ENCLOSURE 2

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

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Report No.:	50-528/98-06 50-529/98-06 50-530/98-06
Licensee:	Arizona Public Service Company
Facility:	Palo Verde Nuclear Generating Station, Units 1, 2, and 3
Location:	5951 S. Wintersburg Road Tonopah, Arizona
Dates:	July 12 through August 22, 1998
Inspectors:	Jim H. Moorman III, Senior Resident Inspector Dan R. Carter, Resident Inspector Dave E. Corporandy, Resident Inspector Nancy L. Salgado, Resident Inspector Greg A. Pick, Senior Project Engineer
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Attachment:	Supplemental Information

EXECUTIVE SUMMARY

Palo Verde Nuclear Generating Station, Units 1, 2, and 3
NRC Inspection Report 50-528/98-06; 50-529/98-06; 50-530/98-06

Operations

- Isolation of all Unit 3 high pressure safety injection system flow transmitters caused both trains of high pressure safety injection to become inoperable, which required entry into Technical Specification 3.0.3. However, the operators did not implement the required actions because they were not aware of the unit being in this condition for approximately 5½ hours after actual entry. The failure to initiate actions within 1 hour to place the unit in a mode in which the specification does not apply is a violation of Technical Specification 3.0.3 (Section O1.1).

- Operators who reviewed the work associated with the Train B high pressure safety injection motor-operated valve testing, focused on the containment isolation requirements and did not adequately consider nor recognize the impact of isolating the flow transmitters on system operability. Following a Train A flow alarm, an attentive senior reactor operator trainee recognized the need to enter Technical Specification 3.0.3. Once the operators recognized that the plant was in Technical Specification 3.0.3, they took prompt and appropriate actions (Section O1.1).

- The licensee was well prepared for the implementation of Improved Technical Specifications, as demonstrated by the absence of problems and the ability of control room operators to use the Improved Technical Specifications. During the transition, observed work activities were conducted in accordance with the applicable Improved Technical Specification requirements and properly recorded in the unit logs. A self-assessment conducted to review the readiness for the implementation was instrumental in preparing for a smooth transition from Standard to Improved Technical Specifications (Section O1.2).

- Control room turnover briefings were effective in ensuring that oncoming shift personnel were knowledgeable of plant conditions. Shift crew composition consistently conformed to Technical Specification requirements (Section O1.3).

- The failure to conduct inspections while performing plant tours, as described in administrative procedures, was identified as a weakness of the operations staff to implement their assigned responsibilities. Specifically, auxiliary operators failed to monitor the operational status of Low Pressure Safety Injection Pump A for four 7-day periods, during an 81 day span, because the pump room was posted as a locked high radiation area. Operations management took prompt and effective corrective actions once the problem was identified (Section O2.1).

- A weakness in attention to detail by an auxiliary operator while restoring a clearance resulted in the inadvertent start of Charging Pump E in Unit 1. Quick and proper actions by the control room operators to diagnose the perturbation and realign the chemical and volume control system minimized the effect of the inadvertent start on the unit (Section O4.1).

Maintenance

- Surveillance activities were generally conducted in a safety conscious manner using approved procedures; however, a poor radiological work practice was observed. Maintenance personnel performing a surveillance test on the auxiliary feedwater system did not follow a posted notice, which required contacting radiation protection prior to opening systems, because low levels of contamination may be present (Section M1.2).

- Maintenance technicians properly calibrated time delay relays using approved procedures and good work techniques (Section M1.3).

- Receipt/inspection of new fuel was accomplished efficiently by knowledgeable personnel who used and adhered to approved procedures (Section M1.4).

- The observed material condition of the three units was satisfactory (Section M2.1).

Plant Support

- Failure to adhere to radiation exposure permit requirements, poor communications, and lack of a questioning attitude by radiation protection technicians resulted in the release of airborne radioactive material inside the Unit 1 radwaste building truck bay. This resulted in widespread contamination of the truck bay. Four workers were also contaminated, one of which was assigned a minor uptake. The failure to follow radiation exposure permit requirements is a noncited violation of Technical Specification 6.8.1. Radiation protection management's initial corrective actions and recovery plan were effective. Planned corrective actions appeared to be comprehensive to prevent recurrence (Section R4.1).

Report Details

Summary of Plant Status

Units 1, 2, and 3 operated at essentially 100 percent power during this inspection period.

I. Operations

O1 Conduct of Operations

O1.1 Inadvertent Entry into Technical Specification (TS) 3.0.3 (Unit 3)

a. Inspection Scope (93702, 71707)

On July 30, 1998, Unit 3 entered TS 3.0.3 because all four high pressure safety injection (HPSI) cold leg flow transmitters (FT-331, -341, -311, -321) for both HPSI trains were isolated. The inspectors reviewed the Unit 3 control room logs, Condition Report/Disposition Request (CRDR) 3-8-0172, and written statements by personnel involved with the incident.

b. Observations and Findings

The licensee planned to perform stroke time testing on the HPSI Train B motor-operated containment isolation valves. Prior to performing the work, the licensee considered shutting the root valves for the associated HPSI flow transmitters. The licensee stated that this would, in part, satisfy the requirements of TS 3.6.3 for containment isolation, which requires that affected penetrations be isolated by the use of at least one closed manual valve or blind flange when an isolation valve is inoperable.

Prior to closing the root valves for the flow transmitters, the tagging coordinator on the night shift approached the shift manager/operation work control with questions on the need to isolate the upstream instruments for each of the HPSI valves to be tested. The tagging coordinator indicated that isolating all eight valves associated with the flow transmitters would comply with TS 3.6.3. According to the shift manager/operations work control, he confirmed that the intent of TS 3.6.3 would be satisfied, but he did not consider the impact of isolating the flow transmitters on the operability of the HPSI system. Based on a review performed by the inspectors, it was determined that TS 3.6.3 did not apply to the flow transmitter root valves since the transmitters are designed as a containment boundary. Therefore, it was determined that there were no technical reasons for isolating the root valves for the HPSI flow transmitters.

