

# CATEGORY 10

## REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9906080307    DOC.DATE: 99/06/02    NOTARIZED: NO    DOCKET #  
 FACIL:50-244 Robert Emmet Ginna Nuclear Plant, Unit 1, Rochester G 05000244  
 AUTH.NAME    AUTHOR AFFILIATION  
 ST MARTIN,J.T.    Rochester Gas & Electric Corp.  
 MECREDY,R.C.    Rochester Gas & Electric Corp.  
 RECIP.NAME    RECIPIENT AFFILIATION

VISSING,G.S.

SUBJECT: LER 99-009-00:on 990503,instrumentation declared inoperable  
 in multiple channels resulted in condition prohibited by TS.  
 Caused by unanticipated high frequency AC voltage ripple.  
 Entered TS LCO 3.0.3.With 990602 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. MECREDDY  
Vice President  
Nuclear Operations

June 2, 1999

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

Subject: LER 1999-009, Instrumentation Declared Inoperable in  
Multiple Channels Results in Condition Prohibited by  
Technical Specifications  
R.E. Ginna Nuclear Power Plant  
Docket No. 50-244

Dear Mr. Vissing:

The attached Licensee Event Report LER 1999-009 is submitted in  
accordance with 10 CFR 50.73, Licensee Event Report System, item  
(a) (2) (i) (B), "Any operation or condition prohibited by the  
plant's Technical Specifications".

Very truly yours,

Robert C. Mecreddy

xc: Mr. Guy S. Vissing (Mail Stop 8C2)  
Project Directorate I-1  
Division of Reactor Projects - I/II  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Regional Administrator, Region I  
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U.S. NRC Ginna Senior Resident Inspector

IE221

9906080307 990602  
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## LICENSEE EVENT REPORT (LER)

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

FACILITY NAME (1)

R. E. Ginna Nuclear Power Plant

DOCKET NUMBER (2)

05000244

PAGE (3)

1 OF 7

TITLE (4)

Instrumentation Declared Inoperable in Multiple Channels Results in Condition Prohibited by Technical Specifications

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
05	03	1999	1999	009	00	06	02	1999	FACILITY NAME	DOCKET NUMBER
										05000
										05000
OPERATING MODE (9)		1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)							
POWER LEVEL (10)		090	20.2201(b)			20.2203(a)(2)(v)		X	50.73(a)(2)(i)(B)	50.73(a)(2)(viii)
			20.2203(a)(1)			20.2203(a)(3)(i)			50.73(a)(2)(ii)	50.73(a)(2)(x)
			20.2203(a)(2)(i)			20.2203(a)(3)(ii)			50.73(a)(2)(iii)	73.71
			20.2203(a)(2)(ii)			20.2203(a)(4)			50.73(a)(2)(iv)	OTHER
			20.2203(a)(2)(iii)			50.36(c)(1)			50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A
			20.2203(a)(2)(iv)			50.36(c)(2)			50.73(a)(2)(vii)	

## LICENSEE CONTACT FOR THIS LER (12)

NAME

John T. St. Martin - Technical Assistant

TELEPHONE NUMBER (Include Area Code)

(716) 771-3641

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

## SUPPLEMENTAL REPORT EXPECTED (14)

YES

(If yes, complete EXPECTED SUBMISSION DATE).

NO

X

EXPECTED  
SUBMISSION  
DATE (15)

MONTH

DAY

YEAR

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

On May 3, 1999, the plant was in Mode 1 at approximately 90% steady state reactor power. It had previously been determined that Overtemperature Delta T and Overpower Delta T bistable trip setpoints were potentially non-conservative on three out of four reactor protection system channels, and an evaluation was in progress. At approximately 2330 EDST, instrumentation for these three channels was declared inoperable.

Immediate corrective action was to enter Technical Specification Limiting Condition for Operation 3.0.3, and take actions to restore the channels to operable status. Following replacement of the affected bistables with bistables of a different design, the bistable trip setpoints were recalibrated and three of four channels were declared operable. The plant exited Limiting Condition for Operation 3.0.3.

