Arizona Nuclear Power Project
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April 14, 1989

Docket Nos. STN 50-528/529/530

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Mail Station P1-137
Washington, D. C. 20555

CORRECTED COPY

Dear Sirs:

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2 and 3
Response to the Station Blackout Rule
File: 89-056-026; 89-014-000

In accordance with the requirements delineated in 10CFR Part 50.63 on Station Blackout, Arizona Public Service has evaluated PVNGS using guidance from NUMARC 87-00 document, "Guidelines and Technical bases for NUMARC Initiatives Addressing Station Blackout at Light Water Reactors," except where Regulatory Guide 1.155 takes precedence.

Attached is the result of this evaluation which indicates that PVNGS is a four-hour coping category plant under station blackout conditions. However, there are some modifications and associated procedure changes identified in Parts A, B, and C of the attachment. These modifications and procedure changes will be completed after the notification provided by the Director, Office of Nuclear Reactor Regulation in accordance with 10CFR 50.63(c)(3) on or before the following schedule:

PVNGS	Unit 1	4th Refueling Outage
PVNGS	Unit 2	4th Refueling Outage
PVNGS	Unit 3	3rd Refueling Outage

If you have any further questions or require any additional information, please contact Mr. A. C. Rogers of my staff.

Very truly yours,

D. B. Karner
Executive Vice President

DBK/GS/jle
Attachment

cc: O. M. De Michele
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RESPONSE TO STATION BLACKOUT RULE FOR PLANTS USING AC INDEPENDENT STATION BLACKOUT RESPONSE POWER

Arizona Public Service has evaluated the Palo Verde Nuclear Generating Station (PVNGS) against the requirements of the SBO rule using guidance from NUMARC 87-00 except where RG 1.155 takes precedence. The results of this evaluation are detailed below. (Applicable NUMARC 87-00 sections are shown in parenthesis.)

A. Proposed Station Blackout Duration

NUMARC 87-00, Section 3 was used to determine a proposed SBO duration of four (4) hours.

The following plant factors were identified in determining the proposed station blackout duration:

1. AC Power Design Characteristic Group is P1 based on:

   a. The offsite power system is in the I1/2 (Section 3.2.1, Part 1D, p. 3-10) or I2 (Table 5 of Reg. Guide 1.155);

   b. Estimated frequency of LOP's due to severe weather places the plant in SW Group 1 (Section 3.2.1, Part 1C, p. 3-7 of NUMARC 87-00); and SW Group 1 (Table 6 of Reg. Guide 1.155);

   c. Expected frequency of grid-related LOOPs does not exceed once per twenty (20) years (Section 3.2.1, Part 1A, p. 3-3 of NUMARC 87-00); SWR Group 1 (Table 7 of Reg. Guide 1.155);

   d. Estimated frequency of LOP's due to extremely severe weather using site specific data places the plant in ESW Group 3 (Table 8 of Reg. Guide 1.155). Section 3.2.1, Part 1B p. 3-4 of NUMARC 87-00 indicates an ESW Group of 2. The more conservative ESW Group of 3 was chosen for this evaluation.

2. The emergency AC power configuration group is C based on: (Section 3.2.2, Part 2C, p. 3-13 of NUMARC 87-00 and Table 3 of Reg. Guide 1.155)

   a. There are two (2) emergency AC power supplies not credited as alternate AC power sources (Section 3.2.2, Part 2A, p. 3-15 of NUMARC 87-00);

   b. One (1) emergency AC power supply is necessary to operate safe shutdown equipment following a loss of offsite power (Section 3.2.2, Part 2B, p. 3-15 of NUMARC 87-00).

3. The target EDG reliability is 0.95.

   A target EDG reliability of 0.95 was selected based on consistency with NUMARC 87-00, Section 3.2.4.

   i. Having a nuclear unit average EDG reliability for the last 20 demands greater than 0.90;

ii. Having a nuclear unit average EDG reliability for the last 50 demands greater than 0.94;

iii. Having a nuclear unit average EDG reliability for the last 100 demands greater than 0.95;

Therefore, from Table 3-8 of NUMARC 87-00 or Table 2 or Reg. Guide 1.155 for AC Power Design Characteristic Group P1, Emergency AC Power configuration Group C and a target EDG reliability of .95, the PVNGS SBO coping period is four hours.

