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102-04619-SAB/TNW/DWG
October 23, 2001

U. S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Mail Station P1-37
Washington, DC 20555-0001

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2, and 3
Docket Nos. STN 50-528/529/530
Technical Specifications Bases Revision 13 Update

Pursuant to PVNGS Technical Specification (TS) 5.5.14, "Technical Specifications Bases Control Program," Arizona Public Service Company (APS) is submitting changes to the TS Bases incorporated into Revision 13, implemented on October 19, 2001. The Revision 13 insertion instructions and replacement pages are provided in the Enclosure.

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

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

Sincerely,

Scott A. Bauer

SAB/TNW/DWG/kg

Enclosure: PVNGS Technical Specification Bases Revision 13
Insertion Instructions and Replacement Pages

cc: E. W. Merschoff (all w/o enclosure)
L. R. Wharton
J. H. Moorman

A001

ENCLOSURE

PVNGS
Technical Specification Bases
Revision 13

Insertion Instructions and
Replacement Pages

PVNGS Technical Specifications Bases
Revision 13
Insertion Instructions

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PVNGS

Palo Verde Nuclear Generating Station
Units 1, 2, and 3

Technical Specification Bases

Revision 13
October 19, 2001

PALO VERDE

TECHNICAL SPECIFICATION BASES
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BASES

BACKGROUND (continued)

certain anticipated operational occurrences (AOOs) and design basis accidents (DBAs), the voltage to ESF buses PBA-S03 and PBB-S04 would change as a result of one or more of the following three automatic operations: (1) tripping of the generating unit, (2) fast bus transfer of the non-Class 1E distribution system to the startup transformers, and (3) powering of the ESF loads by the automatic load sequencer. Analyses have been performed to determine the magnitude of voltage change due to each of these operations. Under conditions where these voltage changes would result in either inadequate voltages to the ESF equipment or tripping of the degraded voltage relays, the guidance from Regulatory Guide 1.93 (Ref. 6) is not met and the affected offsite circuit(s) do not meet their required capability.

Tripping of a Palo Verde unit can result in either a decrease or increase in the switchyard voltage due to the change in the flow of volt-amperes reactive (VARs) into or out of the electrical grid. The maximum voltage change (following the trip of the only operating unit) has been determined analytically. This analysis bounds the condition of one 525 kV line out of service and no Palo Verde unit on line during the event (assumes unit trip at the beginning of the event while the unit is providing switchyard voltage support). In that case, tripping of the unit results in loss of local switchyard voltage control, and the switchyard voltage has more latitude to change than it would with one or both of the other Palo Verde units remaining on line.

If an accident results in a loss of local switchyard voltage control (last operating unit loses capability to regulate switchyard voltage) and more than one 525 kV transmission line is out of service, the condition is not bounded by the transmission system studies.

Voltage analyses also conclude that the maximum switchyard voltage should not exceed 535.5 kV. However, even if this limit is exceeded, the offsite circuits still have the capability to effect a safe shutdown, mitigate the effects of an accident, and continue to meet the operability

(continued)

BASES

BACKGROUND (continued)

requirements of Regulatory Guide 1.93 (Ref. 6). Although sustained overvoltages can cause accelerated aging of electrical equipment, this would not cause catastrophic equipment failure or unavailability. Furthermore, an overvoltage condition can be corrected quickly by adjustment of the MVAR output of the Palo Verde generator(s). Therefore, there is no LCO for high switchyard voltage.

Grid frequency can also affect the operation of safety equipment. For example, high frequency can result in an excessive differential pressure across motor operated valves, and low frequency can result in substandard pump flow. There are no LCOs for offsite circuit frequency, because the grid frequency is continuously monitored and maintained within a tight tolerance by non-Palo Verde organizations. These organizations utilize various automatic and manual methods to control frequency, such as maintaining a spinning reserve, load shedding, and turbine-governor controls. Analyses, as documented in UFSAR Appendix 8B (Ref. 2), and operating experience have demonstrated that the tripping of a Palo Verde unit has a minimal effect on grid frequency.

APPLICABLE SAFETY ANALYSES

The initial conditions of DBA and transient analyses in the updated FSAR, Chapter 6 (Ref. 4) and Chapter 15 (Ref. 5), assume ESF systems are OPERABLE. The AC electrical power sources are designed to provide sufficient capacity, capability, redundancy, and reliability to ensure the availability of necessary power to ESF systems so that the fuel, Reactor Coolant System (RCS), and containment design limits are not exceeded. These limits are discussed in more detail in the Bases for Section 3.2, Power Distribution Limits; Section 3.4, Reactor Coolant System (RCS); and Section 3.6, Containment Systems.

The OPERABILITY of the AC electrical power sources is consistent with the initial assumptions of the accident analyses and is based upon meeting the design basis of the unit. This results in maintaining at least one train of the onsite or offsite AC sources OPERABLE during accident conditions in the event of:

a. An assumed loss of all offsite power or all onsite AC power; and

b. A worst case single failure.

(continued)

BASES

ACTIONS

G.1 and G.2 (continued)

Maximum Post-Trip Loading (MVA_{max})

The maximum allowable post-trip loading is based on the following:

- If the unit under consideration is not the only Palo Verde unit available to regulate the switchyard voltage (one or both of the other Palo Verde units online and available to regulate the switchyard voltage) or the unit under consideration is not providing switchyard voltage support (generator gross MVAR output is ≤ 0), then MVA_{MAX} = (KV-490) x 2 where *KV* = steady state switchyard kilovolts. A voltage dip lasting less than 35 seconds is considered a transient, rather than a steady-state, condition, and would not require evaluation.
- If the unit under consideration is the only Palo Verde unit operating, is providing switchyard voltage support, and all five 525 kV lines are in service (Devers, Kyrene, North Gila, Westwing 1, and Westwing 2), MVA_{MAX} = 50.8 MVA.
- If the unit under consideration is the only Palo Verde unit operating, is providing switchyard voltage support, and four of the five 525 kV lines are in service, MVA_{MAX} = 44 MVA.
- If the unit under consideration is the only Palo Verde unit operating, is providing switchyard voltage support, and less than four 525 kV lines are in service, the offsite circuits do not meet their required capability.

