



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
REGION II
245 PEACHTREE CENTER AVENUE N.E., SUITE 1200
ATLANTA, GEORGIA 30303-1200

May 5, 2023

EA-23-031

Daniel G. Stoddard
Senior Vice President and Chief Nuclear Officer
Virginia Electric and Power Company
Innsbrook Technical Center
5000 Dominion Boulevard
Glenn Allen, VA 23060-6711

SUBJECT: SURRY POWER STATION – INTEGRATED INSPECTION REPORT
05000280/2023001 AND 05000281/2023001

Dear Daniel G. Stoddard:

On March 31, 2023, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Surry Power Station. On April 20, 2023, the NRC inspectors discussed the results of this inspection with David Wilson, Site Vice President, and other members of your staff. The results of this inspection are documented in the enclosed report.

Two findings of very low safety significance (Green) are documented in this report. Two of these findings involved violations of NRC requirements. We are treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2 of the Enforcement Policy.

If you contest the violations or the significance or severity of the violations documented in this inspection report, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region II; the Director, Office of Enforcement; and the NRC Resident Inspector at Surry Power Station.

If you disagree with a cross-cutting aspect assignment in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001; with copies to the Regional Administrator, Region II; and the NRC Resident Inspector at Surry Power Station.

This letter, its enclosure, and your response (if any) will be made available for public inspection and copying at <http://www.nrc.gov/reading-rm/adams.html> and at the NRC Public Document Room in accordance with Title 10 of the *Code of Federal Regulations* 2.390, "Public Inspections, Exemptions, Requests for Withholding."

D. Stoddard

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Sincerely,



Signed by Fannon, Matthew
on 05/05/23

Matthew S. Fannon, Chief
Reactor Projects Branch 4
Division of Reactor Projects

Docket Nos. 05000280 and 05000281
License Nos. DPR-32 and DPR-37

Enclosure:
As stated

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SUBJECT: SURRY POWER STATION – INTEGRATED INSPECTION REPORT
05000280/2023001 AND 05000281/2023001 Dated May 05, 2023

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S. Kennedy
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DATE	05/04/23	05/04/23	05/03/23	05/05/23	05/05/23

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U.S. NUCLEAR REGULATORY COMMISSION
Inspection Report

Docket Numbers: 05000280 and 05000281

License Numbers: DPR-32 and DPR-37

Report Numbers: 05000280/2023001 and 05000281/2023001

Enterprise Identifier: I-2023-001-0037

Licensee: Virginia Electric and Power Company

Facility: Surry Power Station

Location: Surry, VA

Inspection Dates: January 1, 2023 to March 31, 2023

Inspectors: S. Campbell, Senior Reactor Systems Engineer
D. Jung, Project Engineer
S. Kennedy, Senior Resident Inspector
K. Kirchbaum, Operations Engineer
M. Meeks, Senior Operations Engineer
W. Monk, Senior Reactor Inspector
A. Rosebrook, Senior Reactor Analyst
M. Schwieg, Senior Reactor Inspector
J. Seat, Senior Project Engineer
D. Turpin, Resident Inspector
A. Wilson, Senior Project Engineer

Approved By: Matthew S. Fannon, Chief
Reactor Projects Branch 4
Division of Reactor Projects

Enclosure

SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring the licensee's performance by conducting an integrated inspection at Surry Power Station, in accordance with the Reactor Oversight Process. The Reactor Oversight Process is the NRC's program for overseeing the safe operation of commercial nuclear power reactors. Refer to <https://www.nrc.gov/reactors/operating/oversight.html> for more information.

List of Findings and Violations

Transient Combustibles Stored in Restricted Areas			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000280,05000281/2023001-01 Open/Closed	[P.5] - Operating Experience	71111.05
The NRC identified a finding of very low safety significance (Green) and an associated non-cited violation (NCV) of License Condition 3.I, Fire Protection, associated with the licensee's failure to implement and maintain in effect, the provisions of the approved fire protection program as described in the Updated Final Safety Analysis Report (UFSAR), which resulted in storage of transient combustibles within restricted or combustion free zones in the Unit 1 and Unit 2 cable tray rooms.			

Failure to Ensure Replacement Parts were the Appropriate Parts Prior to Installation			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000280/2023001-02 Open/Closed EA-23-031	[H.12] - Avoid Complacency	71153
A self-revealing finding of very low safety significance (Green) and an associated non-cited violation (NCV) of Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for the failure to implement licensee procedure MA-AA-100, Attachment 5, "Work Preparation and Planning." Specifically, maintenance personnel did not inspect the new air handler V-belts prior to installation as required by MA-AA-100, Attachment 5, to ensure that replacement parts were appropriate. This led to the failure of both air handling units (1-VS-AC-6 and 1-VS-AC-7) and the Unit 1 emergency switchgear room (ESGR) cooling being inoperable greater than its Technical Specification (TS) allowed outage time.			

Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
LER	05000280/2022-003-00	LER 2022-003-00 for Surry Power Station Unit 1, Loss of Emergency Switchgear Room Cooling Due to Use of Incorrect Air Handler Fan V-Belts	71153	Closed

PLANT STATUS

Unit 1 operated at or near rated thermal power for the entire inspection period.

Unit 2 began the inspection period at rated thermal power. On January 10, 2023, the unit was down powered to 60 percent due to a failure of "B" main feed pump seal. The unit was returned to rated thermal power on January 14, 2023, and remained at or near rated thermal power for the remainder of the inspection period.

INSPECTION SCOPES

Inspections were conducted using the appropriate portions of the inspection procedures (IPs) in effect at the beginning of the inspection unless otherwise noted. Currently approved IPs with their attached revision histories are located on the public website at <http://www.nrc.gov/reading-rm/doc-collections/insp-manual/inspection-procedure/index.html>. Samples were declared complete when the IP requirements most appropriate to the inspection activity were met consistent with Inspection Manual Chapter (IMC) 2515, "Light-Water Reactor Inspection Program - Operations Phase." The inspectors performed activities described in IMC 2515, Appendix D, "Plant Status," observed risk significant activities, and completed on-site portions of IPs. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel to assess licensee performance and compliance with Commission rules and regulations, license conditions, site procedures, and standards.

REACTOR SAFETY

71111.04 - Equipment Alignment

Partial Walkdown Sample (IP Section 03.01) (3 Samples)

The inspectors evaluated system configurations during partial walkdowns of the following systems/trains:

- (1) Unit 1 charging system with the "B" charging pump out of service on February 8, 2023
- (2) Fire protection system on February 14, 2023
- (3) Alternate AC diesel returned to service lineup following maintenance on March 27, 2023

71111.05 - Fire Protection

Fire Area Walkdown and Inspection Sample (IP Section 03.01) (7 Samples)

The inspectors evaluated the implementation of the fire protection program by conducting a walkdown and performing a review to verify program compliance, equipment functionality, material condition, and operational readiness of the following fire areas:

- (1) Control room, elevation 27 feet – 6 inches on January 17, 2023
- (2) Unit 1 cable spreading room, elevation 45 feet – 3 inches on January 20, 2023
- (3) Unit 1 battery rooms 1A and 1B, turbine building, elevation 9 Feet - 6 Inches on February 2, 2023
- (4) Unit 2 battery rooms 2A and 2B, turbine building, elevation 9 Feet - 6 Inches on February 2, 2023

- (5) Auxiliary building – general area Unit 1, elevation 13 feet on February 8, 2023
- (6) Auxiliary building – general area Unit 2, elevation 13 feet on February 8, 2023
- (7) Unit 2 cable spreading room elevation 45 feet – 3 inches on March 14, 2023

Fire Brigade Drill Performance Sample (IP Section 03.02) (1 Sample)

- (1) The inspectors evaluated the onsite fire brigade training and performance during an unannounced fire drill on February 21, 2023. The simulated fire location was on the 27-foot elevation of the auxiliary building.

