

ACCELERATED DISTRIBUTION DEMONSTRATION SYSTEM

REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR: 9107100328 DOC. DATE: 91/07/05 NOTARIZED: NO DOCKET #
 FACIL: 50-387 Susquehanna Steam Electric Station, Unit 1, Pennsylv 05000387
 AUTH. NAME AUTHOR AFFILIATION
 METER, J.J. Pennsylvania Power & Light Co.
 STANLEY, H.G. Pennsylvania Power & Light Co.
 RECIP. NAME RECIPIENT AFFILIATION

SUBJECT: LER 91-006-00: on 910608, unplanned actuations of ESF
 occurred. Caused by unexpected trip of primary power supply
 EPA breaker loses power. 'A' RPS bus placed on alternate
 power supply & all isolations. W/910705 ltr.

DISTRIBUTION CODE: IE22T COPIES RECEIVED: LTR 1 ENCL 1 SIZE: 5
 TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

NOTES: LPDR 1 cy Transcripts. 05000387

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	AEOD/ROAB/DSP	2	2	NRR/DET/ECMB 9H	1	1
	NRR/DET/EMEB 7E	1	1	NRR/DLPQ/LHFB10	1	1
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	NRR/DST/SRXB 8E	1	1	<u>REG FILE</u> 02	1	1
	RES/DSIR/EIB	1	1	RGNI FILE 01	1	1
EXTERNAL:	EG&G BRYCE, J.H	3	3	L ST LOBBY WARD	1	1
	NRC PDR	1	1	NSIC MURPHY, G.A	1	1
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July 5, 1991

U.S. Nuclear Regulatory Commission
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SUSQUEHANNA STEAM ELECTRIC STATION
LICENSEE EVENT REPORT 91-006-00
FILE R41-2
PLAS - 490

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

Attached is Licensee Event Report 91-006-00. This event was determined reportable per 10CFR50.73(a)(2)(iv) in that unplanned actuations of Engineered Safety Features occurred due to the loss of the primary power supply to the Division 1 Reactor Protection System power distribution panel when the Electrical Protection Assembly breakers tripped.

H.G. Stanley
Superintendent of Plant - Susquehanna

JJM/mjm

cc: Mr. T. T. Martin
Regional Administrator, Region I
U.S. Nuclear Regulatory Commission
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Mr. G. S. Barber
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PDR ADOCK 05000337
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Handwritten initials: JEM 1/1

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			PAGE (3) 1 OF 0 4	
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TITLE (4)
ESF Actuations Due to RPS EPA Breakers Spurious Trip

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	6	0	8	9	1	9	1	0	0	6	0	0	7	0	5	9	1			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		<input type="checkbox"/>	20.402(b)	<input type="checkbox"/>	20.405(c)	<input checked="" type="checkbox"/>	60.73(a)(2)(iv)	<input type="checkbox"/>	73.71(b)			
		<input type="checkbox"/>	20.405(a)(1)(i)	<input type="checkbox"/>	60.36(c)(1)	<input type="checkbox"/>	60.73(a)(2)(v)	<input type="checkbox"/>	73.71(c)			
		<input type="checkbox"/>	20.405(a)(1)(ii)	<input type="checkbox"/>	60.36(c)(2)	<input type="checkbox"/>	60.73(a)(2)(vi)	<input type="checkbox"/>	OTHER (Specify in Abstract below and in Text, NRC Form 366A)			
		<input type="checkbox"/>	20.405(a)(1)(iii)	<input type="checkbox"/>	60.73(a)(2)(i)	<input type="checkbox"/>	60.73(a)(2)(viii)(A)	<input type="checkbox"/>				
		<input type="checkbox"/>	20.405(a)(1)(iv)	<input type="checkbox"/>	60.73(a)(2)(ii)	<input type="checkbox"/>	60.73(a)(2)(viii)(B)	<input type="checkbox"/>				
		<input type="checkbox"/>	20.405(a)(1)(v)	<input type="checkbox"/>	60.73(a)(2)(iii)	<input type="checkbox"/>	60.73(a)(2)(ix)	<input type="checkbox"/>				

LICENSEE CONTACT FOR THIS LER (12) NAME J.J. Meter - Engineer II - Compliance										TELEPHONE NUMBER AREA CODE 7 1 7 5 4 2 - 1 8 7 3			
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRPDS	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO NRPDS

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)

At 2331 hours on June 8, 1991 with Unit 1 operating at 100% power, the primary power supply to the "A" Reactor Protection System (RPS) power distribution panel was lost when its Electrical Protection Assembly (EPA) breakers tripped. RPS as well as other Plant systems and components functioned properly and as expected in response to the event. No reactor parameters were affected and no Emergency Core Cooling Systems were actuated. The 'A' distribution panel was swapped to alternate power until the primary power supply was restored. There was no indication of abnormalities and all isolation signals were reset by 0042 hours on 6/9/91. The primary power source EPA breakers were reset at 1430 hours on 6/9/91. Full power operation of the unit continued without interruption. While the exact cause of the trip was not definitively determined, the most probable cause for the trip was attributed to a faulty power supply on the EPA logic card. A task team has been organized to enhance the reliability of the Reactor Protection System. In addition, an EPA study prepared by GE - Nuclear Energy for the BWR Owners Group is also under PP&L review to assess any operational or design changes that may be warranted. LER 90-007 (Docket No. 50-388/License No. NPF-22) will be updated to provide the results of the efforts to enhance RPS reliability. Since all Engineered Safety Feature (ESF) systems and components functioned properly and per design, there were no safety consequences or compromises to the health or safety of the public.

