



**UNITED STATES  
NUCLEAR REGULATORY COMMISSION**

REGION III  
2443 WARRENVILLE RD. SUITE 210  
LISLE, ILLINOIS 60532-4352

March 27, 2018

EA-17-043

Mr. David Hamilton  
Site Vice President  
FirstEnergy Nuclear Operating Company  
Perry Nuclear Power Plant  
Mail Stop A-PY-A290  
P.O. Box 97, 10 Center Road  
Perry, OH 44081-0097

**SUBJECT: PERRY NUCLEAR POWER PLANT—NRC SUPPLEMENTAL INSPECTION  
REPORT 05000440/2018040 AND ASSESSMENT FOLLOW-UP LETTER**

Dear Mr. Hamilton:

The U.S. Nuclear Regulatory Commission (NRC) completed a supplemental inspection using Inspection Procedure 95001, "Supplemental Inspection Response To Action Matrix Column 2 Inputs," at your Perry Nuclear Power Plant. On February 15, 2018, the NRC discussed the results of this inspection and the implementation of your corrective actions with Mr. Frank Payne and other members of your staff in an exit Meeting. On February 16, 2018, the NRC discussed the causes and your corrective actions identified as a result of the WHITE finding, and the criteria required for returning to the Licensee Response Column of the Action Matrix with Mr. Frank Payne in a Regulatory Performance Meeting. The results of this inspection are documented in the enclosed report.

By letter dated August 24, 2017, (ADAMS ML17236A187), the U.S. Nuclear Regulatory Commission (NRC) informed you that as a result of a White (low-to-moderate safety significance) finding in the Mitigating Systems Cornerstone that the NRC assessed Perry Nuclear Power Plant performance to be in the Regulatory Response Column of the Reactor Oversight Process (ROP) Action Matrix, effective the second quarter of 2017. In the same letter, the NRC informed you of our intent to perform a supplemental inspection using Inspection Procedure 95001 upon notification of your readiness for the inspection. By letter dated October 31, 2017, we were notified by your staff that you were ready for the NRC to conduct our supplemental inspection to review the actions taken to address the White finding.

The NRC performed this inspection to review your station's actions in response to a White finding in the Mitigating System cornerstone which was documented in NRC Inspection Report 05000440/2017009 (ML17156A750). The finding involved the failure to evaluate the effects of voltage suppression diode failure on the Emergency Diesel Generator (EDG) control circuit, which was a component subject to the requirements of Title 10 of the *Code of Federal Regulations* (CFR) Part 50, Appendix B. Specifically, FirstEnergy failed to consider the effect of a shorted diode on the control circuitry of the EDG, and, as a result, failed to recognize that installation of voltage suppression diodes across control relays, with no mitigation for diode

failure, was not suitable for the EDG control circuit. This introduction of new components (diodes) into the control circuitry resulted in the eventual failure of the EDG control circuit, thereby rendering the EDG inoperable and unable to start.

The NRC determined that the completed or planned corrective actions were sufficient to address the performance issue that led to the White finding previously described and were prioritized commensurate with the safety significance of the issue. In addition, the NRC determined that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem and reached reasonable conclusions as to the root and contributing causes of the event.

No finding or violations were documented.

After reviewing Perry Nuclear Power Plant's performance in addressing the White finding subject of this Inspection Procedure 95001, the NRC concluded your actions met the objectives of the inspection. Therefore, in accordance with the guidance in Inspection Manual Chapter (IMC) 0305, "Operating Reactor Assessment Program," the White finding will only be considered in assessing plant performance for a total of four quarters. As a result, the NRC determined the performance at Perry Nuclear Power Plant to be in the Licensee Response Column of the ROP Action Matrix as of April 1, 2018.

