



July 1, 2011

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

Dear Sir / Madam:

Subject: VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1  
DOCKET NO. 50/395  
OPERATING LICENSE NO. NPF-12  
LICENSEE EVENT REPORT (LER 2011-001-00)  
UNANALYZED CONDITION DUE TO FAILURE TO MAINTAIN ONE TRAIN  
OF SYSTEMS FOR SAFE SHUTDOWN IN ACCORDANCE WITH  
APPENDIX R SECTION III.G.a/III.G.3

Attached is Licensee Event Report (LER) No. 2011-001-00 for the Virgil C. Summer Nuclear Station Unit 1. This report describes an Appendix R violation for postulated fires in the Main Control Room, the Cable Spreading Room or the North Chase, which could have caused isolation of the B-Train essential electrical bus (XSW1DB). SCE&G is submitting this report in accordance with 10 CFR 21.2(c), "Reporting of Defects and Noncompliance," and 10 CFR 50.73(a)(2)(ii)(B), regarding an unanalyzed condition due to failure to maintain one train of systems for safe shutdown.

Should you have any questions, please call Bruce Thompson at (803) 931-5042.

Very truly yours,

Thomas D. Gatlin

JMW/TDG/gr  
Attachment

c: K. B. Marsh  
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RTS (CR-11-02298)  
File (818.07)  
PRSF (RC-11-0095)

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<b>NRC FORM 366</b> (10-2010)		<b>U.S. NUCLEAR REGULATORY COMMISSION</b>		APPROVED BY OMB: NO. 3150-0104		EXPIRES: 10/31/2013					
<b>LICENSEE EVENT REPORT (LER)</b> (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 FOIA/Privacy Section (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to infocollects.resource@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.							
<b>1. FACILITY NAME</b> Virgil C. Summer Nuclear Station Unit 1				<b>2. DOCKET NUMBER</b> 05000      395		<b>3. PAGE</b> 1 OF 4					
<b>4. TITLE</b> Failure to Maintain One Train of Safe Shutdown Systems in Accordance with Appendix R Section III. G. a/III.G.3.											
<b>5. EVENT DATE</b>			<b>6. LER NUMBER</b>			<b>7. REPORT DATE</b>					
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO.	MONTH	DAY	YEAR			
05	03	2011	2011	- 1 -	0	07	01	2011			
						<b>8. OTHER FACILITIES INVOLVED</b>					
						FACILITY NAME		DOCKET NUMBER 05000			
						FACILITY NAME		DOCKET NUMBER 05000			
<b>9. OPERATING MODE</b>  DE-FUELED			<b>11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)</b>								
<b>10. POWER LEVEL</b>  000			<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)(ii)(A)		<input type="checkbox"/> 50.73(a)(2)(viii)(A)		
			<input type="checkbox"/> 20.2203(a)(1)		<input type="checkbox"/> 20.2203(a)(4)		<input checked="" type="checkbox"/> 50.73(a)(2)(ii)(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 checked="" type="checkbox"/> OTHER		
			<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)		Specify in Abstract below or in NRC Form 366A		
<b>12. LICENSEE CONTACT FOR THIS LER</b>											
FACILITY NAME Bruce Thompson, Manager Licensing, Virgil C. Summer Nuclear Station Unit 1								TELEPHONE NUMBER (Include Area Code) (803) 931-5042			
<b>13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT</b>											
CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANU-FACTURER	REPORTABLE TO EPIX		
<b>14. SUPPLEMENTAL REPORT EXPECTED</b>						<b>15. EXPECTED SUBMISSION DATE</b>			MONTH	DAY	YEAR
<input type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE)						<input checked="" type="checkbox"/> NO					
<b>ABSTRACT</b> (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)											
On May 3, 2011 at 0514 hours, V.C. Summer Nuclear Station (VCSNS) determined the following:											
During circuit analysis review for transitioning the Fire Protection Program to NFPA 805, VCSNS identified a violation of the Appendix R requirement to maintain one train of systems free of fire damage, which are necessary to achieve and maintain Hot Shutdown conditions. VCSNS determined that a fire in the Main Control Room (MCR), the Cable Spreading Room (CSR), or the Control Building (CB) 412 North Chase could result in a hot short that could actuate a relay and trip and lock out all incoming breakers to the B-train essential electrical bus (XSW1DB).											
A root cause analysis was conducted and determined the cause was human error in the Appendix R analysis performed for VCSNS by a vendor.											
Immediate corrective actions consisted of establishing roving fire watches in the affected areas and revising the Fire Emergency Procedures (FEPs) to ensure the ability to achieve/maintain Hot Shutdown conditions.											
This report also provides a 10 CFR Part 21 written notification.											

