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March 3, 2000

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

SUSQUEHANNA STEAM ELECTRIC STATION  
LICENSEE EVENT REPORT 50-387/00-001-00  
PLA - 5168 FILE R41-2

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

Attached is Licensee Event Report 50-387/00-001-00 . This report is being made pursuant to 10CFR50.73(a)(2)(i)(B), in that Primary Containment Leak Rate testing was not performed for the Hydrogen-Oxygen Analyzer System and portions of the Post Accident Sampling System.

A handwritten signature in black ink, appearing to read "Bryce L. Shriver".

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

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

IE22

**LICENSEE EVENT REPORT (LER)**

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

ESTIMATED BURDEN PER RESPONSE TO COMPLY WITH THIS MANDATORY INFORMATION COLLECTION REQUEST: 50.0 HRS. REPORTED LESSONS LEARNED ARE INCORPORATED INTO THE LICENSING PROCESS AND FED BACK TO INDUSTRY. FORWARD COMMENTS REGARDING BURDEN ESTIMATE TO THE INFORMATION AND RECORDS MANAGEMENT BRANCH (T-6 F33), U.S. NUCLEAR REGULATORY COMMISSION, WASHINGTON, DC 20555-0001, 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)  
05000387

PAGE (3)  
1 OF 5

TITLE (4)  
Inadequate System Design Documentation Leads To Missed 10CFR50 Appendix J Testing

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 NAME	DOCKET NUMBER
02	02	00	00	001	00	03	03	00	Susquehanna SES Unit 2	05000388
									FACILITY NAME	DOCKET NUMBER
										05000

OPERATING MODE (9)	POWER LEVEL (10)	THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR 5: (Check one or more) (11)								
1	100	20.2201(b)	20.2203(a)(2)(v)	<input checked="" type="checkbox"/>	50.73(a)(2)(i)	50.73(a)(2)(viii)				
		20.2203(a)(1)	20.2203(a)(3)(i)		50.73(a)(2)(ii)	50.73(a)(2)(x)				
		20.2203(a)(2)(i)	20.2203(a)(3)(ii)		50.73(a)(2)(iii)	73.71				
		20.2203(a)(2)(ii)	20.2203(a)(4)		50.73(a)(2)(iv)	OTHER				
		20.2203(a)(2)(iii)	50.36(c)(1)		50.73(a)(2)(v)	Specify in Abstract below or in NRC Form 366A				
		20.2203(a)(2)(iv)	50.36(c)(2)		50.73(a)(2)(vii)					

LICENSEE CONTACT FOR THIS LER (12)

NAME Gerard M. Machalick - Senior Engineer, Licensing	TELEPHONE NUMBER (Include Area Code) 570 / 542-3861
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COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT (13)										
CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX		CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX

SUPPLEMENTAL REPORT EXPECTED (14)

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

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

On February 2, 2000 with Unit 1 and Unit 2 in Mode 1 (Power Operation) at 100% power, engineering personnel (utility, non-licensed) discovered that testing required by 10CFR50 Appendix J had not been performed for piping and panels in the Hydrogen-Oxygen (H<sub>2</sub>O<sub>2</sub>) Analyzer system and the gas sampling portion of the Post Accident Sampling System (PASS). The affected system components will be called the Containment Atmosphere Monitoring (CAM) system in this report. Testing had been performed to NUREG 737 requirements, but it had not been recognized that 10CFR50 Appendix J requirements applied to this system as an extension of containment.

The root cause of this event is that the documentation provided for the CAM system was inadequate to clearly identify the system as a closed boundary that is an extension of containment that requires 10CFR50 Appendix J leak rate testing. Several causal factors were also identified in the areas of organizational responsibility, multiple design configurations and corrective actions. Corrective actions include development and performance of required testing, comprehensive review of containment design documentation, enhancements to the Corrective Action Program, and to update and provide training on primary containment systems.

This event is reportable per 10CFR50.73(a)(2)(i)(B), operation or condition prohibited by the plant's Technical Specifications. The safety significance of this event is low, and the health and safety of the public was not compromised.

