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December 5, 2001

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Operating Licenses DPR-74
Docket Nos. 50-316

Document Control Manager:

In accordance with the criteria established by 10 CFR 50.73 entitled Licensee Event Report System, the following report is being submitted:

LER 316/2001-004-00: "Reactor Protection System Actuation Initiated by Power Range, Neutron Flux, High Negative Rate"

No new commitments are identified in this submittal.

Should you have any questions regarding this correspondence, please contact Mr. Ronald W. Gaston, Manager, Regulatory Affairs, at 616/465-5901, extension 1366.

Sincerely,

Joseph E. Pollock
Plant Manager

TW/pae

Attachment

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IE22

NRC Form 366 (7-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 7-31-2004

Estimated burden per response to comply with this mandatory information collection request: 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

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

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4. TITLE

Reactor Protection System Actuation Initiated by Power Range, Neutron Flux, High Negative Rate

5. EVENT DATE			6. LER NUMBER				7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER		REVISION NUMBER	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
10	07	2001	2001	--	004	-- 00	12	05	2001	FACILITY NAME	DOCKET NUMBER

9. OPERATING MODE	1
10. POWER LEVEL	8

11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)

	20.2201(b)		20.2203(a)(3)(ii)		50.73(a)(2)(ii)(B)		50.73(a)(2)(ix)(A)
	20.2201(d)		20.2203(a)(4)		50.73(a)(2)(iii)		50.73(a)(2)(x)
	20.2203(a)(1)		50.36(c)(1)(i)(A)	X	50.73(a)(2)(iv)(A)		73.71(a)(4)
	20.2203(a)(2)(i)		50.36(c)(1)(ii)(A)		50.73(a)(2)(v)(A)		73.71(a)(5)
	20.2203(a)(2)(ii)		50.36(c)(2)		50.73(a)(2)(v)(B)		OTHER Specify in Abstract below or in NRC Form 366A
	20.2203(a)(2)(iii)		50.46(a)(3)(ii)		50.73(a)(2)(v)(C)		
	20.2203(a)(2)(iv)		50.73(a)(2)(i)(A)		50.73(a)(2)(v)(D)		
	20.2203(a)(2)(v)		50.73(a)(2)(i)(B)		50.73(a)(2)(vii)		
	20.2203(a)(2)(vi)		50.73(a)(2)(i)(C)		50.73(a)(2)(viii)(A)		
	20.2203(a)(3)(i)		50.73(a)(2)(ii)(A)		50.73(a)(2)(viii)(B)		

12. LICENSEE CONTACT FOR THIS LER

NAME	TELEPHONE NUMBER (Include Area Code)
Toby Woods, Regulatory Affairs	616-466-2430

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	AA	MG	West.	Yes					

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

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

On October 7, 2001, a reactor trip occurred at 8 percent reactor power. The trip was the result of a loss of rod control system voltage. The cause of the loss of rod control system voltage was an open resistor at the input to the north control rod drive motor generator (CRD-MG) voltage regulator. The open resistor caused a low voltage transient when the north CRD-MG field collapsed. A protective auxiliary relay removed power from the south CRD-MG voltage regulator resulting in a loss of rod control system voltage. The loss of voltage caused all control rods to rapidly insert, thereby, initiating a Power Range, Neutron Flux, High Negative Rate trip from the reactor protection system (RPS). The RPS actuation was initiated by actual plant conditions that satisfied the requirements for the initiation of the trip, and was, therefore, a valid RPS actuation.

The failed resistor was determined to be the result of a random component failure. The resistor was original equipment and inspection revealed no evidence of overheating or manufacturing defect. The defective resistor was replaced and, as a precaution, the remaining series resistor in the north CRD-MG along with the identical resistors in the south CRD-MG were replaced.

This event was reported in accordance with 10 CFR 50.72(b)(1)(iv)(B).

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

Conditions Prior to Event

Unit 2 was in Mode 1, at 8 percent rated thermal power.

