10 CFR 50.90

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References:
1. Arizona Public Service Company (APS) Letter 102-07060, *License Amendment Request to Revise Technical Specifications to Adopt TSTF-505-A, Revision 1, Risk-Informed Completion Times*, dated July 31, 2015 [Agencywide Documents Access and Management System (ADAMS) Accession number ML15218A300]

2. APS Letter 102-07587, *License Amendment Request Supplement for Risk-Informed Completion Times,* dated November 3, 2017 (ADAMS Accession number ML17307A188)

3. APS Letter 102-07691, *APS Response to Request for Additional Information for Risk-Informed Completion Times,* dated May 18, 2018 (ADAMS Accession number ML18138A480)

Dear Sirs:

Subject: **Palo Verde Nuclear Generating Station Units 1, 2, and 3**
Docket Nos. STN 50-528, 50-529, and 50-530
Response to Electrical Engineering Operating Reactor Branch (EEOB) Request for Additional Information for Risk-Informed Completion Times

On July 31, 2015, as supplemented by letter dated November 3, 2017, APS submitted a license amendment request (LAR) to modify the Palo Verde Nuclear Generating Station (PVNGS) Technical Specification requirements to permit the use of risk Informed completion times in accordance with the Risk Informed Technical Specification Task Force Initiative 4b, References 1 and 2, respectively.

During the week of February 20, 2018, the NRC staff conducted an audit at PVNGS to gain an understanding of the planned risk-informed completion time program at PVNGS and to review the probabilistic risk assessment model that will be used by APS for this risk-informed LAR. The NRC staff communicated that additional information was required to complete their review in an email to the APS staff on May 3, 2018 (ADAMS Accession number ML18124A011), and a clarifying phone call was held to discuss the information needed. The NRC request for additional information (RAI) and the APS response is provided in the enclosure to this letter. The RAI response included in this letter is separate from the RAI response letter sent to the NRC staff on May 18, 2018 (Reference 3).

APS has reviewed the information supporting a finding of no significant hazards consideration previously provided to the NRC in the enclosure of Reference 1. APS has concluded that the information provided in this response does not affect the basis for concluding that the proposed license amendment does not involve a significant hazards consideration under the standards set forth in 10 CFR 50.92. No commitments are being made to the NRC by this letter.

Should you need further information regarding this letter, please contact Michael DiLorenzo, Nuclear Regulatory Affairs, at (623) 393-3495.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on June 1, 2018 .
(Date)

Sincerely,

Lacal, Maria L(Z06149)

Digitally signed by Lacal, Maria L(Z06149)
DN: cn=Lacal, Maria L(Z06149)
Date: 2018.06.01 14:20:08 -07'00'

MLL/CJS/sma

Enclosure: APS Response to Electrical Engineering Operating Reactor Branch (EEOB) Request for Additional Information for Risk-Informed Completion Times

cc:	K. M. Kennedy	NRC Region IV Regional Administrator
	M. D. Orenak	NRC NRR Project Manager for PVNGS
	C. A. Peabody	NRC Senior Resident Inspector for PVNGS

ENCLOSURE

APS Response to Electrical Engineering Operating Reactor Branch (EEOB) Request for Additional Information for Risk-Informed Completion Times

Introduction

On July 31, 2015, as supplemented by letter dated November 3, 2017, Arizona Public Service Company (APS) submitted a license amendment request (LAR) to modify the Palo Verde Nuclear Generating Station (PVNGS) Technical Specification (TS) requirements to permit the use of risk-informed completion times (RICT) in accordance with Risk-Informed Technical Specification Task Force (RITSTF) Initiative 4b [Agencywide Documents Access and Management System (ADAMS) Accession numbers ML15218A300 and ML17307A188].

During the week of February 20, 2018, the NRC staff conducted an audit at PVNGS to gain an understanding of the risk-informed completion time program at PVNGS and to review the probabilistic risk assessment (PRA) model that will be used by APS for this risk-informed LAR. The NRC staff communicated that additional information was required to complete their review in an email to the APS staff on May 3, 2018 (ADAMS Accession number ML18124A011), and a clarifying phone call was held to discuss the information needed. The NRC request for additional information (RAI) and the APS response is provided in this enclosure. The APS response is provided after each RAI.

