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OCT 09 2019

10 CFR 50.73

Serial: RA-19-0384

United States Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, DC 20555-0001

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2  
DOCKET NO. 50-261/RENEWED LICENSE NO. DPR-23

Subject: LICENSEE EVENT REPORT NO. 2019-001-00:  
TURBINE TRIP / REACTOR TRIP DUE TO MAIN GENERATOR LOCKOUT

Ladies and Gentlemen:

Pursuant to 10 CFR 50.73, Duke Energy Progress, LLC is submitting the attached Licensee Event Report. There are no unresolved corrective actions necessary to restore compliance with NRC requirements. Please direct any questions regarding this submittal to Tomas G. Bardauskas, Regulatory Affairs, at (843) 951-1053.

This document contains no new regulatory commitments.

Sincerely,

Kevin M. Ellis  
Manager – Nuclear Support Services

KME/tgb

Attachment

c: Region Administrator, NRC, Region II  
NRC Resident Inspectors, HBRSEP  
N. Jordan, NRC Project Manager, NRR

United States Nuclear Regulatory Commission  
Attachment to Serial: RA-19-0384  
4 Pages (including this page)

**H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2**

**LICENSEE EVENT REPORT NO. 2019-001-00:**

**TURBINE TRIP / REACTOR TRIP DUE TO MAIN GENERATOR LOCKOUT**

**LICENSEE EVENT REPORT (LER)**

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

(See NUREG-1022, R.3 for instruction and guidance for completing this form)

<http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1022/r3/>

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the Information Services Branch (T-2 F43), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by e-mail to [Infocollects.Resource@nrc.gov](mailto:Infocollects.Resource@nrc.gov), and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

|  |   |                                 |
|--|---|---------------------------------|
| <b>1. Facility Name</b><br>H. B. Robinson Steam Electric Plant, Unit No. 2 | <b>2. Docket Number</b><br><b>05000</b> 261 | <b>3. Page</b><br><b>1 OF 3</b> |
|--|---|---------------------------------|

|  |
|--|
| <b>4. Title</b><br>Turbine Trip / Reactor Trip due to Main Generator Lockout |
|--|

| 5. Event Date |     |      | 6. LER Number |                   |         | 7. Report Date |     |      | 8. Other Facilities Involved |               |
|---------------|-----|------|---------------|-------------------|---------|----------------|-----|------|------------------------------|---------------|
| Month         | Day | Year | Year          | Sequential Number | Rev No. | Month          | Day | Year | Facility Name                | Docket Number |
| 08            | 11  | 2019 | 2019          | 001               | 00      | 10             | 09  | 2019 | NA                           | 05000         |
|               |     |      |               |                   |         |                |     |      | NA                           | 05000         |

