



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-4005**

April 18, 2003

EA 03-068

Garry L. Randolph, Senior Vice
President and Chief Nuclear Officer
Union Electric Company
P.O. Box 620
Fulton, Missouri 65251

SUBJECT: CALLAWAY PLANT - NRC INTEGRATED INSPECTION REPORT 50-483/03-03

Dear Mr. Randolph:

On March 22, 2003, the NRC completed an integrated inspection at your Callaway Plant. The enclosed report documents the inspection findings which were discussed with you and other members of your staff on March 21, 2003.

This inspection 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. Within these areas, the inspection consisted of selected examination of procedures and representative records, observations of activities, and interviews with personnel.

Based on the results of this inspection, the NRC has identified issues that were evaluated under the risk significance determination process as having very low safety significance (Green). The NRC has also determined that violations are associated with these issues. These violations are being treated as noncited violations, consistent with Section VI.A of the Enforcement Policy, and are described in the subject inspection report. If you contest the violations or significance of these 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, DC 20555-0001, with copies to the Regional Administrator, U.S. Nuclear Regulatory Commission, Region IV, 611 Ryan Plaza Drive, Suite 400, Arlington, Texas 76011; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Callaway Plant facility.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response will be made 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).

Should you have any questions concerning this inspection, we will be pleased to discuss them with you.

Sincerely,

/RA/

David N. Graves, Chief
Project Branch B
Division of Reactor Projects

Docket: 50-483
License: NPF-30

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NRC Inspection Report
50-483/03-03

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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket: 50-483
License: NPF-30
Report: 50-483/03-03
Licensee: Union Electric Company
Facility: Callaway Plant
Location: Junction Highway CC and Highway O
Fulton, Missouri
Dates: December 29, 2002, through March 22, 2003
Inspectors: M. S. Peck, Senior Resident Inspector
J. D. Hanna, Resident Inspector
G. A. Pick, Senior Physical Security Inspector
R. E. Lantz, Senior Emergency Preparedness Inspector
D. R. Carter, Health Physicist
J. B. Nicholas, Ph.D., Senior Health Physicist
Approved By: D. N. Graves, Chief, Project Branch B

SUMMARY OF FINDINGS

Callaway Plant NRC Inspection Report 50-483/03-03

IR 05000483-03-03; Union Electric Co; 12/29/02-03/22/03; Callaway Plant. Operability Evaluations, Event Followup, and Access Control to Radiologically Significant Areas.

The report covers a 12-week period of routine Resident Office and Regional Office inspection activities from December 29, 2002, through March 22, 2003. Three findings of significance were identified. The significance of most findings is indicated by their color (Green, White, Yellow, 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 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 3, dated July 2000.

A. Inspector Identified Findings

Cornerstone: Mitigating Systems

- Green. A noncited violation of 10 CFR Part 50, Appendix B, Criterion V, Instructions, Procedures, and Drawings, for failure to correctly manufacture and install a valve stem on the turbine-driven auxiliary feedwater turbine. Appropriate quantitative and qualitative measures were not utilized to assure that the valve stem was manufactured to the correct dimensions, as required by Appendix B, prior to installation.

This finding had actual safety significance because the condition resulted in the failure of the turbine-driven auxiliary feedwater pump to respond to a valid demand signal. The finding was more than minor because it was associated with the mitigating system equipment performance cornerstone attribute and adversely affected the availability/reliability cornerstone objective. This finding was of very low safety significance because the condition was not a design or qualification deficiency, did not represent the actual loss of a safety function of a system, did not represent the actual loss of a safety function of a single train for greater than its Technical Specification allowed outage time, did not represent the loss of a non-Technical Specification related train for greater than 24 hours, or did not screen as potentially risk significant due to a seismic, fire, flooding, or severe weather initiating event (Section 4OA3.4).

Cornerstone: Barrier Integrity

- Green. A noncited violation of Technical Specification Action 3.6.3, Containment Isolation Valves, occurred when operators failed to isolate an inoperable component cooling water containment penetration flow path within the prescribed 4 hours.

