UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
612 EAST LAMAR BLVD, SUITE 400
ARLINGTON, TEXAS 76011-4125

February 11, 2010

Stewart B. Minahan, Vice President
Nuclear and CNO
Nebraska Public Power District
72676 648A Avenue
Brownville, NE 68321

Subject: COOPER NUCLEAR STATION- NRC INTEGRATED INSPECTION REPORT 05000298/2009005

Dear Mr. Minahan:

On December 31, 2009, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Cooper Nuclear Station. The enclosed integrated inspection report documents the inspection findings, which were discussed on January 14, 2010, with Mr. D. Willis, General Manager of Plant Operations, and other members of your staff.

The inspections examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

This report documents six NRC-identified findings and seven self-revealing findings of very low safety significance (Green). Ten of these findings were determined to involve violations of NRC requirements. Additionally, four licensee-identified violations, which were determined to be of very low safety significance, are listed in this report. However, because of the very low safety significance and because they are entered into your corrective action program, the NRC is treating these findings as noncited violations, consistent with Section VI.A.1 of the NRC Enforcement Policy. If you contest the violations or the significance of the noncited violations, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001, with copies to the Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV, 612 E. Lamar Blvd, Suite 400, Arlington, Texas, 76011-4125; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspector at the Cooper Nuclear Station facility. In addition, if you disagree with the characterization of any finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region IV, and the NRC Resident Inspector at Cooper Nuclear Station. The information you provide will be considered in accordance with Inspection Manual Chapter 0305.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, and its enclosure, will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room).

Sincerely,

/RA/

Vince Gaddy, Chief
Project Branch C
Division of Reactor Projects

Docket: 50-298
License: DRP-46

Enclosure:
NRC Inspection Report 05000298/2009005
w/Attachment: Supplemental Information

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U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket:	50-298
License:	DRP-46
Report:	05000298/2009005
Licensee:	Nebraska Public Power District
Facility:	Cooper Nuclear Station
Location:	72676 648A Ave Brownville, NE 68321
Dates:	September 24 through December 31, 2009
Inspectors:	M. Bloodgood, Reactor Inspector M. Chambers, Resident Inspector P. Elkmann, Senior Emergency Preparedness Inspector N. Okonkwo, Reactor Inspector D. Reinert, Reactor Inspector D. Stearns, Health Physicist N. Taylor, Senior Resident Inspector E. Uribe, Reactor Inspector M. Vasquez, Senior Health Physicist
Approved By:	Vince Gaddy, Chief, Project Branch C Division of Reactor Projects

SUMMARY OF FINDINGS

IR 05000298/2009005; 09/24/2009 – 12/31/2009; Cooper Nuclear Station, Integrated Resident and Regional Report; Fire Protection, Maintenance Risk Assessments and Emergent Work Control, Refueling and Other Outage Activities, Access Control to Radiologically Significant Areas, ALARA Planning and Controls, Identification and Resolution of Problems, Event Follow-up.

The report covered a 3-month period of inspection by resident inspectors and announced baseline inspections by regional based inspectors. Ten noncited violations and three findings of very low safety significance were identified. The significance of most findings is indicated by their color (Green, White, Yellow, or Red) using Inspection Manual Chapter 0609, "Significance Determination Process." Findings for which the significance determination process does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

A. NRC-Identified Findings and Self-Revealing Findings

Cornerstone: Initiating Events

- Green. A self-revealing noncited violation of Technical Specification 5.4.1.d, "Fire Protection Program Implementation" was identified for the licensee's failure to follow the requirements of Surveillance Procedure 6.FP.306, "Fire Detection Systems Semi-Annual Examination." Specifically, licensee technicians actuated the wrong thermal detector during surveillance testing, causing the CO_2 fixed flooding system timer to actuate. Technicians recognized the error when the local and remote alarms actuated, and removed the heat source from the detector prior to release of the CO_2 gas. The licensee entered this issue in their corrective action program as CR-CNS-2009-07008.

  The performance deficiency associated with this finding involved the licensee's failure to follow the requirements of Surveillance Procedure 6.FP.306, "Fire Detection Systems Semi-Annual Examination." Specifically, licensee technicians actuated the wrong thermal detector during surveillance testing, causing the CO_2 fixed flooding system timer to actuate. The finding affects the initiating events cornerstone and is more than minor because it could be reasonably viewed as a precursor to a significant event, namely a toxic CO_2 release in the Diesel Generator 1 room. Using the Manual Chapter 0609, Appendix F, Phase 1 screening worksheet, the inspectors determined that the finding has very low safety significance because it was associated with a low degradation rating. The finding has a crosscutting aspect in the area of human performance associated with work practices because maintenance technicians failed to use appropriate self or peer checking techniques, and proceeded in the face of uncertainty when unlabeled components were encountered [H.4(a)] (Section 1R05).

- Green. The inspectors identified multiple examples of a finding for the licensee's failure to initiate condition reports as required by Administrative Procedure 0.36.7, "Electrical Cord Control/GFCI Program," to resolve extension cords which had been in place longer than 90 days. Had the condition reports been initiated, design engineering would have evaluated whether permanent power receptacles were needed to power plant equipment, such as security cameras. The licensee entered this issue in their corrective action program as CR-CNS-2009-08610.

  The performance deficiency associated with this finding was the licensee's failure to initiate condition reports for multiple examples of extension cords being used as a substitute for permanent wiring for greater than 90 days. The finding is more than minor because, if left uncorrected, the performance deficiency had the potential to lead to a more significant safety concern, such as electrical shock, equipment damage or fire. Because the plant was shutdown at the time this performance deficiency occurred, the inspectors used Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process." Using Checklist 7 in Attachment 1, "Shutdown Operations Significance Determination Process Phase 1 Operational Checklists For Both PWRs and BWRs", the inspectors determined that the finding had very low safety significance because every item on the checklist was met. The finding has a crosscutting aspect in the area of human performance associated with resources because the licensee's procedure for control of extension cords does not require tracking of extension cord use to ensure that condition reports are initiated for cords in use greater than 90 days [H.2(c)] (Section 1R05).

- Green. The inspectors identified a finding for the licensee's failure to follow the requirements of Administrative Procedure 0.40, "Work Control Program," Revision 68. Specifically, a maintenance technician violated the procedure by attempting corrective maintenance on the Reactor Recirculation Motor Generator A lubricating oil system without notifying the control room, resulting in a trip of the motor generator and the supported reactor recirculating pump. The licensee entered this issue in their corrective action program as CR-CNS-2009-09023.

  The performance deficiency associated with this finding was the licensee's failure to follow the requirements of Administrative Procedure 0.40, "Work Control Program," on October 29, 2009. The finding is more than minor because it adversely affected the configuration control attribute of the initiating events cornerstone, and adversely affected the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Because the plant was shutdown at the time this performance deficiency occurred, the inspectors used Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process." Using Checklist 7 in Attachment 1, "Shutdown Operations Significance Determination Process Phase 1 Operational Checklists For Both PWRs and BWRs", the inspectors determined that the finding had very low safety significance because every item on the checklist was met. The finding has a crosscutting aspect in the area of human performance associated with work practices because the licensee's maintenance technician did not use the procedurally-required Stop-Think-Act-Review step (error prevention tool) which would have required him to ensure that all energy had been removed from the recirculation motor generator oil system prior to performing maintenance on the system [H.4(a)] (Section 1R20).

- Green. A self-revealing finding was identified for the licensee's failure to follow Administrative Procedure 0.47, "Control of In-Process Material," Specifically, a maintenance technician violated the procedure by obtaining a spare o-ring from an uncontrolled toolbox and that o-ring was then installed in the Main Turbine Control Valve 3 hydraulic fitting. The o-ring was the wrong size and caused a hydraulic leak that required taking the turbine off line and shutting down the reactor from 70 percent power. The licensee entered this issue in their corrective action program as CR-CNS-2009-09606.

  The finding is more than minor because it adversely affected the configuration control attribute of the initiating events cornerstone, and adversely affected the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations, in that this finding resulted in a condition that prompted a plant shutdown from 70 percent power. In accordance with Manual Chapter 0609, Attachment 4, the inspectors used the Phase 1 "Initial Screening and Characterization" worksheet to determine that the finding has very low safety significance because it did not result in the loss of any system safety function. The cause of this finding is related to human performance cross cutting component of work practices because the involved maintenance personnel proceeded in the face of uncertainty when obtaining replacement o-rings [H.4(a)] (Section 4OA3).

- Green. A self-revealing noncited violation of Technical Specification 5.4.1.d, "Fire Protection Program Implementation," was identified for the licensee's failure to follow Administrative Procedure 0.39, "Hot Work." Specifically, contractors under the licensee's control failed to consider weld pre-heating as an activity requiring hot work controls, and as such did not take the appropriate precautions for a pre-heating activity. As a result, a degraded pre-heating blanket failed in service, started a fire in the heater bay and resulted in declaration of a Notice of Unusual Event. The licensee entered this issue in their corrective action program as CR-CNS-2009-08061.

  The performance deficiency associated with this finding involved the licensee's failure to follow the requirements of Administrative Procedure 0.39, "Hot Work." Specifically, contractors performing work in the turbine building heater bay failed to consider weld pre-heating as an activity requiring hot work controls and did not take the appropriate precautions for the pre-heating activity. The finding is more than minor because it affected the external events aspect of the initiating events cornerstone and affected the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. The inspectors determined that Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," could not be applied to shutdown plant conditions. Because the plant was shutdown at the time this performance deficiency occurred, the inspectors used Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process." Using Checklist 7 in Attachment 1, "Shutdown Operations Significance Determination Process Phase 1 Operational Checklists For Both PWRs and BWRs", the inspectors determined that the finding had very low safety significance because every item on the checklist was met. This finding has a crosscutting aspect in the area of human performance associated with work practices because the licensee personnel failed to maintain adequate supervisory control over contractors performing welding in the turbine building heater bay [H.4(c)] (Section 4OA3).

Cornerstone: Mitigating Systems

- <u>Green</u>. The inspectors identified a noncited violation of 10 CFR 50.65(a)(1) for the failure to monitor the performance of the diesel generator lubricating oil system against licensee-established goals in a manner sufficient to provide reasonable assurance that the diesel generator lubricating oil system was capable of fulfilling its intended safety functions. Specifically, a revision to the root cause investigation report for a diesel generator 2 lubricating oil pipe crack failure resulted in an undetected repeat maintenance preventable functional failure that required an automatic (a) (1) status of the associated maintenance rule function. Although the diesel generator system was already in (a) (1) status for other reasons, the appropriateness of the existing goals required evaluation under 10 CFR 50.65(a) (1). The licensee entered this issue in their corrective action program as Condition Report CR-CNS-2009-06392 and determined it was appropriate to establish and monitor an additional goal for the emergency diesel generator lubricating oil system.

  This finding is more than minor because it affected the reliability objective of the equipment performance attribute under the mitigating systems cornerstone. The inspectors determined that this performance deficiency was an additional, but separate consequence of the degraded performance of the diesel generators lubricating oil systems. Following the guidance of Appendix B to Manual Chapter 0612 and Appendix D to Inspection Procedure 71111.12, the inspectors determined that this finding occurred as a consequence of actual problems with the diesel generator lubricating oil system, and that those actual problems were not attributable to this finding. The inspectors used Manual Chapter 0609, Appendix M, "Significance Determination Process Using Qualitative Criteria," to conclude that the finding was of very low safety significance. The finding has a crosscutting aspect in the area of human performance associated with resources because the licensee did not ensure that procedures were available and adequate to assure nuclear safety, in that the licensee did not ensure that Administrative Procedure 0.5.NAIT required reevaluation of maintenance rule failures following revisions of equipment cause analyses [H.2(c)] (Section 1R12).

- Green. The inspectors identified a noncited violation of 10 CFR 50.65.a (4) for the licensee's failure to manage the increase in risk that may result from proposed maintenance activities. Specifically, inspectors discovered that after the licensee had designated Core Spray Pump B as "protected" in accordance with Administrative Procedure 0-PROTECT-EQP, "Protected Equipment Program," the licensee removed the protected core spray pump from service for a maintenance activity. The licensee entered this issue in their corrective action program as CR-CNS-2009-09243.

  The performance deficiency associated with this finding involved the licensee's failure implement prescribed risk mitigating actions. Specifically, inspectors discovered that a protected train core spray pump had been made unavailable for a maintenance activity. The finding is more than minor because the licensee failed to implement a prescribed significant compensatory measure. A senior reactor analyst assisted with the significance determination process. For this finding, the analyst used the guidance in NRC Inspection Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," and Appendix K, "Maintenance Risk Assessment and Risk Management Significance Determination Process." The analyst determined that the finding associated with an inoperable core spray pump, while that pump was specified as protected equipment, screened as having very low safety significance in both the Appendix K and Appendix G significance determination processes. This finding has a crosscutting aspect in the area of human performance associated work practices because operations personnel failed to follow the procedural requirements of Administrative Procedure 0-PROTECT-EQP [H.4(b)] (Section 1R13).

- Green. A self-revealing noncited violation of 10 CFR 50 Appendix B, Criterion XVI, "Corrective Action," occurred for the licensee's failure to assure that a condition adverse to quality was corrected. Specifically, the licensee identified oil leakage on Diesel Generator 2 mechanical overspeed governor drive flange as a condition adverse to quality on June 23, 2009, and failed to correct the condition of oil leakage as demonstrated by a September 9, 2009, failure of the Diesel Generator 2 due to loose fasteners at this location. The licensee entered this issue in their corrective action program as CR-CNS-2009-06716.

  The finding is more than minor because it is associated with the equipment performance attribute of the mitigating systems cornerstone, and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events. Using the screening worksheet in Manual Chapter 0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings", the inspectors determined that the finding has very low safety significance because it was not a design or qualification deficiency and did not result in the loss of any system safety function. This finding has a crosscutting aspect in the corrective action program component of the Problem Identification and Resolution area because the licensee's periodic trends and assessments did not identify programmatic and common cause problems, in that the licensee's periodic trends and assessments did not recognize the significance of precursor events related to fasteners loosening and prompt action to prevent further problems on the emergency diesel generators [P.1(b)] (Section 4OA2).

- Green. A self-revealing noncited violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," was identified for the licensee's failure to preclude repetition of a significant condition adverse to quality, namely the loss of shutdown cooling caused by drawing a vacuum in the reactor pressure vessel. Specifically, corrective actions taken after a March 17, 1994, loss of shutdown cooling event were inadequate to prevent a similar event from occurring on November 7, 2009. The licensee entered this issue in their corrective action program as CR-CNS-2009-09486.

  The finding is more than minor because it affected the procedure quality attribute of the mitigating systems cornerstone and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). The inspectors determined that Manual Chapter 0609, Appendix G was applicable due to the fact that at the time of the performance deficiency was discovered, the plant was in a forced outage with residual heat removal system in service. Using Checklist 8 in Attachment 1, "Shutdown Operations Significance Determination Process Phase 1 Operational Checklists For Both PWRs and BWRs", the inspectors determined that although the residual heat removal mitigation capability on the checklist was not met, the criteria for requiring a phase 2 or phase 3 analysis were not satisfied. The inspectors determined that no cross cutting aspects were appropriate for this finding due to the fact that the performance deficiency occurred in 1994 and is not reflective of current performance (Section 4OA3).

Cornerstone: Barrier Integrity

- Green. The inspectors identified a noncited violation of 10 CFR 50 Appendix B, Criterion XVI, "Corrective Action," for the licensee's failure to identify a condition adverse to quality. Specifically, the licensee failed to identify of foreign material in the reactor core during the core verification process of Procedure 10.2, "Core Verification." This foreign material was identified by inspectors during a review of the core verification video following vessel reassembly. The licensee entered this issue in their corrective action program as CR-CNS-2009-08890.

  The finding is more than minor because it was associated with the cladding performance attribute of the barrier integrity cornerstone, and affected the cornerstone objective to provide reasonable assurance that physical design barriers (fuel cladding, reactor coolant system and containment) protect the public from radionuclide releases caused by accidents or events. Using the Manual Chapter 0609, Appendix A, Phase 1 screening worksheet, the inspectors determined that the finding has very low safety significance because it is associated with a potential failure of the fuel barrier. This finding has a crosscutting aspect in the area of human performance associated with resources because the licensee's procedure for the core verification process is silent on potential identification of foreign material in the core [H.2(c)] (Section 1R20).

- Green. A self-revealing noncited violation of Technical Specification 5.4.1.a was identified regarding the licensee's failure to follow the requirements of System Operating Procedure 2.2.18, "4160V Auxiliary Power Distribution System." Specifically, operators preparing the 4160 F bus for a maintenance outage secured the wrong fuel pool cooling pump. When the bus was subsequently de-energized, a loss of fuel pool cooling occurred. The licensee entered this issue in their corrective action program as CR-CNS-2009-07770.

  The finding is more than minor because it is associated with barrier integrity cornerstone attribute of configuration control, and adversely affected the cornerstone objective of maintaining functionality of the spent fuel pool cooling system to provide reasonable assurance that the fuel cladding physical design barrier protects the public from radionuclide releases caused by accidents or events. Because the plant was shutdown at the time this performance deficiency occurred, the inspectors used Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process." Using Checklist 7 in Attachment 1, "Shutdown Operations Significance Determination Process Phase 1 Operational Checklists For Both PWRs and BWRs", the inspectors determined that the finding had very low safety significance because every item on the checklist was met. The finding has a crosscutting aspect in the area of human performance associated with work practices because the licensee failed to effectively use required self-checking error prevention tools [H.4(a)] (Section 1R20).

Cornerstone: Occupational Radiation Safety

- Green. The inspectors identified a noncited violation of Technical Specifications 5.4.1 for a failure to establish a procedure with adequate provisions to control work inside a locked high radiation area. Specifically, although the licensee's procedure required constant communications with workers in a locked high radiation area, the procedure had no provisions for providing a reasonable assurance that constant communications was being maintained during the duration the workers were inside the area. As a result, on October 6, 2009, the licensee lost constant communications with workers inside a locked high radiation area when the workers unknowingly bumped the cell phone and de-energized it. The licensee's immediate corrective action was to lock the keyboard on the cell phones to prevent them from inadvertently being turned off. The licensee entered the finding into the corrective action program as Condition Report CR-CNS-2009-07718.

  The inspectors determined that the failure of licensee procedures to contain adequate provisions that work inside a locked high radiation area would be controlled through constant communications is a performance deficiency. The finding was more than minor because, if left uncorrected, the performance deficiency has the potential to lead to a more significant safety concern. Using the Occupational Radiation Safety Significance Determination Process the inspectors determined this finding had very low safety significance because the finding did not involve ALARA planning and work controls, did not result in an overexposure, did not involve a substantial potential for overexposure, and did not compromise the licensee's ability to assess dose. Additionally, the finding had a crosscutting aspect in the area of human performance, resources component, because the licensee failed to ensure that equipment used to control work inside a posted locked high radiation area was adequate for environment and working conditions [H.2(d)] (Section 2OS1).

- <u>Green</u>. The inspectors reviewed a self-revealing, noncited violation of Technical Specifications 5.4.1 involving two examples of a failure to follow Radiation Work Permit requirements. In the first example, workers were not monitored with telemetry and constant coverage by a radiation protection technician was not provided as required by the radiation work permit. In the second example, a worker was not monitored with telemetry as required by the special work permit. As a result, the licensee conducted a stand-down to reinforce expectations for compliance with radiation work permits, instituted management challenges at the access control point, and began conducting an apparent cause evaluation. This was entered into the licensee's corrective action program as Condition Report CR-CNS-2009-08197 and CR-CNS-2009-08623.

  The inspectors determined that the failure to meet radiation and special work permit requirements was a performance deficiency. The finding is more than minor because it involved multiple failures of radiation protection measures which, if left uncorrected, could become a more significant safety concern. Using the Occupational Radiation Safety Significance Determination Process, the inspectors determined this finding had very low safety significance because the finding involved an ALARA planning and work controls and the licensee's average collective dose is less than 240 person-rem per unit. The finding had a crosscutting aspect in the area of human performance associated with work practices because of the lack of self and peer checking to ensure work activities were performed safely [H.4(a)] (Section 2OS2).

B. Licensee-Identified Violations

Violations of very low safety significance, which were identified by the licensee, have been reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. These violations and their associated condition report numbers are listed in Section 4OA7.

