UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
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November 28, 2018

EA-18-013

Mr. Charles Arnone
Vice President, Operations
Entergy Nuclear Operations, Inc.
Palisades Nuclear Plant
27780 Blue Star Memorial Highway
Covert, MI 49043–9530

SUBJECT: RESPONSE TO DISPUTED NON-CITED VIOLATION IN PALISADES NUCLEAR PLANT—NRC DESIGN BASES ASSURANCE INSPECTION (TEAMS) INSPECTION REPORT 05000255/2017007—WITHDRAWAL OF NON-CITED VIOLATION

Dear Mr. Arnone:

On January 28, 2018, Palisades Nuclear Plant (PNP), provided a written response to the U.S. Nuclear Regulatory Commission (NRC) Inspection Report 05000255/2017007 issued on December 29, 2017, concerning a Design Bases Assurance Inspection completed at PNP. The letter contested a Non Cited Violation 05000255/2017007-01 associated with the failure to test the emergency diesel generators' (EDGs') capacity to start and accelerate design basis sequenced loads. Specifically, periodic testing and post-maintenance testing did not confirm the Palisades EDG design requirement that the recovery time for the EDG voltage to return to 90 percent of rated voltage after each load step is less than 3 seconds. The letter explained that the inspection report does not provide a rationale for contending that this testing is required by the Institute of Electrical and Electronics Engineers Standard 308-1978 and does not explain why PNP testing performed following maintenance activities that could adversely affect EDG frequency and voltage response is inadequate.

The NRC reviewed PNP's reply and determined that the original enforcement decision to disposition this issue as a violation of Title 10 of the *Code of Federal Regulations*, Part 50, Appendix B, Criterion XI, "Test Control," was not valid. Within the context of the Palisades plant specific licensing basis, the high level/broad statement from Institute of Electrical and Electronics Engineers Standard 308-1978 noted in the Non-Cited Violation could not reasonably be construed as specifically requiring that licensee periodic EDG testing verify a necessary minimum voltage is retained throughout the loading sequence. Further, the NRC inspection did not include and the inspection report did not reflect a comprehensive look at the full extent of Palisades post maintenance testing following EDG governor controller or voltage regulator work, address/discuss a specific example thereof, nor provide a technical rationale that would invalidate other testing performed as sufficient to meet regulatory requirements. The basis for the NRC staff conclusion is enclosed.

This letter, its enclosure, PNP's January 29, 2018, response, 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*, Part 2.390, "Public Inspections, Exemptions, Requests for Withholding."

Sincerely,

/RA/

Kenneth G. O'Brien
Director, Division of Reactor Safety

Docket No. 50–255
License No. DPR–20

Enclosure:
NRC Staff Assessment of Disputed
NCV 05000255/2017007-01

cc: Distribution via LISTSERV®

Letter to Charles Arnone from Kenneth G. O'Brien dated November 28, 2018.

SUBJECT: RESPONSE TO DISPUTED NON-CITED VIOLATION IN PALISADES NUCLEAR PLANT—NRC DESIGN BASES ASSURANCE INSPECTION (TEAMS) INSPECTION REPORT 05000255/2017007—WITHDRAWAL OF NON-CITED VIOLATION

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The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the information provided in Palisades Nuclear Plant (PNP) letter dated January 29, 2018, to determine whether Non-Cited Violation (NCV) 05000255/2017007 was valid. This review was performed by an NRC staff member having relevant regulatory knowledge and who did not participate in the inspection documented in Inspection Report 05000255/2017007, which dispositioned the disputed violation. The NRC staff referenced documents that are listed in the Reference Section of this Enclosure and consulted with other NRC staff members that were independent from the original enforcement decision, including members of the Office of Nuclear Reactor Regulation (NRR).

1. BACKGROUND

On December 29, 2017, the NRC issued Inspection Report 05000255/2017007 documenting the results of a Design Bases Assurance Inspection at PNP. The report included an NCV of Title 10 of the *Code of Federal Regulations* (CFR), Part 50, Appendix B, Criterion XI, "Test Control," for the failure to periodically test the emergency diesel generators' (EDGs') capability to start and accelerate all of the sequenced loads within the applicable design voltage and frequency transient and recovery limits. This violation was dispositioned as NCV 05000255/2017007-01.

