ENCLOSURE 1

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

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Report No.:	50-528/98-08 50-529/98-08 50-530/98-08
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 4 through November 14, 1998
Inspectors:	J. Moorman, III, Senior Resident Inspector D. Carter, Resident Inspector D. Corporandy, Resident Inspector N. Salgado, Resident Inspector R. Azua, Senior Project Engineer M. Fields, Project Manager, Office of Nuclear Reactor Regulation
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ATTACHMENT: Supplemental Information

EXECUTIVE SUMMARY

Palo Verde Nuclear Generating Station, Units 1, 2, and 3
NRC Inspection Report 50-528/98-08; 50-529/98-08; 50-530/98-08

Operations

- Failure to adequately perform a verification of containment integrity resulted in movement of fuel for 14 hours without containment closure. A noncited violation of Technical Specification (TS) 3.9.3 was identified. The refueling team successfully performed the core reload in accordance with plant procedures (Section O1.1).

- Operator oversight and direction of the draining of the Unit 3 reactor coolant system to the midloop condition were excellent. Midloop operation was conducted to remove a piece of foreign material that had become trapped during reinstallation of the manway cover following steam generator (SG) tube inspections. This was a conservative management decision, since an engineering evaluation indicated that the material did not interfere with the sealing of the gasket (Section O1.2).

- The Unit 3 reactor shutdown, to replace the Reactor Coolant Pump 1B lift oil pump, was well planned and conducted in accordance with procedures. Supervisory oversight and direction of the operating crew and the operators' performance during the shutdown were excellent (Section O1.3).

- The licensee methodically addressed an emergent failure of solenoid Valve 3JSIAUV660 (an emergency core cooling system valve) and promptly corrected the condition. Operators entered the appropriate TS limiting condition for operation (Section O2.1).

- The four license conditions associated with conversion to the Improved TS were properly implemented (Section O3.1).

- A weakness in attention to detail by an auxiliary operator while establishing a clearance associated with the fuel pool cleanup pump resulted in a 5-inch, inadvertent draindown of the spent fuel pool. The inspectors considered this an isolated human error and, as a result, a noncited violation of TS 5.4.1 was identified (Section O4.1).

Maintenance

- Knowledgeable technicians used approved procedures to perform routine maintenance activities in a safety conscious manner. Good work and foreign material control practices were observed by the inspectors (Section M1.1).

- Knowledgeable technicians used approved procedures to conduct surveillance activities in a safety conscious manner (Section M1.2).

- Material condition of all three units was good (Section M2.1).

- Mechanics and technicians who performed work on the work orders that involved welding or machining were appropriately qualified for the tasks they performed (Section M4.1).

Engineering

- In general, the licensee's response to correct the pinhole leak in the service water supply line to the water-to-air aftercooler of Unit 1 Emergency Diesel Generator B was adequate. However, the initial safety evaluation, to provide a conditional release from applying the epoxy coating to the pipe interior until the next refueling outage, did not adequately consider the affects of the damaged epoxy coating on other system components should the coating not adhere to the pipe (Section E2.1).

- The engineering disposition of foreign material left in the Unit 3 reactor vessel was thorough and reasonable. Better planning of the retrieval operation would have allowed recovery of the material (Section E3.1).

Plant Support

- Implementation of radiological controls in the Unit 3 refueling outage was characterized by excellent radiation protection controls and effective radiation work practices. Source term reduction efforts were successful in reducing overall radiation exposure (Section R1.1).

Report Details

Summary of Plant Status

Units 1 and 2 were operated at essentially 100 percent power for the duration of this inspection period.

Unit 3 began this inspection period defueled in the seventh refueling outage. The unit was taken to Mode 3 on October 23 and Mode 1 on October 25, 1998. The unit reached 100 percent power on October 29 and was operated there until November 7, when the unit was shut down to repair the Reactor Coolant Pump 1B lift oil pump. The unit was restarted on November 8 and was returned to 100 percent power on November 9, where it was operated for the duration of this inspection period.

I. Operations

O1 Conduct of Operations

O1.1 Core Reload (Unit 3)

a. Inspection Scope (60710)

The inspectors observed the refueling team perform portions of Procedure 72IC-9RX03, "Core Reloading," Revision 11, and reviewed Condition Report/Disposition Request (CRDR) 3-8-0311, which documented a failure to establish containment closure conditions as required by TS 3.9.3 prior to starting the core reload.

b. Observations and Findings

On October 12, 1998, the licensee determined that, approximately 14 hours after starting core alterations, containment closure was not established because an active clearance affected the integrity of Penetration 44 (reactor drain tank to reactor drain pump). Clearance 3-98-01368 specified positioning reactor drain tank drain Valve 3-J-CHE-V049 and the upstream containment isolation Valve 3-J-CHA-HV-560 open; therefore, a pathway from containment to the auxiliary building existed. This discrepancy with containment integrity was identified by the licensee.

