10 CFR 50.54(f)

Palo Verde Nuclear Generating Station

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102-05531-CDM/TNW/GAM
July 13, 2006

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
11555 Rockville Pike
Rockville, Maryland 20852

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2 and 3
Docket Nos. STN 50-528, 50-529 and 50-530
Re-submittal of Response to NRC Generic Letter 2006-02, "Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power"

By letter no. 102-05451 dated March 29, 2006, Arizona Public Service Company (APS) submitted a response to NRC Generic Letter 2006-02, "Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power." After discussions with the NRC staff, it has been determined that a sentence in the March 29, 2006 letter, containing a level of detail that is not required for NRC evaluation of the GL response, contained potentially security sensitive information. APS requests to withdraw the March 29, 2006 letter. Provided in Enclosure 2 to this letter is a re-submittal of APS' response to GL 2006-02 with the potentially security sensitive sentence deleted. No other changes to the March 29, 2006 letter are being made. Enclosure 1 is a notarized affidavit.

There are no commitments made to the NRC by this letter. If you have any questions, please contact Thomas N. Weber at (623) 393-5764.

Sincerely,

David Mauldin

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

A123

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

Sworn To Before Me This 13th Day Of July, 2006.

Cassandra Justiss
Notary Public

OFFICAL SEAL
Cassandre Justiss
NOTARY PUBLIC - STATE of ARIZONA
MARICOPA COUNTY
MY COMM. EXPIRES October 30, 2006

Notary Commission Stamp

ENCLOSURE 2

Re-submittal -
Arizona Public Service Company Responses to NRC Generic Letter 2006-02, "Grid Reliability and the Impact on Plant Risk and the Operability of Offsite Power"

Background

In the mid 1990's, Palo Verde identified a potential switchyard undervoltage scenario that could have resulted in the possible double sequencing of safety-related equipment. This condition was entered in the corrective action program (Legacy CRDRs 920774 and 940214), and the condition was reported to the NRC in Licensee Event Report 93-011-01, dated February 6, 1995 (letter no. 192-00918). In order to ensure that the appropriate actions would be taken to prevent double sequencing of safety-related loads, procedures were revised, operator training was provided, and an amendment to Technical Specification (TS) 3.8.1 was proposed by APS and approved by the NRC (Amendment No. 123 to the Palo Verde Facility Operating Licenses, dated December 29, 1999 (ADAMS accession no. ML003670588). Condition G of TS 3.8.1 and the associated TS Bases B 3.8.1, Actions G.1 and G.2, implemented in TS Amendment No. 123, use administrative controls as a permanent solution to protect against double sequencing of safety-related loads. The evaluation summary in the NRC Safety Evaluation related to Amendment No. 123 stated the following:

> *"The licensee's proposed revision to TS 3.8.1, Condition G is designed to preclude a degraded voltage/double sequencing scenario from occurring at the Palo Verde site. The staff finds this approach acceptable based in part on the fact that operation with only a single Palo Verde generator regulating switchyard voltage will only occur infrequently (approximately 1.3 percent of the time). The majority of the time additional Palo Verde generators (under the direct control of Palo Verde personnel) will also be regulating switchyard voltage, such that if one is lost during an event the remaining generators will maintain the pre-event switchyard voltage level. This in combination with the conservative approach taken by APS in their analysis used to predict the post-trip switchyard voltages during the infrequent periods of single generator voltage regulation, provides reasonable assurance that double sequencing events will be precluded and the requirements of General Design Criterion 17 will be met."*

In addition, procedure 40DP-9OP34, "Switchyard Administrative Control," was developed in 1996 to formalize the lines of communication to be used between Palo Verde, Arizona Public Service Company Energy Control Center (APS-ECC), and Salt River Project Transmission and Generation Dispatching (SRP-TGD) for normal and off-normal switching and loading operations. A formal agreement between Palo Verde, APS-ECC, and SRP-TDG for Revision 0 of this procedure was documented in Palo Verde letter no. 035-00456, dated October 23, 1996. Although this procedure has undergone several revisions to incorporate administrative changes since 1996, the essential communications requirements have not changed. Nonetheless, an updated agreement letter for the latest revision (revision 14) of this procedure has been signed.

NRC Requested Information

Use of protocols between the NPP licensee and the TSO, ISO, or RC/RA and the use of analysis tools by TSOs to assist NPP licensee in monitoring grid conditions to determine the operability of offsite power systems under plant TS.

GDC 17, 10 CFR Part 50, Appendix A, requires that licensees minimize the probability of the loss of power from the transmission network given a loss of the power generated by the nuclear power unit(s).

1. Use of protocols between the NPP licensee and the TSO, ISO, or RC/RA to assist the NPP licensee in monitoring grid conditions to determine the operability of offsite power systems under plant Technical Specifications.

1(a) Do you have a formal agreement or protocol with your TSO?

APS Response

Palo Verde's primary point of contact for transmission operational issues is the Arizona Public Service Company (APS) Energy Control Center (ECC), hereinafter designated "ECC" or "TSO." Although Palo Verde has agreements and protocols with the TSO, none of them are for the purpose of determining the operability of offsite power circuits. All required monitoring and assessments to verify the capability of the offsite power circuits to provide adequate post-trip voltage are done by the Palo Verde control room operators in accordance with procedures 41AL-1RK1B, 42AL-2RK1B, and 43AL-3RK1B, for Units 1, 2, and 3, respectively, "Panel B01B Alarm Responses," which implement Technical Specification (TS) Limiting Condition for Operation (LCO) 3.8.1 Actions G.1 and G.2 and the associated TS Bases as required for each offsite circuit to meet its required capability. This approach was reviewed and approved by the NRC in Amendment No. 123 to the Palo Verde Facility Operating Licenses, dated December 29, 1999 (ADAMS accession no. ML003670588).

An agreement exists between Palo Verde and the owners of the Palo Verde transmission system that any new interconnections to the Palo Verde transmission system must consider the design basis requirements for the Palo Verde offsite power circuits. This includes studies to verify that the contingencies discussed in NUREG-0800 would not result in transmission system instability.

1(b) Describe any grid conditions that would trigger a notification from the TSO to the NPP licensee and if there is a time period required for the notification.

APS Response

In accordance with ECC Letter of Instruction 1.5.6, dated October 6, 2000, if the TSO operator observes that the Palo Verde switchyard voltage is less than 525 kV, he is

instructed to notify the Palo Verde Unit 1 control room. After the voltage is restored to greater than 525 kV, he is instructed to again notify the Palo Verde Unit 1 control room. The TSO operator is also instructed to notify the Palo Verde Unit 1 control room if there is a failure in his voltage metering for the Palo Verde switchyard. The TSO letter of instruction does not specify a time period for these notifications. However, as discussed in the response to 1(a), Palo Verde does not rely on these notifications to determine the capability of the offsite power circuits in accordance with LCO 3.8.1, but instead relies on its own meters and alarms.

