Angela K. Krainik
Director
Regulatory Affairs
Palo Verde Nuclear
Generating Station

Tel: 623/393-5421
Fax: 623/393-5442

Mail Station 7636
P.O. Box 52034
Phoenix, AZ 85072-2034

102-04472- AKK/SAB/GAM
August 2, 2000

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 4 Update

Pursuant to PVNGS Technical Specification (TS) 5.5.14, "Technical Specifications Bases Control Program," Arizona Public Service Company (APS) is submitting the changes to the TS Bases incorporated into Revision 4. These changes are provided in the enclosure on Revision 4 pages with the changes identified by revision bars. Also enclosed are insertion instructions for the Revision 4 pages.

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

Should you have any questions, please contact Scott A. Bauer at (623) 393-5978.

Sincerely,

Angela K Krainik

AKK/SAB/GAM/kg

Enclosure

cc: E. W. Merschoff (all w/o enclosure)
M. B. Fields
J. H. Moorman

A001

PVNGS Technical Specifications Bases Revision 4

Insertion Instructions and

Revised Pages

PVNGS Technical Specifications Bases
Revision 4
Insertion Instructions

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PVNGS

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

Technical Specification Bases

Revision 4
July 28, 2000

PALO VERDE

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B 3.7.8-2	1		B 3.8.1-15	2	
B 3.7.8-3	1		B 3.8.1-16	2	
B 3.7.8-4	1		B 3.8.1-17	2	
B 3.7.9-1	0		B 3.8.1-18	2	
B 3.7.9-2	1		B 3.8.1-19	2	
B 3.7.9-3	0		B 3.8.1-20	2	
B 3.7.10-1	0		B 3.8.1-21	2	
B 3.7.10-2	1		B 3.8.1-22	2	
B 3.7.10-3	1		B 3.8.1-23	2	
B 3.7.10-4	1		B 3.8.1-24	4	
B 3.7.11-1	0		B 3.8.1-25	2	
B 3.7.11-2	0		B 3.8.1-26	2	
B 3.7.11-3	1		B 3.8.1-27	2	
B 3.7.11-4	0		B 3.8.1-28	2	
B 3.7.11-5	0		B 3.8.1-29	2	
B 3.7.11-6	1		B 3.8.1-30	2	
B 3.7.12-1	1		B 3.8.1-31	2	
B 3.7.12-2	1		B 3.8.1-32	2	
B 3.7.12-3	0		B 3.8.1-33	2	
B 3.7.12-4	0		B 3.8.1-34	2	
B 3.7.13-1	0		B 3.8.1-35	2	
B 3.7.13-2	0		B 3.8.1-36	2	
B 3.7.13-3	0		B 3.8.1-37	2	
B 3.7.13-4	0		B 3.8.1-38	2	
B 3.7.13-5	0		B 3.8.1-39	2	
B 3.7.14-1	0		B 3.8.2-1	0	
B 3.7.14-2	0		B 3.8.2-2	0	
B 3.7.14-3	0		B 3.8.2-3	0	
B 3.7.15-1	3		B 3.8.2-4	0	
B 3.7.15-2	3		B 3.8.2-5	0	

