

**Virginia Electric and Power Company  
Surry Power Station  
5570 Hog Island Road  
Surry, Virginia 23883**

August 2, 2010

U. S. Nuclear Regulatory Commission  
Attention: Document Control Desk  
Washington, D. C. 20555-0001

Serial No.: 10-442  
SPS: JSA  
Docket No.: 50-280  
50-281  
License No.: DPR-37

Dear Sirs:

Pursuant to 10CFR50.73, Virginia Electric and Power Company hereby submits the following Licensee Event Report applicable to Surry Power Station Units 1 and 2.

Report No. 50-280, 50-281/2010-002-00

This report has been reviewed by the Station Facility Safety Review Committee and will be forwarded to the Management Safety Review Committee for its review.

Very truly yours,



Gerald T. Bischof,  
Site Vice President  
Surry Power Station

Enclosure

Commitment contained in this letter: None

IE22  
NINN

cc: U.S. Nuclear Regulatory Commission, Region II  
Marquis One Tower  
245 Peachtree Center Ave., NE, Suite 1200  
Atlanta, GA 30303-1257

NRC Senior Resident Inspector  
Surry Power Station

**LICENSEE EVENT REPORT (LER)**

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

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Records and FOIA/Privacy Service Branch (T-5 F52), U. S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to [infocollects@nrc.gov](mailto:infocollects@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 an 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.

1. FACILITY NAME Surry Power Station								2. DOCKET NUMBER <b>05000 - 280</b>	3. PAGE <b>1 OF 5</b>																												
4. TITLE Use of Aluminum Conduits for Cable Penetrations Degrades Fire Barriers																																					
5. EVENT DATE			6. LER NUMBER		7. REPORT DATE			8. OTHER FACILITIES INVOLVED																													
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR	FACILITY NAME Surry Power Station, Unit 2	DOCKET NUMBER <b>05000 - 281</b>																											
06	04	10	2010	- 002	- 00	08	02	10	FACILITY NAME	DOCKET NUMBER <b>05000</b>																											
9. OPERATING MODE N			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)(i)	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(viii)(A)	<input type="checkbox"/> 20.2203(a)(1)	<input checked="" type="checkbox"/> 20.2203(a)(4)	<input checked="" type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> OTHER Specify in Abstract below or in NRC Form 366A	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(v)(D)
12. LICENSEE CONTACT FOR THIS LER																																					
FACILITY NAME B. L. Stanley, Director Safety and Licensing								TELEPHONE NUMBER (Include Area Code) <b>(757) 365-2003</b>																													
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																											
B	MF	PEN	N/A	N																																	
14. SUPPLEMENTAL REPORT EXPECTED								15. EXPECTED SUBMISSION DATE	MONTH	DAY	YEAR																										
<input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input checked="" type="checkbox"/> NO																																					

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

During the June 2009 Triennial Fire Protection Inspection, the NRC requested test results for aluminum conduits used in fire barrier penetrations. The testing documentation could not be produced. The fire barriers in question were declared non-functional and a condition report was initiated. Compensatory actions involved establishing fire watches for the non-functional barriers. A vendor was selected to test representative aluminum conduit configurations in fire barriers in accordance with IEEE 634-1978. Several configurations failed the 3-hour fire test. A design change was developed to modify penetrations that did not have proven test configurations, by installing seals on both side of the barrier. Since the modified aluminum conduit penetrations did not have proven test configurations, their function of preventing a fire from affecting redundant trains of safe shutdown systems could not be assured. NRC guidance for reportability, NUREG-1022, states missing fire barriers, such that the required degree of separation for redundant safe shutdown trains is lacking, is reportable as an unanalyzed condition that significantly degraded plant safety. Therefore, this report is being submitted pursuant to 10CFR50.73(a)(2)(ii)(B).

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## NARRATIVE

**1.0 DESCRIPTION OF THE EVENT**

The Surry NRC Triennial Fire Protection Inspection was initiated on June 8, 2009. During performance of the inspection, the NRC inspectors requested documentation that aluminum conduits used for Appendix R wall and floor fire barrier penetrations seals [EIIS-IC-PEN] were qualified to a 3-hour fire rating. Documentation was available for steel conduits, steel cable trays, and aluminum cable trays that penetrate fire barriers. Test reports were not available for the aluminum conduit penetrations. The concern was that the aluminum conduit would melt at the flame temperature used during fire testing and if not properly sealed internally, flame and smoke may pass through the barrier.

The Surry specification for the installation, inspection, and documentation of silicone foam in fire barrier penetrations was issued in 1978 and provided guidance for foam installation. It requires that all conduits that penetrate the control room pressure envelope or penetrate fire area boundaries and terminate at a distance up to 5 feet from the barrier are to be foamed internally. Also, station electrical maintenance procedures for opening and sealing of fire barriers required that conduits be internally foamed to a depth of 10 inches with at least part of the foam contained within the wall or floor. The internal foam would provide a seal to prevent passage of hot gasses and smoke through the penetration in the event of an Appendix R fire. Conduit penetrations foamed internally to these requirements were considered acceptable.

