



**PP&L****Pennsylvania Power & Light Company**

Two North Ninth Street • Allentown, PA 18101 • 215 / 770-5151

July 10, 1992

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

SUSQUEHANNA STEAM ELECTRIC STATION  
LICENSEE EVENT REPORT 92-007-01  
FILE R41-2  
PLAS - 529

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

Attached is Licensee Event Report 92-007-01. 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 2 Reactor Protection System power distribution panel when two Electrical Protection Assembly breakers tripped.

  
H.G. Stanley  
Superintendent of Plant - Susquehanna

JJM/mjm

cc: Mr. T. T. Martin  
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LICENSEE EVENT REPORT (LER)

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) <b>Susquehanna Steam Electric Station - Unit 1</b>	DOCKET NUMBER (2) <b>0 5   0   0   0   3   8   7   1</b>	PAGE (3) <b>OF 0   4</b>
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TITLE (4)  
**ESF Actuations Due to RPS EPA Breakers Tripping**

EVENT DATE (6)			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 4	0 7	9 2	9 2	0 0 7	0 1	0 7	1 0	9 2			0 5   0   0   0

OPERATING MODE (9) <b>5</b>	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check one or more of the following) (11)									
POWER LEVEL (10) <b>0 0 0</b>	20.402(b)	20.406(c)	<input checked="" type="checkbox"/>	60.73(a)(2)(iv)	73.71(b)					
	20.406(a)(1)(i)	60.36(c)(1)	<input type="checkbox"/>	60.73(a)(2)(v)	73.71(c)					
	20.406(a)(1)(ii)	60.36(c)(2)	<input type="checkbox"/>	60.73(a)(2)(vii)	OTHER (Specify in Abstract below and in Text, NRC Form 366A)					
	20.406(a)(1)(iii)	60.73(a)(2)(ii)	<input type="checkbox"/>	60.73(a)(2)(viii)(A)						
	20.406(a)(1)(iv)	60.73(a)(2)(iii)	<input type="checkbox"/>	60.73(a)(2)(vii)(B)						
20.406(a)(1)(v)	60.73(a)(2)(iii)	<input type="checkbox"/>	60.73(a)(2)(ix)							

LICENSEE CONTACT FOR THIS LER (12)

NAME <b>J. J. Meter - Power Production Engineer</b>	TELEPHONE NUMBER <b>7   1   7   5   4   2   -   1   8   7   3</b>
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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
B	J   C	5   2	G   0   8   0	Y					

SUPPLEMENTAL REPORT EXPECTED (14)

<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO	EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
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ABSTRACT (Limit to 1400 spaces, i.e., approximately fifteen single-space typewritten lines) (16)

At 2214 hours on April 7, 1992 with Unit 1 shutdown and defueled, the primary power supply to the "B" Reactor Protection System (RPS) power distribution panel was lost when both of its Electrical Protection Assembly (EPA) breakers tripped. RPS as well as other Plant systems and components functioned properly in response to the event. One control rod inserted. No Emergency Core Cooling Systems were actuated. The "B" 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 2315 hours. The primary power source EPA breakers were reset at 1010 hours on 4/12/92. Analysis of the logic card by the manufacturer revealed that a defective transistor was the cause for misoperation. This upstream logic card was removed, sent to the manufacturer for failure analysis, repair and component lifetime upgrade, and replaced with a card that had a component lifetime upgrade. The remaining EPA logic cards with limited component lifetimes will also be replaced. Currently, modifications to enhance the RPS/EPA power system are in the scope and estimate stages. 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: 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 9   2	SEQUENTIAL NUMBER - 0   0   7	REVISION NUMBER - 0   1	0   2	OF	0   4