In accordance with ECC Letter of Instruction 1.5.2, dated January 12, 2005, the TSO also notifies the Palo Verde Unit 1 control room when the switchyard voltage is expected to exceed 535.5 kV. As discussed in the Background section of TS Bases 3.8.1, high switchyard voltage would not impact operability.

1(c) Describe any grid conditions that would cause the NPP licensee to contact the TSO. Describe the procedures associated with such a communication. If you do not have procedures, describe how you assess grid conditions that may cause the NPP licensee to contact the TSO.

APS Response

The Palo Verde Unit 1 control room operator adjusts the switchyard voltmeter alarm setpoints as appropriate for the particular plant bus alignment conditions in accordance with TS Bases B 3.8.1, Actions G.1 and G.2, and procedure 40OP-9NA03, "13.8 kV Electrical System (NA)." If the switchyard voltage drops below the minimum allowable level, procedure 41AL-1RK1B, "Panel B01B Alarm Responses," directs the Unit 1 Operator to contact the TSO (ECC) and request that voltage be restored to within acceptable limits. If a Palo Verde unit is the last unit on line, procedures 41AL-1RK1B, 42AL-2RK1B, 43AL-3RK1B for Units 1, 2, and 3, respectively, "Panel B01B Alarm Responses," and 41ST-1ZZ02, 42ST-2ZZ02, and 43ST-3ZZ02, for Units 1, 2, and 3, respectively, "Inoperable Power Sources Action Statement," direct the control room operator to contact the TSO and request that adjustments be performed in order to manage generator gross MVAR output at less than or equal to 0 MVAR while maintaining switchyard voltage within acceptable limits. This is supported by the guidance to the TSO in ECC Letter of Instruction 3.32.20, dated April 1, 2003. The purpose of these notifications is to restore offsite power circuit capability in accordance with TS LCO 3.8.1, Action G.1. Communication with the TSO is conducted in accordance with procedure 40DP-9OP34, "Switchyard Administrative Control."

Contacts from Palo Verde to transmission organizations as a result of other grid conditions, such as blackout or switchyard alarms, are unassociated with the post-trip switchyard voltage issue.

1(d) Describe how NPP operators are trained and tested on the use of the procedures or assessing grid conditions in question 1(c).

APS Response

During Licensed Operator Initial Training (LOIT), license candidates are trained on procedure 40DP-9OP34, "Switchyard Administrative Control." This training is conducted in both the classroom and on-the-job training (OJT). The task that supports this procedure (#1290220302) was not selected for the licensed operator continuing training (LOCT) program. Recently, the Senior Reactor Operator (SRO) Task List was modified to add this task to the LOCT program with a biennial (24 month) training requirement.

Assessing grid conditions is performed with voltage indicators on Unit 1 control room panel B01B, as described in procedure 41AL-1RK1B, "Panel B01B Alarm Responses." Based on the voltage, alarm response procedures would trigger the operating crew to take contingency actions in the event of a degraded voltage condition. The training that supports this skill and knowledge is covered in both LOIT and LOCT by task #1250570302, direct actions of grid voltage less than 525kv. Additionally, Technical Specification training also focuses on grid voltage levels, as well as the "double sequencing" issue.

The response to the "last unit on line" alarm was also taught in the simulator. The lesson plan (NLR04S0201) reviewed the capability / operability issue, and the effect of having the last unit supporting local grid voltage (boosting versus bucking). The simulator was purposely arranged such that if the crew attempted to go <0 MVARs, the "low voltage" alarm would alarm, forcing the crew to raise generator voltage (>0 MVARs), and block their fast bus transfer.

Evaluation of crew performance in the area of responding to a degraded voltage condition is through the use of simulator scenarios. Additionally, individual evaluations are also conducted using written examinations.

1(e) If you do not have a formal agreement or protocol with your TSO, describe why you believe you continue to comply with the provisions of GDC 17 as stated above, or describe what actions you intend to take to assure compliance with GDC 17.

APS Response

All required monitoring and assessments to determine the capability of offsite power circuits to meet the conditions described in TS Bases B 3.8.1, Actions G.1 and G.2, which involve verification of the adequacy of post-trip switchyard voltage, are accomplished on site, without reliance on notification from the TSO. This approach was reviewed and approved by the NRC in Amendment No. 123 to the Palo Verde Facility

Operating Licenses, dated December 29, 1999 (ADAMS accession no. ML003670588). The Background section of TS Bases B 3.8.1 states the following:

> *"If two or more of Palo Verde units are on line and available to regulate switchyard voltage, the voltage will not change significantly following tripping of one unit. If only one unit is on line, is not providing switchyard voltage support (generator gross MVAR output < 0), and it trips, the post-trip switchyard voltage will be equal to or greater than the pre-trip switchyard voltage. If it had been providing switchyard voltage support (generator gross MVAR output > 0) the post-trip switchyard voltage could be lower than the pre-trip switchyard voltage. In this case, adequate voltage to the Class 1E buses is assured by blocking fast bus transfer and thus minimizing the loading and voltage drop on the startup transformer secondary circuit."*

This approach provides assurance that the offsite power system meets the capacity and capability requirements specified in GDC-17 in the event of anticipated operational occurrences and postulated accidents, and it minimizes the probability of losing electric power from the transmission network as a result of, or coincident with, the loss of power generated by the nuclear power unit.

1(f) If you have an existing formal interconnection agreement or protocol that ensures adequate communication and coordination between the NPP licensee and the TSO, describe whether this agreement or protocol requires that you be promptly notified when the conditions of the surrounding grid could result in degraded voltage (i.e., below TS nominal trip setpoint value requirements; including NPP licensees using allowable value in its TSs) or LOOP after a trip of the reactor unit(s).

APS Response

Palo Verde does not rely on a formal agreement or protocol with the TSO to identify when grid voltage is degraded or when predicted post-trip voltage would be inadequate. As discussed in response 1(a), all such monitoring and evaluation is performed on site.

1(g) Describe the low switchyard voltage conditions that would initiate operation of plant degraded voltage protection.

