



Commonwealth Edison
LaSalle County Nuclear Station
2601 N. 21st. Rd.
Marseilles, Illinois 61341
Telephone 815/357-6761

February 26, 1993

Director of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Mail Station P1-137
Washington, D.C. 20555

Dear Sir:

Licensee Event Report #93-003-00, Docket #050-373 is being submitted to your office in accordance with 10CFR50.73(a)(2)(v).

G. F. Spedl
Station Manager
LaSalle County Station

GFS/MMT/mk1

Enclosure

xc: Nuclear Licensing Administrator
NRC Resident Inspector
NRC Region III Administrator
INPO - Records Center
IDNS Resident Inspector

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LICENSEE EVENT REPORT (LER)

Form Rev 2.0

Facility Name (1) LaSalle County Station Unit 1 Docket Number (2) 0 15 10 10 10 1 3 17 3 Page (3) 1 of 0 6
 Title (4) Reactor Core Isolation Cooling System Barometric Condenser Condensate Pump Failure And Discharge Flow And Turbine Speed Problems

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)
0 1	2 9	9 3	9 3	0 10 3	0 0	0 2	2 6	9 3		0 15 10 10 10 1 3 17 3

OPERATING MODE (9) 1
 POWER LEVEL (10) 0 2 0

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

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)(vii)	Other (Specify
20.405(a)(1)(iii)	50.73(a)(2)(i)	50.73(a)(2)(viii)(A)	in Abstract
20.405(a)(1)(iv)	50.73(a)(2)(ii)	50.73(a)(2)(viii)(B)	below and in
20.405(a)(1)(v)	50.73(a)(2)(iii)	50.73(a)(2)(x)	Text)

LICENSEE CONTACT FOR THIS LER (12)

Name: Michael Tennyson, System Engineer, Extension 2421
 TELEPHONE NUMBER: AREA CODE 8 1 5 3 5 7 1 - 6 7 6 1

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

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS
X	B	N	1	M	0	G	0	B	2

SUPPLEMENTAL REPORT EXPECTED (14)

Expected Submission Date (15) Month Day Year
 [Yes (If yes, complete EXPECTED SUBMISSION DATE)] X NO

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

On January 29, 1993, at 0505 hours, while Unit 1 was in Operational Condition 1 (Run), at 20% power, the Reactor Core Isolation Cooling Turbine (RCIC) Barometric Condenser Condensate Pump, 1E51-C004, failed during a planned RCIC System run per LaSalle Special Procedure, LLP-92-193. Uneven brush wear, overheating that caused a burnt brush contact surface, and heavy carbon-graphite film build-up found on the commutator caused the motor to stop running. The motor commutator was cleaned, the brushes were replaced, and the pump was then operated satisfactorily.

On January 30, 1993 at 1905 hours, following successful repairs to the RCIC Barometric Condenser Condensate Pump, the RCIC System was started and approximately twenty five minutes into the surveillance, the RCIC System experienced a sudden decrease in discharge flow, discharge pressure, and turbine speed. The cause was attributed to loose wire connections on the RCIC Ramp Generator Signal Converter Terminal.

The two connections at the Ramp Generator Terminal were fastened securely. The remaining cables at the Ramp Generator Terminal and the Electronic Control Box Terminal were verified to be fastened securely.

The RCIC System was re-started on January 31, 1993, and the system was returned to service on February 1, 1993, at 0330 hours.

This event is reported to the Nuclear Regulatory Commission as a Licensee Event Report in accordance with 10CFR50.73(a)(2)(v) due to RCIC being declared inoperable (loss of a safety system function).

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LaSalle County Station Unit 1	0 5 0 0 0 3 7 3	9 3	-	0 0 3	-	0 0	0 2	OF	0 6		
TEXT Energy Industry Identification System (EIIS) codes are identified in the text as [XX]											

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): 1 Event Date: 01/29/93 Event Time: 0505 Hours
 Reactor Mode(s): 1 Mode(s) Name: Run Power Level(s): 20%

B. DESCRIPTION OF EVENT

This writing describes two separate problems which occurred during the associated RCIC System inoperability period.