B. Procedure Description

The following procedures have been revised and implemented to meet the guidelines in NUMARC 87-00:

° AC power restoration per NUMARC 87-00, Section 4.2.2;

a. Arizona Public Service - Black start system restoration procedure.

b. Salt River Project - Black start system restoration procedure.

The following procedures have been developed but not yet implemented:

° Severe Weather

41-AO-1ZZ55, Rev. 0
42-AO-2ZZ55, Rev. 0
43-AO-3ZZ55, Rev. 0

° Station Blackout Response per NUMARC 87-00 Section 4.2.1

41-EP-1R007, Rev. 0
42-EP-2R007, Rev. 0
43-EP-3R007, Rev. 0

Procedure changes associated with any modifications required after assessing coping capability per NUMARC 87-00, Section 7 will also be implemented.

C. Proposed Modifications and Schedule

The ability of PVNGS to cope with a station blackout for four (4) hours in accordance with NUMARC 87-00, Section 3.2.5 and as determined in Section "A" above; was assessed using NUMARC 87-00, Section 7 with the following results:

RESPONSE TO STATION BLACKOUT RULE FOR
PLANTS USING AC INDEPENDENT STATION BLACKOUT RESPONSE POWER

1. Condensate Inventory for Decay Heat Removal (Section 7.2.1)

It has been determined from Section 7.2.1 of NUMARC 87-00 that 90,000 gallons of water are required for decay heat removal for four (4) hours. The minimum permissible condensate storage tank level per technical specifications provides 300,000 gallons of water, which exceeds the required quantity for coping with a four (4) hour station blackout.

No plant modifications or procedure changes are needed to utilize these water sources.

2. Class 1E Battery Capacity (Section 7.2.2)

A battery capacity calculation verifies that the Class 1E batteries have sufficient capacity to meet station blackout loads for four (4) hours assuming batteries are cross connected with extended capacity. Actions required to cross connect class battery will be identified in the following procedures:

41-RO-1ZZ09, Rev. 3
42-RO-2ZZ09, Rev. 2
43-RO-3ZZ09, Rev. 1

The voltage drop, battery capacity calculation and basis for battery cross connect will be identified in the technical guideline for these procedures. The following plant modifications will be made. A cross connect between the Class 1E battery trains will be installed and the battery capacity for the C&D trains will be increased.

3. Compressed Air (Section 7.2.3)

Air-operated valves relied upon to cope with a station blackout for four (4) hours can either be operated manually or have sufficient backup sources independent of the preferred and blacked out unit's Class 1E power supply. Valves requiring manual operation or that need backup sources for operation are identified in plant procedures.

The only valves that are needed to cope with the Station Blackout are the Atmospheric Dump Valves (ADVs) and RCP seal bleedoff valves. The ADVs have a 10.5 hour supply of compressed nitrogen given a loss of power to the station air compressors. ADV Instrument Air reliability is being handled through response to Confirmatory Action Letter J. B. Martin to Don Karner dated March 28, 1989. The reliability of control air power to the RCP seal bleedoff valve will be improved.

RESPONSE TO STATION BLACKOUT RULE FOR
PLANTS USING AC INDEPENDENT STATION BLACKOUT RESPONSE POWER

4. Effects of Loss of Ventilation (Section 7.2.4)

a. The calculated steady state ambient air temperature for the steam driven AFW pump room during a station blackout induced loss of ventilation is conservatively determined to be 150°F.

b. Control Room Complex

The assumption in NUMARC 87-00, Section 2.7.1 that the control room will not exceed 120°F during a station blackout has been assessed.

The control room at PVNGS does not exceed 120°F during a station blackout. Therefore, the control room is not a dominant area of concern.

In addition to these two initial areas the following rooms were analyzed for loss of HVAC during simulated SBO conditions for four (4) hours and the temperatures in these rooms did not exceed operability limits for the equipment in the following rooms:

DC equipment room, Battery Room, Switchgear Room and Charging Pump room.