APS Response

Calculations 01-EC-MA-0221 (Unit 1), 02-EC-MA-0221 (Unit 2), and 03-EC-MA-0221 (Unit 3) analyze many different bus alignment conditions that could affect the voltage of the two 4160 V Class 1E buses. These calculations determine the switchyard voltage level for each condition that would result in a steady-state voltage following automatic load sequencing that would assure resetting of the degraded voltage relays (thus

avoiding their operation). Based on these results, the following formula has been developed:

$$V = 490 + \frac{MVA}{2}$$

"V" is the switchyard voltage, in kilovolts, that would assure that plant degraded voltage protection would not operate. "MVA" is the steady-state load, in megavolt-amperes, that would occur on the startup transformer following automatic load sequencing for the particular bus alignment and loading condition under consideration.

For example, in a scenario of unusual bus alignment that would result in startup transformer loading to its maximum rating of 70 MVA, a switchyard voltage of 525 kV would assure that the plant degraded voltage protection would not operate. Under normal bus alignment conditions, the startup transformer loading would be less than 70 MVA, resulting in a lower required switchyard voltage.

This formula is conservative with respect to the actual results of the calculations, and it includes sufficient margin to account for degraded voltage relay loop uncertainties and other analytical uncertainties.

2. Use of criteria and methodologies to assess whether the offsite power system will become inoperable as a result of a trip of your NPP.

2(a) Does your NPP's TSO use any analysis tools, an online analytical transmission system studies program, or other equivalent predictive methods to determine the grid conditions that would make the NPP offsite power system inoperable during various contingencies? If available to you, please provide a brief description of the analysis tool that is used by the TSO.

APS Response

No, the Palo Verde TSO does not use any analysis tools, an online analytical transmission system studies program, or other equivalent predictive methods to determine the grid conditions that would make the offsite power system inoperable during various contingencies. Instead, the predictive methodology used to verify the adequacy of switchyard voltage following a trip of a Palo Verde generator utilizes Palo Verde monitoring and analysis tools only and does not rely on information from the TSO. This approach is discussed in the response to 1(a).

Transmission grid stability studies are performed by various transmission organizations. Palo Verde understands that there are no credible grid conditions in which tripping of a Palo Verde generator would result in instability. Palo Verde further understands the following:

- General Electric PSLF software is used to perform many of these studies.
- The studies use models of the western transmission grid that have been developed by the transmission organizations in accordance with the reliability criteria of the Western Electricity Coordinating Council (WECC).
- The models do not utilize real-time transmission grid operating parameters.

2(b) Does your NPP's TSO use an analysis tool as the basis for notifying the NPP licensee when such a condition is identified? If not, how does the TSO determine if conditions on the grid warrant NPP licensee notification?

APS Response

No, the Palo Verde TSO does not use an analysis tool as the basis for notifying Palo Verde when such a condition is identified. As discussed in response to 1(a), notification from the TSO is not required for Palo Verde to predict whether the offsite power circuits could be lost as a result of a Palo Verde generator trip.

2(c) If your TSO uses an analysis tool, would the analysis tool identify a condition in which a trip of the NPP would result in switchyard voltages (immediate and/or long-term) falling below TS nominal trip setpoint value requirements (including NPP licensees using allowable value in its TSs) and consequent actuation of plant degraded voltage protection? If not, discuss how such a condition would be identified on the grid.

APS Response

Not applicable. As discussed in response to 1(a), Palo Verde utilizes its own monitoring devices and methodology to verify that a trip of the NPP would not result in actuation of the degraded voltage relays, without reliance on information from the TSO.

2(d) If your TSO uses an analysis tool, how frequently does the analysis tool program update?

APS Response

Not applicable. See discussion in response to 2(c).

2(e) Provide details of analysis tool-identified contingency conditions that would trigger an NPP licensee notification from the TSO.

APS Response

Not applicable. See discussion in response to 2(c).

2(f) If an interface agreement exists between the TSO and the NPP licensee, does it require that the NPP licensee be notified of periods when the TSO is unable to determine if offsite power voltage and capacity could be inadequate? If so, how does the NPP licensee determine that the offsite power would remain operable when such a notification is received?

APS Response

Not applicable. See discussion in response to 1(a).

Parameters that are monitored to verify the adequacy of post-trip switchyard voltage, in accordance with TS Bases B 3.8.1, Actions G.1 and G.2, are (1) real time switchyard voltage using the two digital volt meters in the Unit 1 control room, (2) determination of whether the unit under consideration is the last Palo Verde unit on line using its "last unit on line" alarm, (3) its gross generator MVAR output level, and (4) the status of its fast-bus transfer permissive switches. Since this methodology uses only simple onsite monitoring devices, redundant metering devices are available, and it does not involve communication with the TSO or use of a transmission system modeling program, the data needed to assess offsite power circuit capability is expected to always be available.

2(g) After an unscheduled inadvertent trip of the NPP, are the resultant switchyard voltages verified by procedure to be bounded by the voltages predicted by the analysis tool?

APS Response

No. Palo Verde has no procedure that requires this verification. However, the switchyard voltage responses to NPP trips are recorded in an on-line data gathering system and are available for later review.

An inadvertent trip of a Palo Verde generator with one or both of the other units available to regulate switchyard voltage would result in very little change to switchyard voltage. An opportunity to observe the voltage effect of an inadvertent trip of a Palo Verde unit when both of the other units are off line has not occurred. However, if the generator remaining on line was producing a gross MVAR output of less than or equal to 0, the switchyard voltage would be expected to remain unchanged or increase, as

described in TS Bases 3.8.1, Actions G.1 and G.2. It would remain unchanged if some of the other nearby non-nuclear generators were on line, since they would automatically regulate the voltage. Otherwise, it would be expected to increase. This increase would be the result of two phenomena. The first is that most of the reactive power consumption of the tripped Palo Verde generator's main transformer (approximately 230 MVAR) would be available to the transmission system, and the second is that the lower transmission line current resulting from the Palo Verde generator trip would result in less reactive power consumption by the affected transmission lines.

2(h) If an analysis tool is not available to the NPP licensee's TSO, do you know if there are any plans for the TSO to obtain one? If so, when?

APS Response

Palo Verde has no plans to change its method for assessing post-trip switchyard voltage and is not involved with the TSO's plans to obtain a real-time analysis tool.

2(i) If an analysis tool is not available, does your TSO perform periodic studies to verify that adequate offsite power capability, including adequate NPP post-trip switchyard voltages (immediate and/or long-term), will be available to the NPP licensee over the projected timeframe of the study?

APS Response

At the request of Palo Verde when significant changes are made to the transmission system, the APS or SRP transmission engineering organization performs a stability study to verify that tripping of a Palo Verde generator will not cause grid instability. This study also includes the other transmission grid contingencies discussed in NUREG-0800. Palo Verde UFSAR section 8.2.2 discusses the results of the current study.