This finding had actual safety significance because it resulted in one of two automatic containment isolation engineering features to be disabled and would have become a more significant safety condition if left uncorrected. This finding was more than minor because it was associated with barrier performance, the containment isolation reliability cornerstone attribute, and adversely affected the barrier integrity cornerstone objective.

This finding was evaluated using Appendix A of the reactor safety significance determination process and determined to be of very low safety significance because the condition did not affect the control room barrier function or represent an actual open containment pathway (Section 1R15).

Cornerstone: Occupational Radiation Safety

- Green. Inspectors identified two examples of a violation of 10 CFR 20.1501(a) for failure to perform radiological surveys. The licensee failed to collect airborne samples to evaluate the potential for airborne activity during the removal and reinstallation of contaminated insulation on Valve BB8378A on October 29 and November 15, 2002, respectively. This violation is being treated as a noncited violation consistent with Section VI.A.1 of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as Callaway Action Request System Number 200300355.

The issue was more than minor because the failure to perform a radiological survey has the potential for unplanned or unintended dose which could have been significantly greater as a result of higher levels of airborne activity. The safety significance of this finding was determined to be very low by the Occupational Radiation Safety Significance Determination Process because it did not involve ALARA planning and controls, there was no personnel overexposure, there was no substantial potential for personnel overexposure, and the finding did not compromise the licensee's ability to assess dose (Section 2OS1).

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 corrective action tracking numbers are listed in Section 4OA7.

Report Details

Summary of Plant Status: At the beginning of the inspection period, Union Electric Company was operating the facility at full power. The licensee reduced power to 80 percent on February 1, 2003, to reduce operational risk during feedwater heater control testing and repair of a nonvital power inverter. The licensee restored the unit to full power the following day. The licensee operated the plant at full power until beginning a forced outage to repair a leaking pressurizer safety relief valve on March 22. This outage extended into the second quarter inspection period.

1. **REACTOR SAFETY**

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

1R01 Adverse Weather Protection (71111.01)

a. Inspection Scope

The inspectors reviewed the licensee's adverse weather preparations to verify that design features and procedural implementation adequately protected mitigating systems. The inspectors walked down the emergency diesel engine fuel oil storage and transfer system, during February 2003, to verify that cold weather would not degrade the system function or operability. The inspectors discussed adverse weather precautions with the licensee and reviewed the following documents:

- Special Operating Procedure OTS-ZZ-0007, "Plant Cold Weather," Revision 6
- Final Safety Analysis Report Section 9.5.4, "Emergency Diesel Engine Fuel Oil Storage and Transfer System"
- Specification 10884-C-0(Q), "Civil and Structural Design Criteria for Site-Related (Non-standard) Category 1 Structures," Revision 3
- Drawing M-23JE01(Q), "Piping Orthographic Emergency Fuel Oil System (Below Grade)," Revision 0

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment (71111.04)

.1 Partial Walkdowns

a. Inspection Scope

The inspectors completed three partial system walkdowns of safety significant equipment during the inspection period. The inspectors performed the walkdowns to verify proper component alignment and equipment readiness when redundant systems were removed from service for maintenance or testing. The inspectors completed the following partial walkdowns during the quarter:

