

# CATEGORY 1

## REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9607180141      DOC.DATE: 96/07/12      NOTARIZED: NO      DOCKET #  
 FACIL: 56-244 Robert Emmet Ginna Nuclear Plant, Unit 1, Rochester G 05000244  
 AUTH.NAME      AUTHOR AFFILIATION  
 MARTIN, J.T.      Rochester Gas & Electric Corp.  
 MECREDY, R.C.      Rochester Gas & Electric Corp.  
 RECIP.NAME      RECIPIENT AFFILIATION

VISSING, G.S.

SUBJECT: LER 96-007-00: on 960612, CR operators identified control rods misaligned & not moving in proper sequence. Caused by faulty firing circuit card in rod control sys. Faulty firing circuit card in LBD power cabinet replaced. W/960712 ltr.

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NOTES: License Exp date in accordance with 10CFR2,2.109(9/19/72).      05000244

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ROBERT C. MECREDY  
Vice President  
Nuclear Operations

July 12, 1996

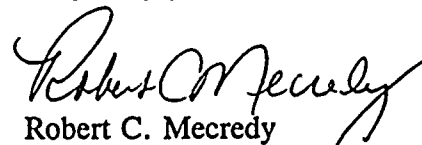
U.S. Nuclear Regulatory Commission  
Document Control Desk  
Attn: Guy S. Vissing  
Project Directorate I-1  
Washington, D.C. 20555

Subject: LER 96-007, Control Rods Misaligned, Due to Rod Sequencing Problem, Results  
in Manual Reactor Trip  
R.E. Ginna Nuclear Power Plant  
Docket No. 50-244

In accordance with 10 CFR 50.73, Licensee Event Report System, item (a) (2) (iv), which requires a report of, "Any event or condition that resulted in a manual or automatic actuation of any engineered safety feature (ESF), including the reactor protection system (RPS)", the attached Licensee Event Report LER 96-007 is hereby submitted.

This event has in no way affected the public's health and safety.

Very truly yours,



Robert C. Mecredy

xc: U.S. Nuclear Regulatory Commission  
Mr. Guy S. Vissing (Mail Stop 14C7)  
PWR Project Directorate I-1  
Washington, D.C. 20555

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U.S. NRC Ginna Senior Resident Inspector

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<b>NRC FORM 366</b> (4-95)		<b>U.S. NUCLEAR REGULATORY COMMISSION</b>		<b>APPROVED BY OMB NO. 3150-0104</b> <b>EXPIRES 04/30/98</b> <small>ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.</small>																			
<b>LICENSEE EVENT REPORT (LER)</b> (See reverse for required number of digits/characters for each block)																							
<b>FACILITY NAME (1)</b> R.E. Ginna Nuclear Power Plant				<b>DOCKET NUMBER (2)</b> 05000244	<b>PAGE (3)</b> 1 OF 6																		
<b>TITLE (4)</b> Control Rods Misaligned, Due to Rod Sequencing Problem, Results in Manual Reactor Trip																							
<b>EVENT DATE (5)</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>MONTH</th> <th>DAY</th> <th>YEAR</th> </tr> <tr> <td>06</td> <td>12</td> <td>96</td> </tr> </table>		MONTH	DAY	YEAR	06	12	96	<b>LER NUMBER (6)</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>YEAR</th> <th>SEQUENTIAL NUMBER</th> <th>REVISION NUMBER</th> </tr> <tr> <td>96</td> <td>-- 007</td> <td>-- 00</td> </tr> </table>		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	96	-- 007	-- 00	<b>REPORT DATE (7)</b> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th>MONTH</th> <th>DAY</th> <th>YEAR</th> </tr> <tr> <td>07</td> <td>12</td> <td>96</td> </tr> </table>		MONTH	DAY	YEAR	07	12	96
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<b>THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more) (11)</b>																							
<b>OPERATING MODE (9)</b> 2		20.2201(b)		20.2203(a)(2)(v)																			
<b>POWER LEVEL (10)</b> 000		20.2203(a)(1)		20.2203(a)(3)(i)																			
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<b>LICENSEE CONTACT FOR THIS LER (12)</b>																							
<b>NAME</b> John T. St. Martin - Technical Assistant				<b>TELEPHONE NUMBER (Include Area Code)</b> (716) 771-3641																			
<b>COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)</b>																							
<b>CAUSE</b>	<b>SYSTEM</b>	<b>COMPONENT</b>	<b>MANUFACTURER</b>	<b>REPORTABLE TO NPROS</b>																			
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<b>SUPPLEMENTAL REPORT EXPECTED (14)</b>																							
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<b>ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines) (16)</b>																							
<p>On June 12, 1996, at approximately 1540 EST, with the plant in Mode 2 but not critical, a reactor startup was in progress. The reactor coolant system was being maintained at a temperature of 547 degrees F and a pressurizer pressure of 2235 PSIG. The Control Room operators identified that control rods were misaligned and were not moving in the proper sequence. The Shift Supervisor conservatively ordered a manual reactor trip. The Control Room operators performed the actions of procedures E-0 and ES-0.1. Following the reactor trip, all systems operated as designed, and the reactor was stabilized in Mode 3.</p> <p>The underlying cause of the misaligned control rods was a faulty firing circuit card in the Rod Control system.</p> <p>The cause of the reactor trip was manual operator action.</p> <p>This event is NUREG-1022 Cause Code (B).</p> <p>Corrective action to prevent recurrence is outlined in Section V.B.</p>																							