71111.06 - Flood Protection Measures

Flooding Sample (IP Section 03.01) (1 Sample)

- (1) The inspectors evaluated internal flooding mitigation protections in the Unit 2 battery room 2B, turbine building, elevation 9 feet - 6 inches, on February 2, 2023.

71111.07A - Heat Exchanger/Sink Performance

Annual Review (IP Section 03.01) (1 Sample)

The inspectors evaluated readiness and performance of:

- (1) 1-CC-E-1C and 1-CC-E-1D, component cooling heat exchangers

71111.11B - Licensed Operator Requalification Program and Licensed Operator Performance

Licensed Operator Requalification Program (IP Section 03.04) (1 Sample)

The inspectors reviewed the facility operating history and associated documents in preparation for this inspection. During the week of February 27, 2023, the inspectors reviewed documentation, interviewed licensee personnel, and observed the administration of operating tests associated with the licensee's operator requalification program. Each of the activities performed by the inspectors was done to assess the effectiveness of the facility licensee in implementing requalification requirements identified in 10 CFR Part 55, "Operators' Licenses." The evaluations were also performed to determine if the licensee effectively implemented operator requalification guidelines established in NUREG-1021, "Operator Licensing Examination Standards for Power Reactors," and Inspection Procedure (IP) 71111.11, "Licensed Operator Requalification Program." The inspectors also evaluated the licensee's simulation facility for adequacy for use in operator licensing examinations using ANSI/ANS-3.5-2009, "American National Standard for Nuclear Power Plant Simulators for use in Operator Training and Examination." The inspectors observed two operations crews during the performance of the operating tests. Documentation reviewed included written examinations, Job Performance Measures (JPMs), simulator scenarios, licensee procedures, on-shift records, simulator modification request records, simulator performance test records, operator feedback records, licensed operator qualification records, remediation plans, watchstanding records, and medical records. The records were inspected using the criteria listed in IP 71111.11. Documents reviewed during the inspection are documented in the List of Documents Reviewed.

(1) Biennial Requalification Written Examinations

The inspectors evaluated the quality of the licensed operator biennial requalification written examination administered in calendar year 2022.

Annual Requalification Operating Tests

The inspectors evaluated the adequacy of the facility licensee's annual requalification operating test.

Administration of an Annual Requalification Operating Test

The inspectors evaluated the effectiveness of the facility licensee in administering requalification operating tests required by 10 CFR 55.59(a)(2) and that the facility licensee is effectively evaluating their licensed operators for mastery of training objectives.

Requalification Examination Security

The inspectors evaluated the ability of the facility licensee to safeguard examination material, such that the examination is not compromised.

Remedial Training and Re-examinations

The inspectors evaluated the effectiveness of remedial training conducted by the licensee, and reviewed the adequacy of re-examinations for licensed operators who did not pass a required requalification examination.

Operator License Conditions

The inspectors evaluated the licensee's program for ensuring that licensed operators meet the conditions of their licenses.

Control Room Simulator

The inspectors evaluated the adequacy of the facility licensee's control room simulator in modeling the actual plant, and for meeting the requirements contained in 10 CFR 55.46.

Problem Identification and Resolution

The inspectors evaluated the licensee's ability to identify and resolve problems associated with licensed operator performance.

71111.11Q - Licensed Operator Requalification Program and Licensed Operator Performance

Licensed Operator Performance in the Actual Plant/Main Control Room (IP Section 03.01)
(1 Sample)

- (1) The inspectors observed and evaluated licensed operator performance in the control room during Unit 2 ramp down to 60 percent power due to #2 main feed pump outboard seal failure on January 10, 2023.

Licensed Operator Regualification Training/Examinations (IP Section 03.02) (1 Sample)

- (1) The inspectors observed and evaluated licensed operator regualification training involving a scenario which included loss of the "1H" 4160 volts alternating current safety bus and a loss of coolant accident on March 8, 2023.

71111.12 - Maintenance Effectiveness

Maintenance Effectiveness (IP Section 03.01) (1 Sample)

The inspectors evaluated the effectiveness of maintenance to ensure the following structures, systems, and components (SSCs) remain capable of performing their intended function:

- (1) Unit 1 and Unit 2 safety-related battery maintenance strategies on March 2, 2023

Quality Control (IP Section 03.02) (1 Sample)

The inspectors evaluated the effectiveness of maintenance and quality control activities to ensure the following SSC remains capable of performing its intended function:

- (1) Unit 1 emergency switchgear room air handling unit belt failures (corrective action 11278872)

Aging Management (IP Section 03.03) (1 Sample)

The inspectors evaluated the effectiveness of the aging management program for the following SSCs that did not meet their inspection or test acceptance criteria:

- (1) Aging management of the "1B1" battery charger on March 2, 2023

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management Sample (IP Section 03.01) (4 Samples)

The inspectors evaluated the accuracy and completeness of risk assessments for the following planned and emergent work activities to ensure configuration changes and appropriate work controls were addressed:

- (1) Risk mitigating actions for #2 emergency diesel generator leads inspection and monthly surveillance on January 9, 2023
- (2) Unit 1 elevated risk due to pressurizer block valve testing on February 2, 2023
- (3) Unit 1 and Unit 2 elevated risk due to the alternate AC diesel out of service, Unit 1 charging pump maintenance, and "B" main control room chiller maintenance on March 16, 2023
- (4) Unit 1 and Unit 2 elevated risk due to emergent repairs to the "B" emergency service water pump on March 29, 2023

71111.15 - Operability Determinations and Functionality Assessments

Operability Determination or Functionality Assessment (IP Section 03.01) (5 Samples)

The inspectors evaluated the licensee's justifications and actions associated with the following operability determinations and functionality assessments:

- (1) Condition Report (CR)1217695, "1B1" uninterruptable power supply (UPS) battery direct current (DC) output current is oscillating on January 20, 2023
- (2) CR1217541, Unit 1, "C" loop Tave step change on January 23, 2023.
- (3) CR1216340, 1-FP-P-3 fire maintenance pump not maintaining level in tank on January 5, 2023
- (4) CR1217994, #1 emergency diesel generator starting speed low on February 27, 2023
- (5) CR1222649, Missing bolt on auxiliary feedwater PS2-FW-PS-252 on March 28, 2023

71111.18 - Plant Modifications

Temporary Modifications and/or Permanent Modifications (IP Section 03.01 and/or 03.02) (1 Sample)

The inspectors evaluated the following temporary or permanent modifications:

- (1) Design Equivalent Change Package SU-18-00123, Unit 1 Residual Heat Removal Heat Exchangers Replacement

71111.24 - Testing and Maintenance of Equipment Important to Risk

The inspectors evaluated the following testing and maintenance activities to verify system operability and/or functionality:

Post-Maintenance Testing (PMT) (IP Section 03.01) (5 Samples)

- (1) 1-IPT-CC-RC-T-432, Delta T and Tave Protection Set III Loop T-432 Channel Calibration after replacement of summator, on March 3, 2023
- (2) Replacement of 1-FP-36, motor driven fire pump recirculation valve, on March 13, 2023 (Work Order #38204302137)
- (3) Replacement of 01-FP-B-2B, diesel driven fire pump starter battery, on March 14, 2023 (Work Order #38103746603)
- (4) 2-PT-1.2, NIS Power Range Trip Channel Test after Range NI Rescale, on March 14, 2023
- (5) 0-OPT-VS-001, Control Room Air Conditioning System Pump and Valve Inservice Testing following replacement of 1-VS-P-2B, "B" main control room chiller water pump motor, on March 15, 2023