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

**EVENT DESCRIPTION**

On February 2, 2000 with Unit 1 and Unit 2 in Mode 1 (Power Operation) at 100% power, engineering personnel (utility, non-licensed) discovered that testing required by 10CFR50 Appendix J had not been performed for piping and panels in the Hydrogen-Oxygen (H<sub>2</sub>O<sub>2</sub>) Analyzer system and the gas sampling portion of the Post Accident Sampling System (PASS). The affected system components will be called the Containment Atmosphere Monitoring (CAM) system in this report.

The CAM system has two testing requirements:

- Technical Specification 5.5.12, Primary Containment Leakage Rate Testing Program – 10CFR50 Appendix J requires that the CAM system be considered an extension of containment. Periodic and post-maintenance testing are required to fulfill this requirement.
- Technical Specification 5.5.2, Primary Coolant Sources Outside Containment – The CAM system requires testing per NUREG 737 as a system that may contain highly radioactive fluids during a transient or accident.

Technical Specification 5.5.2 testing had been performed to NUREG 737 requirements every refueling cycle, but it had not been recognized that the 10CFR50 Appendix J requirements applied to this system as an extension of containment. Thus, post-maintenance leakage testing was not accomplished when the system boundary was breached.

**CAUSE OF EVENT**

The root cause of this event is that the documentation provided for the CAM system was inadequate to clearly identify the system as a closed boundary that is an extension of containment that requires 10CFR50 Appendix J leak rate testing. During the early construction and design phase of SSES, the H<sub>2</sub>O<sub>2</sub>/PASS panels were installed with two Primary Containment Isolation Valves (PCIVs) for isolation from the containment. The two-PCIV valve design led to the conclusion that testing of the CAM system was limited to the NUREG 737 requirements. However, it was subsequently recognized that both PCIVs are powered from the same electrical source, which requires the system boundary to be considered as an extension of containment.

Several causal factors were also identified in the areas of organizational responsibility, multiple design configurations and corrective actions.

**REPORTABILITY/ANALYSIS**

Surveillance Requirement 3.6.1.1.1 requires testing in accordance with the Primary Containment Leakage Rate Testing Program, which is defined in Technical Specification 5.5.12. The CAM system should have

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been included in this program but was not, and this constitutes a failure to comply with the action statements of LCO 3.6.1.1. This event is reportable per 10CFR50.73(a)(2)(i)(B), operation or condition prohibited by the plant's Technical Specifications.

The function of the primary containment is to isolate and contain fission products released from the Reactor Primary System following a Design Basis Loss of Coolant Accident (LOCA) and to confine the postulated release of radioactive material. In the analysis of this accident, it is assumed that primary containment is OPERABLE such that release of fission products to the environment is controlled by the rate of primary containment leakage. The maximum allowable leakage rate for the primary containment ( $L_a$ ) is 1.0% by weight of the containment air per 24 hours at the design basis LOCA maximum peak containment pressure of 45 psig. Primary containment OPERABILITY is maintained by limiting leakage to less than or equal to  $0.6 L_a$ , the Technical Specification limit.

Because the testing on the system was not historically performed in accordance with 10 CFR 50 Appendix J, the actual leakage rates prior to discovery of the condition are not known for post-maintenance system conditions. Standard maintenance practices, design of system fittings and qualifications of Maintenance workers result in a high level of confidence that leakage rates measured in February, 2000 represent typical historical values. Additionally, post-maintenance testing in the past included a pressure drop test and independent verification that the equipment was restored properly. If the system was restored improperly or had significant leakage, the  $H_2O_2$  analyzers would not function properly, the readings would indicate an elevated amount of oxygen due to air being drawn into the system, or primary containment would lose nitrogen quickly.

