



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

November 7, 2022

EA-22-100

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

**SUBJECT: SURRY POWER STATION – INTEGRATED INSPECTION REPORT  
05000280/2022003 AND 05000281/2022003, OPERATION OF AN  
INDEPENDENT SPENT FUEL STORAGE INSTALLATION REPORT  
07200055/2022001, AND EXERCISE OF ENFORCEMENT DISCRETION**

Dear Mr. Stoddard:

On September 30, 2022, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at Surry Power Station. On October 19, 2022, the NRC inspectors discussed the results of this inspection with Mr. David Wilson and other members of your staff. The results of this inspection are documented in the enclosed report.

Two Severity Level IV violations without an associated finding are documented in this report. We are treating these violations as non-cited violations (NCVs) consistent with Section 2.3.2 of the Enforcement Policy.

No NRC-identified or self-revealing findings were identified during this inspection.

The licensee identified a violation of 10 CFR 72.212 (b)(6), associated with tornado hazard protection. Because this violation was identified during the discretion period covered by Enforcement Guidance Memorandum 22-001, "Enforcement Discretion for Noncompliance of Tornado Hazard Protection requirements at Independent Spent Fuel Storage Installations," and because the licensee was implementing compensatory measures and has taken or plans to take the necessary actions to restore compliance, the NRC is exercising enforcement discretion by not issuing an enforcement action for the violation and is allowing continued independent spent fuel storage installation (ISFSI) handling operations.

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.

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."

Sincerely,



Signed by Fannon, Matthew  
on 11/07/22

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

Docket Nos. 05000280, 05000281  
and 07200055  
License Nos. DPR-32 and DPR-37

Enclosure:  
As stated

cc w/ encl: Distribution via LISTSERV

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 INDEPENDENT SPENT FUEL STORAGE INSTALLATION REPORT  
 07200055/2022001, AND EXERCISE OF ENFORCEMENT DISCRETION  
 – dated November 7, 2022

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**U.S. NUCLEAR REGULATORY COMMISSION  
Inspection Report**

Docket Numbers: 05000280, 05000281 and 07200055

License Numbers: DPR-32 and DPR-37

Report Numbers: 05000280/2022003, 05000281/2022003, and 07200055/2022001

Enterprise Identifier: I-2022-003-0023 and I-2022-001-0043

Licensee: Virginia Electric and Power Company

Facility: Surry Power Station

Location: Surry, VA

Inspection Dates: July 01, 2022 to September 30, 2022

Inspectors: P. Cooper, Senior Reactor Inspector  
M. Davis, Transportation and Storage Safety Inspector  
P. Gresh, Emergency Preparedness Inspector  
S. Kennedy, Senior Resident Inspector  
A. Rosebrook, Senior Reactor Analyst  
S. Sanchez, Senior Emergency Preparedness Inspector  
B. Towne, Resident Inspector  
J. Walker, Emergency Response Inspector

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

Boiling in the Dry Shielded Canister (DSC) and Transfer Cask (TC) annulus			
Cornerstone	Severity	Cross-Cutting Aspect	Report Section
Not Applicable	Severity Level IV NCV 05000280,05000281/2022003-01 Open/Closed	Not Applicable	60855
The team identified a Severity Level IV non-cited violation (NCV) of 10 CFR 72.48(d)(1), "Changes, Tests, and Experiments," because the licensee did not perform an adequate written evaluation which provided the bases for the determination that the change, test, or experiment does not require a license or Certificate of Compliance (CoC) amendment pursuant to paragraph (c)(2) of this section. Specifically, the licensee did not provide the bases for the determination that the presence of boiling water in the Dry Shielded Canister (DSC) and Transfer Cask (TC) annulus does not require a CoC amendment.			

Forced Air Cooling to the Dry Shielded Canister (DSC) and Transfer Cask (TC) annulus			
Cornerstone	Severity	Cross-Cutting Aspect	Report Section
Not Applicable	Severity Level IV NCV 05000280,05000281/2022003-02 Open/Closed	Not Applicable	60855
The inspectors identified a Severity Level IV, non-cited violation of 10 CFR Part 72.162, "Test Control," for the licensee's failure to perform testing in accordance with written test procedures incorporating design basis requirements and acceptance limits. Specifically, design basis flow rates for the EOS Forced Air Cooling units (FAC) were not incorporated into testing procedures or other instructions to test the system on an ongoing basis. As a result, unacceptable degradation of the FAC would not have been identified.			

### Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
EDG	EA-22-100	Tornado Hazards Protection Requirements at Independent Spent Fuel Storage Installations (EGM 22-100)	60855	Closed
URI	05000280,05000281/2022003-03	Appendix R Cable Separation	71153	Open
LER	05000280,05000281/2021-001-00	LER 2021-001-00 for Surry Power Station Unanalyzed Condition Due to Appendix R Concern Identified with Cable Separation	71153	Closed

## PLANT STATUS

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

Unit 2 operated at or near rated thermal power for the entire 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

### 71111.01 - Adverse Weather Protection

#### Seasonal Extreme Weather Sample (IP Section 03.01) (1 Sample)

The inspectors evaluated readiness for seasonal extreme weather conditions prior to the onset of seasonal hot temperatures for the following systems:

- (1) Unit 1 and Unit 2 refueling water storage tanks and 4160 volt alternating current emergency switchgear on July 21, 2022

#### External Flooding Sample (IP Section 03.03) (1 Sample)

- (1) The inspectors evaluated that flood protection barriers, mitigation plans, procedures, and equipment are consistent with the licensee's design requirements and risk analysis assumptions for coping with external flooding for the emergency service water pump house in July 2022.

### 71111.04 - Equipment Alignment

#### Partial Walkdown Sample (IP Section 03.01) (4 Samples)

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

- (1) #3 emergency diesel generator during #1 emergency diesel generator emergent repair on July 24, 2022

- (2) Unit 2 4160 volt alternating current and 480 volt alternating current emergency switchgear on August 11, 2022
- (3) 2J1 480 volt alternating current motor control center following failure of multiplexer 08A power supply on August 12, 2022
- (4) Emergency service water pumps at the low-level intake structure on August 16, 2022

#### Complete Walkdown Sample (IP Section 03.02) (1 Sample)

- (1) The inspectors evaluated system configurations during a complete walkdown of the Unit 2 auxiliary feedwater system on September 30, 2022

#### 71111.05 - Fire Protection

##### Fire Area Walkdown and Inspection Sample (IP Section 03.01) (4 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) Unit 1 switchgear room, elevation 58 feet – 6 inches on July 8, 2022
- (2) Unit 2 switchgear room, elevation 58 feet – 6 inches on July 8, 2022
- (3) Alternate alternating current diesel room, construction site elevation 35 feet on July 14, 2022
- (4) Fuel oil pump house A and B, elevation 16 feet on July 27, 2022

#### 71111.06 - Flood Protection Measures

##### Inspection Activities - Internal Flooding (IP Section 03.01) (2 Samples)

The inspectors evaluated internal flooding mitigation protections in the:

- (1) Units 1 and 2 turbine building basement on August 17, 2022
- (2) Mechanical equipment room 3 on September 1, 2022

#### 71111.07A - Heat Exchanger/Sink Performance

##### Annual Review (IP Section 03.01) (2 Samples)

The inspectors evaluated readiness and performance of:

- (1) Unit 1 recirculation spray heat exchangers 1A, 1B, 1C, and 1D
- (2) Unit 2 recirculation spray heat exchangers 2A, 2B, 2C, and 2D

#### 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 post maintenance testing of the #1 emergency diesel generator following generator replacement on July 26, 2022.

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

- (1) The inspectors observed and evaluated just-in-time training in the classroom and simulator in preparation for potential Units 1 and 2 plant shutdowns on July 26, 2022.

71111.12 - Maintenance Effectiveness

Maintenance Effectiveness (IP Section 03.01) (4 Samples)

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

- (1) #1 Emergency diesel generator loss of load during monthly testing on July 18, 2022
- (2) 1-SW-P-1C, C emergency service water pump, unable to obtain required speed on August 7, 2022
- (3) Unit 2 anticipated transient without scram mitigation system armed and trouble alarms on August 10, 2022
- (4) Unit 2 source range nuclear instrumentation N31 reading higher than N32 on September 29, 2022

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 and Unit 2 emergency switchgear air handling units on September 22, 2022

71111.13 - Maintenance Risk Assessments and Emergent Work Control

Risk Assessment and Management Sample (IP Section 03.01) (7 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) Unit 1 and 2 elevated risk during Unit 1 A charging pump maintenance and 500 kilovolt switchyard activity on July 12, 2022
- (2) Risk mitigating actions for Unit 1 and 2 during #1 emergency diesel generator outage for generator replacement on July 20, 2022
- (3) Elevated risk on Units 1 and 2 during hot weather alert and Unit 1 A motor driven feedwater pump performance testing on August 4, 2022
- (4) Risk mitigation actions for U2 auxiliary full flow recirculation line leakage and code case temporary patch, including observation of the 90 day non-destructive examination inspection on August 25, 2022
- (5) Emergent risk assessment on Units 1 and 2 during C emergency service pump failed surveillance on August 8, 2022
- (6) Emergent risk assessment on Units 1 and 2 during #3 emergency diesel generator declared inoperable due to failure to reach 2700 kW on September 6, 2022
- (7) Emergent risk assessment on Units 1 and 2 during C main control room chiller failure on September 15, 2022



### 71111.15 - Operability Determinations and Functionality Assessments

#### Operability Determination or Functionality Assessment (IP Section 03.01) (6 Samples)

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

- (1) Condition Report (CR)1203764, #1 emergency diesel generator loss of load during the monthly performance testing on July 18, 2022
- (2) CR1204681, 1-SW-P-1A, 1A emergency service water pump, biofouling on July 31, 2022
- (3) CR1203829, Design calculation ME-0768, revision 0, calculated non-conservative containment spray flow rates on July 19, 2022
- (4) CR1205257, 2-SI-P-1A, Unit 2 low pressure safety injection pump seal head tank low level alarm on August 3, 2022
- (5) CR1205497, Unit 2 computer enhanced rod position indication system inoperable on August 11, 2022
- (6) CR1205455, Steam generator tube rupture analysis non-conservatism identified, resulting in a prompt operability determination for the main control room envelope on August 23, 2022

