

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

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 FACIL: 50-387 Susquehanna Steam Electric Station, Unit 1, Pennsylv 05000387
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 RYDER, T. S. Pennsylvania Power & Light Co.
 BYRAM, R. G. Pennsylvania Power & Light Co.
 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 87-007-00: on 870306, multiple plant disturbances occurred when lightning arrester failed at const substation. Caused by failure to lightning arrester at substation T.21. Mods installed to prevent sys trips. W/870406 ltr.

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 TITLE: 50.73 Licensee Event Report (LER), Incident Rpt, etc.

NOTES: 1cy NMSS/FCAF/PM. LPDR 2cys Transcripts. 05000387

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LICENSEE EVENT REPORT (LER)

FACILITY NAME (1)
Susquehanna Steam Electric Station - Unit 1

DOCKET NUMBER (2)
0 5 0 0 0 3 8 7

PAGE (3)
1 OF 0 4

TITLE (4)
Loss of Power to Unit 2 Startup Transformer T-20

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	3	06	87	007	0	0	04	06	SSES - Unit 2	0 5 0 0 0 3 8 8		
										0 5 0 0 0 1 1 1		

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

<input type="checkbox"/> 20.402(b)	<input type="checkbox"/> 20.406(a)	<input checked="" type="checkbox"/> 80.73(a)(2)(iv)	<input type="checkbox"/> 73.71(b)
<input type="checkbox"/> 20.406(a)(1)(i)	<input type="checkbox"/> 80.36(a)(1)	<input type="checkbox"/> 80.73(a)(2)(v)	<input type="checkbox"/> 73.71(a)
<input type="checkbox"/> 20.406(a)(1)(ii)	<input type="checkbox"/> 80.36(a)(2)	<input type="checkbox"/> 80.73(a)(2)(vi)	<input checked="" type="checkbox"/> OTHER (Specify in Abstract below and in Text, NRC Form 368A)
<input type="checkbox"/> 20.406(a)(1)(iii)	<input type="checkbox"/> 80.73(a)(2)(ii)	<input type="checkbox"/> 80.73(a)(2)(vii)(A)	
<input type="checkbox"/> 20.406(a)(1)(iv)	<input type="checkbox"/> 80.73(a)(2)(iii)	<input type="checkbox"/> 80.73(a)(2)(vii)(B)	
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LICENSEE CONTACT FOR THIS LER (12)

NAME: T. S. Ryder - Power Production Engineer

TELEPHONE NUMBER: AREA CODE 7 1 7, NUMBER 5 4 2 - 3 2 3 5

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

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPPDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NPPDS
X	FK	LAR	W 1 2 0	N	X	SM	SOL	C 3 3 9	N

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 March 6, 1987 at 1555 hours with Units 1 and 2 both operating at 100% power, multiple plant disturbances occurred when a lightning arrestor failed at a construction substation. The failure resulted in a phase to ground fault on the 230 KV supply line to Unit 2 Startup Transformer T-20. Power interruptions caused by realignment of the electrical distribution system when T-20 was lost resulted in numerous trips or auto starts of equipment/systems in both Units including Engineered Safety Feature (ESF) actuations of Reactor Water Cleanup, Standby Gas Treatment, Control Room Emergency Outside Air Supply and Recirculation Fan systems. Isolation of the 5A Feedwater Heater due to a solenoid failure resulted in a thermal power excursion. Unit 1 reactor power peaked at 102.8% violating the requirements of the Operating License, a reportable event. No immediate effects on fuel performance were apparent and no core thermal limits were exceeded. The electrical distribution system was returned to a normal operating lineup, plant systems were restored and no safety consequences or compromise to public safety occurred. Actions to prevent recurrence will include removing the effect of the construction substation on the plant by supplying 12.5 KV site distribution from a different source, investigating the cause of the solenoid failure which led to the Feedwater Heater isolation, installing a modification to prevent unwarranted trips of Standby Gas Treatment and review of the reactor power transient by reactor engineering personnel and licensed operators to assure full understanding of all aspects of the event.

