



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

August 3, 2021

Mr. Ernest J. Kapopoulos, Jr.  
Site Vice President  
H. B. Robinson Steam Electric Plant  
Duke Energy Progress, LLC  
3581 West Entrance Road, RNPA01  
Hartsville, SC 29550

SUBJECT: H. B. ROBINSON STEAM ELECTRIC PLANT – INTEGRATED INSPECTION  
REPORT 05000261/2021002

Dear Mr. Kapopoulos, Jr.:

On June 30, 2021, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at H. B. Robinson Steam Electric Plant. On July 15, 2021, the NRC inspectors discussed the results of this inspection with you and other members of your staff. The results of this inspection are documented in the enclosed report.

No findings or violations of more than minor significance were identified during this inspection.

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,

**/RA/**

David E. Dumbacher, Chief  
Reactor Projects Branch 3  
Division of Reactor Projects

Docket No. 05000261  
License No. DPR-23

Enclosure:  
As stated

cc w/ encl: Distribution via LISTSERV®

SUBJECT: H. B. ROBINSON STEAM ELECTRIC PLANT – INTEGRATED INSPECTION  
REPORT 05000261/2021002 – DATED August 3, 2021

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

Docket Number: 05000261

License Number: DPR-23

Report Number: 05000261/2021002

Enterprise Identifier: I-2021-002-0011

Licensee: Duke Energy Progress, LLC

Facility: H. B. Robinson Steam Electric Plant

Location: Hartsville, SC

Inspection Dates: April 1, 2021 to June 30, 2021

Inspectors: A. Beasten, PhD, Reactor Engineer  
M. Fannon, Senior Resident Inspector  
C. Fontana, Emergency Preparedness Inspector  
J. Hickman, Senior Resident Inspector  
A. Nielsen, Senior Health Physicist  
W. Pursley, Health Physicist  
J. Rivera, Health Physicist  
S. Sanchez, Senior Emergency Preparedness Insp  
S. Sandal, Senior Reactor Analyst  
J. Walker, Emergency Response Inspector

Approved By: David E. Dumbacher, Chief  
Reactor Projects Branch 3  
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 H. B. Robinson Steam Electric Plant, 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**

No findings or violations of more than minor significance were identified.

### **Additional Tracking Items**

None.

## PLANT STATUS

Unit 2 began the inspection period at rated thermal power. On April 2, 2021, the unit was downpowered to 50 percent due to abnormal temperatures and vibrations on the 'B' condensate pump. The 'B' condensate pump motor was replaced, and the unit was returned to rated thermal power on April 8, 2021. The unit 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 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. Starting on March 20, 2020, in response to the National Emergency declared by the President of the United States on the public health risks of the coronavirus (COVID-19), resident and regional inspectors were directed to begin telework and to remotely access licensee information using available technology. During this time, the resident inspectors performed periodic site visits each week, increasing the amount of time on site as local COVID-19 conditions permitted. As part of their onsite activities, resident inspectors conducted plant status activities as described in IMC 2515, Appendix D; observed risk significant activities; and completed on site portions of IPs. In addition, resident and regional baseline inspections were evaluated to determine if all or a portion of the objectives and requirements stated in the IP could be performed remotely. If the inspections could be performed remotely, they were conducted per the applicable IP. In some cases, portions of an IP were completed remotely and on site. The inspections documented below met the objectives and requirements for completion of the IP.

## REACTOR SAFETY

### 71111.01 - Adverse Weather Protection

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

- (1) The inspectors evaluated readiness for seasonal extreme weather conditions prior to the onset of extreme high temperatures on May 26, 2021.