RAI 1 Electrical Engineering Operating Reactor Branch (EEOB)

Attachment 5, Table A5-2, "Unit 1/2/3 In Scope TS/LCO [limiting condition for operation] Conditions RICT Estimate," of the LAR dated November 3, 2017, identifies TS 3.8.1, "AC Sources - Operating," Condition E – Two DGs [Diesel Generators] inoperable as a Loss of Function TS condition. Note No. 2 of Table A5-2 states, in part, that the use of a RICT is permitted for emergent conditions which represent a loss of a specified safety function or inoperability of all required trains of a system required to be OPERABLE if one or more of the trains are considered "PRA functional" as defined in Section 2.3.1 of NEI [Nuclear Energy Institute] 06-09-A.

Please describe the following:

a) The process of identifying "PRA functional" equipment.

b) How the design success criteria met from the onset of the completion time to the time when one of the inoperable equipment is identified as PRA functional?

APS Response to RAI 1 EEOB

a) The operations staff is responsible for performing PRA functionality evaluations using procedure 40DP-9RS04, *PRA Functionality Determination*. The procedure is in draft form pending NRC approval of the RICT Program LAR.

   The draft procedure specifies that components that are declared inoperable for meeting TS requirements are not considered PRA functional until a PRA functionality evaluation is performed. The procedure provides both guidance and a form for performing a PRA functionality evaluation. In loss of function conditions (i.e., all trains of a safety system inoperable), the PRA functionality determination criteria requires at least one train to be capable of meeting its design basis success criteria parameters for design basis accident scenarios (e.g., the train is inoperable only for administrative reasons).

   The evaluation is performed and independently reviewed by senior reactor operators. Upon completion of a successful PRA functionality evaluation, the component may be credited in the RICT program calculation. Until the PRA functionality determination is made, the existing TS front stop is applicable.

b) As described in "a" above, the RICT cannot be entered in a loss of function condition until successful determination that one train is PRA functional using the definition applied to loss of function conditions. Until the PRA functionality determination is made, the existing TS front stop is applicable.

   As an example, for the case of emergent entry into TS 3.8.1, required action E, two diesel generators inoperable, at least one diesel generator would have to be found PRA functional using the PRA functionality definition within two hours, or TS 3.8.1, Condition I, would be entered for not meeting required action E and its associated completion time. TS 3.8.1, Condition I, requires plant shutdown to Mode 3 in 6 hours and Mode 5 in 36 hours.

RAI 2 EEOB

For TS 3.8.4 Condition A, please describe how the battery's capacity during discharge is monitored when the battery charger is inoperable during the proposed completion time.

APS Response to RAI 2 EEOB

Procedure 40OP-9PK01, *125 VDC Class 1E Electrical System*, Appendix K, is used to evaluate battery discharge rate when a battery bank is the only power source to a 125 VDC bus. The discharge rate of the battery is determined by operations personnel recording battery discharge amperage every 15 minutes. As directed by alarm response procedure 40AL-9RK1A, *Panel B01A Alarm Responses,* the operator computes the amp hours discharged using the formulas in the Appendix K of procedure 40OP-9PK01, compares the result to a table of maximum amp hours that can be discharged, and confirms that the remaining charge meets the battery design function. The table is unit and battery specific.

RAI 3 EEOB

Palo Verde's TS 3.8.9 Bases state that the AC [alternate current), DC [direct current], and AC vital instrument bus electrical power distribution systems are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF [Engineered Safety Feature] systems so that the fuel, Reactor Coolant System, and containment design limits are not exceeded. When TS 3.8.9 Condition A, B, or C is entered, the associated subsystems are vulnerable to single failures that will reduce protection against the exceedance of the design limits.

TS Condition	Description
3.8.9 A	One AC electrical power distribution subsystem inoperable.
3.8.9 B	One AC vital instrument bus electrical power distribution subsystem inoperable.
3.8.9 C	One DC electrical power distribution subsystem inoperable

Please provide the following information:

a. A description of the scenario/plant configuration for each TS 3.8.9 condition.

b. For each scenario in Item (a) above, please provide a discussion of the most catastrophic failure including whether any actions would be taken as the result.

c. A description of during the scenario described in Item (a) above, how each subsystem would retain the ability to defend against vulnerabilities (i.e., examples of compensatory measures to assure a reasonable balance of defense-in-depth is maintained for each TS condition).