Procedure 40ST-9ZZ08, "Containment Building Atmospheric Penetrations Weekly Surveillance," Revision 3, was performed prior to the start of core alterations. During performance of Procedure 40ST-9ZZ08, the licensee failed to recognize the integrity issue affecting Penetration 44. Condition A of TS 3.9.3 states, in part, that, when one penetration was not in the required state, core alterations, and movement of irradiated fuel assemblies within containment should have been suspended immediately.

Immediate corrective actions included closing Valve 3-J-CHA-HV-560 and suspending core alterations pending reperformance of Procedure 40ST-9ZZ08. The planned corrective actions included an evaluation of the adequacy of Procedure 40ST-9ZZ08 and establishment of a database that provided a method to identify components that could affect containment closure when those components are included as part of a

clearance. Inadequate performance of Procedure 40ST-9ZZ08 is a violation of TS 3.9.3. This nonrepetitive licensee-identified and corrected violation is being treated as a noncited violation consistent with the requirements of Section VII.B.1 of the NRC Enforcement Policy (50-530/9808-01).

On October 13 through 15, the inspectors observed the refueling team continue to perform Procedure 72IC-9RX03. The inspectors randomly verified the following throughout the performance of the core reload: two startup nuclear channels were operating in agreement, no neutron count rates from either startup nuclear channels increased by a factor of five, the computer trend of startup nuclear channels was available and visible for the refueling communicators in the control room (CR), reactor coolant system (RCS) water level was maintained at least 23 feet above the top of the reactor vessel flange, one shutdown cooling loop was in operation, and the current boron sample was within procedural requirements.

On October 13, at approximately 9:30 p.m., the refueling team identified a foreign object in the area of Core Location H12. Core alterations were suspended to support retrieval of the object. Refer to Section E3.1 of this report for further discussion on this issue.

The core reload was completed on October 15. The inspectors observed good communications between the reactor engineer in the CR and the licensed senior reactor operator in containment during the performance of Procedure 72IC-9RX03, Appendix E, "Fuel Load Verification Check." The fuel load verification check was required to provide a final check of fuel assemblies and sources prior to installing the upper internals. The licensee verified the that the core had been loaded properly, including location, orientation, and seating of neutron sources and fuel assemblies.

c. Conclusions

Failure to adequately perform a verification of containment integrity resulted in movement of fuel for 14 hours without containment closure. A noncited violation of TS 3.9.3 was identified. The refueling team successfully performed the core reload in accordance with plant procedures.

O1.2 Midloop/Reduced Inventory Activities (Unit 3)

a. Inspection Scope (71707)

On October 17, 1998, the licensee drained the RCS to midloop conditions using Procedure 40OP-9ZZ16, "RCS Drain Operations," Revision 11. This draindown was performed to allow removal of the SG 2 cold leg manway cover so the foreign material, which had been trapped between the SG and its manway cover during reinstallation, could be removed. The inspectors reviewed the licensee's preparations for draining the RCS to midloop conditions and observed the CR operators perform the evolution.

b. Observations and Findings

On completion of eddy current testing of SG 2, the licensee removed the nozzle dams and reinstalled the manway covers. During removal of equipment and foreign material control boundaries, the licensee identified that a piece of cloth material from the exterior foreign material exclusion boundary was trapped between the steam generator and the cold leg manway cover. The licensee initiated CRDR 3-8-0310 and performed an evaluation to determine if the material interfered with the manway sealing surface. The licensee determined that the seal was adequate and within design standards by the measurement of an even gasket crush around the manway perimeter. However, licensee management conservatively decided to drain the RCS to midloop conditions to remove the manway cover and ensure that the foreign material did not interfere with the manway sealing surface.

On October 17, the licensee augmented the on-shift operating crew with a team dedicated to perform midloop operations. The midloop team was comprised of a control room supervisor (CRS), reactor operator, and shift technical advisor, who acted as the midloop coordinator. There was a clearly defined division of the CR activity oversight between the midloop team and the normal shift crew. The inspectors observed that the midloop team maintained positive control of the evolution at all times.

The inspectors reviewed Procedure 40OP-9ZZ16 prior to the reduction of RCS inventory and verified that all the prerequisites were met. From discussions with the midloop crew members, the inspectors determined that the midloop crew was knowledgeable of the draindown procedure, contingency plans, and shutdown risk assessment. The inspectors verified that the licensee had calculated and was sensitive to the amount of time that existed between loss of shutdown cooling and boiling in the core.

