



102-08397-CDH/KJG
February 22, 2022

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

Cary D. Harbor
Vice President
Regulatory & Oversight

Palo Verde
Nuclear Generating Station
P.O. Box 52034
Phoenix, AZ 85072
Mail Station 7602
Tel: 623.393.7953

Reference: Arizona Public Service Company (APS) Letter 102-08377, *Request for Exemption from Certain Requirements in 10 CFR 50.62(c)(1) using Risk-Informed Process for Evaluations*, dated January 14, 2022 [Agency Documents Access and Management System (ADAMS) Accession Number ML22014A415]

Subject: **Palo Verde Nuclear Generating Station Units 1, 2, and 3
Docket Nos. STN 50-528, 50-529, and 50-530
Renewed Operating License Number NPF-41, NPF-51, and NPF-74
Response to Requests for Confirmation of Information for
Exemption from Certain Requirements of 10 CFR 50.62(c)(1)
using Risk-Informed Process for Evaluations**

In accordance with the provisions of 10 CFR 50.12, *Specific Exemptions*, Arizona Public Service Company (APS) submitted in the referenced letter a request for an exemption from certain requirements of the 10 CFR 50.62(c)(1) regulation using the Risk-Informed Process for Evaluations for Palo Verde Nuclear Generating Station (PVNGS) Units 1, 2, and 3.

The Nuclear Regulatory Commission (NRC) staff concluded that additional requests for confirmation of information (RCIs) are required to complete their evaluation of the referenced letter. A clarifying phone call was held between NRC staff and APS on February 10, 2022, to discuss the RCIs. The APS response to the RCIs is provided in the enclosure to this letter.

No new commitments are being made to the NRC by this letter.

Should you have any questions regarding the content of this letter, please contact Matthew S. Cox, Licensing Section Leader, at (623) 393-5753.

Sincerely,

A handwritten signature in blue ink, appearing to read "C.D. Harbor", written over a light blue horizontal line.

CDH/KJG/mg

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U.S. Nuclear Regulatory Commission

Response to Requests for Confirmation of Information for Exemption from Certain Requirements of 10 CFR 50.62(c)(1) using Risk-Informed Process for Evaluations

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Enclosure: Response to Requests for Confirmation of Information for Exemption from Certain Requirements of 10 CFR 50.62(c)(1) using Risk-Informed Process for Evaluations

cc: S. A. Morris NRC Region IV Regional Administrator
S. P. Lingam NRC NRR Project Manager for PVNGS
L. N. Merker NRC Senior Resident Inspector for PVNGS
B. D. Goretzki Arizona Department of Health Services – Bureau of Radiation Control

ENCLOSURE

**Response to Requests for Confirmation of Information
for Exemption from Certain Requirements of 10 CFR
50.62(c)(1) using Risk-Informed Process for
Evaluations**

Enclosure

Response to RCIs for Exemption from Certain Requirements of 10 CFR 50.62(c)(1) using Risk-Informed Process for Evaluations

Introduction

By letter dated January 14, 2022 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML22014A415), Arizona Public Service Company (APS) submitted an exemption using the Risk-Informed Process for Evaluations (RIPE) to delete the Diverse Auxiliary Feedwater Actuation System (DAFAS) from the Palo Verde Nuclear Generating Station (PVNGS), Units 1, 2, and 3, licensing basis. Specifically, the proposed change is a request for an exemption under Title 10 of the Code of Federal Regulations (10 CFR) Section 50.12, "Specific exemptions," from certain requirements of 10 CFR 50.62, "Requirements for reduction of risk from anticipated transients without scram (ATWS) events for light-water-cooled nuclear power plants."

The request is for a partial exemption from 10 CFR 50.62(c)(1). The portion of 10 CFR 50.62(c)(1) for which the exemption is requested is shown below in bold.