On January 29, 2018, PNP provided a written response to the NRC contesting the enforcement decision associated with NCV 05000255/2017007-01. In the letter, PNP stated that the NRC inspection report does not provide a rationale for contending that periodic system testing to demonstrate that the EDGs could start and accelerate their sequenced loads within the applicable voltage and frequency acceptance limits is required by Institute of Electrical and Electronics Engineers (IEEE) Standard 308-1978 and does not explain why PNP testing performed following maintenance activities that could adversely affect EDG frequency and voltage response is inadequate.

2. ORIGINAL ENFORCEMENT DECISION

Inspection Report 05000255/2017007described the violation as:

> Title 10 CFR Part 50, Appendix B, Criterion XI, "Test Control," requires, in part, that a test program be established to assure that all testing required to demonstrate that structures, systems, and components will perform satisfactorily in service is identified and performed in accordance with written test procedures which incorporate the requirements and acceptance limits contained in applicable design documents. It also stated that test results shall be documented and evaluated to assure that test requirements have been satisfied.
>
> The Updated Final Safety Analysis Report [UFSAR], Section 8.1.1, "Design Basis," states, in part, "that the engineered safeguards electrical system … is intended to meet all the other requirements identified in IEEE 308-1978." The IEEE 308-1978, Section 7.4, "Periodic Equipment Tests," states that, "Tests shall be performed at scheduled intervals to (1) Detect the deterioration of the system towards an unacceptable condition. (2) Demonstrate that standby power equipment and other components that are not exercised during normal operation of station are operable."

> Contrary to the above, as of November 15, 2017, the licensee failed to establish a testing program to demonstrate that the EDGs could start and accelerate their sequenced loads within the applicable voltage and frequency acceptance limits periodically as required by IEEE 308-1978 and following maintenance activities that could adversely affect EDG frequency and voltage response (e.g., governor and voltage regulator maintenance activities). The licensee is still evaluating its planned corrective actions, however, the team determined that the continued non-compliance does not present an immediate safety concern because the licensee reasonably determined the affected systems, structures, and components remained operable.
>
> Because this violation was of very-low safety significance and was entered into the licensee's Corrective Action Program as CR-PLP-2017-05265 and CR-PLP-2017-05283, this violation is being treated as an NCV, consistent with Section 2.3.2 of the NRC Enforcement Policy.

Licensee testing performed in accordance with Palisades Improved Technical Specifications demonstrates starting and load sequencing of the EDGs to attain steady state voltage and frequency, and in the required time (fully loaded condition). The description section of the associated finding in the NRC inspection report noted that the UFSAR Section 8.4.1.3, "Design Basis" states that the recovery time for the EDG voltage to return to 90 percent of rated voltage after application of each load step is less than 3 seconds. Hence, the focus of the enforcement action was that neither periodic testing nor post maintenance testing verified that a necessary minimum voltage is retained throughout the loading sequence, in particular verifying the UFSAR design requirement that EDG voltage returns to 90 percent of rated voltage within 3 seconds for each load step, instead providing a voltage verification only at the final fully loaded condition within a prescribed time, and hence misses a testing opportunity that could identify a deteriorating EDG.

3. LICENSEE POSITION

In a letter dated January 29, 2018, PNP concluded the inspection report does not provide a rationale for contending that periodic testing to demonstrate that the EDGs could start and accelerate their sequenced loads within the applicable voltage and frequency acceptance limits is required by IEEE Standard 308-1978. In addition, the NRC inspection does not explain why PNP testing performed following maintenance activities that could adversely affect EDG frequency and voltage response is inadequate. In summary, the bases for PNP's position is:

The IEEE Standard 308-1978, Section 7.1, "Surveillance Methods," states that the extent, selection, and application of the various surveillance methods, including periodic testing, to indicate the operation status of Class 1E power systems will depend on individual plant design requirements, and refers to the surveillance methods for Class 1E equipment outlined in Table 3, "Illustrative Surveillance Methods." Table 3 outlines the testing described in Section 7.4 of the IEEE standard, which is to detect the deterioration of the equipment toward an unacceptable condition and to demonstrate that standby power equipment and other components that are not exercised during normal operation of the station are operable. The table does not specify that diesel

generator voltage and frequency recovery be monitored at periodic intervals. Instead it specifies periodic monitoring of diesel generator dc auxiliary systems, starting capability, loading capability, and breaker operation.