### 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-22-00145 for replacement of generator end of #1 emergency diesel generator

### Severe Accident Management Guidelines (SAMG) Update (IP Section 03.03) (1 Sample)

- (1) The inspectors verified the site Severe Accident Management Guidelines were updated in accordance with the pressurized water reactor generic severe accident technical guidelines and validated in accordance with NEI 14-01, "Emergency Response Procedures and Guidelines for Beyond Design Basis Events and Severe Accidents," Revision 1.

### 71111.19 - Post-Maintenance Testing

#### Post-Maintenance Test Sample (IP Section 03.01) (5 Samples)

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

- (1) 0-OPT-SW-002, B Emergency Service Water Pump 1-SW-P-1B, following troubleshooting/maintenance to determine the cause of the diesel engine failure to start on July 15, 2022
- (2) 1-OPT-EG-009, Number 1 Emergency Diesel Generator Major Maintenance Operability Test, after generator replacement on July 26, 2022

- (3) 2-OPT-SI-005, Low Head Safety Injection Test, following planned maintenance on B low head safety injection pump on August 3, 2022
- (4) 2-PT-25.2, Testing of Service Water Valves to and from Recirc Spray Heat Exchangers, for return to service of 2-SW-MOV-205B and 2-SW-MOV-205D on August 12, 2022
- (5) 0-OP-VS-006, Control and Relay Room Ventilation System, for return to service testing of 1-VS-AC-6, emergency switchgear room air handling unit following belt failure on September 21, 2022

#### 71111.22 - Surveillance Testing

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

#### Surveillance Tests (other) (IP Section 03.01) (3 Samples)

- (1) 0-OPT-EG-001, Number 3 Emergency Diesel Generator Monthly Start Exercise Test, on July 11, 2022
- (2) 2-NPT-SI-013, Ultrasonic Examination of Safety Injection Piping, on August 18, 2022
- (3) 00-NSP-CW-006, Canal Level Probe Removal, Inspection and Cleaning, on August 23, 2022

#### Inservice Testing (IP Section 03.01) (1 Sample)

- (1) 1-OPT-FW-006, Unit 2 Auxiliary Feedwater System Motor Operated Valve Inservice Test, on July 11, 2022

#### 71114.02 - Alert and Notification System Testing

##### Inspection Review (IP Section 02.01-02.04) (1 Sample)

- (1) The inspectors evaluated the maintenance and testing of the alert and notification system during the week of September 26, 2022.

#### 71114.03 - Emergency Response Organization Staffing and Augmentation System

##### Inspection Review (IP Section 02.01-02.02) (1 Sample)

- (1) The inspectors evaluated the readiness of the Emergency Response Organization (ERO) during the week of September 26, 2022.

#### 71114.04 - Emergency Action Level and Emergency Plan Changes

##### Inspection Review (IP Section 02.01-02.03) (1 Sample)

- (1) The inspectors evaluated submitted Emergency Action Level (EALs), Emergency Plan, and Emergency Plan Implementing Procedure changes during the week of September 26, 2022. This evaluation does not constitute NRC approval.

#### 71114.05 - Maintenance of Emergency Preparedness

##### Inspection Review (IP Section 02.01 - 02.11) (1 Sample)

- (1) The inspectors evaluated the maintenance of the emergency preparedness program during the week of September 26, 2022.

#### 71114.06 - Drill Evaluation

##### Drill/Training Evolution Observation (IP Section 03.02) (1 Sample)

- (1) The inspectors observed a licensed operator training evolution in the control room simulator that contributed to the Emergency Response Organization Performance Indicators on August 30, 2022. Events included loss of charging, a failed power range nuclear instrumentation, and loss of auxiliary feedwater flow.

#### **OTHER ACTIVITIES – BASELINE**

##### 71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

##### MS05: Safety System Functional Failures (SSFFs) Sample (IP Section 02.04) (1 Sample)

- (1) Unit 1 (July 1, 2021 through June 30, 2022)  
Unit 2 (July 1, 2021 through June 30, 2022)

##### EP01: Drill/Exercise Performance (DEP) Sample (IP Section 02.12) (1 Sample)

- (1) April 1, 2021, through June 30, 2022

##### EP02: Emergency Response Organization (ERO) Drill Participation (IP Section 02.13) (1 Sample)

- (1) April 1, 2021, through June 30, 2022

##### EP03: Alert And Notification System (ANS) Reliability Sample (IP Section 02.14) (1 Sample)

- (1) April 1, 2021, through June 30, 2022

##### 71152A - Annual Follow-up Problem Identification and Resolution

##### Annual Follow-up of Selected Issues (Section 03.03) (1 Sample)

The inspectors reviewed the licensee's implementation of its corrective action program related to the following issues:

- (1) Two leaks in auxiliary feedwater full flow recirculation line

##### 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 2021-001-00, Unanalyzed Condition Due to Appendix R Concern Identified with Cable Separation (ADAMS Accession No. ML21315A001). The inspection conclusions associated with this LER are documented in this report under the Inspection Results Section, Unresolved Item (URI) 05000280,05000281/2022003-03, Appendix R Cable Separation.

