## ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

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| Docket Nos.: | 50-528<br>50-529<br>50-530 |
| License Nos.: | NPF-41<br>NPF-51<br>NPF-74 |
| Report No.: | 50-528/99-06<br>50-529/99-06<br>50-530/99-06 |
| Licensee: | Arizona Public Service Company |
| Facility: | Palo Verde Nuclear Generating Station, Units 1, 2, and 3 |
| Location: | 5951 S. Wintersburg Road<br>Tonopah, Arizona |
| Dates: | March 21 through May 1, 1999 |
| Inspectors: | J. H. Moorman, III, Senior Resident Inspector<br>D. R. Carter, Resident Inspector<br>N. L. Salgado, Resident Inspector |
| 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. 50-528/99-06; 50-529/99-06; 50-530/99-06

## Operations

- Operator oversight and direction of the Unit 2 draindown to midloop evolution were excellent. Licensee activities related to midloop operation demonstrated a strong safety focus (Section O1.1).

- The licensee failed to take actions to correct an inadequate procedure that was used to verify the position of valves in the Unit 1 essential chilled water system. This deficiency was again identified during operation of the system for maintenance, which resulted from mispositioned valves in the essential chilled water system. 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 Appendix C of the NRC Enforcement Policy. This issue is in the licensee's corrective action program as Condition Report/Disposition Request 9-9-Q0107 (Section O7.1).

- Two examples of a violation of Technical Specification 3.3 were identified for not placing an instrument in the bypass or tripped condition within 1 hour from the time the instrument was identified as inoperable. These events were reported in Licensee Event Reports 50-528/98-001-00, 50-529/98-003-00, and 50-529/98-003-01. This Severity Level IV violation is being treated as a noncited violation, consistent with Appendix C of the NRC Enforcement Policy. These issues are in the licensee's corrective action program as Condition Report/Disposition Requests 1-8-0044 and 9-8-0931 (Section O8.1).

## Maintenance

- Knowledgeable technicians used approved procedures to perform routine maintenance activities in an effective manner. Good work and foreign material control practices were observed (Section M1.1).

- Knowledgeable technicians and operators used approved procedures to conduct surveillance activities in a satisfactory manner. However, during Unit 2 integrated safeguards testing of the containment spray actuation signal, operators overlooked a caution note in the procedure providing for the isolation of nuclear cooling water relief valves. The relief valves inadvertently lifted during the test, which resulted in approximately 80 gallons of water being discharged to the containment sump. The caution note contained guidance that should have been included as a procedure sign-off step. Licensee actions to correct the procedure deficiency were acceptable (Section M1.2).

- Observable material condition of the three units was good. During a postshutdown walkdown of the Unit 2 containment, licensee inspection of Inconel 600 resistance temperature detector nozzles revealed no evidence of leakage. The licensee's actions to address the boron accumulation were good (Section M2.1).

- During a walkdown of the Unit 2 containment just prior to plant restart, it was noted that material condition of equipment was good (Section M2.2).

Engineering

- Personnel error in preparing a material balance transfer sheet form and inadequate independent verification of the form resulted in Assembly P1B241 being stored in an incorrect location in the Unit 2 spent fuel pool since August 1997. This is a violation of Technical Specification 3.7.17. This Severity Level IV violation is being treated as a noncited violation, consistent with Appendix C of the NRC Enforcement Policy. This issue is in the licensee's corrective action program as Condition Report/Disposition Request 2-9-0048 (Section E2.1).

Plant Support

- The licensee effectively implemented their shutdown chemistry plan for the Unit 2 outage. The coordination of the radiation protection, chemistry, and operations departments, to allocate the time and resources needed to effectively reduce reactor coolant system activity prior to outage activities, was effective in establishing new plant radiological safety benchmarks (Section R1.1).

## Report Details

### Summary of Plant Status

Units 1 and 3 operated at essentially 100 percent power for the duration of this inspection period.

