



Palo Verde Nuclear  
Generating Station

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102-05484-CDM/TNW/GAM  
May 04, 2006

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

Dear Sirs:

**Subject: Palo Verde Nuclear Generating Station (PVNGS)  
Units 1, 2 and 3  
Docket Nos. STN 50-528, 50-529, and 50-530  
Response to NRC Request for Additional Information Regarding  
Proposed Technical Specification Change to Emergency Diesel  
Generator Allowed Out of Service Time**

By letter no. 102-05391, dated December 23, 2005, Arizona Public Service Company (APS) submitted a license amendment request for PVNGS Units 1, 2, and 3. The request is to extend the allowed out of service time (AOT) for one inoperable emergency diesel generator (EDG) from 72 hours to 10 days, add a clarifying note to Condition F of Technical Specification (TS) 3.8.1, "AC [alternating current] Sources - Operating," and revise TS 3.4.9, "Pressurizer," to delete the words which require that the two groups of pressurizer heaters be capable of being powered from an emergency power supply. In a letter dated March 21, 2006 the NRC provided to APS a request for additional information (RAI) related to the proposed amendment, asking for a response within 60 days. Provided in Enclosure 2 is APS' response to the RAI. A notarized affidavit is provided in Enclosure 1.

The following commitment is being made in this submittal:

APS commits to add to TS Bases B 3.8.1 the compensatory measures described in this submittal that will be required in order to utilize the extended 10-day EDG Completion Time (a Completion Time greater than 72 hours and less than or equal to 10 days). The TS Bases change will be implemented along with implementation of the extended 10-day EDG Completion Time TS amendment after NRC approval.

A member of the STARS (Strategic Teaming and Resource Sharing) Alliance  
Callaway • Comanche Peak • Diablo Canyon • Palo Verde • South Texas Project • Wolf Creek

ADD

U. S. Nuclear Regulatory Commission  
ATTN: Document Control Desk  
Response to NRC Request for Additional Information Regarding Proposed Technical  
Specification Change to Emergency Diesel Generator Allowed Out of Service Time  
Page 2

If you have any questions, please contact Thomas N. Weber at (623) 393-5764.

Sincerely,

A handwritten signature in black ink, appearing to read "David O'Neil". The signature is written in a cursive style with a large, prominent "D" and "O".

CDM/TNW/GAM

Enclosures: As stated

cc:	B. S. Mallett	NRC Region IV Regional Administrator
	M. B. Fields	NRC NRR Project Manager
	G. G. Warnick	NRC Senior Resident Inspector for PVNGS
	A. V. Godwin	Arizona Radiation Regulatory Agency (ARRA)

ENCLOSURE 1

AFFIDAVIT

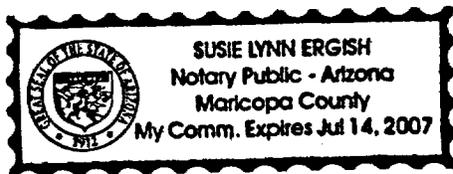
STATE OF ARIZONA        )  
                                  ) ss.  
COUNTY OF MARICOPA    )

I, David Mauldin, represent that I am Vice President, Nuclear Engineering, Arizona Public Service Company (APS), that the foregoing document has been signed by me on behalf of APS with full authority to do so, and that to the best of my knowledge and belief, the statements made therein are true and correct.

David Mauldin  
David Mauldin

Sworn To Before Me This 4th Day Of May, 2006.

Susie Lynn Ergish  
Notary Public



Notary Commission Stamp

**ENCLOSURE 2**

**Response to NRC Request for Additional Information Regarding  
Proposed Technical Specification Change to Emergency Diesel  
Generator Allowed Out of Service Time**

**NRC Request 1**

**The staff finds that the compensatory measures listed on page 12 of Enclosure 2 [of APS' December 23, 2005 submittal] are not comprehensive in nature. Please include the following compensatory measures in this list or provide justification for not including them:**

- a. The operability of the gas turbine generators (GTGs) will be verified by test before entering the extended EDG AOT.**
- b. The operability of the steam driven auxiliary feedwater pump will be verified before entering the extended EDG AOT.**
- c. The system dispatcher will be contacted once per day and informed of the EDG status, along with the power needs of the facility.**
- d. Should a severe weather warning be issued for the local area that could affect the switchyard or the offsite power supply during the AOT, an operator will be available locally at the GTG should local operation of the GTG be required as a result of on-site weather-related damage.**
- e. No discretionary maintenance will be allowed on the main and unit auxiliary transformers associated with the unit.**

**APS Response 1**

APS agrees to the additional compensatory measures, as requested, with minor modifications. The list below summarizes the compensatory measures that will be implemented when utilizing an extended EDG Completion Time (a Completion Time greater than 72 hours and less than or equal to 10 days). For planned maintenance utilizing an extended Completion Time, the compensatory measures shall be implemented prior to entering TS 3.8.1 Condition B. For an unplanned entry into an extended Completion Time, the compensatory measures shall be implemented without delay.

