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ACCESSION NBR:9510030079 DOC.DATE: 95/09/25 NOTARIZED: NO DOCKET #
FACIL:50-244 Robert Emmet Ginna Nuclear Plant, Unit 1, Rochester G 05000244
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RECIP.NAME RECIPIENT AFFILIATION

JOHNSON,A.R. Project Directorate I-1 (PD1-1) (Post 941001)

SUBJECT: LER 95-008-00:on 950825,secondary transient occurred.Caused by loss of "B" condenser circulating water pump that resulted in manual RT.Returned S/G levels to normal operating levels.W/950925 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 9
TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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

September 25, 1995

U.S. Nuclear Regulatory Commission
Document Control Desk
Attn: Allen R. Johnson
PWR Project Directorate I-1
Washington, D.C. 20555

Subject: LER 95-008, Secondary Transient, Caused by Loss of "B" Condenser Circulating Water Pump, 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 95-008 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. Allen R. Johnson (Mail Stop 14B2)
PWR Project Directorate I-1
Washington, D.C. 20555

U.S. Nuclear Regulatory Commission
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U.S. NRC Ginna Senior Resident Inspector

IE22
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NRC FORM 366 (4-95) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104
EXPIRES 04/30/98

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

LICENSEE EVENT REPORT (LER)

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

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TITLE (4)

Secondary Transient, Caused by Loss of "B" Condenser Circulating Water Pump, Results in Manual Reactor Trip

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
08	25	95	95	-- 008	-- 00	09	25	95	FACILITY NAME	DOCKET NUMBER

OPERATING MODE (9)	N
POWER LEVEL (10)	97

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)

	20.2201(b)		20.2203(a)(2)(v)		50.73(a)(2)(i)		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)	X	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	TELEPHONE NUMBER (Include Area Code)
John T. St. Martin - Technical Assistant	(716) 771-3641

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
B	KE	EXC	W120	N						

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

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

On August 25, 1995, at approximately 0541 EDST, with the plant at approximately 97% steady state reactor power, the "B" condenser circulating water pump tripped. This resulted in a reduction of turbine-condenser heat removal capability. Immediate action was to decrease turbine load to less than 50%, as per procedure AP-CW.1. However, due to a secondary system transient that followed the reduction in heat removal capability, at approximately 0543 EDST, 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 at hot shutdown conditions.

The underlying cause of the tripping of the "B" condenser circulating water pump was due to a sheared bolt that affected the motor exciter. The cause of the reactor trip was manual operator action.

This event is NUREG-1022 Cause Code (B).

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

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

I. PRE-EVENT PLANT CONDITIONS:

The plant was at approximately 97% steady state reactor power with no significant activities in progress. On August 25, 1995, at approximately 0541 EDST, the Control Room operators received Main Control Board Annunciator J-16 (Motor Oil CW-EH Emerg Oil Seal Oil BU), caused by the trip of the "B" condenser circulating water (CW) pump. The trip of the "B" CW pump was followed by closure of the discharge valve for the "B" CW pump. While the discharge valve was closing, there was "short-cycling" of the circulating water from the "A" CW pump back to the lake, rather than following the path to the main condensers. This resulted in a decrease in total CW flow and an imbalance in CW flow to the two main condensers, which caused a vacuum imbalance between the main condenser hotwells. (There was a loss of approximately 40% of the turbine-condenser heat removal capability due to the CW pump trip.) This resulted in condensate water being "pushed" from the "B" hotwell to the "A" hotwell.

The Control Room operators observed that the "B" CW pump had tripped, entered Abnormal Operating Procedure AP-CW.1 (Loss of a CW Pump), and performed the appropriate actions. A turbine load reduction was initiated, and, within two minutes, turbine load had been reduced to less than 50%. Reactor power was decreasing due to the load reduction, and was at approximately 67%.

II. DESCRIPTION OF EVENT:

A. DATES AND APPROXIMATE TIMES OF MAJOR OCCURRENCES:

- August 25, 1995, 0541 EDST: "B" condenser circulating water pump trips.
- August 25, 1995, 0543 EDST: Event date and time.
- August 25, 1995, 0543 EDST: Discovery date and time.
- August 25, 1995, 0543 EDST: Control Room operators manually trip the reactor, verify both reactor trip breakers open, and verify all control and shutdown rods inserted.
- August 25, 1995, 0546 EDST: Control Room operators manually stop both operating main feedwater pumps due to concerns for adequate suction pressure to the pumps.
- August 25, 1995, 0550 EDST: Control Room operators manually close both main steam isolation valves to limit a reactor coolant system cooldown.
- August 25, 1995, 0600 EDST: Plant stabilized at hot shutdown condition.