The formula for MVA_{MAX} is based on calculations, 01, 02, 03-EC-MA-221, which analyze many different bus alignment conditions. The load limit is conservative, with sufficient margin to account for analytical uncertainties and to provide assurance that the degraded voltage relays will not actuate as a result of an accident.

If one or more of the other Palo Verde units is online and available to regulate switchyard voltage, the voltage will not change significantly following an accident in the unit under consideration. Therefore, the steady-state pre-trip

(continued)

BASES

ACTIONS

G.1 and G.2 (continued)

voltage can be used in the formula which calculates MVA_{MAX}. The voltage used in the formula is the actual switchyard voltage. Therefore, loop uncertainty of the measuring equipment, as determined by Engineering, must also be taken into account. A voltage dip lasting 35 seconds or less is considered a transient, rather than steady-state, condition based on the credited 35 second time delay of the degraded voltage relay.

If an accident results in a loss of local switchyard voltage control (last operating unit trips while providing switchyard voltage support), transmission system studies have concluded that the switchyard voltage will stabilize at or above 515.4 kV with all transmission lines in service, and 512 kV with four transmission lines in service. At these switchyard voltages, control of MVA_{PRED} at or below the allowed MVA_{MAX} assures that the degraded voltage relays will not actuate. If the last operating unit is not providing switchyard voltage support (generator gross MVAR output ≤ 0) and it trips, then the post-trip switchyard voltage will be equal to or greater than the pre-trip switchyard voltage.

If the required capability in Condition G is not met, the effects of an AOO or DBA could cause further depression of the voltage at the ESF bus and actuation of the degraded voltage relays. These actuations would result in disconnection of the bus from the offsite circuits. Regulatory Guide 1.93 (Ref. 6) defines this condition as "The Available Offsite Power Sources Are One Less Than the LCO" or "The Available Offsite AC Power Sources Are Two Less Than the LCO," depending on the number of affected circuits. However, degraded post-trip voltage could also cause ESF electrical equipment to be exposed to a degraded condition during the degraded voltage relay time-out period. There is a risk that equipment misoperation or damage could occur during this time. In this scenario, the ESF equipment may not perform as designed following an automatic disconnection of the offsite circuits and reconnection to the diesel generators (DGs), even though adequate power is available from the DG. For certain DBAs, an additional consideration is that the initial sequencing of the ESF equipment onto the offsite circuits, subsequent tripping of the degraded voltage relays, and interruption in equipment credited in the UFSAR Chapter 6 and 15 safety analyses could challenge the credited equipment response times. Therefore, it is appropriate to implement Required Actions that are more stringent than those specified in Condition A or C.

(continued)

BASES

ACTIONS

G.1 and G.2 (continued)

If the required capability in Condition G is not met, the following options are available to restore full or partial Operability. Options are listed in their order of preference.

1. Improve post-trip switchyard voltage.

   - If more than one Palo Verde unit is operating, post-trip switchyard voltage is improved by raising switchyard voltage either by increased MVAR output of any Palo Verde unit, or by any number of methods implemented by the Energy Control Center.

   - If only one Palo Verde unit is operating, post-trip switchyard voltage is improved by any number of methods implemented by the Energy Control Center while maintaining the generator gross MVAR output of the Palo Verde unit to ≤ 0.

2. Reduce post-trip loading. One way that this could be accomplished is by disabling fast bus transfer. Although Palo Verde has no formal restrictions on the amount of time that fast bus transfer can be out of service, this option should be used judiciously in order to maintain forced circulation capability. Besides blocking fast bus transfer, there may be other methods available to reduce the loading, such as removing loads or realigning equipment power sources. With only one Palo Verde unit operating, this option does not apply if that unit is providing switchyard voltage support (generator gross MVAR output > 0) and there are less than four transmission lines in service.

3. Transfer the safety bus(es) to the diesel generator(s). This is less desirable than option 2, because it would perturb the plant. It would cause the plant to remain in an LCO 3.8.1 condition (A or C, depending on whether one or two buses are transferred).

Options 1 and 2 satisfy Required Action G.1, and Option 3 satisfies Required Action G.2. With more than one offsite circuit that does not meet the required capability, Condition G could be satisfied for each offsite circuit by the use of Required Action G.1 or G.2. The Completion

(continued)

BASES

ACTIONS

G.1 and G.2 (continued)

Time for both Required Action G.1 and G.2 is one hour. 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 circuits 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.

Required Action G.2 is modified by a Note. The reason for the Note is to ensure that the offsite circuit is not inoperable for a time greater than the Completion Time allowed by LCO 3.8.1 Condition A or C. Therefore, if Conditions A or C are entered, the Completion Time clock for Conditions A and C would start at the time Condition G was entered.

H.1 and H.2

If the inoperable AC electrical power sources cannot be restored to OPERABLE status within the required Completion Time, the unit must be brought to a MODE in which the LCO does not apply. To achieve this status, the unit must be brought to at least MODE 3 within 6 hours and to MODE 5 within 36 hours. The allowed Completion Times are reasonable, based on operating experience, to reach the required unit conditions from full power conditions in an orderly manner and without challenging unit systems.

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