APS commits to add to TS Bases B 3.8.1 the compensatory measures described in this submittal that will be required in order to utilize the extended 10-day EDG Completion Time. The TS Bases are controlled under 10 CFR 50.59 in accordance with the TS Bases Control Program, TS 5.5.14.

**[Compensatory measures from page 12 of December 23, 2005 submittal, with minor modifications:]**

1. The redundant diesel generator (DG) (along with all of its required systems, subsystems, trains, components, and devices) will be verified operable (as required by TS) and no discretionary maintenance activities will be scheduled on the redundant (operable) DG.
2. No discretionary maintenance activities will be scheduled on the gas turbine generators (GTGs).
3. No discretionary maintenance activities will be scheduled on the startup transformers.
4. No discretionary maintenance activities will be scheduled in the APS switchyard or the unit's 13.8 kV power supply lines and transformers which could cause a line outage or challenge offsite power availability to the unit utilizing the extended DG Completion Time.
5. All activity, including access, in the Salt River Project (SRP) switchyard shall be closely monitored and controlled. Discretionary maintenance within the switchyard that could challenge offsite power supply availability will be evaluated in accordance with 10 CFR 50.65(a)(4) and managed on a graded approach according to risk significance.
6. The GTGs will not be used for non-safety functions (i.e., power peaking to the grid).
7. Weather conditions will be assessed prior to removing a DG from service during planned maintenance activities. Additionally, DG outages will not be scheduled when severe weather conditions and/or unstable grid conditions are predicted or present.
8. All maintenance activities associated with the unit that is utilizing the extended DG Completion Time will be assessed and managed per 10 CFR 50.65 (Maintenance Rule).

**[New compensatory measures in this submittal:]**

9. The functionality of the GTGs will be verified by ensuring that the monthly start test has been successfully completed within the previous four weeks before entering the extended DG Completion Time.
10. The operability of the steam driven auxiliary feedwater pump will be verified before entering the extended DG Completion Time.

11. The system dispatcher will be contacted once per day and informed of the DG status, along with the power needs of the facility.
12. Should a severe weather warning be issued for the local area that could affect the switchyard or the offsite power supply during the extended DG Completion Time, an operator will be available locally at the GTG should local operation of the GTG be required as a result of on-site weather-related damage.
13. No discretionary maintenance will be allowed on the main and unit auxiliary transformers associated with the unit.

### **NRC Request 2**

**Are there any restrictions on the EDGs in the other two units when one EDG in one of the units is in extended AOT? Also, please confirm that no more than one EDG at the Palo Verde site will be in extended AOT at the same time.**

### **APS Response 2**

Yes, there are restrictions on the planned maintenance on the EDGs in the other two units when one EDG in one of the units is in an extended AOT. Paragraph 2.1.3 in Appendix B of procedure 70DP-0RA05, "Assessment of Risk When Performing Maintenance in Modes 1 and 2," specifies the following:

*"Maintenance should not be scheduled on any two emergency diesels at the same time. This includes the refueling outage periods when one diesel is being torn down for inspection and testing."*

This procedural requirement would ensure that no more than one EDG at the Palo Verde site would be in a planned extended AOT at the same time.