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**NARRATIVE**

**PLANT IDENTIFICATION**

Westinghouse - Pressurized Water Reactor

**EQUIPMENT IDENTIFICATION:** XSW1DB, 1DB Switchgear

**IDENTIFICATION OF EVENT**

On May 3, 2011 at 0514 hours, VCSNS personnel identified a violation of 10 CFR 50 Appendix R, Fire Protection Program for Nuclear Power Facilities, Sections III.G.a and III.G.3 during circuit analysis review for transitioning the Fire Protection Program to NFPA 805. Specifically, VCSNS failed to maintain one train of systems free of fire damage, which are necessary to achieve and maintain Hot Shutdown conditions for postulated fires in the Main Control Room (MCR) or Cable Spreading Room (CSR).

**EVENT DATE**

May 03, 2011

Condition Report CR-11-02299 was generated to address this violation.

**REPORT DATE**

July 01, 2011

**CONDITIONS PRIOR TO EVENT**

De-Fueled, 0% Power

**DESCRIPTION OF EVENT**

On May 3, 2011 at 0514 hours, VCSNS personnel identified a violation of 10 CFR 50 Appendix R during circuit analysis review for transitioning the Fire Protection Program to NFPA 805. VCSNS determined that a fire in the MCR, CSR or Control Building (CB) 412 North Chase could result in a hot short that actuates a relay and trips all incoming breakers to the B-train 7.2KV essential electrical bus (XSW1DB), rendering this dedicated safety-related bus inoperable.

The original Appendix R circuit analysis (1982) and re-analysis (1984) identified circuit ESM301XB as being required for safe shutdown. This circuit connects a set of sensing current transformers (CTs) in XSW1DB to an ammeter on the Main Control Board (MCB), and provides over-current sensing for Relay 51BN-1DB (XSW1DB Bus Neutral Over-current Relay). It was recognized that a fire-induced open circuit in this CT circuit could result in damage to, or a fire in, the 1DB switchgear. Therefore, steps were taken to protect the CTs from this open circuit condition as part of the Appendix R re-analysis. However, this analysis and resolution failed to consider the hot-short-to-ground failure mode.

As part of the transition to NFPA 805, a re-analysis of the circuits required to support NFPA 805 performance goals was performed. From this review, it was determined that a fire in CB-15 (Upper Cable Spread Room), CB-17.01 (Control Room) or CB-01.01 (CB412 North Chase) could result in a spurious actuation of Relay 51BN-1DB. This relay actuates Relay 51BX-1DB (XSW1DB Bus Over-current Lockout Relay), which trips and locks-out all incoming breakers to the 1DB switchgear and the feeder breaker for the 480V XSW1DB1 and XSW1DB2 transformers. Tripping of the feeder breaker also trips the incoming main breakers in 480V busses XSW1DB1 and XSW1DB2. The lockout relay also prevents the 'B' EDG incoming breaker from closing and powering the 'B' ESF Train. This condition compromises the ability to use local controls for maintaining power to Train 'B' switchgear in the event of a fire in these fire zones, as credited in the Appendix R analysis.

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**NARRATIVE**

**CAUSE OF EVENT**

A root cause analysis was conducted to identify the reason a fire in either the MCR, CSR or CB412 North Chase could result in a hot short rendering the B-train essential electrical bus (Bus 1DB) inoperable. The result of this analysis has determined the most likely cause to be human error in Appendix R reviews performed by the vendor. The review of Appendix R circuits was in large part a manual process of evaluation that was prone to human error. Failure to consider a possible hot-short-to-ground for circuit ESM301XB during the original Appendix R analysis and the re-analysis in the early 1980s is indicative of human error. Due to the elapsed time since these errors were made, the exact cause could not be determined.