Following concurrence by the shift manager/operations work control, directions were given to an auxiliary operator (AO) on the day shift to shut the root valves associated with the HPSI flow transmitters. The AO completed this task at approximately 6:45 a.m.

At approximately 11:30 a.m., the shift technical advisor, a reactor operator (RO), and an RO performing senior reactor operator (SRO) on-the-job training (OJT), observed that the Train A transmitter flow indicator was performing erratically. Shortly afterwards, the RO acknowledged a Train A flow alarm. According to the OJT SRO, it was at the time of the Train A flow alarm that he recognized that the plant might possibly be in TS 3.0.3,

if both trains of flow transmitters were isolated. The OJT SRO informed the control room supervisor and the shift manager of his TS 3.0.3 concern. After reviewing the system flow diagrams, the control room supervisor entered TS 3.0.3 at 12:12 p.m. At 12:42 p.m., all HPSI flow transmitters were returned to service and TS 3.0.3 was exited.

In summary, at approximately 6:45 a.m., the flow transmitters were isolated, and as a result, the instrumentation was not able to perform its intended function. Since the flow instruments could not perform their intended function, both HPSI trains were inoperable, which required entry into TS 3.0.3.

TS 3.0.3 requires that when a limiting condition for operation is not met within 1 hour, action shall be initiated to place the unit in a mode in which the specification does not apply. Once the HPSI flow transmitters were isolated, at approximately 6:45 a.m., the TS 3.5.2 requirement for one operable HPSI pump was no longer met. The failure to initiate actions within 1 hour to place the unit in a mode in which the specification does not apply is a violation of TS 3.0.3 (50-530/9806-01).

c. Conclusions

Isolation of all Unit 3 HPSI system flow transmitters caused both trains of HPSI to become inoperable, which required entry into TS 3.0.3. However, the operators did not implement the required actions because they were not aware of the unit being in this condition for approximately 5 1/2 hours after actual entry. The failure to initiate actions within 1 hour to place the unit in a mode in which the specification does not apply is a violation of TS 3.0.3. Operators who reviewed the work associated with the Train B HPSI motor-operated valve testing focused on the containment isolation requirements and did not adequately consider nor recognize the impact of isolating the flow transmitters on system operability. Following a Train A flow alarm, an attentive SRO trainee recognized the need to enter TS 3.0.3. Once the operators recognized that the plant was in TS 3.0.3, they took prompt and appropriate actions.

O1.2 Implementation of Improved Technical Specifications (ITS) (Units 1, 2, and 3)

a. Inspection Scope (71707)

On August 13, 1998, the licensee implemented ITS for all three units. The inspectors were in the control room to observe the transition to the ITS by interviewing the operators, reviewing unit logs, and reviewing an assessment titled, "ITS Readiness Self-Assessment."

b. Observations and Findings

At 10 a.m. on August 13, the licensee, in accordance with Amendment 117 of the operating license, implemented the ITS on all three units. The inspectors verified that the unit logs reflected the change and that any appropriate translation of TS action statements into ITS requirements was appropriately documented. To minimize the number of translations, the licensee scheduled work involving entry into TS action

statements to commence after 10 a.m. The inspectors also noted that a Nuclear Assurance representative was in the control room to assist with the transition.

At approximately 10:05 a.m., the inspectors observed reactor engineering personnel change Unit 3 addressable constants in the plant computer and the core monitoring computer using Procedure 72DP-9RJ01, "Core Operating Limit Supervisory System Addressable Constants," Revision 3. The affected constants were axial shape index low limit, axial shape index high limit, and model uncertainty adjustment. The addressable constant changes resulted from new values in the ITS. The inspectors determined that Procedure 72DP-9RJ01 was performed satisfactorily.

From June 2-12, the licensee had assessed the readiness for implementation of the ITS. The self-assessment concluded that the site was not ready to implement the ITS at that time. The self-assessment recommended developing a revised implementation plan and schedule to include correction of the issues identified. The inspectors reviewed the revised plan and verified that all corrective actions were complete and/or planned as of August 13.

On August 13, the inspectors observed control room operators assess information for TS applicability related to the hydrogen recombiner system. Although hard piping to support the recombiners existed in all units, the two recombiner units were only installed in Unit 1. They were designed to be transported to Units 2 or 3 and installed, if needed, for accident mitigation. The Unit 2 control room operators received CRDR 2-8-0236, which indicated that the hydrogen recombiners may not operate properly if installed in Units 2 or 3 because of the electrical phasing of the applicable power supply load centers. The Unit 2 shift manager assessed the information using the ITS, ITS Bases, and the Technical Requirements Manual. Within an appropriate time, the shift manager determined that both trains of the hydrogen recombiner system were inoperable for Units 2 and 3 and entered the appropriate action statement. The assessment was closely coordinated with the Unit 3 shift manager. The inspectors considered the assessment to be timely and accurate.

c. Conclusions

The licensee was well prepared for the implementation of the ITS, as demonstrated by the absence of problems during implementation and the ability of control room operators to use the ITS. During the transition, observed work activities were conducted in accordance with the applicable ITS requirements and properly recorded in the unit logs. A self-assessment conducted to review the readiness for the implementation was instrumental in preparing for a smooth transition from Standard TS to the ITS.