### **NRC Request 3**

**Please discuss what types of communication protocol have been established between the control room operator at Palo Verde and transmission system operator (TSO). Is the TSO notified in advance that an EDG is going to be taken out for an extended period of time?**

### **APS Response 3**

The communication protocol that has been established between the control room operator at Palo Verde and the transmission system operator (TSO) was described in APS letter no. 102-05451, dated March 29, 2006 in response to Generic Letter 2006-02, "Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power." The following excerpt is from that submittal:

***[NRC Request] 5(e) Do you have contacts with the TSO to determine current and anticipated grid conditions as part of the grid reliability evaluation performed before conducting grid-risk-sensitive maintenance activities?***

***APS Response***

***Yes. Contacts with the TSO (ECC) to determine current and anticipated grid maintenance conditions is accomplished by Palo Verde having a listing of current and planned maintenance activities 1) in the Palo Verde switchyard and 2) on overhead lines that feed the Palo Verde switchyard. This planned switchyard maintenance is included in the risk assessment associated with evaluating grid-risk-sensitive maintenance activities.***

***The TSO normally provides at least 3 days notice on planned switchyard maintenance that could impact Palo Verde. The TSO also notifies Palo Verde of emergent work activities that could impact Palo Verde, as described in procedure 40DP-9OP34, "Switchyard Administrative Control."***

In addition, per compensatory measure no. 11 in response 1, when utilizing the extended 10-day AOT, the system dispatcher will be contacted once per day and informed of the EDG status, along with the power needs of the facility. For planned maintenance utilizing an extended Completion Time (a Completion Time greater than 72 hours and less than or equal to 10 days), the compensatory measure would be implemented prior to entering TS 3.8.1 Condition B. For an unplanned entry into an extended Completion Time, the compensatory measure would be implemented without delay.

**NRC Request 4**

**Does your TSO notify the plant operators when degraded grid conditions could occur and what action will be taken if degraded grid conditions occur during the EDG extended AOT?**

**APS Response 4**

The following excerpts are from APS letter no. 102-05451, dated March 29, 2006:

***[NRC Request] 5(b) Is grid status monitored by some means for the duration of the grid-risk-sensitive maintenance to confirm the continued validity of the risk assessment and is risk reassessed when warranted? If not, how is the risk assessed during grid-risk-sensitive maintenance?***

*APS Response*

*Yes. New or emergent work activities 1) in the Palo Verde switchyard or 2) on overhead lines that feed the Palo Verde switchyard are communicated to the Palo Verde Unit 1 Operations Department (Unit Department Leader or designee) from the TSO (ECC), as described in procedure 40DP-9OP34, "Switchyard Administrative Control."*

*New work items are evaluated for risk by the Palo Verde Work Week Manager (WWM). Emergent work items are evaluated for risk by either the Control Room staff or the WWM, as described in procedure 70DP-0RA05, "Assessment and Management of Risk When Performing Maintenance in Modes 1 and 2."*

*The Palo Verde Unit 1 Control Room operators monitor switchyard voltage using digital voltmeters equipped with low switchyard voltage alarms.*

*Procedure 70DP-0RA05 directs that emergent condition risk assessments be completed on a reasonable schedule commensurate with the safety significance of the condition.*

Additionally:

*[NRC Request] 5(f) Describe any formal agreement or protocol that you have with your TSO to assure that you are promptly alerted to a worsening grid condition that may emerge during a maintenance activity.*

*APS Response*

*The TSO (ECC) is responsible for issuing curtailment alerts to the APS owned and operated power plants. These alerts are based on the reasonable potential that the loss of a generating unit will create a system disturbance (e.g., customer outages, transmission line overloads, and voltage instability).*

*The TSO also notifies Palo Verde when equipment problems occur in the Palo Verde switchyard as directed by Palo Verde procedure 40DP-9OP34, "Switchyard Administrative Control."*

If degraded grid conditions occur during the EDG extended AOT (i.e., an emergent condition), procedure 70DP-0RA05 (Step 3.3.2) requires that the effect of emergent conditions on previously performed risk assessments and the associated risk management action level (RMAL) be assessed.

### NRC Request 5

In Section 4.1 of Enclosure 2, Page 10 [of APS' December 23, 2005 submittal], you have stated that "The Gas Turbine (GT) system is comprised of two standby GTGs, either of which is capable of meeting the AC power requirements for any one of the three PVNGS units." Also, on Page 11, you have stated that "Therefore, consistent with the defense-in-depth philosophy, the proposed change will continue to provide for multiple means to accomplish safety functions and prevent the release of radioactive material in the event of an accident." The staff understands that GTGs are rated at 3.4 megawatts (MW) and loss of offsite power with forced shutdown load is 5.19 MW (Unit 2 - EDG A) and loss of offsite power with loss of coolant accident load is 5.281 MW (Unit 1- EDG B) per the Final Safety Analysis Report Table 8.3-3 (Page 8.3-29). Please explain how one GTG is capable of meeting the AC power requirements for any one of the three PVNGS units.