On January 29, 1993, at 0505 hours, while Unit 1 was in Operational Condition 1 (Run), at 20% power, the Reactor Core Isolation Cooling (RCIC) [BN] Turbine Barometric Condenser Condensate Pump, 1E51-C004, failed during the performance of LaSalle Special Procedure, LLP-92-194, "Reactor Core Isolation Cooling System Cold Quick Start in Conditions 1, 2, and 3 When RCIC is Aligned To The Suppression Pool".

While the system was in operation a High Barometric Condenser Tank Level Alarm was received at control panel 1H13-P601. Upon inspection, at the turbine, it was determined that the Condensate Pump was not in operation, although the Control Switch indicated that the pump was operating. The system was shutdown and RCIC was declared inoperable (Degraded Equipment Log DEL #33-92-1-197). In accordance with Technical Specification 3.7.3, a fourteen day timeclock was initiated.

The Nash Gland Exhauster System consists of a Barometric Condenser, Receiving Tank, Condensate Pump, and Vacuum Pump. The steam condensate and non-condensable gases are drawn into the condenser and condensed from a condensate spray piped to the condenser from the RCIC System Discharge Line.

The non-condensable gases are then pumped to the Suppression Pool through the Vacuum Pump, and the Condensate Pump 1E51-C004 returns the condensate back to the RCIC Suction Line while the system is running or to the Reactor Building Equipment Drains while the RCIC System is not in operation.

On January 30, 1993 at 1905 hours, following successful repairs to the RCIC Barometric Condenser Condensate Pump, the RCIC System was started per LaSalle Operating Surveillance, LOS-RI-Q5, "Reactor Core Isolation Cooling System Pump Inoperability, Valve Inservice Tests in Conditions 1, 2, and 3, and Cold Quick Start".

Approximately twenty five minutes into the surveillance, the RCIC System experienced a sudden decrease in discharge flow, discharge pressure, and turbine speed. The Nuclear Station Operator immediately tripped the system, closing the Turbine Trip and Throttle Valve. The RCIC System was still inoperable due to the inoperable Condensate Pump as post maintenance testing was in progress. The additional inoperable condition was entered into the Degraded Equipment Log 33-92-1-202.

This event is reported to the Nuclear Regulatory Commission as a Licensee Event Report in accordance with 10CFR50.73(a)(2)(v) due to RCIC being declared inoperable (loss of a safety system function).

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

C. APPARENT CAUSE OF EVENT

Barometric Condenser Condensate Pump Motor Failure:

The cause for the high Barometric Condenser Level Alarm was due to a high level in the Receiving Tank and the Condensate Pump Motor not operating due to no commutation.

The Condensate Pump was removed from service and inspected. During the inspection, the pump motor was found with the South Commutator Brush burnt on the contact surface and physically shorter than the North Commutator Brush. The commutator was covered with a heavy carbon film build-up from the Commutator Brushes.

System Operational Analysis Department performed an inspection of the commutator bars in July 1989. Upon close examination it was discovered that at some earlier time the commutator insulation was undercut with too wide of a tool. This resulted in the width of about ten percent of the total number of commutator bars being reduced.

At that time, the Electrical Maintenance Department reseated the commutator brushes and the Condensate Pump was returned to service with regular inspections being performed. The pump remained in service until its failure occurred on January 29, 1993.

The uneven brush wear, the overheating that caused the burnt brush contact surface, and the carbon-graphite film build-up that was found on the commutator developed due to a failure of the south Commutator brush to slide in it's carrier. This condition is usually caused by inadequate spring force in the brush assembly, and is a large part of the reason for the current high surveillance frequency for LES-DC-104 (i.e. to detect this condition).

System Flow Reduction During Operation:

The cause for the sudden decrease in turbine speed and discharge flow that occurred on January 30, 1993, following repairs on the Condensate Pump was attributed to loose connections on the RCIC Ramp Generator Signal Converter. Following system shutdown, the voltage output from the Flow Controller in the Control Room to the Ramp Generator was checked. The voltage output from the Flow Controller at the Remote Shutdown panel to the Ramp Generator was also checked for proper voltage level.

