

U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report Nos. 50-529/85-25 and 50-530/85-19

Docket Nos. 50-529 and 50-530

Construction Permit Nos. CPPR 142 and 143

Licensee: Arizona Nuclear Power Project  
Post Office Box 52034  
Phoenix, Arizona 85072-2034

Facility Name: Palo Verde Nuclear Generating Station - Units 2 and 3

Inspection at: Palo Verde Site, Wintersburg, Arizona

Inspection conducted: June 24-28, 1985

Inspector:

R. C. Sorensen, Reactor Inspector

7/3/85  
Date Signed

Approved By:

L. F. Miller, Jr., Chief  
Reactor Projects Section 2

7/3/85  
Date Signed

Summary:

Inspection on June 24-28, 1985 (Report Nos. 50-529/85-25 and 50-530/85-19)

Areas Inspected: Routine, unannounced inspection by regional based inspector of licensee action on iE Circulars, follow-up of previously identified items, 50.55(e) construction deficiencies, and observation of hot functional testing (HFT) in Unit 2. The inspection of Units 2 and 3 involved 44 inspector hours onsite by one NRC inspector.

Results: No violations or deviations were identified.

## DETAILS

### 1. Persons Contacted

#### a. Arizona Nuclear Power Project (ANPP)

\*L. Souza, Assistant Manager, Corporate QA/QC  
\*J. Bynum, Plant Manager  
\*C. Russo, Manager, Quality Audits and Monitoring  
\*P. Brandjes, Unit Startup Manager  
\*T. Bloom, Licensing Engineer  
\*W. Montefour, ANPP QA  
C. Churchman, Unit Startup Manager

#### b. Bechtel Power Corporation (Bechtel)

\*D. Hawkinson, QA Manager  
\*H. Foster, Principal QC Engineer  
\*W. Murphy, Project Superintendent  
\*W. Miller, Construction Engineer

\*Denotes those persons attending exit meeting, June 28, 1985.

The inspector also contacted numerous other licensee and contractor craft and engineering personnel during the course of this inspection.

### 2. Review of Licensee Responses to IE Circulars (IEC)

#### A. (Closed) IEC 81-02 - Performance of NRC Licensed Individuals While on Duty

This Circular recommended review and revision of administrative controls, as necessary, to prescribe performance requirements for licensed personnel.

The licensee has developed and approved procedure 40AC-9ZZ02, Conduct of Shift Operations, which specifies licensed individuals performance requirements and duties while on shift. It also specifies prohibited activities while on duty. The inspector reviewed this procedure and found that it satisfactorily addresses the recommendations of this Circular. In addition, the inspector personally observed control room activities and found that the procedure had been properly implemented. This Circular is closed for Units 2 and 3.

#### B. (Closed) IEC 81-04 - The Role of Shift Technical Advisors (STAs) and Importance of Reporting Operational Events

Recommendations provided by this Circular included:

- (1) Licensees should review their guidance to STAs and Shift Supervisors so that the use of STAs will be optimized. Also, licensees should suitably define the functional duties of the STA during operating and shutdown conditions.

- (2) Licensees should review with their staffs the importance of ensuring information regarding off-normal events is reported to the NRC.

The licensee developed the following procedures to address the recommendations of this Circular:

79IS-9ZZ01 - STA Shift Conduct  
79AC-9ZZ02 - Licensee Event Report Preparation  
7I405.02.01 - ISEG Operating Experience Review

The inspector concluded that the above procedures acceptably addressed this Circular.

This Circular is closed for Units 2 and 3.

C. (Open) IEC 80-05 - Emergency Diesel Generator Lubricating Oil Addition and Onsite Supply

This Circular described an incident where five barrels of lube oil were added to the engine air box of an operating diesel generator through a mismarked drain connection.

