

PRIORITY 1

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REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9511070250 DOC. DATE: 95/11/02 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.
STANLEY, H.G. Pennsylvania Power & Light Co.
RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 93-008-01: on 930712, reactor scram occurred following turbine trip on high vibration. Replaced L-1 & L-0 turbine blades on both ends of turbine. W/951102 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: 05000387

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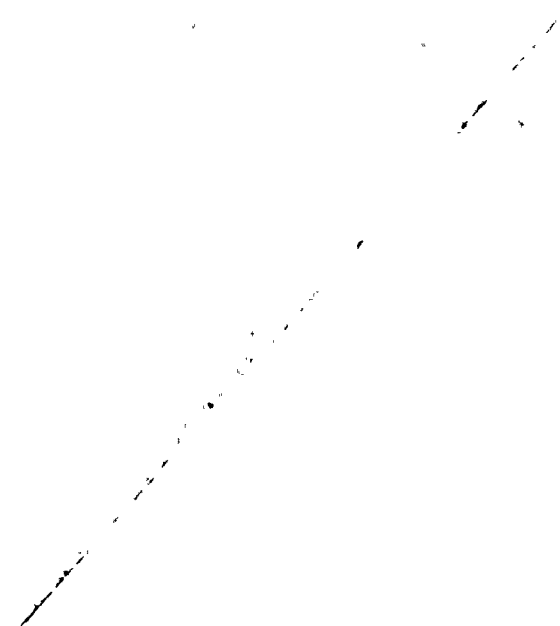
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November 2, 1995

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

SUSQUEHANNA STEAM ELECTRIC STATION
LICENSEE EVENT REPORT 93-008-01
PLAS - 651 FILE R41-2

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

Attached is Licensee Event Report 93-008-01. This report is provided as a supplement to Licensee Event Report 93-008-00 which 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 turbine control valve fast closure with power greater than 24%. The final root cause evaluation for the turbine blading failure which resulted in the unplanned automatic reactor scram concluded that the blade failure was caused by electrical system torsional induced vibration.


H.G. Stanley
VP - Nuclear Operations

RRW/dmd

cc: Mr. T. T. Martin
Regional Administrator, Region I
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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), U7.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 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 7	1 2	9 3	9 3	0 0 8	0 1	1 1	0 2	9 5			0 5 0 0 0

OPERATING MODE (9) 1		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5 - (Check one or more of the following) (11)										
POWER LEVEL (10) 1 0 0	20.402(b)			20.405(c)			50.73(a)(2)(v)			73.71(b)		
	20.405(a)(1)(i)			50.38(c)(1)			50.73(a)(2)(v)			73.71(c)		
	20.405(a)(1)(ii)			50.38(c)(2)			50.73(a)(2)(v)			OTHER (Specify in Abstract below and in Text, NRC Form 366A)		
	20.405(a)(1)(iii)			50.73(a)(2)(i)			50.73(a)(2)(iv)(A)					
	20.405(a)(1)(iv)			50.73(a)(2)(ii)			50.73(1)(2)(iv)(B)					
20.405(a)(1)(v)			50.73(a)(2)(iii)			50.73(a)(2)(v)						

NAME Richard R. Wehry, Project Engineer - Nuclear Licensing											
TELEPHONE NUMBER											
AREA CODE											
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		
X	T A	T R B	G O 8 4	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 fifteen single-space typewritten lines) (16)

At 1635 hours on July 12, 1993, with Unit 1 operating at 100% power, a reactor scram occurred, per design, when the Main Turbine tripped. 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 reactor scram was caused by a turbine control valve fast closure that resulted from a turbine master trip actuation. The turbine master trip was caused by Main Turbine high vibration as a result of failure of two turbine blades on the 'C' Low Pressure Turbine. The turbine blade failure was caused by electrical system torsional induced vibration. This event was determined to be reportable per 10CFR50.73(a)(2)(iv) in that an unplanned ESF actuation occurred when the RPS initiated an automatic reactor scram following turbine control valve fast closure with power greater than 24%. The plant was safely shut down and there were no safety consequences or compromise to public health or safety during this incident, nor would there have been under different initial operating conditions. This transient was within the bounds of a turbine trip as analyzed in Chapter 15 of the FSAR. Repairs were made to the turbine and an inertia ring was installed, at the manufacturer's recommendation, to minimize the potential for high cycle fatigue as a result of excited torsional vibrations. Subsequent inspections, testing, torsional test reports for both (Unit 1 and Unit 2) Susquehanna units and analytical results all reinforced the initial 8/12/93 root cause conclusion and the corrective actions taken.

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)															
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YEAR		SEQUENTIAL NUMBER		REVISION NUMBER														
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2	OF	3																

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

DESCRIPTION OF EVENT

At 1635 hours on July 12, 1993, with Unit 1 operating at 100% power, a Reactor Protection System (RPS; EIIS Code: JC) actuation occurred when the Main Turbine (EIIS Code: TA) tripped. Per design, the turbine control valves closed and an automatic reactor scram occurred. Both Reactor Recirculation (EIIS Code: AD) pumps tripped per design via the EOC-RPT logic circuitry. All control rods inserted fully. Two Safety Relief Valves (EIIS Code: SB) automatically lifted momentarily to control reactor pressure and properly reseated. The immediate operator actions for reactor scram and reactor pressure control were performed. Reactor water level reached 0 inches before recovering. Two of three Feedwater Heater (EIIS Code: SN) strings isolated. 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.

CAUSE OF EVENT

The reactor scram was caused by a turbine control valve fast closure which resulted from a turbine master trip actuation. The turbine master trip was caused by Main Turbine high vibration as a result of failure of two turbine blades on the 'C' Low Pressure Turbine. The turbine blade failure was caused by electrical system torsional induced vibration.

REPORTABILITY/ANALYSIS

This event was determined reportable per 10CFR50.73(a)(2)(iv), in that an unplanned Engineered Safety Feature (ESF) actuation occurred when the RPS initiated an automatic reactor scram following turbine control valve fast closure with power greater than 24%. All major equipment operated per design during the transient, ECCS was 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 compromise to public health or safety during this incident, 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 FSAR.

In accordance with the guidance provided in NUREG 1022 Supplement 1 item 14.1, the required submission date for this report was determined to be August 11, 1993.

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				
		9 3	—	0 0 8	—	0 1	3	OF	3	

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

CORRECTIVE ACTION

Repairs made to the 'C' Low Pressure Turbine included replacement of the L-1 and L-0 turbine blades on both ends of the turbine, repair of damaged turbine diaphragms and repair of low pressure condenser damage. Visual inspections were completed on the 'B' Low Pressure Turbine and no damage was found.

A modification was performed to install an inertia ring, at the manufacturer's recommendation, to minimize the potential for high cycle fatigue as a result of excited torsional vibrations.

Subsequent inspections, testing, torsional test reports for both (Unit 1 and Unit 2) Susquehanna units and analytical results all reinforced the initial 8/12/93 root cause conclusion and the corrective actions taken.

ADDITIONAL INFORMATION

Failed Component Identification:

Component: Turbine
Manufacturer: General Electric

Previous Similar Events: None