Surveillance Testing (IP Section 03.01) (3 Samples)

- (1) 0-OPT-EG-001, #3 Emergency Diesel Generator Monthly Test, on January 26, 2023,
- (2) 1-NPT-RX-014, Hot Rod Drops by Bank, on February 24, 2023
- (3) 1-NPT-RX-005, Control Rod Assembly Partial Movement, on March 1, 2023

Inservice Testing (IST) (IP Section 03.01) (2 Samples)

- (1) 1-OPT-SI-005, Low Head Safety Injection Pump Test, on January 31, 2023
- (2) 1-OPT-CS-002, Containment Spray System Test, on February 9, 2023

71114.06 - Drill Evaluation

Select Emergency Preparedness Drills and/or Training for Observation (IP Section 03.01)
(1 Sample)

- (1) The inspectors observed and evaluated the conduct of an emergency preparedness drill on Unit 1 involving a dropped control rod and a large break loss of coolant accident resulting in a General Emergency declaration on February 7, 2023.

OTHER ACTIVITIES – BASELINE

71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

IE01: Unplanned Scrams per 7000 Critical Hours Sample (IP Section 02.01) (2 Samples)

- (1) Unit 1 (January 1, 2022 through December 31, 2022)
- (2) Unit 2 (January 1, 2022 through December 31, 2022)

IE03: Unplanned Power Changes per 7000 Critical Hours Sample (IP Section 02.02)
(2 Samples)

- (1) Unit 1 (January 1, 2022 through December 31, 2022)
- (2) Unit 2 (January 1, 2022 through December 31, 2022)

IE04: Unplanned Scrams with Complications (USwC) Sample (IP Section 02.03) (2 Samples)

- (1) Unit 1 (January 1, 2022 through December 31, 2022)
- (2) Unit 2 (January 1, 2022 through December 31, 2022)

71152A - Annual Follow-up Problem Identification and Resolution

Annual Follow-up of Selected Issues (Section 03.03) (2 Samples)

- (1) Malware Attack of Engineer of Choice Computer Network (CR 1210497) and Notification of Engineering Firm of Choice (EOC) Vendor Subjected to a Cyber-Attack (CR 1212946)

The inspector reviewed the licensee's corrective actions taken by the Fleet's cybersecurity incident response team (CSIRT) in response to a data exfiltration cyber incident, which occurred on a third-party engineering firm's network server. The inspector determined the licensee adequately implemented effective corrective actions for this concern. Specifically, the list of exfiltrated documents was reviewed and the licensee concluded that these documents did not present a substantial

security risk to their stations nor was any safeguards information (SGI) material involved in the data exfiltration. No findings were identified.

- (2) Results of Surry Unit 1 MRP-227 Phase II (CR1213488)

71153 - Follow Up of Events and Notices of Enforcement Discretion

Event Report (IP section 03.02) (1 Sample)

The inspectors evaluated the following licensee event reports (LERs):

- (1) LER 2022-003-00, Loss of Emergency Switchgear Room Cooling Due to Use of Non-Compliant Air Handler Unit Fan V-Belts, ADAMS Accession No. ML22316A021. The inspection conclusions associated with this LER are documented in this report under Inspection Results Section. This LER is Closed.

INSPECTION RESULTS

Transient Combustibles Stored in Restricted Areas			
Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000280,05000281/2023001-01 Open/Closed	[P.5] - Operating Experience	71111.05
<p>The NRC identified a finding of very low safety significance (Green) and an associated non-cited violation (NCV) of License Condition 3.I, Fire Protection, associated with the licensee's failure to implement and maintain in effect, the provisions of the approved fire protection program as described in the Updated Final Safety Analysis Report (UFSAR), which resulted in storage of transient combustibles within restricted or combustion free zones in the Unit 1 and Unit 2 cable tray rooms.</p> <p><u>Description:</u> During the inspection period the inspectors identified two examples which were in violation of the licensee transient combustible control program, which is described in CM-AA-FPA-101, "Control of Combustible and Flammable Materials." Transient fire loading reports are developed based on the requirements in CM-AA-FPA-101.</p> <p>On January 20, 2023, the inspectors conducted a walkdown of the Unit 1 cable tray room, Fire Zone 46, elevation 45 feet – 3 inches. The inspectors identified transient combustibles, which were stored for Unit 1 turbine control system replacement project, were not stored in accordance with the designated transient fire loading report posted at the storage location. Section 2, "Work Area Preparation and Precautions," of the transient fire loading report stated, "Do not locate combustible materials under cable trays in Safety-Related areas." The transient combustibles were stored under several cable trays and the Unit 1 cable tray room is designated as a safety-related area.</p> <p>On March 14, 2023, the inspectors conducted a walkdown of the Unit 2 cable tray room, Fire Zone 47, elevation 45 feet – 3 inches. The inspectors identified that the transient combustibles, which were stored for the Unit 2 turbine control system replacement project, were not stored in accordance with the designated fire loading report posted at the storage location. Specifically, the transient combustibles were located underneath cable trays, plastics were more than the two-pound limit, and transient combustibles were stored within 10 feet of fire door 2-BS-DR-12 (Unit 2 cable tray room exit down to emergency switchgear</p>			

room) contrary to the requirements on the posted transient fire loading report. The Unit 2 cable tray room is also designated as a safety-related area.

The inspectors concluded that the licensee did not follow the provisions described in CM-AA-FPA-101 for control of transient combustibles. The Unit 1 cable tray room transient fire loading report was placed into effect on November 13, 2022, and the Unit 2 cable tray room transient fire loading report was placed into effect on February 24, 2023.

To assist in informing the potential safety significance of the issue, the inspectors inquired as to whether there were any Appendix R safe shutdown cables in the trays above the areas where the transient combustibles were stored in the Unit 1 and Unit 2 cable tray rooms. The licensee did not rule out that Appendix R safe shutdown cables were in the trays in question. The concern is that transient combustibles could cause the spread of fire and impact the availability of Appendix R safe shutdown and/or safety-related equipment.

Corrective Actions: On January 20, 2023, the licensee removed the transient combustibles from the Unit 1 cable tray room. On March 14, 2023, the licensee relocated the transient combustibles away from fire door 2-BS-DR-12, established a roving fire watch every 12 hours, and updated the transient fire loading report. The licensee held a site wide safety standdown to stress the importance of compliance with the transient combustible program to station personnel.

Corrective Action References: CR1218432, CR1221774

Performance Assessment:

Performance Deficiency: The inspectors found that the licensee's failure to implement the fire protection program in accordance with licensee procedure CM-AA-FPA-101, which resulted in the storage of transient combustibles within restricted or combustion free zones, was a performance deficiency within the licensee's ability to foresee and prevent.

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Protection Against External Factors attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, a credible fire scenario involving the identified transient combustibles could affect equipment important to safety and/or safety-related equipment. The inspectors used IMC 0612, Appendix E, "Examples of Minor Issues," dated January 1, 2021, to inform answers to the more than minor screening questions and found this condition consistent with more than minor Example 4.j.

Significance: The inspectors assessed the significance of the finding using IMC 0609 Appendix F, "Fire Protection and Post - Fire Safe Shutdown SDP." In accordance with IMC 0609, Appendix F, Attachment 1, "Fire Protection Significance Determination Process Worksheet," the finding was determined to be of very low safety significance (Green) because the fire finding would not increase the likelihood of a fire, delay detection of a fire, or result in a more significant fire than previously analyzed such that the credited safe shutdown strategy could be adversely impacted.