Testing in February 2000 determined that leakage for the Unit 1 CAM system is 6.12 SLM (standard liters per minute) and leakage for Unit 2 is 4.84 SLM. Testing during the last Refuel Outage determined that leakage for the Unit 1 CAM system was 1.078 SLM and leakage for Unit 2 was 0.042 SLM. Because the test lineups are different, these two test results are added together to determine total CAM system leakage for Unit 1 of 7.2 SLM and total system leakage for Unit 2 of 4.88 SLM. Adding the two test results is conservative because the majority of the system is tested in both lineups.

For the leakage path, the design of the plant causes all leakage to be released into secondary containment and processed by the Standby Gas Treatment system. The leakage from above is added to the current leakage from all other leakage tests. The total leakage for Unit 1 is 38.9 SLM and the total leakage for Unit 2 is 43.7 SLM. For both units the leakage is less than the limit of 190.7 SLM ( $0.6 L_a$ ).

The current offsite dose calculation uses leakage of 317.9 SLM which is  $1.0 L_a$ . Using this maximum leakage rate, the regulatory limits of 10 CFR 100 are not exceeded. Therefore, there is no impact to offsite dose due to this additional leakage that is now identified in accordance with 10 CFR 50 Appendix J.

Based on the evaluation above, the safety significance of this event is low, and the health and safety of the public was not compromised.

In accordance with the guidelines provided in NUREG-1022, Revision 1, the required submission date for this report is March 3, 2000.

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**CORRECTIVE ACTIONS**

Corrective actions that have been completed:

- Restored Primary Containment operability by closing the H<sub>2</sub>O<sub>2</sub> PCIVs and disabling the H<sub>2</sub>O<sub>2</sub> PCIVs by pulling fuses. This completed the action of LCO 3.6.1.1, but rendered the H<sub>2</sub>O<sub>2</sub> Analyzers inoperable.
- Restored H<sub>2</sub>O<sub>2</sub> Analyzer operability by developing and successfully performing new leak testing procedure for CAM system panels and piping.
- Developed and issued Technical Specification Interpretations (TSIs) to describe boundaries and barriers and give direction to operators if any of these boundaries or barriers are degraded.

Corrective actions that are to be completed:

- Update documentation and procedures to reflect that the CAM piping is an extension of containment and that the 2 PCIVs are effectively only one Containment Boundary.
- Perform an integrated review of containment design bases, documentation, and testing requirements for air and water systems to ensure that the designs are properly documented and that testing requirements are properly defined and satisfied.
- Review the responsibility split between the cognizant technology engineers, the licensing engineers, the leak rate test engineers, and the system engineers with systems that can affect leak rate testing to ensure the split is appropriate and that all parties understand their responsibilities.
- Update the training material and provide updated training with regards to the CAM system containment design and licensing bases and the containment design, licensing and testing bases. Include definitions of and the requirements for: containment boundary extension; closed system; and, containment leakage testing.
- Revise or issue procedures for testing CAM system as an extension of containment during both outage and on-line maintenance situations.

Generic Implication – Lack of Adequate Documentation:

The root cause of this event was inadequate documentation of the design and licensing basis for specific containment penetrations (CAM). Several other major projects have improved the quality of our design and licensing basis documentation (e.g. – Design Basis Documentation, Current Licensing Basis). Therefore the scope of consideration for Generic Implications is limited to the Primary Containment.

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**Generic Implication – Lack of Effective Corrective Actions:**

There were several opportunities for this issue to be recognized and corrected previously, which indicates ineffective corrective actions. Two similar industry events were evaluated in the Industry Event Review Program. These events were reported in NRC Information Notice 96-13. Industry events were recently incorporated into the Corrective Action Program at Susquehanna S.E.S., which partially addresses the causal factors in this area. Recent internal assessments and an NRC Inspection of the Corrective Action Program have identified areas which warrant improvement in this program. Improvement actions which address results of these assessments will correct generic implications.

**ADDITIONAL INFORMATION**

Past Similar Events:    Docket No. 50-387    LER 98-002-00  
                                   Docket No. 50-387    LER 97-005-00  
                                   Docket No. 50-387    LER 95-014-00

Failed Component:    None