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/*

Billy Dickson, Chief  
Branch 5  
Division of Reactor Projects

Docket No. 50-440  
License No. NPF-58

Enclosure:  
Inspection Report 05000440/2018040

cc: Distribution via LISTSERV®

Letter to David Hamilton from Billy Dickson dated March 27, 2018

SUBJECT: PERRY NUCLEAR POWER PLANT—NRC SUPPLEMENTAL INSPECTION  
REPORT 05000440/2018040 AND ASSESSMENT FOLLOW-UP LETTER

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U.S. NUCLEAR REGULATORY COMMISSION

REGION III

Docket No: 50-440

License No: NPF-58

Report No: 05000440/2018040

Enterprise Identifier: I-2018-040-0000

Licensee: FirstEnergy Nuclear Operating Company (FENOC)

Facility: Perry Nuclear Power Plant

Location: North Perry, Ohio

Dates: February 12 through February 15, 2018

Inspectors: J. Jandovitz, Project Engineer, Branch 5  
T. Ospino, Reactor Engineer, Branch 5

Approved by: B. Dickson, Chief  
Branch 5  
Division of Reactor Projects

Enclosure

## SUMMARY

The U.S. Nuclear Regulatory Commission (NRC) continued monitoring licensee's performance by conducting a supplemental inspection at Perry Nuclear Power 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. NRC and self-revealed findings, violations, and additional items are summarized in the table below.

### List of Findings and Violations

No findings or violations were identified.

### Additional Tracking Items

Type	Issue Number	Title	Report Section	Status
NOV	05000440/2017009-01	Division 2 Diesel Generator Failure to Start due to a Failed Diode in the 125 VDC Control Power Circuit	95001	Closed

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## **INSPECTION SCOPES**

Inspections were conducted using the appropriate portions of the inspection procedure (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.

## **OTHER ACTIVITIES—TEMPORARY INSTRUCTIONS, INFREQUENT AND ABNORMAL**

### 95001 - Supplemental Inspection Response to Action Matrix Column 2 Inputs

Perry Nuclear Power Plant entered the Regulatory Response column of NRC's Action Matrix in the 2nd quarter of 2017 due to a White (low-to-moderate safety significance) inspection finding, 05000440/2017009-01, in the Mitigating Systems Cornerstone. The finding was associated with the station's failure to evaluate the effects of voltage suppression diode failure on the Emergency Diesel Generator (EDG) control circuit. The finding was characterized as having White safety significance based on the results of a risk assessment performed by a region-based Senior Reactor Analyst. This issue was documented in NRC Inspection Reports (IRs) 05000440/2017009 and 05000440/2017010.

By letter dated November 3, 2017, the licensee notified the NRC that it had completed its evaluation of the circumstances surrounding the degraded performance and were ready for the NRC to assess the evaluation and subsequent corrective actions. In preparation for the inspection, the licensee performed Root Cause Evaluation (RCE), "PRA Evaluation Associated with the Div. 2 EDG MSPI Failure (CR 2016-14456) Indicates a Preliminary Level of Significance that Warrants a Root Cause Evaluation," Revision 2, dated October 9, 2017. It identified weaknesses that existed in various organizations which allowed for a risk-significant finding, and to determine the organizational attributes that resulted in the White finding.

The affected diesel generators are identified as the Standby Diesel Generator and Emergency Diesel Generator in this report's reference documents and are used interchangeably. This report uses Emergency Diesel Generator for consistency.

The inspectors reviewed the licensee's root causes, contributing causes, extent of condition, and extent of cause determinations. The inspectors assessed whether the licensee's corrective actions to address the root and contributing causes were sufficient to prevent recurrence. The highlights of the performance review and NRC's assessment are documented below.

## Evaluation of Inspection Requirements

### (1) Problem Identification

- a) *[Describe who identified the issue and under what conditions the issue was identified.]*

Root cause CR 2016–14456 evaluation concluded that the diode failure (shorted) for relay R10BB, 1R43Q0003B, which resulted in loss of the 125 Volts, Direct Current, (VDC) control power to the Division 2 EDG, was self-revealed on November 6, 2016, while performing surveillance test PTI–R43–P0006B, “Division 2 Diesel Generator Pneumatic Logic Board Functional Check.” Operators received various unexpected alarms when a jumper was installed to simulate an emergency (auto) start as part of the surveillance test.

- b) *[Describe how long the issue existed and prior opportunities for identification.]*

Root cause CR 2016–14456 evaluation concluded this issue existed when the suppression diodes were installed in the control circuitry of the Division 2 EDG on April 21, 2007.