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
R.E. Ginna Nuclear Power Plant	05000244	96	-- 007 --	00	2 OF 6

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

## I. PRE-EVENT PLANT CONDITIONS:

On June 12, 1996, at approximately 1432 EDST, the plant was in Mode 2 but not critical. A reactor startup was in progress. The reactor coolant system (RCS) was being maintained at a temperature of approximately 547 degrees F and a pressurizer (PRZR) pressure of approximately 2235 PSIG. The reactor startup was interrupted by a concern with the auxiliary feedwater (AFW) system. At this time, the reactor was subcritical, Banks A and B were fully withdrawn, Bank C was at 140 steps, and Bank D was at 10 steps. By approximately 1509 EDST, the startup was resumed after resolution of the AFW concerns.

As soon as the control rods were pulled two more steps out (to 12 steps on Bank D), Main Control Board Annunciator C-5 (PPCS Rod Sequence or Rod Deviation) alarmed, caused by the position of two rods in Control Band "D" (rods C-7 and K-7) deviating from the bank position by 12 steps or more. The Control Room operators observed that rods C-7 and K-7 deviated from the rest of the bank (rods G-3 and G-11). Rods C-7 and K-7 had not transitioned off the bottom of the first Microprocessor Rod Position Indication (MRPI) transition. The Control Room operators immediately stopped all rod movement. The Control Room operators immediately entered Abnormal Operating Procedure AP-RCC.2 (RCC/RPI Malfunction) and performed the appropriate actions.

Rods C-7 and K-7 are in Bank D, Group 1, and are powered from the 1BD Power Cabinet. Instrument and Control (I&C) technicians inspected the 1BD Power Cabinet for any obvious faults or blown fuses. There were no "Rod Control Urgent" alarms or "MRPI Urgent Failure" alarms, and there was no local indication of Regulation Failure on the associated Failure Detection cards. After consulting with the I&C group and higher supervision, it was determined that, since the plant was estimated to be near criticality, rods would be manually inserted to shut down to Mode 3 in a controlled manner, rather than attempting to correct the rod control problem while in Mode 2.

The Control Room operators exited procedure O-1.2, and initiated rod insertion to shut down the reactor to Mode 3. After rods had been inserted sixteen (16) steps from the previous positions, Annunciator C-5 alarmed again. Bank C rods were at 126/125 steps, and two Bank B rods had already transitioned off the top of the reactor core by MRPI indications. (The Bank B rods should not have started to move until Bank C was at 100 steps). The C-5 Annunciator alarm was due to two rods in Bank B (E-7 and I-7) deviating from the bank position by 12 steps or more. The Control Room operators immediately stopped all rod movement and entered procedure AP-RCC.2 at approximately 1531 EDST.