Unit 2 began this inspection period at 94 percent power, coasting down to its eighth refueling outage. The unit was shut down and taken to Mode 5 on March 27, 1999. The unit was returned to Mode 3 on April 29. On May 1, the unit entered Mode 2 and was taken critical at 2:48 a.m.

## I. Operations

### O1 Conduct of Operations

#### O1.1 Midloop/Reduced Inventory Activities (Unit 2)

a. Inspection Scope (71707)

On April 23, 1999, the licensee drained the reactor coolant system (RCS) to the midloop condition using Procedure 40OP-9ZZ16, "RCS Drain Operations," Revision 13. This was done to allow removal of steam generator (SG) nozzle dams that had been installed to allow for eddy current testing of the SG tubes. The inspectors reviewed the licensee's preparations for midloop operations and observed control room operators as they performed the various evolutions.

b. Observations and Findings

The licensee augmented the onshift operating crew with a team dedicated to perform midloop operations. The midloop team was comprised of a control room supervisor, reactor operator, and shift technical advisor, who acted as the midloop coordinator. There was a clearly defined division of the control room 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. A unit department leader actively provided management oversight of the evolution.

The inspectors reviewed Procedure 40OP-9ZZ16, during reduction of RCS inventory, and verified that all the prerequisites were met. From discussions with the midloop crew members, the inspectors determined that the crew had received training and were knowledgeable of the draindown procedure, contingency plans, and shutdown risk assessment. The inspectors verified that the licensee had calculated and was sensitive to the short amount of time that existed between a 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 a 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 going into the field. In addition, the licensee maintained sources of offsite and onsite power available and limited access to critical equipment areas.

Unit 2 entered midloop operation when reactor vessel level dropped below the 103-foot 1-inch level and was in the midloop condition for approximately 7 hours. During the draindown, both trains of the locally-installed gage glass and the refueling water level indication system instruments functioned properly and tracked uniformly. The licensee appropriately implemented and maintained the requirements specified by Procedure 40OP-9ZZ16.

c. Conclusions

Operator oversight and direction of the Unit 2 draindown to midloop evolution were excellent. Licensee activities related to midloop operation demonstrated a strong safety focus.

## O7 Quality Assurance in Operations

### O7.1 Inadequate Corrective Action for Essential Chilled Water (ECW) System Surveillance (Unit 1)

a. Inspection Scope (71707)

On February 9, 1999, an auxiliary operator monitoring the operation of ECW Systems A and B observed that lube oil temperatures were above the normal range of operation. The inspectors interviewed personnel, reviewed procedures, and Condition Report/Disposition Requests (CRDR) 1-9-0024, 9-9-0295, and 3-6-0180.

b. Observations and Findings

On February 9, at 5:10 a.m., ECW Systems A and B were started to support maintenance on the normal ventilation cooling system. At 10:40 a.m., the auxiliary operator who was monitoring the ECW chillers noted that the temperature in the compressor lube oil reservoirs was 193°F and 190°F for Chillers A and B, respectively. The normal operating band for this temperature is 140-150°F. The heating, ventilation, and air conditioning technicians were contacted by the control room and immediately responded to observe operation of the chillers. After determining that the oil temperatures had stabilized, the technicians adjusted the cooling water flow through the chiller oil coolers by repositioning essential chiller oil cooler outlet isolation Valve ECV-321 on the Train A Chiller and essential chiller oil cooler outlet isolation Valve ECV-421 on the Train B Chiller. The chiller oil temperatures returned to their normal values by 11:15 a.m. The licensee initiated significant CRDR 1-9-0024 to document the event and determine the root cause. In addition, engineering performed a detailed evaluation of the operability of both chillers. The evaluation concluded that the chillers continued to be operable with the cooling water valves mispositioned. The inspectors reviewed the conclusions in the evaluation and did not identify any concerns.

