

December 5, 2016



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 2016-005-00)  
STEAM PROPAGATION BARRIER DEGRADED DUE TO REMOVAL OF  
VENTILATION DUCT ACCESS PANEL FOR SURVEILLANCE  
ACTIVITIES

Attached is Licensee Event Report (LER) 2016-005-00, for the Virgil C. Summer Nuclear Station. This report describes an event that was identified as an Extent of Condition Review for LER 2016-003-00 Steam Propagation Door (DRIB/107) Discovered Propped Open. The station identified ventilation duct access panels that were periodically removed for surveillance activities while the plant was online. This configuration created pathways for steam to enter mild environmental qualification (EQ) areas during a High Energy Line Break (HELB) and potentially impact safety related equipment. The preliminary results indicate that steam propagation through an open fire damper inspection panel during a postulated HELB would not affect the capability of the structures, systems and components in the impacted rooms to perform their required functions. This report is submitted in accordance with 10CFR50.73(a)(2)(v)(A)&(D) and will be supplemented when results are finalized.

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

Very truly yours,

  
George A. Lippard For

BAB/GAL/ts  
Attachment

c:	K. B. Marsh	S. A. Williams	Marsh USA, Inc.
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**LICENSEE EVENT REPORT (LER)**

(See Page 2 for required number of digits/characters for each block)

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**1. FACILITY NAME**

VC SUMMER - UNIT 1

**2. DOCKET NUMBER**

05000 395

**3. PAGE**

1 OF 5

**4. TITLE**

STEAM PROPAGATION BARRIER DEGRADED DUE TO REMOVAL OF VENTILATION DUCT ACCESS PANEL FOR SURVEILLANCE ACTIVITIES

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	DOCKET NUMBER
10	04	2016	2016	005	00	12	05	2016	FACILITY NAME	05000
									FACILITY NAME	DOCKET NUMBER
										05000

9. OPERATING MODE	11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)			
1	<input type="checkbox"/> 20.2201(b)	<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)(A)
	<input type="checkbox"/> 20.2201(d)	<input type="checkbox"/> 20.2203(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(ii)(B)	<input type="checkbox"/> 50.73(a)(2)(viii)(B)
	<input type="checkbox"/> 20.2203(a)(1)	<input type="checkbox"/> 20.2203(a)(4)	<input type="checkbox"/> 50.73(a)(2)(iii)	<input type="checkbox"/> 50.73(a)(2)(ix)(A)
	<input type="checkbox"/> 20.2203(a)(2)(i)	<input type="checkbox"/> 50.36(c)(1)(i)(A)	<input type="checkbox"/> 50.73(a)(2)(iv)(A)	<input type="checkbox"/> 50.73(a)(2)(x)
10. POWER LEVEL	<input type="checkbox"/> 20.2203(a)(2)(ii)	<input type="checkbox"/> 50.36(c)(1)(ii)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(A)	<input type="checkbox"/> 73.71(a)(4)
	<input type="checkbox"/> 20.2203(a)(2)(iii)	<input type="checkbox"/> 50.36(c)(2)	<input type="checkbox"/> 50.73(a)(2)(v)(B)	<input type="checkbox"/> 73.71(a)(5)
	<input type="checkbox"/> 20.2203(a)(2)(iv)	<input type="checkbox"/> 50.46(a)(3)(ii)	<input type="checkbox"/> 50.73(a)(2)(v)(C)	<input type="checkbox"/> 73.77(a)(1)
	<input type="checkbox"/> 20.2203(a)(2)(v)	<input type="checkbox"/> 50.73(a)(2)(i)(A)	<input checked="" type="checkbox"/> 50.73(a)(2)(v)(D)	<input type="checkbox"/> 73.77(a)(2)(i)
	<input type="checkbox"/> 20.2203(a)(2)(vi)	<input type="checkbox"/> 50.73(a)(2)(i)(B)	<input type="checkbox"/> 50.73(a)(2)(vii)	<input type="checkbox"/> 73.77(a)(2)(ii)
	<input type="checkbox"/> 50.73(a)(2)(i)(C)	<input type="checkbox"/> OTHER	Specify in Abstract below or in NRC Form 366A	

**12. LICENSEE CONTACT FOR THIS LER**

LICENSEE CONTACT Bruce Thompson	TELEPHONE NUMBER (Include Area Code) (803) 931-5042
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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	KM	CHU	N418	Y	X	EI	BTRY	C173	Y

14. SUPPLEMENTAL REPORT EXPECTED	15. EXPECTED SUBMISSION DATE		
	MONTH	DAY	YEAR
<input checked="" type="checkbox"/> YES (If yes, complete 15. EXPECTED SUBMISSION DATE) <input type="checkbox"/> NO	02	28	2017

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

LER-2016-003 documented a steam propagation door (DRIB/107) to the Chiller Room for XHX0001C-VU propped open on September 13, 2016 without compensatory actions during routine operator rounds.