The licensee minimized unnecessary work while the unit was in a reduced inventory condition. To prevent loss of shutdown cooling or RCS level perturbations, the licensee stationed a senior reactor operator at the entry of the auxiliary building to screen work activities. In addition, the licensee maintained sources of offsite and onsite power available and limited access to critical equipment areas.

Reactor vessel level indication was provided by two trains of narrow- and wide-range level instruments and by a gage glass system consisting of two trains. During the inspectors' observations, the narrow- and wide-range instruments provided accurate level indication as determined by agreement and overlap between all the different trains of indication during the draindown.

During the previous draindown to midloop conditions on September 22, the licensee experienced a problem with the Train A sightglass, when a 3-inch deviation was seen between it, the Train B sightglass, and the refueling water level indicating system. The licensee initiated CRDR 3-8-0247 to document and troubleshoot the deficiency. Initial troubleshooting indicated that refueling water level indicating system Train A sightglass lower isolation Valve RCN-LG-752 was restricting flow. The licensee replaced the valve and determined that the level error was due to the binding of the valve diaphragm assembly within the valve bonnet, which prevented the valve poppet from retracting,

thus restricting water level from lowering within the sightglass. These corrective actions were effective, as indicated by all trains of level indication within agreement of procedural requirements.

The licensee's inspection of the manway sealing surface revealed that the foreign material left between the SG and the manway cover had not interfered with the sealing surface, as the material was only trapped between the manway retention studs and the outer edge of the manway. The licensee removed the material, reinstalled the manway, and refilled the RCS without incident.

c. Conclusions

Operator oversight and direction of the draining of the Unit 3 reactor coolant system to the midloop condition were excellent. Midloop operation was conducted to remove a piece of foreign material that had become trapped during reinstallation of the manway cover following steam generator tube inspections. This was a conservative management decision since an engineering evaluation indicated that the material did not interfere with the sealing of the gasket.

O1.3 Plant Shutdown (Unit 3)

a. Inspection Scope (71707)

On November 6 and 7, 1998, the inspectors observed the CR crew commence a planned reactor shutdown to troubleshoot and repair the Reactor Coolant Pump (RCP) 1B lift oil pump.

b. Observations and Findings

On November 3, the CR received a lift oil tank high level alarm on RCP 1B. When CR operators started the RCP lift oil pump to clear the alarm, the alarm did not clear. The operators saw no change in tank level and had indication of low lift oil pump discharge pressure. The licensee initiated CRDR 3-8-0360 to document and troubleshoot the problem. After troubleshooting activities, the pump failed to develop adequate discharge pressure to function and a sample of oil from the lift oil pump had a burnt odor. Management directed the unit to be shut down to replace the lift oil pump.

On November 6, approximately 2 hours prior to unit shutdown, CR operators commenced a power reduction from 100 to approximately 30 percent power in accordance with Procedure 40OP-9ZZ05, "Power Operations," Revision 22. Prior to the reactor being tripped, the CRS conducted a briefing with the CR operators to discuss the trip and the posttrip actions. The reactor was tripped from approximately 30 percent power at 12 a.m. on November 7. Following the trip, the operators performed Procedures 40EP-9EO01, "Standard Post Trip Actions," Revision 2, and 40EP-9EO02, "Reactor Trip," Revision 1.

Step 3.b of Procedure 40EP-9EO01 directed operators to determine that maintenance of vital auxiliaries acceptance criteria were met by checking, in part, that the main

generator output breakers were open. When the CRS questioned if the main generator output breakers were open, the CR operator indicated the breakers were not. The CRS directed the CR operator to manually open the breakers. As the operator was preparing to open the breakers, the breakers opened automatically. The CR crew continued with the procedure with no further problems.

After the unit was stable in Mode 3, the CR crew generated CRDR 3-8-0367 to investigate why the main generator output breakers did not open. The licensee's trouble shooting determined that Primary Reverse Power Relay 132-1 did not operate as required and that Backup Reverse Power Relay 132 operated to open the main generator output breakers. The primary relay was found to contain a metal filing that prevented it from operating properly. The relay was cleaned, retested, and reinstalled. The licensee evaluated the transportability of this event to similar relays in Units 1 and 2. A visual inspection was performed and no obvious problems were found. However, these relays could not be throughly inspected until deenergized under outage conditions.

c. Conclusions

The Unit 3 reactor shutdown, to replace the Reactor Coolant Pump 1B lift oil pump, was well planned and conducted in accordance with procedures. Supervisory oversight and direction of the operating crew and the operators' performance during the shutdown were excellent.

