



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**  
REGION III  
2443 WARRENVILLE RD. SUITE 210  
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July 26, 2017

Mr. Bryan C. Hanson  
Senior Vice President, Exelon Generation Company, LLC  
Chief Nuclear Officer, Exelon Nuclear  
4300 Winfield Road  
Warrenville, IL 60555

**SUBJECT: DRESDEN NUCLEAR POWER STATION, UNIT 3—NRC SUPPLEMENTAL  
INSPECTION REPORT 05000249/2017010**

Dear Mr. Hansen:

On June 30, 2017, the U.S. Nuclear Regulatory Commission (NRC) completed a supplemental inspection at your Dresden Nuclear Power Station. The enclosed report documents the results of this inspection, which were discussed with Mr. J. Washko, Station Manager, and other members of the licensee management and staff on June 30, 2017. A Regulatory Performance Meeting with Mr. J. Washko and Mr. Jamnes Cameron was held on May 25, 2017, to discuss the corrective actions implemented in response to the White inspection finding and Notice of Violation. The inspector documented the results of this inspection in the enclosed inspection report.

As required by the NRC Reactor Oversight Process (ROP) Action Matrix, this supplemental inspection was performed in accordance with Inspection Procedure (IP) 95001, "Supplemental Inspection Response to Action Matrix Column 2 Inputs." The purpose of the inspection was to examine the causes for, and actions taken related to, a White violation in the Mitigating Systems Cornerstone at the Dresden Nuclear Power Station, Unit 3.

On February 27, 2017, the U.S. Nuclear Regulatory Commission (NRC) provided you with a letter of final significance determination for a preliminary White finding discussed previously in inspection report 05000249/2016010, dated December 5, 2016, for Unit 3. This report is available in the NRC's Agencywide Documents Access and Management System (ADAMS) at Accession Number ML16340B229. ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>. The finding involved the failure of the Unit 3 High Pressure Coolant Injection Auxiliary Oil Pump Motor. As a result of the inspection, the NRC assigned a White finding Action Matrix input for the Mitigating Systems cornerstone in the fourth quarter of 2016 for Unit 3.

In response to the Action Matrix input, the NRC informed you that a supplemental inspection under Inspection Procedure 95001, "Supplemental Inspection for One or Two White Inputs in a Strategic Performance Area," would be required. In a letter dated, April 11, 2017, you informed the NRC that Dresden Station Unit 3 was ready for the supplemental inspection.

The NRC performed the supplemental inspection to determine whether (1) the root and contributing causes for the significant issue was understood, (2) the extent of condition and extent of cause for the identified issues were understood, and (3) your completed or planned

corrective actions were sufficient to address and prevent repetition of the root and contributing causes.

The NRC determined that your staff's evaluation identified the primary root cause of the issue to be the inadequate control of critical parameters when installing a direct current shunt wound motor. The Root Cause Evaluation also identified a contributing cause that historical motor procurement evaluation standards were not sufficiently rigorous. The NRC determined that the programs and processes at Dresden Nuclear Power Station generally met the Commission's rules and regulations. The NRC also determined that the completed or planned corrective actions are sufficient to address the performance that led to the White Finding. Since a safety-significant finding is considered an Action Matrix input for the entire duration of (1) the quarter that includes the finding's start date and (2) the next three quarters, Unit 3 will remain in the Regulatory Response Column of the Action Matrix until the end of the third quarter of 2017.

Based on the results of this inspection, the NRC inspectors did not identify any findings or violations.