Transmission organizations do not perform studies to verify that post-trip switchyard voltage is adequate to prevent actuation of the degraded voltage relays. As discussed in the response to 1(a), Palo Verde relies on onsite monitoring and analysis to verify the adequacy of post-trip switchyard voltage.

2(i)(a) Are the key assumptions and parameters of these periodic studies translated into TSO guidance to ensure that the transmission system is operated within the bounds of the analyses?

APS Response

Palo Verde understands that:

- Transmission organizations throughout the western transmission system perform numerous planning and operating studies using both power flow and transient stability models;
- A primary purpose of these studies is to verify compliance with the WECC reliability criteria;
- Some of the scenarios that are modeled to satisfy the WECC criteria are more adverse than those modeled to satisfy the NUREG 0800 criteria;
- Nomograms and other operating guidelines are used by transmission organizations to ensure that the transmission system is operated within the bounds of the relevant studies.

2(i)(b) If the bounds of the analyses are exceeded, does this condition trigger the notification provisions discussed in question 1 above?

APS Response

No, not unless the corrective actions involve curtailment of Palo Verde generation in accordance with Palo Verde procedure 40AO-9ZZ25, "ECC Directed Turbine Unloading."

Palo Verde understands that:

- When the boundary of a nomogram or other operating guideline is exceeded, WECC requires that the responsible transmission organization correct the condition within a short period of time.
- Many such nomograms and guidelines exist within the western transmission system.
- Protocol does not exist within the transmission organizations to provide notifications throughout the western transmission system when a boundary is exceeded.
- Automatic protection systems, such as underfrequency and undervoltage load shedding and remedial action schemes, are used to minimize the disruption in the event of a disturbance while system conditions are being corrected.

- Although there is no analysis that quantifies the probability of a Palo Verde loss of offsite power event during the limited period while the transmission system is operating outside of a nomogram or guideline limit, the probability is very low.

Operation of the transmission grid outside of a nomogram or guideline limit would not affect the capability and capacity of the Palo Verde offsite circuits to effect a safe shutdown or mitigate the effects of an accident. The only exception would be if the postulated disturbance was the trip of a Palo Verde unit. However, this is not a credible initiator of transmission grid instability since the WECC reliability criteria require that the grid be designed and operated to withstand a simultaneous trip of two generators at a site.

2(j) If your TSO does not use, or you do not have access to the results of an analysis tool, or your TSO does not perform and make available to you periodic studies that determine the adequacy of offsite power capability, please describe why you believe you comply with the provisions of GDC 17 as stated above, or describe what compensatory actions you intend to take to ensure that the offsite power system will be sufficiently reliable and remain operable with high probability following a trip of your NPP.

APS Response

Palo Verde utilizes its own monitoring and analysis tools in accordance with the TS Bases B 3.8.1, Actions G.1 and G.2, as discussed in the response to 1(a), to verify the capability of the offsite power circuits. This approach was reviewed and approved by the NRC in Amendment No. 123 to the Palo Verde Facility Operating Licenses, dated December 29, 1999 (ADAMS accession no. ML003670588). It provides assurance that the offsite power system meets the capacity and capability requirements specified in GDC 17 in the event of anticipated operational occurrences and postulated accidents, and it minimizes the probability of losing electric power from the transmission network as a result of, or coincident with, the loss of power generated by the nuclear power unit.

3. Use of criteria and methodologies to assess whether the NPP's offsite power system and safety-related components will remain operable when switchyard voltages are inadequate.

3(a) If the TSO notifies the NPP operator that a trip of the NPP, or the loss of the most critical transmission line or the largest supply to the grid would result in switchyard voltages (immediate and/or long-term) below TS nominal trip setpoint value requirements (including NPP licensees using allowable value in its TSs) and would actuate plant degraded voltage protection, is the NPP offsite power system declared inoperable under the plant TSs? If not, why not?

APS Response

As discussed in the response to 1(a), Palo Verde utilizes its own monitoring and analysis tools in accordance with TS Bases B 3.8.1, Actions G.1 and G.2, to verify the capability of the offsite power circuits in the event of anticipated operational occurrences and postulated accidents. When one or more required offsite circuits do not meet their required capability, Action G.1 requires that the offsite circuit capability be restored within one hour, or Action G.2 requires the offsite circuit to be declared inoperable and the engineered safety feature (ESF) buses transferred from the affected offsite circuit to the emergency diesel generator within one hour.

Postulated contingencies on the transmission grid are not used as a basis for operability determinations since:

- Such events are only postulated and have not actually occurred,
- The offsite power sources remain capable of effecting a safe shutdown and mitigating the effects of an accident in accordance with the limiting conditions for operation (LCO) criteria of Regulatory Guide 1.93,
- The offsite power system meets the capacity and capability requirements specified in GDC 17 to supply power in the event of anticipated operational occurrences and postulated accidents,
- The GDC 17 criterion discussed in Generic Letter 2006-02 is still met, i.e., loss of power from the transmission network would not occur as a result of loss of power generated by the nuclear power unit.

Furthermore, the normal operating voltages of the Class 1E 4160 V buses (typically around 4300 V) are so much higher than the degraded voltage relay setting (3744 V) that there is no credible transmission grid disturbance involving a single transmission element that would result in sustained degraded voltages to the level that would cause degraded voltage relay actuation.

3(b) If onsite safety-related equipment (e.g., emergency diesel generators or safety-related motors) is lost when subjected to a double sequencing (LOCA with delayed LOOP event) as a result of the anticipated system performance and is incapable of performing its safety functions as a result of responding to an emergency actuation signal during this condition, is the equipment considered inoperable? If not, why not?

APS Response

In Amendment No. 123 to the Palo Verde Facility Operating Licenses, dated December 29, 1999 (ADAMS accession no. ML003670588), Condition G of TS 3.8.1, "AC Sources

- Operating," was established to ensure that the appropriate actions will be taken to prevent double sequencing of safety-related loads. Since Palo Verde does not have an analysis to predict the effects of double sequencing on plant equipment, the required completion time for LCO 3.8.1, Actions G.1 and G.2 is one hour. The TS Bases B 3.8.1 for Actions G.1 and G.2 states the following:

> *"The one hour time limit is appropriate and consistent with the need to remove the unit from this condition, because the level of degradation exceeds that described in Regulatory Guide 1.93 (Ref. 6) for two offsite sources inoperable. The regulatory guide assumes that an adequate onsite power source is still available to both safety trains, but in a scenario involving automatic load sequencing and low voltage to the ESF buses, adequate voltage is not assured from any of the power sources for the following systems immediately after the accident signal has been generated (i.e., while the degraded voltage relay is timing out): radiation monitors Train A RU-29 or Train B RU-30 (TS 3.3.9), Train B RU-145; ECCS (TS 3.5.3); containment spray (TS 3.6.6); containment isolation valves (TS 3.6.3); auxiliary feedwater system (TS 3.7.5); essential cooling water system (TS 3.7.7); essential spray pond system (TS 3.7.8); essential chilled water system (TS 3.7.10); control room essential filtration system (TS 3.7.11); ESF pump room air exhaust cleanup system (TS 3.7.13); and fuel building ventilation."*

3(c) Describe your evaluation of onsite safety-related equipment to determine whether it will operate as designed during the condition described in question 3(b).