- Train B Containment Coolers: The inspectors completed a walkdown of the Train B containment cooler subsystem to verify correct mechanical and electrical alignment of components located in the auxiliary and control buildings. The inspectors completed the walkdown on February 4, 2003, while components of the redundant containment heat removal subsystem were out of service for maintenance. The inspectors reviewed critical portions of system alignments using the Final Safety Analysis Report, Section 6.2.2, "Containment Heat Removal Systems"; Piping and Instrumentation Diagram Drawings M-22EF02, "Essential Service Water System," Revision 47, and M-22GN01, "Containment Cooling System," Revision 17; and Normal Operating Procedures OTN-EF-00001, "Essential Service Water," Revision 24, and OTN-GE-00001, "Containment Cooling," Revision 11.
- Train B Auxiliary Feedwater System: The inspectors completed a walkdown of Train B of the auxiliary feedwater system to verify correct mechanical and electrical alignment of components located in the auxiliary, turbine, and control buildings. The inspectors completed the walkdown on March 11, 2003, while components of the redundant subsystem were out of service for testing. The inspectors reviewed critical portions of system alignments using the Final Safety Analysis Report, Section 10.4.9, "Auxiliary Feedwater System"; Piping and Instrumentation Diagram Drawing M-22AL01, "Auxiliary Feedwater System," Revision 24; and Normal Operating Procedure OTN-AL-00001, "Auxiliary Feedwater System," Revision 12.
- Train A Standby Diesel Generator: The inspectors completed a walkdown of the Train A standby diesel generator to verify correct mechanical and electrical alignment of components located in the diesel generator and control buildings. The inspectors completed the walkdown on March 20, 2003, while the redundant subsystem was out of service for testing. The inspectors reviewed critical portions of system alignments using the Final Safety Analysis Report, Section 8.3.1.1.3, "Standby Power Supply and Piping and Instrumentation Diagram Drawings M-22KJ01 through M-22KJ06 (Revisions 16, 17, 16, 15, 16, and 15, respectively).

b. Findings

No findings of significance were identified.

.2 Complete Walkdown of the Component Cooling Water System

a. Inspection Scope

The inspectors completed a walkdown of the component cooling water system mechanical components on March 1 and electrical lineup on March 4, 2003. The inspectors performed the walkdowns to verify correct system alignment; review component leakage which may impact system function; verify labeling, lubrication, and cooling; and verify that hangers and supports were correctly installed. The inspectors used Drawing M-22EG01, "Component Cooling Water System," Revisions 6 and 14;

Drawing E-21NB01, "Lower Medium Voltage System Class IE Single Line Meter and Relay Diagram," Revision 7; Final Safety Analysis Report, Section 9.2.2., "Cooling System For Reactor Auxiliaries"; and Technical Specification 3.7.7, "Component Cooling Water," to determine system requirements.

The inspectors also assessed operability and conformance of the component cooling water system with licensing requirements and commitments by in-office review. The inspectors considered the licensee's corrective measures to address Callaway Action Request System Number 200301779, potential component cooling water pump adverse trend, the corrective maintenance backlog, and the "Component Cooling Water System Health Report," dated February 21, 2003.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05)

a. Inspection Scope

The inspectors performed six fire protection walkdowns to verify operational status and material condition of fire detection and mitigation systems, passive fire barriers, and suppression equipment. The inspectors also reviewed the licensee's implementation of combustible material controls and ignition sources in selected fire protection zones. The inspectors compared plant conditions against descriptions and commitments described in the Final Safety Analysis Report, Section 9.5.1, "Fire Protection System," and Appendix 9.5B, "Fire Hazard Analysis." The inspected areas included:

- Fire Areas A-13, A-14, and A-15, auxiliary feedwater pump and valve rooms, completed on January 25, 2003
- Fire Areas C-15 and C-16, north and south battery and switchboard rooms, completed on January 25, 2003
- Fire Area A-23, main steam and feedwater valve compartment rooms, completed on February 1, 2003
- Fire Area A-27, reactor trip switchgear room, completed on February 1, 2003
- Fire Area A-7, boron injection room, completed on February 1, 2003
- Fire Area A-2B, safety injection pump and centrifugal charging pump rooms, completed on February 5, 2003

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures (71111.06)

a. Inspection Scope

The inspectors completed a walkdown of the auxiliary feedwater pump and support rooms on February 1, 2003. The inspectors conducted the walkdown to verify that the licensee had implemented adequate flood protection for equipment below the flood-line, including electrical conduits, holes, and wall penetrations. The inspectors walked down the common drain system and sumps and observed operable sump pumps, level alarms, and control circuits. The inspectors also inspected underground bunkers and manholes, subject to flooding, that contain multiple pieces of equipment which support the auxiliary feedwater system. The inspectors used Request for Resolution 16409, "Watertight Door Matrix," November 14, 1996; and the Final Safety Analysis Report, Section 3.4, "Water Level Flood Design," as the bases for acceptability of the plant configuration.

b. Findings

No findings of significance were identified.