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 10 CFR 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

*/RA/*

Jamnes Cameron, Chief  
Branch 4  
Division of Reactor Projects

Docket No. 50-249  
License No. DPR-25

Enclosure:  
Inspection Report 05000249/2017010

cc: Distribution via LISTSERV®

Letter to Bryan C. Hanson from Jamnes Cameron dated July 26, 2017

SUBJECT: DRESDEN NUCLEAR POWER STATION, UNIT 3—NRC SUPPLEMENTAL  
INSPECTION REPORT 05000249/2017010

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No: 50-249  
License No: DPR-25

Report No: 05000249/2017010

Licensee: Exelon Generation Company, LLC

Facility: Dresden Nuclear Power Station, Unit 3

Location: Morris, IL

Dates: June 26 through June 30, 2017

Inspectors: M. Garza, Emergency Preparedness Inspector  
D. Sargis, Acting Resident Inspector,  
Braidwood (Observer)

Approved by: J. Cameron, Chief  
Branch 4  
Division of Reactor Projects

Enclosure

## SUMMARY

Inspection Report (IR) 05000249/2017010; 06/26/2017 – 06/30/2017; Dresden Nuclear Power Station, Unit 3; Supplemental Inspection – Inspection Procedure (IP) 95001.

A Region-based inspector performed this inspection. No findings were identified during this inspection. The U.S. Nuclear Regulatory Commission's (NRC's) program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG 1649, "Reactor Oversight Process."

### **Cornerstone: Mitigating Systems**

The NRC staff performed this supplemental inspection in accordance with IP 95001, "Inspection for One or Two White Inputs in a Strategic Performance Area," to assess the licensee's evaluation associated with the failure of the Unit 3 high pressure coolant injection (HPCI) auxiliary oil pump (AOP) motor, which was self-revealed on June 27, 2016. During this supplemental inspection, the inspectors determined that the licensee performed a comprehensive evaluation of the self-revealed failure described in NRC inspection report 05000249/2016010. The licensee identified the primary root cause for the failure to be the inadequate control of critical parameters when installing a Direct Current (DC) shunt wound motor. The Root Cause Evaluation (RCE) also identified a contributing cause to be that historical motor procurement evaluation standards were not sufficiently rigorous.

Given the licensee's acceptable performance in addressing the deficiencies that led to the failure of the Unit 3 HPCI AOP motor and the resultant White finding, Unit 3 will change Action Matrix columns back to the Licensee Response Column at the end of the third quarter of 2017, absent the occurrence of any additional greater-than-green findings or performance indicators.

## REPORT DETAILS

### 4. OTHER ACTIVITIES

#### 4OA4 Supplemental Inspection (95001)

##### .1 Inspection Scope

This inspection was conducted in accordance with Inspection Procedure (IP) 95001, "Inspection for One or Two White Inputs in a Strategic Performance Area," to assess the licensee's evaluation of one White inspection finding in the Mitigating Systems Cornerstone for Unit 3.

The inspection objectives were to provide assurance that:

- the root causes and contributing causes of risk significant performance issues were understood;
- the extent of condition and extent of cause of risk significant issues were identified; and
- the licensee's corrective actions to risk significant performance issues were or will be sufficient to address the root causes and contributing causes, and to prevent recurrence.

Dresden Nuclear Power Station, Unit 3, entered the Regulatory Response column of the NRC's Action Matrix in the fourth quarter of 2016, as a result of an inspection finding of low to moderate safety significance (White). The finding was associated with the failure to verify the adequacy of design for the Unit 3 HPCI AOP motor shunt resistor setting, which led to the failure of the Unit 3 HPCI AOP motor. The self-revealed finding was described in NRC inspection report 05000249/2016010, dated December 5, 2016, and was considered as a Mitigating Systems Cornerstone finding. The NRC staff characterized this issue as having low to moderate safety significance and finalized these characterizations in NRC inspection report 05000249/2017009, dated February 27, 2017.

By letter dated April 11, 2017, the licensee notified the NRC that it had completed the evaluation of the circumstances surrounding the performance deficiency and was ready for the NRC to assess their evaluation and subsequent corrective actions. The licensee's preparation for the inspection consisted of primarily the development of a RCE under action request (AR) 02686163, "High Pressure Coolant Injection (HPCI) Auxiliary Oil Pump (AOP) Motor Failure." The licensee also conducted a focused self-assessment under AR 03951927, "Readiness Assessment – Supplemental Inspection for Unit 3 HPCI AOP Motor Failure White Finding," to review the adequacy of the developed RCE. The inspectors reviewed the RCE, the focused self-assessment report, and other documents related to the root cause-identified issues.