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B. EVENT:

On August 25, 1995, at approximately 0543 EDST, reactor power was at approximately 67% and still decreasing after a rapid turbine load reduction to less than 50% load. Due to the loss of the "B" condenser circulating water (CW) pump there was no cooling water flow in the "B" main condenser for a period of time. This resulted in an imbalance in condenser cooling in the hotwells as condenser vacuum decreased in the "B" condenser, leading to a vacuum imbalance between the "A" and "B" condensers. "B" hotwell level indication showed no level, and "A" hotwell level indication showed high hotwell level. In addition, as per design, condenser steam dump was in operation after the rapid turbine load reduction to decrease reactor coolant system (RCS) temperature to match the turbine load.

The combination of no cooling water to the "B" condenser, decreased hotwell level, and steam dump into the hotwell caused the temperature in the "B" hotwell to increase. (Higher seasonal lake temperatures contributed to the magnitude of the secondary transient.) Part of the condensate pump suction was from the hotter water in the "B" hotwell, causing cavitation in the condensate pumps and a decrease in condensate pump flow and discharge pressure. Low condensate pressure resulted in an automatic start of the standby condensate pump and automatic opening of the condensate bypass valve.

Main feedwater (MFW) pump net positive suction head (NPSH) and suction pressure decreased due to this transient. The Control Room operators received Main Control Board Annunciators H-1 (Feed Water Pump Lo Suct Press 185 PSI) and H-17 (Feed Pump Net Positive Suction Head) and responded appropriately to these alarms. The shift supervisor had concerns for degrading plant conditions, including protecting plant equipment from the effects of cavitation, the low suction pressure to the MFW pumps, and secondary plant vibrations that were evident in the Control Room. When conditions did not improve after a reasonable amount of time, he ordered a manual reactor trip (as a conservative decision) at approximately 0543 EDST. At the time of the reactor trip, levels in the "A" and "B steam generators (S/G) were at approximately 40% level and slowly decreasing, which is well above the trip setpoint of 17%.

The Control Room operators performed the immediate actions of Emergency Operating Procedure E-0 (Reactor Trip or Safety Injection) and 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 inserted, and safety injection was not actuated or required. During the performance of ES-0.1, the Control Room operators manually tripped both MFW pumps at approximately 0546 EDST. They also noted that an anticipated reactor coolant system (RCS) cooldown was occurring and manually closed both main steam isolation valves (MSIV) at approximately 0549 EDST.

Pressurizer (PRZR) level decreased below the setpoint for letdown isolation, automatically closing the letdown isolation valves. PRZR level was increased above the setpoint within seven (7) minutes, and letdown was manually reinstated by the Control Room operators.

The plant was subsequently stabilized in hot shutdown (at approximately 0600 EDST) using Plant Operating Procedures O-2.1 (Normal Shutdown to Hot Shutdown) and O-3 (Hot Shutdown with Xenon Present).

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

None

D. OTHER SYSTEMS OR SECONDARY FUNCTIONS AFFECTED:

None

E. METHOD OF DISCOVERY:

This event was immediately apparent due to Main Control Board Annunciator J-16 and Control Room operator observation that the "B" CW pump had tripped. The reactor trip was manually initiated and was confirmed by plant response, alarms and indications in the Control Room.

F. OPERATOR ACTION:

The Control Room operators promptly identified the loss of the "B" CW pump and performed the appropriate actions of AP-CW.1. The shift supervisor conservatively ordered a reactor trip when plant conditions continued to degrade. After the reactor trip, the Control Room operators performed the appropriate actions of procedures E-0 and ES-0.1.

The MFW pumps were manually tripped due to concerns for the low suction pressure that had existed. The MSIVs were manually closed approximately seven (7) minutes after the trip to limit further RCS cooldown. Appropriate actions were taken to restore levels in the "A" and "B" S/Gs and to increase PRZR level. When PRZR level was increased, letdown was manually restored to service. The plant was stabilized at hot shutdown.

Subsequently, the Control Room operators notified higher supervision and the NRC per 10CFR50.72 (b) (2) (ii), non-emergency four hour notification, at approximately 0923 EDST.

G. SAFETY SYSTEM RESPONSES:

All safeguards equipment functioned properly. Auxiliary feedwater (AFW) pumps started when S/G levels decreased below 17% after the reactor trip.

III. CAUSE OF EVENT:

A. IMMEDIATE CAUSE:

The immediate cause of the reactor trip was manual initiation by the Control Room operators.

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B. INTERMEDIATE CAUSE:

The intermediate cause of the degrading plant conditions was a trip of the "B" CW pump.

C. ROOT CAUSE:

The underlying cause of the trip of the "B" CW pump was the tripping of the power factor protective relay for the "B" CW pump motor. This relay was activated due to a decrease in the power factor for this motor, caused by broken subcomponents in the exciter circuitry. These subcomponents were broken after being impacted by a sheared bolt head. Therefore, the circuit breaker for the "B" CW pump tripped.

The underlying cause of the sheared bolt in the "B" CW pump exciter was determined to be a fracture caused by overtorquing of this bolt. This conclusion is supported by the oxidized appearance of the fracture faces of the failed bolt, suggesting that the fracture had existed for a period of time prior to impacting the subcomponents in the exciter circuitry.