<u>APS Response to RAI 3 EEOB</u>

a. In the license amendment supplement dated November 3, 2017, the *RICT Calculated – High Estimate* durations (longest RICT duration estimate) provided in Table A5-2 were calculated with no other structures, systems, and components (SSCs) unavailable except those associated with the LCO condition. The basic events for the components that would result in loss of power to affected power distribution system were set to "failed" (i.e., a probability of one). The components selected for *RICT Calculated – High Estimate* durations for each LCO condition were as follows:

1. TS 3.8.9 Condition A

    - 1EPBAS03, Train A 4.16 kV Engineered Safety Feature (ESF) bus

2. TS 3.8.9 Condition B

    - 1EPNBD26, Channel B 120 VAC Class 1E distribution panel
    - 1EPNDD28, Channel D 120 VAC Class 1E distribution panel

3. TS 3.8.9 Condition C

    - 1EPKBM42, Channel B 125 VDC Class 1E motor control center (MCC)
    - 1EPKDM44, Channel D 125 VDC Class 1E MCC
    - 1EPKBF12, Channel B 125 VDC battery
    - 1EPKBH12, Channel B 125 VDC normal battery charger
    - 1EPKBH16, Swing charger BD (supplies B or D buses)
    - 1EPKDF14, Channel D 125 VDC battery
    - 1EPKDH14, Channel D 125 VDC normal battery charger

The *RICT Calculated – Low Estimate* backstop durations (shortest RICT duration estimate) provided in Table A5-2 were calculated with the following SSCs unavailable for the listed LCO condition. This represents the worst case train/channels removed from service.

1. TS 3.8.9 Condition A

    - 1EPBBS04, Train B 4.16 kV ESF bus

2. TS 3.8.9 Condition B

    - 1EPNAD25, Channel A 120 VAC Class 1E distribution panel
    - 1EPNCD27, Channel C 120 VAC Class 1E distribution panel

3. TS 3.8.9 Condition C

    - 1EPKAM41, Channel A 125 VDC Class 1E MCC
    - 1EPKCM43, Channel C 125 VDC Class 1E MCC
    - 1EPKAF11, Channel A 125 VDC battery
    - 1EPKAH11, Channel A 125 VDC normal battery charger
    - 1EPKAH15, Swing charger AC (supplies A or C buses)
    - 1EPKCF13, Channel C 125 VDC battery
    - 1EPKCH13, Channel C 125 VDC normal battery charger

b. As described in RAI 3, subpart "a" above, the *RICT Calculated – Low Estimate* (shortest RICT duration estimate) was based on loss of the most important power distribution subsystem, so reflects the most risk

significant failure for each LCO condition. The actions that will be taken with one power distribution subsystem in a RICT will be the respective risk management actions (RMAs) for the LCO. Examples of these are described in RAI 3, subpart "c" below.

c. Defense-in-depth is maintained for each of the TS LCOs in RAI 3, subpart "a" by implementing RMAs. Risk management actions are described in procedure 40DP-9RS03*, Risk Management Actions for 10 CFR 50.65(a)(4) and the Risk Informed Completion Time Program Procedure*. The procedure is in draft form pending NRC approval of the RICT Program LAR.

   Examples of RMAs that provide defense-in-depth that would be performed for these LCO Conditions are as follows:

   1) TS 3.8.9 Condition A – the following actions would be taken for bus 1EPBBS04, Train B, 4.16 kV ESF bus, being in a RICT:
      - (a) Terminate any in-progress maintenance/testing activities and defer any scheduled maintenance testing activities with the potential to cause the following initiating events:
        - (i) Loss of offsite power,
        - (ii) Loss of DC bus 1EPKAM41 (Class 1E bus breaker control power for alternate train), and
        - (iii) Loss of 4160V AC bus 1EPBAS03 (alternate train bus).
      - (b) Avoid switching (i.e., breaker manipulations) on 'A' train AC and DC electrical systems.
      - (c) Stage equipment to provide defense-in-depth for risk reduction.
        - (i) Place the FLEX Steam Generator Makeup Pump on its local pad in the unit (diesel powered low pressure feedwater pump that feeds to permanent plant feedwater connections).
        - (ii) If a RICT is pre-planned, stage the portable 4160kV diesel generators (requires wiring to permanent plant connections, which takes approximately 24 hours).
        - (iii) If an extended loss of offsite power is in progress, install the FLEX 480V diesel generators.
      - (d) Notify the Energy Control Center to defer any planned activities with the potential to generate a grid disturbance.
      - (e) Evaluate weather predictions and take appropriate actions to mitigate potential impacts of severe weather.
      - (f) Establish 24/7 staffing and response teams to ensure prompt restoration of operability of 1EPBBS04, Train B 4.16 kV ESF bus.
      - (g) Perform a beginning of shift brief that focuses on actions operators will take in response to a loss of offsite power,

loss of DC bus 1EPKAM41, or loss of 4160V AC bus 1EPBAS03.