The inspectors reviewed the corrective actions that were taken or planned to address the identified causes. The inspectors also held discussions with licensee personnel to ensure that the root and contributing causes and the contribution of safety culture components were understood and corrective actions taken or planned were appropriate to address the causes and preclude repetition. Documents reviewed are listed in the Attachment to this report.

## .2 Evaluation of the Inspection Requirements

### 02.01 Problem Identification

- a. Determine whether the evaluation identified by whom (i.e., licensee, self-revealing, or NRC), and under what conditions the issue was identified.

The Root Cause Evaluation (RCE) concluded that the findings were self-revealing. On 06/27/16, at approximately 1042 hours, the 3-2303-AOP, HPCI AOP motor failed and was discovered on fire during performance of DOS 2300-03, "HPCI System Operability and Quarterly In-Service Testing Verification Test." The inspectors determined that the licensee accurately specified who identified the issue and under what conditions.

- b. Determine whether the evaluation documented how long the issue existed, and whether there were any prior opportunities for identification.

The inspectors determined that the RCE adequately identified how long the issue existed and that there were prior opportunities for identification. The RCE stated there were a series of events that occurred in March 2015 and earlier that were missed opportunities to prevent the event. The RCE described each event in some detail. The inspectors independently determined that the licensee identified the prior opportunities for identification.

- c. Determine whether the licensee's RCE documented the plant specific risk consequences and compliance concerns associated with the issue.

The inspectors determined that the RCE adequately documented the plant-specific risk consequences and compliance concerns associated with the issue. The RCE included a discussion of risk assessment, significance of the event, and design basis safety significance of the event. It also included a reportability assessment. The inspectors determined that the licensee appropriately documented the risk consequences and compliance concerns.

- d. Findings

No findings were identified.

### 02.02 Root Cause, Extent of Condition, and Extent of Cause Evaluation

- a. Determine whether the licensee's RCE applied systematic methods in evaluating the issue in order to identify root causes and contributing causes.

The inspectors determined that the RCE adequately applied systematic methods in evaluating the issues to identify the root cause and the contributing cause. The licensee assigned a multi-disciplined team to utilize various analysis tools to determine the root and contributing causes for the failure of the Unit 3 HPCI AOP. Those tools included:

- Why Staircase analyses;
- TapRoot;
- Event and Causal Factor Chart;
- Barrier Analysis; and
- Support/Refute Matrix.

The inspectors determined that the licensee used adequate methods to evaluate the root and contributing causes of the events

- b. Determine whether the licensee's RCE was conducted to a level of detail commensurate with the significance of the problem.

The inspectors determined that the RCE was conducted to a level of detail commensurate with the significance of the events. In the RCE, the licensee identified the primary root cause for the failure to be the inadequate control of critical parameters when installing a DC shunt wound motor. The RCE also identified a contributing cause to be that historical motor procurement evaluation standards were not sufficiently rigorous. Based upon the work performed, the inspectors concluded that the RCE was conducted at a level appropriate to the significance of the issue.

- c. Determine whether the licensee's RCE included consideration of prior occurrences of the problem and knowledge of prior operating experience.

The inspectors determined that the RCE adequately included consideration of prior occurrences of the problem and knowledge of prior operating experience. In its RCE, the licensee created a timeline on the history of the Unit 3 HPCI AOP motor and the issues that arose over that period of time. The licensee also reviewed industry experience related to the issue. Based upon the considerations described in the analysis, the inspectors concluded that the analysis appropriately considered prior occurrences of the issue and knowledge of prior operating experience.

- d. Determine that the root cause evaluation addressed the extent of condition and the extent of cause of the problem.