Notice of Enforcement Discretion (NOED) (IP Section 03.04) (1 Partial)

- (1) (Partial)  
The inspectors evaluated the licensee actions and completed portions 03.04 items a and b of the inspection surrounding Notice of Enforcement Discretion, EA-2022-073, which can be accessed at <http://www.nrc.gov/reading-rm/doc-collections/enforcement/notices/noedreactor.html>, on July 24, 2022.

**OTHER ACTIVITIES – TEMPORARY INSTRUCTIONS, INFREQUENT AND ABNORMAL**

60855 - Operation Of An ISFSI

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) 2690, “Inspection Program for Storage of Spent Reactor Fuel and Reactor-Related Greater-than-Class C Waste at Independent Spent Fuel Storage Installations (ISFSI) and for 10 CFR Part 71 Transportation Packaging’s.”

Operation Of An ISFSI (1 Sample)

- (1) From June 13 – July 21, 2022, the inspectors performed a review of the licensee’s ISFSI activities to verify compliance with regulatory requirements. During the on-site inspection, the inspectors observed and reviewed licensee activities in each of the five safety focus areas including occupational exposure, public exposure, fuel damage, confinement, and impact to plant operations.

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. Additionally, the inspectors performed independent walkdowns of the heavy load lifting equipment and the ISFSI haul path. The inspector also performed an independent radiation survey of the ISFSI pad.

**INSPECTION RESULTS**

Boiling in the Dry Shielded Canister (DSC) and Transfer Cask (TC) annulus			
Cornerstone	Severity	Cross-Cutting Aspect	Report Section
Not Applicable	Severity Level IV NCV 05000280,05000281/2022003-01 Open/Closed	Not Applicable	60855
The team identified a Severity Level IV non-cited violation (NCV) of 10 CFR 72.48(d)(1), “Changes, Tests, and Experiments,” because the licensee did not perform an adequate			

written evaluation which provided the bases for the determination that the change, test, or experiment does not require a license or Certificate of Compliance (CoC) amendment pursuant to paragraph (c)(2) of this section. Specifically, the licensee did not provide the bases for the determination that the presence of boiling water in the Dry Shielded Canister (DSC) and Transfer Cask (TC) annulus does not require a CoC amendment.

Description: The team reviewed the 10 CFR 72.48 Licensing Review (LR) document No. 721042-146, Revision 2, to the NUHOMS EOS Updated Final Safety Analysis Report, Amendment 0 (FSAR) to the CoC No. 1042 and the corresponding NRC Safety Evaluation Report (SER) to assess the proposed changes that revised the FSAR to allow boiling of water within the annulus between the Dry Shielded Canister (DSC) and Transfer Cask (TC).

As stated in section 4.5.11, "Thermal Evaluation for Loading/Unloading Conditions," of the FSAR, the water in the annulus is monitored and replenished with fresh water to maintain the water level if excessive evaporation occurs. The presence of water within the annulus maintains the maximum DSC shell temperature below the boiling temperature of water in open atmosphere (223°F). Section 4.5.11, further states, in part, that the presence of helium during blowdown and vacuum drying operations and the cooling provided by water in the annulus between the DSC and TC eliminate the thermal cycling of fuel cladding during helium backfilling of the DSCs subsequent to vacuum drying. Additionally, sections 9.1.3, 9.1.4, and 9.2.2 of the FSAR contain information to monitor the TC/DSC annulus water level and replenish if necessary.

The team reviewed procedure 0-OP-FH-085, "NUHOMS EOS Vacuum Drying System Operation," and identified that it incorporated a caution to continually monitor the annulus for boiling while helium is added to the DSC and to replenish the water as necessary. However, the team noted that section 4.4.3, "Loading Conditions (Vacuum Drying)," of the NRC SER relied upon both the presence of helium and the cooling provided by water in the TC/DSC annulus. Furthermore, section 8.16.1, "Cladding Temperature Limits," of the NRC SER described how the NRC staff evaluated the thermal cycling analysis and found that the presence of the annulus water during the canister draining operation would effectively mitigate thermal cycling that could lead to embrittlement from hydride reorientation.

