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

SUSQUEHANNA STEAM ELECTRIC STATION
LICENSEE EVENT REPORT 50-388/00-05-01
PLA-5587

Docket 50-388
License No. NPF-22

Attached is Licensee Event Report 00-005-01. This event was determined reportable per 10 CFR 50.73(a)(2)(iv)(A) 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 the downstream Electrical Protection Assembly breaker tripped.

Revision 0 of this report, (12-28-2000), concluded that the trip was caused by an intermittent failure of the downstream EPA logic card. A manufacturer's analysis of the EPA card suggests that the card was functionally sound and did not contribute to the event described herein. It has since been concluded that the power source signal to the EPA logic card had degraded, due to a high resistance experienced across an in-line switch, thus causing the EPA breaker trip. Accordingly, this LER revision is being issued to modify previously stated conclusions and associated corrective actions. No new regulatory commitments are created by virtue of this updated report.

Richard L. Anderson
Vice President - Nuclear Operations

Attachment

cc: Mr. H. J. Miller
Regional Administrator
U.S. Nuclear Regulatory Commission
475 Allendale Road
King of Prussia, PA 19406

cc: Mr. S. L. Hansell
Sr. Resident Inspector
U.S. Nuclear Regulatory Commission
P.O. Box 35
Berwick, PA 18603-0035

JE22

Estimated burden per response to comply with this mandatory information collection request 50 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records Management Branch (T-6 E6), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to bjs1@nrc.gov, and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202 (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

LICENSEE EVENT REPORT (LER)

(See reverse for required number of digits/characters for each block)

1. FACILITY NAME Susquehanna Steam Electric Station - Unit 2	2. DOCKET NUMBER 05000388	3. PAGE 1 OF 4
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4. TITLE
ESF Actuations Due to RPS EPA Breaker Trip

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
12	05	00	00	005	01	03	25	03		05000
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE 1	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR § (Check all that apply)			
	<input type="checkbox"/> 20 2201(b)	<input type="checkbox"/> 20 2203(a)(3)(ii)	<input type="checkbox"/> 50 73(a)(2)(ii)(B)	<input type="checkbox"/> 50 73(a)(2)(ix)(A)
10. POWER LEVEL 100	<input type="checkbox"/> 20 2201(d)	<input type="checkbox"/> 20 2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50 73(a)(2)(x)
	<input type="checkbox"/> 20 2203(a)(1)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input checked="" type="checkbox"/> 50 73(a)(2)(iv)(A)	<input type="checkbox"/> 73 71(a)(4)
	<input type="checkbox"/> 20 2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50 73(a)(2)(v)(A)	73.71(a)(5) OTHER Specify in Abstract below or in NRC Form 366A
	<input type="checkbox"/> 20 2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50 73(a)(2)(v)(B)	
	<input type="checkbox"/> 20 2203(a)(2)(iii)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50 73(a)(2)(v)(C)	
	<input type="checkbox"/> 20 2203(a)(2)(iv)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50 73(a)(2)(v)(D)	
	<input type="checkbox"/> 20 2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50 73(a)(2)(vii)	
	<input type="checkbox"/> 20 2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50 73(a)(2)(viii)(A)	
	<input type="checkbox"/> 20 2203(a)(3)(i)	<input type="checkbox"/> 50.73(a)(2)(ii)(A)	<input type="checkbox"/> 50 73(a)(2)(viii)(B)	

12. LICENSEE CONTACT FOR THIS LER

NAME Eric J. Miller - Nuclear Regulatory Affairs	TELEPHONE NUMBER (Include Area Code) 570 / 542-3321
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13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	JC	52	G080	Y					

14. SUPPLEMENTAL REPORT EXPECTED				15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR
<input type="checkbox"/> YES (If yes, complete EXPECTED SUBMISSION DATE).	<input checked="" type="checkbox"/> X	<input type="checkbox"/> NO					

16. ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)

At 07:00 on December 5, 2000 with Unit 2 in Mode 1 at 100% power, the primary power supply to the "B" Reactor Protection System (RPS) power distribution panel was lost when the downstream Electrical Protection Assembly (EPA) breaker tripped. This resulted in Primary Containment Isolation System actuations and other automatic system initiations. RPS as well as other plant systems and components functioned properly in response to the event. The "B" distribution panel was swapped to alternate power while investigation of the event took place. There were no indications of abnormalities and all isolation signals were reset by 08:15. The investigation resulted in replacement of the downstream EPA logic card. The primary power source EPA breakers were reset and aligned to the "B" distribution panel at 18:11 on 12/9/00. The suspect faulty downstream EPA logic card was returned to the manufacturer to determine cause of failure. Manufacturer testing did not reveal any functional problems with the card. It has now been concluded (by virtue of an observed high resistance across the EPA Calibration/Test switch in-line contacts) that the power source signal to the EPA logic card was degraded thus causing the EPA breaker trip. The event is reportable under 10 CFR 50.73(a)(2)(iv)(A) in that unplanned actuations of Engineered Safety Features occurred. 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)

