

LICENSEE EVENT REPORT (LER)

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 50.0 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-630), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1): Perry Nuclear Power Plant, Unit 1 DOCKET NUMBER (2): 0 5 0 0 0 4 4 1 0 1 OF 0 3 PAGE (3)

TITLE (4): Unexpected Turbine Stop Valve Closure During Performance of a Surveillance Results in a Reactor Protection System Actuation.

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
0	1	0	1	9	1	0	0	2	
						0	0	0	
						1	3	1	

OPERATING MODE (9): 2 THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check one or more of the following) (11)

20.402(b)	20.406(i)	<input checked="" type="checkbox"/>	50.73(a)(2)(iv)	73.71(b)
20.406(a)(1)(i)	50.38(e)(1)	<input type="checkbox"/>	50.73(a)(2)(v)	73.71(e)
20.406(a)(1)(ii)	50.38(e)(2)	<input type="checkbox"/>	50.73(a)(2)(vi)	OTHER (Specify in Abstract below and in Text, NRC Form 368A)
20.406(a)(1)(iii)	50.73(a)(2)(i)	<input type="checkbox"/>	50.73(a)(2)(vii)(A)	
20.406(a)(1)(iv)	50.73(a)(2)(ii)	<input type="checkbox"/>	50.73(a)(2)(vii)(B)	
20.406(a)(1)(v)	50.73(a)(2)(iii)	<input type="checkbox"/>	50.73(a)(2)(ix)	

LICENSEE CONTACT FOR THIS LER (12)

NAME: Henry L. Hegrat, Compliance Engineer, Extension 6855 TELEPHONE NUMBER: 2 1 6 2 5 9 - 1 3 7 3 7

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRC

SUPPLEMENTAL REPORT EXPECTED (14)

YES (If yes, complete EXPECTED SUBMISSION DATE) NO

EXPECTED SUBMISSION DATE (15): MONTH DAY YEAR

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

On January 1, 1991, at 2050, while performing activities for Turbine Stop Valve and Reactor Protection System (RPS) testing, an inadvertent Turbine Stop Valve (TSV) closure signal resulted in a full scram signal being generated. At the time of the event the plant was in Operational Condition 2 with all of the control rods inserted.

The root cause of this event is indeterminate. A possible electrical malfunction was investigated by troubleshooting the speed control logic and troubleshooting efforts did not identify any equipment problems. The two surveillances were reviewed for possible interaction effects. Although SVI-N31-T1151, "Main Turbine Valve Exercise Test", could have provided more detail for adjusting control valve position, the operator's chosen methods would not have initiated the RPS actuation and interaction between the surveillances was not found. Control room and I&C personnel were interviewed and the exact actions performed prior to the scram signal were reviewed. Although none of the individuals could distinctly remember depressing or inadvertently touching the CLOSE VALVES button, this action would have caused the TSV to close and a scram to occur. The CLOSE VALVES control button is located in close proximity to the LOAD SET button and was observed to be lit following the scram.

To prevent recurrence, SVI-N31-T1151 is being revised to clarify the actions needed to meet all of the prerequisites. Additionally, this event will be discussed during licensed operator requalification training.

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TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (F-630), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20546, AND TO THE PAPERWORK REDUCTION PROJECT (3150-0104), OFFICE OF MANAGEMENT AND BUDGET, WASHINGTON, DC 20503.

FACILITY NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER	
Perry Nuclear Power Plant, Unit 1	0500044091	002	00	00	2 OF 3

TEXT (if more space is required, use additional NRC Form 366A's) (17)

On January 1, 1991, at 2050, an inadvertent Turbine Stop Valve closure signal resulted in a full scram signal being generated. At the time of this event the plant was in Operational Condition 2 with all of the control rods inserted. The Reactor Pressure Vessel [RPV] was at atmospheric pressure with the reactor water temperature at 170 degrees Fahrenheit.

