Bryce L. Shriver
Vice President – Nuclear Site Operations

PPL Susquehanna, LLC
P.O. Box 467, Berwick, PA 18603
Tel. 570.542.3120 Fax 570.542.1477
blshriver@pplweb.com

APR 30 2001

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, DC 20555

SUSQUEHANNA STEAM ELECTRIC STATION
LICENSEE EVENT REPORT 50-388/01-002-00
PLA - 5308 FILE R41-2

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

Attached is Licensee Event Report 50-388/01-002-00. This event was determined to be reportable per 10CFR50.73(a)(2)(v)(D) in that the Unit 2 Suppression Chamber Hydrogen Recombiners in both trains were inoperable when one train was out of service for planned maintenance, and the emergency onsite power supply for the other train was declared inoperable due to a relay failure.

Bryce L. Shriver
Vice President – Nuclear Site 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

IE22
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NRC FORM 366 (1-2001) U.S. NUCLEAR REGULATORY COMMISSION

APPROVED BY OMB NO. 3150-0104 EXPIRES 6-30-2001

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)

FACILITY NAME (1)	DOCKET NUMBER (2)	PAGE (3)
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TITLE (4)

Both Trains of Suppression Chamber Hydrogen Recombiners Inoperable

EVENT DATE (5)			LER NUMBER (6)			REPORT DATE (7)			OTHER FACILITIES INVOLVED (8)	
MO	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MO	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
										05000
03	02	2001	01	002	00	04	30	2001	FACILITY NAME	DOCKET NUMBER 05000

		THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply) (11)			
OPERATING MODE (9)	1	20.2201(b)	20.2203(a)(3)(ii)	50.73(a)(2)(ii)(B)	50.73(a)(2)(ix)(A)
POWER LEVEL (10)	100	20.2201(d)	20.2203(a)(4)	50.73(a)(2)(iii)	50.73(a)(2)(x)
		20.2203(a)(1)	50.36(c)(1)(i)(A)	50.73(a)(2)(iv)(A)	73.71(a)(4)
		20.2203(a)(2)(i)	50.36(c)(1)(ii)(A)	50.73(a)(2)(v)(A)	73.71(a)(5)
		20.2203(a)(2)(ii)	50.36(c)(2)	50.73(a)(2)(v)(B)	OTHER
		20.2203(a)(2)(iii)	50.46(a)(3)(ii)	50.73(a)(2)(v)(C)	Specify in Abstract below or in NRC Form 366A
		20.2203(a)(2)(iv)	50.73(a)(2)(i)(A)	X 50.73(a)(2)(v)(D)	
		20.2203(a)(2)(v)	50.73(a)(2)(i)(B)	50.73(a)(2)(vii)	
		20.2203(a)(2)(vi)	50.73(a)(2)(i)(C)	50.73(a)(2)(viii)(A)	
		20.2203(a)(3)(i)	50.73(a)(2)(ii)(A)	50.73(a)(2)(viii)(B)	

LICENSEE CONTACT FOR THIS LER (12)

NAME	TELEPHONE NUMBER (Include Area Code)
Joseph J. Meter - Nuclear Licensing	570 / 542-1873

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

CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX
X	EK	RLY	A109	Y					

SUPPLEMENTAL REPORT EXPECTED (14)		EXPECTED SUBMISSION DATE (15)	MONTH	DAY	YEAR
X	YES (If yes, complete EXPECTED SUBMISSION DATE).		NO	08	30	2001

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

On March 2, 2001 at 01:15 with Unit 2 in Mode 1 (Power Operation) at 100% power, the 'B' Emergency Diesel / Generator (D/G) was declared inoperable when a DC control power relay failed and multiple control room alarms were received. Operations personnel responded to the 'B' D/G and observed multiple local alarms and several auxiliary system pumps running that would normally be in standby. Operations personnel shutdown the auxiliary pumps and placed the 'B' D/G control switch in "local" to prevent an automatic start. Prior to this event the 'A' Suppression Chamber Hydrogen Recombiner had been removed from service for planned maintenance. The 'B' D/G is the emergency onsite power supply for the 'B' Suppression Chamber Hydrogen Recombiner. Therefore, there was a potential for a complete loss of the Unit 2 Suppression Chamber Hydrogen Recombiner safety function while emergency onsite power supply to the 'B' Suppression Chamber Hydrogen Recombiner was inoperable. The emergency onsite power supply to the 'B' Suppression Chamber Hydrogen Recombiner was restored via the spare 'E' D/G at 15:08 on March 2, 2001. It was determined that the cause for the multiple 'B' D/G alarms and auxiliary equipment starts was a failed relay coil in the DC control power circuitry for the 'B' D/G. Preliminary analysis has attributed the relay failure to "infant mortality" of the electrical component. The failed relay was replaced. It was determined that no generic concerns / common mode failure mechanisms exist with other like-in-kind relays installed at the station. The failed relay will be sent to an independent lab for failure analysis. During any postulated design basis accident, one of the two recombiners would have been restored prior to requiring its operation. There were no actual safety consequences or compromises to the public health and safety as a result of this event.

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

EVENT DESCRIPTION

On March 2, 2001 at 01:15 with Unit 2 in Mode 1 (Power Operation) at 100% power, Control Room Operators (licensed) declared the 'B' Emergency Diesel / Generator (D/G; EIIS Code: EK) inoperable when a DC control power relay failed and multiple control room alarms were received indicating that the 'B' D/G had tripped even though it was in a standby condition and was not operating. Operations personnel responded to the 'B' D/G and observed multiple local alarms and several auxiliary system pumps running that would normally be in standby. Operations personnel shutdown the auxiliary pumps and placed the 'B' D/G control switch in "local" to prevent an automatic start. After a preliminary investigation of the 'B' D/G alarms by Operations and Electrical Maintenance personnel, alignment activities to substitute the spare 'E' D/G for the 'B' D/G were commenced.