Valves ECV-321 and ECV-421 in Units 1 and 2 are manually-operated, 1½-inch ball valves with handles that go from full open to full closed in 90 degrees of travel. The similar valves in Unit 3 are globe valves. There is no position indication on these valves,

and they were not designed to be used as throttle valves. The cooling water for the oil cooler is taken directly off of the chilled water outlet piping, which provides a constant, low temperature supply of water. This configuration, combined with the throttling characteristics of ball valves, required that the valve be open only a minimal amount to provide the desired cooling for the oil. Also, this made the control of oil temperature very sensitive, since only a slight amount of valve movement was needed to cause a large change in the cooling capacity of the oil cooler.

Valves ECV-321 and ECV-421 are located on the interior of the chiller package and are not easily accessible. The inspectors determined, through interviews with maintenance services personnel, that insulation had been installed on both of the essential chillers in the weeks just prior to the event. The insulation covered the chillers and required the personnel installing the insulation to climb on the chillers in the vicinity of Valves ECV-321 and ECV-421. None of the personnel interviewed could positively remember if they were around the valves in question or if they had bumped the valves. From a review of Work Orders 829081 and 829082, the inspectors determined that Chiller A was insulated between December 21, 1998, and January 29, 1999, and that Chiller B was insulated between December 15, 1998, and February 3, 1999. From discussions with the heating, ventilation, and air conditioning system engineer and a review of logs, the inspectors determined that the last time the chillers had been run successfully were January 20 for Train A and January 7 for Train B.

Procedure 41ST-1EC01, "Essential Chilled Water Valve Verification," Revision 11, was performed every 31 days to ensure that ECW system valves were in the correct position, as required by Technical Specification (TS) Surveillance Requirement 3.7.10.1. This surveillance was last performed for Trains A and B on February 7. The inspectors determined that the valves were most likely bumped out of position during insulation work and that Procedure 41ST-1EC01 was performed after completion of the insulation work. A note in the Procedure 41ST-1EC01 valve checklist, used to accomplish the surveillance, stated that the acceptable position for Valves ECV-321 and ECV-421 was "throttled 10 to 94 percent." The note also referred the user to Appendix C of the procedure for guidance on position verification. The appendix provided a series of drawings showing the valve handle in various throttle positions relative to pipe position. However, since flow through the oil cooler was so sensitive to valve position, there was no practical way for an operator to verify that the valve was in the proper position by a visual inspection. Additionally, the range of 10 to 94 percent open was too broad a range to ensure chiller operability. Too much cooling to the oil cooler results in the overcooled oil absorbing refrigerant. Based on the above, the inspectors considered the guidance in Procedure 41ST-1EC01 inadequate to provide assurance that the proper cooling flow existed for chiller operation. This condition was transportable to Unit 2 only since the Unit 3 valves are of a different design and less susceptible to mispositioning. The inspectors brought this to the attention of the licensee and CRDR 9-9-0295 was written to document the issue.

Further investigation into the issue revealed that CRDR 3-6-0180, initiated on October 24, 1996, requested a resolution to the confusing guidance for position verification of Valves ECV-321 and ECV-421 in Revision 9 of Procedure 41ST-1EC01. The inspectors reviewed this CRDR and the previous revisions of Procedure 41ST-1EC01. The valve checklist in Revision 9 listed the required position as "throttled" with a note that stated "Oil cooler outlet isolation valve throttled to maintain 140 - 150°F while running." Procedure 41ST-1EC01 did not contain provisions for running the chillers during the surveillance. The CRDR response stated, in part, that the requirements of the surveillance were met by observing that the valves were throttled and that the valves were not meant to be in a single preset position for all operating conditions. Instead, fine tuning of valve position would be done by the auxiliary operator when the chillers were running. The CRDR also stated that it was the intent and practice, while performing the surveillance, to take the valves closed and then open again to the approximate last position that it was in to verify that the valves were throttled. This guidance was not contained in Procedure 41ST-1EC01, Revision 9. Although the CRDR answer stated that no changes were necessary, a Priority 4 corrective action to change Procedure 41ST-1EC01 was assigned. This action resulted in a procedure change to add the guidance found in Revision 11, as stated above. Another Priority 4 corrective action was assigned to engineering to propose a method to lock the valves in position in all units. Since Priority 4 actions were considered enhancements, no valve locks were installed. From this review, the inspectors determined that CRDR 3-6-0180 documented the inadequacy of Procedure 41ST-1EC01 and represented an opportunity to provide corrective action; however, no action was taken.