As part of the Extent of Condition Evaluation, the station discovered an additional degradation to the steam propagation barriers. Ventilation access panels were found with missing fasteners. While investigating this, on October 4, 2016, it was discovered that access panels were removed periodically, while the plant was at power, to conduct surveillance activities. Removal of these panels could have resulted in steam entering Environmental Qualification (EQ) mild areas during a postulated steam line break. The station has conducted a preliminary evaluation of the impacted rooms. The preliminary results indicate that steam propagation through an open fire damper inspection panel during a postulated High Energy Line Break (HELB) would not affect the capability of the structures, systems, and components (SSC) in the impacted rooms to perform their required functions. This License Event Report will be supplemented when results are finalized. This event is reportable under 10CFR50.73(a)(2)(v)(A)&(D) as any event or condition that could have prevented the fulfillment of a safety function.



### LICENSEE EVENT REPORT (LER)

(FAILURE CONTINUATION)

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1. FACILITY NAME	2. DOCKET NUMBER	3. LER NUMBER		
VC SUMMER - UNIT 1	05000-	YEAR	SEQUENTIAL NUMBER	REV NO.
	395	2016	005	00

**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
X	EI	BYC	S250	Y



**LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET**

(See NUREG-1022, R.3 for instruction and guidance for completing this form  
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1. FACILITY NAME VC SUMMER - UNIT 1	2. DOCKET NUMBER 05000- 395	3. LER NUMBER		
		YEAR 2016	SEQUENTIAL NUMBER 005	REV NO. 00

**NARRATIVE**

**1.0 EVENT DESCRIPTION**

On September 29 and October 3 of 2016, missing fasteners in ventilation access panel covers were identified as potential pathways for steam to enter EQ mild environment safety related equipment areas during a postulated steamline break. The areas potentially impacted included the safety related Chiller Rooms and Battery/Charger Rooms. The degradation was corrected and Engineering performed an analysis which determined that there was reasonable assurance of operability with the access panel covers in a degraded condition.

On October 04, 2016, investigation into the degraded conditions identified that the panels were periodically removed for inspection and maintenance activities while the plant was online. Condition report CR-16-05696 was written to document this condition. A review of surveillance test tasks sheets (STTS) for the past three years determined that six access panel covers were removed for inspection of fire dampers that could have impacted the Battery/Chiller Rooms. The fire dampers were XFD0136, XFD0138, XFD0140, XFD0143, XFD0137, and XFD0142. The STTS numbers were 1417856 completed on 3/30/2015, 1607759 completed on 9/20/2016, 1404157 completed on 9/08/2014, and 1510784 completed on 3/15/2016. Each inspection panel for the associated fire damper was opened one at a time on the dates listed during the last three years. The panels were estimated to be open for no more than a 10 minute duration.

An extent of condition investigation identified additional access panels that were removed periodically while the plant was at power which could have resulted in steam entering Environmental Qualification (EQ) mild areas during a postulated steam line break. An analysis was performed to determine which panels could affect safe shutdown of the plant and/or mitigate a HELB. This resulted in a scope expansion to include the Component Cooling Water (CCW) Speed Switch Rooms and Control Room Evacuation Panel Rooms. A review of the Surveillance Test Task Sheets for the past three years determined that two access panel covers were removed for inspection of fire dampers that could have impacted the Component Cooling Water (CCW) Pump Speed Switch Rooms and the Control Room Evacuation Panel Rooms. The fire dampers were XFD0189-AH and XFD0190-AH. The STTS numbers were 1405860 completed on 9/16/2014 and 1513111 completed on 3/08/2016. Each inspection panel for the associated fire damper was opened one at a time on the dates listed during the last three years. The panels were estimated to be open for no more than a 10 minute duration.

The station has conducted a preliminary evaluation of the impacted rooms. The preliminary results indicate that steam propagation through an open fire damper inspection panel during a postulated HELB would not affect the capability of the SSCs in the impacted rooms to perform their required functions. This Licensee Event Report will be supplemented when results are finalized. This event is reportable under 10CFR50.73(a)(2)(v)(A)&(D) as any event or condition that could have prevented the fulfillment of a safety function.

**2.0 EVENT ANALYSIS**

Some portions of the ventilation ductwork for the Chiller rooms, Chilled Water Pump room, Battery rooms, Battery Charger rooms, Control Room Evacuation Panel (CREP) Rooms, and the CCW Pump Speed Switch Rooms (Mild EQ Areas) are safety related, Class 2b. The safety related portions of the ductwork include access panels for fire dampers which, if removed online, create a flow path from the Harsh EQ Areas into the Mild Areas, increasing the possibility of elevated temperatures, pressures, and relative humidity in the EQ Mild environment areas.



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**NARRATIVE**

An Apparent Cause Evaluation determined that the removal of the access panels had not been considered to be a breach of a stream propagation barrier. The access panels were designed for removal for maintenance and surveillance tasks. These tasks were scheduled based on system availability and maintenance windows without consideration of an at-power mode of operation.

