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

Perry Nuclear Power Plant
Docket No. 50-440

Ladies and Gentlemen:

Enclosed is Licensee Event Report 1999-006, "Disengaged Locking Spring on Relay Renders One Train of Standby Liquid Control System Inoperable."

No regulatory commitments were identified in this report. If you have questions or require additional information, please contact Mr. Gregory A. Dunn, Manager - Regulatory Affairs, at (440) 280-5305.

Very truly yours,

for John Wood

Enclosure

cc: NRC Project Manager
NRC Resident Inspector
NRC Region III

IE22 1/1

PDR ADOCK 05000440

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

LICENSEE EVENT REPORT (LER)

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

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.

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
PERRY NUCLEAR POWER PLANT, UNIT 1	050000440	1 OF 3

TITLE (4)

Disengaged Locking Spring on Relay Renders One Train of Standby Liquid Control System Inoperable

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
11	24	1999	1999	-- 006 --	00	12	22	1999	FACILITY NAME	DOCKET NUMBER

		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more) (11)					
OPERATING MODE (9)	1		20.2201(b)		20.2203(a)(2)(v)	X	50.73(a)(2)(i)		50.73(a)(2)(viii)
POWER LEVEL (10)	100		20.2203(a)(1)		20.2203(a)(3)(i)	X	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)	X	50.73(a)(2)(v)		Specify in Abstract below
			20.2203(a)(2)(iv)		50.36(c)(2)		50.73(a)(2)(vii)		or in NRC Form 366A

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Bruce A. Luthanen, Compliance Engineer	(440) 280-5389

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURE	REPORTABLE TO EPIX
UNK	BR	RLY	[Agastat]	Yes					

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 November 24, 1999, at 1015 hours, personnel at the Perry Nuclear Power Plant discovered that a relay in the Standby Liquid Control system circuitry had a locking spring that was disengaged from the relay. The locking spring prevents the relay, which is part of the circuit for firing the explosive squib valves, from becoming dislodged from its mounting in a seismic event. A review of work orders from several months preceding this discovery revealed that no other work activities were conducted in the cabinet, and so there was a reasonable assurance that the Standby Liquid Control system Train A had been inoperable for seven days or more in the current operating cycle.

Technical Specifications require that two Standby Liquid Control subsystems be operable in Modes 1 and 2. The associated Limiting Condition for Operation states that an inoperable SLC subsystem must be restored to operability within seven days. Exceeding this limit constitutes the loss of a safety function of structures or systems that are needed to mitigate the consequences of an accident, and is reportable under 10 CFR 50.73(a)(2)(v)(D). This would also constitute operation of the plant in a condition outside of its design basis, which is reportable under 10 CFR 50.73(a)(2)(ii)(B), and operation in a condition outside of Technical Specifications, reportable under 10 CFR 50.73 (a)(2)(i)(B). Accordingly, the NRC was notified via Emergency Notification System phone message at 1411 hours on November 24, 1999, (ENF #36461).

Standby Liquid Control Train A was immediately declared inoperable upon discovery of the loose locking spring. The locking spring was re-installed, and the train was declared operable at 1223 hours on November 24, 1999.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	2 OF 3
PERRY NUCLEAR POWER PLANT, UNIT 1	05000440	1999	-- 006 --	00	

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

I. INTRODUCTION

The Standby Liquid Control (SLC)[BR] system serves as a redundant control for reactivity in the event that control rods are inoperable. In the event that the reactor must be taken subcritical rapidly, the SLC subsystems can add soluble boron solution via injection lines. The addition of boron as a neutron absorber will serve to bring the reactor to a subcritical state for accident mitigation, lacking other reactivity controls.

The SLC system consists of a storage tank for the boron solution, pumps and explosive squib valves. On actuation from the Control Room, the explosive valves will fire, resulting in the shearing of internal valve sealing components, as per the design. This opens a flow path for the boron solution, which will be injected into the reactor vessel via the High Pressure Core Spray[BG] sparger lines. Although the SLC injection pumps can be run from a local panel near the pumps for the purpose of testing, there is no provision for firing the explosive squib valves locally.

There are two independent and redundant trains of SLC subsystems, either of which are capable of taking suction on the boron storage tank, and completing reactor shutdown in the event that control rod insertion is unavailable. If the squib valves cannot be fired, there is no flowpath for the boron solution, and the solution will remain isolated from the reactor vessel.