The failure to correct a condition adverse to quality 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 Appendix C of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as CRDR 9-9-Q0107 (50-528,-529/9906-01).

c. Conclusions

The licensee failed to take actions to correct an inadequate procedure that was used to verify position of valves in the Unit 1 ECW system. This deficiency was again identified during operation of the system for maintenance, which resulted from mispositioned valves in the ECW system. 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 Appendix C of the NRC Enforcement Policy. This issue is in the licensee's corrective action program as CRDR 9-9-Q0107.

## O8 Miscellaneous Operations Issues (92901)

O8.1 (Closed) Licensed Event Reports (LER) 50-528/98-001-00, 50-529/98-003-00, 50-529/98-003-01: Reactor Protection and Engineer Safety Features Actuation System Instrumentation Not Bypassed Within One Hour Allowed by TS; Refueling Water Tank Level Channel Failure Due to Water Intrusion.

On January 30, 1998, Unit 1 control room personnel identified that, from approximately 4:05 p.m. to 5:16 p.m., the SG 1 low pressure trip parameter had been inoperable for greater than the 1 hour allowed by TS 3.3.1 without being placed in the bypass or tripped condition. The SG 1 low pressure trip setpoint drifted low during the performance of Surveillance Procedure 36ST-9SB42, "Plant Protection System Bistable and Bistable Relay Response Time Test," Revision 5, and was not noticed by control room operators. At 5:16 p.m., the licensee entered into TS 3.3.1 and placed SG 1 low pressure trip Channel A in bypass.

On January 13, 1998, Unit 2 control room personnel identified that, from approximately 12:19 p.m. to 7:50 p.m., refueling water tank level Instrument 203C had been inoperable for greater than the 1 hour allowed by TS 3.3.2 without being placed in the bypass or tripped condition. Refueling water tank level Instrument 203C failed as a result of rainwater intrusion into the level transmitter conduit and pull box and was not noticed by control room operators. At 7:50 p.m., the licensee entered into TS 3.3.2 and placed the plant protection system recirculation actuation signal for Channel C in bypass.

These failures to place a failed channel in bypass are a violation of TS 3.3. This Severity Level IV violation is being treated as a noncited violation, consistent with Appendix C of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as CRDRs 1-8-0044 and 9-8-0931 (50-528,-529/9906-02).

Conclusions

Two examples of a violation of Technical Specification 3.3 were identified for not placing an instrument in the bypass or tripped condition within 1 hour from the time the instrument was identified as inoperable. These events were reported in LERs 50-528/98-001-00, 50-529/98-003-00, and 50-529/98-003-01. This Severity Level IV violation is being treated as a noncited violation, consistent with Appendix C of the NRC Enforcement Policy. These issues are in the licensee's corrective action program as CRDRs 1-8-0044 and 9-8-0931.

O8.2 Administrative Closure of Previously Identified Violations (Unit 1 and 3)

The Severity Level IV violations listed below were issued in Notices of Violation prior to the March 11, 1999, implementation date for the NRC's new policy for treatment of Severity Level IV violations (Appendix C of the Enforcement Policy). Because these violations would have been treated as noncited violations, in accordance with Appendix C, they are being closed out in this report.

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| Violation 50-528/9809-03 | This violation is in the licensee's corrective action program as CRDR 9-8-Q239. |
| Violation 50-530/9809-01 | This violation is in the licensee's corrective action program as CRDR 3-8-0337. |
| Violation 50-530/9806-01 | This violation is in the licensee's corrective action program as CRDR 3-8-0172. |

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| Violation 50-528/9805-01 | This violation is in the licensee's corrective action program as CRDR 1-8-0376. |
| Violation 50-528/9803-04 | This violation is in the licensee's corrective action program as CRDRs 1-8-0184, 9-8-0721, and 9-8-0511. |

O8.3 (Closed) LER 50-530/98-004-00: Loss Of Containment Closure During Refueling Operations.