There was no problem found with the voltage output from the Flow Controllers in the Control Room and Remote Shutdown Panel to the Ramp Generator. The potential causes were determined to be either from a loose Governor Valve Plug or loss of control signal. The successful restart and control of the turbine verified that the valve plug had not separated from the stem.

Voltmeters were connected to the output from the EG-R Actuator to the Electronic Control Box, the output from the Flow Controller to the ramp generator, and at the test points of the ramp generator.

The system (restart) run continued past the twenty five minute mark and no problems were encountered. After approximately seventy five minutes, the RCIC System was shutdown with no problems observed.

A second system startup was performed about two hours later. During this run the Turbine Governor control connections at the Ramp Generator Signal Converter and Electronic Control Box were checked in an effort to determine if any of the connections were loose enough to change the operating parameters of the system.

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

C. APPARENT CAUSE OF EVENT CONTINUED

One loose connection was found at terminal 5 of the Ramp Generator. A radio was brought down to the turbine and the radio controls were keyed near the restricted areas around the turbine to determine if RFI could be the cause. There was no change in the turbine operating parameters.

The control connections at the Remote Shutdown Panel were also tested for loose connections that could interrupt demand signals. No loose connections were found. The turbine run continued again for approximately sixty five minutes. After the turbine was shutdown, the Instrument Maintenance Department was notified to securely fasten the loose connection at terminal 5 of the Ramp Generator and also examine all the cable connections thoroughly. In addition to the loose lead at terminal 5, while examining the cable connections at the Ramp Generator, terminal 7 popped out of its position as soon as the screwdriver was placed at the terminal screw. The screw was replaced and the cable at terminal 7 of the Ramp Generator from the Electronic Control Box was fastened securely.

The negative output voltage from the Flow Controller is connected to terminal 5 at the Ramp Generator. The voltage input to the Ramp Generator from the Flow Controller signals the turbine to increase or decrease turbine speed, to provide the required flow. The cable connected to terminal 7 is a load signal from the Control Box to the Ramp Generator. This signal is used as a summing point between the Ramp Generator Signal Converter (RGSC) gain and the null voltage while the system is operating at rated speed (4200-4500 rpm).

At rated speed, the voltage measured at the actuator connection to the Control Box is considered the null voltage. On the RCIC System, the null voltage is negative one volt. A change in the cables for either the null voltage at rated turbine speed or the Flow Controller would change the operating parameters of the RCIC System.

The loose connections at the ramp generator terminal appear to have resulted from previous troubleshooting and recalibrations. These activities had resulted from an inoperable Ramp Generator that was discovered during system startup from the refueling outage. The lifting and landing of leads at the RGSC during troubleshooting, replacement, and calibration did not leave the connections securely attached.

D. SAFETY ANALYSIS OF EVENT

The Nash Gland Exhauster System is in place to prevent radioactive steam leakage to the reactor building atmosphere. The Turbine Gland Seals, Turbine Trip Valve, Governor Valve Stem Leak-off Lines and exhaust Drain Pot are piped to the Exhauster System.

While the RCIC System is in operation, an inoperable Condensate Pump would possibly allow some steam leakage to the atmosphere and some condensate to return to the turbine through the leak-off lines. The condensate that returns back to the turbine gets included in the steam discharge. The remainder of the condensate would eventually be returned to Reactor Building Equipment Drains through the Vacuum Tank Relief Valve. The relief valve is set to open at five psig.

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D. SAFETY ANALYSIS OF EVENT CONTINUED

The Condensate Pump failure did not create any adverse consequences to the plant. The RCIC System was shutdown for equipment reliability concerns, although operation could have continued if necessary for Reactor Pressure Vessel inventory control. Due to the precautionary shutdown of RCIC, the 14 day action requirement of Technical Specification 3.7.3 was entered.

