

ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket Nos.: 50-528
50-529
50-530

License Nos.: NPF-41
NPF-51
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Report No.: 50-528/99-20
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Licensee: Arizona Public Service Company

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

Location: 5951 S. Wintersburg Road
Tonopah, Arizona

Dates: October 17 through November 27, 1999

Inspectors: J. H. Moorman, III, Senior Resident Inspector
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Approved By: P. Harrell, Chief, Project Branch D

ATTACHMENT: Supplemental Information

EXECUTIVE SUMMARY

Palo Verde Nuclear Generating Station, Units 1, 2, and 3
NRC Inspection Report No. 50-528/99-20; 50-529/99-20; 50-530/99-20

Operations

- The wording of Technical Specification Bases 3.4.7 was ambiguous in describing the plant conditions necessary to transition from Technical Specification 3.4.8, "Reactor Coolant System Loops-Mode 5, Loops Not Filled," to Technical Specification 3.4.7, "Reactor Coolant System Loops-Mode 5, Loops Filled." Licensee management was aware of the issue, but had not taken action to correct it until highlighted by the inspectors. Condition Report/Disposition Request 110856 was initiated by the licensee to document this issue (Section O1.1).
- The Corrective Action Review Board was appropriately staffed with experienced personnel that provided a thorough and critical review of the resolution to significant conditions adverse to quality (Section O7.1).

Maintenance

- Knowledgeable technicians used approved procedures to perform routine maintenance activities safely. Good work and foreign material control practices were observed (Section M1.1).
- Knowledgeable technicians used approved procedures to conduct surveillance activities in a safety conscious manner (Section M1.2).
- Cancellation of a work order implementing the corrective action for a condition adverse to quality resulted in the failure to promptly correct the condition. As a result, both 42-inch containment purge valves in Unit 1 were inoperable for a short time. This is a violation of 10 CFR Part 50, Appendix B, Criterion XVI. This Severity Level IV violation is being treated as a noncited violation, consistent with Section VII.B.1.a of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as CRDR 101502 (Section M1.3).
- Material condition of the three units was good (Section M2.1).

Engineering

- The operability assessment to disposition a leaking exhaust manifold on the Unit 1 Train B diesel generator was comprehensive. The assessment was based on sound engineering analysis and referenced empirical data to support the conclusions (Section E1.1).

Plant Support

- The radiological protection program was effectively implemented in those areas reviewed. Licensee efforts to keep personnel exposure as-low-as-is-reasonably-achievable during the Unit 1 outage were effective (Section R1.1)
- Control room personnel properly implemented emergency plan requirements for emergency classification and offsite notifications after the shift manager declared and simultaneously terminated a Notification of Unusual Event for a valid strong motion accelerometer alarm (Section P4.1).

Report Details

Summary of Plant Status

Unit 1 began this inspection period in Mode 6 in the eighth refueling outage. The unit was restarted on November 7, 1999, and returned to 100 percent power on November 11, 1999. It operated at 100 percent power for the remainder of this inspection period.

Units 2 and 3 operated at essentially 100 percent power for the duration of this inspection period.

I. Operations

O1 Conduct of Operations

O1.1 Application of Technical Specification (TS) Bases 3.4.7 (Unit 1)

a. Inspection Scope (71707)

The Unit 1 reactor was depressurized and in Mode 5 to support integrated leak rate testing of the containment building from November 2-4, 1999. The inspectors conducted an ongoing review of plant operations, including a review of compliance with the TS.

b. Observations and Findings

The inspectors reviewed the plant conditions necessary to support the integrated leak rate test of the containment building for compliance with the TS. The reactor coolant system (RCS) was required to be vented during the test. Heat removal requirements were being maintained as required by TS 3.4.7, "RCS Loops-Mode 5, Loops Filled." The inspectors reviewed TS 3.4.7 Bases and noted that one portion of the Bases stated, in part, that total gas concentration of <20 cc/kg is required for MODE 5 Operations. This limit ensures that gases coming out of solution in the SG U-tubes will not adversely affect natural circulation with the RCS at atmospheric conditions.

The inspectors determined that the unit had recently transitioned to TS 3.4.7 from TS 3.4.8, "RCS Loops-Mode 5, Loops Not Filled," and discussed the transition with the shift manager. From this discussion, the inspector determined that RCS total gas concentration was approximately 70 cc/kg. The shift manager explained that the plant was in compliance with TS 3.4.7 because the RCS vents could be shut from the control room and a high pressure safety injection pump was available to pressurize the RCS. With the RCS pressurized, a total gas concentration of 70 cc/kg would not cause problems with natural circulation. He further stated that this was allowed by Procedure 40OP-9RC02, "Reactor Coolant System Fill and Vent," Revision 9, and supported by another portion of the same TS Bases that states, in part, that normal operating procedures implement the findings for determination when RCS loops are considered filled, which in turn allows for transition from RCS Loops-Mode 5 Loops Not Filled to RCS Loops-Mode 5 Loops Filled.