O1.3 Control Room Turnover Briefings (Units 1, 2, and 3)

a. Inspection Scope (71707)

The inspectors attended several control room operations turnover briefings to assess operations turnover process and verify that the TS requirements for minimum shift crew composition were met.

b. Observations and Findings

The control room turnover process was controlled by Procedure 40DP-9OP33, "Shift Turnover," Revision 2. The purpose of the procedure was to ensure that the shift turnover was accomplished in a manner that the relieving crew would possess an adequate knowledge of critical plant parameters, system status, and availability and alignment of equipment to effectively perform their job functions. The inspectors verified that the turnovers were in compliance with Procedure 40DP-9OP33. The inspectors also verified that the shift manager, control room supervisor, and RO turnover checklists were completed, as required. During random checks that encompassed all shifts, the inspectors verified that the shift crew composition met the requirements of TS 5.2.2.b.

During routine control room observations, the inspectors questioned the ROs regarding the reason certain annunciators were in alarm. The ROs were knowledgeable of the conditions that caused the annunciators to be in alarm.

c. Conclusions

Control room turnover briefings were effective in ensuring that oncoming shift personnel were knowledgeable of plant conditions. Shift crew composition consistently conformed to TS requirements.

O2 Operational Status of Facilities and Equipment

O2.1 Operations Personnel Monitoring of Safety-Related Equipment (Unit 1)

a. Inspection Scope (71707)

The inspectors conducted routine tours of the radiologically controlled area (RCA) of all units and observed the condition of safety-related structures, systems, and components. On July 1, 1998, the inspectors observed that the Unit 1 Low Pressure Safety Injection (LPSI) A pump room was controlled as a locked high radiation area (LHRA). The inspectors questioned radiation protection (RP) personnel concerning dose rates in the room, the reason the room was posted as a LHRA, the frequency of access to the room, and the identity of the individuals who had entered.

b. Observations and Findings

RP personnel locked and posted the LPSI A room as a LHRA on April 18, 1998, because elevated dose rates existed at local areas in the room. Radiation dose rates on contact with the pump mechanical seal filter (cyclone separator) piping indicated approximately 22 Rem/hr on contact and 1.2 Rem/hr at 12 inches. The cyclone separator is located approximately 8 feet above floor level. The general area dose rates in the upper level of the pump room ranged from 8 to 35 mRem/hr. Procedure 75RP-9OP02, "Control of LHRAs and Very High Radiation Areas," Revision 11, required the LPSI A room to be controlled as a LHRA, which RP personnel properly posted and informed the control room.

On May 12, the LPSI A pump room required fire protection compensatory measures when the fire protection computer was not able to monitor the room. A video camera and a monitor, located just outside the LPSI A pump room, were installed to allow fire watches to monitor the room without having to enter. The need for the fire protection compensatory measure ended on May 22, after the fire detection equipment was repaired. The camera remained in place until the room was reposted as a radiation area on July 9, when the cyclone separator piping was shielded.

During the period (81 days) that the LPSI A pump room was controlled as a LHRA, four periods of greater than 6 days existed that the room was not inspected by operations personnel. The AOs relied on the installed video camera and monitor to satisfy the minimum area rounds. However, the camera only showed the upper portion of the LPSI A pump room and the top portion of the LPSI A motor. The lower level of the room, the LPSI A pump and seal area, the motor oil lubricators, and other safety-related components could not be seen by viewing the video camera.

Posting and locking of the LPSI A pump room as a LHRA did not prohibit personnel from entering the area. Procedure 75DP-9RP01,"Radiation Exposure and Access Control ", Revision 1, allowed an individual to enter any LHRA with continuous RP coverage, a proper radiation exposure permit (REP) and task, a specific verbal brief by an RP technician, and an electronic personnel dosimeter set for LHRA entry.

The inspectors questioned several control room supervisors and shift managers about the status of LPSI A pump room. At least two control room supervisors/shift managers were not aware that the room was a LHRA and that AOs had not made the minimum area rounds described in Procedure 40DP-9OP20, "Area Operator Practices," Revision 12. The AO logs did not contain log readings for verification of the inspection of any safety-related pump rooms. The inspectors also questioned operations management on their expectations of AO minimum area rounds. The operations department leader stated that not touring the LPSI A pump room on a regular frequency did not meet the intent of Procedure 40DP-9OP20.

Procedure 40DP-9OP20 provided guidance to the AOs regarding their responsibilities while making tours of the facility. This guidance stated, in part, that operators should balance their other responsibilities with performing complete inspections of their areas, and that for minimum area rounds, the AOs should inspect areas where critical equipment important to safety is located as directed by the control room supervisor or shift manager. Between the time period of April 18, when the LPSI A pump room was locked and controlled as a LHRA, and July 9 when the hot spot in the LPSI A pump room was shielded (81 days), operations personnel entered the room only eight times. Other organizations (RP, Fire Protection, Engineering) had entered the room 11 times during this period; however, these organizations do not perform the required inspections on safety-related equipment specified for operations personnel.

The immediate corrective actions were to place in the Unit 1 logs a required action note stating that it is management's expectation that when plant conditions prevent an operator from entering an area required on AO rounds, the operator request permission

from the control room supervisor to not complete that portion of the logs. On July 15, operations management issued a night order, applicable to all three units, describing the LPSI A pump room situation and additional requirements.