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B 3.8.2-6	0		B 3.8.10-1	0	
B 3.8.3-1	0		B 3.8.10-2	0	
B 3.8.3-2	0		B 3.8.10-3	0	
B 3.8.3-3	0		B 3.8.10-4	0	
B 3.8.3-4	0		B 3.9.1-1	0	
B 3.8.3-5	1		B 3.9.1-2	0	
B 3.8.3-6	0		B 3.9.1-3	0	
B 3.8.3-7	0		B 3.9.1-4	0	
B 3.8.3-8	0		B 3.9.2-1	0	
B 3.8.3-9	0		B 3.9.2-2	0	
B 3.8.4-1	0		B 3.9.2-3	1	
B 3.8.4-2	0		B 3.9.2-4	1	
B 3.8.4-3	0		B 3.9.3-1	0	
B 3.8.4-4	2		B 3.9.3-2	0	
B 3.8.4-5	2		B 3.9.3-3	0	
B 3.8.4-6	2		B 3.9.3-4	0	
B 3.8.4-7	2		B 3.9.3-5	1	
B 3.8.4-8	2		B 3.9.4-1	0	
B 3.8.4-9	2		B 3.9.4-2	1	
B 3.8.4-10	2		B 3.9.4-3	0	
B 3.8.4-11	2		B 3.9.4-4	0	
B 3.8.5-1	1		B 3.9.5-1	0	
B 3.8.5-2	1		B 3.9.5-2	1	
B 3.8.5-3	1		B 3.9.5-3	0	
B 3.8.5-4	1		B 3.9.5-4	0	
B 3.8.5-5	2		B 3.9.6-1	0	
B 3.8.5-6	2		B 3.9.6-2	0	
B 3.8.6-1	0		B 3.9.6-3	0	
B 3.8.6-2	0		B 3.9.7-1	0	
B 3.8.6-3	0		B 3.9.7-2	0	
B 3.8.6-4	0		B 3.9.7-3	0	
B 3.8.6-5	1				
B 3.8.6-6	1				
B 3.8.6-7	0				
B 3.8.7-1	0				
B 3.8.7-2	0				
B 3.8.7-3	0				
B 3.8.7-4	0				
B 3.8.8-1	1				
B 3.8.8-2	1				
B 3.8.8-3	1				
B 3.8.8-4	1				
B 3.8.8-5	1				
B 3.8.9-1	0				
B 3.8.9-2	0				
B 3.8.9-3	0				
B 3.8.9-4	0				
B 3.8.9-5	0				
B 3.8.9-6	0				
B 3.8.9-7	0				
B 3.8.9-8	0				
B 3.8.9-9	0				
B 3.8.9-10	0				
B 3.8.9-11	0				

BASES

APPLICABLE SAFETY ANALYSES

During accident conditions, the RWT provides a source of borated water to the HPSI, LPSI and containment spray pumps. As such, it provides containment cooling and depressurization, core cooling, and replacement inventory and is a source of negative reactivity for reactor shutdown (Ref. 1). The design basis transients and applicable safety analyses concerning each of these systems are discussed in the Applicable Safety Analyses section of Bases B 3.5.3, "ECCS – Operating," and B 3.6.6, "Containment Spray." These analyses are used to assess changes to the RWT in order to evaluate their effects in relation to the acceptance limits.

The volume limit of Figure 3.5.5-1 for the ESF function is based on two factors:

a. A required volume of 558,978 gallons (138' 11") must be available to provide inventory to the ESF pumps prior to reaching a low level switchover to the containment sump for recirculation. This ESF Reserve Volume ensures that the ESF pump suction will not be aligned to the containment sump until the point at which 75% of the minimum design flow of one HPSI pump is capable of meeting or exceeding the decay heat boil-off rate.

b. A required volume of 576,616 gallons to ensure that sufficient water will be transferred to the sump for adequate net positive suction head to support continued ESF pump operation after the switchover to recirculation occurs.

By time of recirculation, the water level in the containment sump must be sufficient to provide adequate Net Positive Suction Head (NPSH) for both trains of HPSI, LPSI, and containment spray pumps operating at runout conditions. Accounting for LPSI pump operation is conservative because these pumps trip automatically upon RAS and are not required during recirculation. The minimum containment sump level can be achieved considering only the inventory specified in the RWT plus limited contributions from safety

(continued)

BASES

APPLICABLE SAFETY ANALYSES (continued)

injection tanks and the reactor coolant. The resultant containment water inventory is further reduced due to the effects of evaporation and flashing of post-accident fluid; holdup in containment atmosphere, subcompartments, and reservoirs due to containment spray operation; and diversions of RWT to the CVCS via the high suction nozzle. Leakages from injection and recirculation equipment to areas outside the containment during the first 24 hours of the event are expected to be small in comparison with the overall conservatism in the analysis and are therefore neglected. Consistent with the positions in Regulatory Guides 1.1 and 1.82, no credit was taken for containment pressure in calculating available NPSH.

The 4000 ppm limit for minimum boron concentration was established to ensure that, following a LOCA with a minimum level in the RWT, the reactor will remain subcritical in the cold condition following mixing of the RWT and RCS water volumes. Small break LOCAs assume that all control rods are inserted, except for the Control Element Assembly (CEA) of highest worth, which is withdrawn from the core. Large break LOCAs assume that all CEAs remain withdrawn from the core. The most limiting case occurs at beginning of core life.