The licensee identified that an opportunity was missed after the diode on relay R11 failed on May 6, 2016. On April 21, 2007, the licensee initiated and discussed in CR–2016–06450 that the new Allen Brandley relays R11A, R10BB, RSS, K4, and associated diodes, were installed on the Division 2 EDG by ECP 04–0049. This relay was energized on May 06, 2016 during a monthly Surveillance test. The diode in parallel with the relay R11A failed causing alarms, abnormal indications, and required operator action to shutdown the DIV2 EDG. The diode was replaced based on CR–2016–06450 on May 06, 2016. The licensee did not then consider the effects of a shorted diode, for other diodes in the system and other EDGs.

- c) *[Describe the plant-specific risk consequences, as applicable, and compliance concerns associated with the issue.]*

The licensee did not document a Probabilistic Risk Assessment (PRA) evaluation for this condition. The Licensee discussed the NRC risk assessment that concluded the safety significance for this issue as White (low-to-moderate) based on the Division 2 EDG not operable and unable to perform its emergency start function from April 2, 2015, when it passes a surveillance test, until November 8, 2016 when the emergency start diode was replaced after failure and the Division 2 EDG was returned to service. Because the licensee was not aware of the Div 2 EDG’s inoperability during the unit’s operation cycle, the required actions of TS 3.8.1.F.1 and 3.8.1.F.2 were not followed. The evaluation also recognized this determination resulted in being placed in the Regulatory Response Column of the NRC’s Reactor Oversight Process (ROP) Action Matrix.

(2) Root Cause, Extent-of-Condition, and Extent-of-Cause Evaluation

a) *[Describe systematic methodology used to identify the root and contributing causes.]*

The licensee assigned a multi-disciplined team to perform a Root Cause Evaluation to identify the root and contributing causes of the EDG inoperability and the inability to start. In its root cause analysis, the licensee used the following processes to identify the root and contributing causes:

- Data gathering through interviews and document review;
- Event and Causal Factor Charting;
- Internal and External Laboratory Analysis;
- Equipment Apparent Cause Evaluation (EACE);
- Latent Organization Weakness Analysis;
- Performance Improvement International Failure Modes Analysis; and
- MORT Analysis.

The licensee used the above processes to evaluate equipment and human performance issues associated with the event. The processes used were systematic processes governed by and implemented in accordance with the licensee's procedures. The processes were used to ensure the information and circumstances surrounding the problem were understood. The results of these processes revealed two root causes and one contributing cause. The initial root cause evaluation attributed the failure to a manufacturing defect in the diode with a contributing cause related to engineering design practices. The Notice of Violation (NOV) was issued in August of 2017 for failing to recognize that installation of voltage suppression diodes across control relays, with no mitigation for diode failure, was not suitable for the EDG control circuit. This introduction of new components (diodes) into the control circuitry resulted in the eventual failure of the EDG control circuit, thereby rendering the EDG inoperable and unable to start. After the NOV was issued, Revision 2 of the Root Cause Evaluation identified using diodes as a common design practice as a second root cause. This aligned closer with the NOV. The licensee also determined that discrepancies with vendor acceptance criteria used during initial dedication was a contributing cause.

b) *[Describe level of detail of detail used in the root cause evaluation and indicate whether it was commensurate with the significance of the problem.]*

In its root cause analysis, the licensee classified the event as a "significant condition adverse to quality" and applied thorough processes and methodologies to identify the root and contributing causes associated with the licensee's failure to evaluate the effects of voltage suppression diode failure on the EDG control circuit. The analysis performed in the root cause were of sufficient detail commensurate with the significance of the problem. The licensee's root cause evaluation included a timeline of events. The licensee conducted interviews, and performed work history and corrective action document reviews to capture the issues leading up to the event. The root cause evaluation resulted in corrective actions that promptly addressed the design issues with the use of the diodes in the EDG control circuitry that would

prevent recurrence. The engineering deficiency that was the basis of the NOV occurred in 2005 and the root cause evaluation addressed engineering issues and performance since then to characterize current behavior and develop corrective actions.

