U. S. NUCLEAR REGULATORY COMMISSION

REGION V

Report No. 50-530/87-36

Docket No. 50-530

License No. NPF-74

Licensee: Arizona Public Service Company
P. O. Box 21666
Phoenix, Arizona 85036

Facility Name: Palo Verde Nuclear Generating Station Unit 3

Inspection at: Palo Verde Site, Wintersburg, Arizona

Inspection Conducted: December 10-18, 1987

Inspectors: S. Richards, Engineering Section Chief, RV
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Approved by: S. Richards, Engineering Section Chief, RV — 2-12-88 Date Signed

Summary:

Inspection on December 10-18, 1987 (Report No. 50-530/87-36)

Areas Inspected: Enhanced Operational Inspection of the operating crews and support activities during power ascension testing at Palo Verde Unit 3.

Results: No violations or deviations were identified.

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DETAILS

1. Persons Contacted

*E. E. Van Brunt, Jr., ANPP Executive Vice President
*J. G. Haynes, Vice President, Nuclear Production
*O. J. Zeringue, Unit 3 Plant Manager
*R. M. Butler, Director, Standards and Technical Support
*J. E. Kirby, Director, Site Services
*L. G. Papworth, Director, Quality Assurance
*J. E. Allen, Director, Engineering and Construction
*W. F. Quinn, Director, Nuclear Safety and Licensing
*A. C. Rogers, Licensing Manager
*P. J. Coffin, Compliance Engineer
*R. Rouse, Compliance Engineer
R. Gouge, Unit 3 Operations Manager

Discussions were also held with numerous other personnel, including operations personnel at all levels, shift technical advisors, QA/QC engineers, test engineers, maintenance personnel and system engineers.

*Present at the exit interview on December 18, 1987.

2. Enhanced Operational Inspection Composition and Purpose

The primary purpose of the inspection was to assess the performance of the Unit 3 licensed operators during the conduct of Power Ascension Testing. Unit 3 received a full power license on November 24, 1987, and at the time the inspection commenced, the unit had reached the 50% power plateau. The team also focused on the performance of other licensee groups which support unit 3 operation. The team was particularly interested in observing the actions of these groups in responding to problems encountered by the operating crews. Additionally, team members toured the unit on a routine basis and probed into areas where cursory observations indicated that problems may lie.

To accomplish the primary purpose of the inspection, members of the team were assigned to around-the-clock coverage of shift operations commencing on December 10, 1987, and continuing through the day shift on December 17, 1987. The team composition consisted of two NRC consultants from Battelle Pacific Northwest Laboratories, both qualified as operator license examiners; one NRC operator license examiner; one NRC resident inspector; two NRC personnel with previous experience as resident inspectors; and one NRC technical expert with a significant background in reactor core physics and reactor protection system design. Four of the team members had previously participated in enhanced operational inspections at other units or facilities.

3. Observation of Plant Operations

The team assessed the performance of the operating crews based on direct observation of shift activities. Specific items of interest included: shift turnover; operator awareness of plant conditions and activities; coordination between shift members; preparation for and conduct of

testing; procedural adherence; control room formality; and response to actual events. The team witnessed all or part of the following power ascension tests and routine surveillance tests, and/or reviewed the completed data sheets.

-72PA-3RX09, Linear Power Subchannel Calibration
-72PA-3RX07, NSSS Calorimetric -72PA-3RX06, Nuclear and Thermal Power Calibrations
-72PA-3RX15, Variable Tavg (ITC and Power Coefficient) Test (50%)
-72PA-3RX22, Temperature Decalibration Test (50%)
-72PA-3RX18, CEA Shadowing Factor/Radial Peaking Factor Test
-72PA-3RX16, Steady State Core Performance Test (50% power)
-72PA-3SB01, Intercomparison of PPS, CPC, PMS Inputs
-72PA-3RI01, Incore Dector (Fixed) Test
-72PA-3SB02, COLSS/CPC Verification Test
-72TI-9RJ02, Determination of COLSS Blowdown Flow Constants
-43ST-3RC02, RCS Water Inventory Balance
-36ST-9SB02, Plant Protection System Functional Check
-43ST-3AF02, AFW Pump Operability Test
-43ST-3DG01, Diesel Generator Operability Test
-43ST-3SF01, Monthly Rod Movement Test

Additionally, the team reviewed several of the administrative control systems in use at the unit, including the clearance log, the temporary modification log, the NCR log, and the caution tag log.