The inspectors reviewed Procedure 40OP-9RC02 and determined that pressurizing the RCS with a high pressure safety injection pump in lieu of establishing RCS total gas concentration less than 20 cc/kg was allowed by the procedure. The inspectors reviewed Engineering Evaluation Requests 90-RC-013, 92-RC-013, and 93-RC-003 that supported the use of a high pressure safety injection pump to pressurize the RCS. The inspectors verified that these engineering evaluation requests had been recently reviewed by engineering to verify that they were still valid. No safety concerns were identified by the inspectors. However, the inspectors considered that the wording of TS Bases 3.4.7 was ambiguous with respect to plant conditions that existed at the time, and was not consistent with what could be reasonably interpreted from the wording.

This issue was discussed with licensee management, who agreed with the inspectors' assessment. The licensee documented this issue in Condition Report/Disposition Request (CRDR) 110856. Action Item 110857 from this CRDR was created to submit a licensing document change request (LDCR) to the Nuclear Licensing Department to clarify the requirements. From discussions with licensee management, the inspectors determined that other ambiguous statements in the TS Bases had been identified, but had not been submitted for enhancement through the LDCR process. Licensee management stated that these issues would be reviewed, prioritized, and submitted as LDCRs.

c. Conclusions

The wording of Technical Specification Bases 3.4.7 was ambiguous in describing the plant conditions necessary to transition from Technical Specification 3.4.8, "Reactor Coolant System Loops-Mode 5, Loops Not Filled," to Technical Specification 3.4.7, "Reactor Coolant System Loops-Mode 5, Loops Filled." Licensee management was aware of the issue, but had not taken action to correct it until highlighted by the inspectors. Condition Report/Disposition Request 110856 was initiated by the licensee to document this issue.

O7 Quality Assurance in Operations

O7.1 Corrective Action Review Board (CARB) (Units 1, 2, and 3)

a. Inspection Scope (71707)

The inspectors attended a CARB meeting to assess the effectiveness of Board activities.

b. Observations and Findings

The licensee chartered the CARB, on September 23, 1999, to provide management oversight and review of the resolution to significant conditions adverse to quality. The

CARB was chaired by the Director of Operations. The CARB was comprised of the Directors of Radiation Protection, Emergency Support, Nuclear Assurance, Engineering, and Maintenance.

The inspectors attended the second CARB meeting held on October 27. The agenda covered the update of CRDR 2-9-0202 and the presentation of CRDR 100062. The Board reviewed the corrective actions to determine if they were comprehensive and would prevent recurrence of the problem. The discussions were open and appropriately focused on problem resolution. The technical expertise of the members contributed to a thorough and critical review of the CRDR corrective actions.

c. Conclusions

The CARB was appropriately staffed with experienced personnel that provided a thorough and critical review of the resolution to significant conditions adverse to quality.

II. Maintenance

M1 Conduct of Maintenance

M1.1 General Comments on Maintenance Activities (Units 1 and 2)

a. Inspection Scope (62707)

The inspectors observed all or portions of the following activities performed per the listed work order (WO):

WO 903527 "Test valve CP3A for packing leakage" (Unit 1)

WO 902245 "Troubleshoot and rework the failure of a Highway 1 Box 8 of the Plant Monitoring System" (Unit 2)

b. Observations and Findings

The inspectors found the work performed under these activities to be properly performed. All work observed was performed with the work package present and in active use. Work and foreign material exclusion practices observed were good. Technicians were experienced and knowledgeable of their assigned tasks.

c. Conclusions

Knowledgeable technicians used approved procedures to perform routine maintenance activities safely. Good work and foreign material control practices were observed.

M1.2 General Comments on Surveillance Activities (Units 1, 2, and 3)

a. Inspection Scope (61726)

The inspectors observed all or portions of the following activities performed per the listed surveillance procedures:

40ST-9ZZ09 "Containment Cleanliness Inspection," Revision 2 (Unit 1)

73ST-9SI06 "Containment Spray Pumps and Check Valves - Inservice Test,"
Revision 7 (Unit 3)

73ST-1DG02 "Class 1E Diesel Generator and Integrated Safeguards Surveillance
Test-Train B," Revision 10 (Unit 1)

36ST-9SB52 "Reactor Trip Switchgear Shunt and Undervoltage Trip Functional Test,"
Revision 2 (Unit 2)

73ST-9CL02 "Integrated Leak Rate Test," Revision 4 (Unit 1)

b. Observations and Findings

The inspectors found that knowledgeable personnel performed these surveillances satisfactorily, as specified by applicable procedures.

c. Conclusions

Knowledgeable technicians used approved procedures to conduct surveillance activities in a safety conscious manner.