- c) *[Describe prior occurrences and operating experience considered during the root cause evaluation.]*

The licensee included an evaluation of internal and external Operating Experience (OE) for issues with issues related to the loss of control power resulting from failed, shorted diodes. The licensee found that failures of diodes used to suppress the inductive kickback of DC coils are not common at Perry nor within the FENOC fleet.

Review of the external operating experience from INPO and NRC Websites was also conducted that revealed seven issues related to diode failures. Three of these occurred prior to completion of the engineering change package in 2005 that subsequently installed the suppression diodes in the EDG control circuit. While several of these events included failed, shorted diodes, none of the applications were for suppression diodes. One event at Seabrook in 2003, OE 16764, concluded the failed diodes were from manufacturing defects. At the time the licensee's initial screening of this OE did not identify any specific diode issues that would likely have resulted in the corrective actions necessary to address the issue identified in Root Cause (CR) 2016–14456.

The inspectors did identify one issue at Cooper, OE 214246, concerning the failure of a blocking diodes in the transient suppression circuit of the EDG was not included in root cause CR 2016–14456. The licensee reviewed this OE and concluded it was missed during the external OE review. The licensee wrote CR 05–02410 that determined the inclusion of this OE would not have changed the conclusion in the root cause report.

- d) *[Describe the extent of condition and the extent of cause evaluations performed.]*

**Extent of Condition** is defined in NRC Inspection Manual 95001 as the extent to which the actual condition exists with other plant processes, equipment, or human performance. The licensee determined there were two conditions of concern.

The first condition was that suppression (flyback) diodes were installed in class 1E 125VDC circuitry whose failure could go undetected for an extended period of time. To evaluate this equipment condition, the licensee identified the extent to where the same component is used in the same or similar applications. In addition, the licensee identified whether similar components existed in same or similar applications. A review of Perry stock codes was performed to see where Allen Bradley 199–FSMZ–1 flyback diodes were installed in the plant. The review identified that these diodes were only utilized on each of the Division 1 and 2 EDGs across relays R11A, R10BB, RSS, and K4. These diodes were all installed as part of the ECP 04–0049 which upgraded the speed control governing system from a

Woodward EGA/EGB–35C to a Woodward2301A/EGB–35P for the Division 1 and 2 EDGs. All eight of these diodes have since been removed by the implementation of ECP 16–0348 in December 2016. There was no other location identified in the plant where this particular diode is used.

Lab testing of the Division 1 R10BB Relay (the same relay that failed in the Division 2) after removal provided assurance that the relay surge suppressor would have performed had an EDG Division 1 Auto-Start occurred during the time it had been installed.

The licensee also identified systems and their respective drawings that were likely to include 1E components. It was determined that there were 13 drawings warranting further review by the Responsible System Engineers to identify diodes/relays that are not tested at least quarterly. This review found there were four systems as follows:

- Reactor Recirculation System (2 total)
- Residual Heat Removal System (52 total)
- Division 3 HPCS Diesel Generator (4 total)
- Reactor Core Isolation Cooling System (18 total)

These components were tested and found satisfactory through continuity tests or performance of surveillance tests. The diodes in these systems were installed in accordance with industry and vendor design practice and not Perry engineering modifications. Their reliability has been established over the many numbers of years of operating experience. The consequences of failures of any of the diodes were evaluated by engineering and operations and found to be no different than a failure of any part in the system and designed to be identified during the normal scheduled surveillances.

The second condition defined by the licensee was associated with Plant Processes and Human Performance. Specifically, related to the NRC performance deficiency cited in the NOV as the failure to evaluate the effects of voltage suppression diode failure on the EDG control circuit. The licensee reviewed the corrective action program to identify issues that may have existed because the failure effects of components added/changed by the modification process were not properly evaluated resulting in a system/component failure. The review identified evidence that the failure effects of components added/changed by the modification process at Perry were not properly evaluated and resulted in a system/component failure. Seven issues were identified in the last ten years, however none within the last three years. The licensee created CA 2016–14456–015 to perform a self-assessment of the safety related design modifications issued at Perry since 2005. This assessment will verify that proper failure modes and effects have been considered for the new components added to MSPI systems. This corrective action will address the potential existence of latent design deficiencies that have not yet resulted in an equipment failure. This corrective action completion date is scheduled for March 30, 2018.

