event.



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**G. COMPONENT FAILURE DATA**

General Electric (GE) Printed Circuit Board, GE Part Number 3300A03B0918

General Electric (GE) Relay, GE Part Number CR120G20103