**ANALYSIS OF EVENT**

A fire in certain areas of the Control Building could cause a hot-short-to-ground in circuit ESM301XB, which would actuate Relay 51BN-1DB. This relay would subsequently actuate Relay 51BX-1DB to trip all incoming breakers to XSW1DB (offsite power and 'B' EDG breaker when the diesel is in the test start mode), which trips the feeder breaker to the 480VAC XSW1DA1 and XSW1DA2 transformers. Tripping of the feeder breaker also trips the incoming main breakers in 480V busses XSW1DB1 and XSW1DB2. This would result in the complete loss of power to the 'B' ESF train until the problem was diagnosed, the relays were reset, and breakers reclosed. Because Fire Emergency Procedures (FEPs) rely on 'B' Train equipment to shut down the plant in the event of a fire in the MCR or CSR, this would have an adverse impact on the ability to safely shut down the plant. The condition is less significant for a postulated fire in the CB412 North Chase because the FEPs rely on 'A' Train equipment.

VCSNS has enforcement discretion for fire issues identified during the transition to NFPA 805 as long as the risk impact of these issues is not 'RED' (Change in Core Damage Frequency (CDF)>1.0E-04/yr) per the guidance in NRC Inspection Manual Chapter 0609, "Significance Determination Process." A PRA Evaluation was conducted to assess the risk significance of both this Appendix R violation and that associated with LER-2011-002-00 to determine if enforcement discretion remains applicable to VCSNS. The results of this evaluation determined that the total CDF increase for both events is below the 'RED' threshold of 1.0E-04/yr, which complies with the requirements for enforcement discretion.

**CORRECTIVE ACTIONS**

Corrective actions include: 1) roving fire watch patrols were established in the fire zones through which the impacted circuits are routed, and 2) The FEPs were revised to provide guidance for preventing and/or responding to the bus lockout condition. The guidance consists of disabling the XSW1DB Neutral Over-Current relay, confirming that none of the XSW1DB Phase Over-Current Relays have tripped, and resetting and/or verifying the 51BX-1DB relay is not tripped. 3) Extent of Condition Evaluation was performed and identified no other similar conditions. VCSNS will develop a permanent hardware change as part of NFPA 805 implementation.

**PRIOR OCCURRENCES**

LER-2010-002, "Unanalyzed Condition Due to Wiring Discrepancy in the "B" Emergency Diesel Generator (EDG) Appendix R Isolation Circuitry," identified a conductor that was not removed during the implementation of a design change in 1983. The cause of this deficiency was a design modification implemented in 1983 that did not contain sufficient information to remove the conductor. The circumstances surrounding this deficiency are not similar to the condition described in this LER.

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**NARRATIVE**

**10 CFR PART 21 REPORTING REQUIREMENTS**

The following information is provided to meet the requirements of 10 CFR 21.21(d)(4)(i)-(viii). The hot short scenario was not considered during the Appendix R analysis and is considered to be a defect in the circuit design. The lockout of XSW1DB has been determined to be a Significant Safety Hazard (SSH) since it would adversely impact the ability to safely shut down the plant in the event of a fire in any of the three affected areas.

**(i) Name and address of the individual or individuals informing the Commission.**

Dan Gatlin, V.P. Nuclear Operations  
SCE&G Co.  
Virgil C. Summer Nuclear Station Unit 1  
HWY 215 Bradham Blvd.  
PO Box 88  
Jenkinsville, SC 29065

**(ii) Identification of the facility and the activity supplied for such facility or such activity within the United States which fails to comply or contains a defect.**

Facility: Virgil C. Summer Nuclear Station Unit 1

**Activity which contains a defect:**

Appendix R design analysis pertaining to the unanalyzed condition described in this Licensee Event Report.

**(iii) Identification of the firm supplying the activity which fails to comply or contains a defect:**

Gilbert & Associates, Inc. (now Worley Parsons) supplied the described activity.

**(iv) Nature of the defect or failure to comply and the safety hazard which is created or could be created by such defect or failure to comply.**

See Description of Event section of this event notification.

**(v) The date on which the information of such defect or failure to comply was obtained:**

SCE&G completed the Part 21 evaluation on June 27, 2011.

**(vi) In the case of a basic component which contains a defect or fails to comply, the number and location of all such components in use at, supplied for, or being supplied for one or more facilities or activities subject to the regulations in this part.**

V. C. Summer is a single unit facility. Worley/Parsons is investigating the potential for similar Appendix R analyses performed for other licensees.

**(vii) The corrective action which has been, is being, or will be taken; the name of the individual or organization responsible for the action; and the length of time that has been or will be taken to complete the action.**

See Corrective Actions section above.

**(viii) Any advice related to the defect or failure to comply about the facility, activity, or basic component that has been, is being, or will be given to purchasers or licensees.**

Licensees whose Appendix R analyses were performed by Gilbert/Commonwealth are advised to contact WorleyParsons concerning the existence of a similar condition.