O2 Operational Status of Facilities and Equipment

O2.1 Failure of Train A Emergency Core Cooling System (ECCS) Minimum Flow Line Isolation Valve 3JSIAUV660 to the Refueling Water Tank (Unit 3)

a. Inspection Scope (71707)

The inspectors assessed the operations staff performance of Procedure 40OP-9CH12, "Refueling Water Tank Operations," Revision 2. The inspectors also reviewed the licensee's plans to correct failure of a valve to reposition during the restoration phase of Procedure 40OP-9CH12.

b. Observations and Findings

Procedure 40OP-9CH12 was performed to support postaccident sampling system testing per Procedures 74ST-9SS02, "Post Accident Sampling System," Revision 11, and 74ST-9SS03, "Post Accident Sampling System Surveillance," Revision 8. The inspectors reviewed unit log entries and verified that the CR staff had entered the appropriate TS limiting condition for operations for the testing.

During the restoration section of Procedure 40OP-9CH12, the ECCS Train A minimum flow line isolation valve (SIA-UV-660) to the refueling water tank failed to reopen with the control board handswitch. The control board handswitch and associated auxiliary relay

cabinet were quarantined per Procedure 70DP-0EE01, "Equipment Root Cause of Failure Analysis," Revision 8. The control fuses for the ECCS Train A motors were rolled to the OFF position, and ECCS Train A remained inoperable as a result of the failure. The licensee initiated CRDR 3-8-0353 to evaluate the root cause of the failure.

An approved troubleshooting plan was implemented and the licensee identified that ARD Relay SIX615 had failed. After the ARD relay was replaced, the licensee retested Valve SIA-UV-660 by performing Procedure 73ST-9XI13, "Train A HPSI Injection and Miscellaneous SI Valves - Inservice Test," Revision 7. Valve SIA-UV-660 was declared operable and the limiting condition for operations action statements for inoperable ECCS Train A were then appropriately exited.

c. Conclusions

The licensee methodically addressed an emergent failure of solenoid Valve 3JSIAUV660 (an emergency core cooling system valve) and promptly corrected the condition. Operators entered the appropriate TS limiting condition for operation.

O3 Operations Procedures and Documentation

O3.1 Implementation of License Conditions (Units 1,2, and 3)

a. Inspection Scope (71707)

On May 20, 1998, an NRC letter was issued that approved the Improved TS included four license conditions, which are contained in Appendix D of the operating licenses. The inspectors reviewed the applicable licensee documents to confirm that the license conditions had been implemented as required.

b. Observations and Findings

The first license condition required the relocation of certain TS requirements to specific destination documents (e.g., Updated Final Safety Analysis Report (UFSAR), Technical Requirements Manual, Inservice Testing Program, etc.), as described in Tables 3, 5, and 6 of the Improved TS Safety Evaluation Report. The inspectors selected a number of items from each of these tables for examination with the objective of including all destination documents specified in these tables in the review. The inspectors compared the relocated items in these destination documents to the items that were in the TS version in place before the Improved TS were implemented. In all cases, the inspectors were able to conclude that the items had been accurately transferred to the correct destination documents. The inspectors observed that the licensee had modified some of these items, after the items had been relocated, using approved processes (e.g., the 10 CFR 50.59 process) to control the changes.

The second license condition provided specific provisions for implementing the Improved TS surveillance requirements. The inspectors selected a number of items from the Impacted Surveillance Test schedule attached to the licensee's June 10, 1998,

internal correspondence (ID 200-01429-TLR) that discussed this issue. The inspectors compared the surveillance intervals in this table to the corresponding surveillance intervals in the new and old TS. In all cases, the inspectors were able to conclude that the changes in surveillance requirements had been accurately implemented by the licensee.

The third license condition required a change to the UFSAR to add a listing to Section 17.2 of the UFSAR sections outside Chapter 17 that contain Quality Assurance Program commitments. The next revision to the UFSAR was not scheduled until early 1999, so the inspectors examined the approved safety analysis report change notice, dated July 27, 1998. The inspectors compared the material added to Section 17.2.0 to the corresponding list of appropriate UFSAR sections identified on page 30 of the NRC's Safety Evaluation Report, dated May 20, 1998. The inspectors concluded that the licensee had accurately implemented this license condition.