The night order required, in part, that the control room supervisor or shift manager be informed each time an area of the plant is inaccessible for normal inspection for any reason; an evaluation must be completed for each situation separately and determine what appropriate compensatory actions should be taken, based on actual exposure; and the type of equipment in the area. All areas normally inspected, which are inaccessible for any reason, will be listed on the control room supervisor or shift manager turnover sheet with entry/inspection frequency requirements. These entries will be carried forward in the log until the area is fully accessible. The inspectors found these corrective actions to be appropriate.

c. Conclusions

The failure to conduct inspections while performing plant tours, as described in administrative procedures, was identified as a weakness of the operations staff to implement their assigned responsibilities. Specifically, auxiliary operators failed to monitor the operational status of LPSI Pump A for four 7-day periods, during an 81-day span, because the pump room was posted as a locked high radiation area. Operations management took prompt and effective corrective actions once the problem was identified.

O4 Operator Knowledge and Performance

O4.1 Inadvertent Start of Charging Pump E (Unit 1)

a. Inspection Scope (71707)

On August 11, 1998, while restoring Charging Pump E from a clearance, an AO inadvertently closed the Load Center 36 breaker to the pump, causing the pump to start. The inspectors discussed the event with operations personnel and reviewed the documentation of the event.

b. Observations and Findings

Charging Pump E was tagged out electrically to support calibration of a lube oil pressure switch in accordance with an approved work order. This pump received power from either Load Center 36 (Train B) or Load Center 35 (Train A). The supply breaker at both load centers and both control board handswitches associated with the pump were tagged to prevent pump operation.

After completion of the work, the AO was directed to restore the electrical lineup for the pump by removing the red tags and racking in the Load Center 36 breaker. After the Load Center 36 breaker was racked in, tags would then be cleared from the Load Center 35 breaker and both control board handswitches.

The AO removed the tag from Charging Pump E and used Procedure 40OP-9PG01, "480V Class 1E Switchgear," Appendix B, to rack in the breaker. After the AO racked in the breaker, the next step directed him to charge the breaker springs. As the AO attempted to operate the charging motor disconnect switch, his hand moved over slightly and inadvertently operated the manual close lever instead. This resulted in closure of the breaker and inadvertent start of Charging Pump E. Since the system was already aligned for pump operation, there were no adverse affects on the pump.

With danger tags still on the control board handswitches for Charging Pump E, the control room operators responded quickly to the inadvertent start by securing Charging Pump B. After the danger tags were cleared from the Charging Pump E handswitches, the charging pump lineup was restored as it was before the inadvertent pump start. With the exception of minor changes in flow in some portions of the chemical and volume control system, there were no adverse affects on the unit.

c. Conclusions

A weakness in attention to detail by an auxiliary operator while restoring a clearance resulted in the inadvertent start of Charging Pump E in Unit 1. Quick and proper actions by the control room operators to diagnose the perturbation and realign the chemical and volume control system minimized the effect of the inadvertent start.

O8 Miscellaneous Operations Issues (92901)

O8.1 (Closed) Inspection Followup Item 50-529/9803-02: Review actions for control room habitability limits.

During an inspection of the control room essential filtration system, the inspectors identified that the Updated Final Safety Analysis Report defined a limited stay time for personnel in the control room when the essential filtration system was in the isolation mode. The stay time was based on the number of people and the expected level of carbon dioxide buildup in the control room envelope. The inspectors identified that the licensee had not included the limitation in the appropriate procedures to ensure control room habitability was maintained. The licensee initiated CRDR 9-8-0485 to evaluate appropriate corrective actions.

The CRDR concluded that a procedure change or addition to the emergency plan of a control room occupancy time or stay time based on carbon dioxide threshold was not warranted. This conclusion was based on an evaluation completed by the licensee that indicated that 12 persons could be within the isolated control room envelope for approximately 13 days. The evaluation results indicated that the habitability requirements were being met. However, the licensee conservatively revised Procedure 40OP-9HJ01, "Control Building Heating Ventilation and Air Conditioning," Revision 5, to include steps to set and reset the event timer to alert control room personnel to monitor control room environment oxygen levels every 48 hours after placing control room essential air handling units in recirculation mode. The inspectors verified that Procedure 40OP-9HJ01 was revised accordingly.

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 activities performed in accordance with the following work orders:

829278 "3MDGBHO1 Change the Rod End Ball and Bolt On Several Fuel Pumps To Correct Looseness and Vibration"

843272 "Inspect/Test Diesel Pre-lube Pump Motor and Space Heater"

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 in a safety conscious manner. Good work and foreign material control practices were observed.

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

a. Inspection Scope (61726)

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

73ST-9XI38 "AFA-P01 Discharge Valve AFA-V015-Inservice Test," Revision 1 (Unit 1)

43ST-3ZZ02 "Inoperable Power Sources Action Statement," Revision 15 (Unit 3)

40ST-9NI01 "Adjustable Power Signal Calibrations," Revision 16 (Unit 3)

b. Observations and Findings

The inspectors found that these surveillances were performed acceptably and as specified by applicable procedures. However, the inspectors observed a poor radiological work practice in connection with the performance of

Surveillance 73ST-9X138 in Unit 1. On the door into the auxiliary feedwater pump rooms, RP posted a sign that required personnel to contact RP prior to opening any system within the room because of the potential for low levels of contamination. Part of the test required opening a vent line to connect a demineralized water source to the auxiliary feedwater system; however, test personnel did not contact RP before opening the system. The inspectors confirmed with RP that for this Unit 1 breech of the auxiliary feedwater system, no significant radiological hazard existed at the time of the test.

c. Conclusions

Surveillance activities were generally conducted in a safety conscious manner using approved procedures; however, a poor radiological work practice was observed. Maintenance personnel performing a surveillance test on the auxiliary feedwater system did not follow a posted notice, which required contacting RP prior to opening the systems because low levels of contamination may be present.