Cross-Cutting Aspect: P.5 - Operating Experience: The organization systematically and effectively collects, evaluates, and implements relevant internal and external operating experience in a timely manner. The inspectors found that the licensee did not implement

relevant internal operating experience related to three similar NRC identified findings since 2021 involving transient combustibles stored in a restricted area.

Enforcement:

Violation: License Condition 3.I, "Fire Protection," states in part, "The licensee shall implement and maintain in effect the provisions of the approved fire protection program as described in the Updated Final Safety Analysis Report..." UFSAR Section 9.10.1, Design Bases, states in part, "Compliance with these criteria is contained in the following documents... Fire Protection Program documents and the associated Administrative Procedures describe the administrative and technical controls." Licensee procedure CM-AA-FPA-101, "Control of Combustible and Flammable Materials," which includes restrictions for the Unit 1 and Unit 2 cable tray rooms, states, in part, "Do not locate combustible materials under cable trays in Safety-Related areas," and "No transient within 10 ft. of door #12."

Contrary to the above, from approximately November 13, 2022, to January 14, 2023, on Unit 1, and February 24, 2023, to March 14, 2023, on Unit 2, the licensee failed to implement and maintain in effect, the provisions of the approved fire protection program as described in the UFSAR, resulting in noncompliance with the fire protection combustible control program as documented CM-AA- FPA-101. Specifically, the licensee stored transient combustibles within the Unit 1 and Unit 2 cable tray room restricted or combustion free zones.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

Failure to Ensure Replacement Parts were the Appropriate Parts Prior to Installation

Cornerstone	Significance	Cross-Cutting Aspect	Report Section
Mitigating Systems	Green NCV 05000280/2023001-02 Open/Closed EA-23-031	[H.12] - Avoid Complacency	71153
A self-revealing finding of very low safety significance (Green) and an associated non-cited violation (NCV) of Title 10 of the Code of Federal Regulations (10 CFR) Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," for the failure to implement licensee procedure MA-AA-100, Attachment 5, "Work Preparation and Planning." Specifically, maintenance personnel did not inspect the new air handler V-belts prior to installation as required by MA-AA-100, Attachment 5, to ensure that replacement parts were appropriate. This led to the failure of both air handling units (1-VS-AC-6 and 1-VS-AC-7) and the Unit 1 emergency switchgear room (ESGR) cooling being inoperable greater than its Technical Specification (TS) allowed outage time.			
<u>Description:</u> The control room and emergency switchgear room cooling include five chillers and eight air handling units arranged in two redundant trains. The air handling units (AHUs) which serve the Unit 1 ESGR are 1-VS-AC-6 in one train and 1-VS-AC-7 in the redundant train.			
As part of planned maintenance beginning on July 29, 2022, and September 15, 2022, the AHU fan V-belts for both Unit 1 ESGR cooling trains (1-VS-AC-6 and 1-VS-AC-7) were replaced, respectively. When the AHU was placed in service, the V-belts eventually failed resulting in the inoperability of one or both AHUs.			

Between September 15 and September 19, 2022, the licensee replaced the V-belts several additional times due to failure. Following the failure of the belts on 1-VS-AC-7 on September 19, 2022, the licensee's investigation revealed that the V-belt vendor sent a different variant of the BX-99 V-belt ordered (Torq Titan vs. the Grip Notch V-belt expected) and these belts were incorrectly accepted and installed at the station.

The new-style Torq Titan V-belts were installed on 1-VS-AC-7 from July 29, 2022, to September 19, 2022. During this same period, the older-style Grip Notch V-belts were installed on 1-VS-AC-6 until replaced with the new-style Torq Titan belts on September 15, 2022. This resulted in one train of ESGR cooling being inoperable from July 29, 2022, until September 15, 2022, and two trains being inoperable between September 15 and September 19, 2022. As a result of one or both trains being inoperable for greater than the TS allowed outage time, the licensee submitted a licensee event report (LER) in accordance with 10 CFR 50.73, "Licensee Event Report Systems" (LER 2022-003-00 for Surry Power Station Unit 1, Loss of Emergency Switchgear Room Cooling Due to Use of Incorrect Air Handler Fan V-Belts).

The inspectors reviewed the LER, the Level of Effort Evaluation (LEE), and other relevant documents associated with this issue. The LEE for this issue documented that the cause of the 1-VS-AC-6 and 1-VS-AC-7 failure was due to the vendor failing to notify changes to the V-belts to the licensee. The LEE stated that the vendor changed their V-belts internally, without changing the part number or specification in their catalog. The LEE and the LER list several missed opportunities to potentially detect and identify the nonconforming V-belts, specifically during the commercial grade dedication, receipt inspection, warehouse stocking, and during installation of the V-belt.

The inspectors determined that the most likely opportunities to identify that the replacement parts were incorrect included the receipt inspection and during installation of the V-belts. During receipt inspection process on several occasions, the licensee identified discrepant conditions with the belts, including dimensional discrepancies. The Supply Chain Management recommended that the vendor be contacted and questioned as to why different parts were supplied. However, the licensee did not follow up with the vendor. The inspectors also noted that during the installation of the V-belts, maintenance personnel did not verify that the new parts being installed were appropriate replacement parts as required by MA-AA-100, Attachment 5, "Work Preparation and Planning." Specifically, step 4.b required that "parts are physically verified and correct." The inspectors concluded that these were reasonable opportunities for the licensee to identify that the Torq Titan V-belts were not the correct replacement parts for the AHU belts.

Corrective Actions: The licensee entered this issue into their corrective action program, performed a level of effort review, created new stock codes for new V-belts manufactured by a different manufacturer, and performed an extent of condition review to verify that there were no other AHUs associated with Unit 1 and Unit 2 with incorrect V-belts (Torq Titan).

Corrective Action References: CR1208021

Performance Assessment:

Performance Deficiency: The licensee did not ensure that replacement parts were appropriate prior to installation as required by MA-AA-100, Attachment 5, "Work Preparation and Planning."

Screening: The inspectors determined the performance deficiency was more than minor because it was associated with the Equipment Performance attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the performance deficiency resulted in the installation of the incorrect belts for the ESGR cooling, which led to the failure of two AHUs and the Unit 1 ESGR cooling being inoperable greater than its TS allowed outage time.

Significance: The inspectors assessed the significance of the finding using IMC 0609 Appendix A, "The Significance Determination Process (SDP) for Findings At-Power." Using IMC 0609, Appendix A, Exhibit 2 – Mitigating Systems Screening Questions, the inspectors determined that the degraded condition represented a loss of the probabilistic risk assessment (PRA) function of one train of a multi-train TS system for greater than its TS allowed outage time. Therefore, a detailed risk evaluation was required to evaluate the significance of the finding. A regional senior reactor analyst (SRA) utilized SAPHIRE 8, version 8.2.6 and the Surry Unit 1 SPAR model, version 8.80, dated May 26, 2022, to perform the detailed risk assessment. The dominant accident sequence was a failure of both AHUs, plant transient, transitioning to a station blackout, the HVAC repairs unsuccessful, extended loss of AC power (ELAP) failing to be declared, extended operation of the turbine-driven feedwater pump unsuccessful, and neither off site power nor EDGs restored within 4 hours. The most representative risk case is 8.92×10^{-7} delta core damage frequency (CDF). This case applied pressurized water reactor (PWR) owner's group data for best available FLEX equipment reliability data, made an adjustment to the Human Error Probabilities for establishing Alternate Switchgear Cooling due to available time, and applied credit for repair of the AHU belts if accomplished within 8 hours. This corresponds to a finding of very low safety significance (Green). The detailed risk assessment is included as Attachment 1 to this report.