REPORT DETAILS

Summary of Plant Status

Cooper Nuclear Station began the inspection period at full power on September 24, 2009. On September 26, 2009, the plant was shut down for Refueling Outage 25. On October 7, 2009, the licensee declared a Notice of Unusual Event due to a fire in the turbine building heater bay that lasted longer than ten minutes. The refueling outage ended when the reactor was started up and connected to the electrical grid on November 5, 2009. On November 6, 2009, a hydraulic leak on a turbine governor valve forced the plant to be shut down for Forced Outage 09-01. During the shut down, the unexpected response of the reactor vessel level control system required operators to insert a manual reactor scram. The plant was restarted on November 9, 2009. Immediately after startup, another hydraulic leak appeared on the same turbine governor valve, forcing the plant to be shut down for Forced Outage 09-02. On November 13, 2009, the reactor was restarted. The plant achieved full power on November 17, 2009, where it remained until November 23, 2009, when an unplanned down power to 70 percent power was required to repair one of three condensate booster pumps. The plant returned to full power later that day, where it remained for the rest of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, and Emergency Preparedness

1R01 Adverse Weather Protection (71111.01)

Readiness for Seasonal Extreme Weather Conditions

a. Inspection Scope

The inspectors performed a review of the adverse weather procedures for seasonal extremes (e.g., extreme high temperatures, extreme low temperatures, or hurricane season preparations). The inspectors verified that weather-related equipment deficiencies identified during the previous year were corrected prior to the onset of seasonal extremes, and evaluated the implementation of the adverse weather preparation procedures and compensatory measures for the affected conditions before the onset of, and during, the adverse weather conditions.

During the inspection, the inspectors focused on plant-specific design features and the procedures used by plant personnel to mitigate or respond to adverse weather conditions. Additionally, the inspectors reviewed the Updated Final Safety Analysis Report and performance requirements for systems selected for inspection, and verified that operator actions were appropriate as specified by plant-specific procedures. Specific documents reviewed during this inspection are listed in the attachment. The inspectors also reviewed corrective action program items to verify that plant personnel were identifying adverse weather issues at an appropriate threshold and entering them into their corrective action program in accordance with station corrective action procedures. The inspectors' reviews focused specifically on the following plant systems:

- Service Water System
- Essential Ventilation System

These activities constitute completion of one readiness for seasonal adverse weather sample as defined in Inspection Procedure 71111.01-05.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignments (71111.04)

Partial Walkdown

a. Inspection Scope

The inspectors performed partial system walkdowns of the following risk-significant systems:

- October 6, 2009, Residual Heat Removal Service Water System, Train B
- November 10, 2009, 250V Battery, Train B

The inspectors selected these systems based on their risk significance relative to the reactor safety cornerstones at the time they were inspected. The inspectors attempted to identify any discrepancies that could affect the function of the system, and, therefore, potentially increase risk. The inspectors reviewed applicable operating procedures, system diagrams, Updated Final Safety Analysis Report, technical specification requirements, administrative technical specifications, outstanding work orders, condition reports, and the impact of ongoing work activities on redundant trains of equipment in order to identify conditions that could have rendered the systems incapable of performing their intended functions. The inspectors also inspected accessible portions of the systems to verify system components and support equipment were aligned correctly and operable. The inspectors examined the material condition of the components and observed operating parameters of equipment to verify that there were no obvious deficiencies. The inspectors also verified that the licensee had properly identified and resolved equipment alignment problems that could cause initiating events or impact the capability of mitigating systems or barriers and entered them into the corrective action program with the appropriate significance characterization. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of two partial system walkdown samples as defined in Inspection Procedure 71111.04-05.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05)

.1 Quarterly Fire Inspection Tours

a. Inspection Scope

The inspectors conducted fire protection walkdowns that were focused on availability, accessibility, and the condition of firefighting equipment in the following risk-significant plant areas:

- October 6, 2009, Fire Zone 8F, Battery Room 1B
- October 6, 2009, Fire Zone 8E, Battery Room 1A
- October 6, 2009, Zone 12C, Turbine Building Heater Bay
- October 15, 2009, Fire Zone 8G, DC Switchgear Room 1B

The inspectors reviewed areas to assess if licensee personnel had implemented a fire protection program that adequately controlled combustibles and ignition sources within the plant; effectively maintained fire detection and suppression capability; maintained passive fire protection features in good material condition; and had implemented adequate compensatory measures for out of service, degraded or inoperable fire protection equipment, systems, or features, in accordance with the licensee's fire plan. The inspectors selected fire areas based on their overall contribution to internal fire risk as documented in the plant's Individual Plant Examination of External Events with later additional insights, their potential to affect equipment that could initiate or mitigate a plant transient, or their impact on the plant's ability to respond to a security event. Using the documents listed in the attachment, the inspectors verified that fire hoses and extinguishers were in their designated locations and available for immediate use; that fire detectors and sprinklers were unobstructed; that transient material loading was within the analyzed limits; and fire doors, dampers, and penetration seals appeared to be in satisfactory condition. The inspectors also verified that minor issues identified during the inspection were entered into the licensee's corrective action program. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of four quarterly fire-protection inspection samples as defined in Inspection Procedure 71111.05-05.

b. Findings

1. Failure to Follow Surveillance Procedure Causes Near Toxic Gas Release

Introduction. A Green self-revealing noncited violation of Technical Specification 5.4.1.d, "Fire Protection Program Implementation" was identified for the licensee's failure to follow the requirements of Surveillance Procedure 6.FP.306, "Fire Detection Systems Semi-Annual Examination." Specifically, licensee technicians actuated the wrong thermal detector during surveillance testing, causing the CO_2 fixed flooding system timer to actuate. Technicians recognized the error when the local and remote alarms actuated, and removed the heat source from the detector prior to release of the CO_2 gas.

Description. On September 22, 2009, maintenance personnel were performing Surveillance Procedure 6.FP.306, "Fire Detection Systems Semi-Annual Examination." As part of this procedure, maintenance personnel actuate thermal detectors by applying a heat lamp to the detector and verifying that the expected alarm response is received. During performance of step 4.6.1, the maintenance technicians were attempting to test detector FP-TD-10-16, which is located in the south east corner of the Diesel Generator 1 room. The technician initially had difficulty locating the correct thermal detector for the test. The technician located an unlabeled thermal detector in the Diesel Generator 1 day tank room and assumed that it was the correct detector. The lead technician, who was at a remote station but in communication with the local technician, challenged the technician to ensure he was on the right detector. Despite the fact that the detector was unlabeled, the technician assured the lead that he was on the right component. He applied the heat lamp to the unlabeled thermal detector that he assumed was FP-TD-10-16. The detector was in fact CO2-TD-DG1, which provides an actuation signal to the Diesel Generator 1 room CO_2 flooding system. This system is designed with a fifty second time delay between detection of a fire and the beginning of CO_2 injection. This time delay is intended to give personnel the opportunity to evacuate the room prior to the CO_2 flooding system initiating (which would have lethal effect on any personnel in the room).

The technician heard the local alarm bell and recognized that this was not the correct system response for detector FP-TD-10-16. He immediately removed the heat lamp and was ordered by the lead technician to evacuate the area. The alarm signal cleared upon removal of the heat lamp, before the CO_2 fixed flooding system discharged into the room. The surveillance procedure was suspended pending a human error review board. The consequences of this error could have been more severe. Had the heat lamp not been removed the CO_2 fixed flooding system could have discharged into the room, causing potential asphyxiation of the maintenance technician.

The inspectors determined that this performance deficiency was associated with the fire category of fire prevention and administrative controls as described in Manual Chapter 0609, Appendix F. Additionally, the inspectors determined that this performance deficiency should be assigned a low degradation rating because the performance and reliability of the fire prevention administrative controls are minimally affected by this failure to follow procedure.

The licensee documented this performance deficiency in CR-CNS-2009-07008, and has since taken corrective actions to (1) label the unlabeled thermal detector, (2) initiate a modification to install a second thermal detector and remove single system failure/actuation mechanisms, (3) perform tailgate training with maintenance personnel to reinforce station expectations for error checking and proceeding in the face of uncertainty.

Analysis. The performance deficiency associated with this finding involved the licensee's failure to follow the requirements of Surveillance Procedure 6.FP.306, "Fire Detection Systems Semi-Annual Examination." Specifically, licensee technicians actuated the wrong thermal detector during surveillance testing, causing the CO_2 fixed flooding system timer to actuate. The finding affects the initiating events cornerstone and is more than minor because it could be reasonably viewed as a precursor to a significant event, namely a toxic CO_2 release in the Diesel Generator 1 room. Using the Manual Chapter 0609, Appendix F, Phase 1 screening worksheet, the inspectors determined that the finding has very low safety significance because it was associated with a low degradation rating. The finding has a crosscutting aspect in the area of human performance associated with work practices because maintenance technicians failed to use appropriate self or peer checking techniques, and proceeded in the face of uncertainty when unlabeled components were encountered [H.4(a)].

Enforcement. Technical Specification 5.4.1.d requires that written procedures shall be established, implemented and maintained covering the fire protection program. Contrary to this requirement, on September 22, 2009, the licensee's maintenance technicians failed to follow the requirements of Surveillance Procedure 6.FP.306, "Fire Detection Systems Semi-Annual Examination," Revision 13. Specifically, licensee technicians actuated the wrong thermal detector during surveillance testing, causing the CO_2 fixed flooding system timer to actuate. Because the finding is of very low safety significance and has been entered into the licensee's corrective action program as CR-CNS-2009-07008, this violation is being treated as an NCV consistent with Section VI.A of the Enforcement Policy: NCV 05000298/2009005-01 "Failure to Follow Surveillance Procedure Causes Near Toxic Gas Release."

2. Multiple Examples of a Failure to Follow Procedure For Extension Cord Configuration Control

Introduction. The inspectors identified multiple examples of a Green finding for the licensee's failure to initiate condition reports as required by Administrative Procedure 0.36.7, "Electrical Cord Control/GFCI Program," to resolve extension cords which had been in place longer than 90 days.

Description. During a plant tour on October 17, 2009, inspectors noted several extension cords that had been in place for an extended period of time to provide power to plant equipment. The inspectors reviewed the licensee's internal standard for the use of extension cords. Administrative Procedure 0.36.7, "Electrical Cord Control / GFCI Program," Revision 2, states in paragraph 3.18:

> *"electrical extension cords should not be used as a permanent extension of the building's fixed electrical system for > 90 days. When temporary power will be required for > 90 days or an extension cord has been in place for > 90 days, a Condition Report should be written, per Procedure 0.5CR, and routed to Design Engineering to evaluate the need for permanent receptacles."*

Contrary to this requirement, the inspectors discovered multiple examples of extension cords in the protected area that had been in use for greater than 90 days for which no condition report had been initiated. These examples included extension cords run to power up security cameras in the intake structure, a diesel generator maintenance trailer outside the turbine building, and a belly-band heater on overflow drum from Condensate

Storage Tank A. In discussing the issue with station personnel, personnel had developed a level of comfort with long-term use of extension cords, and that none of the persons interviewed were aware of the procedural requirement to initiate a condition report for such conditions. The licensee was not able to determine when the errant extension cords had been put in service. The inspectors were able to use plant photographs taken during plant status activities to demonstrate that all three of the errant cords identified had been in place longer than 90 days but less than one year. The licensee determined that Procedure 0.36.7 was inadequate in that it did not include a mechanism to track the use of extension cords and identify those in use longer than 90 days.

Improper use of extension cords is a potential industrial safety hazard as well as a potential fire hazard due to their vulnerability to damage with prolonged use. Any fire in the protected area can be significant and result in an emergency action level declaration. The inspectors verified that this performance deficiency did not result in the unavailability of any mitigating systems listed in Manual Chapter 0609, Appendix G, Table 7. As a result of the inspectors observations, the licensee initiated several condition reports including CR-CNS-2009-08329, CR-CNS-2009-08482, and CR-CNS-2009-08610. Corrective actions included a plant walkdown to correct improperly installed cords, communication of safety standards to site personnel and development of a tracking tool to identify extension cords in use for longer than 90 days.

<u>Analysis</u>. The performance deficiency associated with this finding was the licensee's failure to initiate condition reports for multiple examples of extension cords being used as a substitute for permanent wiring for greater than 90 days. The finding is more than minor because, if left uncorrected, the performance deficiency had the potential to lead to a more significant safety concern, such as electrical shock, equipment damage or fire. Because the plant was shutdown at the time this performance deficiency occurred, the inspectors used Manual Chapter 0609, Appendix G,"Shutdown Operations Significance Determination Process." Using Checklist 7 in Attachment 1, "Shutdown Operations Significance Determination Process Phase 1 Operational Checklists For Both PWRs and BWRs", the inspectors determined that the finding had very low safety significance because every item on the checklist was met. The finding has a crosscutting aspect in the area of human performance associated with resources because the licensee's procedure for control of extension cords does not require tracking of extension cord use to ensure that condition reports are issued for cords in use greater than 90 days [H.2(c)].

<u>Enforcement</u>. Enforcement action does not apply because the performance deficiency did not involve a violation of a regulatory requirement. Because this finding did not involve a violation of regulatory requirements and has very low safety significance, it is identified as FIN 05000298/2009005-02, "Multiple Examples of a Failure to Follow Procedure For Extension Cord Configuration Control."

.2 Annual Fire Protection Drill Observation (71111.05A)

a. Inspection Scope

On December 4, 2009, the inspectors observed a fire brigade activation in response to a simulated fire at the independent spent fuel storage installation. The observation evaluated the readiness of the plant fire brigade to fight fires. The inspectors verified that the licensee staff identified deficiencies, openly discussed them in a self-critical manner at the drill debrief, and took appropriate corrective actions. Specific attributes evaluated were (1) proper wearing of turnout gear and self-contained breathing apparatus; (2) proper use and layout of fire hoses; (3) employment of appropriate fire fighting techniques; (4) sufficient firefighting equipment brought to the scene; (5) effectiveness of fire brigade leader communications, command, and control; (6) search for victims and propagation of the fire into other plant areas; (7) smoke removal operations; (8) utilization of preplanned strategies; (9) adherence to the preplanned drill scenario; and (10) drill objectives.

These activities constitute completion of one annual fire-protection inspection sample as defined in Inspection Procedure 71111.05-05.

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures (71111.06)

a. Inspection Scope

The inspectors reviewed the Updated Final Safety Analysis Report, the flooding analysis, and plant procedures to assess susceptibilities involving internal flooding; reviewed the corrective action program to determine if licensee personnel identified and corrected flooding problems; inspected underground bunkers/manholes to verify the adequacy of sump pumps, level alarm circuits, cable splices subject to submergence, and drainage for bunkers/manholes; and verified that operator actions for coping with flooding can reasonably achieve the desired outcomes. The inspectors also inspected the areas listed below to verify the adequacy of equipment seals located below the flood line, floor and wall penetration seals, watertight door seals, common drain lines and sumps, sump pumps, level alarms, and control circuits, and temporary or removable flood barriers. Specific documents reviewed during this inspection are listed in the attachment.

- November 24, 2009, Diesel Generator 1 Room

These activities constitute completion of one flood protection measures inspection sample as defined in Inspection Procedure 71111.06-05.

b. Findings

No findings of significance were identified.

1R07 Heat Sink Performance (71111.07)

Triennial Review

a. Inspection Scope

The inspectors reviewed design documents (e.g., calculations and performance specifications), program documents, test and maintenance procedures, and corrective action documents for the inspection samples selected. The inspectors also interviewed chemistry and engineering personnel.

The inspectors selected heat exchangers that ranked high in the plant specific risk assessment and were directly or indirectly connected to the safety-related service water system. The inspectors selected the following heat exchangers:

- Division I Residual Heat Removal Heat Exchanger
- Division I Reactor Equipment Cooling Heat Exchanger
- Diesel Generator 1 Intercooler

For heat exchangers directly connected to the safety-related service water system, the inspectors verified that testing, inspection and maintenance, or the biotic fouling monitoring program provided sufficient controls to ensure proper heat transfer. Specifically, the inspectors reviewed: (1) heat exchanger test methods and test results from performance testing; (2) chemical treatments for micro-fouling and controls for macrofouling; and (3) whether test results appropriately considered differences between testing conditions and design conditions.

For heat exchangers directly or indirectly connected to the safety-related service water system, the inspectors verified that the licensee: (1) performed condition monitoring and operation consistent with design assumptions in the heat transfer calculations; (2) evaluated the potential for water hammer, as applicable; and (3) instituted appropriate chemistry controls for the heat exchangers.

For the ultimate heat sink and its subcomponents, the inspectors verified that the licensee established appropriate controls for macrofouling and biological fouling. Since the licensee had a river fed service water system, a system walk-down was performed to verify the licensee had: (1) evaluated for any possible settlement or movement indicating loss of structural integrity and/or capacity; and (2) periodic monitoring for sediment intrusion that may reduce capacity.

The inspectors reviewed the following additional aspects related to the service water system and the ultimate heat sink: (1) operation of the ultimate heat sink; (2) performance testing components; and (3) actions taken to maintain buried piping at the facility.

The inspectors examined the condition of the service water system and associated service water pipe to determine the effectiveness of the chemistry control program.

Documents reviewed by the inspectors are listed in the attachment.

These activities constitute completion of three samples as defined in Inspection Procedure 71111-07-05.

b. Findings

No findings of significance were identified.

1R08 In-service Inspection Activities (71111.08)

.1 Inspection Activities Other Than Steam Generator Tube Inspection, Pressurized Water Reactor Vessel Upper Head Penetration Inspections, and Boric Acid Corrosion Control (71111.08-02.01)

a. Inspection Scope

The inspectors reviewed two types of nondestructive examination activities and, one weld on the reactor coolant system pressure boundary. The inspectors also reviewed six examinations with relevant indications that had been accepted by licensee personnel for continued service.

The inspectors directly observed the following nondestructive examinations:

SYSTEM	WELD IDENTIFICATION	EXAMINATION TYPE
Main Steam	PSA-BJ-2	UT
Core Spray	CSB-BJ-18	UT
Reactor Pressure Vessel	JP16-ADSCR-TWLD-GAP	VT
Reactor Pressure Vessel	JP20-ADSCR-TWLD-GAP	VT

The inspectors reviewed records for the following nondestructive examinations:

SYSTEM	IDENTIFICATION	EXAMINATION TYPE
Reactor Pressure Vessel	JP15-ADSCR-TWLD-GAP	VT
Core Spray	CS-A-TJB@90	VT
Reactor Pressure Vessel	SD-LR145	VT

SYSTEM	IDENTIFICATION	EXAMINATION TYPE
Reactor Pressure Vessel	STMDRY-DRCHWLD-1VL@23	VT
Reactor Pressure Vessel	STMDRY-DRCHWLD-1VL@23	VT
Main Steam	HPEX-CF-3	UT

During the review and observation of each examination, the inspectors verified that activities were performed in accordance with the ASME Code requirements and applicable procedures. The inspectors compared any indications previous examinations and verified that licensee personnel dispositioned the indications in accordance with the ASME Code and approved procedures. The inspectors also verified the qualifications of all nondestructive examination technicians performing the inspections were current.

The inspectors verified, by review, that the welding procedure specifications and the welders had been properly qualified in accordance with ASME Code, Section IX, requirements. The inspectors also verified, through observation and record review, that essential variables for the welding process were identified, recorded in the procedure qualification record, and formed the bases for qualification of the welding procedure specifications. Specific documents reviewed during this inspection are listed in the attachment.

These actions constitute completion of the requirements for Section 02.01.

b. Findings

No findings of significance were identified.

.2 Identification and Resolution of Problems (71111.08-02.05)

a. Inspection scope

The inspectors reviewed 10 condition reports which dealt with inservice inspection activities and found the corrective actions were appropriate. The specific condition reports reviewed are listed in the documents reviewed section. From this review, the inspectors concluded that the licensee has an appropriate threshold for entering issues into the corrective action program and has procedures that direct a root cause evaluation when necessary. The licensee also has an effective program for applying industry operating experience. Specific documents reviewed during this inspection are listed in the attachment.

These actions constitute completion of the requirements of Section 02.05.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalification Program (71111.11)

a. Inspection Scope

On December 1, 2009, the inspectors observed a crew of licensed operators in the plant's simulator to verify that operator performance was adequate, evaluators were identifying and documenting crew performance problems, and training was being conducted in accordance with licensee procedures. The inspectors evaluated the following areas:

- Licensed operator performance
- Crew's clarity and formality of communications
- Crew's ability to take timely actions in the conservative direction
- Crew's prioritization, interpretation, and verification of annunciator alarms
- Crew's correct use and implementation of abnormal and emergency procedures
- Control board manipulations
- Oversight and direction from supervisors
- Crew's ability to identify and implement appropriate technical specification actions and emergency plan actions and notifications

The inspectors compared the crew's performance in these areas to pre-established operator action expectations and successful critical task completion requirements. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of one quarterly licensed-operator requalification program sample as defined in Inspection Procedure 71111.11-05.

b. Findings

No findings of significance were identified.