(c) *Requirements.* (1) Each pressurized water reactor must have equipment from sensor output to final actuation device, that is diverse from the reactor trip system, **to automatically initiate the auxiliary (or emergency) feedwater system** and initiate a turbine trip under conditions indicative of an ATWS. This equipment must be designed to perform its function in a reliable manner and be independent (from sensor output to the final actuation device) from the existing reactor trip system.

The requirement for PVNGS is to provide a Diverse Scram System (DSS), DAFAS, and Diverse Turbine Trip (DTT). The exemption request will remove the requirement for the DAFAS from the PVNGS licensing basis. This exemption does not alter the requirements for the DSS or DTT at PVNGS.

The U.S. Nuclear Regulatory Commission (NRC) staff reviewed the application for the subject exemption and accepted it on January 31, 2022 (ADAMS Accession No. ML22032A031). The NRC staff's further review concluded that the following additional requests for confirmation of information (RCIs) are required for complete evaluation.

The NRC request is stated first followed by the APS response.

RCI-1

Section 4.5, "Manual Operator Actuation of Auxiliary Feedwater," of the Enclosure to the APS application dated January 14, 2022, states that core heat removal and reactor coolant system (RCS) heat removal are critical safety functions following the Palo Verde standard post trip actions. The RCS pressure analysis discussed in the exemption indicates that there would be no time limit for operator action. This information could be misleading.

The NRC staff noted that the Integrated Decisionmaking Panel (IDP) package describes a deterministic engineering evaluation (Engineering Work Order No. 21-03084-003). This evaluation provides insight into the beyond design basis case of a loss of normal feedwater flow accident, which occurs coincidentally with a trip on supplementary protection system high-high pressurizer pressure, no auxiliary feedwater actuation signal (AFAS) -1, no AFAS-2, and no DAFAS. The results of the

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IDP analysis show that in the worst-case scenario, approximately 10 minutes are available for the operators to manually actuate auxiliary feedwater before a lack of adequate inventory occurs in the steam generator. Avoiding the lack of adequate inventory in the steam generator by taking this operator action can address the critical safety function of core and RCS heat removal.

Please provide a description of, or the information from, the analysis in Engineering Evaluation 21-03804-003, "Deterministic Computer Code Runs to Support RIPE Process," which provides the justification and basis for the need to manually actuate AFW flow to preclude a lack of adequate inventory in the steam generator within 645 seconds as discussed in the IDP held on September 30, 2021, and observed by the NRC staff. This approximate 10-minute time requirement is alluded to in Enclosure Attachment 3 of the licensee's application dated January 14, 2022.

APS Response to RCI-1

The deterministic evaluation demonstrates that for the beyond design basis scenario of a loss of normal feedwater (LONF) with a trip on supplementary protection system (SPS) high-high pressurizer pressure, no AFAS-1 and AFAS-2 occurring, and no DAFAS, there can be a delay of up to 645 seconds (~10.75 minutes) in auxiliary feedwater actuation before a lack of adequate steam generator inventory occurs. Provided auxiliary feedwater is initiated within about 10 minutes, the steam generators will have adequate inventory and continue to act as an adequate heat sink for the primary system. The SPS high-high pressurizer pressure trip with no DAFAS demonstrates that for the beyond design basis scenario for a LONF, operator action within 645 seconds (~10.75 minutes) would prevent a lack of adequate steam generator inventory.

This deterministic evaluation is conservative and is a beyond design basis scenario, in that it does not reflect an automatic reactor trip from the RPS, application of the single failure criterion for AFAS automatic actuation, or the expected and demonstrated operator actions to trip the reactor prior to the RPS and SPS high-high pressurizer pressure trips and to initiate auxiliary feedwater, as described in Section 4.5 of the exemption request and Attachment 1, starting at page 27. Additionally, this beyond design basis scenario was reviewed for impacts to the time critical action (TCA) program and determined that existing TCAs are not affected by this change, as described on page 24 of Attachment 1 to the enclosure.