Cross-Cutting Aspect: H.12 - Avoid Complacency: Individuals recognize and plan for the possibility of mistakes, latent issues, and inherent risk, even while expecting successful outcomes. Individuals implement appropriate error reduction tools. Specifically, individuals did not recognize and plan for the possibility of mistakes and latent issues such as the V-belts received were not like-for-like replacement parts for the V-belts installed in the plant.

Enforcement:

Violation: 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," states, in part, that "Activities affecting quality shall be prescribed by documented instructions, procedures, or drawings, of a type appropriate to the circumstances and shall be accomplished in accordance with these instructions, procedures, or drawings." Procedure MA-AA-100, Attachment 5, "Work Preparation and Planning," implements this requirement and requires that maintenance personnel inspect new parts prior to installation to ensure they are the appropriate parts. Specifically, step 4.b requires that "parts are physically verified and correct."

TS 3.23.A.2.a.1, "Main Control Room and Emergency Switchgear Room Air Conditioning System" states, in part, the main control room and emergency switchgear room air conditioning system, including the Unit 1 AHUs, shall be operable whenever Unit 1 is above cold shutdown. If either any single Unit 1 AHU or two Unit 1 AHUs on the same chilled water loop become inoperable, restore operability of the one inoperable AHU or two inoperable AHUs within 7 days or bring Unit 1 to hot shutdown within 6 hours and be in cold shutdown

within the following 30 hours.

TS 3.23.A.2.a.3, states, in part, if two Unit 1 AHUs in the same air conditioning zone become inoperable, restore operability of at least one Unit 1 AHU in each air conditioning zone within one hour or bring Unit 1 to hot shutdown within the next six hours and be in cold shutdown within the following 30 hours.

Contrary to the above, on July 29, 2022, and on September 15, 2022, while the plant was in Mode 1, the licensee did not ensure that maintenance activities were accomplished in accordance with procedures affecting the quality of the Unit 1 ESGR AHUs. One train of ESGR cooling was rendered inoperable on July 29, 2022, and two trains were rendered inoperable on September 15, 2022. Specifically, maintenance personnel did not inspect the new air handler V-belts prior to installation as required by MA-AA-100, Attachment 5, to ensure that the parts were physically verified and correct. This led to the incorrect parts being installed and the failure of 1-VS-AC-6 and 1-VS-AC-7. This resulted in the Unit 1 ESGR room cooling being inoperable greater than its TS allowed outage time, and the required actions to either restore operability of at least one AHU or shut down the Unit as described above were not taken during the timeframe that the conditions existed until operability was restored on September 19, 2022. The licensee took the appropriate actions in accordance with the TS once the conditions were identified.

Enforcement Action: This violation is being treated as a non-cited violation, consistent with Section 2.3.2 of the Enforcement Policy.

EXIT MEETINGS AND DEBRIEFS

The inspectors verified no proprietary information was retained or documented in this report.

- On April 20, 2023, the inspectors presented the integrated inspection results to David Wilson, Site Vice President, and other members of the licensee staff.
- On January 25, 2023, the inspectors presented the inspection results of the problem identification and resolution annual follow-up inspection sample to Don Robinson, Fleet Cyber Security Lead, and other members of the licensee staff.

Attachment 1

SRA Analysis Number: Surry-2023-001

Analysis Type: SDP Detailed Risk Evaluation Appendix A

Inspection Report #: 2023-001

Plant Name/Unit Number: Surry Units 1 & 2

Enforcement Action #: EA-2023-031

OVERALL RISK SUMMARY

The most representative risk case is 8.92×10^{-7} delta core damage frequency (CDF). This case applied pressurized water reactor (PWR) owner's group data for best available FLEX equipment reliability data, made an adjustment to the human error probabilities (HEPs) for establishing alternate switchgear cooling due to available time, and applied credit for repair of the air handling unit (AHU) belts if accomplished within 8 hours.

BACKGROUND

As part of planned maintenance beginning on July 29, 2022, the AHU fan V-belts supporting the Unit 1 emergency switchgear room (ESGR) cooling train 1-VS-7 were replaced. The unit was in standby from July 29, 2022, until September 14, 2022, when the AHU was placed in service. On September 15, 2022, cooling train 1-VS-AC-6 also had the incorrect belts installed. A failure of the AHU belts then occurred on September 16 (VS7), September 17 (VS6), September 18 (VS7), and September 19 (VS7). On September 19, 2022, the licensee identified that the new belts were incorrect and declared both trains of AHUs inoperable. The licensee replaced the VS7 belts with the proper belts on September 19, 2022, and declared VS7 operable and did the same with the VS6 belts on September 22, 2022. Therefore, for 55 days at least one train of AHUs was inoperable. This overlapped with a period of 4 days where the incorrect belts were installed on both cooling trains. It was determined that neither ESGR cooling train would have been able to perform its 30-day mission time safety function with the incorrect V-belts installed.

The cause of this event was that the V-belt vendor sent a different variant of the BX-99 V-belt ordered (Torq Titan vs. the expected Grip Notch V-belt), and these belts were incorrectly accepted and installed at the station. Contributing to this cause was that there were missed opportunities to recognize that the new V-belts were not the same design as those being replaced.

PERFORMANCE DEFICIENCY

The performance deficiency is the licensee did not ensure that replacement parts were appropriate prior to installation as required by MA-AA-100, Attachment 5, "Work Preparation and Planning." In addition, after identifying several discrepant issues during the receipt inspection of V-belts, the licensee did not follow up with the vendor to determine if the parts received conformed to procurement documents for the emergency switchgear rooms AHUs.

EXPOSURE TIME

The AHU 1-VS-7 exposure time was 52 days when the incorrect belts were installed from July 29, 2022, until September 19, 2022.

The AHU 1-VS-6 exposure time was 7 days when the incorrect belts were installed from September 15, 2022, until September 22, 2022.

Both Units were inoperable concurrently for 4 days due to the incorrect belts being installed from September 15, 2022, until September 19, 2022.

Therefore, one AHU train was continuously inoperable from July 29, 2022, until September 22, 2022, a period of 55 days in excess of Technical Specification (TS) 3.23(A)(2)(a)(1) allowed outage time (AOT) of 7 days. Both AHUs were continuously inoperable between September 15, 2022, until September 19, 2022, a period of four days in excess of the TS 3.23(A)(2)(a)(3) AOT of one hour or be in mode 3 in 36 hours.

DATE OF OCCURRENCE

July 29, 2022, to September 22, 2022

SAFETY IMPACT

Affected Structures, Systems, Components, Operator Actions, and Risk-Relevant Functions:

One of the two AHUs are required for operability of the emergency switchgear HVAC function. Switchgear HVAC is a required support system for the emergency switchgear and instrumentation to remain within design temperature limits (120F for room bulk temperature).

Conditions when the performance deficiency would manifest itself (e.g., type of event, plant configuration):

Normally one AHU unit is in service and the other in standby. Both AHUs start on a safety injection signal. The incorrect belts were repeatedly observed to fail after approximately 24-48 hours of run time. However, belts are normally "run in" for several hours after installation.