1R12 Maintenance Effectiveness (71111.12)

a. Inspection Scope

The inspectors evaluated degraded performance issues involving the following risk significant systems:

- November 19, 2009, Diesel Generator 1 functional failure evaluation of lubricating oil cracked piping

- November 19, 2009, Diesel Generator 2 CR-CNS-2009-00968 root cause investigation Revision 2

The inspectors reviewed events such as where ineffective equipment maintenance has resulted in valid or invalid automatic actuations of engineered safeguards systems and independently verified the licensee's actions to address system performance or condition problems in terms of the following:

- Implementing appropriate work practices

- Identifying and addressing common cause failures

- Scoping of systems in accordance with 10 CFR 50.65(b)

- Characterizing system reliability issues for performance

- Charging unavailability for performance

- Trending key parameters for condition monitoring

- Ensuring proper classification in accordance with 10 CFR 50.65(a)(1) or -(a)(2)

- Verifying appropriate performance criteria for structures, systems, and components classified as having an adequate demonstration of performance through preventive maintenance, as described in 10 CFR 50.65(a)(2), or as requiring the establishment of appropriate and adequate goals and corrective actions for systems classified as not having adequate performance, as described in 10 CFR 50.65(a)(1)

The inspectors assessed performance issues with respect to the reliability, availability, and condition monitoring of the system. In addition, the inspectors verified maintenance effectiveness issues were entered into the corrective action program with the appropriate significance characterization. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of two quarterly maintenance effectiveness samples as defined in Inspection Procedure 71111.12-05.

b. Findings

Introduction. The inspectors identified a Green noncited violation of 10 CFR 50.65(a)(1) for the failure by the licensee to monitor the performance of the diesel generator lubricating oil system against licensee-established goals in a manner sufficient to provide reasonable assurance that the diesel generator lubricating oil system was capable of fulfilling its intended safety functions. Specifically, a revision to the root cause investigation report for a Diesel Generator 2 lubricating oil pipe crack failure resulted in an undetected repeat maintenance preventable functional failure that required an automatic (a)(1) status of the associated maintenance rule function. Although the diesel generator system was already in (a)(1) status for other reasons, the appropriateness of the existing goals required evaluation under 10 CFR 50.65(a)(1). The licensee determined it was appropriate to establish and monitor an additional goal for the emergency diesel generator lubricating oil system after performing the required evaluation.

Description. The licensee's 10 CFR 50.65 maintenance rule program includes several diesel generator lubricating oil system functions, including function DG-PF01A "provides emergency diesel power to plant equipment required for safe shutdown of the plant in emergencies-Train B." In accordance with 10 CFR 50.65(a)(2), the licensee established performance criteria to demonstrate that the performance of the system was being effectively controlled through the performance of appropriate preventive maintenance. One of those criteria was that there should be no repeat maintenance preventable functional failures.

On February 13, 2008, the Diesel Generator 2 lubricating oil discharge piping cracked and leaked oil. The initial root cause report, completed March 11, 2008, concluded the pipe failure resulted from high cycle fatigue caused by forces exerted from a flexible hose downstream of the break location. The initial maintenance rule evaluation determined that this was a functional failure to provide emergency power to the plant although not a repeat failure. The licensee subsequently reopened the root cause investigation to question if the relatively small forces from the misaligned flex hose compared to the tensile strength of the piping material could have initiated a crack. On November 17, 2008, Revision 1 of the root cause investigation concluded that misapplication of a large external load to the piping was the cause of the pipe failure. This cause determination, based almost entirely on analysis, contradicted the physical evidence, contradicted observations by plant employees and contradicted conclusions drawn by industry experts that the crack had initiated and progressed via high cycle fatigue.

On January 27, 2009, a nearly identical pipe crack occurred in the Diesel Generator 1 lubricating oil discharge piping. Following this repeat failure the licensee reopened the root cause investigation into the February 13, 2008, Diesel Generator 2 piping crack. On March 23, 2009, the maintenance rule evaluation of the January 27, 2009, Diesel Generator 1 pipe crack concluded that this was also a functional failure to provide emergency power to the plant. However, it was evaluated to not be a repeat of the similar February 2008 Diesel Generator 2 pipe crack since the Diesel Generator 1 pipe crack was due to oil piping resonance while the Diesel Generator 2 pipe crack cause had been identified as a misapplication of a large external load by Revision 1 of the root cause determination. Though the Diesel Generator 2 piping overload cause was known to be incorrect by the engineering staff when the March 23, 2009, functional failure evaluation was performed the engineering staff advised the inspectors that revision of the functional failure evaluation to consider it a repeat failure would have to wait on completion of Diesel Generator 2 pipe crack root cause evaluation Revision 2.

On July 29, 2009, Revision 2 of the licensee's root cause investigation was completed and determined a contributing cause of the Diesel Generator 2 pipe crack was that preventative maintenance work instructions did not specify installation tolerances of the flexible hose. Additional loading from a misaligned and over length flexible hose applied thrust loads to the Diesel Generator 2 lubricating oil pump discharge pipe crack site, causing the pipe to fail by high cycle fatigue.

Given that Revision 2 of the root cause investigation demonstrated that the February 2008 lubricating oil piping failure had been caused by high cycle fatigue, the licensee should have recognized that the January 27, 2009 failure of Diesel Generator 1 was indeed a repeat maintenance preventable functional failure. Had this failure been appropriately reconsidered, Administrative Procedure 0.27, "Maintenance Rule Program," should have led licensee personnel to complete a 10 CFR 50.65(a)(1) evaluation to determine if the performance of the system was being effectively controlled through the performance of appropriate preventive maintenance and if goals and monitoring criteria should be established in accordance with 10 CFR 50.65(a)(1). On August 20, 2009, the inspectors discovered that no maintenance rule repeat functional failure evaluation existed nor was one pending in the licensee's maintenance rule program. Upon being notified of this error, the licensee initiated CR-CNS-2009-6392 to document the process gap in the maintenance rule program when root cause investigations are revised and CR-CNS-2009-6778 was originated to perform a maintenance rule (a)(1) evaluation due to the repeat maintenance preventable failure. This evaluation determined that it was necessary to have an additional goal of "no further failures associated with the flex joints on the diesel generator lubricating oil discharge piping due to high cycle fatigue issues." This goal will be monitored past the next scheduled flexible coupling replacement dates in November 2010.

The evaluation of the process gap determined that the maintenance rule program and the corrective action programs were inadequate in that they did not require reconsideration of maintenance rule functional failure evaluations following the revision of a root cause investigation report. This was corrected by revision of Procedure 0.5.NAIT, "Corrective Action Implementation and Nuclear Action Item Tracking," to require determination if subsequent actions, such as Maintenance Rule Program Evaluations, will be affected when cause analysis actions are reopened.

Following the guidance of Appendix D to Manual Chapter 0612 this finding is more than minor because failure to monitor the effectiveness of the emergency diesel generator lubricating oil system affects the reliability objective of the equipment performance attribute under the mitigating systems cornerstone. This issue was screened with the assistance of Inspection Procedure 71111.12, "Maintenance Effectiveness," Appendix D, "Regulatory Review," that supplements the general guidance of Inspection Manual Chapters 0612, 0609, and 0305 by providing specific guidance on the disposition of maintenance effectiveness issues. This is a Category II maintenance effectiveness issue in that this failure to establish goals and monitoring for the emergency diesel generator lubricating oil system is not attributable to the pipe cracking but a result of inadequate licensee procedures to track changes in cause investigations that required reevaluation of the equipment maintenance rule status. Since the equipment problems are not attributable to the maintenance rule violation, rather, the maintenance rule violation has occurred as a separate consequence of those problems, they cannot be processed through the significance determination process. Therefore, this maintenance rule violation is green.

Analysis. The inspectors determined that the failure by licensee personnel to effectively set goals and monitor the performance of the diesel generator lubricating oil system in accordance with 10 CFR 50.65(a)(1) was a performance deficiency. This finding is more than minor because it affected the reliability objective of the equipment performance attribute under the mitigating systems cornerstone. The inspectors determined that this performance deficiency was an additional, but separate consequence of the degraded performance of the diesel generators lubricating oil systems. Following the guidance of Appendix B to Manual Chapter 612 and Appendix D to Inspection Procedure 71111.12, the inspectors determined that this finding occurred as a consequence of actual problems with the diesel generator lubricating oil system, and that those actual problems were not attributable to this finding. The inspectors used Manual Chapter 0609, Appendix M, “Significance Determination Process Using Qualitative Criteria,” to conclude that the finding was of very low safety significance. The finding has a crosscutting aspect in the area of human performance associated with resources because the licensee did not ensure that procedures were available and adequate to assure nuclear safety, in that the licensee did not ensure that Administrative Procedure 0.5.NAIT required reevaluation of maintenance rule evaluations following revisions of equipment cause analyses [H.2(c)].

Enforcement. Title 10 CFR 50.65 (a)(1) requires, in part, that holders of an operating license shall monitor the performance or condition of structures, systems and components within the scope of the rule as defined by 10 CFR 50.65 (b), against licensee-established goals, in a manner sufficient to provide reasonable assurance that such structures, systems, and components are capable of fulfilling their intended safety functions. Contrary to this requirement, from January 27, 2009 to August 20, 2009, the licensee did not monitor the performance of the diesel generator lubricating oil system against licensee-established goals in a manner sufficient to provide reasonable assurance that the diesel generator lubricating oil system was capable of fulfilling its intended safety functions, in that following repeat maintenance-preventable functional failures of that system, the licensee failed to establish goals and monitor the performance of that system against those goals. Because the finding is of very low safety significance and has been entered into the licensee’s corrective action program as CR-CNS-2009-06392, this violation is being treated as a noncited violation consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 05000298/2009005-03, “Failure to Set Goals and Monitoring for the Diesel Generator Lubricating Oil System.”

1R13 Maintenance Risk Assessments and Emergent Work Control (71111.13)

a. Inspection Scope

The inspectors reviewed licensee personnel's evaluation and management of plant risk for the maintenance and emergent work activities affecting risk-significant and safety-related equipment listed below to verify that the appropriate risk assessments were performed prior to removing equipment for work:

- October 2, 2009, Dredging in front of intake structure
- October 6, 2009, 4160V F bus outage
- October 18, 2009, Reactor feedwater inboard check valves RF-CV14 and 16 failed initial local leak rate test

The inspectors selected these activities based on potential risk significance relative to the reactor safety cornerstones. As applicable for each activity, the inspectors verified that licensee personnel performed risk assessments as required by 10 CFR 50.65(a)(4) and that the assessments were accurate and complete. When licensee personnel performed emergent work, the inspectors verified that the licensee personnel promptly assessed and managed plant risk. The inspectors reviewed the scope of maintenance work, discussed the results of the assessment with the licensee's probabilistic risk analyst or shift technical advisor, and verified plant conditions were consistent with the risk assessment. The inspectors also reviewed the technical specification requirements and inspected portions of redundant safety systems, when applicable, to verify risk analysis assumptions were valid and applicable requirements were met. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of three maintenance risk assessments and emergent work control inspection samples as defined in Inspection Procedure 71111.13-05.

b. Findings

Introduction. The inspectors identified a Green noncited violation of 10 CFR 50.65.a(4) for the licensee’s failure to manage the increase in risk that may result from proposed maintenance activities. Specifically, inspectors discovered that after the licensee had designated Core Spray Pump B as “protected” in accordance with Administrative Procedure 0-PROTECT-EQP, “Protected Equipment Program,” the licensee removed the protected core spray pump from service for a maintenance activity.

Description. 10 CFR 50.65.a(4) requires that licensees assess and manage the risk of proposed maintenance activities. The licensee meets this requirement during shutdown plant conditions by complying with Administrative Procedure 0.50.5, “Outage Shutdown Safety,” Revision 7. Procedure 0.50.5 directs the licensee to identify a list of equipment which must be maintained available to keep the plant risk assessment in the acceptable range. This list of equipment is updated regularly based on planned equipment outages, and is published in multiple prominent places, including building corridors, the site television system, and in control room log entries. Procedure 0-PROTECT-EQP requires in step 2.4.1.3 that "work or testing on Protected Equipment…should be limited to that necessary to address emergent conditions affecting plant or personnel safety."

At the time that this performance deficiency was identified, the plant was in Mode 5, Cold Shutdown, during Refueling Outage 25. During a routine control room tour November 3, 2009, inspectors noticed that one of the items on the protected equipment list was unavailable. The operating switch for Core Spray Pump B had been placed in the "pull-to-lock" position on the control room panel. In reviewing the logs, the inspectors noted that the pump had been placed in this condition on the previous shift (at time 7:41 p.m. on November 2, 2009) for the purpose of lowering torus water level. A low point drain valve on the B core spray loop was being used to draw water from the torus to maintain its level in the acceptable range due to long-standing boundary valve leakage.

The inspectors noted that either train of the core spray system could have been used to accomplish this maintenance activity as prescribed in System Operating Procedure 2.2.9, "Core Spray System," Revision 68. The choice to use Train B was a matter of convenience based on the proximity of the drain valve to the sump being used to accept the water. Procedure 2.2.9 provides the guidance necessary to consider the pump available in this condition; the procedure would have required posting of an operator at the drain valve in continuous communication with the control room. By placing the pump in pull-to-lock without additional risk compensating measures such as a dedicated operator, the control room introduced an approximate ten-minute delay in the response time of Core Spray Pump B that was not evaluated (this is a conservative estimate of the time necessary to dispatch an operator to close the drain valve). The inspectors challenged control room operators as to the acceptability of this condition, as the torus level correction was not an "emergent condition," and the non-protected train of core spray was equally capable of reducing torus level. Plant operators recognized the error and immediately restored the Core Spray Pump B to an available and operable status at 9:22 a.m. on November 3, 2009.

The inspectors noted that the assessed risk condition for the previous two shifts had been "green," the lowest plant risk condition. After consultation with the licensee's risk analysis staff, the inspectors determined that the unavailability of Core Spray Pump B for the previous two shifts did not significantly change the risk analysis for these two shifts.

A senior reactor analyst assisted with the significance determination process. For these findings, the analyst used the guidance in NRC Inspection Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," and Appendix K, "Maintenance Risk Assessment and Risk Management Significance Determination Process." The finding associated with an inoperable core spray pump, while that pump was specified as protected equipment, screened as having very low safety significance in both the Appendix K and Appendix G significance determination processes. Using the Appendix K worksheet, the risk deficit was the difference between the actual risk (due to the noted configuration) and the previously evaluated risk (assuming that the pump was operable). The licensee had noted that there was only a small difference in the risk assessments when comparing the actual versus evaluated conditions. Based on this input, the risk analyst determined that the finding was of very low risk significance (Green) because the risk deficit was not greater than 10^{-6}. Considering the plant conditions at the time, this assessment was reasonable. Operators could have restored the inoperable low pressure core spray train to service within 10 minutes, at least four trains of low pressure injection were available, both residual heat removal trains were available, and time to boil was approximately 4.5 hours. Using the Appendix G significance determination process, the analyst obtained similar results. Checklist 8 applied to the applicable conditions, "BWR Cold shutdown or Refueling Operations Time to Boil Greater than 2 hours: Reactor Coolant System Level Less than 23 Feet above Top of Flange." The finding screened as Green because: (1) no instrumentation was adversely affected; (2) the finding did not affect freeze seals or procedures nor did it affect administrative controls training for valves that can cause a rapid inventory loss; and (3) at least two low pressure injection trains were available for injection (four trains were actually available).

As a result of this performance deficiency, the licensee initiated condition report CR-CNS-2009-09243. In responding to this condition report, the licensee has taken actions to modify the procedure to allow the core spray pump to be considered available during this activity while in Modes 4 or 5.

Analysis. The performance deficiency associated with this finding involved the licensee's failure implement prescribed risk mitigating actions. Specifically, inspectors discovered that a protected train of core spray pump had been made unavailable for a maintenance activity. The finding is more than minor because the licensee failed to implement a prescribed significant compensatory measure. A senior reactor analyst assisted with the significance determination process. For this finding, the analyst used the guidance in NRC Inspection Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," and Appendix K, "Maintenance Risk Assessment and Risk Management Significance Determination Process." The analyst determined that the finding associated with an inoperable core spray pump, while that pump was specified as protected equipment, screened as having very low safety significance in both the Appendix K and Appendix G significance determination processes. This finding has a crosscutting aspect in the area of human performance associated work practices because operations personnel failed to follow the procedural requirements of Administrative Procedure 0-PROTECT-EQP [H.4(b)].

Enforcement. 10 CFR Part 50.65.a(4) requires that licensees assess and manage the increase in risk that may result from proposed maintenance activities. The licensee manages this risk, in part, by protecting risk-significant equipment in accordance with Administrative Procedure 0-PROTECT-EQP, "Protected Equipment Program," Revision 11. Procedure 0-PROTECT-EQP requires in paragraph 2.4.1.3 that "work or testing on Protected Equipment…should be limited to that necessary to address emergent conditions affecting plant or personnel safety." Contrary to these requirements, between 7:41 p.m. on November 2, 2009 and 9:22 a.m. on November 3, 2009, the licensee did not effective manage the risk associated with ongoing maintenance when Core Spray Pump B was made unavailable for the purpose of draining water from the torus. Because the finding is of very low safety significance and has been entered into the licensee's corrective action program as CR-CNS-2009-09243, this violation is being treated as an NCV consistent with Section VI.A of the Enforcement Policy: NCV 05000298/2009005-04, "Failure to Implement a Prescribed Risk Mitigating Action."

1R15 Operability Evaluations (71111.15)

a. Inspection Scope

The inspectors reviewed the following issues:

- October 1, 2009, Main Steam Isolation Valve A failed local leak rate test

The inspectors selected these potential operability issues based on the risk significance of the associated components and systems. The inspectors evaluated the technical adequacy of the evaluations to ensure that technical specification operability was properly justified and the subject component or system remained available such that no unrecognized increase in risk occurred. The inspectors compared the operability and design criteria in the appropriate sections of the technical specifications and Updated Final Safety Analysis Report to the licensee personnel's evaluations to determine whether the components or systems were operable. Where compensatory measures were required to maintain operability, the inspectors determined whether the measures in place would function as intended and were properly controlled. The inspectors determined, where appropriate, compliance with bounding limitations associated with the evaluations. Additionally, the inspectors also reviewed a sampling of corrective action documents to verify that the licensee was identifying and correcting any deficiencies associated with operability evaluations. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of one operability evaluations inspection samples as defined in Inspection Procedure 71111.15-04

b. Findings

No findings of significance were identified.

1R18 Plant Modifications (71111.18)

a. Inspection Scope

The inspectors reviewed the following temporary/permanent modifications to verify that the safety functions of important safety systems were not degraded:

- November 1, 2009, Temporary Configuration Change 4699557, diesel generator mechanical overspeed cable removal

The inspectors reviewed the temporary modification and the associated safety evaluation screening against the system design bases documentation, including the

Updated Final Safety Analysis Report and the technical specifications, and verified that the modification did not adversely affect the system operability/availability. The inspectors also verified that the installation and restoration were consistent with the modification documents and that configuration control was adequate. Additionally, the inspectors verified that the temporary modification was identified on control room drawings, appropriate tags were placed on the affected equipment, and licensee personnel evaluated the combined effects on mitigating systems and the integrity of radiological barriers. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of one sample for temporary plant modifications as defined in Inspection Procedure 71111.18-05

b. Findings

No findings of significance were identified.

1R19 Postmaintenance Testing (71111.19)

a. Inspection Scope

The inspectors reviewed the following postmaintenance activities to verify that procedures and test activities were adequate to ensure system operability and functional capability:

- October 14, 2009, Division 2 sequential load test
- October 20, 2009, Postmaintenance testing for Work Order 4692506-0010
- October 21,2009, Diesel Generator 1 fan shaft replacement and balancing
- October 29, 2009, 250V B battery replacement
- November 2, 2009, American Society of Mechanical Engineers Class 1 System Leakage Test
- November 19, 2009, Governor Valve 3 repairs

The inspectors selected these activities based upon the structure, system, or component's ability to affect risk. The inspectors evaluated these activities for the following (as applicable):

- The effect of testing on the plant had been adequately addressed; testing was adequate for the maintenance performed
- Acceptance criteria were clear and demonstrated operational readiness; test instrumentation was appropriate

The inspectors evaluated the activities against the technical specifications, the Updated Final Safety Analysis Report, 10 CFR Part 50 requirements, licensee procedures, and various NRC generic communications to ensure that the test results adequately ensured that the equipment met the licensing basis and design requirements. In addition, the inspectors reviewed corrective action documents associated with postmaintenance tests to determine whether the licensee was identifying problems and entering them in the corrective action program and that the problems were being corrected commensurate with their importance to safety. Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of six postmaintenance testing inspection samples as defined in Inspection Procedure 71111.19-05.

b. Findings

No findings of significance were identified.