### 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) 'A' emergency diesel generator (EDG) while the 'B' EDG was out of service for a lube oil pressure sensing line leak on April 19, 2021
- (2) 'A' and 'B' motor driven auxiliary feedwater on April 27, 2021

- (3) 'D' service water (SW) pump and 'B' service water booster pump alignment on April 29, 2021
- (4) 'A' and 'B' charging pump while the 'C' charging pump was out of service for seal plunger replacement on June 16, 2021

#### 71111.05 - Fire Protection

##### Fire Area Walkdown and Inspection Sample (IP Section 03.01) (5 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) Fire Zone 5, component cooling pump room, on April 1, 2021
- (2) Fire Zone 9, north cable vault, on April 1, 2021
- (3) Fire Zone 10, south cable vault, on April 1, 2021
- (4) Fire Zone 16, 'A' and 'B' battery room, on April 29, 2021
- (5) Fire Zone 26, transformer yard, on May 25, 2021

#### 71111.06 - Flood Protection Measures

##### Cable Degradation (IP Section 03.02) (1 Sample)

The inspectors evaluated cable submergence protection in:

- (1) M-50A and M-50B SW pump motor and valve cable vaults

#### 71111.07A - Heat Sink Performance

##### Annual Review (IP Section 03.01) (1 Sample)

The inspectors evaluated readiness and performance of:

- (1) 'B' component cooling water heat exchanger

#### 71111.11Q - Licensed Operator Regualification 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 a power ascension from 47 percent power to 100 percent power following replacement of the 'B' condensate pump on April 8, 2021.

##### Licensed Operator Regualification Training/Examinations (IP Section 03.02) (2 Samples)

- (1) The inspectors observed and evaluated a licensed operator regualification examination on April 6, 2021.
- (2) The inspectors observed and evaluated a licensed operator regualification examination on April 27, 2021.

### 71111.12 - Maintenance Effectiveness

#### Maintenance Effectiveness (IP Section 03.01) (2 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) Nuclear condition report (NCR) 2378753, 'B' EDG oil pressure sensing line leak
- (2) NCR 2371506, 'C' auxiliary feedwater pump would not start

### 71111.13 - Maintenance Risk Assessments and Emergent Work Control

#### Risk Assessment and Management Sample (IP Section 03.01) (5 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) 'D' SW pump and engine driven fire pump out of service for 'C' circulating water pump replacement activities on April 13, 2021
- (2) 'B' EDG out of service for a lube oil pressure sensing line leak on April 19, 2021
- (3) 'D' SW pump out of service for oil sight glass replacement on April 20, 2021
- (4) Steam driven auxiliary feedwater pump out of service for governor replacement and maintenance activities on June 8, 2021
- (5) 'C' charging pump out of service for seal plunger replacement activities on June 16, 2021

### 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) NCR 2354646, containment vessel sump recirculation suction valve passive failures
- (2) NCR 2370335, 'A' charging pump 25 drop per minute head leak
- (3) NCR 2371372, 'A' direct current electrical distribution ground indication
- (4) NCR 2379337, errors in calculation for minimum thickness of containment vessel steel liner
- (5) NCR 2385648, 'A' EDG oil leak
- (6) NCR 2385889, emergency turbine trip quadvoter solenoid failed to reset

### 71111.18 - Plant Modifications

#### Temporary Modifications and/or Permanent Modifications (IP Section 03.01 and/or 03.02) (2 Samples)

The inspectors evaluated the following temporary or permanent modifications:

- (1) Engineering Change (EC) 418513, evaluation of leakage into residual heat removal

- pit  
(2) EC 418607, post-accident containment water level transmitter temporary change (L-802)

#### 71111.19 - Post-Maintenance Testing

##### Post-Maintenance Test Sample (IP Section 03.01) (6 Samples)

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

- (1) NCR 2378236, right main steam stop valve trip indication repair activities on April 15, 2021
- (2) NCR 2378753, 'B' EDG lube oil pressure sensing line repair activities on April 19, 2021
- (3) Work Order (WO) 20357505, 'D' SW pump oil sight glass replacement on April 20, 2021
- (4) WO 20369541, steam driven auxiliary feedwater governor replacement on June 9, 2021
- (5) WO 20460090, 'C' charging pump plunger seal replacement on June 16, 2021
- (6) WO 2416980, 'A' containment vessel spray pump breaker replacement on June 29, 2021

#### 71111.22 - Surveillance Testing

The inspectors evaluated the following surveillance tests:

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

- (1) MST-20, 'A' reactor protection logic train testing on May 3, 2021
- (2) OST-251-1, 'A' residual heat removal component testing on June 8, 2021
- (3) MST-016, containment pressure protection channel testing on June 21, 2021

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

- (1) OST-201-1, 'A' motor driven auxiliary feedwater system component test on May 6, 2021
- (2) OST-151-3, 'C' safety injection component testing on June 23, 2021

#### 71114.01 - Exercise Evaluation

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

- (1) The inspectors evaluated the biennial emergency plan exercise during the week of May 17, 2021. The exercise scenario started with a simulated loss of offsite power event which caused the reactor to trip and the emergency diesel generators (EDGs) to start. This met the conditions for declaring an Unusual Event. A short time later, an Alert was declared when one of the EDGs tripped on undervoltage and was expected to be unavailable for greater than 15 minutes. Once the second EDG tripped on undervoltage and was expected to be unavailable for more than 15 minutes, the conditions for declaring a Site Area Emergency were met. After a large



break loss of cooling accident, followed by a breach in a containment penetration, conditions were met for declaring a General Emergency simulated classification and allowing the Offsite Response Organizations to demonstrate their ability to implement emergency actions.

#### 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, Emergency Plan, and Emergency Plan Implementing Procedure changes during the week of May 17, 2021. This evaluation does not constitute NRC approval.

#### 71114.08 - Exercise Evaluation Scenario Review

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

- (1) The inspectors reviewed and evaluated in-office, the proposed scenario for the biennial emergency plan exercise at least 30 days prior to the day of the exercise.

### **RADIATION SAFETY**

#### 71124.06 - Radioactive Gaseous and Liquid Effluent Treatment

##### Walkdowns and Observations (IP Section 03.01) (3 Samples)

The inspectors evaluated the following radioactive effluent systems during walkdowns:

- (1) Plant vent discharge and associated effluent monitor R-14.
- (2) Chemistry lab gaseous discharge and associated effluent monitor R-22.
- (3) Liquid radwaste discharge to Service Water and associated effluent monitor R-18.

##### Sampling and Analysis (IP Section 03.02) (4 Samples)

The inspectors observed and/or reviewed the following sampling activities:

- (1) Chemistry lab gaseous discharge sampling (particulate, iodine, tritium, noble gas).
- (2) Compensatory sampling records for F-14, plant stack flowmeter.
- (3) Turbine building sump/condensate polisher liquid discharge composite sampling (tritium and gamma scan).
- (4) Fuel handling building basement gaseous discharge sampling (particulate, iodine, tritium, noble gas).

##### Dose Calculations (IP Section 03.03) (2 Samples)

The inspectors evaluated the following dose calculations:

- (1) Gaseous release permit G-2021-0085, containment vessel pressure release
- (2) Gaseous release permit G-2021-0006, plant vent weekly release

#### 71124.07 - Radiological Environmental Monitoring Program

Environmental Monitoring Equipment and Sampling (IP Section 03.01) (1 Sample)

- (1) The inspectors evaluated environmental monitoring equipment and observed collection of environmental samples.

Radiological Environmental Monitoring Program (IP Section 03.02) (1 Sample)

- (1) The inspectors evaluated the implementation of the licensee's radiological environmental monitoring program.

GPI Implementation (IP Section 03.03) (1 Sample)

- (1) The inspectors evaluated the licensee's implementation of the Groundwater Protection Initiative program to identify incomplete or discontinued program elements.

71124.08 - Radioactive Solid Waste Processing & Radioactive Material Handling, Storage, & Transportation

Radioactive Material Storage (IP Section 03.01) (2 Samples)

- (1) Inspectors evaluated the licensee's performance in controlling, labelling and securing radioactive materials in the Radwaste Building.
- (2) Inspectors evaluated the licensee's performance in controlling, labelling and securing radioactive materials at the Sea-Land Storage Building.

Radioactive Waste System Walkdown (IP Section 03.02) (2 Samples)

- (1) Inspectors walked down accessible portions of the solid radioactive waste systems and evaluated system configuration and functionality of the resin transfer system.
- (2) Inspectors walked down waste drumming room in the auxiliary building and the dry cask preparation area in the fuel handling building.