This event was discussed and dispositioned as a noncited violation in NRC Inspection Report 50-528;50-529;50-530/98-08. No new issues were revealed during review of this LER.

O8.4 (Closed) LER 50-528, -529, -530/98-006-00 and 98-006-01: Safety Injection Discharge Check Valve Reverse Flow Causes Condition Outside Design Basis.

This event was discussed and dispositioned as three violations in NRC Inspection Report 50-528;50-529;50-530/98-14. No new issues were revealed during review of this LER.

O8.5 (Closed) LER 50-528, -529, -530/99-003-00: Required Surveillance Not Completed Due To Deficient Procedure.

This LER was issued to discuss the event described in Section O7.1 of this report.

O8.6 (Closed) LER 50-529/99-003-00: Unit 2 Spent Fuel Assembly in Wrong Location.

This LER was issued to discuss the event described in Section E2.1 of this report.

## II. Maintenance

### M1 Conduct of Maintenance

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

a. Inspection Scope (62707)

The inspectors observed all or portions of the following activities performed per the listed work document:

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| 682556 | "Repack S/G-2 Economizer Feedwater Isolation Valve" (Unit 2) |
| 767871 | "Remove and Reweld S/G-1 Steam Supply to AFW Pump A" (Unit 2) |
| 875338 | "Disassemble/Inspect AFW Pump A Turbine Governor Valve" (Unit 2) |

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| 878161 | "Perform Emergency Diesel Generator B, Cylinder 6-L, leak down test as required due to low compression on cylinder" (Unit 2) |
| 880144 | "Troubleshoot and replace main turbine load limit potentiometer" (Unit 3) |
| 787535 | "Install New SMB-00 and Stem Modification Kit on 2JSIAUV0666" (Unit 2) |
| 807400 | "Install New GNB Batteries/Rack and Associated Equipment in "A" Battery IAW DMWO/EDC's" (Unit 2) |
| 807402 | "Install New GNB Batteries/Rack and Associated Equipment in "B" Battery IAW DMWO/EDC's" (Unit 2) |
| 807403 | "Install New GNB Batteries/Rack and Associated Equipment in "C" Battery IAW DMWO/EDC's" (Unit 2) |
| 807404 | "Install New GNB Batteries/Rack and Associated Equipment in "D" Battery IAW DMWO/EDC's" (Unit 2) |
| 833829 | "Install a New Larger Air Cylinder and Weld in Body Guides and Install New Valve Disc on SG 2 Downcomer Feedwater Upstream Isolation Valve 2JSAUV0175" (Unit 2) |
| 833830 | "Install a New Larger Air Cylinder and Weld in Body Guides and Install New Valve Disc on SG 2 Downcomer Feedwater Upstream Isolation Valve 2JSGAUV0172" (Unit 2) |

b. Observations and Findings

The inspectors found the work completed 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 in an effective manner. Good work and foreign material control practices were observed.

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

a. Inspection Scope (61726)

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

36ST-9SB02 "PPS Bistable Trip Unit Function Test," Revision 18 (Unit 1)

40DP-9OP06 "Gas Turbine Load Test, Appendix 2," Revision 34 (Unit 2)

32ST-9ZZ03 "Surveillance Test Procedures For The Class 4160 Bus Undervoltage Protective Relays," Revision 9 (Unit 2)

b. Observations and Findings

The inspectors found that knowledgeable personnel performed these surveillances acceptably and as specified by applicable procedures. On March 28, 1999, during the Unit 2 refueling outage, the licensee performed Surveillance Procedure 73ST-2DG01, "Class 1E Diesel Generator and Integrated Safeguards Surveillance Test - Train A," Revision 9. While performing Section 8.5, "Containment Spray Actuation Signal Actuation - Train A (Sequencer Mode 1)," nuclear cooling water to containment automatically isolated as expected. Section 8.5 contained a caution note at the beginning of the section that stated, in part, that nuclear cooling water relief Valves PSV-614 and PSV-615 should be isolated to prevent possible lifting upon the closure of the nuclear cooling water containment outlet Valve 2JNCNUV040 during the containment spray actuation signal actuation. However, the nuclear cooling water relief valves were not isolated prior to performing the test as directed by procedure. The relief valves lifted, as required, discharging approximately 80 gallons to the containment sump.