1R07 Heat Sink Performance (71111.07)

a. Inspection Scope

The inspectors reviewed the Train A component cooling water heat exchanger performance test completed during Refueling Outage 12. The inspectors performed the review to verify adequate essential service water flow and heat exchanger capacity. The inspectors completed an in-office review of Engineering Test Procedures ETP-EG-00001, "Component Cooling Water Heat Exchanger Test," Revision 5; ETP-EF-0002A, "Essential Service Water Train A Flow Verification," Revision 8; and ETP-EG-00002, "Component Cooling Water Flow Verification," Revision 1, during March 2003. The inspectors compared the test results against Technical Specification requirements and guidance found in Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment."

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalifications (71111.11)

a. Inspection Scope

The inspectors observed a licensed operator training exercise to assess operator performance and the scenario critique. The inspectors placed an emphasis on observing high-risk operator actions, activities associated with the emergency plan, previous lessons learned items, and plant operational experiences. The inspectors

observed licensed operator continued training examination Scenario R0301S1, "Response to a Faulted Steam Generator," on February 11, 2003.

b. Findings

No findings of significance were identified.

1R12 Maintenance Rule Implementation (71111.12)

a. Inspection Scope

The inspectors assessed the effectiveness of the licensee's maintenance efforts and reviewed maintenance rule implementation. Specifically, the inspectors reviewed structure and component scoping, characterization, safety significance, performance criteria, and the appropriateness of goals and corrective actions. The inspection was performed during February and March 2003. The inspectors used Administrative Procedure APA-ZZ-00303, "Classification of Systems," Revision 6; Engineering Procedure EDP-ZZ-01128, "Maintenance Rule and EPIX Programs, Revision 3; and Regulatory Guide 1.160, "Monitoring the Effectiveness of Nuclear Power Plants," Revision 2, as a bases for acceptance. The inspectors also reviewed minutes from various maintenance rule expert technical panel meetings. The inspection scope included the following five items:

- 125 volt vital battery corrective action plan, Callaway Action Request System Number 200000113
- Turbine-driven auxiliary feedwater pump corrective action plan, Callaway Action Request System Number 200105218
- Containment hydrogen control system corrective action plan, Callaway Action Request System Number 200208437
- Steam generator blowdown sample isolation Valve BMHV66 functional failure determination, Callaway Action Request System Number 200206461
- Turbine-driven auxiliary feedwater Pump PAL02 functional failure determination, Callaway Action Request System Number 200208352

b. Findings

No findings of significance were identified.

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

a. Inspection Scope

The inspectors completed in-office reviews and control room inspections of the licensee's risk assessment of four emergent maintenance activities. The inspectors

compared the licensee's risk assessment and risk management activities against the requirements of 10 CFR 50.65(a)(4); the recommendations of Nuclear Management and Resource Council 93-01, "Industry Guidelines for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 3; and Engineering Department Procedure EDP-ZZ-01129, "Callaway Plant Risk Assessment," Revision 2. The inspectors also reviewed the effectiveness of the licensee's contingency actions to mitigate increased risk resulting from the degraded equipment. The inspectors evaluated the following risk assessments during the inspection:

- Work Request W225110, repair of Inverter PN10. The inspectors observed the implementation of compensatory measures from the control room on February 1, 2003.
- Work Request P597984, preventive maintenance of the power supply breaker to Train A containment cooler fan. The inspectors observed the implementation of compensatory measures from the control room and performed an auxiliary and control building walkdown of Workman's Protection Assurance System WPA-45667 on February 4, 2003.
- Operations Surveillance Procedure OSP-EJ-P001B, "RHR Train 'B' In Service Test," Revision 30, performed on February 18, 2003. The inspectors reviewed the risk assessment performed for this evolution and the associated compensatory measures taken by the licensee.
- Callaway Action Request System Number 200300381, "TDAFWP Steam Supply Warmup Valves found closed." The inspectors reviewed the licensee elevated risk compensatory actions following discovery of the condition by the operating authority. This issued involved a licensee-identified violation and was discussed in Section 40A7 of this report.

