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RLB-92-022

January 16, 1992

U. S. Nuclear Regulatory Commission
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Washington, DC 20555

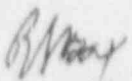
Reference: Quad Cities Nuclear Power Station
Docket Number 50-254, DPR-29, Unit One

Enclosed is Licensee Event Report (LER) 91-028, Revision 00, for Quad Cities Nuclear Power Station.

This report is submitted in accordance with the requirements of the Code of Federal Regulations, Title 10, Part 50.73(a)(2)(iv). The licensee shall report any event or condition that resulted in manual or automatic actuation of any Engineered safety feature.

Respectfully,

COMMONWEALTH EDISON COMPANY
QUAD CITIES NUCLEAR POWER STATION


R. L. Bax
Station Manager

RLB/TB/plm

Enclosure

cc: J. Schrage
T. Taylor
INPO Records Center
NRC Region III

310027
CTMCR 965
9201310215 920117
PDR ADDCK 05000254
S PDR

Handwritten initials/signature

LICENSEE EVENT REPORT (LER)

Form Rev 2.0

Facility Name (1) Quad Cities Unit One
 Docket Number (2) 0 | 5 | 0 | 0 | 0 | 2 | 5 | 4 | 1 | of | 0 | 6
 Page (3) 1 of 6
 Title (4) Loss Of Power To 1A RPS Bus Caused By EPA 1A-1 Tripping On Undervoltage Due To Low M-G Set Output

Event Date (5)			LFR 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)
11	22	09	1991	028	00	01	17	1992		0 5 0 0 0 1 1 0 5 0 0 0 1 1

OPERATING MODE (9) 4

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)

20.402(b)	20.405(c)	<input checked="" type="checkbox"/>	50.73(a)(2)(iv)	<input type="checkbox"/>	73.71(b)
20.405(a)(1)(i)	50.36(c)(1)	<input type="checkbox"/>	50.73(a)(2)(v)	<input type="checkbox"/>	73.71(c)
20.405(a)(1)(ii)	50.36(c)(2)	<input type="checkbox"/>	50.73(a)(2)(vii)	<input type="checkbox"/>	Other (Specify in Abstract below and in Text)
20.405(a)(1)(iii)	50.73(a)(2)(i)	<input type="checkbox"/>	50.73(a)(2)(viii)(A)	<input type="checkbox"/>	
20.405(a)(1)(iv)	50.73(a)(2)(ii)	<input type="checkbox"/>	50.73(a)(2)(viii)(B)	<input type="checkbox"/>	
20.405(a)(1)(v)	50.73(a)(2)(iii)	<input type="checkbox"/>	50.73(a)(2)(x)	<input type="checkbox"/>	

LICENSEE CONTACT FOR THIS LER (12)

Name: David Harmon, Technical Staff Engineer, Ext. 2116
 TELEPHONE NUMBER: 3 | 0 | 9 | 6 | 5 | 4 | - | 2 | 2 | 4 | 1

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	J	C	R H E	5 0 0 0	Y				

SUPPLEMENTAL REPORT EXPECTED (14)

[Yes (If yes, complete EXPECTED SUBMISSION DATE)] NO

Expected Submission Date (15) _____

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

ABSTRACT:

At 1720 hours on December 20, 1991, UNIT ONE was in the RUN mode at 100% of rated core thermal power. Reactor Protection System (RPS) Bus 1A unexpectedly lost power. This caused a 1/2 scram and Primary Containment Isolation (PCI) Groups I, II, and III isolation signals to be received in the Control Room. It also caused Reactor Water Clean-up (RWCU) pumps to trip, and Control Room Vents and Reactor Building Vents to isolate as designed.

The loss of power was due to an undervoltage trip on an Electrical Protection Assembly for the RPS 1A Motor-Generator (M-G) Set. At 1735 hours, RPS Bus 1A was energized from its reserve feed. The 1/2 scram and PCI Group Isolations were reset, and RWCU, Control Room Vents, and Reactor Building Vents were returned to service.