On January 1, 1991, Surveillance Instructions (SVI-N31-T1151) "Main Turbine Valve Exercise Test" and (SVI-C71-T0046) "Turbine Stop Valve Closure and Control Valve Fast Closure Channel Functional for 1C71-N006A, B, C, D, E, F, G, H and 1C71-N005A, B, C, D" were being performed concurrently. These SVIs demonstrate operability of Turbine Overspeed Protection and Reactor Scram functions, respectively. The test set-up portion of SVI-C71-T0046 had been completed by Instrument and Control (I&C) technicians and they were waiting for the SVI-N31-T1151 prerequisites to be completed prior to continuing. At this time, to satisfy the prerequisites of SVI-N31-T1151 and the test set-up section of SVI-C71-T0046, the turbine [TRB] was reset with the SPEED SET at 100 RPM, and the Turbine Stop Valves (TSV) [SHV] and Combined Intercept Valves (CIV) [PCV] open. I&C technicians had simulated turbine power of greater than 40 percent and steam pressure of 125 psig. The Unit Supervisor was attempting to establish another prerequisite step requiring the Turbine Control Valves (TCV) [PCV] to be greater than fifteen percent open. SVI-N31-T1151 did not detail how to open the TCVs if they did not meet the greater than 15 percent open criteria. Therefore the Unit Supervisor attempted to open the TCV using the PRESSURE SETPOINT and LOAD SET buttons. At 2055, while increasing the Turbine LOAD SET, a TSV closure occurred and the SPEED SET/RPM indicating light changed from 100 RPM to CLOSE VALVES. It was later confirmed that the valves did not close as a result of a turbine trip signal. When the TSV position traveled below 95 percent open, the Reactor Protection System (RPS) Turbine Stop Valve Closure Scram signal initiated a full scram. The operators utilized the appropriate plant procedures to place the Mode switch in shutdown and to verify that all control rods had been inserted. The main turbine then tripped on a high Reactor Water Level (level eight) signal, as the Supervising Operator was about to perform a manual turbine trip. The scram signal was reset at 2105, and a walkdown of the TSV and associated piping was initiated, along with troubleshooting activities. At 2354 the NRC was notified via the Emergency Notification System. The surveillances were successfully performed independently of each other; SVI-N31-T1151 on January 1, 1991 at 1071 and SVI-C71-T0046 on January 4, at 1523. All Technical Specification requirements for system operability were satisfied.

Investigation of this event resulted in an indeterminate root cause. A possible electrical malfunction within the General Electric Mark II Electro-Hydraulic Control (EHC) system was investigated. Extensive troubleshooting of the speed control logic and a subsequent successful rerun of SVI-N31-T1151 revealed no abnormalities in the control logic. The troubleshooting activities, which included checking every input into the CLOSE VALVE circuitry, found no problems with any of the relays' response or timing. The problem could not be repeated during the attempts to recreate the event. Also no anomalous behavior of the EHC

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PLANT NAME (1)	DOCKET NUMBER (2)	LER NUMBER (6)			PAGE (3)	
		YEAR	SEQUENTIAL NUMBER	REVISION NUMBER		
Perry Nuclear Power Plant, Unit 1	05000440	91	-002	-00	03	OF 03

TEXT (if more space is required, use additional NRC Form 305A-1 (17))

turbine control circuits were observed during the subsequent plant startup. The turbine valve testing had been successfully performed the previous week with the SPEED SET at 100 RPM and every week during the previous operating cycle at rated power.

Additionally, both surveillances were reviewed for possible interaction effects, considering both plant conditions and operator actions taken. SVI-N31-T1151 was considered to be inadequate in that specific directions were not provided as to how to adjust the control valve position to establish prerequisite conditions; however, the operator's chosen method would not have initiated the RPS actuation. There was no interaction between the surveillances that would have caused the TSV closure.

Control room and I&C personnel were interviewed and an attempt was made to walk through the exact actions performed prior to the scram signal. Although none of the individuals could distinctly remember the CLOSE VALVES button being depressed or inadvertently touched, this action would have caused the TSV to close and a scram to occur. The CLOSE VALVES control button is located in reasonably close proximity to the LOAD SET button. Furthermore, the CLOSE VALVES light was observed to be lit following the scram, indicating that this part of the EHC control circuit was involved due to either a malfunction or inadvertent actuation.

The turbine overspeed protection system [JJ] instrumentation and the turbine speed control valves ensure the turbine is protected from excessive overspeed, which could generate potentially damaging missiles which could impact and damage safety related components, equipment or structures. Upon a Turbine Stop Valve Closure the Reactor Protection System automatically initiates a reactor scram in anticipation of the pressure, neutron flux, and heat flux increases that would result from closure of the stop valves. With a trip setting of 5 percent of valve closure from full open, the resultant increase in heat flux is such that adequate thermal margins are maintained during the worst case transient. This function is automatically bypassed below the turbine first stage pressure value equivalent to thermal power less than 40 percent of rated thermal power. In this event the RPS system reacted to the closure of the TSV with a simulated power above the bypass setpoint by initiating a scram signal. Both the turbine speed control system and the RPS system performed as designed. The surveillances were successfully performed independently of each other, SVI-N31-T1151 on January 1, 1991 and SVI-C71-T0046 on January 4. At the time of this event, all of the control rods were inserted, so there was no control rod movement in response to the scram signal. Therefore this event is not safety significant. A review of previous events found no similar ones.

To prevent recurrence, SVI-N31-T1151 will be revised to provide direction as to how to adjust the control valve position to establish the prerequisite conditions. Additionally, this event will be discussed during licensed operator requalification training.

Energy Industry Identification System Codes are identified in the text as [XX].