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		YEAR 87	SEQUENTIAL NUMBER -007	REVISION NUMBER -00	02	OF 04

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

DESCRIPTION OF EVENT

On March 6, 1987 at 1555 hours with Units 1 and 2 both operating at 100% power, multiple plant disturbances occurred when a lightning arrester failed at Construction Substation T-21. The initial electrical transient consisted of the following: (1) a phase to ground fault occurred on the 230 KV supply line to Unit 2 Startup Transformer T-20; (2) T-20 tripped due to protective relay operation; (3) Unit 1 and 2 Engineered Safeguard System (ESS, EIIS Code: EB) 4 KV Busses 1B, 1D, 2B and 2D transferred to Startup Bus 10 per plant design.

Major effects of the electrical transient on Unit 1 and Common Systems were as follows: (1) "A" and "B" Reactor Recirculation (RX Recirc. EIIS Code: AD) Motor-Generator scoop tubes locked; (2) Reactor Water Cleanup (RWCU, EIIS Code: CE) System isolated; (3) Offgas Recombiner (EIIS Code: WF) tripped and subtrains isolated; (4) "B" Containment Rad Monitor (CRM, EIIS Code: IK) tripped; (5) "B" Control Rod Drive (CRD, EIIS Code: AA) Pump tripped; (6) extraction steam to the 5A Feedwater Heater (EIIS Code: SM) isolated; (7) reactor thermal power increased above rated thermal power for approximately 21 minutes and peaked at 102.8%; (8) "B" train of Standby Gas Treatment System (SGTS, EIIS Code: BH) started; (9) "B" train of Control Room Emergency Outside Air Supply System (CREOASS, EIIS Code: BH) started; (10) "B" Recirculation Fans (EIIS Code: BH) started; (11) 13.8 KV supply to Transformer 0X502 was lost causing "A" and "B" River Water Makeup (RWMU, EIIS Code: KI) Pumps to trip; (12) chilled water to Rx Recirc Pumps isolated; (13) approximately 3 minutes into the event a SGTS heater failure caused "B" SGTS to trip; (14) Turbine Buildings (TB) Chillers (EIIS Code: KM) tripped; (17) Reactor Building (RB) Chillers (EIIS Code: KM) tripped.

Major effects of the electrical transient on Unit 2 were as follows: (1) "B" CRD pump tripped; (2) "B" TB Chiller tripped; (3) "B" RB Chiller tripped; (4) "B" Containment Atmosphere Control (CAC, EIIS Code: BB) Valves isolated; (5) Chilled Water to Rx Recirc Pumps was lost; (6) RWCU isolated; (7) "B" Reactor Building Closed Water Cooling (RBCCW, EIIS Code: CC) Pump auto started; (8) "B" channel of Suppression Pool Temperature Monitoring System (SPTMOS, EIIS Code: IM) was lost.

CAUSE OF EVENT

The cause of the electrical transient precipitating the various plant disturbances described above was a failure to a lightning arrester at Construction Substation T-21. The failure resulted in a phase to ground fault on the 230 KV supply line to Unit 2 Startup Transformer T-20. Protective relay operation caused the 230 KV line to trip and power to T-20 was subsequently lost. The Unit 1 and 2 ESS 4KV Busses 1B, 1D, 2B and 2D transferred to Startup Bus 10 in accordance with plant design.

The plant response to the loss of T-20 including events described above was in accordance with design and as expected with the following exceptions:

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		87	0107	010	03	04

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

Extraction steam to the 5A Feedwater Heater isolated because a solenoid valve which de-energized properly during the transient failed to reposition when its power was restored. This caused feedwater heater level to increase to the setpoint at which it isolated per design.

The loss of the 5A Feedwater Heater on Unit 1 resulted in a significant power excursion during this event. A review determined that reactor power exceeded 100% for approximately 21 minutes due to reduction in feedwater temperature. Reactor power reached a maximum of 102.8% and remained greater than 102% for approximately 14 minutes.