The following observations were made by the team concerning conduct of operations and testing:

a. During the inspection, the licensee experienced problems maintaining secondary chemistry within specification. One discussion held with the head chemistry technician on shift indicated that control of the sampling program on that shift was weak. The discussion revealed that the technician had discounted all of the feedwater and condensate samples taken the previous shift because he had lost track of the sampling points, apparently due to a weak shift turnover. The team additionally noted that communications between the licensed operators and the chemistry personnel could be improved, in that several of the licensed operators interviewed did not appear well informed of the status of secondary chemistry.

b. The team observed that a chemistry form used to report the chemistry status to the shift supervisor contained an incorrect value for the sulfate specification of 0.15 ppm, versus the correct value of 0.015 ppm. This discrepancy was brought to the attention of the licensee.

   Further followup indicated that each unit is allowed to draft unit specific chemistry forms. This practice could result in wide variations between the forms used at each unit, thereby losing some of the advantages of having three standardized units, such as the ease of exchangeability of personnel between units.

c. While conducting a monthly control element assembly (CEA) movement test on December 14, 1987, CEA-2 unexpectedly dropped to the fully

inserted position at approximately 11:54 p.m. The actions taken by the onshift personnel to respond to the event over the next 6 hours were closely followed by the team. The team concluded that the response was generally good. Actions were promptly taken to comply with Technical Specification and procedural requirements. Additionally, I&C personnel and the system engineer were quickly called to respond. The system engineer appeared knowledgeable in the CEA control system and was of assistance in trouble-shooting the problem. A faulty circuit card was identified and the CEA restored to the group position by 3:40 a.m. on December 15, 1987. The team did observe that log keeping during the event was weak.

d. On December 17, 1987, while conducting test 72PA-3RX18, "CEA Shadowing Factor/Radial Peaking Factor Test," the unit tripped on a low DNBR signal. The operator response to the trip and the actions taken to stabilize the plant were considered by the team to be good. The team followed the licensee's actions to determine the cause of the trip. The licensee issued a Post Trip Review Report which described the event and the resulting concerns. The licensee then held meetings to discuss each concern and to assign actions to individual groups as a result of the discussions held. The Post Trip Review Report was updated as additional information became available. The licensee identified that the DNBR trip was caused by a CEA subgroup deviation between part length groups P1 and P2. At the time the team concluded the inspection, the licensee was still conducting their review of the event. The team considered the licensee's actions to review the event, up to that point, to have been appropriate.

   The team observed that log keeping immediately following the plant trip was poor. Although the team considered the operators' response to the event to be the highest priority action, the team observed that there were personnel available in the control room, who could have assisted in log keeping without disrupting the actions of the licensed operators. Licensee management was encouraged at the exit interview to consider actions to aid in log keeping following events.

e. The team observed that during the conduct of procedure 72PA-3RX22, "Temperature Decalibration Test", both CEACs were initially inoperable. During the test, the CEACs were returned to service. Although the status of the CEACs affected the data taken by the test, the test prerequisites did not address the CEACs. The licensee stated that the affected data was "for information only," and did not impact the acceptability of the primary test data. Nonetheless, the team concluded that the test prerequisites should have addressed the CEAC status or the test should have been annotated as to the CEAC status, to preclude potentially misleading data from being recorded.

f. The team noted that the test acceptance criteria band appeared relatively large for several parameters, i.e., a temperature band of ± 14 degrees °F. Although the acceptance band is based on the accuracies of the instruments involved, the team questioned whether

the band should be smaller, because statistically the inaccuracies would tend to cancel out. The licensee agreed to review this observation with Combustion Engineering. The licensee also stated that the Test Review Group specifically looks for outlying test results that, although it may fall within the acceptance criteria, is outside the range that is reasonable expected.

g. The team observed that Technical Specification Limiting Condition for Operation (LCO) 3.2.3 appeared to be inappropriate, in that the action statement implies that the Core Protection Calculator is not required with reactor thermal power less than 50%. The team noted that the LCO is from the Standard Technical Specifications and is therefore a generic concern. An NRR team member agreed to feedback this concern to NRR for potential generic consideration. The licensee was encouraged to review the LCO as it applies to their facility.

Overall, the team concluded that the performance of the operators at Unit 3 during the inspection was directed towards safe, professional operation of the Unit. Procedural adherence was observed to be good and a businesslike atmosphere was generally maintained in the control room. Briefings were conducted prior to performing major test procedures and shift turnovers appeared to be generally thorough. Senior licensee management was observed to be in the unit on several occasions, as was Quality Assurance personnel.