The Chilled Water (VU) System provides cooling to safety related areas (TS Table 3.7-7) as an attendant cooling system and supports the comfort requirements for the Control Room Emergency Filtration Systems (CREFS). The VU System is needed to ensure that equipment located within these areas can withstand the environmental effects of a postulated FSAR Chapter 15 event. With a nonfunctional chiller unit, its associated VU train will become nonfunctional, thereby affecting room temperatures and the reliability of the train's associated equipment. The most limiting area for temperature limits has been identified as the charging pump rooms. Per TS 3/4.5.2, one charging pump has to be operable per train of Emergency Core Cooling System (ECCS) during Mode 1-3.

TS 3/4.3.3.5, "Remote Shutdown Instrumentation", states that the remote shutdown monitoring instrumentation channels must be operable as required by Table 3.3-9. If the requirements are not met, the plant must restore the channel within 7 days or be in hot shutdown within 12 hours.

TS 3/4.7.3, "Component Cooling Water System", states at least two loops of CCW shall be operable. With only one component cooling water loop operable, restore at least two loops to operable status within 72 hours or be in at least Hot Standby within the next six hours and in Cold Shutdown within the following thirty hours.

TS 3/4.7.9, "Area Temperature Monitoring", and associated Table 3.7-7 describe the area temperature limits during normal operation due to cooling provided by the VU System. If the chiller cooling a Chilled Water loop is not running or if a HELB results in steam propagation, room temperatures will rise over time. If the temperature in a given area exceeds the limit shown in TS Table 3.7-7 for 8 hours, a Special Report detailing the basis for continued operability must be submitted to the NRC within 3 days. In addition, if the Technical Specifications limit for a given area is exceeded by thirty degrees for 4 hours, the equipment in the associated area must be declared inoperable.

TS 3/4.7.6, "Control Room Emergency Filtration Systems (CREFS)", states that two CREFS trains shall be operable. The surveillance requirements under TS 3/4.7.6 require each CREFS train to be demonstrated operable through verification that the control room air temperature is less than or equal to 85 degrees Fahrenheit. With one CREFS train inoperable, restore the inoperable train within 7 days or be in at least Hot Standby within the next 6 hours and in Cold Shutdown within the following 30 hours.

TS 3/4.8.2 "D.C. Sources", states that two battery banks and its associated full capacity charger shall be operable while operating in modes 1, 2, 3 and 4. The surveillance requirements under TS 3/4.8.2 require each battery and charger be demonstrated operable through verifying that the electrolyte level, float voltage, and specific gravity meet the specifications and total battery terminal voltage is greater than or equal to 129 volts on float charge.

VCSNS contracted an engineering firm to conduct an assessment of the impact on equipment affected by this condition. Specifically, this evaluation considers a condition where the ventilation access panels were removed.



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**NARRATIVE**

A thermal hydraulic model was developed using the GOTHIC computer code (version 8.1) to calculate the environmental conditions that could have existed at IB 412 foot elevation during a postulated HELB event. The GOTHIC computer program is a general purpose analysis tool that solves the conservation equations for mass, energy, and momentum for multi-component, multi-phase flow, and it has been used extensively for compartment transient analysis in nuclear power plants. Preliminary results indicate that for HELB events which are consistent with the design basis evaluation of steam line breaks outside of containment, there is reasonable assurance that equipment in the Chiller rooms, Chiller Pump rooms, Battery/Battery Charger rooms, Speed Switch Switchgear and Control Room Evacuation Panel rooms, would have been able to perform their required functions had such an event occurred when an inspection panel was open.

The station is currently evaluating breaks smaller than the design basis break sizes. This License Event Report will be supplemented when results are finalized.

**3.0 SAFETY SIGNIFICANCE**

The risk significance of removing the access panels for ventilation ductwork at power to conduct inspections has been determined to be of low risk significance. A review of data looking back three years shows that the maximum time that panels were opened in a rolling one year period is 51 minutes. The frequency of a Steam/Feed line break outside containment is 6.96E-03, per year. The change in core damage frequency (CDF) is therefore less than 1.00E-06 per year, which is determined to be low risk significance.

It should be noted that very conservative assumptions were used (i.e., that the HELB would occur in the area of the open access panel (no parsing for piping in the IB), that all of the HELBs would go directly to core damage, and that no credit is taken for mitigation by equipment recently shown by thermal hydraulic analysis to remain functional) were used. Using these very conservative assumptions resulted in a low risk significance. Refining these assumptions would further reduce the risk impact.

**4.0 PREVIOUS OCCURRENCE**

No previous occurrence within the last three years.

**5.0 CORRECTIVE ACTIONS**

Immediate action taken: A walk down was completed by engineering personnel to verify the integrity of the ventilation access panels. The walk down also determined the extent of condition for all instances in the plant where steam from a Harsh EQ environment could communicate to a Mild EQ environment through an open ventilation duct access panel.

On-line removal of the associated access panels has been stopped. Future on-line removal of the associated access panels will not occur until the risk has been evaluated and applicable regulatory requirements are met.