Commonwealth Edison
Zion Generating Station
101 Shiloh Blvd.
Zion, Illinois 60099
Telephone 708 / 746-2084

January 29, 1993

U. S. Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Dear Sir:

The enclosed Licensee Event Report number 92-024-00, Docket No. 50-295/DPR-39 from Zion Generating Station is being transmitted to you in accordance with the requirements of 10CFR50.73(a)(2)(iv), which requires a 30 day written report when any event or condition occurs that resulted in a manual or automatic actuation of any Engineer Safety Feature, including the Reactor Protection System.

Very truly yours,

W. R. Kunsl
for T. P. Joyce
Station Manager
Zion Generating Station

TPJ/JD/dmb

Enclosure: Licensee Event Report

cc: NRC Region III Administrator
NRC Resident Inspector
INPO Record Center
CECo Distribution List

010016

ZDVRLER-592(8)

IE22 1/1

ATTACHMENT B
(Continued)

Tracking Number: 29555492180-119

********** Section 2 Regulatory Assurance Supervisor (Designee) **********

A. Verify appropriate immediate notification requirements as noted in Section B of page 1

Written Notification Determination Results:

10CFR50.9			LLIN		
10CFR20.402		30 Day	Special Report		#
10CFR20.405		30 Day	10CFR55		30 Day
10CFR20.403		30 Day	Part 21		
10CFR50.36		30 Day	None		
10CFR50.73	X	30 Day	10CFR73.71		30 Day

B. Determination of investigation level. Review the event description as well as the Reporting Requirements then refer to the SLM (Appendix D) to determine the impact category and significance level.

Impact Cat. [A] Sig. Level [3] Item [2]

C. Investigative techniques that should be used for this event.

Cause Determination Evaluation		Barrier Analysis	
Event and Causal Factor Charting	X	Task Analysis	
Change Analysis		Other	

D. Type of Report Issuance:

LER	X
PIR	
HPES	
NPRDS/PADS	Y
CDE	
OTHER	
Corrective Action Sufficient	

E. Type of Review and or Approval

Level 1 - Onsite/Offsite Review
Level 2 - Onsite/Offsite Review
Level 3 - LER/NOV response/200 Type Invst.
Onsite/Offsite Review
Others; Station Review
Level 4 - Department Head

Screening Approval
S. Mika /12-31-92
Regulatory Assurance Supervisor/Designee Date

******* Investigative Report and Approval *******

A, B, G
Disciplines Required:

Review: Paul Cantrell PBEC 1/28/93

Review: William H Orders PBG 1-28-93

Approval: W R Kunsl 1/29/93

LICENSEE EVENT REPORT (LER) Form Rev 2.0

Facility Name (1)	Docket Number (2)	Page (3)
Zion Unit 1	0 5 0 0 0 2 9 5	1 of 0 5

Title (4)
Autostart of the 1B Residual Heat Removal Pump Due to a Binding Sequency Timer

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 Names	Docket Number(s)
1 2	3 0	9 2	9 2	---	0 2 4	0 0	0 1	2 9	9 3	Zion Unit 2	0 5 0 0 0 3 0 4

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10CFR (Check one or more of the following) (11)			
POWER LEVEL (10) 0 9 9		___ 20.402(b)	___ 20.405(c)	_X_ 50.73(a)(2)(iv)	___ 73.71(b)
		___ 20.405(a)(1)(i)	___ 50.36(c)(1)	___ 50.73(a)(2)(v)	___ 73.71(c)
		___ 20.405(a)(1)(ii)	___ 50.36(c)(2)	___ 50.73(a)(2)(vii)	___ Other (Specify in Abstract below and in Text)
		___ 20.405(a)(1)(iii)	___ 50.73(a)(2)( )	___ 50.73(a)(2)(viii)(A)	
		___ 20.405(a)(1)(iv)	___ 50.73(a)(2)(ii)	___ 50.73(a)(2)(viii)(B)	
		___ 20.405(a)(1)(v)	___ 50.73(a)(2)(iii)	___ 50.73(a)(2)(x)	