1R20 Refueling and Other Outage Activities (71111.20)

.1 Refueling Outage (RE-25)

a. Inspection Scope

The inspectors reviewed the outage safety plan and contingency plans for the RE-25 refueling outage, conducted September 26, 2009, to confirm that licensee personnel had appropriately considered risk, industry experience, and previous site-specific problems in developing and implementing a plan that assured maintenance of defense in depth. During the refueling outage, the inspectors observed portions of the shutdown and cooldown processes and monitored licensee controls over the outage activities listed below.

- Configuration management, including maintenance of defense in depth, is commensurate with the outage safety plan for key safety functions and compliance with the applicable technical specifications when taking equipment out of service.

- Clearance activities, including confirmation that tags were properly hung and equipment appropriately configured to safely support the work or testing.

- Installation and configuration of reactor coolant pressure, level, and temperature instruments to provide accurate indication, accounting for instrument error.

- Status and configuration of electrical systems to ensure that technical specifications and outage safety-plan requirements were met, and controls over switchyard activities.

- Monitoring of decay heat removal processes, systems, and components.

- Verification that outage work was not impacting the ability of the operators to operate the spent fuel pool cooling system.

- Reactor water inventory controls, including flow paths, configurations, and alternative means for inventory addition, and controls to prevent inventory loss.

- Controls over activities that could affect reactivity.

- Maintenance of secondary containment as required by the technical specifications.

- Refueling activities, including fuel handling and sipping to detect fuel assembly leakage.

- Startup and ascension to full power operation, tracking of startup prerequisites, walkdown of the drywell (primary containment) to verify that debris had not been left which could block emergency core cooling system suction strainers, and reactor physics testing.

- Licensee identification and resolution of problems related to refueling outage activities.

Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of one refueling outage and other outage inspection sample as defined in Inspection Procedure 71111.20-05.

b. Findings

1. Failure Identify Foreign Material in the Reactor Core

Introduction. The inspectors identified a Green noncited violation of 10 CFR 50 Appendix B, Criterion XVI, “Corrective Action,” for the licensee’s failure to identify a condition adverse to quality. Specifically, the licensee failed to identify a foreign material in the reactor core during the core verification process of Procedure 10.2, “Core Verification.” This foreign material was identified by inspectors during a review of the core verification video following vessel reassembly.

Description. Procedure 10.2, “Core Verification,” Revision 5, describes the core verification process, which is intended to identify any potential fuel loading errors following refueling (such as misoriented or misplaced fuel assemblies). Completion of this procedure results in video tape of the core configuration that is useful not only for verifying the core load, but understanding the as-left condition of the vessel internals.

On October 22, 2009, the licensee completed the core verification process using Procedure 10.2. Completion of this process involved a review of the video tape by at least two persons, each independently reviewing the video to look for discrepancies. The inspectors requested a copy of the video and reviewed it on October 28, 2009. During this review, the inspectors identified an indication of concern between fuel assemblies JLF 908 and JLF 883. This indication had the appearance of a loop of wire suspended in the control rod channel between the two assemblies.

The inspectors notified the licensee of the indication. The licensee validated that the indication was most likely foreign material, but without better information its size and composition could not be determined. At the time that the inspectors reviewed the video, the reactor vessel had already been reassembled. Instead of disassembling the reactor vessel, the licensee contacted the fuel vendor to discuss possible origins of the foreign material and the potential impact of the material on the fuel.

The inspectors challenged the licensee to determine if the foreign material could have been related to any loss of material on the refuel floor during the outage. The licensee reviewed the foreign material logs for the refuel floor but did not identify any lost parts that fit the description of the foreign material. The licensee documented the results of their foreign material analysis in Engineering Evaluation 09-062, "'Use as-is evaluation of Foreign Material in Core Location 10-07 Next to bundle JLF908." The licensee determined that the foreign material was not likely to interfere with the function of the control rod, but that "there is a potential to cause a debris fuel failure but this is not a significant safety concern. Operation with a fuel failure is not desirable but can be managed…" The inspectors considered that transport of the foreign material into a location adjacent to a fuel rod was likely, and that any resulting damage could reduce assurance that the fuel cladding would protect the public from radionuclide releases caused by accidents or events. The inspectors determined that this would have a detrimental effect on the cladding performance attribute of the barrier integrity cornerstone.

The inspectors noted that in the time between the recording of the video and the observation by inspectors, vessel assembly had been completed and reactor recirculation pumps had been operated, making location of this piece of foreign material relatively unlikely even if the reactor were to be disassembled for recovery. As a result of this performance deficiency, the licensee initiated Condition Report CR-CNS-2009-08890. Corrective actions from this evaluation include procedure changes to require a review of the core verification video by a qualified foreign material exclusion monitor and re-inspection of the affected core location in the next refueling outage in an attempt to identify and recover the foreign material.

<u>Analysis</u>. The licensee's failure to identify a condition adverse to quality during the core verification process was a performance deficiency. The finding is more than minor because it was associated with the cladding performance attribute of the barrier integrity cornerstone, and affected the cornerstone objective to provide reasonable assurance that physical design barriers (fuel cladding, reactor coolant system and containment) protect the public from radionuclide releases caused by accidents or events. Using the Manual Chapter 0609, Appendix A, Phase 1 screening worksheet, the inspectors determined that the finding has very low safety significance because it is associated with

a potential failure of the fuel barrier. This finding has a crosscutting aspect in the area of human performance associated with resources because the licensee's procedure for the core verification process is silent on potential identification of foreign material in the core [H.2(c)].

Enforcement. 10 CFR 50 Appendix B, Criterion XVI, "Corrective Action," requires, in part, that conditions adverse to quality be promptly identified and corrected. Contrary to this requirement, on October 22, 2009, licensee personnel completed the core verification process but did not identify a piece of foreign material that was obviously visible in the core. This foreign material was identified by NRC inspectors during a review of the core verification video following vessel reassembly. Because the finding is of very low safety significance and has been entered into the licensee's corrective action program as CR-CNS-2009-08890, this violation is being treated as an NCV consistent with Section VI.A of the Enforcement Policy: NCV 05000298/2009005-05, "Failure to Identify Foreign Material in the Reactor Core."

2. Maintenance Error Results in Recirculation Pump Trip

Introduction. The inspectors identified a Green finding for the licensee's failure to follow the requirements of Administrative Procedure 0.40, "Work Control Program," Revision 68, on October 29, 2009. Specifically, a maintenance technician violated the procedure by attempting corrective maintenance on the Reactor Recirculation Motor Generator A lubricating oil system without notifying the control room, resulting in a trip of the motor generator and the supported reactor recirculating pump.

Description. On the October 29, 2009, Cooper Nuclear Station was in the midst of Refueling Outage 25 with the plant in Mode 4. Reactor Recirculation Motor Generator A, a non-safety-related component, was running for the purpose of heating up the reactor for Surveillance Procedure 6.MISC.502, "ASME Class 1 System Leakage Test." At the time that the performance deficiency occurred, reactor temperature and pressure had been raised to approximately 240° F and 1015 psig, respectively.

At the beginning of shift on October 29, 2009, a maintenance technician was directed, via a vaguely worded email from his supervisor, to attempt to stop a small flange leak on the lubricating oil filter for one of the reactor recirculation motor generators. This activity was not on the work schedule, and the instructions given in the email did not identify which of the two motor generators needed the repair. The technician went to the field and identified that one of the lubricating oil filter plugs on Reactor Recirculation Motor Generator A was leaking slightly. He viewed this repair as a skill-of-the-craft activity and attempted to stop the leak. His intention was to back the plug out two turns, apply thread sealant, and then retighten the plug. Unbeknownst to the technician, the plug was not properly installed during a work activity on October 5, 2009. In this earlier work activity, conducted under Work Order 4644756, the maintenance technicians had only inserted the plug two full turns (as opposed to the four full turns necessary to fully seat the plug). When the technician attempted to back the plug out on October 29, the plug fell out of the filter and a significant lubricating oil leak ensued.

Plant operators became aware of the problem when the maintenance technician called the control room to report the leak at 9:59 p.m. Operators immediately tripped the recirculating pump and secured the motor generator. The licensee estimated that approximately 600 gallons of lubricating oil sprayed out of the open hole prior to the machine being secured. An inspection of the motor generator after the event did not identify any equipment damage.

The trip of the recirculation pump left the core pressurized, hot, and without any forced flow. Stratification of the reactor vessel occurred, complicating the restoration of shut down cooling, which was eventually placed in service at 5:00 a.m.. The inspectors verified that throughout the event, all safety-related mitigating systems remained available.

The licensee determined root cause was lack of alignment surrounding implementation and reinforcement of Maintenance Procedure 0.31.1, "Skill-of-the-Craft Configuration Control." This lack of alignment resulted in failure to utilize a requirement to ensure drain plug configuration control. The licensee determined that during the work activity on October 5, 2009, the controls of Procedure 0.31.1 should have been used, which would have required a second check of the work activity by another technician. It was the licensee stated that this second check would have identified the improperly inserted plug and prevented the event.

The inspectors reviewed the results of this root cause report, and determined that it did not identify the true root cause of the event. The failure to use the controls of Procedure 0.31.1 could be viewed as a contributing factor, but the cause of the major lubricating oil leak, however, was the decision to perform corrective maintenance on the running motor generator without notifying the control room. Because of the failure of the corrective action program to identify the true cause of this event, this issue is being considered NRC-identified for the purposes of the assessment program. The decision to perform corrective maintenance without notifying the control room was in direct violation of Administrative Procedure 0.40, "Work Control Program," Revision 68. Procedure 0.40 contains the following requirements:

> *"4.4.1.2 Spot Maintenance tasks are Skill-of-the-Craft activities where use of written work instructions are not required and which have a negligible risk of causing a plant transient….*
>
> *b. The Control Room shall be informed anytime a Spot Maintenance activity could cause an alarm in the Control Room, when working on energized equipment or operating systems, structures, or components (SSCs), both before work starts and after work is stopped, whether activity is completed or not."*

The technician reported that he was not able to tell whether or not the equipment (the running recirculation motor generator) was in operation prior to commencing his work activity. He did, however, know that the lubricating oil system on which he was working was operating and pressurized, but failed to notify the control room of his planned activity as required by Procedure 0.40. Additionally, he was not told which motor generator oil system had the oil leak, and he was preparing to work on an oil filter plug, not a discharge flange as directed in the email from his supervisor. Instead of contacting the control room for clarification, he went forward with his work. In doing so, the technician failed to use the licensee's procedurally-required error prevention tools. Administrative Procedure 0-HU-TOOLS, "Human Performance Tools," Revision 12, requires all personnel to utilize the STAR (Stop, Think, Act, Review) process to prevent errors in the field. Attachment 1 to Procedure 0-HU-TOOLS provides the licensee's specific expectations for each of the steps in this process. One of the questions the individual is to consider during the "stop" step of the process is "has all the energy been removed from the system/component?" In the "think" step, the procedure instructs personnel not to proceed in the face of uncertainty. The inspectors determined that had the required human performance tools been used, the technician likely would have realized either that the lubricating oil system was pressurized, or that he should contact the control room to get clarification for the work activity.

Analysis. The performance deficiency associated with this finding was the licensee's failure to follow the requirements of Administrative Procedure 0.40, "Work Control Program," on October 29, 2009. The finding is more than minor because it adversely affected the configuration control attribute of the initiating events cornerstone, and adversely affected the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Because the plant was shutdown at the time this performance deficiency occurred, the inspectors used Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process." Using Checklist 7 in Attachment 1, "Shutdown Operations Significance Determination Process Phase 1 Operational Checklists For Both PWRs and BWRs", the inspectors determined that the finding had very low safety significance because every item on the checklist was met. The finding has a crosscutting aspect in the area of human performance associated with work practices because the licensee's maintenance technician did not use the procedurally-required Stop-Think-Act-Review step which would have required him to ensure that all energy had been removed from the recirculation motor generator oil system prior to performing maintenance on the system [H.4 (a)].

Enforcement. Enforcement action does not apply because the performance deficiency did not involve a violation of a regulatory requirement. Because this finding does not involve a violation of regulatory requirements and has very low safety significance, it is identified as FIN 05000298/2009005-06, "Maintenance Error Results in Recirculation Pump Trip."

.2 Forced Outage 09-01

a. Inspection Scope

During a four-day forced outage beginning on November 6, 2009, the inspectors reviewed the licensee's outage work scope, the outage risk profile, and verified that key shutdown safety functions, such as power availability and decay heat removal, were not challenged by the outage work scope. The inspectors monitored significant activities including reactor shutdown and startup, forced cooldown, and control rod scram timing testing.

The inspectors completed one sample as defined in Inspection Procedure 71111.20-05. Documents reviewed by inspectors included:

- General Operating Procedure 2.1.1, "Startup Procedure," Revision 155
- General Operating Procedure 2.1.1.1, "Plant Startup Review and Authorization," Revision 21
- General Operating Procedure 2.1.1.2, "Technical Specification Pre-Startup Checks," Revision 34

b. Findings

Introduction. A Green self-revealing noncited violation of Technical Specification 5.4.1.a was identified regarding the licensee's failure to follow the requirements of System Operating Procedure 2.2.18, "4160V Auxiliary Power Distribution System." Specifically, operators preparing the 4160 F bus for a maintenance outage by secured the wrong fuel pool cooling pump. When the bus was subsequently de-energized, a loss of fuel pool cooling occurred.

Description. At the time this performance deficiency occurred, the plant was in Mode 5, cold shutdown, with vessel level flooded up to the refueling floor. Residual Heat Removal Train B was providing shutdown cooling, and time-to-boil was 22 hours. Preparations were in progress for a planned outage of the 4160 F bus. These preparations were being conducted in accordance with System Operating Procedure 2.2.18, "4160V Auxiliary Power Distribution System." These preparations included unloading subordinate motor control centers, transferring power supplies for essential equipment and altering system lineups to ensure safety-related and risk-significant systems continued to perform their functions during the planned bus outage.

Attachment 8 to Procedure 2.2.18 provides instructions for unloading and de-energizing Motor Control Center K, which normally receives its power from bus 4160 F. One of the supported loads on Motor Control Center K is Fuel Pool Cooling Pump A. The fuel pool cooling system at Cooper Nuclear Station contains two divisionally powered pumps. The system is not safety-related, but it is risk significant. As such, Procedure 2.2.18 requires the plant operators to align the system such that the fuel pool cooling function will be maintained. Step 1.8 of Attachment 8 to Procedure 2.2.18 requires the following: "Ensure Fuel Pool Cooling Pump A secured per Procedure 2.2.32." Contrary to this step, at 8:50 p.m. on October 6, 2009, the operator secured Fuel Pool Cooling Pump B and marked the step as complete.

At 1:28 a.m. on October 7, 2009, Motor Control Center K was de-energized in preparation for the 4160 F bus outage. Upon de-energization of the motor control center, operators received the fuel pool cooling trouble alarm in the control room, indicating that a loss of fuel pool cooling had occurred. The operators quickly discovered that the wrong fuel pool cooling pump had been secured in Procedure 2.2.18, and restored Fuel Pool Cooling Pump B to service at 1:44 a.m., ending the event. The inspectors determined that this performance deficiency adversely affected the configuration control attribute of the barrier integrity cornerstone, in that it resulted in a total loss of fuel pool cooling requiring operator action to recover.

The licensee reviewed the plant configuration and determined that Fuel Pool Cooling Pump B was available for the entire event. In addition, licensee determined that Residual Heat Removal Train B was available for fuel pool cooling assist as well. Based upon the availability of these two cooling systems, risk remained Green throughout the event. The inspectors verified that all mitigating systems listed in Manual Chapter 0609, Appendix G, Checklist 7 remained available throughout the event.

The licensee completed a human performance error review board, which revealed that the plant operator who secured the wrong fuel pool cooling pump had failed to use the licensee's error prevention tools, namely the two-minute drill. The second question of the two-minute drill, as defined in Administrative Procedure 0-HU-TOOLS, "Human Performance Tools," Revision 12, is "are we on the correct train/component?" The operator acknowledged that he had been in a hurry due to self-imposed time pressure, did not use the two-minute drill, and had simply grabbed the wrong switch (the operating switches to the A and B fuel pool cooling pumps are adjacent to one another). The inspectors determined that the failure to utilize this basic error prevention tool was the cause of the event. This event was documented in CR-CNS-2009-07770. Corrective actions taken included restoring the pump to service and counseling the operator who made the error.

<u>Analysis</u>. The performance deficiency associated with this finding involved the licensee's failure to follow the requirements of System Operating Procedure 2.2.18, "4160V Auxiliary Power Distribution System." The finding is more than minor because it is associated with barrier integrity cornerstone attribute of configuration control, and adversely affected the cornerstone objective of maintaining functionality of the spent fuel pool cooling system to provide reasonable assurance that the fuel cladding physical design barrier protects the public from radionuclide releases caused by accidents or events. Because the plant was shutdown at the time this performance deficiency occurred, the inspectors used Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process." Using Checklist 7 in Attachment 1, "Shutdown Operations Significance Determination Process Phase 1 Operational Checklists For Both PWRs and BWRs", the inspectors determined that the finding had very low safety significance because every item on the checklist was met. The finding has a crosscutting aspect in the area of human performance associated with work practices because the licensee failed to effectively use required self-checking error prevention tools [H.4(a)].

<u>Enforcement</u>. Technical Specification 5.4.1.a requires that licensees establish, implement and maintain the applicable procedures recommended in Regulatory

Guide 1.33, Revision 2, Appendix A, February 1978. Paragraph 4.w of Appendix A requires that such procedures include operating procedures for the onsite electrical power system. To prepare the 4160 F bus for a maintenance outage, System Operating Procedure 2.2.18, "4160V Auxiliary Power Distribution System," Revision 125, requires operators to secure spent fuel cooling pump A. Contrary to this requirement, on October 6, 2009, the licensee did not properly implement System Operating Procedure 2.2.18, in that to prepare the 4160 F bus for a maintenance outage, the operator did not secure Fuel Pool Cooling Pump A, but instead secured Fuel Pool Cooling Pump B. When the bus was subsequently de-energized on October 7, 2009, a loss of fuel pool cooling occurred. Because the finding is of very low safety significance and has been entered into the licensee's corrective action program as CR-CNS-2009-07770, this violation is being treated as an NCV consistent with Section VI.A of the Enforcement Policy: NCV 05000298/2009005-07, "Procedure Violation Results in Loss of Fuel Pool Cooling."

.3 Forced Outage 09-02

a. Inspection Scope

During a five-day forced outage beginning on November 9, 2009, the inspectors reviewed the licensee's outage work scope, the outage risk profile, and verified that key shutdown safety functions, such as power availability and decay heat removal, were not challenged by the outage work scope. The inspectors monitored significant activities including reactor shutdown, forced cooldown and startup.

The inspectors completed one sample as defined in Inspection Procedure 71111.20-05. Documents reviewed by inspectors included:

- General Operating Procedure 2.1.1, "Startup Procedure," Revision 156
- General Operating Procedure 2.1.1.1, "Plant Startup Review and Authorization," Revision 21
- General Operating Procedure 2.1.1.2, "Technical Specification Pre-Startup Checks," Revision 34

b. Findings

The enforcement aspects associated with the cause of this forced outage are addressed in Section 4OA3.4 of this report. No other findings of significance were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors reviewed the Updated Final Safety Analysis Report, procedure requirements, and technical specifications to ensure that the surveillance activities listed below demonstrated that the systems, structures, and/or components tested were capable of performing their intended safety functions. The inspectors either witnessed or reviewed test data to verify that the significant surveillance test attributes were adequate to address the following:

- Preconditioning
- Evaluation of testing impact on the plant
- Acceptance criteria
- Test equipment
- Procedures
- Jumper/lifted lead controls
- Test data
- Testing frequency and method demonstrated technical specification operability
- Test equipment removal
- Restoration of plant systems
- Fulfillment of ASME Code requirements
- Updating of performance indicator data
- Engineering evaluations, root causes, and bases for returning tested systems, structures, and components not meeting the test acceptance criteria were correct
- Reference setting data
- Annunciators and alarms setpoints

The inspectors also verified that licensee personnel identified and implemented any needed corrective actions associated with the surveillance testing.