(h) Maintain operability and availability of 'A' Spray Pond, 'A' Diesel Generator, and 'A' train AC and DC electrical systems.

Perform the following actions:

(i) Establish protection of the following SSCs against inadvertent operation or contact that may impede the SSC from fulfilling its design function: 'A' Spray Pond, 'A' Diesel Generator, and 'A' train AC and DC electrical systems, and

(ii) Terminate any in-progress testing or maintenance activities with the potential to impact the aforementioned SSCs, and

(iii) Defer any scheduled testing or maintenance activities with the potential to impact the aforementioned SSCs.

(i) Maintain/establish operability/availability of important mitigating SSCs. Identify risk significant SSCs, either from a pre-plan or by real-time use of configuration risk management importance reports.

Perform the following actions:

(i) Terminate any in-progress testing or maintenance activities with the potential to impact the availability of important in-service SSCs, and

(ii) Defer any scheduled testing or maintenance activities with the potential to impact the important in-service SSCs, and

(iii) Promptly return to service any important out-of-service SSCs.

(j) Limit the likelihood for fires and limit the potential consequences of fires.

(i) Maintain/establish availability of fire pumps.

(ii) Identify risk-significant fire zones, either from a pre-plan or by real-time use of configuration risk management importance reports.

(iii) Perform the following actions for the risk-significant fire zones:

1. Restrict activities that can impact the availability of fire protection SSCs (fire pumps, detection, suppression, barriers), and
2. Restrict activities that can initiate a fire such as hot work or high energy circuit breaker operation, and
3. Restrict the introduction of transient combustible materials.

(k) Every 24 hours, senior reactor operators and/or management personnel perform walk downs of switchyard, 'A' Spray Pond, 'A' Diesel Generator, and 'A' train AC and DC electrical systems.

2) TS 3.8.9 Condition B – the following actions would be taken for the example of distribution panel 1EPNAD25, Channel A 120 VAC Class 1E distribution panel, being in a RICT:
    (a) Terminate any in-progress maintenance/testing activities and defer any scheduled maintenance testing activities in the switchyard with the potential to cause a loss of offsite power.
    (b) Maintain operability and availability of remaining 'A' train electrical SSCs, and the remaining PN distribution panels (1EPNBD26, Channel B 120 VAC Class 1E distribution panel, 1EPNCD27, Channel C 120 VAC Class 1E distribution panel, 1EPNDD28, Channel D 120 VAC Class 1E distribution panel).
        Perform the following actions:
        (i) Establish protection of the following SSCs against inadvertent operation or contact that may impede the SSC from fulfilling its design function: 'B', 'C', and 'D' train batteries, battery chargers, inverters, and panels, and
        (ii) Terminate any in-progress testing or maintenance activities with the potential to impact the aforementioned SSCs, and
        (iii) Defer any scheduled testing or maintenance activities with the potential to impact the aforementioned SSCs.
    (c) Stage equipment to provide defense-in-depth for risk reduction.
        (i) Place the FLEX Steam Generator Makeup Pump on its local pad in the unit (diesel powered low pressure feedwater pump that feeds to permanent plant feedwater connections).
        (ii) If a RICT is pre-planned, stage the portable 4160kV diesel generators (requires wiring to permanent plant connections, which takes approximately 24 hours).
        (iii) If an extended loss of offsite power is in progress, install the FLEX 480V diesel generators.
    (d) Notify the Energy Control Center to defer any planned activities with the potential to generate a grid disturbance.
    (e) Evaluate weather predictions and take appropriate actions to mitigate potential impacts of severe weather.
    (f) Establish 24/7 staffing and response teams to ensure prompt restoration of operability of 1EPNAD25, Channel A 120 VAC Class 1E distribution panel.
    (g) Perform a beginning of shift brief that focuses on actions operators will take in response to a loss of offsite power or ESFAS actuation with no power to 1EPNAD25, Channel A 120 VAC Class 1E distribution panel.

