

# CATEGORY 1

## REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:9609100207 DOC.DATE: 96/08/30 NOTARIZED: NO DOCKET #  
 FACIL:50-387 Susquehanna Steam Electric Station, Unit 1, Pennsylv 05000387  
 AUTH.NAME AUTHOR AFFILIATION  
 WEHRY,R.R. Pennsylvania Power & Light Co.  
 KUCZYNSKI,G.J. Pennsylvania Power & Light Co.  
 RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 96-006-00:on 960801,reactor scram occurred,per design,  
 when main turbine tripped on indicated high vibration.Caused  
 by main turbine control valve fast closure.Training provided  
 to station personnel.W/960830 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 4  
 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

NOTES:

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AUG 30 1996

U.S. Nuclear Regulatory Commission  
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SUSQUEHANNA STEAM ELECTRIC STATION  
LICENSEE EVENT REPORT 50-387/96-006-00  
PLAS - 675 FILE R41-2

Docket No. 50-387  
License No. NPF-14

Attached is Licensee Event Report 50-387/96-006-00. This report was determined reportable per 10CFR50.73(a)(2)(iv), in that an unplanned Engineered Safety Feature actuation occurred when the Reactor Protection System initiated an automatic reactor scram following a main turbine trip on indicated high vibration.

G. J. Kuczynski  
Plant Manager - Susquehanna SES

Attachment

cc: Mr. H. J. Miller  
Regional Administrator  
U. S. Nuclear Regulatory Commission  
475 Allendale Road  
King of Prussia, PA 19406

Mr. Kenneth M. Jenison  
Sr. Resident Inspector  
U. S. Nuclear Regulatory Commission  
P. O. Box 35  
Berwick, PA 18603-0035

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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-530), 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) Susquehanna Steam Electric Station - Unit 1						DOCKET NUMBER(2) 0 5 0 0 0 3 8 7 1			PAGE (3) OF 0 3		
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TITLE (4) Reactor Scram Following Turbine Trip on Indicated High Vibration																
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)					
0	8	0	1	9	6	9	6	0	0	6	0	0	0	0		
OPERATING MODE (9) 1			THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 1: (Check one or more of the following) (11)									73.71(b)				
POWER LEVEL (10)		0	9	8	20.402(b)	20.405(c)	X	50.73(a)(2)(v)	73.71(c)		OTHER (Specify in Abstract below and in Text, NRC Form 365A)					
					20.405(a)(1)(i)	50.36(c)(1)		50.73(a)(2)(v)								
					20.405(a)(1)(ii)	50.36(c)(2)		50.73(a)(2)(vi)								
					20.405(a)(1)(iii)	50.73(a)(2)(i)		50.73(a)(2)(vi)(A)								
					20.405(a)(1)(iv)	50.73(a)(2)(ii)		50.73(1)(2)(vi)(B)								
					20.405(a)(1)(v)	50.73(a)(2)(iii)		50.73(a)(2)(v)								
					20.405(a)(1)(vi)	50.73(a)(2)(iv)										

NAME Richard R. Wehry, Nuclear Licensing Engineer												TELEPHONE NUMBER 7 1 7 5 4 2 - 3 6 6 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					

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 0533 hours on August 1, 1996, with Unit 1 operating in Condition 1 (Power Operation) at 98% power, a reactor scram occurred, per design, when the Main Turbine tripped on indicated high vibration. Both Reactor Recirculation pumps also tripped, per design, and all control rods fully inserted. Reactor water level dropped to +6.6 inches and all reactor Level 3 (+13 inches) isolations occurred per design. Reactor pressure peaked at 1127 psig, momentarily cycling Safety Relief Valves G, K, L, M and N. All Primary Containment parameters remained normal throughout the event. The cause of the turbine trip was attributed to a false, spurious signal from the turbine #1 bearing's vibration instrument loop. The investigation also concluded that the response to some precursor alarms, which may have precluded the turbine trip, was less than adequate. The plant was safely shut down and there were no safety consequences or compromises to public health or safety during this event, nor would there have been under different initial operating conditions. This transient is within the bounds of a turbine trip as analyzed in Chapter 15 of the Susquehanna FSAR. The components of the #1 bearing vibration monitoring loop which most likely could have caused the false, spurious signal were replaced. Training on expectations and sensitivity to alarms was completed. Actions to prevent recurrence include additional monitoring of vibration data, procedural enhancements, failure analysis of removed components, enhancing significance reviews of events to better identify precursors to more significant events and evaluation of design changes to eliminate unnecessary single failure design and obsolete equipment.

**LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION**

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-530), 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)  Unit 1  Susquehanna Steam Electric Station	DOCKET NUMBER (2)  0   5   0   0   0   3   8   7	LER NUMBER (6)						PAGE (3)		
		YEAR		SEQUENTIAL NUMBER		REVISION NUMBER				
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

**DESCRIPTION OF EVENT**

At 0533 hours on August 1, 1996, with Unit 1 operating in Condition 1 (Power Operation) at 98% power, a reactor scram occurred, per design, when the Main Turbine (EISS Code: TA) tripped on indicated high vibration. Both Reactor Recirculation pumps (EISS Code: AD) also tripped, per design, and all control rods (EISS Code: AA) fully inserted. Reactor water level dropped to +6.6 inches and all reactor Level 3 isolations occurred per design. Reactor pressure peaked at 1127 psig, momentarily cycling Safety Relief Valves (EISS Code: SB) G, K, L, M and N. All Primary Containment parameters remained normal throughout the event. There were no equipment malfunctions during the transient.

**CAUSE OF EVENT**

A root cause analysis of this event was performed by a multi-disciplined investigative team. The reactor scram was caused by a Main Turbine control valve fast closure as the result of an indicated high turbine vibration signal. Subsequent investigations attributed the turbine trip to a false, spurious signal from the turbine #1 bearing's vibration instrument loop. This vibration trip instrument logic is of a single failure design.

The investigation also concluded that the response to some precursor alarms, which may have precluded the turbine trip, was less than adequate. This included a low sensitivity to risk significant instrumentation malfunction and an inadequate alarm response procedure for turbine high vibration.

**REPORTABILITY / ANALYSIS**

This event was determined to be reportable per 10CFR50.73(a)(2)(iv), in that an unplanned Engineered Safety Feature (ESF) actuation occurred when the Reactor Protection System (RPS; EISS Code: JC) initiated an automatic reactor scram following a turbine control valve fast closure. All major equipment operated per design during the transient, Emergency Core Cooling Systems (ECCS) were not challenged and no abnormal operator actions were required to place the unit in a stable condition. The plant was safely shut down and there were no safety consequences or compromises to public health or safety during this event, nor would there have been under different initial operating conditions. The transient was within the bounds of a turbine trip as analyzed in Chapter 15 of the Susquehanna FSAR.

In accordance with the guidance provided in NUREG 1022, Supplement 1, Item 14.1 and 10CFR50.4(d), the required submission date for this report was determined to be September 3, 1996.

**LICENSEE EVENT REPORT (LER)  
TEXT CONTINUATION**

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

**CORRECTIVE ACTIONS**

The components of the #1 bearing vibration monitoring loop which most likely could have caused the false, spurious signal were replaced. Training of station personnel concerning expectations and sensitivity to alarms was completed. The alarm response procedures for turbine high vibration were enhanced and the #1 turbine bearing vibration trip was temporarily bypassed. Increased monitoring of turbine vibration was performed during the subsequent startup and will continue until the next refueling outage, scheduled for September 1996.

Actions to prevent recurrence include:

- Additional monitoring of turbine vibration data;
- Evaluating the need to enhance procedures concerning documenting, communicating and ensuring that adequate actions are taken to investigate unexplained, important alarms;
- Performing lab failure analysis on the removed, suspect components;
- Enhancing significance reviews of events to better identify precursors, or potential precursors, to more significant events (including internal events, industry events, event prioritization and resource management);
- Evaluating possible design changes to eliminate unnecessary single failure design and to upgrade obsolete equipment.

**ADDITIONAL INFORMATION**

Failed Component: None identified. Failure analysis of removed, suspect components is being performed.

Previous Similar Reported Events: None.