

ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9012120282 DOC. DATE: 90/12/06 NOTARIZED: NO DOCKET #
 FACIL: 50-387 Susquehanna Steam Electric Station, Unit 1, Pennsylv 05000387
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 RECIPIENT NAME RECIPIENT AFFILIATION

SUBJECT: LER 90-024-00: on 901107, engineered safety feature actuations occurred when power lost to 13.8 kv startup bus 10.

DISTRIBUTION CODE: IE22T COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 2
 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

NOTES: LPDR 1 cy Transcripts. 05000387

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December 6, 1990

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

SUSQUEHANNA STEAM ELECTRIC STATION
LICENSEE EVENT REPORT 90-024-00
FILE R41-2
PLAS - 457

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

Attached is Licensee Event Report 90-024-00. This event was determined reportable per 10CFR50.73(a)(2)(iv) in that multiple unplanned Engineered Safety Feature (ESF) actuations occurred when power was lost to 13.8 KV Startup Bus 10.


H.G. Stanley
Superintendent of Plant - Susquehanna

MLC/mjm

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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.

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TITLE (4) Multiple Engineered Safety Feature Actuations Occurred When Power Was Lost to 13.8 KV Startup Bus 10 Due to Feeder Breaker Opening

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)		
1	1	0 7 9 0	9 0	0 2 4	0 0	1 2 0 6 9 0	SSES - Unit 2			0 5 0 0 0 3 8 8				
												0 5 0 0 0		

OPERATING MODE (9) 4		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)									
POWER LEVEL (10) 0 0 0	20.402(b)	20.405(c)	<input checked="" type="checkbox"/>	50.73(a)(2)(iv)	73.71(b)						
	20.405(a)(1)(i)	50.38(c)(1)	<input type="checkbox"/>	50.73(a)(2)(v)	73.71(c)						
	20.405(a)(1)(ii)	50.38(c)(2)	<input type="checkbox"/>	50.73(a)(2)(vi)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)						
	20.405(a)(1)(iii)	50.73(a)(2)(i)	<input type="checkbox"/>	50.73(a)(2)(vii)(A)							
	20.405(a)(1)(iv)	50.73(a)(2)(ii)	<input type="checkbox"/>	50.73(a)(2)(vii)(B)							
	20.405(a)(1)(v)	50.73(a)(2)(iii)	<input type="checkbox"/>	50.73(a)(2)(viii)							

LICENSEE CONTACT FOR THIS LER (12)									
NAME Michael L. Crist - Compliance Evaluator							TELEPHONE NUMBER 7 1 7 5 4 2 - 3 2 8 9		

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
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO											

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

On November 7, 1990 at 1741 hours with Unit 1 in Condition 4, Cold Shutdown, and Unit 2 in Condition 1 at 100% power the feeder breaker to 13.8 KV Startup Bus 10 opened causing the bus to de-energize. The Unit 1 and Unit 2 "A" and "C" Emergency Safeguard System (ESS) buses normally powered from Bus 10 transferred to Bus 20 as designed. During the transfer, the momentary power loss to the ESS buses resulted in a loss of the Unit 1 "A" Reactor Protection System (RPS) bus. As a result of the loss of RPS "A" bus, a Zone I and III isolation of the HVAC systems occurred which caused an automatic initiation of the "A" train of the Standby Gas Treatment System and the Control Room Emergency Outside Air Supply System. In addition, the loss of RPS resulted in a half-scrum and the closure of various Unit 1 and Unit 2 containment isolation valves. Various Unit 1 and Unit 2 radiation monitors, chillers, and other plant equipment also tripped or isolated as a result of the power interruption. The feeder breaker to Bus 10 was racked out and racked back in. Power was then restored to Bus 10. The units were stabilized and the affected systems were restored as applicable. An additional investigation into the event did not identify a definitive cause(s) for the breaker opening. The Engineered Safety Feature (ESF) systems performed their intended functions. As such, there were no safety consequences or compromise to public health and safety from this event.



LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 60.0 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.