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15)

a. Inspection Scope

The inspectors reviewed the following four evaluations to ensure that operability was properly justified and the component or system remained available:

- Operability Determination 200300164, component cooling water Valve EGHV-00133. The inspectors completed in-office reviews on February 24 and March 5, 2003, of Callaway Action Request System Number 200301950, Valve EGHV0061, which failed Operations Surveillance Procedure OPS-EG-V002A.

- Operability Determination 200301690, equipment qualification deficiency of the containment hydrogen mixing fan. The inspectors completed an in-office review on February 27, 2003.
- Operability Determination 200300397, whip restraints on the steam supply line to the turbine-driven auxiliary feedwater pump. The inspectors completed an in-office review during January 2003.
- Operability Determination 200300943, gas vented from Safety Injection A discharge line to hot leg injection. The inspectors completed an in-office review on March 14, 2003.

b. Findings

Introduction. The inspectors identified one example of a noncited violation with very low safety significance (Green). The noncited violation was the result of the licensee's failure to meet the Technical Specification 3.6.3 action requirement to isolate an inoperable containment penetration flow path.

Description. The reactor coolant pumps are equipment with thermal barriers cooled by component cooling water. Thermal barrier discharge leaves the primary containment through Penetration P-76. Penetration P-76 inboard and outboard containment isolation valves automatically close on a containment isolation signal. The Final Safety Analysis Report stated that General Design Criteria 56, *Primary containment isolation*, was applicable to Penetration P-76. The plant configuration included a second motor-operated valve (EGHV00133) installed in parallel to the outboard containment isolation valve (EGHV00061). Valve EGHV00133 is a normally closed, remote manual valve with power removed. Valve EGHV00133 will not respond to an automatic containment isolation signal. Valve EGHV00133 was powered by the same source as the inboard isolation valve (EGHV00062).

General Design Criteria 56, *Primary containment isolation*, required Penetration P-76 to have automatic inside and outside containment isolation valves or to be isolated. The bases for Technical Specification 3.6.3, Actions A.1 and A.2, stated "In the event one containment isolation valve in one or more penetration flow paths is inoperable . . . the affected penetration flow path must be isolated. The method of isolation must include the use of at least one leak rate tested isolation barrier that cannot be adversely affected by a single failure. Isolation barriers that meet this criterion are a closed and de-activated automatic valve, a closed manual valve (with power removed), a blind flange This is necessary to ensure that containment penetrations required to be isolated following an accident and no longer capable of being automatically isolated will be in the isolation position should an event occur."

On January 8, 2002, the licensee declared the primary containment outboard isolation valve (EGHV00061) inoperable following a stroke time test failure. The operating authority manually closed the valve and removed power as required by plant Technical Specification 3.6.3, Action A.1. However, the licensee continued to use the penetration by opening the parallel outboard containment isolation valve (EGHV00133).

Valve EGHV00133 was not designed to automatically close on a containment isolation signal as required by General Design Criteria 56. Also, Penetration P-76 did not meet the Technical Specification single failure criteria because Valve EGHV00133 was powered from the same source as the inboard containment isolation valve.

Analysis. The inspectors determined that the licensee's failure to isolate the penetration flow path, as required by Technical Specification Action 3.6.3.A.1, was a performance deficiency. This finding was more than minor because it was associated with the barrier performance and the containment isolation reliability cornerstone attribute and the finding affected the barrier integrity cornerstone objective. The condition had actual safety significance because it resulted in one of two automatic containment isolation engineering features to be disabled. The finding was of very low safety significance because the issue did not affect the control room barrier function or represent an actual open containment pathway.

Enforcement. Technical Specification 3.6.3, Action A.1, required the licensee to isolate the affected penetration flow path by the use of at least one closed and deactivated automatic valve, closed manual valve, blind flange, or check valve with the flow secured within 4 hours after identifying an inoperable containment isolation valve. Contrary to the above, the licensee failed to isolate the Penetration P-76 flow path within 4 hours of declaring containment isolation Valve EGHV00061 inoperable. Penetration P-76 was inoperable and not isolated from January 8-10, 2003. The inspector treated this issue as a noncited violation, consistent with Section VI.A.1 of the NRC Enforcement Policy, because the failure to isolate the penetration flow path within 4 hours was of very low safety significance and the condition was entered into the licensee's corrective action program (Callaway Action Request System Number 200300176) (NCV 50-483/200303-01).