The fourth license condition required that the commercial-grade certification program detect the types of failures that were discussed in References 8, 9, 11, and 12 of the NRC's Safety Evaluation Report, dated February 27, 1996, that approved the Combustion Engineering Owners Group Topical Report CEN-403, "ESFAS Subgroup Relay Test Interval Extension," Revision 1. These four references discussed the material deficiencies discovered on certain Potter and Brumfield MDR relays. The inspectors reviewed licensee documents IPSCN GENX-A01-NA-0358 and MEE/ITTE-01006, Revision 5, and verified that the guidance contained in the four references had been appropriately added to the licensee's documents. The inspectors concluded that the licensee had accurately implemented this license condition.

c. Conclusions

The four license conditions associated with conversion to the Improved TS were properly implemented.

O4 Operator Knowledge and Performance

O4.1 Inadvertent Draindown of Spent Fuel Pool (SFP) (Unit 2)

a. Inspection Scope (71707)

On November 3, 1998, approximately 5 inches from the SFP were inadvertently drained while establishing conditions for Clearance 2-8-00984. The inspectors discussed the event with Operations personnel and reviewed applicable documentation.

b. Observations and Findings

Clearance 2-8-00984 isolated and drained piping associated with Fuel Pool Cleanup Pump A. These conditions were necessary to allow the licensee to perform preventive maintenance tasks and mechanical seal replacement of the pump.

Prior to establishing the condition described in Clearance 2-8-00984, a reactor operator and the auxiliary operator (AO) conducted a prejob briefing. The briefing included discussion of the current system/component configuration, use of Procedure 40OP-9PC06, "Fuel Pool Cleanup and Transfer," Revision 9, to stop the pump, required boundaries and associated valves positions, and expected pool cooling system lineup following the clearance. The inspector concluded that a sensitive issues briefing, which would have involved the shift supervisor and shift manager, should have been performed. The sensitive issues briefing may have discussed the expected short duration drain, the need for independent verification could have been requested prior to the drain, and contingencies would have been explored.

The fuel pool cleanup pump was stopped and pump discharge Valve PCN-V043 was closed at 9:20 p.m. per Procedure 40OP-9PC06. The AO then performed the initial alignment of Clearance 2-8-00984. The AO began draining the system and left the area to obtain support equipment for the job. While the AO was away from the area (approximately 40 minutes), the CR received alarm "Pool/Spent Fuel Pool Trouble." The AO was dispatched to investigate the alarm and found that local alarm, "SFP Hi Lo Trbl," was annunciated. The AO reported to the CR that the SFP level had decreased approximately 5 inches since being checked earlier in the shift. The CR personnel immediately directed the AO to secure the drain valves that were opened for the clearance.

The licensee's investigation discovered that Fuel Pool Cleanup Pump A suction isolation Valve 2MPCNV038 was mispositioned. The AO had failed to close the valve as specified by the clearance. The AO relied on a visual indication and did not attempt to close the valve to ensure it was closed. With the suction and drain valves open, a drain path from the SFP to the fuel building sumps existed. Approximately 4300 gallons of borated water was drained from the SFP to the liquid radwaste holdup tank. No TS actions were required, since SFP level remained greater than 23 feet above irradiated fuel assemblies. The inspectors held discussions with the licensee about the draining process beginning before the independent verification of the position of the valves was performed. The AO had not yet requested an independent verification of the clearance. Procedure 40DP-9OP30, "Clearance Processing," Revision 11, provided an additional barrier, in that independent verification of the tagout and component position may be accomplished prior to the establishment of equipment conditions or completion of the initial placement of all tags at the discretion of the responsible supervisor. The licensee had a barrier available that could have prevented the draindown of the SFP by identifying the mispositioned valve much sooner had an independent verification been requested prior to opening the pump casing drain valve.

The licensee initiated CRDR 2-8-0286 to evaluate the corrective action associated with this tagging error and to determine if there were any lessons to be learned from this incident. The immediate corrective action was to terminate the draindown of the SFP. Also, the AO was coached and his tagging duties were administratively put on hold.

The failure to position Valve 2MPCNV038 closed, as specified on Clearance 2-8-00984, is a violation of TS 5.4.1. This nonrepetitive licensee-identified and corrected violation is being treated as a noncited violation consistent with the requirements of Section VII.B.1 of the NRC Enforcement Policy (50-529/9808-02).

The inspectors held discussions with Operations management about the recent tagging and clearance issues documented in previous NRC Inspection Reports. The licensee informed the inspectors that tagging and clearance was a top ten issue for Nuclear Assurance. The licensee had initiated CRDR 2-8-Q217 to evaluate and help identify opportunities to reduce field errors in tagging.

c. Conclusions

A weakness in attention to detail by an auxiliary operator while establishing a clearance associated with the fuel pool cleanup pump resulted in a 5-inch, inadvertent draindown of the spent fuel pool. The inspectors considered this an isolated human error and, as a result, a noncited violation of TS 5.4.1 was identified.