APS Response

Palo Verde has no evaluation to determine the effects of double sequencing. Instead, as described in the response to 1(a), Condition G of TS 3.8.1, "AC Sources - Operating," was changed in Amendment No. 123 to ensure that the appropriate actions will be taken to prevent double sequencing of safety-related loads.

3(d) If the NPP licensee is notified by the TSO of other grid conditions that may impair the capability or availability of offsite power, are any plant TS action statements entered? If so, please identify them.

APS Response

No. Technical Specification action statements are not entered for conditions that are only postulated, with the exception of Required Actions G.1 and G.2 of TS 3.8.1 that consider the predicted effect on switchyard voltage of a postulated trip of a Palo Verde generator. This approach is consistent with the offsite power source LCO criteria specified in Regulatory Guide 1.93.

3(e) If you believe your plant TSs do not require you to declare your offsite power system or safety-related equipment inoperable in any of these circumstances, explain why you believe you comply with the provisions of GDC 17 and your plant TSs, or describe what compensatory actions you intend to take to ensure that the offsite power system and safety-related components will remain operable when switchyard voltages are inadequate.

APS Response

Not applicable. Palo Verde Technical Specifications do address the adequacy of both real-time and predicted post trip switchyard voltages.

3(f) Describe if and how NPP operators are trained and tested on the compensatory actions mentioned in your answers to questions 3(a) through (e).

APS Response

The accredited training program at Palo Verde utilizes a systematic approach to training. Several topics were evaluated for inclusion into the training program when the double sequencing issue arose. Technical Specifications and their Bases were taught in the classroom setting on several occasions. In the simulator, the alarm response to the "last unit on line," and low switchyard voltage were covered in a dynamic situation.

The operators are trained six times per year, for one week periods. Included in one of those weeks is the annual re-qualification exam week. The annual re-qualification week includes an operating evaluation which is based on the content of the training program. Every other year, a comprehensive written exam is administered to the individual operators.

Task #1250570302 (direct actions of grid voltage less than 525 kV) imposes a biennial training requirement.

With the advent of deregulation, questions arose regarding the communications between the control room operators and the TSO (ECC). Following an analysis of this subject, a lesson plan was developed to discuss ODP-10, (Operations Department External Communication Practices) in conjunction with FERC Order 2004 (Standards of Conduct). The following lesson plans provided that training: NLR0003RC001, NLR00-04-RR-004-000, NLR03S02050, NLR04 S0201 00, and NLR05 S0104 00.

4. Use of criteria and methodologies to assess whether the offsite power system will remain operable following a trip of your NPP.

4(a) Do the NPP operators have any guidance or procedures in plant TS bases sections, the final safety analysis report, or plant procedures regarding situations in which the condition of plant-controlled or -monitored equipment (e.g., voltage regulators, auto tap changing transformers, capacitors, static VAR compensators, main generator voltage regulators) can adversely affect the operability of the NPP offsite power system? If so, describe how the operators are trained and tested on the guidance and procedures.

APS Response

The main generator voltage regulators are the only plant-controlled or monitored equipment that are designed to control switchyard voltage. The Background section in TS Bases B 3.8.1 states the following:

> *"If two or more of Palo Verde units are on line and available to regulate switchyard voltage, the voltage will not change significantly following tripping of one unit."*

However, on infrequent occasions, a main generator voltage regulator is switched to DC regulation mode (non-automatic) to perform corrective maintenance or for other reasons. At such times, that unit's main generator voltage regulator is not available to regulate switchyard voltage. During Palo Verde's review of Generic Letter 2006-02, it was found that the plant procedures did not address the possibility that, even with multiple units on line, tripping of one of the units would result in loss of all switchyard voltage control from the Palo Verde units if the other operating unit(s) were in DC regulation mode. This issue has been entered into the plant corrective action program (CRDR 2873519) and a revision to procedure 40OP-9MB01, "Main Generation and Excitation," has been implemented to address this condition. The procedure change was communicated to the operators in a night order.

As previously discussed in response to 3(f), the systematic approach to training (SAT) process has ensured that operators are trained and evaluated on the requirements of LCO 3.8.1 and the associated TS Bases B 3.8.1 for switchyard voltage concerns.

4(b) If your TS bases sections, the final safety analysis report, and plant procedures do not provide guidance regarding situations in which the condition of plant-controlled or -monitored equipment can adversely affect the operability of the NPP offsite power system, explain why you believe you comply with the provisions of GDC 17 and the plant TSs, or describe what actions you intend to take to provide such guidance or procedures.

APS Response

Guidance is provided in TS Bases B 3.8.1 and plant procedure 40OP-9MB01, "Main Generation and Excitation," as discussed in response 4(a).

Use of NPP licensee/TSO protocols and analysis tool by TSOs to assist NPP licensees in monitoring grid conditions for consideration in maintenance risk assessments

The Maintenance Rule (10 CFR 50.65(a)(4)) requires that licensees assess and manage the increase in risk that may result from proposed maintenance activities before performing them.

5. Performance of grid reliability evaluations as part of the maintenance risk assessments required by 10 CFR 50.65(a)(4).

5(a) Is a quantitative or qualitative grid reliability evaluation performed at your NPP as part of the maintenance risk assessment required by 10 CFR 50.65(a)(4) before performing grid-risk-sensitive maintenance activities? This includes surveillances, post-maintenance testing, and preventive and corrective maintenance that could increase the probability of a plant trip or LOOP or impact LOOP or SBO coping capability, for example, before taking a risk-significant piece of equipment (such as an EDG, a battery, a steam-driven pump, an alternate AC power source) out-of-service?

APS Response

Yes, grid related maintenance activities that could impact the off-site power supply to the Palo Verde switchyard receive a quantitative risk assessment. Grid related maintenance activities include work on 1) switchyard breakers or disconnects, 2) startup transformers, and 3) overhead lines. This is implemented in procedure 70DP-0RA05, "Assessment of Risk When Performing Maintenance in Modes 1 and 2."