|                          |  |   |  |   |
|--------------------------|--|---|--|---|
| <b>9. Operating Mode</b> | <b>11. This Report is Submitted Pursuant to the Requirements of 10 CFR §: (Check all that apply)</b> |   |  |   |
| <b>1</b>                 | <input type="checkbox"/> 20.2201(b)  | <input type="checkbox"/> 20.2203(a)(3)(i)   | <input type="checkbox"/> 50.73(a)(2)(ii)(A)                                    | <input type="checkbox"/> 50.73(a)(2)(viii)(A) |
|                          | <input type="checkbox"/> 20.2201(d)  | <input type="checkbox"/> 20.2203(a)(3)(ii)  | <input type="checkbox"/> 50.73(a)(2)(ii)(B)                                    | <input type="checkbox"/> 50.73(a)(2)(viii)(B) |
|                          | <input type="checkbox"/> 20.2203(a)(1)   | <input type="checkbox"/> 20.2203(a)(4)      | <input type="checkbox"/> 50.73(a)(2)(iii)                                      | <input type="checkbox"/> 50.73(a)(2)(ix)(A)   |
|                          | <input type="checkbox"/> 20.2203(a)(2)(i)  | <input type="checkbox"/> 50.36(c)(1)(i)(A)  | <input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A)                         | <input type="checkbox"/> 50.73(a)(2)(x)       |
| <b>10. Power Level</b>   | <input type="checkbox"/> 20.2203(a)(2)(ii)   | <input type="checkbox"/> 50.36(c)(1)(ii)(A) | <input type="checkbox"/> 50.73(a)(2)(v)(A)                                     | <input type="checkbox"/> 73.71(a)(4)          |
| <b>100</b>               | <input type="checkbox"/> 20.2203(a)(2)(iii)  | <input type="checkbox"/> 50.36(c)(2)        | <input type="checkbox"/> 50.73(a)(2)(v)(B)                                     | <input type="checkbox"/> 73.71(a)(5)          |
|                          | <input type="checkbox"/> 20.2203(a)(2)(iv)   | <input type="checkbox"/> 50.46(a)(3)(ii)    | <input type="checkbox"/> 50.73(a)(2)(v)(C)                                     | <input type="checkbox"/> 73.77(a)(1)          |
|                          | <input type="checkbox"/> 20.2203(a)(2)(v)  | <input type="checkbox"/> 50.73(a)(2)(i)(A)  | <input type="checkbox"/> 50.73(a)(2)(v)(D)                                     | <input type="checkbox"/> 73.77(a)(2)(i)       |
|                          | <input type="checkbox"/> 20.2203(a)(2)(vi)   | <input type="checkbox"/> 50.73(a)(2)(i)(B)  | <input type="checkbox"/> 50.73(a)(2)(vii)                                      | <input type="checkbox"/> 73.77(a)(2)(ii)      |
|                          |  | <input type="checkbox"/> 50.73(a)(2)(i)(C)  | <input type="checkbox"/> Other (Specify in Abstract below or in NRC Form 366A) |   |

|   |   |
|---|---|
| <b>12. Licensee Contact for this LER</b>                                      |   |
| <b>Licensee Contact</b><br>Kevin M. Ellis, Manager - Nuclear Support Services | <b>Telephone Number</b> (Include Area Code)<br>843-951-1329 |

|   |              |                  |                      |                         |                                     |       |        |           |              |                    |
|---|--------------|------------------|----------------------|-------------------------|-------------------------------------|-------|--------|-----------|--------------|--------------------|
| <b>13. Complete One Line for each Component Failure Described in this Report</b>                                    |              |                  |                      |                         |                                     |       |        |           |              |                    |
| Cause<br>X  | System<br>TL | Component<br>EXC | Manufacturer<br>S125 | Reportable to ICES<br>Y |                                     | Cause | System | Component | Manufacturer | Reportable to ICES |
| <b>14. Supplemental Report Expected</b>   |              |                  |                      |                         | <b>15. Expected Submission Date</b> |       |        | Month     | Day          | Year               |
| <input type="checkbox"/> Yes (If yes, complete 15. Expected Submission Date) <input checked="" type="checkbox"/> No |              |                  |                      |                         |                                     |       |        |           |              |                    |

**Abstract** (Limit to 1400 spaces, i.e., approximately 14 single-spaced typewritten lines)

At 0840 hours Eastern Daylight Time (EDT) on 08/11/2019 with the plant in Mode 1 at 100 percent power, H. B. Robinson Steam Electric Plant, Unit No. 2 (HBRSEP2), experienced an electrical fault within the main generator exciter. The exciter field breaker tripped due to a loss of generator field excitation, causing a main generator lockout. As a result, HBRSEP2 experienced an automatic turbine trip and subsequent reactor trip. Plant safety systems operated as designed. Auxiliary Feedwater Pumps started as expected. The plant was stabilized in Mode 3 and subsequently cooled to Mode 4.

The exciter was removed and shipped from HBRSEP2 to a vendor where it was disassembled, tested and inspected. This inspection identified extensive exciter damage. Due to the extensive damage, the precise failure cause is indeterminate.

Actions taken to correct the condition were to reinstall a refurbished exciter. HBRSEP2 returned to power operation on 09/03/2019. There was no impact to the health and safety of the public as a result of this event.

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

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

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| 1. FACILITY NAME                                | 2. DOCKET NUMBER | 3. LER NUMBER |                            |                 |
|---|------------------|---------------|----------------------------|-----------------|
| H. B. Robinson Steam Electric Plant, Unit No. 2 | 05000-261        | YEAR<br>2019  | - SEQUENTIAL NUMBER<br>001 | - REV NO.<br>00 |

**NARRATIVE****BACKGROUND**

At the time this condition was identified, H. B. Robinson Steam Electric Plant, Unit No. 2 (HBRSEP2) was operating in Mode 1 at approximately 100 percent power. No structures, systems or components were out of service at the time of the event that contributed to this event.