LICENSEE EVENT REPORT (LER)
TEXT CONTINUATION

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS INFORMATION COLLECTION REQUEST: 500 HRS. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE RECORDS AND REPORTS MANAGEMENT BRANCH (P-630), 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 1	- 0 0 6	- 0 0	0 2	OF 0 4

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

DESCRIPTION OF EVENT

At 2331 hours on June 8, 1991 with Unit 1 operating in CONDITION 1 at 100% power, the primary power supply to the "A" Reactor Protection System (RPS; EIIS Code: JC) power distribution panel 1Y201A was lost when its Electrical Protection Assembly (EPA) breakers tripped. This power interruption resulted in numerous Primary Containment Isolation System (EIIS Code: JM) actuations and automatic system initiations. RPS as well as other plant systems functioned as designed in response to the event. The major actuations were as follows:

- 1) Reactor Building HVAC (EIIS Code: VA) Zones II and III isolated.
- 2) Reactor Water Cleanup System (EIIS Code: CE) inboard isolation valve closed.
- 3) Cooling water isolation valves to the Reactor Recirc Pumps (EIIS Code: CC) closed.
- 4) "A" Standby Gas Treatment System (EIIS Code: BH) auto initiated.
- 5) "A" Control Room Emergency Outside Air Supply System (EIIS Code: VI) auto initiated.

Reactor parameters were not affected and no Emergency Core Cooling Systems (ECCS) actuated. The 'A' RPS bus was supplied by alternate power and all isolation signals were reset by 0042 hours on 6/9/91. The primary power EPA breakers were reset at 1430 on 6/9/91 and full power operation of the unit continued without interruption.

CAUSE OF EVENT

The loss of power to the "A" RPS bus was due to an unexpected trip of a primary power supply EPA breakers. When the "up stream" EPA breaker trips, the "down stream" EPA breaker loses power and also trips. While the exact cause was not definitively determined, the most probable cause for the spurious trip of the EPA breaker was attributed to a faulty power supply on the EPA logic card. Investigation of the "upstream" EPA breaker logic card showed that the faulty power supply caused the oscillator output frequency to shift from 6000 hertz to 5000 hertz. This output frequency (which is in direct correlation to the input voltage) is the reference for the EPA trip circuits. The shift in frequency resulted in normal 120 VAC input from the RPS M/G set appearing as 109 VAC to the EPA logic. The erroneous 109 VAC signal is within the trip set point range of the under voltage setting. Since no "flags" or indicators are set when an EPA trips to indicate the tripping signal, the power supply induced oscillator frequency shift can not definitively be stated as the cause of the trip.

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-630), 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)	
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TEXT (If more space is required, use additional NRC Form 366A's) (17)

CORRECTIVE ACTIONS

The 'A' RPS bus was placed on alternate power supply and all isolations were reset within one and one-half hour of the primary supply EPA breaker trip. The primary EPA breakers were then reset at 1430 on 6/9/91.

An investigation was commenced to determine the cause of the EPA trip. The "upstream" EPA logic card was replaced as being the most likely cause for the trip because of a faulty power supply. Measurement of the power supply and oscillator parameters on the "down stream" EPA logic card did not reveal any problems and the card is operating properly.

Prior to an EPA breaker trip on May 15, 1991 (LER 91-007-00 NPF-22), efforts were already underway to enhance the reliability of RPS. Since the event, the efforts have been expedited. A task team with members representing Technical Staff Engineering, Electrical Maintenance, Nuclear Plant Engineering, Electrical Testing, Operations and General Electric has been formed to address the reliability of the entire RPS system with initial efforts focused on EPA breaker hardware.

Spurious actuation of EPA breakers has been identified as a problem affecting BWR reliability. This issue has been under review by the BWR Owners Group for several years. In January, 1991 GE-Nuclear Energy issued Electrical Protection Assembly (EPA) Study (Report No. EDE-18-0789) in response to the BWR Owners Group's request to address the EPA operational and design issues which may explain the occurrence of reported spurious trips. The report is also under PP&L review to assess any operational or design changes that may be warranted. LER 90-007 (Docket No. 50-388/License No. NPF-22) which describes a previous similar event will be updated to provide the results of PP&L's efforts to enhance RPS reliability.

REPORTABILITY/ANALYSIS

This event was determined to be reportable under 10CFR50.73(a)(2)(iv) in that unplanned actuations of Engineered Safety Features (ESF) occurred when the RPS EPA breakers tripped.

The safety function of the EPA breaker is to interrupt power to the RPS buses in the event of overvoltage, undervoltage, or under-frequency conditions. RPS is designed such that a loss of power to the RPS buses results in plant systems aligning to their safety function positions.

Since all ESF systems and components functioned properly and per design, there were no safety consequences or compromises to the health or safety of the public.

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-630), 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 388A's) (17)

Had this event occurred with the unit in cold shutdown or refueling, the safety consequences could have been slightly greater due to the fact that shutdown cooling would have been temporarily lost due to the automatic isolation of the RHR Shutdown Cooling suction line.

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 July 8, 1991.

ADDITIONAL INFORMATION

A review of past Licensee Event Reports (LERs) for the station identified ten previous events where spurious EPA breaker trips resulted in ESF actuations. Several other events in which the EPA breaker trips were caused by the starting of large motors are not reported here since this problem was corrected in 1985 by replacing the RPS Alternate Power Supply transformers with constant voltage transformers in both Units 1 and 2.

UNIT 1 (Docket No. 50-387/License No. NPF-14)

- LER 91-004
- LER 90-005
- LER 87-024
- LER 86-029
- LER 86-023
- LER 83-172

UNIT 2 (Docket No. 50-388/License No. NPF-22)

- LER 91-008
- LER 91-007
- LER 90-007
- LER 88-005