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17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

EVENT DESCRIPTION

At 07:00 on December 5, 2000 with Unit 2 in Mode 1 at 100% power, the primary power supply to the "B" Reactor Protection System (RPS; EIIS Code: JC) power distribution panel was lost when the downstream Electrical Protection Assembly (EPA) breaker tripped. This power interruption resulted in a RPS Half-SCRAM, Primary Containment Isolation System (EIIS Code: JM) actuations and other 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 II and Zone III isolated.
- 2) Reactor Water Cleanup System (EIIS Code: CE) inlet isolation valves closed.
- 3) Cooling water isolation valves to the Reactor Recirculation 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.

Following manual realignment, the "B" RPS distribution panel was supplied by alternate power while isolation signals were reset and the cause of the trip was investigated. All isolation signals were reset by 08:15. The primary power EPA breakers were reset and aligned to the "B" distribution panel at 18:11 on 12/9/00 after replacement of the downstream EPA logic card and replacement of the Calibration/Test switches (also known as S1 switches) for both primary supply breakers.

CAUSE OF EVENT

The loss of power to the "B" RPS bus was due to an unexpected trip of the downstream primary power supply EPA breaker. The upstream EPA breaker did not trip which is the expected system response. The EPA breakers are in series and a trip of an upstream breaker would cause the downstream breaker to trip also, because of power loss to the downstream breaker. However, a trip of the downstream breaker does not cause the upstream breaker to trip. Investigation by Maintenance personnel (non-licensed, utility) of the downstream EPA logic card and breaker originally concluded that the trip was caused by an intermittent failure of the downstream EPA logic card which could not be replicated onsite. The voltage of the Unit 2 "B" primary power supply was monitored for anomalies for several days. None were recorded. The downstream logic card was replaced. Subsequent manufacturer testing has shown that the EPA logic card did not contribute to this event. It has now been concluded that the power source signal to the EPA logic card was degraded due to an increased resistance across the EPA Calibration/Test switch contacts (also known as the S1 switch) observed during initial systematic troubleshooting of this event. Upon identification of this abnormality, the switch was conservatively replaced although its role in the event was not completely understood at the time.

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17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

REPORTABILITY/SAFETY CONSEQUENCES ANALYSIS

This event was determined to be reportable under 10 CFR 50.73(a)(2)(iv)(A) in that unplanned actuations of Engineered Safety Features (ESF) occurred when the Unit 2 "B" primary power supply downstream RPS EPA breaker tripped.

The safety function of the EPA breaker assembly 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 in Mode 1 at 100% power and shutdown cooling was not required. Had this event occurred with the Unit in Cold Shutdown or Refueling, shutdown cooling would have shutdown due to the automatic isolation of the RHR Shutdown Cooling suction line.

CORRECTIVE ACTIONS

The following corrective actions for this event have been completed:

The "B" RPS bus was placed on its alternate power supply and all isolations were reset within 1 hour and 15 minutes of the downstream primary supply EPA breaker tripping. An investigation was commenced to determine the cause of the EPA breaker trip. The EPA logic card circuit and trip function of the downstream card was checked and found to be normal. The 'B' RPS Motor-Generator (M/G) set was operating normally with normal output voltage and the generator output breaker closed. Although an onsite investigation of the downstream EPA logic card did not indicate any failed components, it was originally concluded that the trip was caused by an intermittent failure on the card that could not be replicated onsite. The suspect card was replaced. EPA Calibration/Test switches (S1) for both primary power supply EPA breaker were also replaced due to a high resistance identified across one of the switch contacts. The voltage of the Unit 2 "B" primary power supply was monitored for anomalies for several days. None were recorded.

The suspect EPA card was returned to the manufacturer to determine cause of the intermittent failure. This evaluation has shown that the EPA logic card did not contribute to this event. With benefit of this new information, it has now been concluded that the power source signal to the EPA logic card was degraded due to the increased resistance observed across the EPA Calibration/Test switch (S1) contacts. These switches have since been replaced on all EPA breakers. Preventive Maintenance work instructions have also been revised to verify appropriate resistance over EPA Calibration/Test switch (S1) contacts during future inspection efforts.

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17. NARRATIVE (If more space is required, use additional copies of NRC Form 366A)

ADDITIONAL INFORMATION

Failed Component Information:

Component – RPS Electrical Protection Assembly Switch S1

Model – CR2940

Manufacturer - General Electric

Past Similar Events:

A review of past Licensee Event Reports (LERs) for the station identified thirteen previous events where spurious EPA breaker trips resulted in ESF actuations. This is the first event since significant preventative measures were taken to prevent spurious EPA breaker trips.

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

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

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

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