



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
WASHINGTON, D.C. 20555-0001

April 20, 2022

Ms. Maria L. Lacal
Executive Vice President
and Chief Nuclear Officer
Arizona Public Service Company
P.O. Box 52034, MS 7602
Phoenix, AZ 85072-2034

**SUBJECT: PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3 –
CLOSEOUT OF BULLETIN 2012-01, “DESIGN VULNERABILITY IN ELECTRIC
POWER SYSTEM” (EPID L-2017-CRS-0063)**

Dear Ms. Lacal:

The purpose of this letter is to inform you that the U.S. Nuclear Regulatory Commission (NRC) staff has verified that Arizona Public Service Company (the licensee) has provided the necessary information requested in NRC’s Bulletin (BL) 2012-01, “Design Vulnerability in Electric Power System,” dated July 27, 2012 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML12074A115), for Palo Verde Nuclear Generating Station, Units 1, 2, and 3 (Palo Verde). The NRC staff has completed its review of this information and has closed out BL 2012-01 at Palo Verde.

The NRC issued BL 2012-01 on July 27, 2012, to all holders of operating licenses and combined licenses for nuclear power reactors, except those who have permanently ceased operation and have certified that fuel has been removed from the reactor vessel. The Bulletin requested information about each facility’s electric power system designs that would allow the NRC staff to verify the system’s capability to address open phase conditions. Specifically, the NRC requested licensees to provide the following information:

- A description of how the protection scheme for engineered safety features buses (Class 1E for current operating plants or non-Class 1E for passive plants) is designed to detect and automatically respond to a single-phase open circuit condition or high impedance ground fault condition on offsite power circuits or another power source; and
- A description of the operating configuration of engineered safety features buses (Class 1E for current operating plants or non-Class 1E for passive plants) at power (i.e., normal operating condition).

By letter dated October 25, 2012 (ADAMS Accession No. ML12305A361), the licensee provided its response to BL 2012-01 for Palo Verde. By letter dated January 31, 2014 (ADAMS Accession No. ML14038A077), the licensee provided supplemental information for this facility in response to an NRC staff request for additional information issued on December 20, 2013 (ADAMS Accession No. ML13351A314).

By letters dated October 9, 2013, and March 16, 2015 (ADAMS Accession Nos. ML13333A147 and ML15075A454, respectively), the Nuclear Energy Institute (NEI) submitted a voluntary industry initiative to address open phase conditions at nuclear power plants. The NEI letter dated March 16, 2015, stated, in part: “The initiative is a formal commitment by the companies that operate nuclear power plants to follow a specific policy or plan of action. The initiative calls for a proactive plan and schedule for addressing potential design vulnerabilities to the open phase condition.”

To evaluate the adequacy of the open phase isolation systems designs, the NRC staff issued Temporary Instruction (TI) 2515/194, “Inspection of the Licensees’ Implementation of Industry Initiative Associated with the Open Phase Condition Design Vulnerabilities in Electric Power Systems (NRC Bulletin 2012-01),” dated October 31, 2017 (ADAMS Accession No. ML17137A416), which provided temporary inspection instructions for the purpose of verifying that licensees appropriately implemented the NEI voluntary industry initiative dated March 16, 2015. The NRC staff piloted the use of TI 2515/194 by inspecting four nuclear power plants with four distinct open phase isolation system designs. A summary of the NRC staff’s preliminary observations and issues needing additional clarity were discussed with industry representatives in two public meetings conducted on September 19, 2018, and October 17, 2018. The meeting summaries can be found in ADAMS under Package Accession Nos. ML18268A342 and ML18309A226, respectively.

In an e-mail dated June 6, 2019 (ADAMS Accession No. ML19163A176), NEI submitted Revision 3 of the voluntary industry initiative to include an option for plants to perform a risk evaluation under certain boundary conditions to support manual response to an open phase condition. NEI also submitted NEI 19-02, “Guidance for Assessing Open Phase Condition Implementation Using Risk Insights,” on June 20, 2019 (ADAMS Accession No. ML19172A086). On August 18, 2020, the NRC staff issued Revision 2 of TI 2515/194 (ADAMS Accession No. ML20230A328), which provided temporary inspection instructions for the purpose of verifying that licensees appropriately implemented Revision 3 of the NEI voluntary industry initiative. The revision accounted for changes reflected in Revision 3 of the NEI voluntary initiative.

In March 2018, the NRC staff performed an inspection at Palo Verde using TI 2515/194 dated October 31, 2017. In September 2021, the NRC staff performed an inspection at Palo Verde using TI 2515/194, Revision 2. These inspections at Palo Verde were performed to verify the licensee’s implementation of the voluntary industry initiative at this facility. To address the open phase condition design vulnerability issue at this facility, the licensee implemented open phase isolation system plant modifications, which provide detection and alarm in the control room, and necessary plant procedures that allow operators to diagnose and take manual action to mitigate an open phase condition. The NRC inspection reports listed below document the results of the TI 2515/194 inspections.

- “Palo Verde Nuclear Generating Station – NRC Inspection of the Licensee’s Implementation of Industry Initiative Associated with the Open Phase Condition Design Vulnerabilities in Electric Power Systems – Inspection Report 05000528/2018010, 05000529/2018010, and 05000530/2018010,” dated April 13, 2018 (ADAMS Accession No. ML18103A157)
- “Palo Verde Nuclear Generating Station – Temporary Instruction 2515/194 Report 05000528/2021015, 05000529/2021015 and 05000530/2021015,” dated October 27, 2021 (ADAMS Accession No. ML21293A339)

The NRC staff reviewed the information submitted by the licensee and the results of the TI 2515/194 inspections for Palo Verde. No findings or exceptions were identified. Based on this review, the NRC staff concludes that the licensee provided the necessary information requested in BL 2012-01 and has completed the implementation of its open phase isolation system. Therefore, the NRC staff closes BL 2012-01 for Palo Verde.

If you have any questions, please contact me at 301-415-1564 or via e-mail at Siva.Lingam@nrc.gov.

Sincerely,

/RA/

Siva P. Lingam, Project Manager
Plant Licensing Branch IV
Division of Operating Reactor Licensing
Office of Nuclear Reactor Regulation

Docket Nos. STN 50-528, STN 50-529,
and STN 50-530

cc: Listserv

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CLOSEOUT OF BULLETIN 2012-01, “DESIGN VULNERABILITY IN ELECTRIC
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ADAMS Accession No.: ML22102A262***via email**

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