O8 Miscellaneous Operations Issues (92901)

O8.1 (Closed) Licensee Event Report (LER) 50-528/9804-00: Three Main Steam Safety Valves As-Found Lift Pressures Were Found Out of Tolerance.

This item was identified while the licensee was performing on-line testing of the Unit 1 main steam safety valves using the Furmanite Digital Trevitest method. Licensee investigations have determined that the apparent root cause for the out-of-tolerance, as-found setpoint was the valve disc "sticking" to the nozzle seat. The licensee was unable to determine what caused the "sticking" to take place. The licensee is continuing to investigate, with other utilities, a number of industry theories regarding this phenomenon. In keeping with these investigations, the licensee has taken some actions, including steaming the valve seats prior to installation in an effort to mitigate the "sticking" effect. In addition, the licensee has increased the frequency of valve testing to reduce the time between tests and minimize the time in which the "sticking" phenomenon can take place. The described corrective actions were found to be appropriate for addressing this issue.

O8.2 (Closed) LER 50-530/9305-00: Failure to Perform Surveillance Test in Accordance With Technical Specification 3.8.1.1, Action b.

This item was addressed during the review of Violation 50-528, 529, 530/9805-02 (refer to Section O8.3). No new issues were revealed by the LER.

O8.3 (Closed) Violation 50-528,529,530/9805-02: Failure to Demonstrate Operability of Offsite Power Circuits.

The inspectors verified the corrective actions described in the licensee's response letter, dated August 7, 1998, to be reasonable and complete. No similar problems were identified.

O8.4 (Closed) Violation 50-528,529,530/9805-03: Required Record Was Not Complete And Accurate.

The inspectors verified the corrective actions described in the licensee's response letter, dated August 7, 1998, to be reasonable and complete. No similar problems were identified.

O8.5 (Closed) Violation 50-528,529,530/9805-04: Failure to Submit an LER For a Condition Prohibited By the Technical Specifications.

The inspectors verified the corrective actions described in the licensee's response letter, dated August 7, 1998, to be reasonable and complete. No similar problems were identified.

II. Maintenance

M1 Conduct of Maintenance

M1.1 General Comments on Maintenance Activities (Unit 3)

a. Inspection Scope (62707)

The inspectors observed all or portions of the following work activities:

860042	"Disassemble and Rework Inboard Mechanical Seal per 31MT-9AF01" (Unit 3)
840831	" Miscellaneous Work in the Fuel Building (specifically removal of a aluminum spacer from the SFP)" (Unit 3)
840974	"Piston Modification Per vendor service bulletin on cylinders 1-L, 2-L, 3-L, 5-L, 6-L, 7-L, 9-L, and 10-L" (Unit 3)
849643	"Replace Lifters on Cylinders 3-L, 4-L, 10-L, and 6-R" (Unit 3)
824788	"Examine Diesel Engine, General Tear down and Inspections" (Unit 3)
32MT-9PE01	"18 Month Cleaning Inspection and Testing Of The Class 1E Diesel Generator" (Unit 3)

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.

For the work associated with the emergency diesel generator (EDG), the inspectors observed good work practices by the EDG team in the area of foreign material exclusion control, identification and control of removed parts, cleanliness, and work package usage. The inspectors also observed good communications and teamwork between the maintenance and engineering groups.

c. Conclusions

Knowledgeable technicians used approved procedures to perform routine maintenance activities in a safety conscious manner. Good work and foreign material control practices were observed by the inspectors.

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

a. Inspection Scope (61726)

The inspectors observed all or portions of the following surveillance activities:

36ST-9SE03 "Excore Safety Liner Channel Quarterly Calibration," Revision 15 (Unit 3)

39TI-9ZZ03 "MOV Dynamic Diagnostic Testing of the Low Pressure Safety Injection Valves," Section 8.4, "Testing of SIA-UV-669, LPSI Pump A Recirc Valve," Revision 8 (Unit 3)

39TI-9ZZ03 "MOV Dynamic Diagnostic Testing of the Low Pressure Safety Injection Valves," Section 8.6, "Testing of SIA-UV-664, CS Pump A Recirc Valve," Revision 8 (Unit 3)

42ST-2ZZ22 "Remote Shutdown Instrumentation Channel Checks," Revision 7 (Unit 2)

40ST-9DG02 "Diesel Generator B Test," Revision 7 (Unit 3)

40DP-9OP08 "Diesel Generator Test Record, " Revision 27 (Unit 3)

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.

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

The inspector's observation of plant material condition during this inspection period identified no major observable material condition deficiencies.

c. Conclusions

Material condition of all three units was good.