The underlying cause of the event was an unanticipated high frequency AC voltage ripple on the Delta T signals that adversely affected the trip setpoints for the bistables.

Corrective action to prevent recurrence is outlined in Section V.B.



LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
R.E. Ginna Nuclear Power Plant	05000244	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 7
		1999	-- 009	-- 00	

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

## I. PRE-EVENT PLANT CONDITIONS:

Beginning in 1996, Nuclear Engineering Services (NES) developed a Plant Change Request (PCR) to redesign input signal processing modules for the Reactor Protection System (RPS). The change (PCR 97-026) replaced resistance temperature detector (RTD) input signaling modules for reactor coolant system (RCS) average temperature (Tavg) and RCS delta temperature (Delta T). It was desired that this change be implemented in phases, to assure proper performance of the replacement modules.

In the 1997 refueling outage, Instrument and Control (I&C) technicians performed PCR 97-026, only for RPS channel 2. I&C installed RTD input signal processing modules, resistance-to-current (R/I) modules, time domain (math) modules, and test points. The new time domain (math) modules function to condition the RCS temperature inputs for the Tavg and Delta T signals and to provide the required lag time for the temperature signals. The new modules are manufactured by NUS Instruments, and replaced the original modules manufactured by Foxboro. Note that this PCR did not replace bistables, and Foxboro bistables remained in the system. These new components were installed and tested, and performed acceptably in service during Cycle 27.

Based on acceptable results for the NUS components installed in channel 2 during Cycle 27, the same changes were made in the other three RPS channels (channels 1, 3, and 4) during the 1999 refueling outage. I&C technicians replaced and tested similar components in RPS channels 1, 3 and 4 under PCR 97-026, Revision 2 during the 1999 outage.

Following the 1999 outage, routine surveillance of RPS channel 1 was planned for May 3, 1999, per procedure CPI-TRIP-TEST-5.10, with the plant at full power. In addition, calibration of channel 1 nuclear instrumentation was to be performed, per procedure CPI-AXIAL-N41. Channel 1 of RPS was declared inoperable at approximately 0820 EDST on May 3, 1999, to perform these calibrations and surveillances. At approximately 0930 EDST, I&C technicians found that the channel 1 Overtemperature Delta T (OT DT) bistable trip setpoint was significantly out of tolerance.

During additional troubleshooting, I&C technicians discovered that an unanticipated high frequency AC voltage ripple was occurring in NUS components recently installed in RPS channel 1, and was superimposed on the normal DC voltage output from the Delta T math module. Normal output range from the Delta T math module is 0 to 8 VDC, and a high frequency (approximately 500 kiloHertz (kHz)) 600 millivolts (mV) AC ripple was observed superimposed on this DC output. NES personnel concluded that the unanticipated AC ripple was adversely affecting the Overtemperature Delta T (OT DT) and Overpower Delta T (OP DT) bistable trip setpoints. The bistable trip setpoints were found to be non-conservative and non-repeatable.

After further troubleshooting and data collection during the day of May 3, a high frequency AC voltage ripple of similar magnitude was discovered on RPS channels 3 and 4. At approximately 1840 EDST on May 3, 1999, the plant manager directed that reactor power be reduced to 90% as a conservative measure while more detailed evaluations were in progress.

LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
R.E. Ginna Nuclear Power Plant	05000244	1999	-- 009	-- 00	3 OF 7

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

The Plant Operations Review Committee (PORC) was convened at approximately 1900 EDST to review this situation. PORC concurred that reducing power to 90% was a prudent measure. Channel 2 bistables, in service for more than 18 months, were not affected by this condition. Channel 2 was proven fully operable and channel 1 was currently in the tripped mode. Thus, continued plant operation was permissible, while bistable operability was assessed by NES personnel. Preliminary calculations were subsequently performed by NES staff. These calculations indicated that RPS channel 1 bistable trip setpoints were within design limits. The margin for OT DT and OP DT were low, but the bistables were considered operable.