The inspectors determined that the RCE adequately addressed the extent of condition and the extent of cause of the issue. In the RCE, the licensee determined that Dresden Station has other DC motors with resistors in series with the shunt winding. The licensee established actions to verify the scope and validate that the critical parameters are identified, monitored, and controlled. This is being applied to selected safety systems that pertain to injection and reactor pressure vessel pressure control.

The inspectors concluded that the licensee's analysis appropriately addressed the extent of condition and the extent of cause of the issue.

- e. Determine whether the licensee's root cause evaluation, extent of condition, and extent of cause appropriately considered the safety culture components as described in IMC 0305.

The licensee conducted an assessment of each safety culture aspect, determined which ones applied to the root and contributing causes, and determined whether additional corrective actions were needed. The inspectors concluded that the root cause evaluation, extent of condition, and extent of cause appropriately considered the safety culture components as described in IMC 0305.

- f. Findings

No findings were identified.

### 02.03 Corrective Actions

- a. Determine that appropriate corrective actions are specified for each root and contributing cause or that the licensee has an adequate evaluation for why no corrective actions are necessary.

The inspectors determined that the licensee specified appropriate corrective actions for each root and contributing cause. The licensee's RCE concluded that the corrective action to prevent recurrence includes procedural controls and training for the installation and testing of DC motors with external shunt field resistors. These controls include ensuring the required motors have working motor heaters.

The inspectors concluded that the corrective actions specified were appropriate to prevent recurrence of the problem.

- b. Determine whether the licensee prioritized the corrective actions with consideration of the risk significance and regulatory compliance.

The inspectors determined that the licensee adequately prioritized the corrective actions with consideration for the risk significance and regulatory compliance. The licensee's corrective action to prevent recurrence was to develop a new procedure, DEP 8300-29, for the installation and testing of DC motors with external shunt field resistors. The procedure was developed in a timely manner and was available for review during this inspection. The training developed and provided to staff to address DC motors was also completed in a timely manner.

The inspectors concluded that the corrective actions had been prioritized with consideration to risk significance and regulatory compliance.

- c. Determine whether the licensee established a schedule for implementing and completing the corrective actions.

The inspectors determined that the licensee adequately established a schedule for implementing and completing the corrective actions.

The majority of the critical corrective actions that were associated with the root cause were complete. There are two actions that are scheduled to be completed in April 2018. These actions include gathering critical parameter data for several risk significant systems and performing an evaluation on the parameters. This schedule was determined to be appropriate due to the extensive research, evaluation, and reviews that are planned to be conducted before completion.

The inspectors concluded that the licensee had established and implemented corrective actions in accordance with the established schedule.

- d. Determine that quantitative or qualitative measures of success have been developed for determining the effectiveness of the corrective actions to prevent recurrence.

The inspectors determined that the licensee adequately developed measures of success for determining effectiveness of the corrective actions to prevent recurrence.

The licensee plans to verify that all DC motors with external resistors at Dresden Station that have been changed out were successfully controlled following the new procedure, DEP 8300–29. There were no specific criteria or measures that were developed at the time of this inspection. The licensee indicated that per their process, they will develop specific measures of success when the effectiveness review is conducted. The inspectors determined that the specific measures of success will be reviewed during a future inspection and that the current plan for the effectiveness review was adequate.

e. Findings

No findings were identified.

4OA6 Exit Meeting

.1 Exit Meeting Summary

The inspectors presented the inspection results to Mr. J. Washko, Station Manager, and other members of the licensee management and staff on June 30, 2017. The inspector asked licensee management whether any materials examined during the inspection should be considered proprietary. None of the proprietary information was included in this inspection report.