The apparent cause of the event is low generator output voltage. The exact cause for the drop in voltage is unknown. No apparent electrical load failure was discovered during the investigation. The possible causes are believed to be normal wear or corrosion of the voltage regulator rheostat at the point of previous adjustment, or a spurious voltage regulator failure. After adjusting the rheostat for a higher generator output voltage, the M-G Set functioned properly and was returned to service.

The Station is investigating replacement of the voltage regulator and rheostat.

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TEXT Energy Industry Identification System (EII5) codes are identified in the text as [XX]

An Emergency Notification System (ENS) phone notification was completed at 1940 hours on December 20, 1991, as required under 10CFR50.72(b)(2)(11).

On December 21, 1991, Operational Analysis Division (OAD) personnel successfully performed a verification of the undervoltage, overvoltage, and underfrequency trips for the 1A-1 and 1A-2 EPA's. Each EPA trip requires that the trip condition exist for a minimum of 3 seconds. All trips occurred properly, including the undervoltage trip for EPA 1A-1, which occurred at approximately 108 volts. No cause for the prior trip could be found. RPS Channel A was left on reserve power while the investigation continued.

Because the cause for the trip could not be determined, preparations were made for conducting a load test on the 1A M-G Set. A recorder was set up to monitor voltage at the EPA's, at the Voltage Regulator [RG], and at the Generator [GEN] Exciter [EXC].

At 1440 hours on December 30, 1991, a one hour load test was conducted on the 1A RPS M-G Set. A load approximately equal to the normal load, 54 amps, was maintained without tripping the M-G Set. The voltage output from the M-G Set was 111.1 volts, as measured by a digital voltmeter [EI] during the test. The voltmeter on the front of the 901-52A M-G Set Control Panel was reading approximately 112.5 volts. The voltage is normally maintained between 115 and 120 volts.

On January 2, 1992, EM technicians adjusted the Voltage Adjust Rheostat [RHE] for the Voltage Regulator to obtain a voltage output for the 1A M-G Set of 118.3 volts.

At 1900 hours on January 3, 1992, the 1A M-G Set was successfully returned to service.

C. APPARENT CAUSE OF EVENT:

This report is being submitted to comply with 10CFR50.73(a)(2)(iv); "The licensee is required to report any event or condition that resulted in manual or automatic actuation of any Engineered Safety Feature [ESF], including the k's, except any actuation which is part of a preplanned sequence during testing or reactor operation." The Control Room Vent and Reactor Building Vent isolations, and the 1/2 Group III which caused the RWCU pumps to trip are ESF actuations.

The apparent cause of the EPA undervoltage trip is that the 1A M-G Set output voltage dropped approximately 2.5 volts, from 115 volts indicated on the 901-52A panel to 111.1 volts actual. It is believed that a voltage dip occurred coincident with the existing low voltage condition, which tripped the 1A-1 EPA. The exact cause of the voltage drop is not known. No apparent electrical load failure was discovered during the investigation. The following are considered to be possibilities: (1) normal wear of the Voltage Adjust Rheostat for the Voltage Regulator, and (2) spurious failure of the Voltage Regulator.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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

The Voltage Adjust Rheostat was adjusted for a voltage output of 118.3 volts, and there have been no further signs of degradation. The rheostat is believed to have developed a flat spot or corrosion at the point of the previous adjustment due to normal wear at that point over a long period of time. The Voltage Regulator and rheostat were visually inspected while installed, and no signs of heat damage or any other degradation could be found.

As per Station Procedure QOS 005-S12, OPERATOR'S SURVEILLANCE/TURNOVER SHEETS U-1 EQUIPMENT OPERATOR, the voltage for the RPS 1A-M-G Set as provided by the voltmeter on the 901-52A panel is recorded once per shift. The last voltage reading recorded before the trip was 115 volts, and this was taken the same shift during which the trip occurred. Previous recordings show that the voltage had been maintained steadily at 115 volts prior to this event.