Waste Characterization and Classification (IP Section 03.03) (3 Samples)

- (1) The inspectors evaluated the licensee's characterization and classification of radioactive waste resin for shipment number 19-0023.
- (2) The inspectors evaluated the licensee's characterization and classification of the Dry Active Waste Stream prepared on 10-13-2019.
- (3) The inspectors evaluated the licensee's characterization and classification of RCS filters performed 03/19/2019.

Shipping Records (IP Section 03.05) (3 Samples)

The inspectors evaluated the following non-excepted radioactive material shipments through a record review:

- (1) UN3321, Radioactive Material, Low Specific Activity II, Category 2 Quantity Shipment Number 19-0023.
- (2) UN2912, Radioactive Material, Low Specific Activity I, DAW Trash, Shipment Number 21-0009

- (3) UN3321, Radioactive Material, Low Specific Activity, DAW Trash, Shipment Number 21-0005

## **OTHER ACTIVITIES – BASELINE**

### 71151 - Performance Indicator Verification

The inspectors verified licensee performance indicators submittals listed below:

#### IE04: Unplanned Scrams with Complications (USwC) Sample (IP Section 02.03) (1 Sample)

- (1) April 1, 2020 to March 31, 2021

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

- (1) April 1, 2020 to March 31, 2021

#### MS06: Emergency AC Power Systems (IP Section 02.05) (1 Sample)

- (1) April 1, 2020 to March 31, 2021

#### PR01: Radiological Effluent Technical Specifications/Offsite Dose Calculation Manual Radiological Effluent Occurrences (RETS/ODCM) Radiological Effluent Occurrences Sample (IP Section 02.16) (1 Sample)

- (1) November 16, 2020 to May 6, 2021

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

- (1) January 1, 2020, to March 31, 2021

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

- (1) January 1, 2020, to March 31, 2021

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

- (1) January 1, 2020, to March 31, 2021

### 71152 - Problem Identification and Resolution

#### Semiannual Trend Review (IP Section 02.02) (1 Sample)

- (1) The inspectors reviewed the licensee's corrective action program for potential adverse trends that might be indicative of a more significant safety concern.

#### Annual Follow-up of Selected Issues (IP Section 02.03) (2 Samples)

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

- (1) NCR 2357174, containment sump pump liner degradation
- (2) NCR 2266558, Fire area G1 fire walls and doors not documented in the national fire protection association 805 analysis

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

2515/194 - Inspection of the Licensee’s Implementation of Industry Initiative Associated With the Open Phase Condition Design Vulnerabilities In Electric Power Systems (NRC Bulletin 2012-01)

Revision 0 of this Temporary Instruction (TI) was previously inspected, and closed, in Inspection Report 2019011 (ADAMS ML19248C229). However, a subsequent revision to the NEI Voluntary Initiative (Revision 3) provided plants the option of to leave the open phase protection (OPP) system in monitoring mode only in lieu of activating the automatic trip circuitry, provided it was supported by a risk evaluation. Revision 1 (and later Revision 2) of this TI was issued to provide inspection guidance for the new option.

The inspectors reviewed licensee analyses and procedures that demonstrated operator manual actions would successfully mitigate the impact of an Open Phase Condition (OPC). The analyses were reviewed remotely, and the procedures were reviewed and walked down on site. The inspectors completed Section 03.01c of TI 2515/194, Revision 2.

The inspectors verified that modeling used for the OPC reflected the as-designed and as-built plant, assumptions made by the licensee were reasonable, and licensee procedures were adequate to successfully respond to an OPC. The inspectors also verified that human reliability analysis and recovery evaluations were done in accordance with NEI and voluntary initiative guidance.

