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October 27, 1998

Re: Indian Point Unit No. 2
Docket No. 50-247
LER 97-021-01

Document Control Desk
US Nuclear Regulatory Commission
Mail Station PI-137
Washington, DC 20555

The attached Licensee Event Report 97-021-01 is hereby submitted in accordance with the requirements of 10 CFR 50.73.

Very truly yours,

Attachment

cc: Mr. Hubert J. Miller
Regional Administrator - Region I
US Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

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NRC FORM 366 (6-1998) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 06/30/2001

Estimated burden per response to comply with this mandatory information collection request: 50 hrs. Reported lessons learned are incorporated into the licensing process and fed back to industry. Forward comments regarding burden estimate to the 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. If an 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)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
Indian Point No. 2	05000-247	1 OF 4

TITLE (4)

Reactor Trip Due to De-energization of 6.9 kV Breaker Logic Relay

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	23	1997	1997	-- 021 --	01	10	31	1998		05000
									FACILITY NAME	DOCKET NUMBER
										05000

OPERATING MODE (9)		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)
POWER LEVEL (10)		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)
James J. Maylath, Senior Engineer	(914) 734-5356

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	JC	RLY	W120	Y					

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 15 single-spaced typewritten lines) (16)

On August 23, 1997, with the unit operating at 100% power, a reactor trip occurred with all control rods fully inserting. This initiated a turbine trip, and the generator tripped 30 seconds following the reactor trip as designed. The cause of the reactor trip was traced to the de-energization of a logic relay which monitors the 6.9 kV breaker for Reactor Coolant Pump 23. There was no condition that would have required the breaker to open during this event, and the breaker did not open. The resistance across a relay contact in the coil circuit of the logic relay was found to vary with no observable plunger motion. The cause of this resistance variation was corrosion on the surfaces of the relay contacts. Such variation can cause intermittent interruption of the circuit. This is the most probable cause of the de-energization of this logic relay which in turn caused the reactor trip. All safety-related equipment performed as designed, and the reactor was safely brought to hot shutdown conditions.

PLANT AND SYSTEM IDENTIFICATION:

Westinghouse 4-Loop Pressurized Water Reactor

IDENTIFICATION OF OCCURRENCE:

Reactor Trip Due to De-energization of 6.9 kV Breaker Logic Relay

EVENT DATE:

August 23, 1997

REPORT DUE DATE:

September 22, 1997

REVISION DATE:

October 31,1998

REFERENCES:

Condition Identification and Tracking System (CITRS) No. 97-E03029

PAST SIMILAR OCCURRENCE:

LER 86-037, 87-009, 92-011 and 96-015

DESCRIPTION OF OCCURRENCE:

On August 23, 1997 at 1625 hours, with the unit operating at 100% power, the 6.9 kV breaker logic relay for Reactor Coolant Pump (RCP) 23 on Train B de-energized. This initiated a reactor trip. All control rods fully inserted into the core with the reactor trip. The turbine tripped following the reactor trip, and 30 seconds later, the generator tripped. RCP 23 continued to run during this event since its 6.9 kV supply breaker remained closed. There was no condition that would have required the breaker to open during this event. All safety-related equipment performed as designed, and the reactor was safely brought to hot shutdown conditions.

ANALYSIS OF OCCURRENCE:

This report is being made because an actuation of the Reactor Protection System (RPS) occurred on August 23, 1997. This actuation is reportable under 10 CFR 50.73(a)(2)(iv). Following the reactor trip, all safety-related equipment functioned as designed, and the reactor was safely brought to hot shutdown conditions. There were no injuries to personnel or damage to equipment as a result of this event.