1R16 Operator Workarounds (71111.16)

a. Inspection Scope

The inspectors reviewed the cumulative effect of operator workarounds on the reliability, availability, potential for misoperation, and ability of operators to respond in a correct and timely manner to plant transients and accidents. The inspectors compared the operator workaround and operator burdens with the criteria specified by Nuclear Division Policy O-Workaround-001, Revision 0. The inspectors completed an in-office review of the licensee's February 2003 operator workaround and burden lists on February 27, 2003, and observed the March 12, 2003, operator workaround review meeting.

b. Findings

No findings of significance were identified.

1R19 Postmaintenance Testing (71111.19)

a. Inspection Scope

The inspectors reviewed four postmaintenance tests that could potentially have affected risk significant systems or components. The inspectors completed an in-office review to verify that each test adequately demonstrated system operability and capability. The inspectors used Technical Specifications, the Final Safety Analysis Report, and ASME Section XI to determine system and component requirements. The inspectors' review included the following postaintenance tests:

- Retests R220212A, R69743A, and R222384A, component cooling water pump and motor repair, on February 3, 2003
- Retest R217687A, reactor coolant drain tank outer containment isolation valve repair, on February 3, 2003
- Retest R684063A, control room pressurization Fan B, on March 10, 2003
- Retest R705959C, perform Operations Procedure OSP-EG-V002A on Valve EGHV0061, on March 11, 2003

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors observed or reviewed the following six surveillance tests to ensure that the systems tested were capable of performing their safety function and to assess their operational readiness. Specifically, the inspectors verified that the following surveillance tests met Technical Specifications, ASME Section XI test requirements, the Final Safety Analysis Report, and licensee procedural requirements:

- Surveillance Test S703587, Operations Surveillance Procedure OSP-BB-00009, "RCS Inventory Balance," Revision 11. The inspectors completed an in-office review on January 27, 2003
- Surveillance Test S702565, Engineering Surveillance Procedure ESP-ZZ-00017, "Nuclear Enthalpy Rise Hot Channel Factor," Revision 11; Core Operating Limits Report ULNRC-04794, January 21, 2003; and Flux Map Number 0301. The inspectors completed an in-office review on January 28, 2003
- Surveillance Test S701686, Engineering Surveillance Procedure ESP-ZZ-00006, "Incore/Excore Calibration," Revision 25, completed on February 20, 2003. The inspectors completed an in-office review on March 1, 2003

- Operations Surveillance Procedure OSP-EJ-P001B, "RHR Train 'B' In-Service Test," Revision 30, performed on February 18, 2003. The inspectors observed the test from the control room.
- Operations Surveillance Procedure OSP-AL-P001B, "Motor Driven Aux Feedwater Pump 'B' Inservice Test," Revision 30 performed on February 19, 2003. The inspectors completed an in-office review on March 19, 2003.
- Surveillance Test S702872, Operations Surveillance Procedure OSP-NE-0001B, "Standby Diesel Generator 'B' Periodic Tests," Revision 12, performed on January 29, 2003. The inspectors completed an in-office review on March 20, 2003.

b. Findings

No findings of significance were identified.

1R23 Temporary Plant Modifications (71111.23)

a. Inspection Scope

The inspectors monitored the licensee's temporary modification log and reviewed Administrative Procedure APA-ZZ-00605, "Temporary System Modifications," Revision 14. The licensee did not implement any risk significant temporary modifications during the inspection period.

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 inspectors conducted an in-office review of Revision 30 of Emergency Plan Implementing Procedure EIP-ZZ-00101, "Classification of Emergencies," and Revision 25 of the Radiological Emergency Response Plan, submitted September 13, 2002. The inspectors compared these revisions to the previous revisions and 10 CFR 50.54(q) to determine if the revisions decreased the effectiveness of the emergency plan.

b. Findings

No findings of significance were identified.