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

DESCRIPTION OF EVENT

At 2214 hours on April 7, 1992 with Unit 1 shutdown for its 6th Refueling and Inspection outage, the primary power supply to the "B" Reactor Protection System (RPS; EIIS Code: JC) power distribution panel 1Y201B was lost when both of its Electrical Protection Assembly (EPA) breakers tripped. This power interruption resulted in 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) Zone III isolated.
- 2) Reactor Water Cleanup System (EIIS Code: CE) inlet isolation valves closed.
- 3) Cooling water isolation valves to the Reactor Recirc Pumps (EIIS Code: CC) closed.
- 4) "A" & "B" Standby Gas Treatment Systems (EIIS Code: BH) auto initiated.
- 5) "A" Control Room Emergency Outside Air Supply System (EIIS Code: VI) auto initiated.
- 6) One control rod (EIIS Code: JD) inserted. Investigation revealed that its select rod insert switch was in the test position giving it an "A" RPS half scram. When the "B" RPS channel power was lost the rod scrambled. There were no consequences of the rod insertion, the reactor was defueled.

No. Emergency Core Cooling Systems (ECCS) actuated which is the expected result to loss of power to one RPS division. The 'B' RPS bus was supplied by alternate power while the Operations personnel reset isolation signals and the cause of the trip was investigated. All isolation signals were reset by 2315 hours. The primary power EPA breakers were reset at 1010 on 4/12/92 after replacement of the upstream EPA logic card.

CAUSE OF EVENT

The loss of power to the "B" RPS bus was due to an unexpected trip of the primary power supply EPA breakers. The EPA breakers are in series and the trip of the upstream breaker caused the downstream breaker to trip also because of power loss to the downstream breaker. Investigation by Relay and Test personnel (non-licensed, utility) of the upstream logic card did not indicate any failed components on the card. This upstream logic card was replaced and this card was returned to the manufacturer for a failure analysis, repair, and a component lifetime upgrade. Analysis of the logic card by the manufacturer

**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-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)

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

revealed that a defective transistor was the cause for misoperation. The transistor in question provides current to the breaker trip coil. Switching of the transistor results in a breaker trip. Additionally two electronic logic gates would not transition to a binary logic of one or zero but would go to an undefined level between one and zero when inputs were changed.

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 power loss to other protective logic, which in turn results in plant systems aligning to their safe, conservative 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.

At the time of the event, the reactor was defueled and shutdown cooling was not required. Had this event occurred with the Unit in Cold Shutdown or Refueling, shutdown cooling would have been temporarily lost, one hour in this event, 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 the original report was determined to be May 7, 1992.

CORRECTIVE ACTIONS

The "B" RPS bus was placed on its alternate power supply and all isolations were reset within an hour of the primary supply EPA breakers tripping. An investigation was commenced to determine the cause of the EPA trip. The EPA logic card circuit and trip function of the upstream card was checked and found to be normal. The RPS Motor-Generator (M/G) set was found in a normal run condition with normal output voltage and the generator output breaker closed.

Although an onsite investigation of the upstream logic card did not indicate any failed components, the card was replaced with a card that had a component lifetime upgrade. This particular logic card had been scheduled for replacement by the end of the current outage due to a previous trip (LER 92-001-00, NPF-14). This card was sent to the manufacturer for failure analysis and a component lifetime upgrade. The faulty transistor and logic gates were replaced and the logic card was satisfactorily tested by the manufacturer. Prior to this event,

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

efforts were underway to perform component lifetime upgrades for those EPA logic cards with limited lifetimes used at the station. This effort will be continued until all EPA logic cards have acceptable component lifetimes. A component lifetime upgrade includes not only replacing failed components but also components which are more susceptible to failure with age (e.g. capacitors).

Concurrent with the EPA card upgrades are modifications to decrease ambient temperatures within the EPA logic card cabinets. Higher EPA temperatures are seen as limiting the life of the electronic logic cards.

Currently, long term modifications to enhance the RPS/EPA power system are in the design stages. Emphasis of these modifications include replacing EPA logic cards with a more reliable device. 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 once modifications to the system are approved.

ADDITIONAL INFORMATION

## Failed Component Information:

Component - EPA Logic Card

Model - 147D8652G003

Manufacturer - General Electric

## Past Similar Events:

A review of past Licensee Event Reports (LERs) for the station identified twelve previous events where spurious EPA breaker trips resulted in ESF actuations.

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

LER 92-001	LER 87-024
LER 91-006	LER 86-029
LER 91-004	LER 86-023
LER 90-005	LER 83-172

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

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