Recommendations provided by this Circular included:

- (1) Verify the existence and adequacy of procedures or instructions for adding lubricating oil to safety-related equipment

The licensee issued Mechanical Maintenance Instruction 19 which provides guidance in this area. It identified where oil is to be added, what type to use, and the expected rise in site glass level for every barrel added. In addition, tags were attached to the emergency diesels in Unit 2, which identified the proper lube oil filling connection. The tags have not yet been attached in Unit 3. Specific instructions for other safety-related equipment was considered unnecessary based upon the journeyman level of experience of maintenance mechanics.

- (2) Verify that personnel are trained in approved procedures and demonstrate an ability for using these procedures to add oil while the diesel generator is operating

Procedure 91PE-1DG01, Appendix L, describes the procedure for adding lube oil to a running diesel generator. Lesson Plan NMC61-00-85-01 addresses this concern and shows that Circular 80-05 is read in class along with the Palo Verde procedure for lube oil addition.

(3) Verify appropriate procedures exist on the proper addition of lube oil to other vital equipment

The licensee incorporates instructions into Work Order packages as needed for filling equipment during Preventive or Corrective Maintenance.

(4) Verify the lube oil usage rate of each diesel under full load conditions. Maintain an adequate inventory of lube oil consistent with the Technical Specification required time period for fuel oil supply

Palo Verde maintains a more than adequate seven day supply of lube oil, conservatively established, onsite. In addition, they are able to have additional lube oil supplied to the site within 10 hours.

The inspector was satisfied with the licensee's actions concerning this Circular. This Circular is closed for Unit 2 but will remain open for Unit 3 until tags specifying lube oil addition points have been attached to the Unit 3 diesel generators.

3. Follow-up of Inspector Identified Items

(Closed) Unresolved Items 50-529/84-15-01 and 50-530/84-09-01  
No Purchase Orders or Specifications for Receipt Inspections of  
Combustion Engineering (CE) Procured Items

Previous Inspection

The inspector had reviewed documentation packages of material procured by Combustion Engineering (CE) from vendors. He was unable to determine if the proper quality documentation, such as specifications, was available onsite. This quality documentation would enable the QC receipt inspector to reference the applicable requirements for material acceptability.

This Inspection

The inspector randomly chose six purchase orders (PO) to verify that the applicable material specification, referenced on the PO, was available onsite for receipt inspector reference. POs 9771149, 9870047, 9602929, 9971230, F156001, and F158941 were chosen. All specifications were found located in the Bechtel Design Document Control Center (DDCC) records area.

As a result of this unresolved item, the licensee identified an additional problem with receiving inspections of CE procured material. When source inspections are not performed for CE procured items, receiving inspections must be performed that compare the quality documentation for the items with the requirements of the applicable specifications. Instances had occurred where this had not been done.

The inspector verified through interview that QC receipt inspectors had been retrained to ensure they perform a receipt inspection of CE supplied material in accordance with the Receiving Inspection Plan and WPP/QCI 4.0, if a source inspection has not been performed. The inspector noted that the Receiving Inspection Plan has been revised to clarify the requirements for receipt inspection of CE procured items. The inspector reviewed four more recent POs for compliance and procedural requirements had been adhered to. POs F172524, F172355, F172328 and F172317 were reviewed.

The inspector is satisfied that these items have been resolved. These items are closed.

4. Licensee Action on 10 CFR 50.55(e) Construction Deficiencies (DERs)

The following DERs were dispositioned by the licensee as being not reportable under the criteria of 10 CFR 50.55(e). The inspector reviewed the DERs described below for reportability and to determine the thoroughness of the licensee's corrective action.

a. (Closed) DER 84-69 - Reactor Protection System Shunt Trip Contacts Failed to Close

Reactor Trip Breakers in CE reactor plants have both Shunt Trip and Undervoltage Trip contacts for redundancy to ensure the breakers open.

During preoperational testing, the response time of the shunt trip path was measured. The contacts for Channel C undervoltage trip were jumpered to maintain power to the undervoltage coils. During the test, the undervoltage contacts did open, but the shunt trip contacts failed to close as required and the Channel C Reactor Trip Breaker failed to open.