Additionally, PNP post-maintenance testing is performed in accordance with industry guidance contained in various Electric Power Research Institute reports, and the reports do not require that post maintenance EDG testing include voltage and frequency recovery testing.

4. NRC STAFF REVIEW

The NRC staff reviewed the PNP position as it applied to the specific circumstances surrounding NCV 05000255/2017007-01 as follows:

1. Palisades Final Safety Analysis Report

   During this review, the NRC staff reviewed Palisades' Final Safety Analysis Report (FSAR) Chapter 8—Electrical Systems. The relevant sections reviewed were:

   - FSAR Section 8.1.1, "Design Basis," states, in part, "that the engineered safeguards electrical system … is intended to meet all the other requirements identified in IEEE 308-1978."

   - FSAR Section 8.4.1, "Emergency Generators," describes the licensee's design parameters for its emergency generators. In the description and operation Section (8.4.1.2) the licensee describes testing of the EDGs to be, "Automatic start and loading sequencing of the emergency generators are tested as part of the safety injection testing. The emergency generators' start-up may be manually tested at any time to verify that the generator is ready for loading within 10 seconds and that it achieved acceptable steady state voltage and frequency. Acceptable voltage is within the rating of the generator, and acceptable frequency is such that flowrate through the safeguards pumps is within the margins of the accident analysis". In addition, the section tells the reader to refer to Technical Specifications for further details.

   - FSAR Section 8.4.1.3, "Design Analysis," states that, "The generator is rated at 2,500 kW at 0.8 power factor with a two–hour overload rating of 2,750 kW. The recovery time for voltage to return to 90% of the rated voltage after application of each load step is less than three seconds".

   As a result of the above review, the NRC staff concluded that the licensee's use of IEEE 308-1978 and the design basis for the EDG (voltage, frequency, rating, etc.) is described in the FSAR.

2. IEEE Standard 308-1978

The NRC staff reviewed the testing requirements discussed in IEEE Standard 308-1978. Section 7.4,"Periodic Equipment Tests," states, "Test shall be performed at scheduled intervals to: (1) Detect as well as practicable, the deterioration of the equipment toward an unacceptable condition and (2) Demonstrate that standby power equipment and other components that are not exercised during normal operation of the station are operable."

The staff noted that the IEEE standard has a table that lists the parameters of the diesel generator and illustrative surveillance methods for each parameter. Per the table, dc aux systems, starting capability, loading capability, and breaker operation should be periodically tested. The table shows the following parameters' illustrative surveillance methods for continuous monitoring: voltage, frequency, amperes, watts, vars, winding temperature, field amperes, field volts, ground, control voltage, and breaker position. However, the standard does not provide EDG voltage and frequency acceptance limits.

Conversations with NRR staff noted that the IEEE Standard 308-1978 tabulated format of illustrative tests in Table 3 does not coherently specify or explain the rationale on how the tests demonstrate conformance with requirements in licensing basis and lacks clarity and definition for EDG testing. As a result of the above review, the staff concluded that IEEE 308-1978 provides information on what parameters of the diesel generator to test but does not give specifics on how to test those parameters and how often.

3. Evaluation of the Original Enforcement Action

The licensee is required to adhere to IEEE 308-1978, including the Section 7.4 provision that applies to Class 1E power systems, and is the focal point of the NCV, that "Tests shall be performed at scheduled intervals to (1) Detect as well as practicable the deterioration of the system towards an unacceptable condition. (2) Demonstrate that standby power equipment and other components that are not exercised during normal operation of station are operable."

The NRC staff reviewed previous regulatory initiatives that related to Palisades EDG reliability and testing including NRC reviews done for the Systematic Evaluation Program, Station Blackout Rule, Maintenance Rule, and transition to Palisades Improved Technical Specifications. Within the context of the Palisades plant specific licensing basis, that high level/broad statement from IEEE 308-1978 noted in the NCV could not reasonably be construed as specifically requiring that licensee periodic EDG testing verify a necessary minimum voltage is retained throughout the loading sequence, in particular verifying the UFSAR design requirement that EDG voltage returns to 90 percent of rated voltage within three seconds for each load step. In fact, evidence would suggest that surveillance tests described in the Palisades Technical Specifications were deemed sufficient to meet the testing requirements with respect to starting and load sequencing of the EDGs.