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

EVENT DESCRIPTION

On November 7, 1990 at 1235 hours with Unit 1 in Condition 4, Cold Shutdown, and Unit 2 in Condition 1 at 100% power the loads from Startup Bus 10 were transferred to Startup Bus 20 in support of maintenance inspection activities on the 13.8 KV Bus OA108 Transition Compartment. Startup Bus 10 and Startup Bus 20 are 13.8 KV distribution buses which are fed from independent offsite sources. Following completion of the inspections the loads were transferred back to Bus 10 at 1605 hours.

At 1741 hours the feeder breaker (OA10301) to Startup Bus 10 unexpectedly opened causing the bus to de-energize. This breaker was previously manipulated during switching evolutions associated with the inspection discussed above. The Unit 1 and Unit 2 "A" and "C" Emergency Safeguard System (ESS) buses (EIIS Code: EB) normally powered from Bus 10 transferred to Bus 20 as designed. During the transfer, the momentary power loss to the ESS buses resulted in a loss of the Unit 1 "A" Reactor Protection System (RPS, EIIS Code: JC) bus. As a result of the loss of RPS "A" bus, a Zone I and III isolation of the Heating, Ventilation and Air Conditioning systems (HVAC, EIIS Code: VA) occurred which caused an automatic initiation of the "A" train of the Standby Gas Treatment System (SGTS, EIIS Code: BH) and the Control Room Emergency Outside Air Supply System (CREOASS, EIIS Code: BH). In addition, the loss of RPS resulted in a half-scrum and the closure of the following containment isolation valves:

- 1) Residual Heat Removal (RHR, EIIS Code: BO) Injection Outboard Isolation Valve, HV-151-F015A.
- 2) RHR Shutdown Cooling Suction Inboard Isolation Valve, HV-151-F009.
- 3) Reactor Water Cleanup (RWCU, EIIS Code: CE) Inboard Isolation Valve, HV-144-F001.
- 4) Division I Reactor Building Chilled Water (RBCW, EIIS Code: KM) Isolation Valves.
- 5) Division I Containment Atmosphere Control (CAC, EIIS Code: BB) Valves.

The electrical transient caused the following Unit 2 containment isolation valves to close.

- 1) Division I CAC Isolation Valves.
- 2) "A" Reactor Recirculation (EIIS Code: AD) Pump Cooling Water Outboard Isolation Valves, HV-28791A1 & A2.



LICENSEE EVENT REPORT (LER)
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3) "B" Reactor Recirculation Pump Cooling Water Inboard Isolation Valves, HV-28792A1 & A2.

Various Unit 1 and Unit 2 radiation monitors, chillers, and other plant equipment also tripped or isolated as a result of the power interruption.

A Nuclear Plant Operator (NPO, utility, non-licensed) was dispatched to Startup Bus 10 to investigate the loss of power. The NPO reported that the relay operation indicators (targets) at Bus 10 did not indicate any relay actuations. The relays are lockout relays which have to be manually reset after actuation. No relays were reset. The subject breaker has a position indication light at the breaker control switch in the control room. This indicator illuminates whenever the breaker automatically opens after the operator has closed the breaker from the control room. The indicator was found illuminated, indicating that an automatic trip had occurred.

Breaker OA10301 was racked out and racked back in. Power was then restored to Bus 10. Control Room personnel (utility, licensed) proceeded to restore the affected systems as applicable. At approximately 1800 hours a second investigation by Technical and Maintenance Engineering (utility and non-utility, other) was commenced. At 2015 hours an ENS call was made in accordance with 10CFR50.72(b)(2)(ii).

CAUSE OF EVENT

A comprehensive investigation into the event was conducted by Technical and Maintenance Section personnel in an attempt to determine the exact cause of OA10301 opening. The investigation included review of the breaker design, i.e., trip logic, and physical inspections of the breaker and its cubicle.