LICENSEE CONTACT FOR THIS LER (12)

Name	TELEPHONE NUMBER
	AREA CODE
John Duff, Technical Staff Engineer ext. 2368	7 0 8 7 4 6 - 2 0 8 4

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	J E	T M B	E 0 2 0	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 fifteen single-space typewritten lines) (16)

At 1421 on 12/30/92, while performing Periodic Test (PT)-10-3, "Bus Drop Testing", the 1B Residual Heat Removal (RHR) [BP] pump unexpectedly auto started. At 1426 the 1B RHR pump was secured. At 1515 the Safeguards System Engineer (SSE) performed a walkdown of the affected Safeguards logic and identified that the Bus 148 Train B sequence timer cam shaft was binding and had failed to fully reset. The SSE also found the two Bus 149 Safety Injection (SI) [BQ] sequence timer cam shafts were binding and had failed to fully reset. The SSE manually reset the three timers. Five additional sequence timers were identified with cam shafts that were binding but had fully reset. Work requests were initiated to repair the eight affected sequence timers.

At 0945 on 12/31/92, prior to starting repairs on the Bus 148 Train B SI sequence timer, the 1B RHR pump unexpectedly auto started. The 1B RHR pump was secured at 1000. By 1355 all eight of the affected sequence timers were adjusted and verified to operate as required.

The cause of the first RHR pump start and the sequence timer binding was due to improper setup and adjustment of the sequence timers during installation. The cause of the second RHR pump start was due to the inadvertent manipulation of the Bus 148 SI sequence timer contacts.

Corrective actions include having the SSE witness the next several performances of PT-10-3 to verify proper operation of the sequence timers, revising PT-10-3 to include a pause to allow time for the sequence timer to reset, revising the Electrical Maintenance procedures to address the initial setup and installation of the sequence timers, and evaluating the timers for Part 21 applicability.

A. CONDITION PRIOR TO EVENT

MODE 1 - Power Operations RX Power 99% RCS [AB] Temperature/ Pressure 559 °F/ 2235 psig

B. DESCRIPTION OF EVENT

At 1421 on 12/30/92, while performing Periodic Test (PT)-10-3, "Bus Drop Testing", on Unit 1 Train B, the 1B Residual Heat Removal (RHR) pump unexpectedly auto started. The section of PT-10-3 was immediately exited with no further complications. At 1426 the 1B RHR pump was secured and the Safeguards System Engineer (SSE) was notified of the event. The SSE reviewed PT-10-3 to determine the possible cause of the 1B RHR pump auto start and if any additional equipment may have been affected. At 1515 the SSE performed a walkdown of the affected Safeguards logic and identified that the Bus 148 Train B Safety Injection (SI) [BQ] sequence timer cam shaft was binding and had failed to fully reset as required during PT-10-3. At 1520 the SSE manually rotated the sequence timer cam shaft to the fully reset position.

At 1525 the SSE inspected the other 11 SI and Station Blackout sequence timers on Unit 1 for Buses 147, 148 and 149 and identified that the Bus 149 Train A and Train B SI sequence timer cam shafts were also binding and had not fully reset. At 1530 the SSE manually rotated the Bus 149 Train A and Train B SI timer cam shafts to the fully reset position. The SSE also identified that five of the eleven sequence timer cam shafts were binding but they had managed to fully reset. Work requests were initiated to repair the eight affected sequence timers.

At 0945 on 12/31/92, while the SSE and Electrical Maintenance (EM) Department electricians were preparing to work on the Bus 148 Train B SI sequence timer, the 1B RHR pump unexpectedly auto started. The 1B RHR pump was secured at 1000. At 1010 the electricians started repairs for the affected sequence timers. At 1355 all eight of the affected sequence timers had been adjusted and were verified to operate as required.