- October 18, 2009, High pressure coolant injection and reactor core isolation coolant testing
- October 19, 2009, SW-MOV-MO89A testing
- October 19, 2009, Division 1 sequential load test
- October 19, 2009, Diesel Generator 1 service water flow testing

- October 20, 2009, Control rod testing

Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of five surveillance testing inspection samples as defined in Inspection Procedure 71111.22-05.

b. Findings

No findings of significance were identified.

Cornerstone: Emergency Preparedness

1EP4 Emergency Action Level and Emergency Plan Changes (71114.04)

a. Inspection Scope

The inspector performed an in-office review of Revision 40 to Emergency Plan Implementing Procedure 5.7.1, "Emergency Classifications," submitted September 2, 2009. This revision consisted of minor editorial and format changes.

This revision was compared to its previous revision, to the criteria of NUREG-0654, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," Revision 1, to Nuclear Energy Institute Report 99-01, "Emergency Action Level Methodology," Revision 5, and to the standards in 10 CFR 50.47(b) to determine if the revision adequately implemented the requirements of 10 CFR 50.54(q). This review was not documented in a safety evaluation report and did not constitute approval of licensee-generated changes; therefore, this revision is subject to future inspection.

These activities constitute completion of one sample as defined in Inspection Procedure 71114.04-05.

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

Cornerstone: Occupational and Public Radiation Safety

2OS1 Access Control to Radiologically Significant Areas (71121.01)

a. Inspection Scope

This area was inspected to assess licensee personnel's performance in implementing physical and administrative controls for airborne radioactivity areas, radiation areas, high radiation areas, and worker adherence to these controls. The inspectors used the requirements in 10 CFR Part 20, the technical specifications, and the licensee's procedures required by technical specifications as criteria for determining compliance. During the inspection, the inspectors interviewed the radiation protection manager, radiation protection supervisors, and radiation workers. The inspectors performed independent radiation dose rate measurements and reviewed the following items:

- Performance indicator events and associated documentation packages reported by the licensee in the Occupational Radiation Safety Cornerstone

- Controls (surveys, posting, and barricades) of radiation, high radiation, or airborne radioactivity areas

- Radiation work permits, procedures, engineering controls, and air sampler locations

- Conformity of electronic personal dosimeter alarm set points with survey indications and plant policy; workers' knowledge of required actions when their electronic personnel dosimeter noticeably malfunctions or alarms

- Barrier integrity and performance of engineering controls in airborne radioactivity areas

- Adequacy of the licensee's internal dose assessment for any actual internal exposure greater than 50 millirem committed effective dose equivalent

- Physical and programmatic controls for highly activated or contaminated materials (non-fuel) stored within spent fuel and other storage pools

- Self-assessments, audits, licensee event reports, and special reports related to the access control program since the last inspection

- Corrective action documents related to access controls

- Licensee actions in cases of repetitive deficiencies or significant individual deficiencies

- Radiation work permit briefings and worker instructions

- Adequacy of radiological controls, such as required surveys, radiation protection job coverage, and contamination control during job performance

- Dosimetry placement in high radiation work areas with significant dose rate gradients

- Changes in licensee procedural controls of high dose rate - high radiation areas and very high radiation areas

- Controls for special areas that have the potential to become very high radiation areas during certain plant operations

- Posting and locking of entrances to all accessible high dose rate - high radiation areas and very high radiation areas

- Radiation worker and radiation protection technician performance with respect to radiation protection work requirements

Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of 21 of the required 21 samples as defined in Inspection Procedure 71121.01-05.

b. Findings

Introduction. The inspectors identified a Green noncited violation of Technical Specifications 5.4.1 for a failure to establish a procedure with adequate provisions to control work inside a locked high radiation area. Specifically, although the licensee's procedure required constant communications with workers in a locked high radiation area, the procedure had no provisions for providing a reasonable assurance that constant communications was being maintained during the duration the workers were inside the area.

Description. On October 6, 2009, at approximately 7:15 a.m., workers entered the 921 elevation of the drywell to remove insulation. The drywell was posted as a locked high radiation area which required continuous job coverage. General area dose rates on the 921 elevation of the drywell were as high as 1300 mrem per hour. General area dose rates in the immediate work area were as high as 250 mrem per hour. As required by Procedure 9.EN-RP-141, Revision 4, "Job Coverage," radiation protection personnel were providing continuous job coverage to the work crew through the use of teledosimetry to track radiation exposure and exposure rate, and the use of cellular phones for constant communication. At approximately 8:05 a.m. the radiation protection technician assigned to perform remote job coverage and monitor the teledosimetry system took the conservative step of attempting to notify the work crew that they were at approximately 70 percent of their allowed accumulated dose of 200 mrem for the entry (the work crew would have to exit the area when their dose was approximately 80 percent of their allowed accumulated dose). Attempts to contact the work crew by cellular phone failed and, in accordance with Procedure 9.EN-RP-141, Revision 4, a radiation protection technician was dispatched to the work area to direct the crew to exit the drywell. The work crew exited the drywell at 8:10 a.m. Investigation revealed that the cell phone had been bumped hard enough to crack the display window, and that the phone was turned off. When the cell phone was turned on, it was able to receive calls. The licensee could not determine when the phone was bumped and de-energized;

however the phone had been working when it was provided to the work crew at the beginning of the job. The maximum amount of time the work crew could have been inside the drywell without the required communication device was 55 minutes. In response to this, the licensee locked the keyboards on the cell phones to prevent them from inadvertently being turned off. The inspectors identified that the licensee's procedure had no provision providing a reasonable assurance that constant communication was being maintained with the work crew while they were inside the locked high radiation area.

Analysis. The inspectors determined that the failure of licensee procedures to contain adequate provisions to assure that work inside a locked high radiation area would be controlled through constant communications is a performance deficiency. The finding was more than minor because, if left uncorrected, the performance deficiency has the potential to lead to a more significant safety concern. Because the NRC identified the procedure deficiency, this finding is considered NRC-identified. Using the Occupational Radiation Safety Significance Determination Process the inspectors determined this finding had very low safety significance because the finding did not involve ALARA planning and work controls, did not result in an overexposure, did not involve a substantial potential for overexposure, and did not compromise the licensee's ability to assess dose. Additionally, the finding had a crosscutting aspect in the area of human performance, resources component, because the licensee failed to ensure that equipment used to control work inside a posted locked high radiation area was adequate for environment and working conditions [H.2(d)].

Enforcement. Technical Specifications 5.4.1 states in part, that written procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978. Regulatory Guide 1.33, Section 7e requires radiation protection procedures for access control to radiation areas including a radiation work permit system. Section 5.1 of licensee procedure 9.EN-RP-141, "Job Coverage," Revision 4, states, in part, continuous job coverage is required when individuals are entering an area posted as a locked high radiation area. Section 6.1 of procedure 9.EN-RP-141, also states, in part, that continuous job coverage by remote technology can only be used in situations where audio communications and teledosimetry are available. Attachment 2 to that procedure defines "Continuous RP Coverage" and requires remote coverage as maintaining audible and telemetry, with visual contact if applicable. Contrary to the above, as of October 6, 2009, although the licensee's procedure required continuous job coverage inside a locked high radiation area, which also required maintaining audible communication, the licensee failed to establish and maintain the procedure in that the procedure had no provision providing reasonable assurance that constant communication was being maintained while workers were inside a locked high radiation area. Because the finding is of very low safety significance and has been entered into the licensee's corrective action program as Condition Report CR-CNS-2009-07718, this violation is being treated as a noncited violation consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 05000298/2009005-08, "Failure to Establish an Adequate Procedure to Ensure Constant Communications in a Locked High Radiation Area."

2OS2 ALARA Planning and Controls (71121.02)

a. Inspection Scope

The inspectors assessed licensee personnel's performance with respect to maintaining individual and collective radiation exposures as low as is reasonably achievable. The inspectors used the requirements in 10 CFR Part 20 and the licensee's procedures required by technical specifications as criteria for determining compliance. The inspectors interviewed licensee personnel and reviewed the following:

- Current 3-year rolling average collective exposure
- Five outage or on-line maintenance work activities scheduled during the inspection period and associated work activity exposure estimates which were likely to result in the highest personnel collective exposures
- Site-specific trends in collective exposures, plant historical data, and source-term measurements
- Site-specific ALARA procedures
- Three work activities of highest exposure significance completed during the last outage
- ALARA work activity evaluations, exposure estimates, and exposure mitigation requirements
- Integration of ALARA requirements into work procedure and radiation work permit (or radiation exposure permit) documents
- Person-hour estimates provided by maintenance planning and other groups to the radiation protection group with the actual work activity time requirements
- Dose rate reduction activities in work planning
- Assumptions and basis for the current annual collective exposure estimate, the methodology for estimating work activity exposures, the intended dose outcome, and the accuracy of dose rate and man-hour estimates
- Method for adjusting exposure estimates, or re-planning work, when unexpected changes in scope or emergent work were encountered
- Exposure tracking system
- Use of engineering controls to achieve dose reductions and dose reduction benefits afforded by shielding

- Workers' use of the low dose waiting areas

- First-line job supervisors' contribution to ensuring work activities are conducted in a dose efficient manner

- Records detailing the historical trends and current status of tracked plant source terms and contingency plans for expected changes in the source term due to changes in plant fuel performance issues or changes in plant primary chemistry

- Source-term control strategy or justifications for not pursuing such exposure reduction initiatives

- Specific sources identified by the licensee for exposure reduction actions, priorities established for these actions, and results achieved since the last refueling cycle

- Radiation worker and radiation protection technician performance during work activities in radiation areas, airborne radioactivity areas, or high radiation areas

- Declared pregnant workers during the current assessment period, monitoring controls, and the exposure results

- Self-assessments, audits, and special reports related to the ALARA program since the last inspection

- Resolution through the corrective action process of problems identified through postjob reviews and post-outage ALARA report critiques

- Corrective action documents related to the ALARA program and follow-up activities, such as initial problem identification, characterization, and tracking

- Effectiveness of self-assessment activities with respect to identifying and addressing repetitive deficiencies or significant individual deficiencies

Specific documents reviewed during this inspection are listed in the attachment.

These activities constitute completion of 14 of the required 15 samples and 10 of the optional samples as defined in Inspection Procedure 71121.02-05.

b. Findings

Introduction. The inspectors reviewed a Green, self-revealing, noncited violation of Technical Specifications 5.4.1 involving two examples of a failure to follow radiation work permit requirements. In the first example, workers were not monitored with telemetry and constant coverage by a radiation protection technician was not provided as required by the radiation work permit. In the second example, a worker was not monitored with telemetry as required by the special work permit.

Description. On October 12, 2009, a grit blasting evolution began on the high pressure rotor on the 932 foot elevation of the turbine building within a tented enclosure. Hearing protection was required on the 932 foot elevation of the turbine building due to high noise. Also, due to the potential for airborne radioactivity levels exceeding 10 times the derived air concentration, the work was controlled using Radiation Work Permit 2009-456 which required continuous coverage of the evolution by radiation protection personnel. General area radiation levels near the rotor were approximately 5 mrem/hour. Individuals working in the enclosure were provided electronic dosimeters with the integrated dose alarm set at 10 mrem. Typically, work time had been limited to approximately two hours due to the general area dose rates and the electronic dosimeter alarm setpoint.

On October 14, 2009, individuals entered the enclosure at 12:50 p.m. to continue the grit blasting operation. Difficulties were encountered during the work which required the individuals to remain in the enclosure longer than anticipated. At approximately 4:15 p.m., as one individual exited the work area their electronic dosimeter was noted to be in a dose alarm status. The second individual was directed to leave the blasting enclosure in order to verify their accumulated dose. As the second individual was exiting the area their electronic dosimeter also went into a dose alarm condition. Hearing protection used inside the enclosure prevented the first individual from hearing the dosimeter alarm. During a review of the dosimeter alarms, the licensee determined that the workers had not used telemetry as required and that continuous coverage had not been provided as required by procedures and the radiation work permit.

In a separate incident, a contract employee working on the refuel bridge received a dose alarm on his direct reading dosimeter on October 22, 2009. Although the worker received a dose of 50.3 mrem as opposed to his administrative limit of 50 mrem, there were multiple failures of radiation protection barriers and measures designed to ensure worker safety. These failures included: (1) the individual failed to wear telemetry as required by the special work permit so radiation protection technicians could monitor his dose; (2) according to the worker, the requirement for telemetry was not discussed by the radiation protection technician performing the pre-job briefing; and (3) although the individual stated that he had checked his alarming dosimeter about 30 minutes prior to receiving the alarm, he failed to recognize that he could not finish his task without receiving a dose alarm. As a result, the licensee conducted a stand-down to reinforce expectations for compliance with radiation work permits, instituted management challenges at the access control point, and began conducting an apparent cause evaluation.

Analysis. The inspectors determined that the failure to meet radiation and special work permit requirements was a performance deficiency. The finding is more than minor because it involved multiple failures of radiation protection measures which, if left uncorrected, could become a more significant safety concern. Using the Occupational Radiation Safety Significance Determination Process, the inspectors determined this finding had very low safety significance because the finding involved an ALARA planning and work controls and the licensee’s average collective dose is less than 240 person rem per unit. Because the failure to meet radiation and special work permit requirements was identified after an individual’s electronic dosimeter went into alarm, the finding is self-revealing. Additionally, the finding had a crosscutting aspect in the area of human performance, work practices component, because of the lack of self and peer checking to ensure work activities were performed safely [H.4.a].

Enforcement. Technical Specifications 5.4.1, states in part, that written procedures shall be established, implemented, and maintained covering the applicable procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978. Regulatory Guide 1.33, Section 7e requires radiation protection procedures for access control to radiation areas including a radiation work permit system. Section 7.3 of Procedure 9-ALARA.4, Revision 11, "Radiation Work Permits," states, "It is each individual's responsibility to comply with the RWP requirements." Radiation Work Permit 2009-456 required continuous job coverage in airborne work areas greater than 10 derived air concentrations and required workers use telemetry. Special Work Permit 2009-436 required the use of telemetry if available. Contrary to the above, on October 14 and 22, 2009, the licensee failed to meet radiation work permit requirements in two instances. Specifically, on October 14, 2009, the licensee failed to meet Radiation Work Permit 2009-456 by not providing continuous job coverage in airborne work areas greater than 10 derived air concentrations, and the worker failed to use telemetry. On October 22, 2009, a worker failed to meet Special Work Permit 2009-436 by not wearing telemetry when it was available. Because the finding is of very low safety significance and has been entered into the licensee's corrective action program as Condition Reports CR-CNS-2009-08197 and CR-CNS-2009-08623, this violation is being treated as a noncited violation consistent with Section VI.A.1 of the NRC Enforcement Policy: NCV 05000298/2009005-09, "Failure to Follow Radiation Work Permit Requirements in Two Instances."

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151)

.1 Mitigating Systems Performance Index - Emergency AC Power System (MS06)

a. Inspection Scope

The inspectors sampled licensee submittals for the mitigating systems performance index - emergency AC power system performance indicator for the period from the fourth quarter 2008 through the third quarter 2009. To determine the accuracy of the performance indicator data reported during those periods, the inspectors used definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 5. The inspectors reviewed the licensee's operator narrative logs, mitigating systems performance index derivation reports, issue reports, event reports, and NRC integrated inspection reports for the period of October 1, 2008 through September 30, 2009, to validate the accuracy of the submittals. The inspectors reviewed the mitigating systems performance index component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator and none were identified. Specific documents reviewed are described in the attachment to this report.

These activities constitute completion of one mitigating systems performance index emergency ac power system sample as defined in Inspection Procedure 71151-05.

b. Findings

No findings of significance were identified.

.2 Mitigating Systems Performance Index - High Pressure Injection Systems (MS07)

a. Inspection Scope

The inspectors sampled licensee submittals for the mitigating systems performance index - high pressure injection systems performance indicator for the period from the fourth quarter 2008 through the third quarter 2009. To determine the accuracy of the performance indicator data reported during those periods, the inspectors used definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 5. The inspectors reviewed the licensee's operator narrative logs, issue reports, mitigating systems performance index derivation reports, event reports, and NRC integrated inspection reports for the period of October 1, 2008 through September 30, 2009, to validate the accuracy of the submittals. The inspectors reviewed the mitigating systems performance index component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator and none were identified. Specific documents reviewed are described in the attachment to this report.

These activities constitute completion of one mitigating systems performance index high pressure injection system sample as defined in Inspection Procedure 71151-05.

b. Findings

No findings of significance were identified.

.3 Mitigating Systems Performance Index - Heat Removal System (MS08)

a. Inspection Scope

The inspectors sampled licensee submittals for the mitigating systems performance index - heat removal system performance indicator for the period from the fourth quarter 2008 through the third quarter 2009. To determine the accuracy of the performance indicator data reported during those periods, the inspectors used definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 5. The inspectors reviewed the licensee's operator narrative logs, issue reports, event reports, mitigating systems performance index derivation reports, and NRC integrated inspection reports for the period of October 1 2008 through September 30, 2009, to validate the accuracy of the submittals. The inspectors reviewed the mitigating systems performance index component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator and none were identified. Specific documents reviewed are described in the attachment to this report.

These activities constitute completion of one mitigating systems performance index heat removal system sample as defined in Inspection Procedure 71151-05.

b. Findings

No findings of significance were identified.

.4 Mitigating Systems Performance Index - Residual Heat Removal System (MS09)

a. Inspection Scope

The inspectors sampled licensee submittals for the mitigating systems performance index - residual heat removal system performance indicator for the period from the fourth quarter 2008 through the third quarter 2009. To determine the accuracy of the performance indicator data reported during those periods, the inspectors used definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 5. The inspectors reviewed the licensee's operator narrative logs, issue reports, mitigating systems performance index derivation reports, event reports, and NRC integrated inspection reports for the period of October 1, 2008 through September 30, 2009, to validate the accuracy of the submittals. The inspectors reviewed the mitigating systems performance index component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator and none were identified. Specific documents reviewed are described in the attachment to this report.

These activities constitute completion of one mitigating systems performance index residual heat removal system sample as defined in Inspection Procedure 71151-05.

b. Findings

No findings of significance were identified.

.5 Mitigating Systems Performance Index - Cooling Water Systems (MS10)

a. Inspection Scope

The inspectors sampled licensee submittals for the mitigating systems performance index - cooling water systems performance indicator for the period from the fourth quarter 2008 through the third quarter 2009. To determine the accuracy of the performance indicator data reported during those periods, the inspectors used definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 5. The inspectors reviewed the licensee's operator narrative logs, issue reports, mitigating systems performance index derivation reports, event reports, and NRC integrated inspection reports for the period of October 1, 2008 through September 30, 2009, to validate the accuracy of the submittals. The inspectors reviewed the mitigating systems performance index component risk coefficient to determine if it had changed by more than 25 percent in value since the previous inspection, and if so, that the change was in accordance with applicable NEI guidance. The inspectors also reviewed the licensee's issue report database to determine if any problems had been identified with the performance indicator data collected or transmitted for this indicator and none were identified. Specific documents reviewed are described in the attachment to this report.

These activities constitute completion of one mitigating systems performance index cooling water system sample as defined in Inspection Procedure 71151-05.

b. Findings

No findings of significance were identified.

.6 Occupational Exposure Control Effectiveness (OR01)

a. Inspection Scope

The inspectors sampled licensee submittals for the Occupational Radiological Occurrences performance indicator for the period from the third quarter 2008 through the third quarter 2009. To determine the accuracy of the performance indicator data reported during those periods, performance indicator definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 5, was used. The inspectors reviewed the licensee's assessment of the performance indicator for occupational radiation safety to determine if indicator related data was adequately assessed and reported. To assess the adequacy of the licensee's performance indicator data collection and analyses, the inspectors discussed with radiation protection staff, the scope and breadth of its data review, and the results of those reviews. The inspectors independently reviewed electronic dosimetry dose rate and accumulated dose alarm and dose reports and the dose assignments for any intakes that occurred during the time period reviewed to determine if there were potentially unrecognized occurrences. The inspectors also conducted walkdowns of numerous locked high and very high radiation area entrances to determine the adequacy of the controls in place for these areas.

These activities constitute completion of the occupational radiological occurrences sample as defined in Inspection Procedure 71151-05.

b. Findings

No findings of significance were identified.