Reasonable assurance of the operability of station blackout response equipment in the above dominant area(s) has been assessed using Appendix F to NUMARC 87-00 and/or the Topical Report. The following modifications and/or associated procedure changes are required to provide reasonable assurance for equipment operability:

The Z to I (impedance to current) position transmitters for two of the ADV trains, located in the A-train AFW pump room will be upgraded to ensure continuous operability at 150°F or moved to a location where station blackout transient temperatures do not exceed the transmitter operability temperature of 140°F.

5. Containment Isolation (Section 7.2.5)

The plant list of containment isolation valves has been reviewed to verify that valves which must be capable of being closed or that must be operated (cycled) under station blackout conditions can be positioned (with indication) independent of the preferred and blacked-out unit's Class 1E power supplies. No plant modifications and/or associated procedure changes were determined to be required to ensure that appropriate containment integrity can be provided under SBO conditions. Reference UFSAR Table 6.2.4-2.

RESPONSE TO STATION BLACKOUT RULE FOR
PLANTS USING AC INDEPENDENT STATION BLACKOUT RESPONSE POWER

6. Reactor Coolant Inventory (Section 2.5)

The ability to maintain adequate reactor coolant system inventory to ensure that the core is cooled has been assessed for four (4) hours. A plant-specific analysis was used for this assessment. The expected rates of reactor coolant inventory loss under SBO conditions do not result in core uncovery in a SBO of four (4) hours.

7. Maintaining Natural Circulation, Subcriticality and General SBO Coping Requirements

The following problems were identified during the coping assessments:

(a) Natural Circulation

The ability to maintain natural circulation becomes more difficult as RCS inventory is both shrinking (cooling down) and losing mass (seal leak). This combined effect results in eventual voiding in the Reactor Vessel Hot Leg and Steam Generator. Although Reflux Boiling provides a means of heat removal in this situation, natural circulation is made more difficult. The following modification to ensure natural circulation is maintained will be made. A portable AC power source will be made available to the units charging pump(s) to provide inventory makeup. This has the additional benefit of providing RCP seal injection and cooling.

(b) Criticality - Emergency Boration

Cooldown of the RCS is made more difficult by reduced depressurization capability. This prevents injection by the Safety Injection Tanks (SITs) which is a source of inventory makeup and boration.

The RCS voiding and loss of Nuclear Cooling makes it difficult to take RCS samples to determine boron levels. The following modification will be made to ensure subcriticality and to aid in maintaining subcooling at all times during a four (4) hour SBO event. A portable AC power source will be made available to the units charging pump(s) to provide boration control and depressurization capability through auxiliary spray. The portable AC power source could also be used to provide power to the pressurizer heaters to provide increased ability to maintain subcooling.

RESPONSE TO STATION BLACKOUT-RULE FOR
PLANTS USING AC INDEPENDENT STATION BLACKOUT RESPONSE POWER

(c) General SBO Coping Requirements

(1) To control and maintain SG water level within required range and flow rates, AF controls and indication will require upgrade. The plant modification will ensure the auxiliary feedwater flow indication can be monitored and controlled in the range of 0-300 gpm (vs. the current 250 gpm).

(2) An assessment of the lighting in the areas where operation of plant equipment will occur indicated that additional backup to the emergency lighting system will have to be made.

(3) Control of plant equipment and recovery operations outside the Control Room will require good communications between the affected units control room and equipment areas. A plant change will need to be made to provide battery backup to the control room communications console.

(4) The severe weather procedure requires that windspeed indication and met tower be available up to 75 mph and that a communications tie with the national weather service be made.

(5) The switchyard main breakers used to restore offsite power depend on non-conducting gas and compressed air to close. The air compressors to these breakers depend on offsite power. The air compressors charge up air receivers which have enough compressed air to cycle the main breakers three (3) times. The station blackout procedure will be modified to ensure that an adequate compressed air supply is available (upon onset of station blackout) to close the breakers. Portable compressed air cylinders will be available to provide additional air if needed.

(6) In the event that operator recovery action is necessary in the AFW pump room and habitability is unacceptable, a portable AC power source will be available to power the "B" Train AFW pump and valves.