C. APPARENT CAUSE OF EVENT

The cause of the initial unexpected auto start of the 1B RHR pump was component failure. Contact #2 on the Bus 148 Train B SI sequence timer was out of adjustment, and the cam shaft failed to rotate to the fully reset position. Proper adjustment of the sequence timers ensures that all of the contacts lift off of the cams, all of the contacts open, and the cam shaft rotates to the fully reset position when the clutch coil is de-energized. When the Bus 148 Train B SI sequence timer clutch coil was de-energized all of the contacts except for #2 lifted off of the cams, all of the contacts except for #2 opened, and the cam shaft did not rotate to the fully reset position. While contact #2 was improperly closed, the Nuclear Station Operator (NSO), following the steps in PT-10-3, restored the Safeguards System to normal. This completed the signal which allowed the 1B RHR pump to auto start. The cam shaft then slowly rotated to a partially reset position (approximately 10%) and contact #2 opened allowing the NSO to secure the 1B RHR pump. A contributing cause of the component failure was procedural inadequacy. Contact #2 was not properly adjusted during the initial setup and installation of the sequence timer. The existing sequence timer inspection procedure does require verification of all contact closures and verification of contact reset upon cam shaft reset. However, this procedure does not require verification of contact reset upon clutch coil de-energization with a simultaneous failure of the cam shaft to reset.

C. APPARENT CAUSE OF EVENT (Continued)

A contributing cause of the 1B RHR pump auto start was procedural deficiency. The 1B RHR pump auto started when the NSO performed PT-10-3 section 5.4 step 60. This step directs the NSO to turn reset push button #12 to the reset position and momentarily depress. This step accomplishes two separate functions. The first function is to reset the sequence timer, which occurs when the push button is turned to the reset position. The second function is to return the Safeguards System to normal, which occurs when the push button is momentarily depressed. The timer requires 0.5 seconds to reset. The procedure does not direct the NSO to pause to allow the timer to reset before momentarily depressing the push button.

The cause of the binding of the sequence timer cam shaft for all eight of the affected sequence timers is believed to be design, manufacture, construction/installation. Initial investigation indicates that an adjustable collar was probably incorrectly set by the manufacturer causing it to be tightly pressed against the cam shaft bushing. With the collar tightly pressed against the cam shaft bushing, the interface between the cam shaft, collar, cam shaft bushing, and the left side plate assembly (metal bracket which is part of the timer's structural support) becomes rigid. In this configuration, any torquing of the timer's metal structure can cause binding of the timer's cam shaft. This torquing can occur during the initial installation when the mounting screws are tightened. The torquing can also occur during normal operations if the timer's metal structure expands or contracts due to temperature variations, in the switchgear rooms. The combination of the torquing during installation and temperature variations in conjunction with the improper collar adjustment probably caused the timers to bind after initial testing had been completed. With the collar properly set, torquing during installation and temperature variations should not cause the cam shafts to bind. The binding of the sequence timer camshaft is being further investigated for Part 21 applicability.

The exact cause of the second unexpected start of the 1B RHR pump could not be determined. The cabinet doors for the Bus 148 Train B SI sequence timer were inadvertently left open following an inspection of the sequence timer by the SSE and the electrician. All personnel involved in the troubleshooting were questioned immediately following the event. No actions were in progress at the time that could have caused this event.

D. SAFETY ANALYSIS OF EVENT

The safety significance of the event was minimal. The failure of the sequence timers to reset would not have prevented the required Safeguards loads on the applicable diesel generator (DG) from starting. However, the sequence timers, which were found to be only partially reset, would have block loaded the components onto their respective DGs instead of sequencing during a SI/Loss Of Offsite Power (LOOP) event.