In 1990 and 1991, Surry developed a Fire Penetration Seal Evaluation Program in response to Information Notice (IN) 88-04 and IN 88-04 Supplement 1, Inadequate Qualification and Documentation of Fire Barrier Penetration Seals. The numbers of penetrations not meeting the 3-hour fire rating were identified and repairs recommended. The scope of the program included identification and repair of conduit internal seals. Repairs were completed during unit outages in 1994. However, the documentation for these repairs was not adequate to ensure compliance with the 3-hour fire rating for aluminum conduit penetrations.

Following the 2009 Triennial Fire Protection Inspection, a condition report was initiated and corrective actions were assigned to establish a valid qualification package for the aluminum conduit penetration configurations. A walkdown of accessible penetration areas (approximately 90% of penetrations) was conducted and an evaluation of drawings was performed to determine the various configurations where aluminum conduits penetrate fire barriers. Approximately 460 aluminum conduit penetrations were identified for both Surry Unit 1 and Unit 2. Three aluminum conduit configurations were identified and an evaluation determined the internal foam installation on two of the configurations may not be adequate. These fire barriers were declared non-functional and a condition report was initiated

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documenting the possible fire barrier impairments. Compensatory actions involved establishing fire watches for the non-functional barriers as required by Surry's Technical Requirements Manual.

A vendor was selected to test the aluminum conduit configurations. Test slabs were constructed and penetration configurations were assembled at the vendor facility. Testing was completed and test reports provided to Surry Engineering.

An evaluation of the vendor test reports indicated that several aluminum conduit configurations did not meet the established test criteria. Aluminum conduit configurations with internal seals provided on both sides of the inside plane of the fire barrier passed the fire testing, whereas some configurations with conduit internal seals provided on only one side of the inside plane of the fire barrier and those without internal seals did not pass the testing.

With fire barrier penetrations specifications in place and significant repairs completed on penetrations in the 1990's, there was a reasonable expectation that the fire barriers could perform their function. However, due to the lack of documentation and the identification of aluminum conduit penetrations configurations where internal foam installation could not be confirmed, further evaluation or modifications were needed to ensure compliance. A design change was developed to accept the aluminum conduit penetrations based upon the proven test configuration, to evaluate the penetrations as satisfactory using Generic Letter (GL) 86-10 as guidance, or to modify the penetrations by installing smoke seals or silicone foam seal on both side of the barrier.

Aluminum conduit penetration configurations that do not have proven test configurations will be modified by installing smoke seals or silicone foam seals on both sides of the barrier. Since the modified aluminum conduit penetrations did not have proven test configurations, it was assumed that their function of preventing a fire from affecting redundant trains of safe shutdown systems could not be assured. NRC guidance on reportability, NUREG-1022, Event Reporting Guidelines for 10CFR50.72 and 50.73, rev. 2, states that if fire barriers are missing, such that the required degree of separation for redundant safe shutdown trains is lacking, the issue is reportable as an unanalyzed condition that significantly degraded plant safety. Therefore, this report is being submitted pursuant to 10CFR50.73(a)(2)(ii)(B), documenting the degraded fire barriers.

## 2.0 SIGNIFICANT SAFETY CONSEQUENCES AND IMPLICATIONS

Safe shutdown would be maintained, as described in the Appendix R Report, for fires in the fire areas affected by the aluminum conduit penetration issue. The bounding testing performed demonstrated that there existed sufficient time for detection and suppression to mitigate a fire prior to expected damage outside of the given fire

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areas. Prompt fire brigade response, the existing fire barriers, and fire suppression and detection systems, where applicable, would preserve safe shutdown capability. Based on this, the change in Core Damage Probability for the aluminum conduit deficiency would be low. This situation has not resulted in any significant safety consequences or implications and the health and safety of the public were not affected at any time.

**3.0 CAUSE**

The apparent cause evaluation determined that the effects of fire on aluminum conduits were not originally considered when the fire testing packages were compiled for Surry. The packages addressed steel conduit and aluminum cable trays penetrations but did not document aluminum conduits in fire barriers.

**4.0 IMMEDIATE CORRECTIVE ACTION(S)**

Upon identification of the fire barrier impairments, a station condition report was issued and, in accordance with the Surry Technical Requirements Manual, fire watches were established as required.

**5.0 ADDITIONAL CORRECTIVE ACTIONS**

Vendor testing of various configurations of aluminum conduit penetrations in fire barriers was completed using IEEE 634-1978, "Standard Cable Penetration Fire Stop Qualification Test", as the basis for the testing.

The procedure used for opening and sealing fire barriers was revised to prohibit the use of aluminum conduit through Appendix R fire barriers. In addition, the station design specification for electrical installation will be revised to prohibit the use of aluminum conduits through Appendix R fire barriers.

A design change was developed to accept the aluminum conduit penetrations based upon the proven test configuration, to evaluate the penetrations as satisfactory using Generic Letter (GL) 86-10 as guidance, or to remediate the penetrations by installing smoke seals or silicone foam on both sides of the barrier.

**6.0 ACTIONS TO PREVENT RECURRENCE**

The design change to modify penetrations that do not have proven test configurations is currently being implemented. The design change is scheduled to be completed in 2010.

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**7.0 SIMILAR EVENTS**

None

**8.0 MANUFACTURER/MODEL NUMBER**

None

**9.0 ADDITIONAL INFORMATION**

Unit 1 and Unit 2 were at 100% reactor power during the inspection.