Prior to this event the 'A' Suppression Chamber Hydrogen Recombiner had been removed from service for planned maintenance. The 'B' D/G is the emergency onsite power supply for the 'B' Suppression Chamber Hydrogen Recombiner (EIIS Code: BB). Therefore, there was a potential for a complete loss of the Unit 2 Suppression Chamber Hydrogen Recombiner safety function while the emergency onsite power supply to the 'B' Suppression Chamber Hydrogen Recombiner was inoperable. The emergency onsite power supply to the 'B' Suppression Chamber Hydrogen Recombiner was restored via the 'E' D/G at 15:08 on March 2, 2001.

CAUSE OF EVENT

The cause for the loss of the Unit 2 Suppression Chamber Hydrogen Recombiners in both trains was that the 'A' train was out of service for planned maintenance and the emergency onsite power supply for the 'B' train became inoperable. An investigation of this event was performed by Maintenance and Engineering personnel. It was determined that the cause for the multiple 'B' D/G alarms and auxiliary equipment starts was a failed relay coil and two blown fuses in the DC control power circuitry for the 'B' D/G. The failure of normally energized relay 3FOT was the cause for the two blown fuses. Preliminary analysis has attributed the failure of the relay coil to "infant mortality" of the electrical component since the relay was recently replaced during preventative maintenance activities for the 'B' D/G. The failed relay was found to be from a batch of relays that was recently obtained from another utility. The failed relay and its external varistor were replaced and will be sent to an independent lab for failure analysis. Although it was subsequently determined that the 3FOT relay failure would not have prevented the 'B' D/G from performing emergency start function, placing the 'B' D/G control switch in "local" for investigation / spare substitution activities would have prevented an automatic emergency start and rendered the "B" D/G inoperable.

SIGNIFICANCE/ANALYSIS

This event was determined to be reportable per 10CFR50.73(a)(2)(v)(D) as a condition that could have prevented the fulfillment of a safety function to mitigate the consequences of a design basis accident.

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

The Suppression Chamber Hydrogen Recombiners provide the capability of controlling the bulk hydrogen concentration in the Suppression Chamber to less than the lower flammable concentration of 4 percent by volume following a design basis accident. This ensures primary containment design pressures and temperatures would not be exceeded if a hydrogen burn would occur.

In this case, the loss of the 'B' Emergency Diesel Generator would, under a Loss of Coolant Accident (LOCA) / Loss of Off-site Power (LOOP) design basis accident, lead to the loss of the 'B' Engineered Safeguard System 4.16 kV bus. The loss of the 'B' 4.16 kV bus would lead to the loss of the Unit 2 'B' Suppression Chamber Hydrogen Recombiner. The Unit 2 'A' Suppression Chamber Hydrogen Recombiner had been removed from service for planned maintenance, thus no Unit 2 Suppression Chamber Hydrogen Recombiners were available from 01:15 to 15:08 on March 2, 2001. However during an actual LOCA / LOOP, greater than 24 hours would elapse prior to build up of oxygen levels in Primary Containment necessary for combustion. During any postulated design basis accident, the onsite emergency power supply to the "B" Suppression Chamber Hydrogen Recombiner would have been restored prior to requiring its operation. Additionally, an alternate means of Suppression Chamber hydrogen concentration control was available via venting of the Primary Containment.

With respect to the inoperable 'B' D/G, Susquehanna is designed and analyzed to operate and safely shut down with 3 of the 4 required Emergency Diesel Generators. Therefore, with the exception described above, the loss of the 'B' D/G is bounded by plant design. It is concluded from the analysis above, that the safety significance of this event is minor. As such, there were no actual safety consequences or compromises to the public health and safety as a result of this event.

In accordance with the guidance provided in NUREG-1022, Revision 2 section 5.1.1, the required submission date for this report is May 1, 2001.

CORRECTIVE ACTIONS

Corrective actions that have been completed are:

- The failed relay was replaced with a relay from a batch other than the batch in question.
- An investigation was conducted to ensure that the 3FOT relay failure was not a common mode / generic failure mechanism. This failure is believed to be an isolated occurrence and there was not a common mode / generic failure mechanism.
- The location of the remaining relays from the batch in question was investigated. Additional relays were found in the control circuitry for the "B" D/G and were determined not to pose a concern since the "B" D/G has successfully completed its logic testing and the failure mechanism is not believed to be generic. The remaining relays are spares. The spare relays have been segregated to prevent use as a prudent measure until the failure analysis is completed for the failed relay.
- An investigation was conducted to ensure that the 3FOT relay failure did not cause any collateral damage or undesired effects in addition to the two blown fuses. None was found.

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

Corrective actions to be completed are:

- The failed relay and its external varistor will be sent to an independent lab for failure analysis. Based on the results of the failure analysis, the need for additional corrective actions will be evaluated.
- This LER will be updated accordingly.

ADDITIONAL INFORMATION

Past Similar Events: There are no previous events in which both trains of Primary Containment Hydrogen Recombiners were simultaneously inoperable. There have been previous failures of Agastat relays used in the Emergency Diesel Generators. As a result, these relay types are replaced periodically during preventative maintenance activities.

Failed Component: Relay 3FOT

Manufacturer: Agastat

Model: EGPDNRC2015004