## II. DESCRIPTION OF EVENT:

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

- o May 3, 1999, 0820 EDST: RPS channel 1 is removed from service and declared inoperable to perform troubleshooting ((per CPI-TRIP-TEST-5.10)).
- o May 3, 1999, dayshift: AC ripple is discovered in RPS channel 1. Later, AC ripple is discovered in RPS channels 3 and 4.
- o May 3, 1999, 2330 EDST: Event Date and Time and Discovery Date and Time.
- o May 3, 1999, 2347 EDST: Plant shutdown initiated.
- o May 4, 1999, 0136 EDST: RPS channel 1 is declared operable.
- o May 4, 1999, 0428 EDST: RPS channel 3 is declared operable.
- o May 4, 1999, 0428 EDST: ITS LCO 3.0.3 is exited. Plant shutdown is stopped at 21% power.
- o May 4, 1999, 2121 EDST: RPS channel 4 is declared operable.

## B. EVENT:

On May 3, 1999, the plant was in Mode 1 at approximately 90% steady state reactor power after the power decrease from full power, which was started at approximately 1840 EDST and completed at approximately 2000 EDST. NES personnel completed the calculations, which now indicated that RPS channel 1 bistables were not operable. The Shift Supervisor and plant management were immediately notified. At approximately 2330 EDST, based on the revised calculational data, it was determined that three affected channels of RPS (channels 1, 3 and 4) be declared inoperable.



LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
R.E. Ginna Nuclear Power Plant	05000244	1999	-- 009	-- 00	4 OF 7

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

The Shift Supervisor declared three of four channels inoperable based on ITS Table 3.3.1-1, Functions 5 and 6. There is no ITS LCO Required Action that meets this condition; therefore, immediate entry into ITS LCO 3.0.3 is required. The Shift Supervisor directed entry into ITS LCO 3.0.3 at this time. ITS LCO 3.0.3 requires that the plant be in Mode 3 within 6 hours, and plant shutdown was initiated at approximately 2347 EDST.

I&C technicians performed replacement of the affected bistables for RPS channel 1. They completed replacement and calibration at approximately 0136 EDST on May 4, 1999. Following channel 1 being declared operable, I&C proceeded to replace the affected channel 3 bistable. They completed replacement and calibration at approximately 0428 EDST. Following channel 3 being declared operable, there were three of four channels operable based on ITS Table 3.3.1-1, Functions 5 and 6. This is a condition covered by ITS LCO Required Actions; therefore, ITS LCO 3.0.3 was exited at this time. The plant shutdown was stopped at approximately 0428 EDST, with reactor power at approximately 21%. I&C technicians continued with bistable replacement in RPS channel 4. At approximately 2121 EDST on May 4, they completed replacement and calibration, and channel 4 was declared operable.

## 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 initial concerns were identified during troubleshooting of the Delta T math module for RPS channel 1. During additional troubleshooting, it was found that this condition also affected bistables in RPS channels 3 and 4. Due to the extent of uncertainty in the bistable trip setpoints for channels 3 and 4, the bistables were declared inoperable.

## F. OPERATOR ACTION:

Reactor power was reduced from full power to 90% between 1840 and 2000 EDST, as directed by the plant manager as a conservative measure to provide a margin while more detailed evaluations were in progress. When it was established that the bistables in three RPS channels were inoperable, the Shift Supervisor declared these channels inoperable. Since there is no ITS LCO Required Action that meets this condition, immediate entry into ITS LCO 3.0.3 is required. The Shift Supervisor directed entry into ITS LCO 3.0.3. A reactor shutdown was initiated.



LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
R.E. Ginna Nuclear Power Plant	05000244	1999	-- 009	-- 00	5 OF 7

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

The Shift Supervisor notified the NRC per 10 CFR 50.72 (b) (1) (i) (A), non-emergency one hour notification, at approximately 0009 EDST on May 4, 1999.

## G. SAFETY SYSTEM RESPONSES:

None

## III. CAUSE OF EVENT:

## A. IMMEDIATE CAUSE:

The immediate cause of the condition prohibited by Technical Specifications was entering ITS Table 3.3.1-1, Functions 5 and 6. There is no ITS LCO Required Action that meets this condition; therefore, immediate entry into ITS LCO 3.0.3 is required.

## B. INTERMEDIATE CAUSE:

The intermediate cause of entering ITS Table 3.3.1-1 was potentially non-conservative bistable trip setpoints for Overtemperature Delta T (OT DT) and Overpower Delta T (OP DT).

## C. ROOT CAUSE:

The underlying cause for the non-conservative trip setpoints was the effect of high frequency AC ripple voltage superimposed on the Delta T signals. The bistables were adversely affected by the high frequency AC ripple.

The AC ripple voltage was caused by component part substitution in the surge suppression portion of the circuit when the modules used in the 1999 modification were manufactured by the NUS Instruments. This substitution caused the AC ripple to occur. NUS was contacted to determine the process by which the design of the surge suppression portion of the circuit was altered from 1997 to 1999. NUS replied that their list of acceptable part substitutions included an incorrectly sized suppression component. This component was installed in the 1999 model; however, a correctly sized component was installed in the 1997 model. The components manufactured for and installed in channel 2 in 1997 are not susceptible to causing this AC ripple.



LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
R.E. Ginna Nuclear Power Plant	05000244	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	6 OF 7
		1999	-- 009	-- 00	

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) (i) (B), "Any operation or condition prohibited by the plant's Technical Specifications". The entry into ITS LCO 3.0.3 as a result of declaring more than one Function in ITS Table 3.3.1-1 inoperable is considered to be a condition prohibited by Technical Specifications.

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 attributed to three RPS channels for OT DT and OP DT being inoperable. A more detailed post-event review was performed. It has subsequently been determined that only one trip function (RPS channel 3 OP DT) was actually inoperable. This determination is based on the as-found data and a more rigorous analysis of the associated instrument uncertainties. All four OT DT channels were found to be within accident analysis assumptions, after accounting for the as-found margin to trip setpoint and incorporating the appropriate instrument uncertainties. Hence, the only function that would not have actuated within the bounds of the Ginna Station accident analysis was one channel of OP DT. With three operable channels available and a 2 out of 4 logic to provide the required trip function, there is adequate assurance that the reactor protection system would have performed within its required envelope as assumed in the accident analysis.

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:

Following replacement of bistables and calibration of the bistables in RPS channels 1 and 3, three channels (channels 1 and 3 and previously unaffected channel 2) were declared operable.

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

- o NUS indicated that they will be updating the parts list to remove the incorrectly sized component.
- o NES personnel designed a modification to the math modules to eliminate the effects of AC ripple on the OP DT and OT DT bistable trip setpoints. This modification has been implemented.



**LICENSEE EVENT REPORT (LER)**  
**TEXT CONTINUATION**

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
R.E. Ginna Nuclear Power Plant	05000244	YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	7 OF 7
		1999	-- 003	-- 00	

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- o This event is being reviewed for any potential lessons to be learned and applied to the appropriate parts of the Ginna modification process: design, procurement, installation, testing.
- o The industry will be notified of this event via an entry in the Nuclear NETWORK system.

**VI. ADDITIONAL INFORMATION:**

**A. FAILED COMPONENTS:**

None

**B. PREVIOUS LERs ON SIMILAR EVENTS:**

A similar LER event historical search was conducted with the following results: No documentation of similar LER events with the same root cause at Ginna Nuclear Power Plant could be identified.

**C. SPECIAL COMMENTS:**

None