M4 Maintenance Staff Knowledge and Performance

M4.1 Review of Selected Outage Work Orders (WO) (Unit 3)

a. Inspection Scope (62707)

The inspectors reviewed, in part, various completed Unit 3 outage WOs that involved machining and welding on safety-related system valves to ensure that work was being performed by qualified personnel.

b. Observations and Findings

The inspectors reviewed, in part, the following WOs:

777295	"Implement DMWO 769331 on 3JSIAUV0647...Replace SMC-04 with SMB-00 APN 00050202...Modify Stem with Stem modification kit APN 45004518"
844476	"Dissemble 3PSIBV532 for check valve inspection"
858062	"Dissemble 3PSIEV144 for check valve inspection and hinge arm NDE inspection"

846785 "Valve 3JSIBUV0638 Leaks by its seat causing the SIT fill and drain header to pressurize"

The WOs involved the performance of various tasks, including machining and welding. The inspectors reviewed current qualifications of individuals that performed the tasks. All individuals were either journeyman mechanics or valve technicians and were trained under ANS 3.1, 1978.

There was a practice described in Procedure 30DP-9MP01, "Conduct of Maintenance," Revision 25, that allowed dependent workers to perform work under task qualified independent workers, as long as the qualified person makes the final acceptance work verifications. For the WOs reviewed, only independent workers performed the subject tasks.

c. Conclusions

Mechanics and technicians who performed work on the work orders that involved welding or machining were appropriately qualified for the tasks they performed.

III. Engineering

E2 Engineering Support of Facilities and Equipment

E2.1 Pinhole Leak on EDG B Aftercooler Inlet Piping (Unit 1)

a. Inspection Scope (37551)

On October 13, 1998, during testing of Unit 1 EDG B, the licensee observed a pinhole leak at the service water supply line to the water-to-air aftercooler. The leak was on the weld neck part of a flanged connection to safety Valve PSV-140. The inspectors reviewed the licensee's actions in response to this problem.

b. Observations and Findings

Following discovery of the pin hole leak, TS 3.8.1, Action B.4, was entered, which required a plant shutdown in 72 hours. The licensee visually inspected the service water supply line to the water-to-air aftercoolers on Unit 1 EDG A, as well as the lines to the Unit 2 and Unit 3 EDGs. No other indications of leakage were observed.

Safety Valve PSV 140 was removed to inspect the inlet piping. The piping was found to be in good condition, except for a pin hole in a spool piece. The piping was lined with an epoxy coating, which would require the damaged spool piece to be recoated with the epoxy once it was repaired. The cure time for the epoxy was 5 days. Engineering personnel performed a safety evaluation to provide a conditional release from applying the epoxy coating until the next refueling outage (approximately 12 months). The inspectors reviewed the safety evaluation for WO 00858564 and determined that it adequately accounted for additional corrosion due to the absence of the epoxy coating.

However, the documentation did not address the consequence of damaged epoxy lining dislodging and plugging or otherwise affecting other components in the system. Once questioned by the inspectors, Engineering personnel obtained sufficient information from the epoxy vendor, as well as the persons who repaired the pin hole leak, to determine that the amount of damage to the epoxy coating was minor and would not significantly affect any of the system components.

c. Conclusions

In general, the licensee's response to correct the pinhole leak in the service water supply line to the water-to-air aftercooler of Unit 1 EDG B was adequate. However, the initial safety evaluation, to provide a conditional release from applying the epoxy coating to the piping interior until the next refueling outage, did not adequately consider the potential affects of the damaged epoxy coating on other system components should the coating not adhere to the piping.

E3 Engineering Procedures and Documentation

E3.1 Engineering Disposition of Foreign Material in the Reactor Vessel (Unit 3)

a. Inspection Scope (37551)

The inspectors reviewed Deficiency WO 858695, which documented a use-as-is disposition for foreign material found in the Unit 3 reactor vessel during core reload. The inspectors also reviewed CRDR 3-8-0318 and the associated 10 CFR 50.59 evaluation.

b. Observations and Findings

On October 13, 1998, while reloading the Unit 3 reactor core, a piece of foreign material was observed on the core flow distribution plate. The source of the material could not be positively identified. The issue was documented in CRDR 3-8-0318. Attempts were made to retrieve the material; however, during the retrieval, the object fell from the retrieval tool and came to rest beneath the flow distribution plate. The object became irretrievable from this location.