No violations were identified.

4. Plant Tours

The team toured various portions of the unit during the inspection in an effort to identify deficient conditions. On several occasions, inspectors followed the licensee's auxiliary operators (AO) during their routine plant tours. Additionally, the auxiliary feedwater system and the containment personnel airlock were walked down. The following observations were made by the team.

a. The proper hanging of danger tags and caution tags was checked on a sampling basis. The team observed that a control switch for turbine building roof exhaust fan HTN-J01-C, which was danger tagged in the "off" position by clearance 2858, was in the "on" position contrary to the requirement of the tag. The fan is not a safety related component. The team also observed a caution tag under clearance 2463, which had no instructions on the tag indicating why caution was necessary. The licensee questioned the personnel who had hung the danger tag and concluded that it had been properly placed. The licensee could not identify why the switch was found by the inspector to be out of the required position. The licensee did offer that company policy calls for any individual who intentionally violates a danger tag to be terminated from employment. The licensee determined that the issuance of the caution tag without instructions was an error. The team emphasized at the exit interview that while neither deficiency resulted in a nuclear safety concern, the correct and accurate implementation of the tagging

system is considered by the NRC to be extremely important, both from a nuclear safety and personnel safety standpoint.

b. The team observed a number of electrical panels and cabinets with doors open and no obvious work activities in progress. This observation was brought to the attention of licensee management and the condition improved over the next few days; however, towards the conclusion of the inspection, a number of opened doors was again observed. Although leaving panel doors open is normally only a poor work practice, the team cautioned the licensee that safety related panels are often seismically qualified, only with all access points properly secured, and therefore the practice of leaving panel doors open could easily lead to more significant problems.

c. A set of double fire doors located in the lower cable spreading room was observed in the open position with a permanent sign on the door stating, "DOOR MUST REMAIN CLOSED". The licensee determined that the doors close automatically if a fire is detected, and that the doors are held open under normal conditions due to ventilation considerations. The licensee stated that the misleading signs would be promptly removed.

d. Emergency numbers are not posted near all plant telephones. Although there is no requirement addressing this, it is a common industry practice to help insure quick, accurate reporting of plant emergencies.

e. A hose was observed blocking open a door on the 100 foot level of the main steam support structure and an air pressure regulator to an air operated valve was identified as failed. The licensee promptly acted on these observations.

f. The unit was generally considered by the team to be clean and in an orderly condition.

No deviations or violations were identified.

5. Engineering Observations

Although the conduct of operations was the primary focus of the inspection, several observations were made related to the engineering area. These observations are summarized as follows:

a. The unit has two containment atmosphere hydrogen analyzers, which are required to be operable by the Technical Specifications. The team reviewed the operation and calibration of the analyzers because early in the inspection the 'A' train analyzer was found to be out of service for maintenance and the 'B' train analyzer had a control room annunicator locked in indicating a problem with the 'B' train system. After reviewing the applicable vendor technical manual and the licensee's surveillance procedure for calibration of the analyzers, 36ST-9HP03, "Containment Hydrogen Monitoring System Calibration Test," the team questioned the appropriateness of the

detection range of the equipment. The Palo Verde Final Safety Analysis Report (FSAR), Table 6.2.5-1, describes the hydrogen analyzer measurement range as 0-10 percent hydrogen by volume, with an accuracy of plus or minus one percent hydrogen. The NRC Safety Evaluation Report found the licensee's approach to combustible gas control to be acceptable, in part, due to the range described by the FSAR. However, the calibration procedure appeared to calibrate the analyzers for a full range of approximately 4 percent.

The team questioned the responsible engineering personnel regarding this question. The system engineer appeared knowledgeable in the operation of the analyzer, and indicated that he seriously doubted that the analyzers could monitor up to 10 percent hydrogen. The engineer estimated that the top end of the range might be as high as 6 percent, however, he concluded that without a test of the system, the actual range could not be known with any certainty. At the exit interview, the licensee indicated that contact had been made with the equipment vendor and that actions would be promptly taken to resolve the concern. Eight weeks following the exit interview, the licensee was still preparing to test the system to determine the actual range. This concern remains unresolved pending the conduct of this test (50-530/87-36-01).