.7 Radiological Effluent Technical Specifications/Offsite Dose Calculation Manual Radiological Effluent Occurrences (PR01)

a. Inspection Scope

The inspectors sampled licensee submittals for the Radiological Effluent Technical Specifications/Offsite Dose Calculation Manual Radiological Effluent Occurrences performance indicator for the period from the third quarter 2008 through the third quarter 2009. To determine the accuracy of the performance indicator data reported during those periods, performance indicator definitions and guidance contained in NEI Document 99-02, "Regulatory Assessment Performance Indicator Guideline," Revision 5, was used. The inspectors reviewed the licensee's issue report database and selected individual reports generated since this indicator was last reviewed to identify any potential occurrences such as unmonitored, uncontrolled, or improperly calculated effluent releases that may have impacted offsite dose. The inspectors reviewed gaseous effluent summary data and the results of associated offsite dose calculations for selected dates between third quarter 2008 through the third quarter 2009, to determine if indicator results were accurately reported. The inspectors also reviewed the licensee's methods for quantifying gaseous and liquid effluents and determining effluent dose. Additionally, the inspectors reviewed the licensee's historical 10 CFR 50.75(g) file and selectively reviewed the licensee's analysis for discharge pathways resulting from a spill, leak, or unexpected liquid discharge focusing on those incidents which occurred over the last few years.

These activities constitute completion of the radiological effluent technical specifications/offsite dose calculation manual radiological effluent occurrences sample as defined in Inspection Procedure 71151-05.

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems (71152)

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity, Emergency Preparedness, Public Radiation Safety, Occupational Radiation Safety, and Physical Protection

.1 Routine Review of Identification and Resolution of Problems

a. Inspection Scope

As part of the various baseline inspection procedures discussed in previous sections of this report, the inspectors routinely reviewed issues during baseline inspection activities and plant status reviews to verify that they were being entered into the licensee's corrective action program at an appropriate threshold, that adequate attention was being given to timely corrective actions, and that adverse trends were identified and addressed. The inspectors reviewed attributes that included the complete and accurate identification of the problem; the timely correction, commensurate with the safety significance; the evaluation and disposition of performance issues, generic implications, common causes, contributing factors, root causes, extent of condition reviews, and previous occurrences reviews; and the classification, prioritization, focus, and timeliness of corrective actions. Minor issues entered into the licensee's corrective action program because of the inspectors' observations are included in the attached list of documents reviewed.

These routine reviews for the identification and resolution of problems did not constitute any additional inspection samples. Instead, by procedure, they were considered an integral part of the inspections performed during the quarter and documented in Section 1 of this report.

b. Findings

Introduction. A self-revealing Green noncited violation of 10 CFR 50 Appendix B, Criterion XVI, "Corrective Action," occurred for the licensee's failure to assure that a condition adverse to quality was corrected. Specifically, the licensee identified oil leakage on Diesel Generator 2 mechanical overspeed governor drive flange as a condition adverse to quality on June 23, 2009, and failed to correct the condition of oil leakage as demonstrated by a September 9, 2009, failure of the Diesel Generator 2 due to loose fasteners at this location.

Description. On June 23, 2009, the licensee identified oil leakage from Diesel Generator 2 mechanical overspeed governor drive assembly flange to the engine rear cam drive chain cover and documented this with Condition Report CR-CNS-2009-04801. The condition report was closed to the work management process where it was walked down by engineering and the associated Work Management Notification 10673566 was closed to, "Trend," on July 16, 2009.

Less than two months later during the monthly operability surveillance of Diesel Generator 2 on September 8, 2009, the overspeed governor trip mechanism and related structural flanges were observed to be vibrating significantly. The diesel was declared inoperable and the required technical specification was entered. Dismantling the overspeed governor drive unit assembly flange from the diesel engine rear cam chain cover found all eight flange nuts loose and accumulated oil below the area. The root cause investigation found that the overspeed governor drive flange nuts had been loosening over time with several precursors indications of these nuts loosening and other diesel generator fasteners loosening noted in addition to the June 23, 2009 overspeed governor drive flange oil leakage precursor. These included:

Overspeed governor oil seepage had been noted in 2006, with the oil seepage possibly indicative of increasing vibrations from the loosening flange nuts.

Governor overspeed trip cable had been damaged due to vibration induced fretting noted in 2008. These cables are driven from the overspeed governor servo and were indicative of increasing vibrations.

An oil sight glass had fallen off the overspeed governor due to fatigue fracture in 2008 possibly due to increasing vibrations from the loosening flange nuts.

Missing bolts from both diesel generator turbocharger saddle plates had been discovered in 2009 indicating engine vibrations can cause fastener relaxation of other joints.

Bolts recently installed on both diesel generator lubricating oil pumps had been found with lowered torque values in 2009 again indicating fastener relaxation issues on both diesel generators.

Additionally, it was found that the drive gear portion of the overspeed governor had never been removed nor the gasket replaced since it was originally installed by the equipment manufacturer around 1972.

The reactor safety mitigation system cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events was affected by the degraded Diesel Generator 2 equipment performance when its operability was affected by the loosening fasteners of the overspeed governor drive flange.

The root cause investigation into the September 9, 2009, diesel generator failure determined that the licensee had not established a maintenance practice to address relaxation for fasteners on the diesel generator systems. It went further to state that, “Organizationally, patterns of emergent failures are minimized or not being effectively used to “connect the dots” to resolve on-going EDG [emergency diesel generator] reliability issues. The corrective actions will include a diesel generator system bolt torque program to ensure all gasketed joint fasteners are maintained tight and establish a diesel generator reliability management council to provide oversight of diesel generator improvement issues.

Analysis. The licensee's failure to correct an identified condition adverse to quality is a performance deficiency. The finding is more than minor because it is associated with the equipment performance attribute of the mitigating systems cornerstone, and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events. Using the screening worksheet in Manual Chapter 0609, Attachment 4, "Phase 1 – Initial Screening and Characterization of Findings", the inspectors determined that the finding has very low safety significance because it was not a design or qualification deficiency and did not result in the loss of any system safety function. This finding has a crosscutting aspect in the corrective action program component of the Problem Identification and Resolution area because the licensee's periodic trends and assessments did not identify programmatic and common cause problems, in that the licensee's periodic trends and assessments did not recognize the significance of precursor events related to fasteners loosening and prompt action to prevent further problems on the emergency diesel generators [P.1 (b)].

Enforcement. 10 CFR 50 Appendix B, Criterion XVI, "Corrective Action," requires, in part, that measures shall be established to assure that conditions adverse to quality are promptly identified and corrected. Contrary to this requirement, from June 23, 2009, until September 8, 2009, licensee personnel identified but did not correct a condition adverse to quality, in that the licensee identified oil leakage from a flange on the Diesel Generator 2 overspeed governor drive on June 23, 2009, but did not correct that leakage before loose fastenters caused Diesel Generator 2 to become inoperable on September 8. Because the finding is of very low safety significance and has been entered into the licensee's corrective action program as CR-CNS-2009-06716, this violation is being treated as an NCV consistent with Section VI.A of the Enforcement Policy: NCV 05000298/2009005-10, "Failure to Correct Diesel Generator 2 Oil Leakage "

.2 Daily Corrective Action Program Reviews

a. Inspection Scope

In order to assist with the identification of repetitive equipment failures and specific human performance issues for follow-up, the inspectors performed a daily screening of items entered into the licensee's corrective action program. The inspectors accomplished this through review of the station's daily corrective action documents.

The inspectors performed these daily reviews as part of their daily plant status monitoring activities and, as such, did not constitute any separate inspection samples.

b. Findings

No findings of significance were identified.

.3 Semi-Annual Trend Review

a. Inspection Scope

The inspectors performed a review of the licensee's corrective action program and associated documents to identify trends that could indicate the existence of a more significant safety issue. The inspectors focused their review on repetitive equipment issues, but also considered the results of daily corrective action item screening discussed in Section 4OA2.2, above, licensee trending efforts, and licensee human performance results. The inspectors nominally considered the 6-month period of July 2009 through December 2009 although some examples expanded beyond those dates where the scope of the trend warranted.

The inspectors also included issues documented outside the normal corrective action program in major equipment problem lists, repetitive and/or rework maintenance lists, departmental problem/challenges lists, system health reports, quality assurance audit/surveillance reports, self-assessment reports, and Maintenance Rule assessments. The inspectors compared and contrasted their results with the results contained in the licensee's corrective action program trending reports. Corrective actions associated with a sample of the issues identified in the licensee's trending reports were reviewed for adequacy.

These activities constitute completion of one semi-annual trend inspection sample as defined in Inspection Procedure 71152-05.

b. Findings and Observations

There were no findings of significance identified. The inspectors evaluated the licensee's trending methodology and observed that the licensee had performed a detailed review. The licensee routinely reviewed cause codes, involved organizations, key words, and system links to identify potential trends in their corrective action program data. The inspectors compared the licensee process results with the results of the inspectors' daily screening and did not identify any discrepancies or potential trends in the corrective action program data that the licensee had failed to identify. The inspectors did, however, identify additional insights into several of these issues as documented below:

Crosscutting Theme in Problem Evaluation

In the Midcycle Performance Review for Cooper Nuclear Station on September 1, 2009, the staff identified that a crosscutting theme existed in problem identification and resolution corrective action component associated with the thoroughness of problem evaluation [P.1(c)]. In response to this cross cutting theme, the licensee initiated Condition Reports CR-CNS-2009-04546 and CR-CNS-2009-05277 to address the adverse trend. The inspectors reviewed the licensee's apparent cause report and the associated corrective actions. The licensee's common cause analysis identified the common trait between these errors to be a lack of formal expectations and standards and a lack of management monitoring of the problem evaluation process. In addition to the review of the apparent cause reports, the inspectors also interviewed the station personnel designated to oversee the implementation of the corrective actions.

The licensee has prescribed several corrective actions to address this crosscutting theme. These actions include (1) "Just-in-Time" apparent cause training to be conducted by the Corrective Action Program manager; (2) the addition of the CNS operability assessment process to CNS Administrative Procedure 0.CNS.12.A; (3) the creation of a periodic Operability Assessments Challenge board; (4) the implementation of a quarterly review of Failure Mode and Effects Analyses.

The inspectors noted that no additional inspection findings have been identified since the midcycle assessment that have a causal factor in this area.

Crosscutting Theme in Conservative Assumptions in Decision-Making

In the Midcycle Performance Review for Cooper Nuclear Station on September 1, 2009, the staff identified that a crosscutting theme existed in the use of conservative assumptions in decision-making [H.1(b)]. In response to the emergence of this crosscutting theme, Cooper Nuclear Station generated Condition Report CR-CNS-2009-03828. The inspectors reviewed the related apparent cause report and the corrective actions proposed to address this crosscutting theme. The licensee identified that the common causal factor associated with these findings was a lack of technical rigor in evaluations and documentation. The inspectors also interviewed the personnel assigned to implement the corrective actions and confirmed the status of the licensee's corrective actions through document reviews.

The licensee's proposed corrective actions include (1) "Just-in-Time" apparent cause training to be conducted by the Corrective Action Program manager; and (2) a series of case studies performed by the engineering, maintenance, and operations departments. These case studies will address one or more of the issues contributing to the crosscutting theme, and aim to ensure that adequate analysis and documentation are provided when addressing similar issues.

The inspectors noted that no additional inspection findings have been identified since the midcycle assessment that have a causal factor in this area.

Crosscutting Theme in Human Error Prevention

In the Midcycle Performance Review for Cooper Nuclear Station on September 1, 2009, the staff identified that a crosscutting theme existed in the use of human error prevention techniques [H.4.(a)].

During the 2008 end of cycle assessment, inspectors noted that a crosscutting theme existed at Cooper Nuclear Station. In response to this data, the licensee initiated Condition Report CR-CNS-2008-09443 to identify the causes and required corrective actions for these errors. In preparation for the 2009 mid-cycle assessment, the inspectors determined that the licensee had completed several significant corrective actions in an attempt to mitigate the emerging trend. Significant actions completed included (1) biweekly tailgate meetings with all employees on human performance fundamentals; (2) increasing required supervisory oversight of high risk activities; (3) implementation of a dynamic learning flow-loop simulator for all personnel to practice error prevention techniques; (4) implementing work scheduling changes to minimize schedule pressure effects; and (5) creation of a human performance review board to periodically review the status of the program. Other actions in progress at the time of the inspection included: (1) implementation of "coach-the-coach" training; and (2) completion of oral boards for all supervisors to verify their knowledge of error prevention strategies. At the mid-cycle assessment, the inspectors noted that several recent inspection findings with error prevention causal factors had been identified, but that these human errors occurred before the implementation of the licensee's corrective actions began for the crosscutting theme. As a result, the mid-cycle assessment determined that a cross cutting theme in human error prevention existed, but that identification of a substantive cross cutting issue was not appropriate.

Since the mid-cycle assessment, an additional five inspection findings have been identified that demonstrate a failure to effectively use human error prevention tools. The inspectors determined that this data is representative of a continuing cross cutting theme in human error prevention. In response to this continuing theme, the licensee initiated CR-CNS-2009-09854. This condition report generated a self assessment of human performance that looked at the human error data from Refueling Outage 25. This self assessment identified several causal factors including use of "shortcuts" in response to short-notice changes in work schedules; a lack of qualified workers; and ineffective station leadership. The licensee has proposed a broad range of corrective actions, most of which are scheduled to be completed in the first half of 2010.

4OA3 Event Follow-up (71153)

.1 (Closed) Licensee Event Report 05000298/2009-001-00, Disarmed Control Rod Technical Specification Requirements Not Met

a. Inspection Scope

On November 1, 2009 the licensee identified that the requirements of Technical Specifications Limiting Condition for Operation 3.10.4, Single Control Rod Withdrawal-Cold Shutdown, were not met when it was discovered the control rods in the five by five array around control rod 50-19 had been rearmed and the clearance order released for over two hours without immediately taking the actions required by technical specification action statement B.2.2. The licensee conducted a root cause evaluation under CR-CNS-2009-09138 and determined the cause to be inadequate configuration control of the five by five array. Immediate actions were taken to restore compliance with Technical Specification until control rod 50-19 was restored to operability. Corrective actions to preclude recurrence include revising appropriate procedure and communicating management expectations for clearance order activities. This licensee-identified finding involved a violation of Technical Specification Limiting Condition for Operation 3.10.4. The enforcement aspects of the violation are discussed in Section 4OA7 of this report. This Licensee Event Report is closed.

b. Findings

No findings of significance were identified.

.2 (Closed) Licensee Event Report 05000298/2009-002-00, Manual Scram On Low Water Level Caused By Turbine Trip From Hydraulic Fluid Leak

a. Inspection Scope

On November 6, 2009, control room operators inserted a manual reactor scram when vessel water level lowered quickly after a turbine trip. The turbine had been tripped after a hydraulic fluid leak developed in the digital electro-hydraulic (DEH) turbine control. The leak was caused by governor valve 3 (GV-3) DEH supply line vibration. The licensee repaired the leak by replacing the fractured swaged joint connection with a modified fitting. Additionally, a missing stop bolt was replaced in the GV-3 actuator DEH line restraint bracket. The Licensee Event Report was reviewed by the inspectors and no findings of significance were identified and no violation of NRC requirements occurred. The licensee documented the failed equipment in CR-CNS-2009-09451. This Licensee Event Report is closed.

b. Findings

No findings of significance were identified.

.3 (Closed) Licensee Event Report 05000298/2009-003-00, Isolation of Residual Heat Removal Shutdown Cooling

a. Inspection Scope

On November 7, 2009, isolation signals from pressure switches in the recirculation system caused shutdown cooling suction isolation valves to close, which initiated a trip of the operating Residual Heat Removal Pump D. The licensee determined the closure of residual heat removal suction isolation valves was a result of deficient operation procedures. The Licensee Event Report was reviewed by the inspectors and a Green noncited violation of 10CFR50, Appendix B, Criterion XVI was identified and the finding is described below. This Licensee Event Report is closed.

b. Findings

Introduction. A Green self-revealing noncited violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," was identified for the licensee's failure to preclude repetition of a significant condition adverse to quality, namely the loss of shutdown cooling caused by drawing a vacuum in the reactor pressure vessel. Specifically, corrective actions taken after a March 17, 1994, loss of shutdown cooling event were inadequate to prevent a similar event from occurring on November 7, 2009.
Description. On November 7, 2009, Cooper Nuclear Station was in the midst of a forced outage following a reactor scram that had occurred on November 6, 2009. A plant cooldown was in progress to transition the reactor from Mode 3, hot shutdown, to

Mode 4, cold shutdown, during the night shift on November 7. In the hours leading up to the event, plant temperatures were being reduced by venting steam from main steam line drains to the condenser, where a mechanical vacuum pump was operating. Reactor Recirculation Pump A was running to provide forced flow through the core. At 7:29 p.m., control room operators started Residual Heat Removal Pump D in a shutdown cooling lineup as directed by General Operating Procedure 2.1.4, "Normal Shutdown," Revision 125. At 8:26p.m., operators declared that the plant had entered Mode 4 operations based upon the recorded Recirculation Pump A suction temperature falling below 212° F.

At 9:08 p.m., the control room received reports of loud banging from the drywell, coincident with a trip of Residual Heat Removal Pump D and the automatic closure of the shutdown cooling common suction line isolation valves, RHR-MO-MO17 and RHR-MO-MO18. This marked the beginning of the loss of shutdown cooling event. Plant operators soon came to the conclusion that the trip had been caused by drawing a vacuum in the reactor coolant system and the resultant flashing in the shutdown cooling lines. The licensee was able to restore the shutdown cooling system to service at 11:02 p.m., after performing an inspection of the residual heat removal system for damage.

In response to this event, the licensee conducted a root cause investigation under CR-CNS-2009-09486 to determine the causes and appropriate corrective actions to preclude repetition. This investigation came to the conclusion that two root causes were applicable. The first identified cause was that operational procedures are deficient in that they do not contain action statements to ensure securing mechanical vacuum pumps (or steps that otherwise break vacuum), with steam lines open to the condenser and pressure is near or below 0 psig with RHR-MO-17 and RHR-MO-18 open. The second root cause identified was that the operations crew did not demonstrate sufficient control of reactor pressure while shutdown cooling was in operation.

The licensee also documented that a similar event had occurred on March 17, 1994. That event was investigated in a root cause report associated with Nonconformance Report 94-048. This earlier report had come to the conclusion that the root cause of the 1994 event was insufficient procedure details, in that Procedure 2.1.4 did not restrict operation of the mechanical vacuum pumps to prevent drawing a negative pressure in the reactor vessel. In response to this event, Revision 42 to Procedure 2.1.4 was implemented on January 11, 1995, to add, amongst other changes, the following caution statement: "Leaving mechanical vacuum pumps in service after the reactor is vented and the main steam isolation valves and/or main steam line drains are open can affect shutdown cooling." The licensee went on to conclude that this caution step was an inadequate control to prevent reoccurrence of the event. The licensee determined that "using a CAUTION statement is insufficient to prevent negative pressure conditions resulting from alignment of steam lines to the condenser with a vacuum. An action step is necessary to positively isolate the reactor from the effects of a vacuum before reactor pressure is zero."

The inspectors determined that the failure to preclude repetition of loss of shutdown cooling events caused by drawing a vacuum in the pressure vessel was a performance deficiency, but that it was not reflective of current performance in that it occurred in 1994. The inspectors noted that Administrative Procedure 0.5CR, “Condition Report Initiation, Review, and Classification,” Revision 15, provides a screening table for categorizing condition reports according to their safety significance. In Attachment 1 to Procedure 0.5CR, the following is provided as an example of a condition requiring a Category A classification (the licensee’s highest classification, requiring identification of cause and actions to preclude repetition):

> *“Equipment failures, personnel actions, or other conditions that prevented fulfillment of, or have a high potential for preventing fulfillment of, a safety system function (e.g. reactivity control, core cooling core heat removal, etc.).”*

The licensee determined that this condition resulted in a loss of the residual heat removal safety function, and that the condition was reportable under 10 CFR 50.72.(b)(3)(v)(B) and 10 CFR 50.73(a)(2)(v)(B). Based upon the licensee’s written guidance in Procedure 0.5CR, and the licensee’s determination that the event represented a loss of safety function, the inspectors determined that the loss of both trains of shutdown cooling was a significant condition adverse to quality as described in 10 CFR 50, Appendix B, Criterion XVI.