RCIC System was already inoperable from the failure of the Barometric Condenser Condensate Pump so the sudden decrease of discharge flow and turbine speed, on January 30, 1993, while LOS-RI-Q5 was being performed, did not have an affect on the total RCIC unavailability time (it extended RCIC inoperability by approximately 18 hours). Because the corrective actions were completed within the 14 day timeclock and because the High Pressure Core Spray (HPCS) System was operable, the safety impact of this event was minimal.

At the time of this incident the HPCS System and the other Emergency Core Cooling Systems (ECCS) were fully operable.

E. CORRECTIVE ACTIONS

Barometric Condenser Condensate Pump Failure:

The RCIC System was declared inoperable on January 29, 1993 at 0505 hours. Work Request # L20633 was written to investigate and repair the problem. The Electrical Maintenance Department performed LaSalle Electrical Surveillance, LES-DC-104, "Inspection of DC Motors and Brushes" and the as found condition of the brushes and the commutator were documented.

The commutator was cleaned, the brushes were replaced, and the pump and motor were tested satisfactorily. A review of the Condensate Pump history was performed. This review led to the decision that an interim replacement of the condensate brushes, followed by motor replacement during a subsequent scheduled outage was appropriate.

Work Requests L21022 and L21343 were initiated. The old pump motor was removed and replaced with the new motor on February 15, 1993. Current traces and vibration readings were obtained for the new motor and found acceptable.

The actions and findings related to the condensate pump motor are being incorporated into the Unit 1 RCIC Task Force Report, which includes a complete review of RCIC System recurring problems. This report is being tracked by AIR #373-400-92-E.505-0102.

On January 30, 1993, following the low flow, low speed conditions, the RCIC System was tripped and entered in The Degraded Equipment Log as inoperable. A fourteen day time clock was already in effect due to the inoperable Condensate Pump.

Work Request L20419 was used to troubleshoot and correct the sudden flow decrease problem. The voltage levels at all the cable terminations between the Flow Controller at the Control Room, the Flow Controller at the Remote Shutdown Panel, and the Ramp Generator at the RCIC Turbine were tested to ensure correct voltage output level.

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E. CORRECTIVE ACTIONS CONTINUED

The two cables at the Ramp Generator Terminal were re-fastened properly. The remaining RCIC Signal conductors at the Ramp Generator Terminal, Electronic Control Box Terminal, Control Room panels, and Auxiliary Electric Room panels were verified to be fastened securely.

Action Item Record (AIR) 373-180-93-01001 will be generated to the Instrument Maintenance Department to perform a review of the work processes used during calibration and testing activities, with respect to verification of the as-left condition of system connections.

The RCIC System was started on January 31, 1993, per LaSalle Operating Procedure, LOP-RI-06, "Controlled Start of the Reactor Core Isolation Cooling System in the CST Test Mode", to verify proper operation at the Turbine Controls. LaSalle Operating Surveillance, LOS-RI-Q3, "Reactor Core Isolation Cooling System Pump Operability, Valve In Service Tests in Conditions 1, 2, & 3", was later performed successfully and the RCIC System was declared operable on February 1, 1993, at 0330 hours.

F. PREVIOUS EVENTS

None.

G. COMPONENT FAILURE DATA

MANUFACTURER	NOMENCLATURE	MODEL NUMBER	MFG PART NUMBER
General Electric	Direct Current Motor	5CD14C10A900000	N/A

EVENT SUMMARY AND CAUSE CODES

 DVR Number
 01-1-93-010

☐ Lost generation
☐ Cost > \$25,000
☐ Hazard or Spill
☐ Personnel injury
☐ Component type

☐ Reactor trip
☐ ESF actuation
☐ NRC reportable
☒ LER
☐ PSR
 Failure mode

☐ NRC violation, level
☐ GSEP event, class
☐ Tech Spec LCO
☐ Potential or future LCO
☐ SALP functional area

	type		Failure mode		Department	
X	P	E	E	I	E	M
X	I	E	E	G	E	M
X						

Licensed? L or blank				Type		Detail code	
Level							
Department							
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				