## II. DESCRIPTION OF EVENT:

## A. DATES AND APPROXIMATE TIMES OF MAJOR OCCURRENCES:

- o June 12, 1996, 1540 EDST: Control Room operators manually trip the reactor, verify both reactor trip breakers open, and verify all control and shutdown rods are fully inserted. Event time and discovery time.
- o June 12, 1996, 1548 EDST: Plant is stabilized in Mode 3.



LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
R.E. Ginna Nuclear Power Plant	05000244	96	-- 007	-- 00	3 OF 6

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

## B. EVENT:

On June 12, 1996, due to problems with control rod sequencing, the Shift Supervisor had consulted with the I&C group and higher supervision. The I&C group advised that troubleshooting to identify and resolve the problem with rod sequencing could potentially be extensive. A conservative decision was made to manually trip the reactor and then proceed with troubleshooting. The Shift Supervisor ordered a manual reactor trip.

Therefore, at approximately 1540 EDST, the Control Room operators manually tripped the reactor and performed the immediate actions of Emergency Operating Procedure E-0 (Reactor Trip or Safety Injection). They transitioned to Emergency Operating Procedure ES-0.1 (Reactor Trip Response) when it was verified that both reactor trip breakers were open, all control and shutdown rods were fully inserted, and safety injection was not actuated or required. They transitioned to Normal Operating Procedure O-3 (Hot Shutdown with Xenon Present) at approximately 1548 EDST, and the plant was stabilized in Mode 3.

The I&C group performed troubleshooting of the Rod Control system and determined that there was a multiplexing error in the 1BD Power Cabinet. I&C observed that Bank B, Group 1 was being selected in the 1BD cabinet, and Bank D, Group 2 was being selected in the 2BD cabinet. Test points measured in the Rod Control Logic Cabinet indicated that the correct bank was being selected by the Bank Overlap circuit, but was not being properly selected by the 1BD Power Cabinet. The problem was isolated to the stationary "B" firing circuit card, which receives the multiplexing signal.

The faulty firing circuit card was replaced. After the completion of maintenance, the Control Room operators performed post-maintenance testing and then commenced a reactor startup. The reactor was taken critical at approximately 2148 EDST on June 12, 1996.

## C. INOPERABLE STRUCTURES, COMPONENTS, OR SYSTEMS THAT CONTRIBUTED TO THE EVENT:

None

## D. OTHER SYSTEMS OR SECONDARY FUNCTIONS AFFECTED:

None

## E. METHOD OF DISCOVERY:

The control rod misalignments caused Main Control Board Annunciator C-5 to alarm, alerting the Control Room operators to this condition. The reactor trip was manually initiated and was confirmed by plant response, alarms, and indications in the Control Room.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
R.E. Ginna Nuclear Power Plant	05000244	96	-- 007	-- 00	4 OF 6

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

## F. OPERATOR ACTION:

The Control Room operators promptly identified the control rod misalignment and performed the appropriate actions of procedure AP-RCC.2. The Shift Supervisor conservatively ordered a manual reactor trip when a second bank of rods became misaligned due to inserting out of sequence.

After the reactor trip, the Control Room operators performed the appropriate actions of procedures E-0 and ES-0.1. The plant was stabilized in Mode 3. Subsequently, the Control Room operators notified the NRC per 10CFR50.72 (b) (2) (ii), non-emergency four hour notification, at approximately 1811 EDST on June 12, 1996.

## G. SAFETY SYSTEM RESPONSES:

None

## III. CAUSE OF EVENT:

## A. IMMEDIATE CAUSE:

The immediate cause of the reactor trip was manual trip initiation, ordered by the Shift Supervisor as a conservative decision when two banks of control rods had moved out of sequence.