M1.3 Inoperable 42-Inch Containment Purge Valve (Unit 1)

a. Inspection Scope (62707, 71707)

On August 6, 1999, Unit 1 entered TS 3.6.3, "Containment Isolation Valves," Condition E, that required the unit to be in Mode 3 within 6 hours. The limiting condition for operation (LCO) was entered when both the inside and outside 42-inch containment refueling purge isolation valves were declared inoperable. The inspectors reviewed the circumstances surrounding the event, interviewed personnel, and reviewed operator logs, procedures, and CRDRs.

b. Observations and Findings

On August 2, the licensee commenced planned preventive maintenance on the 42-inch refueling purge outer Containment Isolation Valve CPAUV0002A. Prior to commencing the work, an as-found local leak rate test (LLRT) was performed on the containment penetration. The LLRT failed and the licensee commenced troubleshooting activities in accordance with a pre-approved contingency plan. Inner Containment Isolation Valve

CPBUV0003A was identified as leaking. The licensee adjusted the inner valve and the penetration subsequently passed the LLRT. The licensee initiated CRDR 9-9-0946 to address the LLRT failure.

On August 6, at 3:49 p.m., after completion of maintenance on Valve CPAUV0002A, the penetration failed the postmaintenance performance of the LLRT. The licensee commenced further troubleshooting activities to determine the leak location. At 5:50 p.m., when no leaks could be identified on Valve CPAUV0002A, technicians identified Valve CPBUV0003A as the most likely source of leakage. Personnel entered containment to troubleshoot Valve CPBUV0003A. Technicians reported that the valve was leaking by its seat. With Valve CPAUV0002A considered inoperable due to maintenance and Valve CPBUV0003A inoperable due to leakage, control room operators declared the penetration inoperable. The control room supervisor entered TS LCO 3.6.3, Condition E, which required the unit to be in Mode 3 within 6 hours. Control room operators commenced preparations to enter Mode 3. Technicians entered containment, manually adjusted Valve CPBUV0003A, and reperformed the LLRT. At 10:08 p.m., the control room supervisor exited TS LCO 3.6.3, Condition E, after satisfactory completion of an LLRT.

The inspectors reviewed CRDR 9-9-0946. This CRDR referenced CRDR 1-9-0021, dated February 3, 1999, which documented a previous problem with leakage past Valve CPBUV0003A. CRDR 1-9-0021 documented the root cause of the leakage. The root cause was determined to be a slight movement of the valve disk past the seat caused by residual torque that remained on the valve stem after the disk initially came to rest on the valve seat. The corrective action for this problem required a limit switch adjustment that stopped the valve at a position such that the residual torque would further seat the valve and not drive the disk past the seat. Valve CPBUV0003A is a butterfly-type valve that can rotate completely through 360 degrees of motion. It has a flexible seal around the perimeter of the valve disk and does not have a physical stop that would prevent the disk from rotating through the proper closed position. With residual torque remaining on the valve stem, any stress or shock to the valve (i.e., pressure cycles, thermal cycles, or vibration) would tend to rotate the disk past its 90 degree full-closed seat position, moving the disk off of the seat.

CRDR 1-9-0021, Action 3, directed that the close limit switch of Valve CHBUV0003A be reset in accordance with Maintenance Instruction MOV00056. This maintenance instruction was developed to optimize the close limit switch setting to account for the residual torque that remained on the valve stem. Corrective Action 3 had an assigned completion date of September 18. The corrective action was incorporated into existing WO 872064, which properly referenced CRDR 1-9-0021. However, the existing WO problem description did not adequately describe the maintenance that had to be performed to correct Valve CPBUV0003A limit switch settings. The WO problem description stated, "During the performance of LLRT a small packing leak was identified. Rework as necessary. The LLRT passed with this packing leak." The WO work description stated, "Repack Valve, Reset Limits (Ref CRDR 1-9-0021)." This WO was scheduled to be completed by June 15. On June 7, while reviewing work packages that could be performed with the unit operating, a valve services scheduler noted that WO 872064 was still active. The valve services scheduler discussed the necessity of

performing the WO with the inservice test engineer who originated the CRDR. The scheduler questioned the inservice test engineer why maintenance was required on the valve since it had passed its as-left LLRT. The inservice test engineer knew of no reason why the maintenance had to be performed since the leak rate was within TS requirements. Based on the discussions with the inservice test engineer, the scheduler canceled the WO. The scheduler did not notice the reference to CRDR 1-9-0021 on the WO and subsequently did not notify the CRDR action owner before the WO was canceled, as required by Procedure 30DP-9WP02, "Work Document Development and Control," Revision 27.