The extent of cause (EOC) evaluation determines the extent to which the causes of an identified problem have impacted other plant processes, equipment, or human performance.

The Root Cause Evaluation CR 2016–14456, identified two root causes and one contributing cause including:

Root Cause: Using diodes as a common design practice

Root Cause: Manufacturing Defect

Contributing Cause: Discrepancies with vendor (ESI) acceptance criteria used during initial dedication testing.

The inspectors only reviewed the extent of the root cause related to using diodes as a common design practice. This evaluation is similar to the extent of condition evaluation associated with Plant Processes and Human Performance discussed above. While the other root cause associated with a manufacturing defect was useful to the licensee, the inspectors determined that absent the performance deficiency cited in the NOV, the failure of the diode in the R10BB relay due to the manufacturing defect would not have had the same consequences.

To evaluate the extent of using diodes as a common design practice, the licensee reviewed safety-related design changes implemented since 2005 identify other locations where surge suppression devices were installed in the plant that may not be needed and hence may have created an unnecessary failure mechanism. To identify if other types of incorrect mindset or misapplication of common design standards existed within engineering that have affected the quality of engineering changes, the Perry site performance indicators associated with engineering changes were reviewed.

As a result of the evaluations, the licensee did not identify any other applications where diodes were not needed. Also, an adverse trend in engineering product quality identified in the Engineering indicators was closed in the first half of 2016 based on a sustained improvement in engineering product/ECP quality.

- e) *[Indicate whether safety culture components were appropriately considered during the root cause, extent of condition, and extent of cause evaluations performed.]*

Safety Culture components were adequately addressed in the root cause by evaluation of the causal factors against the NRC safety culture aspects and the categories for INPO traits of a healthy safety culture. The licensee identified no safety culture aspects as significant contributors to the event. No cross-cutting issue was assigned by the NRC in the NOV since the performance deficiency associated with this finding occurred more than three years ago; therefore, it did not reflect current licensee performance.

The root cause did identify related cross cutting aspects that could be related to the design aspects of the NOV's performance deficiency. Specific aspects identified were, (1) Avoid Complacency, (2) Consistent Process and, (3) Conservative Bias. Corrective actions CA–2016–14456–02 and CA–2016–14456–013 were initiated to address these safety culture aspects. The first action provided training and lessons learned to all engineering staff that emphasized minimizing installation of components that are not needed. The second action was to discuss the lessons learned from this issue to all supervisory staff. Both of these actions were completed.

### (3) Corrective Actions

- a) *[Describe corrective actions taken, planned, or why unnecessary for each root and contributing cause. Specifically identify those corrective action taken or planned to prevent recurrence. Planned corrective actions to prevent recurrence will be inspected using IP 71152.]*

The Root Cause Evaluation in CR 2016–14456, identified two root causes and one contributing cause including:

Root Cause: Using diodes as a common design practice

Root Cause: Manufacturing Defect

Contributing Cause: Discrepancies with vendor acceptance criteria used during initial dedication testing.

The NOV cited the failure to consider the effect of a shorted diode on the control circuitry of the Division 2 EDG, and, as a result, the failure to recognize that installation of voltage suppression diodes across control relays, with no mitigation for diode failure, was not suitable for the EDG control circuit and was a violation of 10 CFR, Part 50, Appendix B, Criterion III, “Design Control.”

Corrective actions that addressed the NOV were conducted under CR 2016–13183. These actions included an evaluation by engineering that all the suppression diodes installed in the control circuitry were not needed and therefore could be removed permanently in ECP 16–0348–004. Removal of the all the suppression diodes was completed for the Division 1 EDG by Work Order (WO) 200701159 on December 17, 2016 and for the Division 2 EDG by WO 200701164 on December 22, 2016. These actions were completed prior to issuance of the NOV.

The actions above addressed the licensee root cause of using diodes as a common design practice. To further address this root cause the licensee initiated corrective actions that performed or will perform reviews of engineering packages since 2006 to determine current engineering practices and standards. Additional corrective actions included training for all design engineers on this issue, ensuring this issue is part of the mentoring program discussions for all new engineers, discussions of this issue with all plant supervisors, and finally revisions to the EDG systems training plan.