## B. INTERMEDIATE CAUSE:

The intermediate cause of the rod sequencing problem was a multiplexing error in the 1BD Rod Control cabinet. The correct bank was being selected by the Bank Overlap circuit, but was not being properly selected by the 1BD Power Cabinet.

## C. ROOT CAUSE:

The I&C group performed troubleshooting in the Logic Cabinet and 1BD Power Cabinet. Test points measured in the Logic Cabinet indicated that the correct bank was being selected by the Bank Overlap circuit, but was not being properly selected by the 1BD Power Cabinet. I&C determined that the stationary "B" firing circuit card, which receives the multiplexing signal from the Logic Cabinet, was faulty.

This event is NUREG-1022 Cause Code (B), "Design, Manufacturing, Construction / Installation". The problem with the Rod Control circuits does not meet the NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants", definition of a "Maintenance Preventable Functional Failure".

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
R.E. Ginna Nuclear Power Plant	05000244	96	-- 007	-- 00	5 OF 6

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

## IV. ANALYSIS OF EVENT:

This event is reportable in accordance with 10 CFR 50.73, Licensee Event Report System, item (a) (2) (iv), which requires a report of, "Any event or condition that resulted in a manual or automatic actuation of any engineered safety feature (ESF), including the reactor protection system (RPS)". The manual reactor trip is an actuation of the RPS.

An assessment was performed considering both the safety consequences and implications of this event with the following results and conclusions:

There were no operational or safety consequences or implications attributed to control rod misalignments and subsequent manual reactor trip because:

- The improper sequencing and misalignment of the control rods with the reactor subcritical is bounded by the safety analysis which assumes a minimum misalignment with respect to power distribution and shutdown margin (SDM) of 25 steps and total misalignment (i.e., stuck rod) for the control rod misalignment accident. Each of these cases is evaluated for critical conditions only, since SDM is maintained through the use of chemical means in place of the control rods when subcritical. Since the reactor was subcritical, rods were not misaligned by 25 steps, and the SDM requirements of the Ginna Station Improved Technical Specifications (ITS), Limiting Condition for Operation (LCO) 3.1.1 were still met, there are no safety implications.
- The two reactor trip breakers opened as required.
- All control and shutdown rods fully inserted as designed.
- The plant was stabilized in Mode 3.

Based on the above, it can be concluded that the public's health and safety was assured at all times.

## V. CORRECTIVE ACTION:

## A. ACTION TAKEN TO RETURN AFFECTED SYSTEMS TO PRE-EVENT NORMAL STATUS:

- The faulty firing circuit card in the 1BD power cabinet was replaced.
- The multiplexing signal was tested for control Bank B and control Bank D in Bank Individual. The proper local indications of group selection was also verified.
- Surveillance Test Procedure PT-1 (Rod Control System) was performed to verify proper rod movement and sequencing.



LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
R.E. Ginna Nuclear Power Plant	05000244	96	-- 007	-- 00	6 OF 6

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

## B. ACTION TAKEN OR PLANNED TO PREVENT RECURRENCE:

- The faulty firing circuit card will be analyzed to determine the failure mode.

## VI. ADDITIONAL INFORMATION:

## A. FAILED COMPONENTS:

The faulty firing circuit card is a new version of the Westinghouse firing circuit card, part number 1C31021G01. (This part number replaced the old Westinghouse design for this card, part number 6050D12601. The card was redesigned due to failures attributed to an elevated operating temperature in the card.) The new version is designed to operate at lower temperatures, and was in service at Ginna Station for two years prior to failure.

## B. PREVIOUS LERs ON SIMILAR EVENTS:

A similar LER event historical search was conducted with the following results:

- LER 85-017 was a similar LER with a similar root cause, when rods C-7 and K-7 did not move with Bank D and rods I-7 and E-7 in Bank B did move, due to a faulty firing circuit card; however, the faulty card was of the old Westinghouse design.

## C. SPECIAL COMMENTS:

There have been other failures of this firing circuit card (of the old Westinghouse design) at Ginna Station in the past that did not result in a LER. This is the first failure of the new design at Ginna Station.