M1.3 Time Delay Relay Tests (Unit 3)

a. Inspection Scope

On August 6, 1998, the inspectors observed electricians calibrate time delay relays in accordance with Work Order 802907, "Inspect/Test Relay Agastat TD Relay for Valves 3JSGA-UV138/138A," to ascertain whether the testing was performed in accordance with documented instructions. In addition, the inspectors evaluated whether the voltage applied to the time delay relays during the test was appropriate.

b. Observations and Findings

Work Order 802907 specified that the time delay relays for Valves AFA HV-138 (SG-2 to AFW Pump A steam supply) and AFA HV-138A (SG-2 to AFW Pump A steam supply bypass) be tested in accordance with Procedure 32MT-9ZZ82, "Time Delay Relay Test," Revision 10. The inspectors confirmed that the electricians used the correct revision of the procedure, worked under an appropriate clearance order, and used calibrated test equipment. The inspectors noted that the electricians used proper self-verification techniques at each procedure step, independent verification for lifting and landing leads was completed, and consistently used repeat backs during communications.

The rated voltage for the time delay relays was 125 Vdc; however, the power supply for the test applied 130 Vdc and the bus voltage during normal operations was nominally 134 Vdc. The inspectors discussed the rated voltage of the time delay relay model with maintenance engineering to determine whether appropriate testing was being conducted. The inspectors found that this model of time delay relays was qualified to perform in the 100-150 Vdc range so the voltage applied during testing and normal operations would not damage the time delay relay. In addition, the inspectors questioned why the time delay relay did not have to be tested under the degraded voltage conditions expected to occur during a station blackout. The licensee indicated that the batteries were sized with sufficient capacity to provide the minimum voltage required for each component to actuate under the conditions anticipated to occur during

a station blackout. The inspectors noted that the minimum voltage at the time delay relay for operation of the valve was approximately 114 Vdc. The maintenance engineer indicated that the last battery discharge test for the Unit 3 Train A battery was 118 Vdc.

c. Conclusions

Maintenance technicians properly calibrated time delay relays using approved procedures and good work techniques.

M1.4 New Fuel Receipt (Unit 3)

a. Inspection Scope (62707)

On July 12, 1998, the inspectors observed the licensee unload and inspect new fuel assemblies in preparation for the upcoming refueling outage. The inspectors reviewed Procedure 78MT-9FH01, "New Fuel Receipt," Revision 7.

b. Observations and Findings

The inspectors verified that Procedure 78MT-9FH01 prerequisite requirements were completed prior to the receipt of new fuel. The new fuel receipt/inspection team had proper authorization prior to performing work and performed all procedure steps in an efficient manner. Team members worked well as a group and double checked each others' work. The inspectors verified that pressure/vacuum was relieved from the fuel container prior to the container cover being removed in accordance with Step 4.2.2 of Procedure 78MT-9FH01. This step was added to Procedure 78MT-9FH01 as a corrective action to an earlier event. In that event, a new fuel container was not vented; and, when attempting to lift only the top half of the container, the entire container was lifted and subsequently dropped approximately 2 inches (see NRC Inspection Report 50-528,529,530/98-02).

The fuel engineer performed required fuel inspections in accordance with Appendix D of Procedure 78MT-9FH01. The inspectors observed good control and inventory of the new fuel assemblies during initial receipt, removal from the truck, unloading and unpacking of the assemblies, and inspection and final storage of the fuel in the new fuel storage area.

c. Conclusions

Receipt inspection of new fuel was accomplished by knowledgeable personnel using and adhering to approved procedures.

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

Inspectors observation of plant material condition during this inspection period identified no major observable material condition deficiencies. Minor deficiencies brought to the attention of the licensee were documented by work requests for correction.

c. Conclusions

The observed material condition of the three units was satisfactory.

M8 Miscellaneous Maintenance Issues (92902)

M.8.1 (Closed) Licensee Event Report 50-528/97-002: Surveillance Requirement for Unit 1 Core Protection Calculators (CPC) Not Performed Because of Inadequate Procedures.

On June 11, 1997, Nuclear Assurance personnel identified that the CPC auto restart channel check had not been accomplished on Unit 1 prior to entering Mode 3. With the unit in Mode 3 and reactor trip switchgear racked in, TS 4.3.1.5 requires operators to check the CPC auto restart once every 12 hours. The licensee determined that operators had performed the surveillance 19 hours after entry into Mode 3, while performing a Mode 2 surveillance checklist.

The licensee identified that the procedure for controlling Mode 3, 4, and 5 changes did not specifically require this surveillance, even though the TS required this test. The licensee specified the corrective actions in CRDR 9-7-Q358. The inspectors verified that the licensee modified Procedures: (1) 40OP-9ZZ11, "Mode Change Checklist," to ensure that operators check the CPC auto restart for actuations whenever the plant is in Modes 3, 4 or 5 with the reactor trip switchgear racked in, and (2) 77DP-0ZZ01, "OCS Mode/Condition Change Requirements," to ensure instrumentation and control personnel were required to perform CPC channel calibrations whenever the reactor trip switchgear was required to be operable. The inspectors considered these actions to be appropriate.

Although operators failed to perform the channel check of the CPC auto restart, this violation of TS 4.3.1.5 is considered to be noncited, consistent with the requirements of Section VII.B.1 of the NRC Enforcement Policy. Specifically, the violation was

nonrepetitive, identified by the licensee, it was not willful, actions taken as a result of a previous violation should not have corrected this problem, and appropriate corrective actions were completed by the licensee (50-528/9806-02).

III. Engineering

E8 Miscellaneous Engineering Issues (92903)

E8.1 (Closed) Licensee Event Report 50-528,529,530/96-007: Test Deficiencies Found During Generic Letter 96-01 Review Lead to TS 3.0.3 Entries.