To address the other licensee root cause of a manufacturing defect, corrective actions included the removal of the diodes as discussed above. In addition, another corrective action was to complete or verify complete the 10 CFR 21 Requirements (internally or externally) of the defective diodes.

The licensee implemented an action for the contributing cause for the discrepancies with vendor acceptance criteria used during initial dedication testing. The diode supplier revised the dedication test plan to change the acceptance criteria for the reverse bias testing of diodes from 500 micro amps leakage current to 5 micro amps.

b) *[Describe the prioritization of each corrective action.]*

Corrective actions were assigned a priority in accordance with procedure NOBP-LP-2011, Root Cause Analysis, based on safety precedence. Priorities included:

1. Design Hazard;
2. Safety Devices;
3. Safety Warnings;
4. Procedures;
5. Training/Awareness; and
6. Notify Management of Risk and Accept without Action.

c) *[Describe the schedule established for implementing and completing each corrective action.]*

The Root Cause Evaluation contains the schedule for implementing the Corrective Actions. Corrective actions to address the performance deficiency in the NOV were completed in December 2016 when the suppression diodes were removed from the control circuit relays in both the Division 1 and Division 2 EDGs. Most of the other corrective actions were completed in 2017. The only corrective action not completed by the time the 95001 inspection occurred was to perform a self-assessment of the attached list of safety related and/or augmented quality design change packages issued at the Perry Plant since 2005 discussed in 1 d) above.

d) *[Describe the quantitative or qualitative measures of success that have been developed for determining the effectiveness of the corrective actions to prevent recurrence.]*

The root cause evaluation contains several measures for determining the effectiveness of the planned and completed corrective actions. Specifically:

- 1- Effectiveness Review (ER) 2016-14456-1, to be completed by January 31, 2019, is to verify that between July 1, 2017 and January 1, 2019, no new component failures have occurred in the 125 VDC control circuitry of the Division 1 and 2 EDGs that are attributed to the removal of the diodes.
- 2- Effectiveness Review (ER) 2016-14456-2, to be completed by September 1, 2019, is to perform a review of all safety related/augmented quality design change ECPs issued between July 1, 2017 and July 1, 2019 that involve electrical and/or instrumentation and control changes. For each ECP, the plant will verify that suppression diodes were properly sized, a failure modes and effects analysis or equivalent was completed, and it did not add unnecessary components. New condition reports will be generated if these criteria were not met.

e) *[Indicate which corrective actions taken or planned adequately address the Notice of Violation (NOV) as applicable.]*

The NOV cited the failure to consider the effect of a shorted diode on the control circuitry of the Division 2 EDG, and, as a result, the failure to recognize that installation of voltage suppression diodes across control relays, with no mitigation for

diode failure, was not suitable for the EDG control circuit and was a violation of 10 CFR, Part 50, Appendix B, Criterion III, "Design Control."

Corrective actions that addressed the NOV were conducted under CR-2016-13183. These actions included an evaluation by engineering that all the suppression diodes installed in the control circuitry were not needed and could be removed permanently in ECP 16-0348-004. Removal of the all the suppression diodes was completed for the Division 1 EDG by Work Order (WO) 200701159 completed on December 17, 2016 and for the Division 2 EDG by WO 200701164 completed on December 22, 2016. These actions were completed prior to issuance of the NOV.

- (4) Evaluation of IMC 0305 Criteria for Treatment of Old Design Issues. The licensee did not request credit for self-identification of an old design issue; therefore, the risk-significant issue was not evaluated against the IMC 0305 criteria for treatment of an old design issue.