Description of Event

On October 7, 2001, at 0950 hours, the Unit 2 reactor tripped from 8 percent rated thermal power while Operations personnel were preparing to roll the main turbine. Immediately prior to the trip, rod control system urgent and non-urgent failure alarms annunciated in the control room. The initial indication from the post trip review was that the trip was the result of a reactor protection system (RPS) actuation from a high negative neutron flux rate detected by the power range nuclear instruments.

Further investigation revealed that generator line voltage from the north and south control rod drive motor generator (CRD-MG) [AA] sets was indicating zero volts. The loss of voltage was attributed to the failure of a resistor on the input to the voltage regulator in the north CRD-MG that resulted in a loss of input voltage to the regulator. The voltage regulator controls the CRD-MG field voltage; therefore, the loss of input voltage resulted in an immediate collapse of the generator field. In response, the south CRD-MG output immediately fed additional circulating current to the north CRD-MG. The additional loading on the south CRD-MG resulted in a rapid decrease in the south CRD-MG output voltage. This caused an auxiliary relay in the south CRD-MG to drop out and remove power from the south CRD-MG voltage regulator. Voltage was lost to the rod control system, initiating rod control system failure alarms and causing the rod control gripper coils to release the control rods. As a result, Unit 2 received an RPS actuation from a high negative neutron flux rate caused by the rapid insertion of the control rods.

The event was reported (EN# 38362) to the Nuclear Regulatory Commission Operations Center at 1302 hours on October 7, 2001, as a four-hour non-emergency event in accordance with 10 CFR 50.72(b)(1)(iv)(B), an event that results in actuation of the RPS when the reactor is critical.

Cause of Event

The cause of the event was an open resistor at the input to the north CRD-MG voltage regulator that resulted in a loss of rod control system voltage as described above. A close inspection of the resistor revealed one open spot in the resistor with no evidence of chronic overheating and no evidence of ceramic voiding or any other obvious manufacturing defect. The resistor was original equipment, installed in 1973 at the manufacturer's facility, with no record of failure of these resistors since original installation. Additionally, an industry operating experience search revealed no previous failures of this type. Based on the investigation, the failure of the resistor is considered a random component failure.

Analysis of Event

The CRD-MG sets are not safety related and their protection circuitry is designed to prevent damage to the CRD-MG sets upon various postulated faults. To accomplish this, the circuitry will remove both CRD-MG sets from service upon certain faults. This protects the CRD-MG sets from damage and protects the reactor from an event where voltage is allowed to go low enough to release control rods followed by voltage restoration with control rod re-latch, resulting in an unanalyzed condition with control rods mis-aligned.

During this event, an auxiliary relay sensed a decrease in bus voltage because of the loss of field voltage on the north CRD-MG set, and opened its contacts, removing the bus voltage input to the south CRD-MG voltage regulator. This prevented the voltage regulator from recovering from a voltage that had potentially dropped below the point where rods

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

would be released, thereby preventing the re-latch condition described above. This circuitry, therefore, functioned as designed during this event.

The safety significance of a reactor trip is the unplanned transient and the challenges it places on the plant safety systems. Though a reactor trip is an undesirable event, in some cases tripping the reactor is the conservative and correct response to a plant perturbation or equipment failure. In this case, the protective scheme for the MG sets removed both machines from service due to a failed component that resulted in an extreme negative voltage transient on the bus and rod control system. Therefore, the overall safety significance for this event is considered to be minimal.

Corrective Actions

The defective resistor was replaced. As a precautionary measure, the remaining series resistor in the Unit 2 north CRD-MG and identical resistors in the Unit 2 south CRD-MG circuit that perform the same function were replaced. Work requests have been generated to replace the same resistors in the Unit 1 CRD-MG sets.

Previous Similar Events

LER 316/95-005-00, "Reactor Trip on High Negative Rate Resulting From Trip of Both CRD-MG Sets due to Mis-Adjusted Voltage Regulators." The previous event was reactor trip from a high negative rate RPS actuation due to a loss of rod control system voltage caused by the loss of both CRD-MG sets. Although the RPS actuation and loss of both CRD-MG sets are similar, the causes for the loss CRD-MG sets differ. Therefore, the corrective actions from the previous event could not have prevented the event described in this report.