L-PI-03-078
10 CFR 50.73

September 24, 2003

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

PRAIRIE ISLAND NUCLEAR GENERATING PLANT
DOCKET NO. 50-306
LICENSE NO. DPR-60
LER 2-03-02, AUTOMATIC ACTUATION OF UNIT 2
EMERGENCY AC 4KV BUS 26 LOAD SEQUENCER

The Licensee Event Report for this occurrence is attached. This event was reported via the Emergency Notification System in accordance with 10 CFR Part 50, Section 50.72(b)(3)(iv)(A) on July 27, 2003. Please contact us if you require additional information related to this event.

This letter and attached report contain no new NRC commitments and no revisions to existing commitments.

Joseph M. Solymossy
Site Vice President, Prairie Island Nuclear Generating Plant

CC Regional Administrator, USNRC, Region III
Project Manager, Prairie Island Nuclear Generating Plant, USNRC, NRR
NRC Resident Inspector – Prairie Island Nuclear Generating Plant
Glenn Wilson, State of Minnesota

Attachment

IE22

NRC FORM 366 (1-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 6-30-2001

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

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TITLE (4)

AUTOMATIC ACTUATION OF UNIT 2 EMERGENCY AC 4KV BUS 26 LOAD SEQUENCER

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
07	26	03	03	– 02	– 00	09	24	03	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)							
POWER LEVEL (10)	100		20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)
			20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)
			20.2203(a)(1)		50.36(c)(1)(i)(A)	√	50.73(a)(2)(iv)(A)		73.71(a)(4)
			20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		50.73(a)(2)(v)(A)		73.71(a)(5)
			20.2203(a)(2)(ii)		50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER
			20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)		Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)		
			20.2203(a)(2)(v)		50.73(a)(2)(i)(B)		50.73(a)(2)(vii)		
			20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)		
			20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)		

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Bob Alexander	651-388-1121 ext 4154

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
B	EA	CON	G0005	Y						

SUPPLEMENTAL REPORT EXPECTED (14)				EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
	YES (If yes, complete EXPECTED SUBMISSION DATE).	√	NO				

ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)

On July 26, 2003 while operating at 100% power, a ground fault on an underground 13.8kV feeder from the substation resulted in a loss of power to a Unit 2 Safeguards 4kV Bus when substation breakers opened to clear the fault. As designed, the Bus Load Sequencer automatically initiated load rejection and load restoration following transfer to the Station Reserve Transformer. The Charging Pumps tripped as a result of the momentary loss of power to the bus, and charging/letdown automatically isolated. Operators manually started one Charging Pump and letdown was restored. The Reactor Vessel Gap Cooling Fan, Containment Dome Recirculation Fan and two Fan Coil Units (FCUs) also tripped on the momentary loss of power to the bus. The FCUs auto-started as designed, and the other fans were manually restarted after the bus was re-energized. Technical Specification 3.8.1 Condition A was entered due to loss of one path from the grid and the "Required Actions" were completed. An 8-hour Non-Emergency Notification was made to the NRC due to the unplanned Bus Auto Sequencer Actuation. The cause of the event was determined to be a "phase to ground" fault across the dielectric compound that had leaked out of and over the A Phase G&W Electric 13.8kV cable termination. Water from within the termination that entered via the cable jacket, is suspected to have provided the path to ground for the fault. The failed termination was replaced with a "3M Cold Shrink" termination and the 13.8 kV feeder was returned to service on August 8, 2003.

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NARRATIVE *(If more space is required, use additional copies of NRC Form 366A)* (17)

EVENT DESCRIPTION

On July 26, 2003 (2139 CDT), while operating at 100% power, a ground fault on an underground 13.8kV feeder from the substation resulted in a loss of power to Unit 2 Safeguards 4kV Bus 26[1] when substation breakers[2] opened to clear the fault. The Bus 26 Load Sequencer[3] automatically initiated load rejection and load restoration following transfer to the 2RY Station Reserve Transformer[4]. Charging flow was lost when the two running Charging Pumps[5] tripped as a result of the momentary loss of power to the bus and letdown automatically isolated, as designed. Control Room Operators manually started one Charging Pump at 2140 CDT and letdown was restored at 2149 CDT. The Reactor Vessel Gap Cooling Fan[6], the Containment Dome Recirculation Fan and the two Containment Fan Coil Units (FCUs)[7] fed from Bus 26, also tripped on the momentary loss of power. The FCUs auto started and the other fans were manually restarted (2140 CDT) after the bus was re-energized.

At 2207 CDT Plant Operators reported back to the Control Room, that a black substance was coming out of an electrical bushing[8] and a "sulfur" smell was evident in the cooling tower equipment house[9].

At 2226 CDT, Technical Specification 3.8.1 Condition A was entered due to one path from the grid being inoperable for Unit 2, and the "Required Actions" were completed.

The event also resulted in the loss of power to the cooling tower pumps/fans and Intake Traveling Screens[10]. At 2230 CDT, plant operators restarted the traveling screens.

On July 27, 2003 (0114 CDT), an 8 hour Non-Emergency Notification was made to the NRC Operations Center due to the unplanned bus Auto Sequencer Actuation.

The loss of cooling towers resulted in a plant discharge canal[11] temperature increase from approximately 87 degrees F to 98 degrees F on July 27, 2003 (0516 CDT). On July 28, 2003 (0533 CDT), restoration of the cooling tower fans that were in service before the event was completed.