Palo Verde has defined a minimum set of switchyard components that can be out of service (OOS) before the reliability of the switchyard is impacted. Switchyard maintenance is generally scheduled so that this minimum set of conditions is satisfied. If switchyard maintenance that exceeds this minimum set of conditions is required, then a special risk assessment will be performed. This special risk assessment would be developed by the Palo Verde Probabilistic Risk Analysis (PRA) group working closely with the Electrical Design group.

Switchyard maintenance on 1) start-up transformers and 2) generator output breakers has the ability to be quantified by the EOOS (Equipment out of Service) monitor (Configuration Risk Management tool). EOOS is used to assess the risk of maintenance when a unit is in Mode 1 or 2.

EOOS has the ability to assess the risk due to maintenance of in-plant equipment like 1) battery chargers, 2) diesel generators, 3) gas turbine generators and 4) various safety systems (e.g., auxiliary feedwater, safety injection) in conjunction with the modeled switchyard components stated above.

Palo Verde also uses EOOS to measure the risk of severe weather on off-site power supplies. Palo Verde procedure 40AO-9ZZ21, "Acts of Nature," provides guidance to control room personnel on how to do risk assessments during select severe weather conditions.

A qualitative risk assessment for switchyard plant maintenance is performed for a unit that is in Mode 3 and below. Palo Verde procedure 70DP-0RA01, "Shutdown Risk Assessments," defines how these risk assessments are to be performed.

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.

5(c) Is there a significant variation in the stress on the grid in the vicinity of your NPP site caused by seasonal loads or maintenance activities associated with critical transmission elements? Is there a seasonal variation (or the potential for a seasonal variation) in the LOOP frequency

in the local transmission region? If the answer to either question is yes, discuss the time of year when the variations occur and their magnitude.

APS Response

Palo Verde has no analysis of seasonal variations in the stress on the transmission system in the vicinity of the plant. It is our understanding that transmission line loadings can increase during hot summer conditions or during maintenance activities involving certain transmission elements out of service, such as lines and transformers. However, during these conditions the transmission system must still be operated in accordance with Western Electric Coordinating Counsel (WECC) reliability criteria.

No seasonal variation is currently applied to LOOP frequency (or any other initiator) in the Palo Verde PRA model. Given that severe weather conditions are seasonal, adjustments to the LOOP frequency based on severe weather is treated as an emergent condition and is described in 5(a) above.

The Palo Verde PRA group is currently evaluating NUREG/CR-6890, "Reevaluation of Station Blackout Risks at Nuclear Power Plants," dated December 2005, and EPRI Technical Report 1011759, "Frequency Determination Method for Cascading Grid Events," dated December 2005, to determine if a seasonal adjustment is applicable to Palo Verde. Seasonal adjustment is being considered for 1) grid-related LOOP frequency, 2) grid disturbances (without LOOP) that result in a reactor trip and 3) LOOP following a reactor trip.

5(d) Are known time-related variations in the probability of a LOOP at your plant site considered in the grid-risk-sensitive maintenance evaluation? If not, what is your basis for not considering them?

APS Response

There is not a time-related variation applied to LOOP frequency in the Palo Verde PRA model. Palo Verde is currently evaluating regional and seasonal trends as indicated in response 5(c) above. Neither NUREG/CR-6890 or EPRI Technical Report 1011759 indicate that LOOP frequency should be tied to time of day.

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."

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."

5(g) Do you contact your TSO periodically for the duration of the grid-risk-sensitive maintenance activities?

APS Response

No. Palo Verde relies on the notifications from the TSO discussed in the response to 5(e) and (f).

5(h) If you have a formal agreement or protocol with your TSO, describe how NPP operators and maintenance personnel are trained and tested on this formal agreement or protocol.

APS Response

Palo Verde procedure 40DP-9OP34, "Switchyard Administrative Control," is taught during the initial license training program, and during the on-the-job training process.

The Senior Reactor Operators are trained in how to run various test cases in EOOS. Task #1290620302, "Assess Risk for Unplanned Maintenance," is performed during the on-the-job training phase of the SRO qualification process.

5(i) If your grid reliability evaluation, performed as part of the maintenance risk assessment required by 10 CFR 50.65(a)(4), does not consider or rely on some arrangement for communication with the TSO, explain why you believe you comply with 10 CFR 50.65(a)(4).

APS Response

Not applicable. See the response to 5(e). Palo Verde has communications with the TSO (ECC) in performing grid reliability evaluations.

5(j) If risk is not assessed (when warranted) based on continuing communication with the TSO throughout the duration of grid-risk-sensitive maintenance activities, explain why you believe you have effectively implemented the relevant provisions of the endorsed industry guidance associated with the maintenance rule.

APS Response

Not applicable. Palo Verde relies on communications as described in 5(e) and 5(f) with the TSO (ECC) throughout the duration of grid-risk-sensitive activities

5(k) With respect to questions 5(i) and 5(j), you may, as an alternative, describe what actions you intend to take to ensure that the increase in risk that may result from proposed grid-risk-sensitive activities is assessed before and during grid-risk-sensitive maintenance activities, respectively.

APS Response

Not applicable based on the responses to 5(i) and 5(j).

6. Use of risk assessment results, including the results of grid reliability evaluations, in managing maintenance risk, as required by 10 CFR 50.65(a)(4).

6(a) Does the TSO coordinate transmission system maintenance activities that can have an impact on the NPP operation with the NPP operator?

APS Response

Yes. Procedure 40DP-9OP34, "Switchyard Administrative Control," establishes the working interfaces between Palo Verde personnel, the TSO (ECC), and the switchyard operator, Salt River Project (SRP). This procedure also provides the process for coordination of maintenance and testing activities conducted in the 525 kV Switchyard.

The TSO is directed to notify the Unit 1 Operations Department Leader or designee of all work requests associated with the Palo Verde 525 kV switchyard equipment and on lines terminating at the switchyard that could potentially impact the operation of Palo Verde.

The affected Unit Work Control, Control Room Supervisors are directed to review the APS Work Request. The Palo Verde Unit 1 Operations Department Leader or designee is directed to notify the APS System Operations Planner regarding approval or disapproval of the work requested. Work scope changes must be approved by the appropriate Work Control Work Week Manager and Work Control SRO.

6(b) Do you coordinate NPP maintenance activities that can have an impact on the transmission system with the TSO?