The team determined that this change from cooling water in the annulus to boiling water had an adverse impact on the design function and method of evaluation (MOE) because the cooling water was an input parameter, determined to be an element of an MOE, based on the conservative acceptance from the NRC staff. Specifically, the team had concerns that the presence of boiling water could adversely affect the heat transfer from the DSC shell and create thermal cycling of the fuel. The team noted that the licensee did not fully evaluate the change under 10 CFR 72.48 (c)(2)(viii) to determine if the change resulted in a departure from a MOE described in the FSAR (as updated) used in establishing the design bases or in the safety analyses. Additionally, the Technical Specifications Bases for B.3.1.1 assumes that the DSC/TC annulus contains water during the vacuum drying process and that the maximum DSC shell temperature of 223°F was an initial condition within the steady state thermal evaluation for transfer operation. The team also noted that the CoC holder used the DSC shell temperature of 223°F as an assumption in calculating the maximum internal pressures within the EOS DSCs. The team determined that this change was more than a clarification as there was no discussion on what type of boiling was occurring (e.g., film or nucleate boiling) and how it would impact TS Bases and maximum internal pressure analysis.

In addition, it is stated in the FSAR and corresponding NRC SER that the cooling provided by the water in the annulus between the DSC and TC eliminates the thermal cycling of fuel cladding. The team noted that the change from cooling water to boiling water has the

potential to cause thermal cycling which would increase the likelihood of a malfunction previously thought to be eliminated based on the assumptions in the FSAR and what the NRC staff relied upon to provide adequate assurance that no thermal cycling would occur. The team determined that this change would increase the likelihood of thermal cycling assumed to be eliminated or not to occur with the presence of helium and cooling water and that the change would create a different result than that currently described in the FSAR and needed to be evaluated under 10 CFR 72.48(c)(2)(vi).

The team determined that the licensee failed to include an adequate written evaluation which provides the bases for the determination that the change does not require a license or CoC amendment pursuant to paragraph 10 CFR 72.48(c)(2) in accordance with NRC requirements.

Corrective Actions: The licensee initiated corrective actions to the loading procedures that would ensure that the cask annulus is sufficiently filled with water and monitored for temperature increases to prevent boiling.

Corrective Action References: CR1201853

Performance Assessment: None

Enforcement: The ROP's significance determination process does not specifically consider the regulatory process impact in its assessment of licensee performance. Therefore, it is necessary to address this violation which impedes the NRC's ability to regulate using traditional enforcement to adequately deter non-compliance.

Severity: The inspectors evaluated the violation of 10 CFR 72.48(d)(1), "Changes, Tests, and Experiments" with the guidance in Section 1.2.6.D of the NRC Enforcement Manual. It states that if a violation does not fit an example in the Enforcement Policy Violation Examples, it should be assigned a severity level: (1) commensurate with its safety significance and (2) informed by similar violations addressed in the Violation Examples. The violation was evaluated to be similar to a Severity Level IV violation in Enforcement Policy Section 6.5.d.6.

Violation: 10 CFR 72.48(d)(1) requires, in part, that the licensee and certificate holder shall maintain records of changes in the facility or spent fuel storage cask design, of changes in procedures, and tests and experiments made pursuant to paragraph (c) of this section. These records must include a written evaluation which provides the bases for the determination that the change does not require a CoC amendment pursuant to paragraph (c)(2) of this section.

Title 10 CFR 72.48(c)(2)(viii) requires, in part, that a specific licensee obtain a license amendment pursuant to 10 CFR 72.56 prior to implementing a proposed change if the change would result in a departure from a method of evaluation described in the FSAR (as updated) used in establishing the safety analyses performed.

Title 10 CFR 72.48(a)(2)(ii) states, in part, that definitions for the purposes of this section include departure from a method of evaluation described in the FSAR (as updated) used in establishing the design bases means changing from a method described in the FSAR to another method unless that method has been approved by NRC for the intended application.

Contrary to the above, as of June 6, 2022, during the processing of the first NUHOMS EOS 27PTH Dry Shielded Canister, the licensee did not maintain adequate records of changes in the spent fuel storage cask design made pursuant to paragraph (c) of 10 CFR 72.48 that

included a written evaluation that provided the bases for the determination that the change does not require a CoC amendment pursuant to 10 CFR 72.48(c)(2). Specifically, the licensee did not include an adequate written evaluation which provided the bases for the determination that the change from water not boiling to allowing boiling of water in the DSC/TC annulus does not require a CoC amendment.

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

Forced Air Cooling to the Dry Shielded Canister (DSC) and Transfer Cask (TC) annulus

Cornerstone	Severity	Cross-Cutting Aspect	Report Section
Not Applicable	Severity Level IV NCV 05000280,05000281/2022003-02 Open/Closed	Not Applicable	60855

The inspectors identified a Severity Level IV, non-cited violation of 10 CFR Part 72.162, "Test Control," for the licensee's failure to perform testing in accordance with written test procedures incorporating design basis requirements and acceptance limits. Specifically, design basis flow rates for the EOS Forced Air Cooling units (FAC) were not incorporated into testing procedures or other instructions to test the system on an ongoing basis. As a result, unacceptable degradation of the FAC would not have been identified.