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[1] System Identifier: EA Component Identifier: BU
[2] System Identifier: FK Component Identifier: 52
[3] System Identifier: EB Component Identifier: 34
[4] Component Identifier: XFMR
[5] System Identifier: CB Component Identifier: P
[6] System Identifier: VA Component Identifier: FAN
[7] System Identifier: BK Component Identifier: CLR
[8] Component Identifier: INS
[9] System Identifier: NN
[10] System Identifier: KG Component Identifier: SCN
[11] System Identifier: KE

Replacement and testing of the failed conductor termination[12] and an additional termination that was leaking was completed on August 6, 2003. Bus 26 was transferred back to the normal off-site source line-up on August 8, 2003.

CAUSE OF THE EVENT

The dielectric compound (Novoid A) is used in G&W Electric Company conductor terminations to fill the internal space around the prepared conductor end with an insulating material superior to that of air. Inspection of the "A" Phase "capnut" conductor termination on the underground feeder from the substation, indicated there was a phase to ground fault across the dielectric compound (Novoid A) that had leaked out of and over the termination. Compound droplets were seen splattered on the floor and adjacent switchgear[13], indicating there was an arc at the location of the leaking compound. In addition, there was visual evidence on the surface of the leaking compound that an arc had traversed the surface between the conductor termination and the body of the termination.

Water in the cable[14] contributed to this failure and a previous failure of 2002. However, water in the cable alone could not have caused the failures. The age of the termination contributed to the failure in 2002 as the Novoid A compound was no longer as pliable as it was when installed. This allowed the formation of voids in the compound and over time, the voids made their way from the body of the termination to the conductor. Water entered the voids and caused the internal phase to ground fault within the termination.

Faulty installation of the replacement terminations contributed to the failure in 2003. The capnuts were not tightened properly to prevent the Novoid A from leaking out. The A phase termination leaked a sufficient amount of compound to allow water to fill the void left by the leaked compound and made its way out of the termination and over the surface of the compound. This ultimately provided a path for the ground fault to occur outside of the termination.

ANALYSIS OF THE EVENT

Impact on Safety System Functional Failure Performance Indicator

This event was reportable per 10CFR 50.73 (a)(2)(iv) as an automatic actuation of an engineered safety feature. The event did not result in the loss of any safety function and therefore, does not impact the Safety System Functional Failure Performance Indicator. The

12 Component Identifier: CON
13 Component Identifier: SWGR
14 Component Identifier: CBL5

bus automatically transferred to its alternate power source and the safeguards loads were automatically restored.

Risk Significance

This underground feeder is part of the normal offsite source to one of two safeguards 4kV buses. In the event of a loss of all offsite power (LOOP), all offsite sources to the safeguards 4kV buses are lost and emergency diesel generators[15] then supply the power to the needed loads. The risk of core damage following all initiating events including the LOOP initiating event is essentially unchanged with this offsite path unavailable. The risk of core damage for all other initiating events besides LOOP, are not affected by the unavailability because of the redundant offsite power supplies. The risk of core damage from the LOOP initiating event is also not affected because all of the emergency diesel generators remain available.

A risk analysis was performed using the Prairie Island model. The analysis assumed that this offsite path was unavailable for 13 days (actual out of service time was about 40 hours) and concluded that the resulting Conditional Core Damage Frequency (CCDF) for Unit 2 is 1.50E-08/yr and a Conditional Core Damage Probability (CCDP) for Unit 2 of 5.26E-10. The Unit 1 results were unchanged. By virtue of the CCDP being less than 1E-06, the event can be classified as non-risk significant.

The plant systems responded to the event as they were designed, with no subsequent failures identified.

CORRECTIVE ACTIONS

Immediate

1. Operators verified proper operation of automatic actuations and manually restarted plant components that tripped as a result of this event, as necessary.

2. Operators conducted Technical Specification "Required Actions" to be performed for the loss of one offsite path, and continued to perform these actions until the offsite path was returned to service.

Subsequent

1. Following identification of the cause of the failure, the failed termination and an additional termination, which showed signs of compound leakage, were repaired on July

[15] System Identifier: EK Component Identifier: DG

30, 2003. Post maintenance testing of the repaired terminations showed that the repair was only marginally successful and further actions were warranted.

2. Following further investigation, the G&W Electric terminations were replaced with 3M, QT-III, Cold Shrink Silicone Rubber terminations to avoid future failures due to Novoid A compound leakage. The replacement activities were completed on August 6, 2003. According to a 3M representative, the new terminations will withstand up to 6 psi of water pressure from within the cable. The G&W style terminations are not designed to withstand any water in the cable.

3. Operators returned the offsite source to service restoring the normal power system line-up on August 8, 2003.

Long Term

The G&W Electric Co. compound filled conductor terminations are used at other locations at the site. Further evaluation under the Prairie Island Corrective Action Process will be completed to determine whether additional replacements (terminations and/or cables) should be performed.

FAILED COMPONENT IDENTIFICATION

Component Information: 15 kV; Single Conductor Capnut Termination
Manufacturer: G&W Electric Company
Model Number: Catalog CA1-80; 15 KV; 1/C; Bracket Mounted
Part Number: NT17841

PREVIOUS SIMILAR EVENTS

On June 18, 2001, a grid disturbance resulted in a similar automatic actuation of the Unit 1 Bus Load Sequencer. This event was previously reported in LER 1-01-02.