ATTACHMENT: SUPPLEMENTAL INFORMATION

**SUPPLEMENTAL INFORMATION**

**KEY POINTS OF CONTACT**

Licensee

J. Washko, Station Manager  
F. Gogliotti, Engineering Director  
D. Thomas, Training Director  
B. Sampson, OR Manager  
B. Franzen, Regulatory Assurance Manager  
A. Rehn, Regulatory Engineer  
L. Antos, Security Manager  
D. Walker, Senior Regulatory Specialist  
P. Hansett, Operations Director  
D. Avery, Senior Regulatory Engineer  
P. Simpson, Manager Licensing, Corporate  
H. Bush, Radiation Protection Manager  
A. McMartin, Chemistry Manager  
B. Kouba, Work Control Outage Manager

U.S. Nuclear Regulatory Commission

J. Cameron, Chief, Reactor Projects Branch 4

**LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

Opened

None

Closed

05000249/2016010-01	VIO	Failure to Verify the Adequacy of Design for the Unit 3 HPCI AOP Motor Shunt Resistor Setting
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## LIST OF DOCUMENTS REVIEWED

The following is a list of documents reviewed during the inspection. Inclusion on this list does not imply that the NRC inspector reviewed the documents in their entirety, but rather, that selected sections or portions of the documents were evaluated as part of the overall inspection effort. Inclusion of a document on this list does not imply NRC acceptance of the document or any part of it, unless this is stated in the body of the inspection report.

- IR 02686163; U3 HPCI Aux Oil Pump on Fire; June 27, 2016
- Root Cause Investigation; High Pressure Coolant Injection (HPCI) Auxiliary Oil Pump Motor Failure; March 30, 2017
- EMC Job #36173; Exelon Dresden Unit 3 HPCI Aux Oil Pump Motor Apparent Cause Failure; Revision A
- Shulz Failure Analysis Report for Exelon Generation Company/Dresden Nuclear Plant; Revision 0
- IR 03951927; Readiness Assessment – Supplemental Inspection for Unit 3 HPCI AOP Motor Failure White Finding; January 26, 2017
- IR 4026528; Errors in DAP 15-10 Revision; June 28, 2017
- IR 4023697; U2 HPCI EOP Motor Heater Not Energized; June 20, 2017
- IR 4023699; U3 HPCI EOP Motor Heater Not Energized; June 20, 2017
- DAP 15-10; Post Maintenance Testing Program; Revision 41
- DAP 15-10; Post Maintenance Testing Program; Revision 42
- DEP 8300-29; DC Motors Post Maintenance Testing; Revision 3
- PI-AA-125; Corrective Action Program (CAP) Procedure; Revision 5
- PI-AA-125-1001; Root Cause Analysis Manual; Revision 2
- PI-AA-125-1001; Root Cause Analysis Manual; Revision 3
- PI-AA-125-1004; Effectiveness Review Manual; Revision 2
- WO 4657858; U2 HPCI EOP Motor Heater not Energized
- WO 4657869; U3 HPCI EOP Motor Heater not Energized
- M-46, Sheet 3; Diagram of HPCI Turbine Lubricating and Hydraulic Oil System and Pump Seal Cooler Piping; Revision G
- EC 618387; Analysis of Unit 3 HPCI AOP Fire; Revision 1
- EC 406053; Unit 3 Bypass of Pressure Switch PS 3-2303-PS4; Revision 0
- EC 6421; Revise the Setpoint for U-3 HPCI Turbine Oil Header Aux Oil Pump; Revision 0

## LIST OF ACRONYMS USED

AOP	Auxiliary Oil Pump
AR	Action Request
CAP	Corrective Action Program
CFR	<i>Code of Federal Regulations</i>
DAP	Dresden Administrative Procedure
DEP	Dresden Electrical Maintenance Procedure
DC	Direct Current
EC	Engineering Change
HPCI	High Pressure Coolant Injection
IP	Inspection Procedure
IR	Issue Report
LLC	Limited Liability Corporation
NRC	U.S. Nuclear Regulatory Commission
RCE	Root Cause Evaluation
ROP	Reactor Oversight Process
SSC	Structures, Systems, and Components
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
WO	Work Order