Description: NUHOMS EOS System Updated Final Safety Analysis Report (FSAR) Section 4.1, "Discussion of Decay Heat Removal System," states that "during loading and transfer operations, evaluations of the heat transfer from the Dry Shielded Canister (DSC) shell assembly through the Transfer Cask (TC) credit conduction and radiation through the TC/DSC annulus gap, conduction through the various shells of the TC, and convection through the liquid neutron shield ... For heat loads above 36.35 kW in the EOS-37PTH DSC ... there is a time limit to transfer. If this time limit cannot be met, then either the TC/DSC annulus gap must be refilled with water or forced cooling (convection) must be implemented."

As stated in FSAR Section 4.5 "Thermal Evaluation for Transfer in EOS-TC125 or EOS-TC135," the "time limits are necessary to satisfy the criteria described in Section 4.2 for the fuel cladding and for the various components of the TCs."

The time limits to transfer are specified in Technical Specifications Section 3.1.3, "Time Limit for Completion of DSC Transfer." This section specifies that if the required time limit for completion of a DSC transfer is not met and the TC is in a horizontal orientation on the transfer skid, to initiate air circulation in the TC/DSC annulus by starting one of the redundant blowers. Additionally, it states that "if the maximum heat load of a DSC is less than 50 kW, new time limits can be determined to provide additional time ... the calculation should be performed using the same methodology documented in the FSAR."

FSAR Section 4.5, "Thermal Evaluation for Transfer in EOS-TC125 or EOS-TC135," states that "the EOS-TC125 contains design provisions for the use of air circulation system to improve its thermal performance for heat loads greater than 36.35 kW ... for EOS-37PTH DSC ... When operating, the fan system is expected to generate a flow rate of 850 cfm or greater, which will be ducted to the location of the ram access cover at the bottom of the TC." Additionally, FSAR Section 4.5.3.3.1, "Flow Regime within TC/DSC Annulus," describes the forced convection methodology (proprietary) that specifies the assumed mean air velocity through the TC/DSC annulus provided by the FAC.

When reviewing procedure 0-OP-FH-082, "NUHOMS EOS 27PTH Dry Shielded Canister Loading and Handling" the inspector identified that measures to ensure the design basis was correctly translated into procedures were not established. Specifically, Attachment 7, "Operation of the EOS Forced Air Cooling Units (FAC)," steps 11-13, specified to turn the motor breaker on and off but did not include a step to verify that the minimum flow rate of the forced air cooling unit, as specified in FSAR Section 4.5 or that the minimum velocity as specified in FSAR Section 4.5.3.3.1, was met. As a result, unacceptable degradation of the FAC would not have been identified to ensure the criteria in FSAR Section 4.2 for the fuel cladding and the various components of the TCs were satisfied.

Corrective Actions: The licensee implemented corrective actions by verifying that the Forced Air Cooling units were able to meet the minimum required flow rate with all appurtenances installed.

Corrective Action References: CR1204603

Performance Assessment: None

Enforcement: The ROP's significance determination process does not specifically consider the regulatory process impact in its assessment of licensee performance. Therefore, it is necessary to address this violation which impedes the NRC's ability to regulate using traditional enforcement to adequately deter non-compliance.

Severity: The inspectors evaluated the violation of 10 CFR 72.162, "Test Control," with the guidance in Section 1.2.6.D of the NRC Enforcement Manual. It states that if a violation does not fit an example in the Enforcement Policy Violation Examples, it should be assigned a severity level: (1) commensurate with its safety significance and (2) informed by similar violations addressed in the Violation Examples. The violation was evaluated to be similar to a Severity Level IV violation in Enforcement Policy Section 6.5.d.2.

Violation: Title 10 CFR 72.162, "Test Control," states, in part, that the licensee shall perform testing in accordance with written test procedures incorporating design basis requirements and acceptance limits. The licensee established procedure 0-OP-FH-082, "NUHOMS EOS 27PTH Dry Shielded Canister Loading and Handling," as the implementing procedure for the testing of the forced air cooling system. The inspector reviewed Attachment 7, "Operation of the EOS Forced Air Cooling Units (FAC)," of this procedure where steps 11-13, specified to turn the motor breaker on and off but did not include a step to verify that the minimum flow rate of the forced air cooling unit.

Contrary to these requirements, as of June 6, 2022 during the processing of the first NUHOMS EOS 27PTH Dry Shielded Canister, the licensee failed to perform testing in accordance with written test procedures incorporating design basis requirements and acceptance limits by not verifying that the FAC could achieve a flow rate of 850 cfm as specified in FSAR Section 4.5, "Thermal Evaluation for Transfer in EOS-TC125 or EOS-TC135."