The operators overlooked the caution note at the beginning of Section 8.5. The caution note contained a procedure action step that is not in accordance with the guidelines of Procedure 01DP-0AP01, "Procedure Process," Revision 7. The licensee initiated CRDR 2-9-0055 to document the event. The CRDR acknowledged the procedure deficiency of having procedure sign-off steps contained within a caution note. The CRDR also requested a transportability review of other surveillance procedures of this type that may contain sign-off steps contained within caution notes. The inspectors determined this action to be appropriate.

c. Conclusions

Knowledgeable technicians and operators used approved procedures to conduct surveillance activities in a satisfactory manner. However, during Unit 2 integrated safeguards testing of the containment spray actuation signal, operators overlooked a caution note in the procedure providing for the isolation of nuclear cooling water relief valves. The relief valves inadvertently lifted during the test, which resulted in approximately 80 gallons of water being discharged to the containment sump. The caution note contained guidance that should have been included as a procedure sign-off step. Licensee actions to correct the procedure deficiency were acceptable.

## 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. The inspectors also reviewed the licensee's assessment of potential primary water stress corrosion cracking of the Inconel 600 resistance temperature detector nozzle penetrations in the RCS.

b. Observations and Findings

The inspector's observations of plant material condition identified no major observable material condition deficiencies. Minor deficiencies brought to the attention of the licensee were documented with work requests.

The licensee performed boric acid walkdowns of RCS piping in the Unit 2 containment prior to cooldown and depressurization, in accordance with Procedure 70TI-9ZC01, "Boric Acid Corrosion Prevention Program," Revision 3. The walkdowns were a physical inspection to identify leakage from the RCS. The licensee identified several instances of minor packing and body-to-bonnet valve leakage as evidenced by boric acid deposits. Identified items were included in the work scope of the outage. In addition, the licensee performed visual inspections of the Inconel 600 resistance temperature detector nozzles on both trains of the RCS hot-leg piping. These inspections were in response to industry concerns of primary water stress corrosion cracking of Inconel 600 resistance temperature detector nozzle penetrations. Insulation panels were removed around the penetrations and bare pipe inspections revealed no boric acid residue. The inspectors performed an independent inspection of the nozzles, reviewed the licensee's assessment, and agreed with the conclusions.

c. Conclusions

Observable material condition of the three units was good. During a postshutdown walkdown of the Unit 2 containment, licensee inspection of Inconel 600 resistance temperature detector nozzles revealed no evidence of leakage. The licensee's actions to address boron accumulation in the Unit 2 containment were good.

### M2.2 Containment Closure Walkdown (Unit 2)

a. Inspection Scope (62707)

During this inspection period, the inspectors toured the Unit 2 containment to assess material condition prior to containment closeout.

b. Observations and Findings

On April 27, 1999, with the unit in Mode 5, the inspectors accompanied the licensee during performance of Procedure 40ST-9ZZ09, "Containment Cleanliness Inspection," Revision 2. Prior to the tour, the inspectors reviewed CRDR 2-9-0144, which documented a list of materials that remained inside the containment building to support work/tests until Mode 3 was achieved. Containment cleanliness and material condition were generally good. The inspectors identified minor debris in various areas, which the licensee retrieved and disposed of properly. The containment coordinator indicated that an additional tour to verify final containment cleanliness would be done at normal operating pressure/normal operating temperature.

c. Conclusions

During a walkdown of the Unit 2 containment just prior to plant restart, it was noted that material condition of equipment was good.