The maximum boron limit of 4400 ppm in the RWT is based on boron precipitation in the core following a LOCA. With the reactor vessel at saturated conditions, the core dissipates heat by pool nucleate boiling. Because of this boiling phenomenon in the core, the boric acid concentration will increase in this region. If allowed to proceed in this manner, a point will be reached where boron precipitation will occur in the core. Post LOCA emergency procedures direct the operator to establish simultaneous hot and cold leg injection to prevent this condition by establishing a forced flow path through the core regardless of break location. These procedures are based on the minimum time in which precipitation could occur, assuming that maximum boron concentrations exist in the borated water sources used for injection following a LOCA. Boron concentrations in the RWT in excess of the limit could result in precipitation earlier than assumed in the analysis.

The upper limit of 120°F and the lower limit of 60°F on RWT temperature are the limits assumed in the accident

(continued)

BASES

ACTIONS (continued)

I.1

Condition I corresponds to a level of degradation in which all redundancy in the AC electrical power supplies has been lost. At this severely degraded level, any further losses in the AC electrical power system will cause a loss of function. Therefore, no additional time is justified for continued operation. The unit is required by LCO 3.0.3 to commence a controlled shutdown.

SURVEILLANCE REQUIREMENTS

The AC sources are designed to permit inspection and testing of all important areas and features, especially those that have a standby function, in accordance with 10 CFR 50, Appendix A, GDC 18 (Ref. 8). Periodic component tests are supplemented by extensive functional tests during refueling outages (under simulated accident conditions).

The SR for demonstrating OPERABILITY of the DGs are based on the recommendations of Regulatory Guide 1.9 (Ref. 3), unless otherwise noted in the Updated FSAR Section 1.8.

The DG capabilities (starting and loading) are required to be met from a variety of initial conditions such as DG in standby condition with the engine hot (SR 3.8.1.15) and DG in standby condition with the engine at normal keep-warm conditions (SR 3.8.1.2, SR 3.8.1.7 and SR 3.8.1.19). Although it is expected that most DG starts will be performed from normal keep-warm conditions, DG starts should be performed with the jacket water cooling and lube oil temperatures within the lower to upper limits of DG OPERABILITY, except as noted above. Rapid cooling of the DG down to normal keep-warm conditions should be minimized.

The required steady state frequency range for the DG is 60 +1.2/-0.3 Hz to be consistent with the safety analysis to provide adequate safety injection flow. In accordance with the guidance provided in Regulatory Guide 1.9 (Ref. 3), where steady state conditions do not exist (i.e., transients), the frequency range should be restored to within ± 2% of the 60 Hz nominal frequency (58.8 Hz to 61.2 Hz).

Specific MODE restraints have been footnoted where applicable to each 18 month SR. The reason for "This Surveillance shall not be performed in MODE 1 or 2" is that

(continued)

BASES

SURVEILLANCE REQUIREMENTS (continued)

during operation with the reactor critical, performance of this SR could cause perturbations to the EDS that could challenge continued steady state operation and, as a result, unit safety systems; or that performing the SR would remove a required DG from service. The reason for "This Surveillance shall not be performed in MODE 1, 2, 3, or 4" is that performing this SR would remove a required offsite circuit from service, perturb the EDS, and challenge safety systems.

SR 3.8.1.1

This SR assures proper circuit continuity for the offsite AC electrical power supply to the onsite distribution network and indicated availability of offsite AC electrical power. The breaker alignment verifies that each breaker is in its correct position to ensure that distribution buses and loads are connected to their preferred power source, and that appropriate independence of offsite circuits is maintained. The 7 day Frequency is adequate since breaker position is not likely to change without the operator being aware of it and because its status is displayed in the control room.

SR 3.8.1.2 and SR 3.8.1.7

These SRs help to ensure the availability of the standby electrical power supply to mitigate DBAs and transients and to maintain the unit in a safe shutdown condition.

To minimize the wear on moving parts that do not get lubricated when the engine is not running, these SRs are modified by a Note to indicate that all DG starts for these Surveillances may be preceded by an engine prelube period and followed by a warmup period prior to loading.

For the purposes of SR 3.8.1.2 and SR 3.8.1.7 testing, the DGs are started from standby condition. Standby conditions for a DG mean that the engine lube oil and coolant temperatures are maintained consistent with manufacturer recommendations. Additionally, during standby conditions the diesel engine lube oil is circulated continuously and the engine coolant is circulated on and off via thermostatic control.

In order to reduce stress and wear on diesel engines, the DG manufacturer recommends a modified start in which the starting speed of DGs is limited, warmup is limited to this

(continued)