**INSPECTION RESULTS**

Observation: 03.01.c - Use of Risk-Informed Evaluation Method	2515/194
<p>The licensee’s risk evaluation supporting operation of the open phase protection (OPP) system in alarm-only did not take credit for manual operator actions to isolate or recover the bus impacted by an open phase condition (OPC) when operated in alarm-only mode. The licensee modeled the OPC as an initiating event and as a 24-hour mission time post-event condition using the representative likelihoods described in industry guidance.</p> <p>The inspector noted that the cutsets generated by the licensee’s probabilistic risk assessment (PRA) model only contained sequences where the OPC occurred during the 24-hour mission time following another event initiator and did not include sequences where the OPC was the initiating event. Further discussions with the licensee resulted in the determination that OPC initiator basic event had not been inserted into the model logic in a manner that would allow those sequences to propagate when then model was solved. This resulted in an underestimation of the change in risk for operation of the open phase protection system in alarm-only vs. automatic mode of operation.</p> <p>The inspector reviewed the licensee’s revised risk evaluation which included proper sequencing of the OPC as an event initiator and raised the estimated change in risk for operation of the OPP system in alarm-only mode by approximately one order of magnitude (i.e., from an E-08 value to an E-07 value). The updated risk estimate was still consistent with the industry guidance described in NEI 19-02, “Guidance for Assessing Open Phase</p>	

Condition Implementation Using Risk Insights,” while still providing no credit for manual operator actions to isolate or recover the bus impacted by an OPC when operated in alarm-only mode. The revised risk evaluation also included additional sensitivities to evaluate potential development of human error recovery probabilities and spurious operation of the OPP system concurrent with emergency diesel generator failure.

The licensee’s failure to correctly model an OPC as an initiator when evaluating the risk of OPP system operation was a minor performance deficiency. The modeling error was minor because it did not alter the overall conclusions of the evaluation supporting operation of the OPP system in alarm-only mode when corrected.

## **EXIT MEETINGS AND DEBRIEFS**

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

- On July 15, 2021, the inspectors presented the integrated inspection results to Ernest J. Kapopoulos, Jr. and other members of the licensee staff.
- On May 19, 2021, the inspectors presented the radiation protection public radiation safety inspection results to Ernest J. Kapopoulos, Jr. and other members of the licensee staff.
- On May 20, 2021, the inspectors presented the emergency preparedness exercise inspection results to Ernest J. Kapopoulos, Jr. and other members of the licensee staff.

## **THIRD PARTY REVIEWS**

Inspectors reviewed the Institute of Nuclear Power Operations report that was issued during the inspection period.

**DOCUMENTS REVIEWED**

Inspection Procedure	Type	Designation	Description or Title	Revision or Date
2515/194	Calculations	RNP-F/PSA-0145	Robinson PRA Analysis of Implementation Options for Open Phase Condition Protection	Revision 1
		RNP-F/PSA-0145	Robinson PRA Analysis of Implementation Options for Open Phase Condition Protection	Revision 2
	Corrective Action Documents Resulting from Inspection	AR 02387036	AOP-026 R020 Open Phase Wording	06/22/2021
		NCR 02387068	2021 NRC Open Phase Insp: Improvement opportunity identified	06/22/2021
		NCR 02387184	2021 NRC Open Phase Insp: Incomplete modeling of PRA Analysis	06/23/2021
	Procedures	AOP-024	Loss of Instrument Bus	Revision 46
		AOP-026	Grid Instability	Revision 19
		AOP-037	Large Transformer Malfunctions	Revision 20
		APP-009	Main Generator and Electrical	Revision 69
		OP-603	Electrical Distribution	Revision 141
71124.06	Corrective Action Documents Resulting from Inspection	NCR 02383030		
	Miscellaneous	EMP-024, Attachment 10.2	E&C ODCM Supplemental Surveillance Log (Flow Rate measuring Devices)	1/7/21
		EMP-024, Attachment 10.2	E&C ODCM Supplemental Surveillance Log (Flow Rate Measuring Devices)	2/28/21
		G-2021-0006	Plant Vent Stack Gaseous Release Permit	
	Procedures	EMP-013	Operation of R-14 and F-14	Rev. 62
		EMP-024	ODCM Surveillance	Rev. 71
71124.07	Corrective Action Documents	AR 02349673	MET Tower Data Recovery	09/22/2020
	Miscellaneous		Year 2020 Meteorological Data Recovery Report	
	Procedures	PM-180	Meteorology Tower Equipment Calibration	Rev 14