## III. Engineering

### E2 Engineering Support of Facilities and Equipment

E2.1 Stored Fuel Assembly In The Wrong Region of Spent Fuel Pool (Unit 2)

a. Inspection Scope (37551,71707)

On March 26, 1999, the licensee identified that Assembly P1B241 was stored in an inappropriate region of the Unit 2 spent fuel pool. The inspectors reviewed applicable logs, procedures, and CRDR 2-9-0048 and held discussions with reactor engineering personnel.

b. Observations and Findings

On March 26, while reviewing the Unit 2 spent fuel pool region specification, reactor engineering personnel identified that Assembly P1B241 was in Region 3 while, by its enrichment and burnup characteristics, it was only allowed to be in Region 2 or 1. The reactor engineer immediately informed the control room, and the control room supervisor entered TS 3.7.17. The licensee determined that the configuration did not create any immediate safety concerns since Keff was less than 0.95, as described in CRDR 2-9-0048. Immediate corrective action included moving the fuel assembly to a Region 2 location and performing a transportability review for Units 1, 2, and 3 to verify spent fuel pool storage configurations. No additional discrepancies were identified.

The licensee determined that the fuel assembly had been stored in the wrong region since August 27, 1997. The licensee's significant investigation determined that the cause of the misplaced fuel assembly was personnel error in preparing the material

balance area transfer form used in August 1997. Specifically, the spent fuel pool specification in place on August 8 identified Assembly P2B241 as eligible for storage in all three regions of the spent fuel pool. However, Assembly P1B241 was only eligible for storage in Regions 2 and 1. Personnel apparently documented the wrong fuel assembly number for the corresponding spent fuel pool location when preparing the material balance area transfer form. Also, the subsequent independent verification was inadequately performed for 100 percent of the information on the material balance area transfer form, as required by Procedure 72DP-9NF01, "Control of Special Nuclear Material Transfer and Inventory," step 3.7.4.2.

The failure to have Assembly P1B241 in the correct region of the spent fuel pool is a violation of TS 3.7.17. This Severity Level IV violation is being treated as a noncited violation, consistent with Appendix C of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as CRDR 2-9-0048 (50-529/9906-03).

c. Conclusions

Personnel error in preparing a material balance transfer sheet form and inadequate independent verification of the form resulted in Assembly P1B241 being stored in an incorrect location in the Unit 2 spent fuel pool since August 1997. This is a violation of Technical Specification 3.7.17. This Severity Level IV violation is being treated as a noncited violation, consistent with Appendix C of the NRC Enforcement Policy. This issue is in the licensee's corrective action program as CRDR 2-9-0048.

## IV. Plant Support

### R1 Radiological Protection and Chemistry Controls

R1.1 Refueling Outage Radiological Controls (Unit 2)

a. Inspection Scope (71750)

The inspectors reviewed exposure records, ALARA goals and results, and shutdown chemistry results from the Unit 2 refueling outage.

b. Observations and Findings

During this inspection period, the licensee completed the eighth Unit 2 refueling outage. The licensee implemented the shutdown chemistry plan, which chemically shocked the RCS and then performed purification of the system prior tc the system breach. Coordination of radiation protection, chemistry, and operation departments, to implement the shutdown chemistry plan, reduced RCS activity (soluble Cobalt-58 and Cobalt-60 curie content). The reduction of RCS activity contributed to an overall shutdown dose rate at or near a Unit 2 all-time low.

The licensee established the new plant benchmarks in the following radiological safety categories:

- Collective radiation exposure of 60.1 person-rem, 7.9 person-rem less than their ALARA goal and 12.6 person-rem lower than their previous best.
- Personnel contamination events of 31, 12 lower than their previous best.
- Radioactive waste generation of 9800 pounds, 3200 pounds less than the outage goal and 4500 pounds less than their previous best.
- Shutdown chemistry plan which removed 3380 curies of cobalt-58 and 16 curies of cobalt-60, 1400 curies more than their previous best.

c. Conclusion

The licensee effectively implemented their shutdown chemistry plan for the Unit 2 outage. The coordination of the radiation protection, chemistry, and operations departments, to allocate the time and resources needed to effectively reduce reactor coolant system activity prior to outage activities, was effective in establishing new plant radiological safety benchmarks.