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

Enforcement Discretion	Enforcement Action EA-22-100: Tornado Hazards Protection Requirements at Independent Spent Fuel Storage Installations (EGM 22-100)	60855
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Description: Upon issuance of U.S. NRC Enforcement Guidance Memorandum (EGM) 22-001 (ML22087A496), dated April 15, 2022, the licensee performed an assessment of all outdoor dry cask storage activities that are not explicitly analyzed for tornado hazards in the cask licensing basis. Several configurations were identified by the licensee including when the transfer cask lid is removed to insert the Dry Shielded Canister (DSC) into the Horizontal Storage Module (HSM) and prior to the HSM lid being reinstalled. These configurations are not explicitly analyzed in the Standardized NUHOMS 72-1004 Final Safety Analysis Report (FSAR). Title 10 of the Code of Federal Regulations (CFR) 72.212 (b)(6), states, in part, that “the general licensee must:... review the Safety Analysis Report referenced in the CoC [Certificate of Compliance] or amended CoC and the related NRC Safety Evaluation Report, prior to use of the general license, to determine whether or not the reactor site parameters, including analyses of earthquake intensity and tornado missiles, are enveloped by the cask design bases considered in these reports. The results of this review must be documented in the evaluation made in paragraph (b)(5) of this section.” Tornado hazards are evaluated in the Standardized NUHOMS 72-1004 FSAR section 3.2.1, “Tornado and Wind Loadings,” and section 8.2.2, “Tornado Winds/Tornado Missile.” These sections of the FSAR do not include an analysis for tornado hazards for these configurations. Additionally, the licensee did not have an evaluation demonstrating the reactor site parameters enveloped the cask design basis for tornado missiles.

Corrective Actions: The licensee entered the issue into its corrective action program (CAP) to address the actions specified in EGM 22-001. Specifically, the licensee established additional measures that:

1. mitigate tornado hazards, through procedures, during periods of ISFSI handling operations which include:
  - a. precluding outdoor dry cask storage activities during periods of adverse weather;
  - b. establishing meteorological criteria and designating staff to monitor weather during ISFSI handling operations;
  - c. Describing actions to take in the event of severe weather necessary to place the cask in an analyzed condition; and
  - d. Minimizing the duration of ISFSI handling operations during which ISFSI important to safety structures, systems, and components are in an unanalyzed condition.
2. document that required weather checks are complete prior to the start of ISFSI handling operations
3. document in the corrective action program a request for the Certificate of Compliance holder to request an amendment within six months of the date of the EGM.

Because the licensee implemented compensatory measures and plans to take necessary actions to restore compliance in accordance with the EGM, the NRC is allowing continued ISFSI handling operations.

Corrective Action References: CR1204603

Enforcement:

Significance/Severity: The inspectors assessed the issue as being more than minor significance but not more than Severity Level IV. Consistent with the guidance in EGM 22-001 discussed below, the NRC is exercising enforcement discretion.

Violation: Title 10 of the Code of Federal Regulations (CFR) 72.212 (b)(6), states, in part, that “the general licensee must:... review the Safety Analysis Report referenced in the CoC

[Certificate of Compliance] or amended CoC and the related NRC Safety Evaluation Report, prior to use of the general license, to determine whether or not the reactor site parameters, including analyses of earthquake intensity and tornado missiles, are enveloped by the cask design bases considered in these reports. The results of this review must be documented in the evaluation made in paragraph (b)(5) of this section.”

Contrary to the above, on June 13, 2022, the licensee did not have a documented evaluation determining whether the reactor site parameters, including analyses of tornado missiles, were enveloped by the cask design bases considered in the Safety Analysis Report. Specifically, the licensee failed to have an analysis for tornado hazards when the transfer cask lid is removed to insert the Dry Shielded Canister into the Horizontal Storage Module.

Basis for Discretion: Because this violation was identified during the discretion period covered by Enforcement Guidance Memorandum 22-001, “Enforcement Discretion for Noncompliance of Tornado Hazard Protection requirements at Independent Spent Fuel Storage Installations,” and because the licensee was implementing compensatory measures and has taken or plans to take the necessary actions to restore compliance, the NRC is exercising enforcement discretion by not issuing an enforcement action for the violation and is allowing continued ISFSI handling operations.

Unresolved Item (Open)	Appendix R Cable Separation URI 05000280,05000281/2022003-03	71153
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Description: On September 13, 2021, at 1822 EDT, an apparent non-compliance with 10 CFR Part 50, Appendix R, Section III.G.2 (separation of redundant fire safe shutdown equipment) was identified based on Operating Experience (OE) from North Anna Power Station as discussed in Licensee Event Report 2021-002-00 (ADAMS Accession No. ML22035A167). A review of the affected control circuits for the Unit 1 and Unit 2 emergency diesel generator (EDG) output breakers and emergency bus feeder breakers identified a concern that damage to the control power circuits during a fire may affect the ability to provide emergency power on both units. An 8-hour non-emergency report was made per 10 CFR 50.72(b)(3)(ii)(B) for an unanalyzed condition (Event Notification 55459 on September 13, 2021). Fire watches were established in the affected areas. Risk mitigating actions have been developed, implemented, and will continue to be performed until appropriate permanent corrective actions are in place to mitigate this condition. Licensee Event Reports 50-280/2021-001-00 and 50-281/2021-001-00, “Unanalyzed Condition Due to Appendix R Concern Identified With Cable Separation,” were submitted on November 11, 2021 (ADAMS Accession No. ML21315A001).

