

George A. Lippard  
Vice President, Nuclear Operations  
803.345.4810



November 14, 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 2016-003-00)  
STEAM PROPAGATION DOOR DISCOVERED PROPPED OPEN

Attached is Licensee Event Report (LER) 2016-003-00, for the Virgil C. Summer Nuclear Station (VCSNS). This report describes a condition and preliminary results from an event, discovered during routine operator rounds, where a steam propagation door to the 'C' Safety Related Chiller Room (DRIB/107) was discovered propped open without all required compensatory actions. The propped open door could have rendered both trains of Chilled Water nonfunctional if a High Energy Line Break (HELB) event occurred. This could have subsequently rendered both trains of High Head Safety Injection inoperable due to the loss of chilled water cooling to safety related room coolers. This report is submitted in accordance with 10CFR50.73(a)(2)(v)(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

JMG/GAL/ts  
Attachment

|    |                |                        |                   |
|----|----------------|------------------------|-------------------|
| c: | K. B. Marsh    | NRC Resident Inspector | Maintenance Rule  |
|    | S. A. Byrne    | L. W. Harris           | Engineer          |
|    | J. B. Archie   | Paulette Ledbetter     | NSRC              |
|    | N. S. Carns    | J. C. Mellette         | RTS (CR-16-04703) |
|    | J. H. Hamilton | ICES Coordinator       | File (818.07)     |
|    | S. M. Shealy   | K. M. Sutton           |                   |
|    | W. M. Cherry   | INPO Records Center    |                   |
|    | C. Haney       | Marsh USA, Inc.        |                   |
|    | S. A. Williams | PRSF (RC-16-0157)      |                   |

**LICENSEE EVENT REPORT (LER)**

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

(See NUREG-1022, R.3 for instruction and guidance for completing this form  
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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 and Information Collections Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to [Infocollections.Resource@nrc.gov](mailto:Infocollections.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.

**1. FACILITY NAME**

VC SUMMER - UNIT 1

**2. DOCKET NUMBER**

05000 395

**3. PAGE**

1 OF 4

**4. TITLE**

STEAM PROPAGATION DOOR DISCOVERED PROPPED OPEN

| 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                         | 13  | 2016 | 2016  | 003               | 00      | 11  | 14  | 2016 | 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<br><br>100 |     |      | <input type="checkbox"/> 20.2203(a)(2)(ii)  |                   |         | <input type="checkbox"/> 50.36(c)(1)(ii)(A) |     |      | <input 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 ThompsonTELEPHONE NUMBER (Include Area Code)  
(803) 931-5042**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

| CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX | CAUSE | SYSTEM | COMPONENT | MANU-FACTURER | REPORTABLE TO EPIX |
|-------|--------|-----------|---------------|--------------------|-------|--------|-----------|---------------|--------------------|
| A     | KM     | CHU       | Y018          | Y                  |       |        |           |               |                    |

**14. SUPPLEMENTAL REPORT EXPECTED**☒ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☐ NO**15. EXPECTED SUBMISSION DATE**

| MONTH | DAY | YEAR |
|-------|-----|------|
| 02    | 16  | 2017 |

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

On September 13, 2016, at 20:30 a steam propagation door (DRIB/107) to the Chiller Room for XHX0001C was discovered propped open without all required compensatory actions during routine operator rounds. The door was determined to be open for approximately 3 hours and 22 minutes. The propped open door could have rendered both trains of Chilled Water nonfunctional if a High Energy Line Break (HELB) event occurred. This could have subsequently rendered both trains of High Head Safety Injection inoperable due to the loss of chilled water cooling to safety related room coolers. Technical Specification 3.0.3 was entered until the door was secured at 20:42. The cause of the event was due to a human performance error. Station Shift Test Specialist authorized the door to be propped open without verifying programmatic contingencies were established. This condition is reportable under 10CFR50.72(b)(3)(v)(D) and 10CFR50.73(a)(2)(v)(D) as any event or condition that at the time of discovery could have prevented the fulfillment of a safety function. An 8 hour event notification (EN 52240) was made.

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

(See NUREG-1022, R.3 for instruction and guidance for completing this form  
<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>)

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| 1. FACILITY NAME   | 2. DOCKET NUMBER | 3. LER NUMBER |                   |         |
|--------------------|------------------|---------------|-------------------|---------|
| VC SUMMER - UNIT 1 | 05000-395        | YEAR          | SEQUENTIAL NUMBER | REV NO. |
|                    |                  | 2016          | 003               | 00      |

**NARRATIVE****1.0 EVENT DESCRIPTION**

On September 13, 2016, at 20:30 a steam propagation door (DRIB/107) to the Chiller Room for XHX0001C was discovered propped open without all required compensatory actions during routine operator rounds. The door was determined to be open for approximately 3 hours and 22 minutes. The propped open door could have rendered both trains of Chilled Water (VU) nonfunctional if a High Energy Line Break (HELB) event occurred. This could have subsequently rendered both trains of High Head Safety Injection inoperable due to the loss of chilled water cooling to safety related room coolers. Technical Specification 3.0.3 was entered until the door was secured at 20:42. The station was monitoring the door under the Fire Protection program.