Although not a contributing cause to this event, QOS 005-S12 specifies a high and low limit for RPS M-G Set voltage of 120 and 110 volts respectively. The trip setpoint for the EPA is 108 volts + 2.7 volts for the undervoltage trip, and 126.5 volts +3.1 volts, -3.2 volts for the overvoltage trip. The low limit of 110 volts is within the possible range of the EPA trip setpoint.

Additionally, although not a contributing cause, the voltmeter on the 901-52A panel read high by approximately 1.5 volts when compared to the Quality Assurance qualified digital voltmeter used during the load test.

D. SAFETY ANALYSIS OF EVENT:

The safety of the public and plant personnel was not affected by this event. RPS, SBGT, RWCU, Control Room Ventilation, and Reactor Building Ventilation functioned as designed throughout the event.

The loss of the 1A RPS Bus caused a trip of the Channel A RPS trip logic resulting in a 1/2 scram. Since the logic of RPS is one-out-of-two taken twice, any trip of a protective instrument on Channel B would have caused a reactor scram as designed. Therefore, the loss of the 1A RPS Bus placed the RPS in a safe, or tripped condition, such that the RPS would have functioned as designed to help safely shutdown the reactor if conditions had required it.

E. CORRECTIVE ACTIONS:

The immediate corrective actions taken were to establish reserve power to the 1A RPS Bus, reset the 1/2 scram and 1/2 Group I, II, and III Isolations, and restart RWCU, Reactor Building Ventilation, and Control Room Ventilation.

The Voltage Adjust Rheostat for the Voltage Regulator was adjusted and the M-G Set was returned to service.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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

Further corrective actions will be: (1) to calibrate the voltmeter and ammeter [II] on the M-G Set control panels for all PRS M-G Sets (NTS #2542009116101). (2) to adjust the voltage output for the 1B, 2A, and 2B RPS M-G Sets to 118 ± 0.5 volts (NTS #2542009116102). (3) to revise QOS 005-S12 and QOS 005-S18, the Unit Two equivalent, to specify a lower and higher limit for RPS M-G Set voltage of 114 volts and 121 volts, respectively (NTS #2542009116103). Work Requests Q97322, Q97323, Q97324, and Q97325 were written to accomplish (1) and (2) above.

Additionally, the Station will investigate replacement of the Voltage Adjust Rheostats and Voltage Regulators for all four RPS M-G Sets (NTS #2542009116104).

F. PREVIOUS EVENTS:

There have been four similar previous events reported as Deviation Reports (DVR) at Quad Cities Station. These are summarized below:

DATE	DVR#	DESCRIPTION OF EVENT
6-6-80	4-1-80-39	Loss of RPS Bus 1B due to burned up undervoltage trip coil.
9-20-82	4-2-82-40	Loss of RPS Bus 2A due to unknown cause - this was investigated under Work Request Q21764. The problem did not repeat and the Work Request was closed out with no actions taken.
8-5-84	4-2-84-41	Loss of RPS Bus 2B due to failure of the 2B M-G Set motor.
2-19-91	4-1-91-31	Loss of RPS Bus 1B due to mechanical vibration in the underfrequency relay contacts.

A nationwide Nuclear Plant Reliability Data System (NPRDS) search was conducted for failures of RPS voltage regulators. Twelve similar events have been reported which occurred at other plants, and are summarized below:

Number of Failures	Description and Correction Action
6	Unknown failure of voltage regulator attributed to a defect or normal wear and aging - replaced voltage regulator.
4	Dirty or bad voltage adjust rheostat or potentiometer - replaced rheostat or the entire voltage regulator.
3	Overheating of resistors in the voltage regulator - replaced voltage regulator.

LICENSEE EVENT REPORT (LER) TEXT CONTINUATION

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TEXT Energy Industry Identification System (EII5) codes are identified in the text as [XX]

G. COMPONENT FAILURE DATA:

The M-G Set is General Electric (GE) model number 5LS4326A22Y32. The generator is GE model number 5SJ4326A22Y35. The Voltage Regulator, which is considered to be a piecepart of the generator circuitry, is GE model number 3300A03B0005. The Voltage Adjust Rheostat, an external piecepart of the Voltage Regulator, is manufactured by Ohmite, model H.