It was discovered that a plastic plate installed by the vendor, which served as a barrier to separate the various relays in the cabinet, had hindered the closing of the shunt trip contacts due to insufficient clearance.

The licensee removed sufficient material from the barrier to provide a 1/16" clearance for the shunt trip contacts for all four channels in Unit 1, per Startup Work Authorization (SWA) 25543.

Preoperational test 92PE-1SB17 was reperformed and all of the shunt relay contacts closed as required. This work was being tracked for Units 2 and 3 on Design Change Packages (DCPs) 2SJ-SB-047 and 3CJ-SB-047, respectively, and will be completed prior to licensing of the units. The licensee dispositioned this DER as Not Reportable due to the fact that the undervoltage trip contacts did open and the trip breaker would have opened had not temporary power been supplied to the undervoltage coils for the test. In addition, it was discovered during preoperational testing . The inspector agreed with the dispositioning of the DER as not reportable and this DER is closed.

b. (Closed) DER 84-62 Load Sequencer Did Not Function Properly During Safeguards Testing

The following deficiency was discovered during preoperational integrated safeguards testing.

When the diesel generator is running, its breaker is open, and closes on a loss of offsite power (LOP) condition. This causes the 480V Load Center (LC) breaker and the High Pressure Safety Injection (HPSI) Pump breaker to close 0.5 seconds later. However, the LOP independently triggers a load shed signal of one second duration. This provides a simultaneous open and close signal to the LC and HPSI pump breakers which causes these breakers to lockout, due to their anti-pump circuits, thus preventing the HPSI pump from starting as required.

The licensee has devised an interim solution for Unit 1 which delays the closing of the diesel generator breaker for two seconds after an LOP signal. This also delays for two seconds the closing signal for the LC and HPSI breakers until the load shed signal passes. Furthermore, both breakers' closing springs have been readjusted to be recharged after the breakers shut instead of recharging after opening, thus eliminating a two to five second delay in closing.

These changes have been accomplished on Unit 1 per DCP 10E-PG-800.

The proposed permanent solution involves adding an interlock to the HPSI pump circuit which delays the start signal until after the load shed signal is cleared. In addition, the load shed signal will be eliminated from the LC breaker circuit thus maintaining this breaker shut. These changes will be implemented in Units 2 and 3 per DCPs 2SE-PG-023 and 3CE-PG-023 respectively prior to licensing these units. Implementation will occur in Unit 1 prior to the warranty run per DCP 10E-PG-023.

Again, this deficiency was discovered during preoperational testing. The inspector concurred with the disposition of this DER and it is closed.

c. (Closed) DER 84-90 - Incorrectly Staked Reactor Vessel Snubber Shim Pins

Eighteen of twenty-four core stabilizing lug shim pins in Unit 2 were found to be improperly staked. Core stabilizing lug shims provide the required core support during a Design Basis Event. The shims are removable (bolted) to accommodate field sizing and machining. The pins for the shims are used to prevent bolt rotation. The pins are secured by staking or upsetting the material above the pin.

The DER reported that the bolts were torqued in place and were expected to retain their preload against flow-induced vibratory loads with or without the pins. In addition, the shims would still

be held in place in the unlikely event of a loss of preload in the bolts, due to the close tolerance between shim and bracket surfaces.

The licensee reinspected Unit 1 shim pins and found no other deficiencies. The shim pins have been properly staked in Unit 2 per CE site process sheet 808-650100. Unit 3 will be inspected in this area per CE site process sheet 807-650100.

This DER is closed.

d. (Closed) DER 84-39 - LPSI and Containment Spray Pumps Have Exhibited Abnormal Rumbling Noises

The Low Pressure Safety Injection (LPSI) pumps exhibited cavitation about one foot below the pump casing in the flow range of 2800 gpm to 3400 gpm. Likewise, the containment spray pumps, of a similar design and suction piping configuration, exhibited cavitation in the same location at 1800 gpm to 2800 gpm. NCRs SM-4201 and SM-4229 described this deficiency.