This event is NUREG-1022 Cause Code (B), "Design, Manufacturing, Construction / Installation". The tripping of the "B" CW pump 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".

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, and the start of AFW pumps is an actuation of an ESF.

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 the trip of the "B" CW pump and subsequent manual reactor trip because:

- The two reactor trip breakers opened as required.
- All control and shutdown rods inserted as designed.
- The plant was stabilized at hot shutdown.

- The Ginna Updated Final Safety Analysis Report (UFSAR) transient, "Loss of Condenser Vacuum", can occur from failure of the circulating water system, as stated in Section 15.2.4 of the UFSAR. In the event of loss of condenser vacuum, the turbine will be tripped and, therefore, the event is bounded by the turbine trip event (UFSAR Section 15.2.2). This UFSAR transient was examined and compared to the plant response for the actual event. The plant behavior was found to be consistent with the assumptions detailed in the accident analysis. As described in Section 15.2.2.4, a loss of load with or without a direct or immediate reactor trip presents no hazard to the integrity of the RCS or the main steam system. The integrity of the core is maintained by operation of the reactor protection system prior to exceeding any thermal design limits.

Technical Specifications (TS) were reviewed with respect to the post trip review data. The following are the results of that review:

- Both S/G levels decreased following the reactor trip to below 0% indicated narrow range level. This is an expected transient. TS 4.3.5.5 states that in order to demonstrate that a reactor coolant loop is operable, the S/G water level shall be >/= 16%. Thus, both coolant loops were inoperable, even though both loops were still in operation and performing their intended function of decay heat removal. Both S/Gs were available as a heat sink, and sufficient AFW flow was maintained for adequate steam release from both S/Gs. TS 3.1.1.1(c) states, in part, that except for special tests, when the RCS temperature is at or above 350 degrees F with the reactor power less than or equal to 130 MWT (8.5%), at least one reactor coolant loop and its associated S/G and reactor coolant pump shall be in operation. Both loops were restored to operable status when S/G levels were restored to >/= 16% ("A" S/G level in less than eleven (11) minutes, and "B" S/G level in less than thirteen (13) minutes). No operation involving a reduction in boron concentration occurred during the time S/G levels were <16%.

Based on the above and the review of post trip data and past plant transients, it can be concluded that the plant operated as designed, that there were no unreviewed safety questions, and 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 S/G levels were returned to their normal operating levels and the S/Gs were restored to operable status by addition of auxiliary feedwater, subsequent to the reactor trip.

- PRZR level was increased to its normal operating level, and letdown flow was restored.

- The "B" CW pump motor was inspected, and the head of a 3/4 inch bolt was discovered sheared off inside the motor. These bolts are used to attach the "diode wheel" to the motor rotor. The sheared bolt head damaged some insulation on the stator windings and impacted two sub-components in the exciter circuitry. The stator winding damage was repaired, the affected subcomponents and bolt were replaced, and the exciter circuitry was cleaned and inspected.

- The remaining five bolts that attach the "diode wheel" to the B" CW pump motor rotor were ultrasonically inspected, and were found to be in satisfactory condition. No evidence of overtorquing or cracks were identified.

- The similar six bolts for the "A" CW pump motor were also ultrasonically inspected, with satisfactory results.

- The protective relays for the "B" CW pump motor were inspected and tested satisfactorily.

- The magnitude and duration of the backpressure transient in the "B" condenser were discussed with the turbine manufacturer (Westinghouse). Based on the short duration of the transient, the turbine manufacturer advised that no inspections of the low pressure (LP) turbine blades were recommended due to this transient.

- The condensate and MFW pumps were monitored (and vibration readings taken) during secondary plant return to service. No adverse results were identified.

B. ACTION TAKEN OR PLANNED TO PREVENT RECURRENCE:

- For the "A" and "B" CW pumps, the bolts that attach the diode wheel to the pump motor rotor will be replaced.

- This transient will be evaluated and changes made to procedure AP-CW.1, as appropriate.

- The existing instrumentation for protection of the LP turbine from loss of vacuum in either main condenser will be evaluated.

VI. ADDITIONAL INFORMATION:

A. FAILED COMPONENTS:

The "B" CW pump motor is a Westinghouse "Life Line" series motor, Model # 110P662H01, frame size HR-111-SPL, rated for 4000 volts and 1750 horsepower. The failed bolt that caused the broken components in the exciter circuitry of this motor is 3/4 inch by 2 1/4 inch medium carbon steel bolt, SAE J 429 Grade 5.

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B. PREVIOUS LERs ON SIMILAR EVENTS:

A similar LER event historical search was conducted with the following results: LER 85-019 was a similar event (loss of CW pump caused a plant transient, resulting in an automatic reactor trip) with a different root cause for the loss of the CW pump.

C. SPECIAL COMMENTS:

None