**INSPECTION RESULTS**

95001 - Supplemental Inspection Response to Action Matrix Column 2 Inputs

Observation	IP 95001
<p>Assessment of licensee’s evaluation and corrective actions.            The NRC determined that completed or planned corrective actions were sufficient to address the performance issue that led to the White finding previously described and were prioritized commensurate with the safety significance of the issue. In addition, the NRC determined that the root cause evaluation was conducted to a level of detail commensurate with the significance of the problem and reached reasonable conclusions as to the root and contributing causes of the event.</p> <p>The inspectors did observe that some of the corrective actions completed prior to the issuance of the NOV were not revised or changed to ensure they addressed the performance deficiency cited in the NOV. An example included the action to provide lessons learned to the engineering department on the results of this root cause investigation. The inspectors found the focus to be on the causal factors associated with the development of ECP 04-0049. Specifically: 1. Need to perform testing during design development to validate proper sizing of diodes 2. Minimizing the installation of components that are not required for the modification to minimize probability of equipment failures. The inspectors noted this training had minimal discussion on the failure to consider the effects of a shorted diode and was not a focus of the training. The inspectors considered this action would have better addressed the performance deficiency of the NOV if it would have been revised with this emphasis.</p> <p>After reviewing Perry Nuclear Power Plant’s performance in addressing the White finding subject of this Inspection Procedure 95001, “Supplemental Inspection Response To Action Matrix Column 2 Inputs,” the NRC concluded actions taken by Perry Nuclear Power Plant met the objectives of the inspection. Therefore, violation 05000440/2017009-01 is closed.</p>	

No findings or violations were identified.

## EXIT MEETINGS AND DEBRIEFS

The inspectors confirmed that proprietary information was controlled to protect from public disclosure. No proprietary information was documented in this report.

- On February 15, 2018, the inspectors presented the Supplemental Procedure 95001 inspection results to Mr. Frank Payne, and other members of the licensee staff.
- On February 15, 2018, the NRC discussed the performance of the Perry Nuclear Power Plant in accordance with IMC 0305, Section 10.01. during a regulatory performance meeting. The meeting was attended by the Mr. Billy Dickson, Chief, Branch 5 and Mr. Frank Payne, Plant General Manager, and other senior licensee staff. The NRC and licensee discussed the issues related to the WHITE finding resulted in Perry Nuclear Power Plant remaining in the Regulatory Response Column of the Action Matrix.

## DOCUMENTS REVIEWED

### 95001 - Supplemental Inspection Response to Action Matrix Column 2 Inputs

#### Condition Reports

- CR-2016-13183; During performance of PTI-R43-P0006B CB-1, CB-2, CB-3, CB-4 DC Breakers Trip when loaded (superseded by root cause evaluation CR-2016-14456)
- CR-2016-14251; Additional vulnerabilities identified in surge suppression diode on the DIV 1 and DIV 2 Diesel Generators
- CR-2016-14456; PRA Evaluation Associated with Div 2 EDG MSPI Failure (CR-2016-13183) Indicates a Preliminary Level of Significance that Warrants a Root Cause Evaluation
- CR-2017-05709; 2017 Pre-NRC PI&R Assessment does not meet Smart Criteria
- CR-2017-06396; NRC Apparent Violation- Unsuitable Application of Surge Suppression Diodes in Standby Diesel Generator Control Power Circuitry
- CR-2018-00268; Evaluation of violation 05000400/2017009-01 "Unsuitable Application of Surge Suppression Diodes in Standby Diesel Generator Control Power Circuitry"

#### Condition Reports Generated During Inspection

- CR-2018-01316; NRC 95001 Inspection; OE Review for CR-2016-14456
- CR-2018-01335; NRC 95001 Inspection; Training Needs Analysis for Root Cause 2016-14456

#### Procedures

- NOBP-LP-2011; Root Cause Analysis; Revision 22
- NOBP-ER-3017; Selection and Development of Engineering Mentors; Revision 00

#### Others

- ECP 16-0348-004; Modify Div. 2 Diesel Generator control circuitry for relay flyback diode failure; dated December 14, 2016
- Equipment Apparent Cause Evaluation Template (EACE) Diode Failure on Relay R10BB; December 2, 2016
- Failure Analysis Report CF16-060; BETA Laboratory Services Section; Diode, Surge Suppressor; November 11, 2016

- Design Basis Assessment Report- Second Half 2017
- E-Mail from M. Koberling to JPR Mentors and Supervisors; November 30, 2017
- Job Performance Requirement, JPR 1.1; Engineering Change, Preparation, Approval, Turnover and Closeout, July 17, 2017