The cavitation was manifested as a rumble and was apparently due to the suction piping configuration and prerotation of the inlet stream by the pump impeller. LPSI pumps are required to operate in this flow range during a LOCA only briefly, and containment spray pumps not at all. The licensee revised the procedure for shutdown cooling operations to incorporate a warning not to operate the LPSI pumps in the 2500 gpm to 3500 gpm flow range during shutdown cooling operations. NCRs SM-4201 and SM-4229 were dispositioned use-as-is.

Responsibility for addressing this DER was transferred to NRR. They have concluded that the LPSI and CS pumps are qualified to carry out their intended safety functions without any modifications, as documented in SSER No. 7.

This DER is closed.

e. (Closed) DER 84-106 - Spurious Load Shed of Balance of Plant (BOP) ESFAS

Two spurious electrical load sheds, due to the BOP ESFAS, occurred in Unit 1 prior to fuel load. The two loads shed were the Train B 4160V switchgear and the associated 480V load centers. It was determined by the licensee that the Train B load sequencer module had failed. Subsequent investigation showed that two integrated circuits and one voltage regulator within the sequencer module had failed.

The vendor of the BOP ESFAS components reviewed these component failures and verified that they were indeed random and did not indicate any inherent design deficiencies.

The licensee replaced the sequencer module with a unit from spares, repaired the old module and returned it to spares. The inspector concurs with the not reportable disposition of this DER, due to the

fact that the failure was random, could have occurred any time during plant life, and does not meet the reportability criteria of 10 CFR 50.55(e).

This DER is closed.

f. (Closed) DER 84-83 - Cavitation in the HPSI Injection Lines

Originally, flow in the four safety injection lines from the HPSI pumps was controlled by throttle valves. However, due to the unreliability of the valves' limit switch settings and the consequent inability to reproduce flow consistently, a flow orifice was installed upstream of each valve to balance flow between the lines, and allow more reliable control of HPSI flow. This caused the flow velocity to increase significantly which resulted in cavitation in the downstream 90° pipe elbow. The elbows were opened and inspected. Slight cavitation damage in the form of pitting, less than two mils deep, was noticed. This damage was negligible. This Schedule 160 piping would only be subjected to minor damage of this nature during the short injection phase of HPSI flow during a LOCA.

The inspector questioned what corrective action had been pursued by the licensee to attempt to correct this problem. DCPs 1SM-SI-150 and 2SM-SI-150, in Units 1 and 2 respectively, were completed. These added orifices downstream of the HPSI flow control valves. Also, these DCPs inverted the flow control valves themselves 180° so that flow moved under the valve seat and disc.

Cognizant startup engineers responsible for testing this system stated that these design modifications had apparently eliminated the problem.

These design modifications are being tracked for Unit 3 on DCP 3CM-SI-150.

This DER is closed.

5. Observation of Hot Functional Testing in Unit 2

The inspector witnessed several aspects of Hot Functional Testing (HFT) in progress in Unit 2 including:

- a. Attending morning startup meetings to assess the resolution of problems and briefing of plant status.
- b. Observing control room activities during plant heatup and the conduct of various test procedures.
- c. Review of the official Hot Functional Test controlling document, 90HF-2ZZ01. The inspector ensured all initial conditions, plant conditions, environmental conditions and prerequisites were signed off as applicable in the procedure. He also reviewed procedure steps to ensure they were signed off, data was properly collected,

and the position of a sample of control room equipment was consistent with that required by the test procedure.

The inspector was satisfied that HFT was being conducted in an orderly fashion, in accordance with FSAR commitments.

No violations or deviations were identified.

6. Exit Meeting

The inspector met with the licensee personnel indicated in paragraph 1 on June 28, 1985. The scope and findings of the inspection described in this report were discussed.