APS Response

Yes. Procedure 40DP-9OP34, "Switchyard Administrative Control," establishes interfaces between the NPP and the TSO during NPP maintenance activities. This procedure also describes the special limitations placed on the 525 kV switchyard and the startup transformer yard during sensitive plant evolutions. These limits include:

- Notification of ECC prior to operating Main Generator and Start-up Transformer power circuit breakers and associated motor operated disconnects,
- Restricted entry into the 525kV switchyard during high risk evolutions,
- Controlled vehicular access to the startup transformer yard to protect important electrical equipment from damage due to contact with overhead lines by high profile vehicles and impact from vehicles,
- High risk evolutions or emergencies that include enforcement discretion when offsite power sources are crucial for justifying operation beyond Technical Specification actions times,
- Operating problems or emergency work requests that may result in issues with plant generating capacity or 525 kV Switchyard equipment problems, and

- Reduced inventory conditions where a LOOP could impact the operation of the shutdown cooling system.

Palo Verde is directed to notify the APS Resource Operations Department for outages or curtailments that affect the output of the Palo Verde generators.

Palo Verde is directed to submit clearance requests for switchyard motor-operated disconnect switches and circuit breakers to the APS System Operations Planner.

Additionally, procedure 40OP-9ZZ16, "RCS Drain Operations," provides specific controls on access to the 525 kV Switchyard during reduced inventory operations.

6(c) Do you consider and implement, if warranted, the rescheduling of grid-risk-sensitive maintenance activities (activities that could (i) increase the likelihood of a plant trip, (ii) increase LOOP probability, or (iii) reduce LOOP or SBO coping capability) under existing, imminent, or worsening degraded grid reliability conditions?

APS Response

Yes. Grid-risk-sensitive maintenance is performed after the risk is assessed and any risk management actions have been put in place per the requirements of the maintenance rule. When the maintenance work is done in response to a Technical Specification, the risk assessment is informative for sequencing tasks, but not controlling.

Emergent issues with the grid are managed to maintain a high level of plant safety. At times appropriate management means rescheduling activities, at other times the shift-supervisor will order the on-shift NPP staff to back-out of the task and restore the safety-related function of the equipment.

6(d) If there is an overriding need to perform grid-risk-sensitive maintenance activities under existing or imminent conditions of degraded grid reliability, or continue grid-risk-sensitive maintenance when grid conditions worsen, do you implement appropriate risk management actions? If so, describe the actions that you would take. (These actions could include alternate equipment protection and compensatory measures to limit or minimize risk.)

APS Response

Generally speaking, grid related maintenance activities could be rescheduled to a time period where degraded grid reliability does not exist. The components most likely to impact risk by being out of service in the event of decreased grid reliability are 1) diesel

generators and associated support systems and 2) gas turbine generators. Palo Verde has a set of proceduralized scheduling rules that prohibits scheduling of concurrent maintenance on 1) a diesel generator (in any unit) and a gas turbine generator, 2) a diesel generator in multiple units and 3) diesel generator (in any unit) or gas turbine generator and a 13.8 kV bus (off-site supply) (Appendix B of procedure 70DP-0RA05, "Assessment and Management of Risk When Performing Maintenance in Modes 1 and 2").

The requirement for contingency actions that are put into place due to maintenance activities are defined by the associated risk management action level (RMAL). Contingency actions can be put in place for limited types of maintenance to maintain SSC availability. For the case of maintaining SSC availability, contingency actions credited must be contained in approved station procedures.

High risk RMAL of Orange and Red may require contingency actions to be in place not for SSC availability but for the work contributing to the high risk RMAL to be performed.

6(e) Describe the actions associated with questions 6(a) through 6(d) above that would be taken, state whether each action is governed by documented procedures and identify the procedures, and explain why these actions are effective and will be consistently accomplished.

APS Response

With regard to question 6(a), transmission suppliers to Palo Verde are required to notify Palo Verde, via the TSO (ECC), of all switching, and/or scheduled work on any 525kV line or series capacitor bank that affects Palo Verde in accordance with procedure 40DP-9OP34, "Switchyard Administrative Control."

With regard to question 6(b), Palo Verde is responsible for notifying the TSO and Salt River Project (SRP) of activities in the 525kV switchyard and adjacent Startup Transformer yards in accordance with procedure 40DP-9OP34, "Switchyard Administrative Control."

With regard to questions 6(c) and 6(d), maintenance activities that require entry into an Orange RMAL require 1) consideration of contingency plans to restore out of service equipment, and 2) rapid restoration of out of service equipment. These requirements are discussed in procedure 70DP-0RA05, "Assessment and Management of Risk When Performing Maintenance in Modes 1 and 2."

Also with regard to questions 6(c) and 6(d), maintenance activities that require entry into an Red RMAL require 1) a specific risk assessment of the specific plant condition(s) and alternative options, 2) establishing additional barriers such as protecting redundant SSCs, if deemed necessary by the PRA analysis, 3) restoring out of service equipment rapidly, and 4) working around the clock to restore the condition. These requirements

are discussed in procedure 70DP-0RA05, "Assessment and Management of Risk When Performing Maintenance in Modes 1 and 2."

6(f) Describe how NPP operators and maintenance personnel are trained and tested to assure they can accomplish the actions described in your answers to question 6(e).

APS Response

As discussed in response 1(d), the operators are trained in regard to Technical Specifications and their bases. The operators are also trained on how to input equipment into EOOS.

Late in 2002 (cycle 5), the licensed operators were given a 2 hour classroom presentation on the EOOS system. Concepts of risk monitoring / managing, how to run "what if" test cases, and practice exercises were performed in the classroom. In the Licensed Operator Initial Training program, the license candidate receives classroom instruction, and then OJT training related to the assessment of risk, and performance of unplanned maintenance.

The work control organization coordinates with the switchyard operator, and their training consist of on-the-job training and briefings. In 2004, the PRA group provided a risk evaluation and management briefing to licensed operators.

6(g) If there is no effective coordination between the NPP operator and the TSO regarding transmission system maintenance or NPP maintenance activities, please explain why you believe you comply with the provisions of 10 CFR 50.65(a)(4).

APS Response

Not applicable. As described in the responses to 6(a) and 6(b), there is coordination of maintenance activities between Palo Verde and the TSO (ECC).

6(h) If you do not consider and effectively implement appropriate risk management actions during the conditions described above, explain why you believe you effectively addressed the relevant provisions of the associated NRC-endorsed industry guidance.

APS Response

Not applicable. Risk management actions levels are implemented for the conditions described in the response to 6(d).

6(i) You may, as an alternative to questions 6(g) and 6(h) describe what actions you intend to take to ensure that the increase in risk that may result from grid-risk-sensitive maintenance activities is managed in accordance with 10 CFR 50.65(a)(4).

APS Response

Not applicable based on the responses to 6(g) and 6(h).