On November 19, 1996, the licensee's investigation team reviewed the logic circuits required by Generic Letter 96-01, "Testing of Safety Related Logic Circuits," and identified that the lockout relays (seal-in circuit that ensures the safety actuation goes to completion) for the Auxiliary Feedwater Actuation Signals-1 and -2 had not been performed within the surveillance interval specified in TS 4.3.2.1, including the 25 percent allowable extension. Upon notification, operators immediately entered TS 3.0.3 and invoked TS 4.0.3 for a missed surveillance. The immediate corrective actions included verifying that the lockout relays functioned as designed by performing the required surveillance in accordance with a maintenance instruction.

The licensee initiated CRDR 9-6-1276, which included long-term corrective actions to develop a procedure to ensure testing of engineered safety features actuation system lockout relays. The inspectors verified that the licensee added Section 8.4 to Procedure 36ST-9SB04, "Plant Protection System Functional Test - Reactor Protective System/ESFAS Logic," Revision 12, to require quarterly testing of the appropriate lockout relays.

In addition, on December 4, the licensee's investigation team identified that the contacts for initiating the undervoltage and shunt trips in the reactor trip switchgear had not been individually tested to verify that they actuated from the plant protection system, supplementary protection system, and manually, as required by TS 4.3.1.1. Upon notification of the deficiency, operators immediately entered TS 3.0.3 and invoked TS 4.0.3 for a missed surveillance. The licensee developed a set of maintenance work instructions and satisfactorily completed the surveillance to demonstrate that the contacts actuated, as designed. The licensee initiated CRDR 9-6-1379 to ensure that corrective actions to address this deficiency would be implemented. As long-term corrective actions to prevent recurrence, the licensee developed Procedure 36ST-9SB52, "Reactor Trip Switchgear Shunt and Undervoltage Trip Functional Test," Revision 0. The inspectors verified that Procedure 36ST-9SB52 performed individual contact testing of the undervoltage and shunt relay contacts from the reactor protection and supplementary protection systems.

The failure to perform quarterly testing of the auxiliary feedwater lockout relays is a violation of TS 4.3.2.1. Similarly, the failure to perform testing of the individual undervoltage and shunt relay contacts for the reactor trip switchgear is a violation of TS 4.3.1.1. However, these licensee-identified and corrected violations are being

treated as two examples of a noncited violation consistent with Section VII.B.1 of the NRC Enforcement Policy. Specifically, the violations were identified by the licensee, they were not willful, actions taken as a result of a previous violation should not have corrected these problems, and appropriate corrective actions were completed by the licensee (50-528,529,530/9806-03).

During review of this issue, the inspectors noted that the licensee event report described that the root cause for the failure to test the lockout relays was an increase in the scope of testing as specified in Generic Letter 96-01, which resulted from a clarification of the requirements by the NRC. Also, the root cause of the failure to test the undervoltage and shunt trip circuits separately was not specifically called out in the TS; therefore, the decision to include this circuit testing was a conservative decision. Based on a review of Generic Letter 96-01 requirements and the details provided in this licensee event report, the inspectors took exception to these statements. The inspectors concluded that the failure to test the lockout relays resulted from a failure to appropriately apply test criteria to ensure circuits could fulfill their safety functions, as specified in the regulations, and that the original test was narrow in scope. Similarly, the decision to independently test the shunt and undervoltage contacts was not conservative, but required to demonstrate that all portions of the circuits actuated as designed.

IV. Plant Support

R4 Staff Knowledge and Performance

R4.1 Review of Radiation Protection Practices During Filter Movement that Caused Contamination of Radwaste Truck Bay and Four Personnel (Unit 1)

a. Inspection Scope (71750)

On July 22, 1998, the licensee was in the process of moving a highly radioactive filter from a crud cask to a multifilter storage box. During movement of the filter, some radioactive material became airborne, which resulted in four personnel and the 100-foot level of the radwaste truck bay becoming contaminated. The inspectors reviewed the circumstances of the event, interviewed RP personnel, and reviewed the documentation related to the event.

b. Observation and Findings

During site-wide radwaste reduction efforts, the licensee was in the process of cleaning up storage casks, drums containing radioactive material, as well as other radioactive items and trash that had accumulated in the radwaste building high level storage areas of each unit. The goal of the project was to inventory, classify, and dispose of the accumulated items. Clean up activities had been completed in Units 2 and 3, and cleanup efforts in Unit 1 had been in progress since May 1998 and were nearing completion. Radiation Exposure Permit (REP) 1-0188, Revision A, "Load, Survey and Weigh HIC(S) and Process Items in HLSA," was developed in April 1998 for the Unit 1 clean up project.

In late June 1998, Revision B to the REP was issued to include items that would have to be handled manually rather than with remote tools. Three crud casks used for storage of highly radioactive material were included in the items to be dispositioned, but were not specifically addressed by REP 1-0188B. One crud cask contained a tape ball, one contained a filter used in 1992, and another contained a filter used in 1993. During the early part of July 1998, RP personnel held discussions to determine how the crud casks should be dispositioned and if REP 1-0188B was sufficient for the task. RP management decided that work with the casks could be performed within the boundaries of REP 1-0188B and that another REP was not necessary.

Revision B to the REP had been issued, in part, to allow technicians to use a manual extension pole (hot stick) to try to manipulate items not reachable by a crane-mounted tool. The technicians who performed the work were briefed on REP 1-0188, Revision B, requirements. The brief included the REP limitations, hold points, and ALARA and engineering controls. Some specific requirements of the REP were continuous RP job coverage, ensuring that the truck bay rollup door was to be closed prior to pulling cask lids and during movement of filters, and stopping work if radiological conditions were compromised.