Further, there is insufficient rationale to support the contention that 10 CFR 50, Appendix B, Criterion XI, requires that post maintenance testing following EDG governor controller and voltage regulator replacement include testing of the voltage

recovery specification described in the USFAR, specifically a test to verify the recovery time for the EDG voltage to return to 90 percent of rated voltage after application of each load step is less than 3 seconds. In particular, the NRC inspection did not include and the inspection report did not reflect a comprehensive look at the full extent of Palisades post maintenance testing following EDG governor controller or voltage regulator work, address/discuss a specific example thereof, nor provide a technical rationale that would invalidate other testing performed as sufficient to meet regulatory requirements.

As a result of the above review, the NRC staff determined that the original enforcement action of NCV 05000255/2017007-01 was not valid.

5. CONCLUSION

Based on this review and after consideration of the information provided by PNP in letter dated January 29, 2018, the NRC staff determined that the violation of 10 CFR Part 50, Appendix B, Criterion XI, “Test Control,” did not occur as stated in NCV 05000255/2017007-01.

6. REFERENCES

1. Letter to Charles Arnone from Mark Jeffers; “Palisades Nuclear Plant—NRC Design Bases Assurance Inspection (Teams) Inspection Report 05000255/2017007;” December 29, 2017

2. Letter from Jeffery A. Hardy to the NRC Document Control Desk; “Design Bases Assurance Inspection (Teams) Inspection Report 05000255/2017007;” January 29, 2018

3. Palisades Nuclear Plant Final Safety Analysis Report; Revision 32

4. IEEE Standard 308-1978, “IEEE Standard Criteria for Class IE Power Systems for Nuclear Power Generating Stations”

5. Regulatory Guide 1.9, “Selection, Design, Qualification, and Testing of Diesel Generator Units Used as Class 1E Onsite Electric Power Systems at Nuclear Power Plants;” Revisions 3 and 4

6. Safety Guide 9, “Selection of Diesel Generator Set Capacity for Standby Power Supplies;” dated March 10, 1971

7. Regulatory Guide 1.108, “Periodic Testing of Diesel Generator Units Used as Onsite Electric Power Systems at Nuclear Power Plants;” Revision 1

8. NUREG 1432 “Standard Technical Specifications: Combustion Engineering (CE) Plants;” Revision 1

9. Letter from D.M. Crutchfield (NRC) to D.P. Hoffman (CPCo), SEP TOPIC VIII-2, Diesel Generators (Palisades Plant); dated February 27, 1981

10. Letter from D.M. Crutchfield (NRC) to D.P. Hoffman (CPCo), SEP TOPIC VIII-Onsite Emergency Power Systems—Diesel Generator, Safety Evaluation for Palisades; dated October 29, 1981

11. NUREG 0820 “Integrated Plant Safety Assessment Systematic Evaluation Program (SEP)—Palisades Plant Final Report;” dated October 1982

12. Letter from T.V. Wambach (NRC) to D.J. VandeWalle (CPCo), Supplement to the Integrated Plant Safety Assessment for the Palisades Plant; dated November 7, 1983

13. NUREG 1424 “Safety—Evaluation Report Related to the Full-term Operating License for Palisades Nuclear Plant;” dated November 1990

14. Letter from A. Masciantonio (NRC) to G.B. Slade (CPCo), Palisades Plant—Station Blackout Analysis Safety Evaluation (TAC NO. M68578); dated June 25, 1992

15. NUREG-0933 “Resolution of Generic Safety Issues: Item B-56: Diesel Reliability;” Revision 2

16. NUREG-0933 “Resolution of Generic Safety Issues: Item B-156: Systematic Evaluation Program;” Revision 8

17. NUREG/CR-0660 “Enhancement of Onsite Emergency Diesel Generator Reliability;” dated February 1979

18. CR-PLP-2017-05283

19. CR-PLP-2017-05265

20. RT-8D; Palisades Nuclear Plant Technical Specifications Surveillance Procedure; Revision 38