Offsite power restoration procedures in accordance with 10 CFR 50.63 as developed in Section 2 of RG 1.155

Pursuant to 10 CFR 50.63, the NRC requires that each NPP licensed to operate be able to withstand an SBO for a specified duration and recover from the SBO. NRC RG 1.155 gives licensees guidance on developing their approaches for complying with 10 CFR 50.63.

7. Procedures for identifying local power sources that could be made available to resupply your plant following a LOOP event.

7(a) Briefly describe any agreement made with the TSO to identify local power sources that could be made available to re-supply power to your plant following a LOOP event.

APS Response

In the event of a Palo Verde station blackout event, on-site gas turbine generators (GTGs) operated by Palo Verde personnel are used as the alternate AC (AAC) source to provide power to the essential AC equipment. The NRC accepted the use of the on-site GTGs as the AAC power source for SBO in their safety evaluation dated February 11, 1992. The use of the on-site GTGs as the AAC power source for SBO is also in the revised SBO evaluation that was submitted to the NRC for review and approval in letter no. 102-05370, dated October 28, 2005 (ADAMS accession no. ML053120390). (Further discussion of the October 28, 2005 submittal is provided in the response to 8(b)).

If a loss of offsite power (LOOP) event is caused by a localized transmission system outage, multiple transmission paths into the Palo Verde switchyard can be used in the restoration process. For example, following the June 14, 2004 event involving a fault to the northeast of Palo Verde, power was restored to the switchyard in about one hour from the transmission system to the south of Palo Verde.

In the event of a total blackout of the Arizona transmission system, the TSO (ECC) would utilize their blackstart system restoration procedures to systematically reenergize

the system. These procedures place a priority on restoration of the Palo Verde offsite power circuits.

7(b) Are your NPP operators trained and tested on identifying and using local power sources to resupply your plant following a LOOP event? If so, describe how.

APS Response

Methods to restore power following a LOOP event are trained and evaluated in both the classroom and simulator. Procedures that employ "standard appendices" discuss methods to bring power from a multitude of sources, including the gas turbine generators (located at the water treatment facility), another unit's diesel generator, and the transmission system. These are required to be trained every 2 years per the current training program description.

7(c) If you have not established an agreement with your plant's TSO to identify local power sources that could be made available to resupply power to your plant following a LOOP event, explain why you believe you comply with the provisions of 10 CFR 50.63, or describe what actions you intend to take to establish compliance.

APS Response

Not applicable. See discussion in response to 7(a).

Losses of offsite power caused by grid failures at a frequency of equal to or greater than once in 20 site-years in accordance with Table 4 of Regulatory Guide 1.155 for complying with 10 CFR 50.63

Pursuant to 10 CFR 50.63, the NRC requires that each NPP licensed to operate be able to withstand an SBO for a specified duration and recover from the SBO. NRC RG 1.155 gives licensees guidance on developing their approaches for complying with 10 CFR 50.63.

8. Maintaining SBO coping capabilities in accordance with 10 CFR 50.63.

8(a) Has your NPP experienced a total LOOP caused by grid failure since the plant's coping duration was initially determined under 10 CFR 50.63?

APS Response

Yes. On June 14, 2004, offsite power was lost to all three Palo Verde units.

8(b) If so, have you reevaluated the NPP using the guidance in Table 4 of RG 1.155 to determine if your NPP should be assigned to the P3 offsite power design characteristic group?

APS Response

APS reevaluated the SBO coping duration for the Palo Verde units and committed to revise the coping duration from four hours to 16 hours. The revised SBO evaluation was submitted to the NRC for review and approval in letter no. 102-05370, dated October 28, 2005 (ADAMS accession no. ML053120390). The NRC is currently reviewing the revised SBO evaluation.

In addition, the following license condition, as proposed by APS in letter no. 102-05363, dated October 21, 2005, (ADAMS accession no. ML053040130) was issued to Palo Verde with Amendment No. 157 for Palo Verde Units 1, 2, and 3 dated November 16, 2005 (ADAMS accession no. ML053130286):

> *"APS will implement the changes needed to revise from a 4-hour station blackout coping duration to a 16-hour coping duration within 6 months following NRC approval of the proposed coping changes."*

8(c) If so, what were the results of this reevaluation, and did the initially determined coping duration for the NPP need to be adjusted?

APS Response

APS has committed to revise the Palo Verde SBO coping duration from four hours to 16 hours as discussed in the response to 8(b).

8(d) If your NPP has experienced a total LOOP caused by grid failure since the plant's coping duration was initially determined under 10 CFR 50.63 and has not been reevaluated using the guidance in Table 4 of RG 1.155, explain why you believe you comply with the provisions of 10 CFR 50.63 as stated above, or describe what actions you intend to take to ensure that the NPP maintains its SBO coping capabilities in accordance with 10 CFR 50.63.

APS Response

Not applicable. APS reevaluated the SBO coping duration for the Palo Verde units and committed to revise the coping duration from four hours to 16 hours, as discussed in the response to 8(b).

Actions to ensure compliance

9. If you determine that any action is warranted to bring your NPP into compliance with NRC regulatory requirements, including TSs, GDC 17, 10 CFR 50.65(a)(4), 10 CFR 50.63, 10 CFR 55.59 or 10 CFR 50.120, describe the schedule for implementing it.

APS Response

Palo Verde complies with the regulatory requirements discussed in this Generic Letter 2006-02, and therefore no action is needed to bring Palo Verde into compliance with NRC regulatory requirements, including TSs, GDC 17, 10 CFR 50.65(a)(4), 10 CFR 50.63, 10 CFR 55.59 and 10 CFR 50.120.

ACRONYMS AND ABBREVIATIONS

APS	Arizona Public Service Co.
ECC	Energy Control Center
EPRI	Electrical Power Research Institute
EOOS	Equipment out of Service monitor
GDC	General design criterion
GL	Generic letter
ISO	Independent system operator
LCO	Limiting condition for operation
LOCA	Loss of coolant accident
LOIT	Licensed operator initial training
LOCT	Licensed operator continuing training
LOOP	Loss of offsite power
MVAR	Mega volt amperes reactive
NPP	Nuclear power plant
NRC	Nuclear Regulatory Commission
OJT	On-the-job training
OOS	Out of service
PRA	Probabilistic risk assessment
RC/RA	Reliability coordinator/authority
RMAL	Risk management action level
SAT	Systems approach to training
SBO	Station blackout
SRO	Senior reactor operator
SRP	Salt River Project
SSC	Systems, structures, and components
TS	Technical specification
TSO	Transmission system operator
WECC	Western Electricity Coordinating Council
WWM	Work week manager