The inspectors reviewed the guidance of Manual Chapter 0609, Appendix G and determined that Attachment 1, “Shutdown Operations Significance Determination Process Phase 1 Operational Checklists For Both PWRs and BWRs,” Checklist 8 was applicable due to the facts that reactor vessel level was in the normal indicating range and time to boil was approximately four hours. The inspectors determined that all equipment on the checklist was available during the event with the exception of item I.C(1), in that neither train of shutdown cooling was operable with RHR-MO-MO17 and RHR-MO-MO18 shut. The inspectors reviewed the checklist criteria for findings requiring phase 2 or phase 3 analysis, and determined that none of the criteria were met. Notably, the third criteria on the checklist reads “findings that significantly degrade the licensee’s ability to recover DHR once it is lost.” The inspectors determined that this criteria was not satisfied due to the fact that no equipment damage resulted from this performance deficiency, and shutdown cooling was restored in less than one-half the evaluated time to boil.

The licensee’s corrective actions to prevent recurrence for the November 7, 2009, event included: (1) revising Procedure 2.1.4 to change the caution statement to a procedural step; (2) updating training material for operations shutdown risk management training; (3) creating a process to involve operations involvement in corrective action effectiveness reviews, and (4) creating a plan to review other operations procedures for extent of condition.

<u>Analysis</u>. The performance deficiency associated with this finding involved the licensee’s failure to assure that corrective action was taken to preclude repetition of a significant condition adverse to quality. The finding is more than minor because it affected the procedure quality attribute of the mitigating systems cornerstone and affected the cornerstone objective to ensure the availability, reliability, and capability of

systems that respond to initiating events to prevent undesirable consequences (i.e., core damage). The inspectors determined that Manual Chapter 0609, Appendix G was applicable due to the fact that at the time of the performance deficiency was discovered, the plant was in a forced outage with residual heat removal system in service. Using Checklist 8 in Attachment 1, “Shutdown Operations Significance Determination Process Phase 1 Operational Checklists For Both PWRs and BWRs,” the inspectors determined that although the residual heat removal mitigation capability on the checklist was not met, the criteria for requiring a phase 2 or phase 3 analysis were not satisfied. The inspectors determined that no cross cutting aspects were appropriate for this finding due to the fact that the performance deficiency occurred in 1994 and is not reflective of current performance.

Enforcement. 10 CFR 50, Appendix B, Criterion XVI, “Corrective Action,” requires, in part, that in the case of significant conditions adverse to quality, measures shall assure that the cause of the condition is determined and that corrective action is taken to preclude repetition. Contrary to this standard, from March 17, 1994 to November 7, 2009, the licensee failed to preclude repetition of a significant condition adverse to quality, namely the loss of shutdown cooling caused by drawing a vacuum in the pressure vessel. Because the finding is of very low safety significance and has been entered into the licensee’s corrective action program as CR-CNS-2009-09486, this violation is being treated as an NCV consistent with Section VI.A of the Enforcement Policy: NCV 05000298/2009005-11, "Failure to Preclude Repetition of Loss of Shutdown Cooling.”

.4 (Closed) Licensee Event Report 05000298/2009-004-00, Manual Reactor Scram for Digital Electro-Hydraulic Fluid Leak

a. Inspection Scope

On November 11, 2009, control room operators inserted a manual reactor scram after a non-isolable digital electro-hydraulic (DEH) fluid leak developed.. The licensee’s investigation determined that the cause of a lowering hydraulic fluid alarm was a hydraulic fluid leak coming from the same fitting on Governor Valve 3 that had required a plant shutdown five days earlier, on November 6. The Licensee Event Report was reviewed by the inspectors and a green finding for the licensee’s failure to follow plant procedures was identified and the finding is described below. This Licensee Event Report is closed.

b. Findings

Introduction. A Green self-revealing finding was identified for the licensee’s failure to follow Administrative Procedure 0.47, “Control of In-Process Material,” Specifically, a maintenance technician obtained a spare o-ring from an uncontrolled toolbox and that o-ring was then installed in the Main Turbine Control Valve 3 hydraulic fitting. The o-ring was the wrong size and caused a hydraulic leak that required taking the turbine off line and shutting down the reactor from 70 percent power.

Description. On November 11, 2009, control room operators received an alarm indicating a lowering inventory of main turbine hydraulic fluid. The licensee's investigation determined that the cause of the alarm was a hydraulic fluid leak from the same fitting on Governor Valve 3 that had required a plant shutdown five days earlier, on November 6, 2009. Because the leak was non-isolable, the licensee removed the turbine from service and manually shut down the reactor.

The licensee's investigation of the leak determined that on November 6, 2009, the maintenance technician who performed the repair of the failed hydraulic fitting was not provided with the required o-ring to complete the assembly of the new fitting. Contrary to the requirements of Administrative Procedure 0.47, "Control of In-Process Material, Revision 15, the technician repaired the leak using an o-ring that he had selected from a toolbox instead of from the warehouse, and did not verify that the selected o-ring was the correct o-ring for that application. Although the selected o-ring fit into its groove in the valve, its cross-section was too large. As a result, when the technician assembled the valve, the o-ring prevented a reliable fit between adjacent metal parts. The resulting fit was adequate to prevent a leak during the post-maintenance test, but after several days of operation was not adequate to prevent the leak that prompted operators to shut down the plant. The technician's selection and installation of an incorrect o-ring thus directly caused an unplanned plant shutdown.

The inspectors reviewed the licensee's root cause investigation conducted under CR-CNS-2009-09606. The licensee's planned corrective actions include implementing additional controls over parts in toolboxes, completing case study training for site personnel and placing additional programmatic controls over main turbine hydraulic system parts.

Analysis The performance deficiency associated with this finding was the licensee's failure to follow the requirements of Administrative Procedure 0.47, "Control of In-Process Material." The finding is more than minor because it adversely affected the configuration control attribute of the initiating events cornerstone, and adversely affected the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations, in that this finding resulted in a condition that prompted a plant shutdown from 70 percent power. In accordance with Manual Chapter 0609 Attachment 4, the inspectors used the Phase 1 "Initial Screening and Characterization" worksheet to determine that the finding has very low safety significance because it did not result in the loss of any system safety function. The cause of this finding is related to human performance cross cutting component of work practices because the involved maintenance personnel proceeded in the face of uncertainty when obtaining replacement o-rings [H.4(a)].

Enforcement. Enforcement action does not apply because the performance deficiency did not involve a violation of a regulatory requirement. Because this finding does not involve a violation of regulatory requirements and has very low safety significance, it is is identified as FIN 05000298/2009005-12, "Failure to Follow Procedure For Control of Material."

.5 Procedure Noncompliance Causes Fire in Heater Bay

a. Inspection Scope

On October 7, 2009, control room operators declared a Notification of Unusual Event due to the occurrence of a fire in the turbine building heater bay that took longer than ten minutes to extinguish. The fire was caused by the failure of a weld pre-heating blanket which ignited nearby combustible material. The event was reviewed by the inspectors and a green noncited violation was identified for the licensee's failure follow procedures for implementation fo the fire protection program. This finding is described below. This Licensee Event Report is closed.

b. Findings

Introduction. A Green self-revealing noncited violation of Technical Specification 5.4.1.d, "Fire Protection Program Implementation," was identified for the licensee's failure to follow Administrative Procedure 0.39, "Hot Work." Specifically,contractors, under the licensee's control, failed to consider weld pre-heating as an activity requiring hot work controls, and as such did not take the appropriate precautions for a pre-heating activity. As a result, a degraded pre-heating blanket failed in service, started a fire in the heater bay and resulted in declaration of a Notice of Unusual Event.

Description. The licensee recently completed Refueling Outage 25, during which one of the major scope items was the replacement of four large feedwater heaters. The majority of the work associated with the heater replacement project was performed by a contractor under the supervision of the licensee's project management team.

On October 12, 2009, the contractor was performing large bore piping welds to connect new B3 feedwater heater to the feedwater system. As part of that activity, the pipe ends were being preheated using electrical resistance heating blankets. These blankets consist of a multi-stranded wire, surrounded by ceramic pellets, which is connected to a temporary power supply. When energized, the wire heats the pellets and can generate temperatures as high as 1500° F. The heat from the pellets is transferred to the base metal, and the blankets are wrapped in foil to protect local equipment and personnel from the local heat source. The heat treatment being conducted on October 12, 2009. was intended to raise the base metal temperature above 450° F.

At 3:51 p.m., on October 12, 2009, the control room received a telephone notification of a fire in the condenser area of the turbine building. Operators properly entered Emergency Procedure 5.1 INCIDENT and dispatched the fire brigade to the scene. Follow up reports indicated that the fire was in the heater bay in the vicinity of the B-3 heater. At 3:56 p.m., the control room received a report from a local fire watch that the fire had been extinguished. At 4:03 p.m., the Shift Manager (in his role as the Emergency Director) declared a Notice of Unusual Event based upon meeting the criteria of emergency action level 5.1.1 due to the long time required by the fire brigade leader to complete a thorough search of the area. At 4:13 p.m., the fire brigade leader reported that a six-sided search of the area had been completed, and the fire was officially declared to be out. The emergency director terminated the Notice of Unusual

Event at 4:38 p.m.. The inspectors noted that this event challenged plant stability by requiring the operations crew to suspend other activities and respond to the fire. The inspectors also verified that this performance deficiency did not result in the unavailability of any mitigating systems listed in Manual Chapter 0609, Appendix G, Table 7.

The cause of the fire was determined to be the failure of a resistance heating blanket. More specifically, the wire pigtail on one end of a preheating blanket had separated, allowing the hot ceramic pellets to fall to the floor. These pellets were estimated to be at approximately 800° F, and caused local combustion with any combustible material that they touched. Most of the damage could be characterized as "burn marks" on the floor and small holes melted through pieces of canvas. One hot pellet, however, fell into an open pipe penetration underneath the feedwater heater. This pipe penetration contained a plastic mat that was being used to prevent tools, parts, etc from falling from the heater bay into the condenser bay. The pellet ignited this plastic sheet, sustaining the class A fire that was reported to the control room. The fire was extinguished by one of the contract personnel using a portable CO_2 extinguisher.

The licensee initiated a root cause investigation under CR-CNS-2009-08061. In the course of this investigation, the licensee determined that Administrative Procedure 0.39, "Hot Work," Revision 39, contained the following definition of hot work:

> *"Hot Work – Any activity which requires the use of an open flame, controlled electrical arcing, grinding which produces sparks, or a heat source with temperatures sufficiently hot enough to ignite, scorch, or melt materials that come into contact with the tool or process. Hot Work includes activities such as welding, cutting, grinding, soldering, etc."*

The licensee determined that the temperature that the ceramic heating blankets achieve during weld preheating exceeded the ignition temperature of paper and plastic materials that were in use in the heater bay, but that the contractors performing the work did not consider this as a hot work activity, nor did the licensee's project management team recognize this error. The licensee determined that had the activity been properly considered to be hot work, Procedure 0.39 would have required generation of a hot work permit. The checklist embedded within the hot work permit required several precautions which would have prevented the event, including pre-use inspections of the heating blankets, posting of fire watches, clearing the area of combustible materials, and sealing pipe penetrations with fire retardant blankets.

The licensee determined that the root cause of the fire was that "appropriate Cooper Nuclear Station personnel were not cognizant that the weld pre-heating process being employed by the vendor met the hot work requirements of CNS Procedure 0.39…" The inspectors determined that the lack of oversight of the contractors was an appropriate causal factor for this performance deficiency. The licensee's corrective actions consisted of making clarifications in Procedure 0.39 and several maintenance procedures to clearly define weld preheating and other heating processes as hot work.

Analysis. The performance deficiency associated with this finding involved the licensee's failure to follow the requirements of Administrative Procedure 0.39, "Hot Work." Specifically, contractors performing work in the turbine building heater bay failed to consider weld pre-heating as an activity requiring hot work controls and did not take the appropriate precautions for the pre-heating activity. The finding is more than minor because it affected the external events aspect of the initiating events cornerstone and affected the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. The inspectors determined that Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," could not be applied to shutdown plant conditions. Because the plant was shutdown at the time this performance deficiency occurred, the inspectors used Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process." Using Checklist 7 in Attachment 1, "Shutdown Operations Significance Determination Process Phase 1 Operational Checklists For Both PWRs and BWRs", the inspectors determined that the finding had very low safety significance because every item on the checklist was met. This finding has a crosscutting aspect in the area of human performance associated with work practices because the licensee personnel failed to maintain adequate supervisory control over contractors performing welding in the turbine building heater bay [H.4(c)].

Enforcement. Technical Specification 5.4.1.d requires that written procedures shall be established, implemented and maintained covering the fire protection program. Contrary to this requirement, from approximately February 1, 2007 through October 12, 2009, the licensee failed to follow Administrative Procedure 0.39, "Hot Work," Revision 39. As a result, a weld pre-heating blanket failed in service, started a fire, and resulted in declaration of a Notice of Unusual Event. Because the finding is of very low safety significance and has been entered into the licensee's corrective action program as CR-CNS-2009-08061, this violation is being treated as an NCV consistent with Section VI.A of the Enforcement Policy: NCV 05000298/2009005-13, "Procedure Noncompliance Causes Fire in Heater Bay."

4OA6 Meetings

Exit Meeting Summary

On September 28, 2009, a regional inspector presented the results of the in-office inspection of the licensee's changes to their emergency action level scheme to Mr. J. Austin, Manager, Emergency Preparedness. The licensee acknowledged the issues presented. The inspector asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

On October 8, 2009, regional inspectors presented the inservice inspection activities results to Mr. A. Zaremba, Director of Nuclear Safety Assurance, and other members of the licensee staff. The licensee acknowledged the issues presented. On November 3, 2009, the inspectors telephonically exited with Mr. D. Madsen, Nuclear Licensing. The inspectors acknowledged review of proprietary material during the inspection which has been returned to the licensee.

On October 9, 2009, regional inspectors presented the radiation safety inspection results Mr. D. Buman, Director of Engineering, and other members of the licensee staff. A subsequent exit briefing was conducted on November 23, 2009, and where the results of the inspection were presented to Mr. David VanDerKamp and David Oshlo and other members of the licensee staff. The licensee acknowledged the issues presented. The inspector asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

On November 20, 2009, regional inspectors presented the triennial heat sink performance inspection results to Mr. A. Zaremba, Director of Nuclear Safety Assurance, and other members of licensee management. The inspectors confirmed that no proprietary information was reviewed.

On January 14, 2009, the resident inspectors presented the inspection results to Mr. D. Willis, General Manager of Plant Operations, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspector asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

4OA7 Licensee-Identified Violations

The following violations of very low safety significance (Green) were identified by the licensee and are violations of NRC requirements which meet the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as a noncited violation.

- 10 CFR Part 50, Appendix B, Criterion V, “Instructions, Procedures and Drawings,” requires, that activities affecting quality shall be accomplished in accordance with procedures that are appropriate for the circumstances. Contrary to this requirement, on October 4, 2009, the licensed operators failed to follow the guidance of Section 7.3 of Administrative Procedure 0.40, “Work Control Program,” Revision 68. Specifically, the licensed operators performed Surveillance Procedure 6.1RPS.313, “RPS Channel Test Switch Functional Test (Div 1),” instead of the scheduled Surveillance Procedure 6.2RPS.313, “RPS Channel Test Switch Functional Test (Div 2).” This performance deficiency was discovered by licensed operators during closeout of the work order and was documented in CR-CNS-2009-07618. This event demonstrated failure to effectively use error prevention tools. Specifically, the licensee’s two minute drill card specifically challenges workers to ensure they are working on the right division. Despite continued emphasis on human error prevention, the entire watchteam agreed to perform a surveillance test on the wrong division. The inspectors determined that this issue was of very low safety significance because no loss of system safety function resulted from the performance deficiency.

- 10 CFR Part 50, Appendix B, Criterion V, “Instructions, Procedures and Drawings,” requires, that activities affecting quality shall be accomplished in accordance with procedures that are appropriate for the circumstances. Contrary to this requirement, during preparation for refueling outage 25, the plant staff failed to follow the guidance of Section 5 of Administrative Procedure 0.50.5, “Outage Shutdown Safety,” Revision 12. Specifically, the licensed operators failed to manage the risks associated with an operation with the potential to drain the reactor vessel. This performance deficiency was discovered on September 27, 2009, while shut down in Mode 4, by a control room operator who noted reactor vessel water level lowering and was documented in CR-CNS-2009-07191. Reactor vessel water level control was lost for five minutes when an inadvertent drain path was established lowering vessel level four inches prior to restoring a positive rising level. The inspectors determined that this issue was of very low safety significance because no loss of system safety function resulted from the performance deficiency.

- 10 CFR Part 50.72(b)(3)(v)(B) requires that any condition resulting in a loss of the residual heat removal safety function be reported to the NRC as soon as practical and in all cases within eight hours of the occurrence. Contrary to this requirement, on November 7, 2009, a human performance error resulted in an automatic isolation of the shutdown cooling system and a loss of the residual heat removal safety function and this loss of safety function was not reported as required. The licensee discovered this missed report during management review of the event on November 9, 2009 and identified the performance deficiency in CR-CNS-2009-09537. The inspectors determined that this issue is consistent with the examples of a SLIV violation in Supplement I, paragraph D.4 of the Enforcement Policy.

- Technical Specification Limiting Condition for Operation 3.10.4 requires, in part, that to allow withdrawal of a single control rod with the reactor in Mode 4, all other control rods in a five by five array centered on the control rod being withdrawn are disarmed. Condition B.2.2 requires when a limiting condition for operation is not met with the affected control rod not insertable to immediately initiate actions to satisfy the requirements of this limiting condition for operation. Contrary to the above, on November 1, 2009, the licensee discovered that the control rods in the five by five array around a withdrawn control rod were not disarmed for over two hours without immediately taking the actions required by technical specification action statement B.2.2. This was documented in the licensee’s corrective action program by CR-CNS-2009-9138. Because the plant was shutdown at the time this performance deficiency occurred, the inspectors used Manual Chapter 0609, Appendix G, ”Shutdown Operations Significance Determination Process.” Using Checklist 7 in Attachment 1, “Shutdown Operations Significance Determination Process Phase 1 Operational Checklists For Both PWRs and BWRs”, the inspectors determined that the finding had very low safety significance because it did not require quantitative assessment for a phase 2 or 3 analysis.