From discussions with the containment purge valve system engineer and engineering management personnel, the inspectors determined that proper implementation of CRDR 1-9-0021, action 3, would have prevented Valve CPBUV0003A from leaking. The failure to complete corrective actions for Valve CPBUV0003A leakage prior to performing the LLRT on August 2, is a failure to promptly correct a condition adverse to quality. This is a violation of 10 CFR Part 50, Appendix B, Criterion XVI. This severity Level IV violation is being treated as a noncited violation, consistent with Section VII.B.1.a of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as CRDR 101502 (50-528/9920-01).

The licensee initiated CRDR 101502 on September 8 to document that WO 872064 was inadvertently canceled without notifying the CRDR owner, as required by Procedure 30DP-9WP02. The licensee adequately addressed this generic transportability concern by reviewing approximately 475 WOs, dating back to 1997, that contained work documents that were canceled. Of these documents, eight required further action and two contained minor issues pertaining to safety-related equipment. The licensee initiated CRDR 108693 to address these deficiencies.

c. Conclusions

Cancellation of a work order implementing the corrective action for a condition adverse to quality resulted in the failure to promptly correct the condition. As a result, both 42-inch containment purge valves in Unit 1 were inoperable for a short time. This is a violation of 10 CFR Part 50, Appendix B, Criterion XVI. This Severity Level IV violation is being treated as a noncited violation, consistent with Section VII.B.1.a of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as CRDR 101502.

M2 Maintenance and Material Condition of Facilities and Equipment

M2.1 Review of Material Condition During Plant Tours (Units 1, 2, and 3)

a. Inspection Scope (62707)

During this inspection period, routine tours of all units were conducted to evaluate plant material condition.

b. Observations and Findings

Observation of plant material condition during this inspection period identified no major material condition deficiencies. Minor deficiencies brought to the attention of the licensee were documented with work requests.

c. Conclusions

Material condition of all three units was good.

III. Engineering

E1 Conduct of Engineering

E1.1 Review of the Engineering Disposition of a Train B Emergency Diesel Generator Exhaust Manifold Leak (Unit 1)

a. Inspection Scope (37551)

The inspectors reviewed Operability Determination 227, CRDR 1-9-174, and Deficiency Work Order (DFWO) 835122, which provided the engineering disposition of a leak in the Unit 1 Train B emergency diesel generator exhaust manifold. The inspectors also interviewed engineers and observed data collection activities.

b. Observations and Findings

On August 17, 1999, the licensee conducted a planned performance of Procedure 40ST-9DG02, "Diesel Generator B Test," Revision 13. During the performance of this test, operators observed that a pre-existing leak on the engine exhaust manifold appeared to have worsened since the last performance of this monthly surveillance test. The licensee initiated CRDR 1-9-0174, performed Operability Determination 227 to assess operability, and updated the existing DFWO 835122 with a more recent 10 CFR 50.59 evaluation and assessment of the leak.

From a review of the above documents, the inspectors determined that engineering personnel performed a thorough and comprehensive review of the items affecting diesel engine operability. The assessment of operability was fully supported by engineering analysis and empirical data. The assessment concluded that the diesel engine was operable to perform its design basis function.

Although the licensee's assessment of operability stated that the diesel engine would perform the design basis function, the assessment concluded that the engine would run for at least 7 days. The inspectors questioned the diesel generator system engineers about the 7-day run time for the emergency diesel generator. The engineers could not provide the inspectors with information supporting the decision to use a 7-day run time for the operability assessment. The licensee initiated CRDR 109282 to address this issue.

The exhaust manifold was repaired during the Unit 1 refueling outage, which ended on November 7, 1999.

c. Conclusions

The operability assessment to disposition a leaking exhaust manifold on the Unit 1 Train B diesel generator was comprehensive. The assessment was based on sound engineering analysis and referenced empirical data to support the conclusions.

IV. Plant Support

R1 Radiological Protection and Chemistry Controls

R1.1 General Comments on Radiological Protection Controls (Units 1, 2, and 3)

a. Inspection Scope (71750)

The inspectors monitored radiological protection activities during routine site tours.

b. Observations and Findings

The inspectors observed radiation protection personnel, including supervisors, routinely touring the radiologically controlled areas. Licensee personnel working in radiologically controlled areas exhibited good radiation work practices.