Specifically, it was determined that some EDG cables may be susceptible to a hot short/spurious operation to the close circuit. A spurious closure of the emergency bus normal supply breakers after the EDG is powering the bus could result in non-synchronous paralleling, EDG overloading, or EDG output breaker tripping due to faulted power cable from normal supply breaker. The spurious closure of the normal supply breakers is not currently addressed in the Appendix R Report or previous Multiple Spurious Operations (MSO) analysis.

This condition is associated with the Appendix R safe-shutdown function of the emergency power system. The emergency power system is considered operable but not fully qualified for its safety-related design function.

The following fire areas are impacted:

- 1) Fire Area 13, Unit 1 normal switchgear room
- 2) Fire Area 46, Unit 1 cable tray room
- 3) Fire Area 3, Unit 1 emergency switchgear and relay room
- 4) Fire Area 2, Unit 2 cable vault and tunnel

Planned Closure Actions: The NRC is currently reviewing the MSO Calculations SU-ETE-000-ETE-SU-2011-0051, "Appendix R Multiple Spurious Operation (MSO) Evaluation – Surry Units 1 and 2," Revisions 0, 1, and 2 and SU-ETE-000-ETE-SEP-2011-012, "Appendix R Multiple Spurious Operations (MSO) Identification – Surry," Revisions 0, 1, 2, and 3, and using NEI-00-01 Revision 2. The circuit analysis of record was SAIC/Tri-En Corporation Circuit analysis files, dated December 22, 2010. This review was to determine if a performance deficiency exists based on the statement in the LER. If a performance deficiency is identified, a detailed risk assessment will be completed in accordance with Inspection Manual Chapter 0609, Appendix F, and the results evaluated using the significance and enforcement review process. If no performance deficiency is identified, the issue will be dispositioned using the traditional enforcement process.

Licensee Actions: The licensee identified this concern through their operating experience program, immediately implemented appropriate compensatory actions as directed by their fire protection program, entered the concern into the corrective action program, and conducted an evaluation and extent of condition review and develop long term corrective actions to restore compliance with Appendix R.

Corrective Action References: CR1180502, CR1197760

## **EXIT MEETINGS AND DEBRIEFS**

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

- On October 19, 2022, the inspectors presented the integrated inspection results to Mr. David Wilson and other members of the licensee staff.
- On July 21, 2022, the inspectors presented the ISFSI inspection results to Mr. Russell Hamilton and other members of the licensee staff.
- On September 30, 2022, the inspectors presented the emergency preparedness program inspection results to Mr. Fred Mladen and other members of the licensee staff.

**DOCUMENTS REVIEWED**

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71111.01	Engineering Evaluations	EE 14-E15	Dominion Flooding Hazard Reevaluation Report for Surry Power Station Units 1 and 2	Revision 1
	Procedures	0-OSP-ZZ-003	Station Hot Weather Checklist	Revision 12
71111.04	Procedures	2-FS-FPS-124	Unit 2 Switchgear Room Elevation 58 Feet - 6 Inches	Revision 4
		2-OP-FW-001A	Auxiliary Feedwater System Valve Alignment	Revision 8
71111.05	Procedures	0-FS-FP-186	Fuel Oil Pump House A Elevation 16 Feet	Revision 1
		0-FS-FP-187	Fuel Oil Pump House B Elevation 16 Feet	Revision 1
		0-FS-FP-225	Alternate AC Diesel Room - Construction Site Elevation 35 Feet	Revision 1
		1-FS-FP-124	Unit 1 Switchgear Room Elevation 58 Feet - 6 Inches	Revision 4
71111.07A	Work Orders	WO#38204292616	Checking for Water in Unit 1 Recirculation Spray Heat Exchangers	07/29/2022
		WO#38204294009	Checking for Water in Unit 2 Recirculation Spray Heat Exchangers	08/12/2022
71111.12	Corrective Action Documents	CR1183601	Unit 2 source range nuclear instrumentation N31 reading higher than N32	10/24/2021
		CR1203764	#1 Emergency diesel generator loss of load during monthly test	07/18/2022
		CR1205138	1-SW-P-1C, C emergency service water pump, unable to obtain required speed	08/07/2022
		CR1205400	Unit 2 anticipated transient without scram mitigation system armed and trouble alarms	08/10/2022
	Procedures	EE-AA-MRL-10	Maintenance Rule Program	Revision 7
		EE-AA-MRL-100, Revision 14	Implementing Maintenance Rule	
71111.18	Miscellaneous	Serial Number 15-538	Dominion Nuclear Connecticut, Inc., Virginia Electric Power Company, Millstone Power Station Units 2 and 3, North Anna Power Station Units 1 and 2, Commitment to Maintain Severe Accident Management Guidelines	December 29, 2015
71111.22	Procedures	0-OPT-EG-001	Number 3 Emergency Diesel Generator Monthly Start Exercise Test	Rev 83
	Work Orders	WO38204293894	28 Day Freq. PT: Number 3 EDG Test - Monthly - OC-22A	07/11/2022

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
71152A	Corrective Action Documents	CR1187818	Two Leaks in Auxiliary Feedwater Full Flow Recirculation Line	12/14/2021