RISK ANALYSIS/CONSIDERATIONS

Influential Assumptions:

- 1) The Exposure Time is 52 days for AHU 1-VS-7 and 7 days for AHU 1-VS-6. Due to overlap both trains were inoperable for 4 days. The Exposure Time is known due to time when incorrect belts were installed.
- 2) Both conditions of one AHU inoperable for greater than TS AOT and both AHUs inoperable for greater than TS AOT were caused by the same performance deficiency and total risk is the combination of the two conditions.
- 3) From the time of the failure of an AHU until the time ESGR bulk temperature is above design limits is approximately 8 hours based upon room heat up calculations with no operator actions. Therefore, Time Available for operators to establish alternate cooling is 8 hours.
- 4) Upon diagnosis on loss of AHUs, operators enter abnormal operating procedure (AOP) 13.02 which establishes alternate cooling and directs load reduction and plant shutdown to Mode 3 prior to exceeding design limits. All equipment is pre-staged in the ESGR, and actions are not complex. The Time Required is estimated to be 30 minutes (actions were completed in under 15 minutes during the event).
- 5) Since Time Required is much less than Time Available to establish alternate ESGR cooling, the Human Error Probability for HVC-XHE-XA-ALTHVAC OPERATOR FAILS TO PROVIDE ALTERNATE COOLING TO U1 ESGR (0-AP-13.02) is adjusted by changing the SPAR-H Performance Shaping Factor of Time from Nominal Time to Extra Time since Time Available is greater than 2 times required and greater than 30 minutes. Resultant HEP is 1E-4. This is applied as a change set HVAC.
- 6) Adjusting the HEP appropriately models and factors in time until the PRA function of the supported equipment is challenged vice the base case which assume the supported function is lost immediately.
- 7) Common Cause adjustments were made for the 1AHU case; however, it was recognized that the incorrect belts had not been introduced to 1-VS-6 for the first 48 days of the

- 1-VS-7 exposure period and was removed from 1-VS-7 for the last 3 days of 1-VS-6 exposure period. Thus, the common cause failure mechanism due to the belts either was not yet introduced; or was no longer present for 51 days. Handled as a sensitivity.
- 8) Surry does not have a Fire PRA so the fire scenarios in the SPAR model developed using IPEEE data were considered best available information.
 - 9) FLEX equipment and implementing procedures would be available to mitigate the loss of one or more vital 4160 VAC buses and is credited.
 - 10) Equipment Reliability probabilities in SPAR are nominal based on installed equipment reliability data and are not directly applicable for portable FLEX equipment used at Surry.
 - 11) A change Set PRIB-FLEX-CREDIT-X3 was used to multiple equipment reliability rates by a factor of 3 and to "turn on" FLEX credit by setting FLX-XHE-XE-ELAP OPERATORS FAIL TO DECLARE ELAP WHEN BENEFICIAL to 1E-2 from 1.0.
 - 12) The industry PWR Owners Group conducted a study to establish FLEX equipment based off industry data. PWROG-18042-NP Revision 1, "FLEX Equipment Data Collection and Analysis," was used to make change sets FLEX-HARDWARE-PWROGCHING (Template changes) and FLEXPWROGFTR (FLEX equipment FTR adjustments) to incorporate this data.
 - 13) PWROG data was considered the best available information due to the data being based upon industry test data for portable flex equipment. However, all FLEX Change sets were used for sensitivity.
 - 14) Actions to replace the failed belt can be performed in parallel with actions to establish alternate cooling. Maintenance procedures, technicians, and spare equipment are available on site. On the day of the event, the belts were changed on backshift in approximately 3.5 hours. Therefore, credit for recovery was added to the appropriate fault tree. A conservative value of 0.5 was used based on SRA judgement and crew performance during the actual event.

REPRESENTATIVE CASE CCDP

The SRA used SAPHIRE 8 Version 8.2.6 and the Surry Unit 1 SPAR model version 8.80 dated 5/15/2022.

Two representative cases were run:

- 1) The 55-day period when 1 AHU was inoperable.
- 2) The 4-day period when both AHUs 1-VS-6 and 1-VS-7 were inoperable.

For both cases HVC-XHE-XA-ALTHVAC OPERATOR FAILS TO PROVIDE ALTERNATE COOLING TO U1 ESGR (0-AP-13.02) was adjusted from 1E-3 to 1E-4 and repair term HVAC-REPAIR was added to the ESGR fault tree logic. In addition, FLEX credit was applied and change sets used to apply PWROG data using change sets FLEX-HARDWARE CHING and FLEX-HARDWAREPWROGFTR.

Total risk was calculated by adding (51/55 x case 1) + case 2 to ensure risk was not double counted.

Since Internal Events were greater than 1E-7 in both cases, external events were calculated as well.

The dominant accident sequence was a failure of both AHUs, plant transient, transitioning to a station blackout, the HVAC repairs unsuccessful, ELAP failing to be declared, extended operation of the TDFW pump unsuccessful, and neither offsite power nor emergency diesel generators restored within 4 hours.

EXTERNAL EVENTS CONSIDERATIONS

Internal fire, internal flooding, seismic, tornado/hurricane, and high winds events were calculated for each case.

HVC-XHE-XA-ALTHVAC OPERATOR FAILS TO PROVIDE ALTERNATE COOLING TO U1 ESGR (0-AP-13.02) TERM ADJUSTMENT

The ESGR for Unit 1 and Unit 2 are located in the main control room envelope. The units are separated by a cinderblock wall with a rolling retractable fire door between units which is normally open. For each unit, the J and H vital 4160 buses are separated by a cinderblock wall with a permanent open walkway. Each unit also has a relay room separated from the vital buses. There is a fire and flood barrier in each unit leading to their respective cable vault and tunnel and a fire door leading to the stairwells up to the main control room.

The space would be considered medium occupancy. TS requires operator rounds once per 8-hour shift but are required twice per shift by site administrative procedures (every 4 hours). AHU parameters are specifically looked at during these rounds. Additionally, Appendix R fire watches are performed periodically in the space as a compensatory measure for an Appendix R cable separation issue and security roving watches go through the space hourly. Maintenance activities, such as surveillances, occur frequently in the space as well. Additionally, there are indications in the main control room, which is continuously staffed for AHU motor status, and HVAC chill water parameters include an annunciator for HVAC trouble based on chill water temperature. Additionally, as documented in the operating logs, several nuisance plant process computer alarms were received that likely were due to slight changes in room temperature. Further, based on discussions with control room operators, changes in ESGR HVAC lineup can be felt in the main control room.

Based upon all the available cues, it is reasonable to conclude a full ESGR HVAC failure would be identified within 4 hours. Based upon review of room heat up rate calculations with a full loss of ventilation and no operator action, it would take at least 8 hours for bulk room temperature to exceed the 120 F design limit for the ESGR.

0-AOP-13.02 would direct operators to act immediately to establish alternate cooling for the ESGR including setting up portable fans and opening fire doors to increase air flow. The equipment for these actions is pre-staged in both ESGRs and were set up in 15 minutes on September 16, 2022, when both trains were actually lost.

HVC-XHE-XA-ALTHVAC is an existing term in the SPAR model. The HEP value was established using SPAR-H and setting all Performance Shaping Factors (PSF) to nominal and only crediting action. In accordance with INL/EXT-10-18533 Rev. 2, SPAR-H Step-by-Step Guidance, it is appropriate to assign a TIME PSF to EXTRA TIME when Time Available is 1-2 x Time Required AND Time Available is greater than 30 minutes. In this case, Time Available is 8 hours and Time Required for the action is conservatively set to 30 minutes and time to diagnose is 4 hours maximum. Thus, EXTRA TIME is appropriate.

The SRA also used IDHEAS-ECA, to calculate the HEP and calculated for the action 1E-4 when using Time Available 8 hours and Time Required 30 (starting at 4 hours). This confirmed the SPAR-H results.