At the time of the event, the plant was in Mode 1 at 100 percent rated thermal power. The reactor vessel was at approximately 1024 pounds per square inch gauge, with the reactor coolant at saturated conditions. Except for the SLC Train A, there were no other inoperable systems, structures or components that contributed to this condition.

II. EVENT DESCRIPTION

On November 24, 1999, a work planner was performing a routine walkdown involving relay[RLY] replacement work scheduled for early 2000 in the Control Room. In the process of the walkdown, it was discovered inside one cabinet that a relay in the SLC system Train A circuitry had a locking spring that was disengaged from the top of the relay itself. The relay in question is an agastat-type EGP, which plugs into a base that is mounted inside the cabinet. The relay is seismically qualified as long as the locking spring is in place, which would prevent it from becoming dislodged in a seismic event. With the locking spring disengaged, the seismic qualification of the relay was challenged, and the Unit Supervisor immediately declared SLC Train A inoperable when notified of the disengaged locking spring.

Immediate follow-up action was taken to re-install the locking spring, and once the locking spring had been re-installed, SLC Train A was declared operable.

III. CAUSE OF EVENT

The cause of this event could not be explicitly determined. However it appears that the locking spring was accidentally dislodged, an apparent personnel error. No similar or related events were discovered through a document search, and no other relays were discovered in this condition from a walkdown of Control Room panels. This appears to be a singular event, and does not present a generic concern.

IV. SAFETY ANALYSIS

The SLC subsystems are designed to provide the capability of bringing the reactor, at any time in a fuel cycle, from full power and minimum control rod inventory to a subcritical condition (which is at the peak of the xenon transient) with the reactor in the most reactive xenon free state without taking credit for control rod movement. The SLC system consists of a boron solution storage tank, two positive displacement pumps, and two explosive squib valves, which are provided in parallel for redundancy, and associated piping and valves to transfer borated water from the storage tank to the Reactor Pressure Vessel (RPV). The borated solution is discharged through the high pressure core spray system sparger.

FACILITY NAME (1)	DOCKET (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
PERRY NUCLEAR POWER PLANT, UNIT 1	05000440	1999	-- 006 --	00	3 OF 3

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

Two SLC subsystems are required to be operable in Modes 1 and 2. Each operable subsystem contains an operable pump, an explosive-operated squib valve, and associated piping, valves and instruments and controls to ensure an operable flowpath. The relay which was discovered with the disengaged locking spring is an integral part of the circuit that causes the explosive squib valves to fire. Under normal conditions, the relay contacts are open, and the relay is a passive part of the circuit that verifies squib circuit continuity. When the applicable switch is closed in the Control Room, the relay contacts close, and the squibs will fire. This creates a discharge path for the boron solution. If the relay in question fails, there is no alternate method of firing the squibs for that train, and so the train is effectively inoperable.

With one subsystem inoperable, the inoperable subsystem must be restored to operable status within seven days. In this condition, the other operable subsystem is adequate to perform the shutdown function. However, the overall reliability is reduced because a single failure in the operable subsystem could result in reduced SLC system shutdown capability.

The SLC Train B remained available throughout the time when Train A was inoperable, and no generic condition existed. The two trains of SLC are independent and redundant, so that the inoperability of one would not have compromised the ability of the parallel train to perform its specified function.

This event had no safety significance.

V. CORRECTIVE ACTIONS

1) The locking spring was re-installed, and SLC Train A was restored to operability.
2) A walkdown was conducted of Control Room panels to identify whether any other relays were in a similar condition. None were found.
3) Interviews of maintenance personnel verified that there was sufficient awareness of the importance of locking springs to component operability and seismic qualifications.
4) Replacement of agastat relays will be completed in accordance with the plant Preventitive Maintenance program. There are approximately 300 agastat relays remaining in the plant out of a total inventory of approximately 1700 which will be replaced by an upgraded style relay which has a much sturdier locking clip, and is not as prone to accidental dislodging.

VI. PREVIOUS SIMILAR EVENTS

A review of Licensee Event Reports from the previous five years did not indicate any similar incidents at the Perry Plant. This appears to be an isolated event.

Energy Industry Identification System (EIIS) Codes are identified in the text by square brackets [XX].