The evaluation provided a logical approach to the disposition. Since the licensee was unsure as to the exact nature of the material, a range of materials was considered in the analysis. The object was flat and estimated to be approximately 4 to 5 inches long by 1/2 inch wide by 1/8 inch thick. In the event that the material remained in one piece, blockage of core flow was considered in the disposition. The disposition also addressed the effects of the material breaking into pieces. The licensee used a guardian grid design fuel, which would prevent objects larger than 1/8 inch from passing through to the core. The licensee concluded that there would be no adverse effect on operation from leaving the material in the reactor. The inspectors considered the licensee's approach to the disposition to be thorough and reasonable. However, better planning for the foreign object retrieval would have led to a successful retrieval operation.

c. Conclusions

The engineering disposition of foreign material left in the Unit 3 reactor vessel was thorough and reasonable. Better planning of the retrieval operation would have allowed recovery of the material.

IV. Plant Support

R1 Radiological Protection and Chemistry Controls

R1.1 Refueling Outage Radiological Controls (Unit 3)

a. Inspection Scope (71750)

The inspector's reviewed exposure records, as low as reasonably achievable goals and results, and radiological problem reports from the Unit 3 outage.

b. Observations and Findings

The licensee's collective radiation exposure for the Unit 3 refueling outage was 72 Rem, which was considerably lower than the licensee's outage goal of 98 Rem. This reduced exposure level was due to the licensee's efforts in chemistry control of the RCS and the use of temporary shield teams to guarantee proper installation of shielding equipment prior to the initiation of work activities. Exposures for the most significant jobs were:

- Steam Generator Maintenance 19.0 Rem
- Valve Maintenance Activities 9.0 Rem
- Reactor Vessel Disassembly, Assembly and Refueling Activities 8.5 Rem
- Temporary Shielding Installation 4.0 Rem
- 10 Year Inservice Inspection 3.9 Rem

The inspectors reviewed the licensee's radiological problem reports issued during the outage and determined that they were issued at an appropriate threshold and did not identify any significant problems.

c. Conclusions

Implementation of radiological controls in the Unit 3 refueling outage was characterized by excellent radiation protection controls and effective radiation work practices. Source term reduction efforts were successful in reducing overall radiation exposure.

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 2, 1998. 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

M. Banks, Communication Representative, Owner Services
R. Fullmer, Director, Nuclear Assurance
J. Hesser, Director, Engineering
D. Kanitz, Engineer, Nuclear Regulatory Affairs
A. Krainik, Department Leader, Nuclear Regulatory Affairs
D. Marks, Section Leader, Nuclear Regulatory Affairs
G. Overbeck, Vice President, Nuclear Production
T. Radke, Director, Outages
G. Shanker, Department Leader, Speciality Engineering
M. Shea, Director, Training
R. Sorensen, Department Leader, Chemistry
W. Stewart, Executive Vice President, Generation
P. Wiley, Unit 2 Department Leader, Operations

INSPECTION PROCEDURES USED

37551	Onsite Engineering
60710	Refueling Activities
61726	Surveillance Observations
62707	Maintenance Observations
92901	Plant Operations Followup
71707	Plant Operations
71750	Plant Support Activities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-530/9808-01	NCV	Failure to Establish Containment Integrity Prior to Commencing Core Reload (Section O1.1)
50-529/9808-02	NCV	Inadvertent Drain Down of SFP (Section O4.1)

Closed

50-530/9808-01	NCV	Failure to Establish Containment Closure Prior to Commencing Core Reload (Section O1.1)
50-529/9808-02	NCV	Inadverent Drain Down of SFP (Section O4.1)
50-530/9305-00	LER	Failure to perform surveillance test in accordance with Technical Specification 3.8.1.1, Action b (Section O.8.2)
50-528/9804-00	LER	Three main steam valves as-found lift pressures were found out of tolerance (Section O.8.1)
50-528,529, 530/9805-02	VIO	Failure to demonstrate operability of offsite power circuits (Section O.8.3)
50-528,529, 530/9805-03	VIO	Required record was not complete and accurate (Section O.8.4).
50-528,529, 530/9805-04	VIO	Failure to submit an LER for a condition prohibited by Technical Specification (Section O.8.5)

LIST OF ACRONYMS USED

AO	auxiliary operator
CFR	Code of Federal Regulations
CR	control room
CRDR	condition report/disposition request
CRS	control room supervisor
ECCS	emergency core cooling system
EDG	emergency diesel generator
LER	licensee event report
NRC	Nuclear Regulatory Commission
PDR	Public Document Room
PVNGS	Palo Verde Nuclear Generating Station
RCP	reactor coolant pump
RCS	reactor coolant system
SFP	spent fuel pool
SG	steam generator
TS	Technical Specification
UFSAR	Updated Final Safety Analysis Report
WO	work order