At the exit interview, the licensee stated that although the range of the analyzers may be less than 0-10 percent, the licensee considered the analyzers to be operable. The licensee pointed out that containment hydrogen concentration never goes above 4 percent during any analyzed accident and noted that the technical specification surveillance only requires the analyzer calibration to be checked at 1 and 4 percent. The team responded that the technical specification surveillance requirements do not alone define equipment performance requirements. The team acknowledged that containment hydrogen should never exceed 4 percent, however the team considered that if the FSAR, SER, the control room indications, the applicable procedures, and operator training, all indicate that the analyzers are capable of detecting 0-10 percent hydrogen, then the equipment performance should be consistent with that description.

b. As described above, the 'B' train hydrogen analyzer was observed to have a trouble annunciation locked in. The team followed up on this alarm and was informed that the cause of the alarm was the isolation of the calibration gas from the system due to a leaky solenoid valve. The calibration gas is not required to be lined up for the system to function properly. The licensee had issued work request #252983 on December 3, 1987, to initiate a repair of the deficiency.

The team questioned the priority assigned to the work. A long term concern at Palo Verde has been the number of continuously lighted annunciators in the control room. In this case, the requested completion date was listed as January 20, 1988, or approximately 7 weeks after the work request was written. When questioned, the

licensee indicated that the priority was low because the deficiency did not affect equipment operability and the annunicator would "reflash" if another system fault occurred. The team concluded that this logic was in error, in that the annunciator in question would actually only reflash due to a loss of power to the system. Although a separate alarm would still be received in the control room indicating a high hydrogen concentration, other alarms related to the proper operation of the system, such as low span gas pressure, low gas flow, and low analyzer temperature, would no longer be annunicated in the control room. By having these alarms effectively blocked out, a malfunction of the system during actual operation could potentially go undetected by the control room personnel. The team brought this to the attention of the licensee. The licensee stated that they would reconsider the priority of the work request.

None of the annunciators associated with the hydrogen analyzers appeared to be required to function for the system to be operable, however, the team concluded that this item illustrated how a weak review of the effect of a deficiency on a system resulted in the action being taken being somewhat less than prudent.

c. The team performed a brief review of inservice testing procedures for several safety systems. The team noted that the inservice testing procedure and the operating procedure for the Essential Spray Pond (ESP) pumps appeared to be inconsistent. The Limitations and Precautions section of the operating procedure, 43OP-3SP01, paragraph 3.6, limited the pump discharge pressure to a band from 47 psig to 58 psig. When the normal suction pressure of the pump is considered, this equates to a differential pressure across the pump of approximately 45.5 to 56.5 psig. The associated inservice testing procedure, 43ST-3SP02, defined the acceptable differential pressure across the pump to be approximately 45 to 53.5 psig for the 'A' train pump and 51 to 60.5 psig for the 'B' train pump.

When questioned concerning this item, the licensee determined that the precaution in the operating procedure was basically carried over from the Unit 1 procedure and was based on the performance of the Unit 1 pumps during preoperational testing. The licensee also stated that an associated control room annunicator was set based on the operating band in the precaution. The team concluded that the precaution and the annunciator appeared to be both inappropriate and misleading.

d. The team observed that two separate procedures, which addressed reactor coolant pump (RCP) restart criteria with a void in the reactor vessel head, appeared to be inconsistent. The licensee determined that of the two procedures, 43EP-3ZZ01 and 43AO-3ZZ13, the AO was incorrect. The EP had been recently revised, however the AO had not been likewise revised. The licensee stated that a system was in place to ensure all procedures affected by a change are updated at the same time; however, they could not identify why the AO had not been revised. The licensee stated that the AO would be corrected.

e. From their post trip review for the reactor trip on December 17, 1987, the licensee identified that the unit could trip, due to the rod control failure experienced, without any warning to the operators of the impending trip. The licensee properly identified this concern as an engineering problem and submitted an Engineering Evaluation Request to the onsite engineering group.

f. The team observed that the local reactor cavity and containment sump level indicators, located in the auxiliary building, read out in mirco-amperes. No conversion chart appeared available to convert the readings into a more usable value. The team concluded that a prudent action would be to have these meters read out in a usable indication. The licensee indicated agreement.

In that the team's primary focus was operations and not engineering, the team was concerned at the number of engineering observations made that indicated weaknesses in this area. This concern was brought to the licensee's attention at the exit interview.

6. Exit Interview

The team met with those licensee representatives indicated in paragraph 1, on December 18, 1987. At this meeting, the scope and findings of the inspection were presented and a discussion of the findings held.