On July 22, an RP technician and two radioactive material control (RMC) technicians performed clean.up operations in the Unit 1 radwaste truck bay. One of the technician's tasks was to remove a filter from the last of the three crud casks, obtain a dose rate reading, and relocate it to a storage box, in preparation for shipping. To get an initial survey of the filter prior to opening the cask lid, one of the RMC technicians performed a dose rate reading through a survey port in the cask lid. The RMC technician reported a dose rate reading of 8 Rem/hr from the filter. However, when the RMC technician communicated this reading to the other technicians, they did not repeat back the communication to the RMC technician and recorded the reading as 2 Rem/hr. The technicians practiced poor communication techniques as demonstrated by the non-repeat back when communicating the filter dose rate.

The technicians then attempted to remove the lid from the crud cask. After opening the lid, they unexpectedly found that the filter was contained in a plastic bag, since filters are normally stored unbagged and are handled easily with the crane-mounted tool. The bag was taut across the top of the filter, which increased the difficulty of extracting the filter from the crud cask. When presented with an unexpected condition, the technicians did not question why the filter was placed in a plastic bag, and they did not consider the potential for degradation of the plastic bag due to exposure to high radiation dose rates for over 6 years. The technicians did not inform RP supervision of the unexpected condition and the potential difficulties they would have in removing the filter from the crud cask.

Since the plastic bag covered the filter, the crane-mounted tool could not be used. The technicians decided to remove the filter from the cask by using a hot stick. The RP technician providing job coverage and the RMC technician, assigned to move the filter with the hot stick, were located on the 112-foot mezzanine of the storage area. The other RMC technician was located in the remote crane operating station (slave station) on the 100-foot elevation. The RMC technician, who was going to try to grapple

the filter with the hot stick, was in protective clothing inside a hot particle controlled area. This area was approximately 8 feet from the centerline of the crud cask. The RMC technician attempted to grapple the filter; however, his location presented a difficult angle for accomplishing the task. In the process of trying to grapple the filter, the RMC technician ripped a small hole in the top of the bag. The RMC technician then gave the hot stick to the RP technician performing the job coverage, who was standing in a more advantageous position directly over the crud cask. The RP technician attempted to grapple the filter, and after approximately three attempts, the bag and filter were lifted out of the crud cask. As the bag was lifted out of the crud cask, the filter tipped over inside the bag. When the filter fell within the bag, the technicians observed that deteriorated filter material spilled out of the ripped opening onto the floor of the storage area. During this time, the technicians observed that the lower portion of the plastic bag was brown, as if it was dirty or stained with corrosion from the cask. Apparently, the bag had deteriorated over time due to the high radiation dose rates of the filter.

When material was spilled from the bag, the radiological conditions of the job were compromised. Although REP 1-0188, Revision B, required that work be stopped when radiological conditions were compromised, the technicians did not stop work. The inspectors noted that the RP technician demonstrated poor judgement by becoming involved with the work activities, and as a result, lost RP oversight of the job.

The RP technician placed the bag containing the filter on the floor next to the crud cask to allow the use of the crane-mounted tool to place the filter in the survey jig. At this time, the RP technician determined that a replacement teletector survey meter was needed, since the meter to be used to survey the filter was not functional. The RP and RMC technicians left the 112-foot mezzanine and the air samplers were secured. The RP technician believed the job was complete except for measuring the dose rate of the filter after it was placed in the survey jig. The RMC technicians agreed that, while the RP technician went to obtain a new survey meter, they would use the crane-mounted tool to remotely relocate the filter to the survey jig. When the RP technician returned with the new survey meter, the filter had been placed in the jig. However, the plastic bag prevented the filter from completely entering the jig, so the filter rested on top of the jig cocked at an angle. The RP and RMC technicians returned to the 112-foot mezzanine and performed a survey of the filter. A reading of 25 Rem/hr at 18 inches was recorded. This dose rate was higher than expected, which required additional shielding and required placement in a different storage box. The added shielding placed the job outside of the original job plan, so the job was stopped to get RP supervision guidance. The RP technician then obtained the air sample media and both technicians left the 112-foot mezzanine.

REP 1-0188, Revision B, required continuous RP job coverage; however, the ripped bag and filter was moved from the floor to the survey jig while the RP technician was absent from the job site obtaining a new survey meter. During filter movement operations, the truck bay rollup door was opened and immediately closed while a trash crew passed their carts through the door. REP 1-0188, Revision B, required that the truck bay rollup door be closed prior to pulling cask lids and during movement of filters.

Upon exiting the RCA, the three technicians and an AO, who had passed through the area, alarmed the personnel contamination monitor and were found to be contaminated. Contamination levels ranged between 2000-5000 disintegrations per minute. The RP technicians at the RCA exit questioned the contaminated technicians about the work they were performing. RP technicians were sent out to determine the source and extent of the contamination. Additional surveys determined that the entire radwaste truck bay, storage area, and hallways leading up to the truck bay were contaminated. The areas were then posted and controlled.

The licensee decontaminated the four individuals and performed whole body counts. These whole body counts were negative for three of the exposed individuals. Bioassy results obtained from the whole body counts indicated levels of Co-60 for the fourth individual. However, activity levels were well below the minimum action level for the licensee's counting system. An uptake of radioactive materials for this individual could neither be confirmed nor excluded. The licensee evaluated the personnel for potentially inhaled radioactive material, including alpha emitting transuranic nuclides. The licensee calculated and conservatively assigned an uptake of 4.33 DAC-hrs (alpha and beta-gamma) to this individual. The inspectors' evaluation of the assignment of personnel exposure to radioactive materials, both external and internal, identified no problems.