## 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 May 6, 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, Regulatory Affairs
P. Crawley, Director, Nuclear Fuel Management
R. Fullmer, Director, Nuclear Assurance
W. Ide, Vice President, Nuclear Engineering
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D. Mauldin, Director, Maintenance
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T. Radke, Director, Outages
H. Riley, EC System Engineer, System Engineering
J. Scott, Director, Chemistry
D. Smith, Director, Operations
M. Sontag, Department Leader, Nuclear Assurance
P. Wiley, Unit 2 Department Leader, Operations

## INSPECTION PROCEDURES USED

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

## ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

| | | |
|---|---|---|
| 50-528,-529/ 9906-01 | NCV | Inadequate corrective action for previously identified surveillance procedure inadequacy (Section O7.1) |

| | | |
|---|---|---|
| 50-528,-529/ 9906-02 | NCV | Two examples of failure to bypass parameters as required by TS 3.3 (Section O8.1) |
| 50-529/9906-03 | NCV | Failure to store an assembly in the correct spent fuel pool location as required by TS 3.7.17 (Section E2.1) |

Closed

| | | |
|---|---|---|
| 50-528/98-001-00 | LER | Reactor Protection and engineered safety features actuation system Instrumentation not Bypassed Within 1 Hour Allowed by TS (Section O8.1) |
| 50-529/98-003-00 and -01 | LER | Refueling Water Tank Level Channel Failure Due to Water Intrusion (Section O8.1) |
| 50-530/98-004-00 | LER | Loss of Containment Closure During Refueling Operations (Section O8.3) |
| 50-528,-529,-530/ 98-006-00 and -01 | LER | Safety Injection Discharge Check Valve Reverse Flow Causes Condition Outside Design Basis (Section O8.4) |
| 50-528,-529,-530/ 99-003-00 | LER | Required Surveillance Not Completed Due to Deficient Procedure (Section O8.5) |
| 50-529/99-003-00 | LER | Unit 2 Spent Fuel Assembly in Wrong Location (Section O8.6) |
| 50-528/9803-04 | VIO | Failure To Provide An Adequate Procedure For Spent Fuel Pool Operations (Section O8.2) |
| 50-528/9805-01 | VIO | Failure To Document Valve Configuration Change (Section O8.2) |
| 50-530/9806-01 | VIO | Inadvertent Entry Into TS 3.0.3 By Isolating All High Pressure Safety Injection Flow Detectors (Section O8.2) |
| 50-530/9809-01 | VIO | Operator Failed To Follow Procedure For Positioning Of A Shutdown Cooling Valve (Section O8.2) |
| 50-528/9809-03 | VIO | Failure To Properly Monitor The Postaccident Sampling System Under The Maintenance Rule (Section O8.2) |
| 50-528,-529/ 9906-01 | NCV | Inadequate corrective action for previously identified surveillance procedure inadequacy (Section O7.1) |
| 50-528,-529/ 9906-02 | NCV | Two examples of failure to bypass parameters as required by TS 3.3 (Section O8.1) |
| 50-529/9906-03 | NCV | Failure to store a spent fuel assembly in the correct spent fuel pool location as required by TS 3.7.17 (Section E2.1) |

## LIST OF ACRONYMS USED

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|---|---|
| ALARA | as low as is reasonably achievable |
| CFR | Code of Federal Regulations |
| CRDR | condition report/disposition request |
| ECW | essential chilled water |
| LER | licensee event report |
| NCV | noncited violation |
| NRC | Nuclear Regulatory Commission |
| PDR | Public Document Room |
| RCS | reactor coolant system |
| SG | steam generator |
| TS | Technical Specification |
| VIO | violation |