RCI-2

In Section 2.2, "Implementation of 10 CFR 50.62 Requirements at Palo Verde," and Section 4.4, "PVNGS Design Features," of the Enclosure to the APS application dated January 14, 2022, the licensee describes the ATWS implementation and general design respectively of the reactor protection system (RPS) and engineered safety features actuation system (ESFAS) as if the systems are physically separate and independent instrumentation and controls systems. However, the Palo Verde Updated Final Safety Analysis Report (UFSAR), Revision 21, Section 7.1.1.1, "Protection System" (ADAMS Accession No. ML21201A262), describes both of these systems as sections of the plant protection system (PPS) and in fact these two subsystems have common inputs as well as extensive physically shared cabinets, instrument racks, and drawers. Please verify whether RPS and ESFAS are physically

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separate systems or part of the same system. Also describe the physical separation of subcomponents between the PPS-RPS and the PPS-ESFAS.

APS Response to RCI-2

The PPS cabinet is an equipment enclosure housing four sets of modular control, test and display assemblies, relay assemblies, cooling assemblies and power supply assemblies for the PPS Channels A, B, C, and D. This cabinet includes the electrical and mechanical devices and circuitry required for monitoring field inputs and providing matrix and initiation logic for both the RPS and the ESFAS.

The PVNGS UFSAR, Revision 21, Section 7.1.2.10, describes the PPS conformance to the Institute of Electrical and Electronics Engineers (IEEE) 384-1974, *IEEE Trial Use Standard Criteria for Separation of Class 1E Equipment and Circuits*, as augmented by Regulatory Guide 1.75, *Criteria for Independence of Electrical Safety Systems*. This section also includes an overview on how RPS and ESFAS conform to the criteria.

Additionally, the PVNGS UFSAR, Revision 21, Sections 7.2.2.3.2.6 and 7.3.2.3.2, describe how the RPS and ESFAS conforms to Section 4.6, Channel Independence of IEEE 279-1971, *Criteria for Protection Systems for Nuclear Power Generating Stations*, respectively.

The design of the PVNGS PPS, RPS, and ESFAS is not changing as a result of this exemption request. The physical separation of the PPS, RPS, and ESFAS will continue to conform to the IEEE standards that are described in the PVNGS UFSAR Sections 7.1.2.10, 7.2.2.3.2.6, and 7.3.2.3.2.

RCI-3

Section 4.5 of the licensee's application dated January 14, 2022, describes (on page 16) "N" AFW Pump as Class 1E. However, the Palo Verde UFSAR, Revision 21, Section 10.4.9.2, "System Description," describes this pump as neither Class 1E electrical nor seismically qualified. While manual operator actions can be taken to energize the pump motor from the "A" emergency diesel generator during a loss of power, the connecting circuitry is not Class 1E beyond the 4 kilovolts Class Bus NB01 connection, and the pump motor is normally aligned to a non-class electrical bus. Please provide clarification as to whether the "N" AFW Pump is Class 1E or Non-Class.

APS Response to RCI-3

The "N" auxiliary feedwater pump is a non-Seismic Category I and non-Class 1E motor-driven pump, that is powered from the Class 1E 4.16 kV bus, PBA-S03.

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RCI-4

Please verify that the described manual operator actions are formally credited in the exemption license basis, as independent diverse means to actuate auxiliary feedwater upon RPS/AFAS failure, and not resulting in more than a minimum decrease in defense-in-depth and safety margin with respect to the existing system and operations (Criterion 5 of Step 2 Screening Assessment of the Enclosure Attachment 1 to the APS application dated January 14, 2022).

APS Response to RCI-4

APS verifies and acknowledges that the described manual operator actions are formally credited in the exemption license basis, as independent diverse means to actuate auxiliary feedwater upon RPS/AFAS failure, and not resulting in more than a minimum decrease in defense-in-depth and safety margin with respect to the existing system and operations.