Based on the switching evolutions prior to the event, the reported observations by Operations and Maintenance personnel, and the design of the breaker trip logic, the most probable causes of the unexplained automatic trip of OA10301 are as follows:

1. Loss of the potential transformer (PT) supply voltage.

Two possible causes can be attributed to PT contact problems:

- a. The mechanical connection of the B phase PT contact connections appeared to be slightly out of alignment and exhibited contact surface oxidation.
- b. Any opening or disturbance of the PT primary and/or secondary contacts would cause an interruption of the potential supply to the scheme.



LICENSEE EVENT REPORT (LER)
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Either of the above would cause a momentary impulse to be sensed by the 27AI relays which in turn would send a trip signal to the trip coil of OA10301 and trip the breaker. These relays detect undervoltage conditions on the incoming feeder to Bus 10. The relay operation indicator (target) did not indicate any relay actuation and interviews with Operations personnel did not provide evidence of any inadvertent opening of the PT cabinet. The B phase connection was re-aligned and the PTs were placed back in service.

2. Breaker Mechanical Problem.

The breaker mechanical linkage could have been out of alignment. The misalignment could have mechanically activated the linkage and caused the breaker to trip. The breaker was removed for inspection and some mechanical checks and alignments were performed. No problems were found and the breaker was re-installed.

3. Cubicle Alignment Problem.

The breaker could have been racked-in in a misaligned fashion causing the breaker to trip. The breaker was racked out and in during the switching evolutions associated with the transition compartment inspection. This trip would be due to a misalignment of the mechanical linkage of the rear floor tripper which cause the automatic floor closing spring release lever to operate. The breaker was racked out and racked in during Operations initial investigation and the subsequent investigation by the Technical and Maintenance Sections without incident.

4. Transient Trip Signal.

The breaker trip logic scheme could have experienced an electrical transient in the 125 VDC control scheme. The protective relaying was tested for both loss of and momentary loss of the DC logic voltage and no relay actuations were observed. After relay testing, the breaker protection scheme was placed back in service without incident.

In summary, it is reasonable to conclude that the disturbance of the Bus 10 incoming feeder PTs, by switching evolutions associated with the inspection of the 13.8 KV transition compartment, aggravated or caused an intermittent stab contact on the B phase of the PT which, subsequently, initiated the trip of breaker OA10301 via the incoming feeder undervoltage relays.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 600 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.

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

REPORTABILITY/ANALYSIS

This event was determined to be reportable per 10CFR50.73.(a)(2)(iv) in that unplanned Engineered Safety Feature (ESF) actuations occurred as noted in the Event Description. The ESF systems performed their intended functions and no safety consequences resulted from their actuations. The intended functions would have occurred regardless of power level. There were no safety consequences from this event and there was no compromise to public health and safety.

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 December 7, 1990.

CORRECTIVE ACTIONS

The feeder breaker to bus 10 was racked out and racked back in. Power was then restored to Bus 10. The units were stabilized and the affected systems were restored as as applicable.

A subsequent investigation was performed by Technical and Maintenance personnel. As part of this investigation breaker 0A10301 was taken out of service for inspection of at 0145 hours on November 8, 1990. The investigation/inspection did not identify any definitive cause(s) for the breaker opening. A summary of the actions which were performed is provided below:

1. The breaker mechanical linkage was checked and alignments were performed.
2. The PT contact alignments were adjusted and the contact surface oxidation was removed.
3. The PT cubicle was cleaned.
4. A breaker cubicle inspection was performed including both wiring and structural aspects. No abnormal condition was found.
5. The protective relaying was removed and tested. No abnormal operations or trips were observed.

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

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The breaker was re-installed and at 0540 hours Bus 10 was returned to service without incident. Actions to prevent recurrence include enhancements to the 13.8 KV and 4.16 KV electrical distribution preventative maintenance program, which are currently under management review.

ADDITIONAL INFORMATION

Failed Component Identification: Not applicable.

Similar Reportable Events: None.

There have been past ESF actuations resulting from the loss of Startup Bus 10. It was determined from a review of these events, however, that the causal factors for the previous events were not similar.