"B" SGTS tripped approximately 3 minutes after it had auto started. Investigation determined that a time delay relay initiated upon loss of power to filter train differential temperature logic. When power was restored to the logic, the response time of the electronics was not fast enough to de-energize the time delay relay before it had timed out causing SGTS to trip. The "A" SGTS started when the "B" train tripped but since the corresponding "A side" dampers had not received an initiation signal, a suction path was not available for the "A" SGTS. The differential temperature logic was reset and the "B" SGTS train was restarted. This is a problem that has previously been identified and there is a modification being designed to prevent future trips of this nature.

REPORTABILITY/ANALYSIS

This event was determined reportable per 10CFR50.73 (a) (2) (iv) in that unplanned Engineered Safety Feature (ESF) actuations occurred when Unit 1 and 2 RWCU isolated, the "B" trains of SGTS and CREOASS started and the "B" Recirculation Fans started. The ESF systems performed their intended functions and no safety consequences resulted from their actuations.

Secondly, this event was determined reportable per Facility Operating License NPF-14 Section 2.G in that requirements of the Operating License were violated when reactor thermal power exceeded 102%. A prompt notification to the Commission was not made as required per the Operating License. By the time the formal review was completed which determined that the power excursion exceeded license requirements, it was too late to meet the 24 hour reporting deadline. Therefore it was decided to report this condition within License Event Report (LER) 87-007-00 rather than make a late prompt notification.

Analysis of the thermal power excursion verified that no core thermal limits were exceeded and that the plant operated within the bounds of the transient analysis for the loss of the feedwater heating event. The adverse effects on the core from operating at greater than 100% power during the transient were limited to fuel preconditioning overpower. No immediate effects on fuel performance were apparent based on monitored off-gas radiation levels and reactor water chemistry results taken following the event. Future Pellet Cladding Interaction (PCI) related fuel failures due to this event appear unlikely due to the short duration and magnitude of the preconditioning overpowers. There were no safety consequences from this event and there was no compromise to the public safety.

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TEXT (If more space is required, use additional NRC Form 368A's) (17)

CORRECTIVE ACTIONS

Immediate corrective actions included restoration of loads to T-20 when power was available and restoration of lost plant systems. On Unit 1 at 1614 hours the RX Recirc Pump Motor-Generator scoop tubes were reset and recirculation flow was reduced to compensate for the increased thermal power due to the feedwater heating transient. At 1650 hours the 5A Feedwater Heater was restored and the electrical distribution system was realigned for normal operation. Recirculation flow was increased beginning at 1754 hours to restore Unit 1 reactor power to 100%. Unit 2 plant systems were restored to normal by approximately 2239 hours.

Actions to prevent recurrence are as follows: (1) Removing the effect of Construction Substation T-21 on the plant by supplying 12.5KV site distribution from a different source; (2) an investigation will be conducted to determine why the solenoid valve did not re-position causing the Feedwater Heater isolation; (3) a modification will be installed which will prevent SGTS trips due to momentary power interruptions to the filter train differential temperature logic; (4) the reactor power transient will be reviewed by all reactor engineering personnel and licensed operators to ensure all aspects of the event are fully understood.

ADDITIONAL INFORMATION

There have been no previous events caused by lightning arrestor failure at Construction Substation T-21. There have been other occasions, however, in which Unit 2 Startup Transformer T-20 has tripped due to other causes. These events are documented in Licensee Event Reports (LER) 84-014, 85-020 and 86-022.

Failed components discussed in this report include Arrestor, Lightning (Component Function Identifier: IAR) manufactured by Westinghouse and Solenoid (Component Function Identifier: SOL) manufactured by Circle Seal.



Pennsylvania Power & Light Company

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April 6, 1987

U. S. Nuclear Regulatory Commission
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SUSQUEHANNA STEAM ELECTRIC STATION
LICENSEE EVENT REPORT 87-007-00
FILE R41-2
PLAS - 242

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

Attached is Licensee Event Report 87-007-00. This event was determined reportable per 10CFR 50.73 (A) (2) (iv), in that multiple unplanned Engineered Safety Feature (ESF) actuations occurred when power was lost to the Unit 2 Startup Transformer and per Facility Operating License requirements, in that license requirements were violated when reactor power exceeded 102%.

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TSR/cmw

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