CAUSE OF OCCURRENCE:

It was determined that de-energization of the Train B logic relay for RCP 23 supply breaker initiated the reactor trip. This logic relay is designed to initiate a reactor trip if the 6.9 kV supply breaker to RCP 23 opens. This design provides for protection of the reactor from loss of reactor coolant flow and is common for each of the four RCPs. Throughout this event, there was no condition that would have required the breaker to open. All RCPs ran as required, and there was no unexpected loss of reactor coolant flow. Following the event, the logic and test relays for all RCP breakers and associated circuitry were tested. The resistance across a test relay contact in the coil circuit of the Train B logic relay for RCP 23 was found to vary with no observable plunger motion. While measuring the voltage drop across the test relay, the associated logic relay dropped out. This indicated that the resistance across the test relay contact increased enough to open the coil circuit of the logic relay, when the voltmeter probes touched the relay. Such resistance variation of the test relay contacts can cause intermittent interruption of the logic relay circuit. For this event the reactor trip signal cleared in about 1.314 seconds. This is indicative of an intermittent interruption of the logic relay circuit caused by a high resistance variation of the test relay contact.

Two normally closed contacts of the test relays in series are in turn in series with logic relay coils for both reactor protection trains for all four RCPs. The test relays for both reactor protection trains for all four RCPs, except Train A on RCP 24, were sent to an independent laboratory for further analysis. The test relay for Train A on RCP 24 had been replaced last year following a similar event in 1996 described in LER 50-247/96-015. The laboratory analysis identified sporadically high resistance on each set of normally closed contacts of the test relays. This sporadic high resistance on the contact of the Train B test relay was of sufficient magnitude and duration to result in de-energization of the associated logic relay for RCP 23. This is the most probable cause for the de-energization of the logic relay for RCP 23 that resulted in the reactor trip. The cause of the sporadically high resistance was corrosion on the surface of the contacts.

CORRECTIVE ACTION:

When the reactor trip occurred, the control room operators took immediate actions in accordance with emergency operating procedures. The reactor was safely brought to hot shutdown conditions.

Subsequent investigation and testing was done on the logic relays, the test relays and associated circuits for all four RCPs. The only anomaly found was the resistance variation of the test relay contacts for RCP 23 on Train B. As a precaution, since there was a similar event in 1996, the test relays for both reactor protection trains for all four RCPs, except Train A on RCP 24, were replaced. The previously installed test relays for both reactor protection trains for all four RCPs were sent to PECO Nuclear laboratories for further analysis. This laboratory analysis identified differing levels of resistance variations on the test relay contacts.

A benchmark of the industry was performed to determine if a generic relay issue existed. Fifteen plants, each with over 200 type BF relays, similar to the RCP test relays, were examined in the Nuclear Plant Reliability Data System (NPRDS) data base. Three type BF relay events were found:

- A reactor trip at Indian Point No. 3, on December 22, 1987, initiated by the RCP low flow trip, similar to the two Indian Point No. 2 events, described in this LER and in LER 50-247/96-015. The Indian Point No. 3 event was caused by tarnish on the BF relay contacts that resulted in high resistance.

- A reactor trip at Kewaunee, on April 2, 1996, initiated in the nuclear instrumentation circuits. This BF relay event was also due to tarnished contacts with high resistance.

- The reactor trip at Indian Point No. 2, on August 19, 1996 described in LER 50-247/96-015.

These three events and the August 23, 1997 event described herein are from a similar device, the BF relay, and are the result of corrosion on the contacts. The plants surveyed above have a minimum of 3,000 BF relays with only four failures identified in a ten year period. This is not indicative of a generic failure issue with the BF relay. Periodic visual inspections of the BF relays will be conducted as part of the preventive maintenance program. Resistance checks will be made on those relays that show evidence of heat degradation or corrosion buildup on the contacts. Relays found to have excessive degradation or unacceptably high resistance will be replaced.

A second normally closed test relay contact was added in the logic relay coil circuit on both trains for all four RCPs to preclude an intermittent high resistance by a single relay contact from causing a reactor trip. Only the one test relay was replaced in 1996 because that failure was considered an isolated occurrence and a maintenance program for test and logic relays had already been instituted.