HVAC-REPAIR (Replacement of the belt for 1 AHU within 8 hours)

A repair term was added to the ESGR fault tree to allow for repair in accordance with the guidance in Risk Assessment of Operational Events (RASP) Handbook Volume 1 – Internal

Events Section 6, Modeling Recovery and Repair. The station has appropriate maintenance procedures for replacing an AHU belt, had the material available in the plant warehouse on site, and had plant technicians available to perform the work and on September 16, 2022, demonstrated they could replace the failed belt and restore the AHU to a functional status in under 4 hours of discovery. The SRA created a compound event HVAC-REPAIR which consists of a Repair Term HVAC-REPAIR1 with a failure probability of 0.5 and ORed with the AHU Failing to Start following repairs. The SRA used 0.5 as a non-success probability based on engineering judgement and maintenance crew performance on September 16, 2022 (Event occurred after hours with minimal maintenance staffing on site and was accomplished in approximately 2:45). Even if the wrong belt was reinstalled it would have been able to mitigate the condition for the remainder of the PRA mission time of 24 hours.

QUALITATIVE RISK CONSIDERATIONS

Although not considered in the SPAR model, the SRA does recognize that the switchgear does not immediately fail upon exceeding the room design basis temperature. In reality, the equipment will begin to degrade based upon the amount of time and temperature above the design limit. Equipment reliability would be reduced based on these variables. The model very conservatively fails the equipment. Thus, is overconservative.

It is also recognized the fire doors separating Unit 1 and Unit 2 are normally open which would allow air flow between the unaffected unit and the affected unit with no operator actions which would at worst slow the room heat up rate and provide additional time for operator action. On September 16, actual room heat up was 2.7 degrees in approximately 2 hours with both Unit 1 AHUs not running and one Unit 2 AHU in service. Approximately 29 hours would have been required to exceed a design temperature limit based on the observed HUR.

SENSITIVITY EVALUATIONS:

Sensitivities were performed by:

- 1) Varying HEP for establishing alternate cooling
- 2) By varying FLEX equipment reliability using Nominal, x3, and PWROG data
- 3) Common Cause sensitivity by setting failure to of 1-VS-7 FTR to True (CC) and 1.0 (No CC)

Calculations Representative Case

	Case 1 1AHU 55 days	Case 2 Both AHU 4 days
Internal Events	3.30E-7	3.75E-7
Fire	7.02E-8	7.32E-8
Flooding	5.77E-8	1.70E-8
Seismic	1.91E-11	4.45E-11
Tornado/Hurricane/HW	5.89E-10	1.57E-9
Total	4.585E-7	4.668E-7

Combined risk = 51/55 (4.585E-7) + 4.668 E-7 = 8.92E-7

Sensitivity cases:

S1- No FLEX credit no repair credit

S2-Nominal FLEX Credit no repair credit

S3-Nominal FLEX Credit no repair and HEP Adjustment

S4-PRIB FLEX Credit (3X nominal) no repair and HEP Adjustment

	S1 C1	S1 C2	S2 C1	S2 C2	S3 C1	S3 c2	S4 C1	S4 C2
IE	6.6E-6	7.5E-6	2.2E-6	2.5E-6	1.9E-7	2.5E-7	3.7E-7	4.2E-7

Fire	1.5E-6	1.8E-6	5.7E-6	7.4E-7	5.3E-8	5.3E-8	9.3E-8	9.2E-8
Flood	1.2E-6	3.4E-7	3.5E-7	1.1E-7	3.1E-8	1.1E-8	6.2E-8	1.9E-8
Seismic			5E-10	1.0E-9			7E-11	1E-10
TOR/HW			3.9E-9	8.4E-9			6E-10	1.4E-9
Total	9.2E-6	9.7E-6	3.1E-6	3.3E-6	2.8E-7	3.2E-7	5.2E-7	5.3E-7

FLEX CREDIT Comparisons with HEP Adjustments but no repair credit.

	PWROG FLEX	PRIB FLEX (X3)	Nominal FLEX
Combined	1.88E-6	1.01E-6	5.80E-7

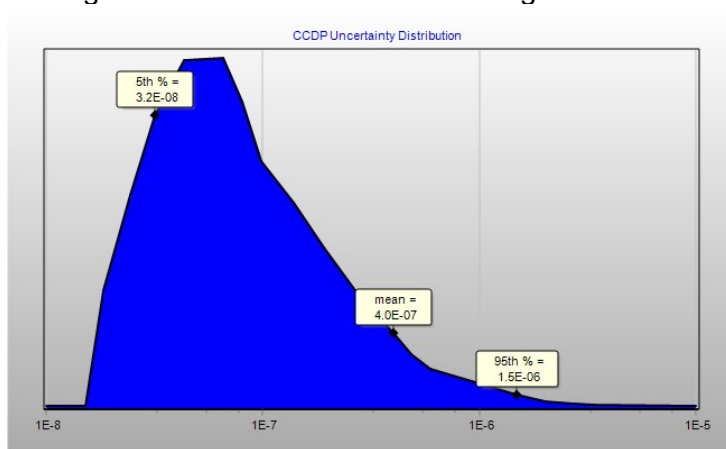
The No CCF Sensitivity (for Case 1 only) reduced IE from 3.65E-7 to 2.45E-7 (33% reduction) run with PRIB FLEX Credit applied.

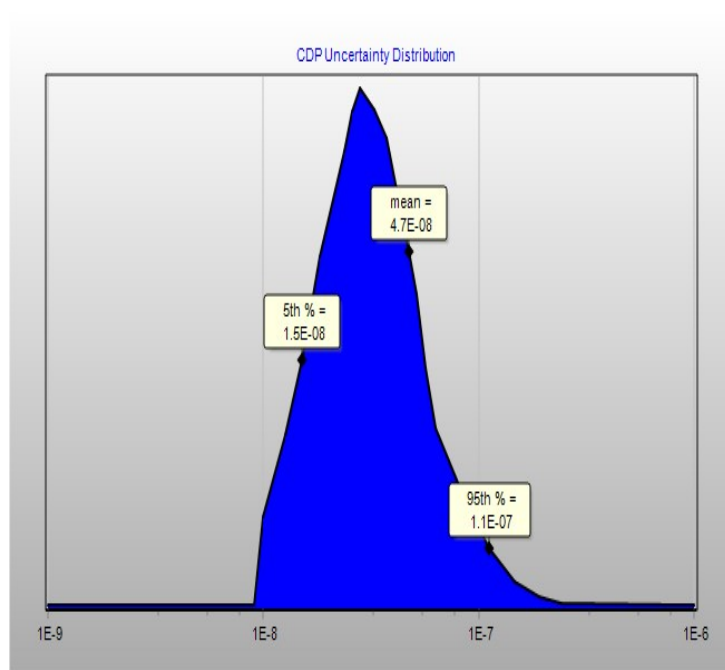
The HVC-XHE-XA-ALTHVAC and HVAC-REPAIR terms were the most sensitive terms. Each term would be present in all cut sets involving a failure of an AHU, so any change of either term results in approximately the same magnitude change in total risk.

SENSITIVITY

UNCERTAINTY ANALYSIS:

Since Surry does not have a Fire PRA, fire scenarios in the SPAR model were used. These scenarios were developed using the IPEEE data and contains very conservative assumptions. FLEX credit and HEPs for operator actions to declare and ELAP and to establish alternate cooling. HEPs for ELAP and establishing alternate cooling also adds uncertainty.





LARGE EARLY RELEASE FREQUENCY (LERF) IMPACT

Since the event takes greater than 8 hours to impact PRA function of the Emergency Switchgear, LERF is not considered to be a significant concern.

CONCLUSIONS/RECOMMENDATIONS

The analyst recommends characterizing this as GREEN due to delta CDF in the representative case being $8.92 E-7$ and no DELTA LERF impacts. Recommend establishing the PWROG FLEX data as the best available data by documenting this in this report as well.