SUPPLEMENTAL INFORMATION
KEY POINTS OF CONTACT

Licensee Personnel

D. Anderson, Supervior, ALARA
J. Austin, Manager, Emergency Preparedness
D. Boes, Welding Engineer
D. Buman, Director of Engineering
B. Chapin, Manager, Outage
S. Charbonnet, NPPD ESD Lead
R. Estrada, Manager, Design Engineering
J. Flaherty, Licensing
S. Freborg, ESD Mechanical Programs Supervisor
G. Gardner, NSSS Supervisor, System Engineering Department
T. Hough, Maintenance Rule Coordinator
L. Keiser, SW and RHR System Engineer
P. Leininger, Erosion/Corrosion Program Engineer
D. Kirkpatrick, Technician, Radiation Protection
D. McMahon, REC System Engineer
M. Metzger, System Engineer
D. Madsen, Licensing
T. McClure, ISI Engineer
D. Parker, Manager, Maintenance
R. Penfield, Manager, Operations
D. Oshlo, Manager, Radiation Protection
A. Sarver, BOP/Elect/I&C Supervisor, System Engineering Department
J. Smith, Maintenance Welding Coordinator
K. Tanner, Supervisor, Radiation Protection
J. Teten, Chemistry Supervisor
D. VanDerKamp, Licensing Manager
R. Wulf, SED Manager
A. Zaremba, Director Nuclear Safety Assurance

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000298/2009005-01	NCV	Failure to Follow Surveillance Procedure Causes Near Toxic Gas Release (Section 1R05)
05000298/2009005-02	FIN	Multiple Examples of a Failure to Follow Procedure For Extension Cord Configuration Control (Section 1R05)
05000298/2009005-03	NCV	Failure to Set Goals and Monitoring for the Diesel Generator Lubricating Oil System (Section 1R12)
05000298/2009005-04	NCV	Failure to Implement a Prescribed Risk Mitigating Action (Section 1R13)

05000298/2009005-05	NCV	Failure to Identify Foreign Material in the Reactor Core (Section 1R20)
05000298/2009005-06	FIN	Maintenance Error Results in Recirculation Pump Trip (Section 1R20)
05000298/2009005-07	NCV	Procedure Violation Results in Loss of Fuel Pool Cooling (Section 1R20)
05000298/2009005-08	NCV	Failure to Establish an Adequate Procedure to Ensure Constant Communications in a Locked High Radiation Area (Section 2OS1)
05000298/2009005-09	NCV	Failure to Follow Radiation Work Permit Requirements in Two Instances (Section 2OS2)
05000298/2009005-10	NCV	Failure to Correct Diesel Generator 2 Oil Leakage (Section 4OA2)
05000298/2009005-11	NCV	Failure to Preclude Repetition of Loss of Shutdown Cooling (Section 4OA3)
05000298/2009005-12	FIN	Failure to Follow Procedure For Control of Material (Section 4OA3)
05000298/2009005-13	NCV	Procedure Noncompliance Causes Fire in Heater Bay (Section 4OA3)

Closed

05000298/2009-001-00	LER	Disarmed Control Rod Technical Specification Requirement Not Met (Section (4OA3.1)
05000298/2009-002-00	LER	Manual Scram on Low Water Level Caused by Turbine Trip from Hydraulic Fluid Leak (Section 4OA3.2)
05000298/2009-003-00	LER	Isolation of Residual Heat Removal Shutdown Cooling (Section 4OA3.3)
05000298/2009-004-00	LER	Manual Reactor Scram for Digital Electro-Hydraulic Fluid Leak (Section 4OA3.4)

LIST OF DOCUMENTS REVIEWED

Section 1RO1 Adverse Weather Protection

PROCEDURES

NUMBER	TITLE	REVISION
2.1.14	General Operating Procedure “Seasonal Weather Preparations”	13

Section 1RO1 Adverse Weather Protection

PROCEDURES

NUMBER	TITLE	REVISION
2.2.42	System Operating Procedure “HVAC Intake Structure”	19
2.2.30	System Operating Procedure “Fire Protection System”`	57
NEDC 91-232	Service Water Pump Room Loss of Heat	3

Section 1RO4 Equipment Alignment

PROCEDURES

NUMBER	TITLE	REVISION
6.EE.611	125v/250v Battery Cell and Rack Examination	3

Section 1RO5 Fire Protection

MISCELLANEOUS DOCUMENTS

NUMBER	TITLE	REVISION / DATE
	Fire Brigade Scenario #34	
	Fire Hazards Analysis	2/28/03
Figure 2	Fire Area Drawing Elevation 903’-6”	
0.23	Administrative Procedure “CNS Fire Protection Plan”	57
6.FP.306	Fire Dectection Systems Semi-Annual Examination	13
0.36.7	Electrical Cord Control/GFCI Program	2

CONDITION REPORTS

CR-CNS-2009-07008 CR-CNS-2009-08329 CR-CNS-2009-08482 CR-CNS-2009-08610

Section 1RO6: Flood Protection Measures

PROCEDURES

NUMBER	TITLE	REVISION / DATE
38	Design Criteria Document – "Internal Flooding	2/2/09
2.3_S-1	Alarm Procedure "Panel S – Annunciator S-1	14
15.DG-SUMP.301	Non-TS Surveillance Procedure "DG Sump Alarm Setpoint Test"	1
NEDC 91-069	Moderate Energy Line Break Flooding and Door Gap Calculation	6
OE 93-057-040		1

Section 1R07: Heat Sink Performance

CALCULATIONS

NUMBER	TITLE	REVISION
NEDC 92-034	Water Hammer Analysis of Service Water System	17
NEDC 94-021	REC-HX-A & REC-HX-B Maximum Allowable Accident Case Fouling	4
NEDC 97-087	Acceptance Criteria for HPCI Room Cooler and Reactor Building Quad Coolers	3

Section 1R07: Heat Sink Performance

DRAWINGS

NUMBER	TITLE	REVISION
2006 Sh. 1	Flow Diagram Circulating, Screen Wash & Service Water Systems	N53
2006 Sh. 3	Flow Diagram Circulating, Screen Wash & Service Water Systems	N74
2006 Sh. 4	Flow Diagram Circulating, Screen Wash & Service	N46

Section 1R07: Heat Sink Performance

DRAWINGS

NUMBER	TITLE	REVISION
	Water Systems	
2006 Sh. 5	Flow Diagram Circulating, Screen Wash & Service Water Systems	N29
2031 Sh. 2	Flow Diagram Reactor Building – Closed Cooling Water System	N65
2031 Sh.3	Flow Diagram, Reactor Bldg-Closed, Cooling Water System	N28
2036 Sh. 1	Flow Diagram Reactor Building Service Water System	N95
2040 Sh. 1	Flow Diagram, Residual Heat Removal System,	N79
2040 Sh. 2	Flow Diagram, Residual Heat Removal System,	N17
2077	Flow Diagram – Diesel Gen. Bldg, Service Water Start Air, Fuel oil, Sump System & Roof Drain,	N40
2852-50	Service Water Reactor Bldg. Class IV P Piping	N08

Section 1R07: Heat Sink Performance

MISCELLANEOUS DOCUMENTS

NUMBER	TITLE	REVISION / DATE
EN-OP-104	Operability Determinations	3
SW-E-1-2852-50	Ultrasonic Thickness Measurement Data Sheet	1

Section 1R07: Heat Sink Performance

MISCELLANEOUS DOCUMENTS

NUMBER	TITLE	REVISION / DATE
Apparent Cause Evaluation – CR 2009-8110		00
Diesel Generator (DG) System Health Report		June 2009
Reactor Equipment Cooling System(REC) System Health Report		June 2009
Residual Heat Removal (RHR) System Health Report		June 2009
Service Water (SW) System Health Report		August 2009
Eddy Current Examination Final Report: "A" Reactor Equipment Cooling Heat Exchanger		February 2009
Eddy Current Examination Final Report: “A” Residual Heat Removal Heat Exchanger		June 2006
Laboratory Analysis for Reactor Equipment Cooling		10/18/09
OPS Service Water/COR002-27-02		27
Letter response to IE Bulletin No. 81-03		5/29/81
Letter response to GL 89-13		1/29/90
Letter recommended inspection program		10/15/09
Letter completion of GL 89-13 actions		1/9/92
Letter action plan update		2/18/94

Section 1R07: Heat Sink Performance

PROCEDURES

NUMBER	TITLE	REVISION
0.27	Maintenance Rule Program	18
2.2.3	Circulating Water System	118
3.30	Macroscopic Biological Fouling Organism Sampling	8
3.34	Heat Exchanger Program	12
6.SW.102	Service Water System Post-Loca Flow Verification	24
6.REC.201	REC Motor Operated Valve Operability Test (IST)	18
7.2.42.1	REC Heat Exchanger Maintenance	6
7.2.42.1	REC Heat Exchanger Maintenance	8
7.2.42.3	Heat Exchanger Tube Plugging	10
13.15.1	Reactor Equipment Cooling Heat Exchanger Performance Analysis	29
13.17.2	Thermal Performance Test Procedure for Residual Heat Removal Heat Exchangers	6

CONDITION REPORTS

CR-CNS-2006-08343	CR-CNS-2006-08470	CR-CNS-2006-08517	CR-CNS-2006-09853
CR-CNS-2007-00259	CR-CNS-2007-00275	CR-CNS-2007-00716	CR-CNS-2007-01612
CR-CNS-2007-02995	CR-CNS-2007-03052	CR-CNS-2007-03680	CR-CNS-2007-03862
CR-CNS-2007-04096	CR-CNS-2007-05102	CR-CNS-2007-07872	CR-CNS-2008-00026
CR-CNS-2009-00947	CR-CNS-2009-08848	CR-CNS-2009-09788*	CR-CNS-2009-09799*

* - indicated documents initiated due to inspection

WORK ORDERS

4625816	REC Heat Exchanger Performance Analysis	2/10/09
4601466	REC Heat Exchanger Performance Analysis	10/3/08
4608987	Chemical Treatment of the SW System, Rev 1	8/8/2008
4559451	Chemical Treatment of The SW System, Rev. 2,	10/5/07
4716410	Chemical Treatment for Clams in E. Bay	8/13/09

Section 1RO8 Inservice Inspection Activities

MISCELLANEOUS DOCUMENTS

NUMBER	TITLE	REVISION / DATE
UT-F09-001 R1	UT Calibration / Examination HPEX-CF-3	1
EE08-20	Review of GEH report 0000-0084-9891 on JP-14 DF-1 Weld Indication	0
L-F09-001	Ultrasonic Instrument Linearity	September 30, 2009
SC09-03	Shroud Screening Criteria Report	August 3, 2009
	Various NDE Certifications	
Table 2	Cooper Nuclear Station Code Compliance Summary – 4th Interval	2
B5.10.0005.RI	Automated Ultrasonic Examination Summary Sheet – RAS-BF-1 (N1A)	May 2, 2008
B3.90.0013	RPV Nozzle Ultrasonic Examination Summary Sheet – NVE-BD-N3A	April 18, 2008
	CNS BWRVIP Program Manual	
	CNS 4th Interval ISI Program Manual	

Section 1RO8 Inservice Inspection Activities

MISCELLANEOUS DOCUMENTS

NUMBER	TITLE	REVISION / DATE
CS-H4	Pipe Support CS System Drawing	March 19, 1990
VT-F09-041	Visual Examination of Pipe Hanger, Support or Restraint (VT-3) – RHH-61	October 2, 2009
VT-F09-003	Visual Examination of Pipe Hanger, Support or Restraint (VT-3) – RHH-61	August 27, 2009
VT-S08-042	Visual Examination of Pipe Hanger, Support or Restraint (VT-3) – RHH-61	April 8, 2008
VT-S08-023	Visual Examination of Pipe Hanger, Support or Restraint (VT-3) – RHH-61	April 1, 2008
VT-F09-016	Visual Examination of Pipe Hanger, Support or Restraint (VT-3) – HPH-11	September 8, 2009
VT-F09-038	Visual Examination of Pipe Hanger, Support or Restraint (VT-3) – PSA-1	September 21, 2009
Table 1	PDI-UT-1 Table 1	22
Table 2	PDI-UT-1 Table 2	March 23, 2009
UT-F09-007	UT Calibration/Examination – CSB-BJ-18	October 3, 2009
UT-F09-006	UT Calibration/Examination – PSA-BJ-2	October 2, 2009
R-097	Examination Summary Sheet	March 16, 2000
R-087	Examination Summary Sheet	December 1, 2001

PROCEDURES

NUMBER	TITLE	REVISION / DATE
54-ISI-160-05	Procedure for the Remote Ultrasonic Examination of BWR Reactor Vessel Internal Core Spray Piping Welds	5
54-ISI-363-05	Remote Underwater In-Vessel Visual Inspection of Reactor Pressure Vessel Internals, Components, and Associated Repairs in Boiling Water Reactors	5
54-ISI-369-02	VT-1, VT-3, General and Detailed Visual Examinations	2
54-ISI-835-12C1	Ultrasonic Examination of Ferritic Piping Welds	12C1
Administrative Procedure 0.5	Conduct of the Condition Report Process	65
Administrative Procedure 0.5.CR	Condition Report Initiation, Review, and Classification	14
Administrative Procedure 0.5.EVAI	Preparation of Condition Reports	19
Administrative Procedure 0.5.NAIT	Corrective Action Implementation and Nuclear Action Item Tracking	39
0-CNS-VT	Qualification and Certification of Visual Examination (VT) NDE Personnel	2
54-ISI-135-08	Linearity and Beam Spread Measurements	8

CONDITION REPORTS

CR-CNS-2006-8510	CR-CNS-2008-2025	CR-CNS-2008-2700	CR-CNS-2008-2770
CR-CNS-2008-3070	CR-CNS-2008-3248	CR-CNS-2008-3382	CR-CNS-2008-7062
CR-CNS-2009-4512	CR-CNS-2009-5835	CR-CNS-2009-6647	CR-CNS-2009-6852
CR-CNS-2009-7656			

Section 1R11: Licensed Operator Requalification Program

MISCELLANEOUS DOCUMENTS

NUMBER	TITLE	DATE
CNS Version 3.1	Drill Exercise Objectives, Section 3 – Control Room Objectives	
	Extent of Play Summary, Team 2A/JIC A Annual Exercise	12/1/2009

Section 1R12: Maintenance Effectiveness

NOTIFICATION

NUMBER	TITLE	DATE
10573190	Function Failure Evaluation of DG-PF01B, provide emergency diesel power to plant equipment required for safe shutdown of the plant in emergencies, Train B	06/11/08
10640421	Function Failure Evaluation of DG-PF01A, provide emergency diesel power to plant equipment required for safe shutdown of the plant in emergencies, Train A	03/23/09
0.27	Maintenance Rule Program	
0.5NAIT	Corrective Action Implementation and Nuclear Action Item Tracking	

CONDITION REPORT

CR-CNS-2009-00968	CR-CNS-2009-06392	CR-CNS-2009-06778

Section 1R13: Maintenance Risk Assessment and Emergent Work Controls

PROCEDURE

NUMBER	TITLE	REVISION / DATE
0.50.5	Attachment 4, “Shutdown Safety Contingency Plan Form” Log Number 25-4	6
2.1.13	General Operating Procedure “System Activity Coordination During Outages”, Attachment 7 “RF Injection Piping Draining”	12
7.9.1.7	Maintenance Procedure “Troubleshooting Plant Equipment”, Attachment 2 “Routine Troubleshooting Plan”	13 10/7/09
0.PROTECT-EQP	Protected Equipment Program	11

Section 1R13: Maintenance Risk Assessment and Emergent Work Controls

PROCEDURE

NUMBER	TITLE	REVISION / DATE
0.50.5	Outage Shutdown Safety	7
2.2.9	Core Spray System	68
	Troubleshooting Plan for X-9A/B RF Penetrations	
	ECO CW-1-RE25 4645300 Dredge Intake	

CONDITION REPORT

CR-CNS-2009-07761 CR-CNS-2009-09243

WORK ORDER

463872 4639786 4645300

Section 1R15: Operability Evaluations

PROCEDURE

NUMBER	TITLE	REVISION
6.PC.513	Attachment 5, "Total Main Steam Pathway Leakage"	19

CONDITION REPORT

CR-CNS-2009-07415

Section 1R19: Postmaintenance Testing

PROCEDURE

NUMBER	TITLE	REVISION
6.1DG.302	Surveillance Procedure "Undervoltage Logic Functional, Load Shedding, and Sequential Loading Test (Div 1)"	51
6.CRD.303	Surveillance Procedure "Control Rod Withdrawal/Operability Test Modes 3, 4 and 5", Performed 10/6/09	11
6.EE.605	Surveillance Procedure "250V Battery Service Test", Performed 10/23/09	16
6.EE.609	Surveillance Procedure "125V/250V Station Battery Intercell	13

Section 1R19: Postmaintenance Testing

PROCEDURE

NUMBER	TITLE	REVISION
	Connection Testing" Performed 10/21/09	
6.EE.611	Surveillance Procedure "125V/250V Battery Cell and Rack Examination", Performed 10/21/09	3
6.MISC.502	Surveillance Procedure "ASME Class 1 System Leakage Test"	34
7.0.5	Maintenance Procedure "Post-Maintenance Testing"	33

CONDITION REPORT

CR-CNS-2009-8581	CR-CNS-2009-09606

WORK ORDER

4503755	4542936	4729542
4729547		

Section 1R20: Refueling and Other Outage Activities

PROCEDURE

NUMBER	TITLE	REVISION / DATE
O-CNS-67	Administrative Procedure, "CNS Reactivity Management Program"	19
0.3	Administrative Procedure, "Station Operations Review Committee"	38
2.1.1	General Operating Procedure, "Startup Procedure"	154
2.1.10	General Operating Procedure, "Station Power Changes"	98
10.13	Nuclear Performance Procedure, "Control Rod Sequence and Movement Control"	63
SP08-002	Special Procedure, "Operational Testing of DEH Control and Main Trip Systems"	0
10.2	Core Verification	5
EE 09-062	Use as-is evaluation of Foreign Material in Core Location 10-07 Next to bundle JLF908	

Section 1R20: Refueling and Other Outage Activities

PROCEDURE

NUMBER	TITLE	REVISION / DATE
0.40	Work Control	68
6.MISC.502	ASME Class 1 System Leakage Test	
0.31.1	Skill-of-the-Craft Configuration Control	
0-HU-TOOLS	Human Performance Tools	12
2.2.18	4160V Auxiliary Power Distribution System	125

CONDITION REPORT

CR-CNS-2009-08271 CR-CNS-2009-08673 CR-CNS-2009-08890
CR-CNS-2009-07770

Section 1R22: Surveillance Testing

PROCEDURE

NUMBER	TITLE	REVISION / DATE
6.CRD.303	Surveillance Procedure “Control Rod Withdrawal/Operability Test Modes 3, 4 and 5”, Performed 10/6/09	11
6.PC.511	Surveillance Procedure “High Pressure Coolant Injection Local Leak Rate Tests”`	10
6.PC.519	Surveillance Procedure “Reactor Core Isolation Coolant Local Leak Rate Tests”	12
6.SW.102	“Service Water Post-LOCA Flow Verification”, Completed 10/13/09	23
6.SWBP.201	“SW-MO-89A/B Full Stroke Operabilituy (IST)”, Completed 10/12/09	1
6.1DG.302	“Undervoltage Logic Functional, Load Shedding and Sequential Loading Test (Div 1)”, Completed 10/14/09	51

Section 2OS2: Access Controls to Radiologically Significant Areas

AUDITS, SELF-ASSESSMENTS, AND SURVEILLANCES

NUMBER	TITLE	DATE
S09-01	Occupational Radiation Safety	February 17, 2009
S08-12	Source Term Mitigation and Control	November 6, 2008
33722	QA Oversight of Radiological Postings / RP Tech Work	August 21, 2009

PROCEDURES

NUMBER	TITLE	REVISION
9.ALARA.4	Radiation Work Permits	11
9.EN-RP-108	Radiation Protection Posting	3
9.EN-RP-141	Job Coverage	4
9.EN-RP-101	Access Control for Radiologically Controlled Areas	4
9.ENN-RP-106-1	Radiation and Contamination Surveys	9
0-PI-01	Performance Indicator Program	27
9.RADOP.5	Airborne Radioactivity Sampling	21
9.EN-RP-208	Whole Body Counting and In-Vitro Bioassay	0

CONDITION REPORT

CR-CNS-2009-0264	CR-CNS-2009-5213	CR-CNS-2009-7566
CR-CNS-2009-8197	CR-CNS-2009-8412	CR-CNS-2009-8452
CR-CNS-2009-8623		

RADIATION WORK PERMITS

2009-401	2009-436	2009-437
2009-438	2009-458	

Section 2OS3: ALARA

AUDITS, SELF-ASSESSMENTS, AND SURVEILLANCES

NUMBER	TITLE	DATE
QAD2008070	Source Term Mitigation and Control	November 6, 2008
QAD2009003	Occupational Radiation Safety	February 17, 2009
CNSLO 2009-215	Focused Assessment; ALARA and Access Control	July 30, 2009

MISCELLANEOUS

TITLE	DATE
Cooper Nuclear Station Collective Radiation Exposure Reduction Plan	September 16, 2009
2008 Cooper Nuclear Station RE-24 ALARA Program Review	

PROCEDURES

NUMBER	TITLE	REVISION
0.ALARA.1	CNS ALARA Program	1
9.ALARA.4	Radiation Work Permits	11
9.ALARA.5	ALARA Planning and Controls	19
9.ALARA.13	Radiation Worker and Tour Group Dosimetry Management	12
9.EN.RP-110	ALARA Program	3
9.EN.RP.203	Dose Assessment	1
9.EN.RP.311	Electronic Alarming Dosimeters	0
9.RADOP.1	Radiation Protection at CNS	8
9.RESP.1	Respiratory Protection Program	12

CONDITION REPORT

CNS-2008-07933	CNS-2008-08658	CNS-2008-08907
CNS-2008-09586	CNS-2009-00208	CNS-2009-00289
CNS-2009-00393	CNS-2009-01005	CNS-2009-01163
CNS-2009-03535	CNS-2009-04698	CNS-2009-04961
CNS-2009-05704	CNS-2009-07718	

RADIATION WORK PERMITS

2009-407	2009-413	2009-416
2009-445		

Section 4OA2: Identification and Resolution of Problems

CONDITION REPORTS

CR-CNS-2009-04801	CR-CNS-2009-06716	CR-CNS-2009-03828
CR-CNS-2009-04546	CR-CNS-2009-05277	CR-CNS-2009-09854
CR-CNS-2009-09443	CR-CNS-2009-02977	CR-CNS-2009-10945
CR-CNS-2009-10898	CR-CNS-2009-05277	CR-CNS-2009-05277