The immediate corrective action was to stop all work in the truck bay and evaluate the condition of the filter. The licensee initiated CRDR 9-8-1174, which described the event and initiated a detailed recovery plan. The recovery plan included the decontamination of the affected areas and the construction of a tent enclosure to contain the filter and survey jig assembly to prevent further spread of contamination. The tent enclosure was equipped with two HEPA exhaust filters to maintain a negative pressure within the tent during filter movement. The licensee constructed a mockup and conducted a dry run of the filter recovery operation. On August 5, the licensee transported the filter to a 55 gallon drum for storage. The drum was sealed and placed in a shielded storage container. Decontamination activities of the storage area and radwaste truck bay were initiated. The recovery plan and initial corrective actions were effective.

During the performance of an independent review of this event, the inspectors identified that the technicians failed to comply with REP 1-0188, Revision B, in the following areas:

- The work was not stopped when the conditions of the job were compromised.
- Continuous RP coverage was not maintained during actual movement of the filter.
- The truck bay rollup door was not maintained shut during the movement of the filter.

The above examples of the failure to follow REP 1-0188 constitute a violation of TS 6.8.1. However, this violation is considered to be noncited, consistent with the requirements of Section VII.B.1 of the NRC Enforcement Policy. Specifically, the violation was non-repetitive, identified by the licensee, it was not willful, actions taken as a result of a previous violation should not have corrected this problem, and appropriate corrective actions were completed by the licensee (50-528/9806-04).

The long-term corrective actions include the following: conduct training briefings of this event with all technicians; perform in-field assessments of continuous RP job coverage practices; incorporate lessons learned from this event into job histories and future waste handling REPs; modify day-shift RP supervisor duties to ensure greater focus on radiological controls activities; evaluate engineering controls for future filter and other hot item handling evolutions; and evaluate REP requirements for RP leadership presence in the field during critical jobs. These corrective actions were scheduled for completion in January 1999. The corrective actions appeared to be complete and adequate to prevent future similar events.

c. Conclusions

Failure to adhere to radiation exposure permit requirements, poor communications, and lack of a questioning attitude by radiation protection technicians resulted in the release of airborne radioactive material inside the Unit 1 radwaste building truck bay. This resulted in widespread contamination of the truck bay. Four workers were contaminated, one of which was assigned a minor uptake. The failure to follow radiation exposure permit requirements is a noncited violation of Technical Specification 6.8.1. Radiation Protection management's initial corrective actions and recovery plan were effective. Planned corrective actions appeared to be comprehensive to prevent recurrence.

V. Management Meetings

X1 Exit Meeting Summary

On August 26, 1998, the inspectors presented the inspection results to members of the licensee's staff. 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

S. Burns, Department Leader, Maintenance Engineering
D. Carnes, Unit 1 Department Leader, Operations
R. Fullmer, Director, Nuclear Assurance
J. Hesser, Director, Engineering
W. Ide, Vice President, Nuclear Engineering
D. Kanitz, Engineer, Nuclear Regulatory Affairs
P. Kirker, Unit 3 Department Leader, Operations
A. Krainik, Department Leader, Nuclear Regulatory Affairs
D. Marks, Section Leader, Nuclear Regulatory Affairs
M. Muhs, Department Leader, Mechanical/RAMS
G. Overbeck, Vice President, Nuclear Production
T. Radke, Director, Outages
F. Riedel, Department Leader, Operations Standards
J. Scott, Director, Chemistry
G. Shanker, Department Leader, Speciality Engineering
M. Shea, Director, Radiation Protection
P. Wiley, Unit 2 Department Leader, Operations
M. Winsor, Department Leader, System Engineering

INSPECTION PROCEDURES USED

IP 37551:	Onsite Engineering
IP 61726:	Surveillance Observations
IP 62707:	Maintenance Observations
IP 71707:	Plant Operations
IP 71750:	Plant Support Activities
IP 92901:	Plant Operations Follow-up
IP 92902:	Maintenance Follow-up
IP 92903:	Engineering Follow-up

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-530/9806-01	VIO	Inadvertent entry into TS 3.0.3 by isolating all HPSI flow detectors.
50-528/9806-02	NCV	Failure to perform TS required channel check of CPC calculators.
50-528,529,530/9806-03	NCV	Failure to perform TS required quarterly testing of lockout relays.

50-528/9806-04	NCV	Failure to adhere to radiological exposure permit requirements causes spread of contamination.

Closed

50-528,529,530/9803-02	IFI	Review actions for control room habitability limits.
50-528/97-002	LER	Surveillance Requirement for Unit 1 CPCs Not Performed Because of Inadequate Procedures.
50-528,529,530/96-007	LER	Surveillance Test Deficiencies Found During Generic Letter 96-01 Review Lead to TS 3.0.3 Entries.
50-528/9806-02	NCV	Failure to perform TS required channel check of CPC calculators after system restart.
50-528,529,530/9806-03	NCV	Failure to perform TS required quarterly testing of AFAS lockout relays.

LIST OF ACRONYMS USED

ALARA	as low as reasonably achievable
AO	auxiliary operator
CPC	core protection calculators
CFR	Code of Federal Regulations
CRDR	condition report/disposition request
ESFAS	engineered safety features actuation system
HEPA	high efficiency particulate air
HLSA	high level storage area
HPSI	high pressure safety injection
IFI	inspection followup item
ITS	improved technical specifications
LER	licensee event report
LHRA	locked high radiation area
LPSI	low pressure safety injection
NCV	noncitwed violation
NRC	Nuclear Regulatory Commission
OJT	on-the-job training
PDR	Public Document Room
RCA	radiologically controlled area
REP	radiation exposure permit
RMC	radioactive material control
RO	reactor operator
RP	radiation protection
SRO	senior reactor operator
TS	Technical Specifications