(h) Maintain/establish operability/availability of important mitigating SSCs. Identify risk significant SSCs, either from a pre-plan or by real-time use of configuration risk management importance reports.
Perform the following actions:
(i) Terminate any in-progress testing or maintenance activities with the potential to impact the availability of important in-service SSCs, and
(ii) Defer any scheduled testing or maintenance activities with the potential to impact the important in-service SSCs, and
(iii) Promptly return to service any important out-of-service SSCs.

(i) Limit the likelihood for fires and limit the potential consequences of fires.
(i) Maintain/establish availability of fire pumps.
(ii) Identify risk-significant fire zones, either from a pre-plan or by real-time use of configuration risk management importance reports.
(iii) Perform the following actions for the risk-significant fire zones:
1. Restrict activities that can impact the availability of fire protection SSCs (fire pumps, detection, suppression, barriers), and
2. Restrict activities that can initiate a fire such as hot work or high energy circuit breaker operation, and
3. Restrict the introduction of transient combustible materials.

(j) Every 24 hours, senior reactor operators and/or management personnel perform walk downs of switchyard, diesel generators, and 'B', 'C', 'D' train batteries, battery chargers, and panels.

3) TS 3.8.9 Condition C – the following actions would be taken for the example of bus 1EPKAM41, Channel A 125 VDC Class 1E MCC, being in a RICT:

(a) Terminate any in-progress maintenance/testing activities and defer any scheduled maintenance testing activities in the switchyard with the potential to cause a loss of offsite power:

(b) Maintain operability and availability of redundant and diverse electrical systems.
Perform the following actions:
(i) Establish protection of the following SSCs against inadvertent operation or contact that may impede the SSC from fulfilling its design function: 'B', 'C', and 'D' train Class 1E batteries, battery chargers, swing battery chargers, and buses, and

(ii) Terminate any in-progress testing or maintenance activities with the potential to impact the aforementioned SSCs, and
(iii) Defer any scheduled testing or maintenance activities with the potential to impact the aforementioned SSCs.

(c) Stage equipment to provide defense-in-depth for risk reduction.
(i) Place the FLEX Steam Generator Makeup Pump on its local pad in the unit (diesel powered low pressure feedwater pump that feeds to permanent plant feedwater connections).
(ii) If a RICT is pre-planned, stage the portable 4160kV diesel generators (requires wiring to permanent plant connections, which takes approximately 24 hours).
(iii) If an extended loss of offsite power is in progress, install the FLEX 480V diesel generators.

(d) Evaluate weather predictions and take appropriate actions to mitigate potential impacts of severe weather.

(e) Establish 24/7 staffing and response teams to ensure prompt restoration of operability of 1EPKAM41, Channel A 125 VDC Class 1E MCC.

(f) Perform a beginning of shift brief that focuses on actions operators will take in response to a loss of offsite power, ESFAS actuation, or reactor trip.

(g) Maintain/establish operability/availability of important mitigating SSCs. Identify risk significant SSCs, either from a pre-plan or by real-time use of configuration risk management importance reports.
Perform the following actions:
(i) Terminate any in-progress testing or maintenance activities with the potential to impact the availability of important in-service SSCs, and
(ii) Defer any scheduled testing or maintenance activities with the potential to impact the important in-service SSCs, and
(iii) Promptly return to service any important out-of-service SSCs.

(h) Limit the likelihood for fires and limit the potential consequences of fires.
(i) Maintain/establish availability of fire pumps.
(ii) Identify risk-significant fire zones, either from a pre-plan or by real-time use of configuration risk management importance reports.
(iii) Perform the following actions for the risk-significant fire zones:
1. Restrict activities that can impact the availability of fire protection SSCs (fire pumps, detection, suppression, barriers), and

2. Restrict activities that can initiate a fire such as hot work or high energy circuit breaker operation, and
3. Restrict the introduction of transient combustible materials.

(i) Every 24 hours, senior reactor operators and/or management personnel perform walk downs of switchyard, diesel generators, and 'B', 'C', 'D' train Class 1E batteries, battery chargers, swing battery chargers, and buses.