### APS Response 5

The gas turbine generators (GTGs) were designed and installed to provide an alternate AC power source for station blackout (SBO) coping. In letter no. 102-05370, dated October 28, 2005, APS submitted to the NRC a revised station blackout (SBO) evaluation to increase the SBO coping time from four hours to 16 hours. Section B, Item 3 of the Enclosure of that submittal contains the following description:

*Two GTGs designated as AAC power sources are available at 1 hour of the onset of the SBO event. Each GTG has sufficient capacity and capability to operate those systems necessary for coping with an SBO for the required duration of 16 hours to bring the plant to and maintain the plant in a safe shutdown condition.*

*The AAC evaluation presented in Reference 1 [the original Palo Verde SBO four hour coping evaluation submittal and supplements] remains applicable for a coping duration of 16 hours.*

*The alternate AC (AAC) source has the capacity and capability to power the equipment necessary to cope with an SBO, for the required coping duration of 16 hours. The summary of loads required to cope with a 16 hour SBO is provided in Table 2 [in the October 28, 2005 submittal]. The continuous [SBO] load on a single GTG is 3364.3 Kw.*

*Before delivery to Palo Verde, each GTG was factory tested and demonstrated a 5.8% capacity margin above 3400 kWe. The GTGs are maintained and tested to ensure their capability to supply the load required to cope with an SBO for 16 hours.*

In addition, UFSAR Section 8.3.1.1.10 states the following:

*The non-safety related AAC power source consists of two 100 percent capacity, black start gas turbine generators (GTGs) that can be connected to each unit at switchgear E-NAN-S03 via the primary winding of the ESF transformer that is normally aligned to the Train A 4.16kV bus as shown in engineering drawings 01, 02, 03-E-MAA-002. One GTG is analyzed to supply all required station blackout loads, which are located on the A Train.*

The purpose of the discussion in Section 4.1.1, "Defense in Depth," on pages 10, 11, and 12 of the December 23, 2005 amendment request was to identify both (1) the analyzed design capabilities to provide power during a design basis accident (DBA) when a single EDG is inoperable (i.e., two operable offsite power circuits and an operable emergency diesel generator) and (2) the additional capability, though not analyzed for DBAs, to provide power from the GTGs. In that context, although not analyzed or credited in any DBA analysis, if needed, the operators have procedural guidance for aligning the electrical system to provide power from both GTGs (procedure 40EP-9EO10, Appendix 57) for defense in depth during a DBA. (Note, an SBO is not considered to be a DBA.)

#### **NRC Request 6**

**Please provide the current reliability and unavailability of the EDGs at PVNGS. Also, evaluate how these actual values relate to the target values committed for station blackout conditions.**

#### **APS Response 6**

**EDG reliability as of March 31, 2006:**

##### **Unit 1 EDG Reliability\*:**

0 Failures per 20 demands

1 Failure per 50 demands: Meets the SBO reliability target of 95% with high confidence level of 92.3% (Alpha = 0.077)

2 Failures per 100 demands: Meets the SBO reliability target of 95% with high confidence level of 96.29% (Alpha = 0.0371)

##### **Unit 2 EDG Reliability\*:**

0 Failures per 20 demands

1 Failure per 50 demands: Meets the SBO reliability target of 95% with high confidence level of 92.3% (Alpha = 0.077)

2 Failures per 100 demands: Meets the SBO reliability target of 95% with high confidence level of 96.29% (Alpha = 0.0371)

**Unit 3 EDG Reliability\*:**

0 Failures per 20 demands

0 Failures per 50 demands

1 Failure per 100 demands: Meets the SBO reliability target of 95% with high confidence level of 99.4% (Alpha = 0.006)

- \* The confidence levels were those corresponding to the smallest alpha-values that yield the corresponding number of failures in a cumulative binomial distribution (using the Microsoft EXCEL CRITBINOM function).

**EDG unavailability as of March 31, 2006 (36-month rolling window):**

Unit 1 DGA = 0.79%

Unit 2 DGA = 0.91%

Unit 3 DGA = 0.96%

Unit 1 DGB = 1.38%

Unit 2 DGB = 0.76%

Unit 3 DGB = 0.67%

As shown above, the current EDG reliability is within the SBO EDG reliability target of 95%. There is no EDG unavailability target value committed for SBO.