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FACIL:50-368 Susquehanna Steam Electric Station, Unit 2, Pennsylva 05000388
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STANLEY,H.G. Pennsylvania Power & Light Co.
RECIP.NAME RECIPIENT AFFILIATION

SUBJECT: LER 90-007-01:on 900705,primary power supply to RPS A power distribution panel lost whrn one electrical protection assembly (EPA) breakers tripped.EPA logic cards reviewed & RPS power supply will be redesigned.W/930609 ltr.

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TITLE: 50.73/50.9 Licensee Event Report (LER), Incident Rpt, etc.

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June 9, 1993

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

SUSQUEHANNA STEAM ELECTRIC STATION
LICENSEE EVENT REPORT 90-007-01
FILE R41-2
PLAS - 566

Docket No. 50-388
License No. NPF-22

Attached is Licensee Event Report 90-007-01 which is an update to LER 90-007-00. The 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 one Electrical Protection Assembly breaker tripped.

H.G. Stanley
VP - Nuclear Operations

JJM/mjm

cc: Mr. T. T. Martin
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IE22
1/1

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 2	0 5 0 0 0 3 8 8	1 OF 0 5

TITLE (4)

ESF Actuations Due to RPS EPA Breaker 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 7	0 5	9 0	9 0	0 0 7	0 1	0 6	0 9	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
J. J. Meter - Power Production Engineer	7 1 7 5 4 2 - 1 8 7 3

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

CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS		CAUSE	SYSTEM	COMPONENT	MANUFAC-TURER	REPORTABLE TO NPRDS	
B	J C	1 5 2	G 0 8 0	Y							

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
YES (If yes, complete EXPECTED SUBMISSION DATE)	X NO				

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

At 1633 on July 5, 1990, with the Unit operating at 100% power, the primary power supply to the "A" Reactor Protection System (RPS) power distribution panel was lost when one of its Electrical Protection Assembly (EPA) breakers tripped. This interruption caused the Reactor Water Cleanup system, and various other Primary Containment Isolation system components to isolate and the Standby Gas Treatment System and Control Room Emergency Outside Air Supply System to auto initiate. All 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 EPA breaker was reset at 1640 and all isolation signals were reset by 1646. Full power operation of the unit continued without interruption. The cause of this EPA breaker trip as well as others at the Station have been investigated. In general, the majority of the EPA breaker trips have been linked to a failure/anomaly of an electrical subcomponent on the EPA logic card. Logic cards have undergone subcomponent lifetime upgrades and other RPS power supply components have been cleaned, inspected and optimized. The long term action is to modify the RPS power supply systems such that the latest version of EPA logic cards will replace the existing models and forced cooling to the EPA cards will be provided.

DESCRIPTION OF EVENT

At 1633 on July 5, 1990 with the Unit operating at 100% power, the primary power supply to the "A" Reactor Protection System (RPS; EIIS Code: JC) power distribution panel 2Y201A was lost when one of its Electrical Protection Assembly (EPA) breakers, 2CB-S003A-C, 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) 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 closed (EIIS Code: CC).

4) "A" Standby Gas Treatment System (EIIS Code: BH) auto initiated.

5) "A" Control Room Emergency Outside Air Supply System (EIIS Code: BH) auto initiated.

The EPA breaker was reset at 1640, all isolation signals were reset by 1646, and all affected systems were subsequently restored. Full power operations 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 the downstream primary power supply EPA breaker. The EPA logic cards monitor RPS power for conditions of overvoltage, undervoltage, and underfrequency and trip the EPA breakers when these conditions exist or when the logic card fails. EPA breakers are in series and the trip of either breaker will interrupt power to the distribution panel.

The cause of this EPA breaker trip as well as others at the Station have been investigated. In general, the majority of the EPA breaker trips at the station have been linked to a failure/anomaly of an electrical subcomponent on the EPA logic

card. A subcomponent failure such as a capacitor or a transistor would cause the logic card to fail and subsequently trip the EPA breaker.

Contributing factors to subcomponent failures were increasing subcomponent age and higher than optimum temperature of the subcomponent environment. As a subcomponent life increases, particularly capacitors, the EPA cards with subcomponents become less reliable and eventually fails. This "aging" process was found to be applicable when the EPA logic card was both in service and in storage. The higher the temperature a subcomponent is subjected to, the shorter its reliable life becomes. In May of 1991 a task team was formed to address the reliability of the RPS power supply systems at the Station. Prior to the task team being formed and reaching its conclusions, logic cards that experienced a trip were not examined on a subcomponent basis. Failed logic cards were typically returned to the manufacturer for analysis. The manufacturer would then replace the subcomponent(s) that failed. The card would then be returned and either put into service or stored for future use. In both instances the logic cards contained both new and used subcomponents. The temperature of the EPA logic card environment was found to be greater than optimum. The ambient room temperature were EPA cards are located was near 90 degrees F. In addition the EPA cards were mounted in a sealed junction box which further increased subcomponent temperature.

CORRECTIVE ACTIONS

As described above, in May of 1991 a task team was formed to address the reliability of the RPS power supply systems at the Station. Two main objectives were established. The first objective was short term and was to reduce the number of spurious RPS power supply trips by enhancing and better maintaining the components in the present systems. The second was long term and was to reduce spurious RPS power supply trips and increase reliability via the modification process.

In the short term, EPA logic cards were reviewed on an individual basis and subcomponents lifetime upgrades were performed so that each card could be reasonably expected not to fail within a five year lifetime. The junction boxes that house the EPA logic cards were equipped with ventilation louvers thereby reducing the ambient temperatures for the logic card subcomponents. Other short term actions included cleaning, inspecting and optimizing performance of RPS power supply components such as motor-

generator sets, regulating transformers, relays and connection panels.

The long term corrective action was to develop an RPS power supply modification that reduced spurious trips and increased reliability. After extensive analysis, modifications have been designed for the RPS power supply systems. The redesigned RPS power supply will utilize an improved version of EPA logic cards in lieu of the existing models and forced cooling to the EPA enclosures will be provided.

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 breaker tripped.

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.

Had this event occurred with the Unit in cold shutdown or refueling, the safety significance would have been greater due to the fact that shutdown cooling could have been temporarily lost. Even under these conditions the safety significance would be minimal since the plant is more than adequately designed to safely handle this type of event.

In accordance with the guidance provided in NUREG 1022 Supplement 1 items 14.1 and 14.10, the original submission date for this report was 8-6-90. No further updates to this report are expected.

ADDITIONAL INFORMATION

Failed Component Information:

Component - EPA Logic Card

Model - 147D8652 G001 & G003

Manufacturer - General Electric

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

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

LER 92-007
LER 92-001
LER 91-006
LER 91-004
LER 90-005
LER 87-024
LER 86-029
LER 86-023
LER 83-172

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

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