**2.0 EVENT ANALYSIS**

The Fire Protection Procedure (FPP-025 Enclosure 6.3) provides the compensatory actions for propping open DRIB/107 without prior engineering approval. Door DRIB/107 may be opened during all Modes provided XHX0001C-VU is declared nonfunctional and train separation has been established via closure of HELB dampers. Closure of the HELB dampers isolates the room from the common ventilation ductwork supplying the other rooms. This contingency is controlled by the station's procedure for controlling fire barriers and the Lock-Out/Tag-Out (LOTO) process. DRIB/107 is a steam propagation door that leads to one of three chiller units that provide chilled water to the VU System. The VU System has two trains and is designed to provide safety related cooling to various areas and equipment as discussed in FSAR 9.4.7.2.4. Allowing the steam propagation door to the XHX0001C-VU Chiller Room to be propped open without closing the room's HELB dampers would have provided a pathway for a steam environment to the other chiller rooms if a HELB event occurred. High Energy Line Breaks are discussed in FSAR 3.11.2.2.2.2 and 15.4.2. The open pathway could have affected the functionality of both trains of VU. In addition, the ventilation for the chiller rooms shares common supply and exhaust ductwork with the Safety Related Battery and Charger Room Ventilation system, thereby providing a potential pathway for a steam environment to also affect the functionality of both trains of vital DC power systems.

The apparent cause of this event was a human performance error. Compensatory measures associated with propping open DRIB/107 had been in place during the previous night shift and were cleared prior to the end of the night shift. There was inadequate communication between Work Control and the Shift Test Specialist that the LOTO for a HELB contingency had been cleared. The Shift Test Specialist assumed the HELB contingencies were still in place when a subsequent request to prop open the door was made.

The 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 Modes 1-3.

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

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|                    |                  | 2016          | 003               | 00      |

**NARRATIVE****2.0 EVENT ANALYSIS (continued)**

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.

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, room temperatures will rise over time. If the temperature in a given area exceeds the limit shown in TS Table 3.7-7 for eight hours, a Special Report detailing the basis for continued operability must be submitted to the NRC within 30 days. Additionally, if the Technical Specification limit for a given area is exceeded by thirty degrees for four hours, the equipment in the associated area must be declared inoperable.

TS 3/4.8.2 "D.C. SOURCES" the D.C power sources and associated distribution systems during operation ensures that sufficient power will be available to supply the safety related equipment required for 1) the safe shutdown of the facility and 2) the mitigation and control of accident conditions within the facility. The minimum specified independent and redundant D.C. power sources and distribution systems satisfy the requirements of General Design Criterion 17 of Appendix "A" to 10 CFR 50.

VCSNS contracted an engineering firm to conduct an assessment of the impact on equipment affected by this condition. Specifically, this evaluation considers DRIB/107 being propped open while the associated room's ventilation system HELB dampers remained open. HELB dampers are installed to prevent steam propagation from the Intermediate Building (IB) Harsh Area into the Chiller Rooms, Chilled Water Pump Room, Battery Rooms, and the Battery Charger Rooms (Mild Areas) during postulated HELB events when the affected chiller room door is propped open. The preliminary evaluation also considers the nonconforming condition of the Chiller Room and Chilled Water Pump Room drain system. Specifically, steam propagation barriers (orifices) in the floor drainage system were installed incorrectly between the Chiller Rooms and the Chilled Water Pump Room. While this condition existed, Chiller Rooms XHX0001B-VU and XHX0001C-VU were connected by an 8-inch drain line, as were Chiller Room A and the Chilled Water Pump Room. This nonconformance condition will be reported in LER-2016-004.

A thermal hydraulic model was developed using the GOTHIC computer code (version 8.1) to calculate the environmental conditions that could have existed at Intermediate Building (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. The preliminary analysis demonstrates that during a postulated HELB event, the environmental result for the additional rooms connected by the drain line are not expected to significantly rise in temperature and humidity. As a result, for the spectrum of HELB events, which are consistent with the design basis evaluation of steam line breaks outside of containment, there is reasonable assurance that the risk significant equipment in the Mild Area (i.e., Chiller, Chiller Pump, Battery and Battery Charger rooms) would have been able to perform their required functions had such an event occurred.

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

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|                    |  |                  |  | 2016          | 003               | 00      |

**NARRATIVE****3.0 SAFETY SIGNIFICANCE**

The safety significance of this event will be provided in a supplemental report to this LER.

**4.0 PREVIOUS OCCURRENCE**

No previous occurrence within the last three years.

**5.0 CORRECTIVE ACTIONS**

The door was closed as the immediate action. The station issued Special Order 16-05 as an interim action to suspend propping open chiller room doors. The station initiated a preliminary assessment of the potential impacts due to steam propagation. The station conducted a walkdown of the steam barriers associated with the event. A detailed analysis will be completed to address the safety significance. Procedures will be reviewed for enhancement to minimize reassurance.