All of the sequence timers on Unit 1 were verified to be fully reset during Technical Staff Surveillance (TSS) 15.6.35-1, "Manual Actuation of the Safety Injection and Safe Shutdown Systems and Diesel Generator Loading Test", which was performed on 7-31-92. The failure of the Bus 148 Train B SI timer cam shaft to fully reset is believed to have occurred during the 12-30-92 performance of PT-10-3. If the cam shaft had failed to reset during the previous performance of PT-10-3, the 1B RHR pump would have auto started at that time. Therefore, the timer was only in this partially reset condition for approximately one hour. The failure of the Bus 149 Train A and Train B SI timers is believed to have occurred during the previous performance of PT-10-3 on 10-06-92 (Train A) and 10-11-92 (Train B). This was the only time that the Bus 149 SI sequence timers had been actuated since TSS 15.6.35-1.

D. SAFETY ANALYSIS OF EVENT (Continued)

From 10-06-92 to 12-30-92, the Bus 149 components would have block loaded onto the 1B DG during a SI/LOOP event. For approximately one hour on 12-30-92 both the Bus 148 and Bus 149 components would have block loaded on to the 1A and 1B DG respectively during a SI/LOOP event.

Zion Station Site Engineering has reviewed the consequence of a block loading event and believes the safety significance is minimal because the diesel engines, generators, and the loads they feed would operate if subjected to a block loading event.

There are no other postulated initial conditions that would have worsened the safety consequences of this event.

E. CORRECTIVE ACTIONS

1. The immediate corrective action was to secure the 1B RHR pump following both of the inadvertent auto starts. The three partially reset SI sequence timer cam shafts were manually reset. Work Requests were initiated to repair the other eight affected sequence timers.

2. Contact #2 on the Bus 143 Train B SI sequence timer was adjusted to open after the clutch coil de-energizes. The contacts on all of the Unit 1 sequence timers were inspected. No other contacts were found to be out of adjustment.

3. The binding of the sequence timer cam shaft was relieved by adjusting the cam shaft collar so that the collar was not in direct contact with the cam shaft bushing. After the collar was adjusted, the cam shaft was verified to fully reset both manually and electrically. Verification and/or adjustment of this collar is not addressed in any Vendor Technical Information on-site.

4. A Manufacturers Representative for Eagle Signal Corporation was brought on-site to evaluate the collar adjustments. The Manufacturers Representative inspected a new timer from the warehouse and found that the cam shaft was binding due to the same improper collar adjustment. The Manufacturers Representative inspected sequence timers installed on Unit 1 and Unit 2, and found the collar settings to be acceptable. The Manufacturers Representative is currently working with the manufacturer to identify any potential procedural enhancements that may be of benefit in the inspection, maintenance, and testing of the sequence timers. (295-180-92-11901)

5. The SSE will be present during the next several performances of PT-10-3 to witness the operation of the sequence timers. (295-180-92-11902)

6. PT-10-3 will be revised to direct the NSO to pause to allow the sequence timer to reset before depressing the reset push-button to return the Safeguards System to normal. (295-180-92-11903)

7. The EM procedures will be revised to address initial setup of the sequence timers. The initial setup will include steps for verification of collar setting, contact adjustment and installation. (295-180-92-11904)

8. Commonwealth Edison Company Corporate Part 21 Group is evaluating this event for Part 21 applicability. (295-180-92-11905)

F. PREVIOUS EVENTS

A search of the Zion Station Deviation Report (DVR) / Licensee Event Report (LER) data base were performed using the following key words: timer; sequence; ESF actuation. Six previous occurrences of sequence timer failures were identified. These occurrences are documented in LER1-92-19, DVR 1-89-116, DVR 1-89-117, DVR 1-88-063, DVR 2-90-067 and DVR 1-86-094. The corrective actions for these events are not applicable to this event.

G. COMPONENT FAILURE DATA

MANUFACTURER	NOMENCLATURE	MODEL NUMBER	MFG PART NUMBER
Eagle Signal	Timer	Bulletin 140	H06402GA6B