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FACIL:50-387 Susquehanna Steam Electric Station, Unit 1, Pennsylva 05000387
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STANLEY,H.G. Pennsylvania Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 93-008-00:on 930712,reactor scram occurred due to turbine control valve fast closure which resulted from turbine master actuation.Repaired damaged turbine diaphragms & low pressure condenser.W/930810 ltr.

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August 10, 1993

U.S. Nuclear Regulatory Commission
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SUSQUEHANNA STEAM ELECTRIC STATION
LICENSEE EVENT REPORT 93-008-00
FILE R41-2
PLAS - 572

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

Attached is Licensee Event Report 93-008-00. 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 turbine control valve fast closure with power greater than 24%.

George J. Kuczynski for
H.G. Stanley 8/10/93
VP - Nuclear Operations

RRW/mkf

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IE22

NRC FORM 366 (6-89)

U.S. NUCLEAR REGULATORY COMMISSION

APPROVED OMB NO. 3150-0104
EXPIRES: 4/30/92

ESTIMATED BURDEN PER RESPONSE TO COMPLY WTH 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.

LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
SUSQUEHANNA STEAM ELECTRIC STATION - UNIT 1	0 5 0 0 0 3 8 7	1 OF 0 3

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 0	0 8	1 0	9 3		0 5 0 0 0
										0 5 0 0 0

OPERATING MODE (9)	1	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)					
POWER LEVEL (10)	1 0 0	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, NRC Form 366A)	
		20.405(a)(1)(iii)	50.73(a)(2)(i)		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
RICHARD R. WEHRY, POWER PRODUCTION ENGINEER - COMPLIANCE	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 0 8 4	YES							

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
X YES (If yes, complete EXPECTED SUBMISSION DATE)	NO		1 2	0 1	9 3

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 cause of the turbine blade failure has been preliminarily attributed to high cycle fatigue. Root cause analyses for the blade failures are continuing and will be provided in a supplement to this report. 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 is within the bounds of a turbine trip as analyzed in Chapter 15 of the FSAR. Repairs are underway to restore the 'C' Low Pressure Turbine.

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 cause of the turbine blade failure has been preliminarily attributed to high cycle fatigue. Root cause analyses for the blade failures are continuing and the results of these analyses will be provided in a supplement to this report.

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.

CORRECTIVE ACTION

Repairs being made to the 'C' Low Pressure Turbine include 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 is being 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 (which is one potential root cause for the blade failures). Temporary instrumentation is also being installed to enable collection of additional data and to monitor machine performance.

Any additional corrective actions which are identified following completion of the root cause analyses will be provided in a supplement to this report.

ADDITIONAL INFORMATION

Failed Component Identification:

Component: Turbine
Manufacturer: General Electric

Previous Similar Events: None

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