Contaminated areas and high radiation areas were properly posted. Area surveys posted outside the room were current. The inspectors checked a sample of doors, required to be locked for the purpose of radiation protection, and all were in accordance with requirements.

The inspectors reviewed a summary of personnel exposure results from the Unit 1 outage. Total personnel exposure for the outage was 67.5 Roentgen Equivalent Man. The outage contained several activities with the potential for high exposure, including a 10-year core barrel in-service inspection and a dive in the refueling transfer canal.

c. Conclusions

The radiological protection program was effectively implemented in those areas reviewed. Licensee efforts to keep personnel exposure as-low-as-is-reasonably-achievable during the Unit 1 outage were effective.

P4 Staff Knowledge and Performance in Emergency Preparedness

P4.1 Notice of Unusual Event (NOUE) Declared For All Three Units Due To Seismic Event (Units 1, 2, and 3)

a. Inspection Scope (71707, 93702)

On October 16, 1999, at 3:05 a.m., the Unit 1 shift manager declared and simultaneously terminated a NOUE emergency classification for a valid strong motion accelerometer system trigger (>0.01g) for all three units. Unit 1 was defueled for its eighth refueling outage, and Units 2 and 3 were at 100 percent power. Plant conditions remained unchanged by the seismic event. The inspectors reviewed unit logs, applicable procedures, and notification forms and held discussion various licensee personnel.

b. Observations and Findings

On October 16, at 2:48 a.m., the Unit 1 control room received a seismic occurrence alarm. Coincidentally, personnel in all three control rooms felt the vibratory ground motion. In accordance with the alarm response procedure, the shift technical advisor was directed to perform Procedure 79IS-9SM01, "Analysis of Seismic Event," Revision 10. All three units dispatched auxiliary operators to monitor the spent fuel pool, refueling pool, and essential spray ponds. No abnormalities were identified. The alarm response procedure provided the shift technical advisor up to 1 hour to complete Procedure 79IS-9SM01. The shift technical advisor's initial analysis of the seismic monitoring instrumentation tape recordings was completed at approximately 3:05 a.m., which validated a "Strong Motion Accelerometer System Trigger," with a reading of 0.015g. The operating basis earthquake and safe shutdown earthquake levels were not approached. The shift manager, at 3:05 a.m., declared and exited a NOUE based on emergency plan emergency action level Technical Bases 6-6. The Maricopa County Sheriff's Office and the Arizona Department of Public Safety were notified at 3:13 a.m., via the notification and alert network. The NRC was notified at 3:53 a.m.

After the event, the inspectors held discussions with the licensee about the 1 hour allowed for alarm validation coincident with vibratory ground motion being in all three control rooms, and it's affect on classifications and notifications. The inspectors also questioned why there were no abnormal operating procedures for addressing a seismic event. The licensee included the questions in CRDR 107862 and will evaluate changes, as necessary.

c. Conclusions

Control room personnel properly implemented emergency plan requirements for emergency classification and offsite notifications after the shift manager declared and simultaneously terminated a Notification of Unusual Event for a valid strong motion accelerometer alarm.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors presented the inspection results to members of licensee's staff at the conclusion of the inspection on December 1, 1999. The licensee acknowledged the findings presented.

The inspectors asked the licensee whether any material examined during the inspection should be considered proprietary. No proprietary information was identified.

ATTACHMENT

PARTIAL LIST OF PERSONS CONTACTED

Licensee

R. Buzzard, Senior Consultant, Nuclear Regulatory Affairs
D. Carnes, Unit 1 Department Leader, Operations
R. Fullmer, Director, Nuclear Assurance
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INSPECTION PROCEDURES USED

37551	Onsite Engineering
61726	Surveillance Observations
62707	Maintenance Observations
71750	Plant Support Activities
71707	Plant Operations
93702	Prompt Onsite Response To Events

ITEMS OPENED And CLOSED

Opened

50-528/9920-01	NCV	Failure to promptly correct a condition adverse to quality (Section M1.3)
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Closed

50-528/9920-01 NCV Failure to promptly correct a condition adverse to quality
(Section M1.3)

LIST OF ACRONYMS USED

CARB	Corrective Action Review Board
CFR	Code of Federal Regulations
CRDR	condition report/disposition request
DFWO	deficiency work order
LCO	limiting condition for operation
LDCR	licensing document change request
LLRT	local leak rate test
NRC	Nuclear Regulatory Commission
NOUE	Notice of Unusual Event
PDR	Public Document Room
RCS	reactor coolant system
TS	Technical Specification
WO	work order