DOCUMENTS REVIEWED

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.04	Corrective Action Documents	CR1165298	0-OPT-FP-008 Review Identified Inconsistent Pressure Measurement Data	02/05/2021
	Drawings	S8825	FP Loop drawing	
71111.05	Fire Plans	1-FS-FP-109	Battery Room 1A Elevation 9 Feet - 6 Inches	3
		1-FS-FP-110	Battery Room 1B Elevation 9 Feet - 6 Inches	1
		2-FS-FP-109	Battery Room 2A Elevation 9 Feet - 6 Inches	3
		2-FS-FP-110	Battery Room 2B Elevation 9 Feet - 6 Inches	4
	Procedures	CM-AA-FPA-101	Control of Combustible and Flammable Materials	15
71111.11B	Miscellaneous	Cycle 31 ANSI 11	Simulator Transient Test Records Associated with ANSI 11, Simultaneous Trip of All Main Feedwater Pumps	
		Cycle 31 ANSI 15	Simulator Transient Test Records Associated with ANSI 15, Main Turbine Trip From Maximum Power Level That Does Not Result In Immediate Reactor Trip	
		Cycle 31 ANSI 16A and 16B	Simulator Transient Test Records Associated with ANSI 16, Maximum Rate Ramp From 100% Down to 75% and Back to 100%	
		Cycle 31 ANSI 19	Simulator Transient Test Records Associated with ANSI 19, Slow Primary Depressurization to Saturated Conditions (PORV or Safety Valve Stuck Open)	
		Cycle 31 ANSI 20	Simulator Test Records Associated with Real Time and Repeatability Tests	
		Form 10 - Remediation	Eleven (11) Licensed Operator Training Remediation Records Reviewed	
		L006-07	In Plant JPM Used for Licensed Operator Requalification Program	Revision 7
		L018-02	In Plant JPM Used for Licensed Operator Requalification Program	Revision 16
		L023-10C	In Plant JPM Used for Licensed Operator Requalification Program	Revision 2
		L026-05A	In Plant JPM Used for Licensed Operator Requalification Program	Revision 9
		L038-07A	Control Room/Simulator JPM Used for Licensed Operator	Revision 2

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
			Requalification Program	
		L038-11	Control Room/Simulator JPM Used for Licensed Operator Requalification Program	Revision 4
		L052-01B	Control Room/Simulator JPM Used for Licensed Operator Requalification Program	Revision 3
		L052-03B	Control Room/Simulator JPM Used for Licensed Operator Requalification Program	Revision 13
		L053-08	Control Room/Simulator JPM Used for Licensed Operator Requalification Program	Revision 5
		L081-04	Control Room/Simulator JPM Used for Licensed Operator Requalification Program	Revision 24
		L088-42	Administrative JPM Used for Licensed Operator Requalification Program	Revision 8
		L088-44	Administrative JPM Used for Licensed Operator Requalification Program	Revision 5
		OP-AA-103 Attachment 1	Four (4) Licensed Operator Reactivation Records Reviewed	
		Personnel Medical Records	Ten (10) Licensed Operator Medical Records Reviewed	
		RQ-22.2-XB-4 Parts I and II	Licensed Operator Requalification Biennial Written Examination XB-4, Part I Closed Book (Rev 0) and Part II Open Reference (Rev 0), both RO and SRO Versions	03/10/2022
		RQ-23.2-SE-10	Evaluated Simulator Examination Scenario Guide Used for Licensed Operator Requalification Program	Revision 0
		RQ-23.2-SE-5	Evaluated Simulator Examination Scenario Guide Used for Licensed Operator Requalification Program	Revision 0
		RQ-23.2-SE-6	Evaluated Simulator Examination Scenario Guide Used for Licensed Operator Requalification Program	Revision 0
		RQ-23.2-SE-7	Evaluated Simulator Examination Scenario Guide Used for Licensed Operator Requalification Program	Revision 0
		RQ-23.2-SE-8	Evaluated Simulator Examination Scenario Guide Used for Licensed Operator Requalification Program	Revision 0
		RQ-23.2-SE-9	Evaluated Simulator Examination Scenario Guide Used for Licensed Operator Requalification Program	Revision 0

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		SBT for RQ-23.2-SE-10	Scenario Based Testing (SBT) Records for Evaluated Scenario RQ-23.2-SE-10	01/03/2023
		SBT for RQ-23.2-SE-9	Scenario Based Testing (SBT) Records for Evaluated Scenario RQ-23.2-SE-9	01/03/2023
		Simulator Work Order (SWO)	Reviewed Summary Reports of Active/Open and Closed Simulator Work Orders Covering a 24-Month Timeframe	02/16/2023
	Procedures	NISP-TR-01	Systematic Approach to Training Process	4
		OP-AA-103	Operator Qualifications	10
		SA-AA-122	Medical Evaluation	11
		TR-AA-101	Conduct of Training	21
		TR-AA-4000	Dominion Training Standard -- Test and Exam Security	1
		TR-AA-710	NRC Exam Security Requirements	8
		TR-AA-730	Licensed Operator Biennial and Annual Operating Requalification Exam Process	13
		TR-AA-740	Administrative Requirements for Application and Maintenance of Operator Licenses	7
		TR-AA-750	Conduct of Simulator Training and Evaluation	13
		TR-AA-SIM-100	Simulator Modification Process	9
		TR-AA-SIM-101	Simulator Configuration Control Committee	6
		TR-AA-SIM-200	Simulator Hardware Management	4
		TR-AA-SIM-300	Simulator Software Management	4
		TR-AA-SIM-400	Simulator Performance Testing	10
	Self-Assessments	PIR 1219448	Surry Power Station Readiness for the February 2023 NRC IP 71111.11 Inspection	
71111.13	Work Orders	38204301893	84 Day Freq PT: Pressurizer Block Valve Stroke T-OC-22A	02/15/2023
71111.15	Corrective Action Documents	CR1217695	1B1 UPS Battery Charger DC Output Current is Oscillating	01/20/2023
	Miscellaneous	38-S984-00001	Instruction & Operating Manual W/Drawings Equipment: 1 Phase 15 KVA UPS System Model: See Cover ORA Wing Serial#: 27135-0101 THRU 0801 (A)	12
	Work Orders	38204302325	28 Day Freq. PT: Number 1 EOG Test Monthly - OC-22A	01/31/2023
71111.24	Corrective Action Documents	CR1175537	1-SI-PI-1944 Suspected of Reading ~ 18 psig High During the Performance of 1-OPT-SI-005	06/21/2021

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
		CR1218440	1-SI-PI-1944 Suspected of Reading ~ 18 psig High During the Performance of 1-OPT-SI-005	01/31/2023
	Procedures	1-NPT-SI-013	Ultrasonic Examination Of Safety Injection Piping	
		1-OPT-SI-005	LHSI Pump Test	34
71152A	Corrective Action Documents	CA 11339584	IT to Complete the Requirements "IT-AA-CYB-102: Nuclear Cyber Security Incident Response and Recovery"	11/16/2022
		CR 1210497	Malware Attack of EOC Computer Network	10/17/2022
		CR 1212578	Cyber Security Related: CSIRT Activation	11/10/2022
		CR 1212946	Cyber Security Related: Notification of EOC Vendor Subjected to a Cyber-Attack	11/15/2022
		CR 1213003	Cyber Security - CSIRT Activation	11/15/2022
	Procedures	IT-AA-CYB-102	Nuclear Cyber Security Incident Response and Recovery	Rev. 6
	Self-Assessments	NAPS IT-AA-CYB-102 Attachment 2	Event Notification Screening	12/01/2022