ATTACHMENT I (Cont'd)

EVENT SUMMARY AND CAUSE CODES

DVR Number
4-1-91-161

- | | | |
|---|---|---|
| <input type="checkbox"/> Lost Generation | <input type="checkbox"/> Reactor Trip | <input type="checkbox"/> NRC violation, level _____ |
| <input type="checkbox"/> Cost > \$25,000 | <input checked="" type="checkbox"/> ESF actuation | <input type="checkbox"/> GSEP event, class _____ |
| <input type="checkbox"/> Hazard or Spill | <input type="checkbox"/> NRC reportable | <input type="checkbox"/> Tech Spec 1.0 |
| <input type="checkbox"/> Personnel injury | <input checked="" type="checkbox"/> LER | <input type="checkbox"/> Potential or future loss |
| | <input type="checkbox"/> PSE | <input type="checkbox"/> SALP functional area _____ |

	Component Type	Failure Mode	Department	
X	PE	ES	EM	Generator Voltage Regulator Rheostat
X				
X				

	Licensed? L or blank	Level	Department	Type	Detail code
A					
A					
A					

	Type	Detail Code	Department
B			
B			
B			

	Type	Detail code
C		

	Type of deficiency	Detail code	Procedure type
D			
D			
D			

	Type	Detail code	Department
E			
E			
E			

DEVIATION REPORT

DVR NO.
04 - 01 - 01 - 161
STA UNIT YEAR NO.

Form Rev 2.0

PART 1 TITLE OF DEVIATION Loss of Power to 1A RPS Bus		OCCURRED 12/20/91 1720 DATE TIME	
SYSTEM AFFECTED 590	PLANT STATUS AT TIME OF EVENT MODE RUN POWER(%) 100	WORK REQUEST NO.	TESTING YES NO <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO

DESCRIPTION OF EVENT

AT 1720 hours, Unit One experienced a loss of "A" RPS Bus. A half-scrum was received, as well as partial actuation of Group I and Group II Primary Containment logic. A Group III isolation occurred, as well as an isolation of Reactor Building ventilation. Standby Gas Treatment was running previously at the request of Fuel Handling. An undervoltage condition on the 1A1 EPA was found and reset. In order to investigate, 1A RPS was re-energized from its reserve feed.

POTENTIALLY SIGNIFICANT EVENT PER NOD DIRECTIVE DP.10	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
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10CFR50.72 NRC RED PHONE NOTIFICATION MADE	<input type="checkbox"/> 1 HOUR	<input checked="" type="checkbox"/> 4 HOUR	1940 TIME	<input type="checkbox"/> NO	A. Scott	12/20/91
10CFR.50.72(b)(2)(ii)					RESPONSIBLE SUPERVISOR	DATE

PART 2 | OPERATING ENGINEER'S COMMENTS

OAD and Electrical Maintenance are investigating the cause for the relay trip.

<input type="checkbox"/> NON REPORTABLE EVENT	NOTIFICATION	REGION III	DATE	TIME
<input checked="" type="checkbox"/> 30 DAY REPORTABLE/10CFR 50.73 (a)(2)(iv)				
<input type="checkbox"/> 5 DAY REPORT PER 10CFR21		NSD	DATE	TIME
<input type="checkbox"/> ANNUAL/SPECIAL REPORT REQUIRED	<input type="checkbox"/> CECD CORPORATE NOTIFICATION MADE IF ABOVE NOTIFICATION IS PER 10CFR21			
A.I.R. # _____	TELECOPY	CECD CORPORATE OFFICER	DATE	TIME
L.E.R. # 91-28				

PRELIMINARY REPORT COMPLETED AND REVIEWED
M. Kooi 12/23/91
OPERATING ENGINEER DATE

INVESTIGATION REPORT & RESOLUTION ACCEPTED BY STATION REVIEW

RESOLUTION APPROVED AND AUTHORIZED FOR DISTRIBUTION

[Handwritten signatures]
STATION MANAGER DATE 1-17-92