The event is reportable under 10 CFR 50.73(a)(2)(iv)(A), any event or condition that resulted in manual or automatic actuation of any of the systems listed in 10 CFR 50.73(a)(2)(iv)(B). This event resulted in automatic actuation of the reactor protection system [JC] and auxiliary feedwater system [BA].

On 08/11/2019, a four-hour, non-emergency notification per 10 CFR 50.72(b)(2)(iv)(B) was made to the Nuclear Regulatory Commission (NRC) due to a reactor protection system initiation during operation. Additionally, an eight-hour, non-emergency notification per 10 CFR 50.72(b)(3)(iv)(A) was made due to actuation of the auxiliary feedwater system (EN# 54212).

**EVENT DESCRIPTION**

At 0840 hours Eastern Daylight Time (EDT) on 08/11/2019 with the plant in Mode 1 at 100 percent power, HBRSEP2 automatically tripped following a main generator [TG] lockout. Immediately prior to the plant trip, the control room staff received indications of an electrical fault in the turbine building. The exciter [EXC] field breaker [BKR] tripped due to a loss of generator field excitation, causing a main generator lockout. The main generator lockout resulted in an automatic turbine [TRB] trip and subsequent automatic reactor [RCT] trip. Auxiliary feedwater pumps [P] started as expected. The plant was stabilized in Mode 3, Hot Standby. On 08/12/2019, the plant was cooled to Mode 4, Hot Shutdown.

Upon completion of the initial inspection and plant data analysis, it was postulated that a fault current occurred inside the exciter housing. The exciter was shipped from HBRSEP2 to a vendor where it was disassembled, tested, and inspected. The subsequent forensic analysis identified extensive armature damage on the outboard end of the exciter and the inboard diode wheel.

**CAUSAL FACTORS**

An analysis of the forensic evidence was conducted to determine if armature failure resulted in the inboard diode wheel failure or if inboard diode wheel failure resulted in the armature failure. Based on the supporting and refuting facts for each scenario, it is most likely that an armature failure resulted in diode wheel failure. Due to the exciter failure leaving behind inconclusive evidence that points to coil [CL] or core failure, the precise cause of the event is indeterminate. However, the forensic analysis and the root cause evaluation refuted other human performance, organizational and programmatic causes. The cause of the automatic turbine trip and subsequent automatic reactor trip was most likely a latent defect internal to the exciter coil or core that resulted in failure of the exciter armature.

**CORRECTIVE ACTIONS**

Complete:

1. Replaced the failed exciter with a refurbished exciter that was assembled and tested per HBRSEP2 specifications.

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

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**1. FACILITY NAME**

H. B. Robinson Steam Electric Plant, Unit  
No. 2

**2. DOCKET NUMBER**

05000-

261

**3. LER NUMBER****YEAR**

2019

**SEQUENTIAL  
NUMBER**

001

**REV  
NO.**

00

**NARRATIVE****SAFETY ANALYSIS**

The reactor was operating at full power at the time of the exciter failure and subsequent turbine / reactor trip. The mitigating equipment (reactor protection and auxiliary feedwater systems) functioned as expected and plant shutdown proceeded normally without further challenge. The cause of the plant trip is attributed to the failure of the non-safety related main generator exciter. There were no other equipment performance issues. Therefore, the risk consequence of this event was minimal based on a successful reactor trip with no equipment or operational challenges.

**ADDITIONAL INFORMATION**

An operating experience (OE) search was conducted and there were no prior events at HBRSEP2 involving failure of the exciter. An external industry-wide OE search identified many exciter component failures that led to loss of excitation for main generators. Causes stemmed from infrequent inspection, inadequate maintenance, poor design and foreign material. This OE was reviewed with no additional concerns identified with any existing programs, procedures or practices.

Energy Industry Identification System (EIIS) codes for systems and components relevant to this event are identified in the text of this document within brackets [ ].