1EP6 Drill Evaluation (71114.06)

a. Inspection Scope

The inspectors observed rapid responder proficiency drill and critique (Drill Number 020509, Cycle 2003-01) from the Technical Support Center on February 13, 2003. The inspectors evaluated the adequacy of the licensee's drill conduct, proper classification of emergency action levels, and protective action recommendations. The inspectors used Operations Procedure ODP-ZZ-0025, "Emergency Operating Procedure Usage," Revision 4; Emergency Plan Implementing Procedure EIP-ZZ-00100, "Classification of Events," Revision 30; and Emergency Plan Implementing Procedure EIP-ZZ-00201, "Notifications," Revision 36, to evaluate licensee performance. The inspectors also reviewed the licensee's postdrill corrective actions, as documented in Callaway Action Request System Number 200301487.

b. Findings

No findings of significance were identified.

3. RADIATION SAFETY
Cornerstone: Occupational Radiation Safety

2OS1 Access Control to Radiologically Significant Areas (71121.01)

a. Inspection Scope

Inspectors performed an in-office review of the licensee's investigation of a personnel contamination event that occurred on or about November 15, 2002, to determine if there were any issues contrary to regulatory requirements.

b. Findings

Introduction. Two examples of a noncited violation with very low safety significance (Green) were identified for a failure to perform radiological surveys, as prescribed in 10 CFR 20.1501(a).

Description. On January 17, 2003, the licensee provided the results of their investigation of a personnel contamination event which occurred on or about November 15, 2002. Based on the results of the investigation, the licensee determined that, during the re-installation of contaminated insulation to reactor coolant system Valve BB8378A, an individual was contaminated on the face and nose. Whole body count and bioassay analysis results confirmed positive results, indicating an intake of Cs-134 and Cs-137. As a result of the bioassay results, a dose of 2 millirem was

assigned to the individual. During the review of the licensee's investigation and through interviews with the licensee, the inspectors identified and confirmed that the licensee failed to perform radiological surveys by failing to collect airborne samples during the removal and reinstallation of contaminated insulation on Valve BB8378A on October 29 and November 15, 2002, respectively.

Analysis. The failure to perform airborne sampling during the removal and reinstallation of contaminated insulation was determined to be a performance deficiency. This finding was more than minor because it was associated with the contamination control cornerstone attributes, and the finding affected the Occupational Radiation Safety cornerstone objective (adequate protection from exposure from radioactive material). Because the finding involved the potential for unplanned and unintended dose resulting from conditions that were contrary to NRC regulations which could have been significantly greater as a result of higher levels of airborne activity, the finding was evaluated using the Occupational Radiation Safety Significance Determination Process. The safety significance of this finding was determined to be very low because it did not involve as low as reasonably achievable (ALARA) planning and controls, there was no personnel overexposure, there was no substantial potential for personnel overexposure, and the finding did not compromise the licensee's ability to assess dose.

Enforcement. Title 10 of the Code of Federal Regulations, Part 20.1501(a), states, in part, that each licensee shall make, or cause to be made, surveys that may be necessary for the licensee to comply with the regulations in Part 20 and that they are reasonable under the circumstances to evaluate the extent of radiation levels, concentrations or quantities of radioactive material, and the potential radiological hazards that could be present. On October 29 and November 15, 2002, the licensee failed to perform radiological surveys to assure compliance with 10 CFR 20.1201(a)(1), which limits radiation exposure to the whole body to 5 rems. Specifically, airborne sampling was not performed during the removal and reinstallation of contaminated insulation on Valve BB8378A to evaluate airborne activity, which resulted in an unplanned and unintended exposure to an individual performing the tasks. Because the failure to effectively evaluate the radiological hazard is of very low safety significance and has been entered into the licensee's corrective action program as Callaway Action Request System Number 200300355, this violation is being treated as a noncited violation consistent with Section VI.A.1 of the NRC Enforcement Policy (NCV 50-483/200303-02).

2OS2 ALARA Planning and Controls (71121.02)

a. Inspection Scope

The inspectors interviewed radiation workers and radiation protection personnel throughout the radiologically controlled area and conducted independent radiation surveys of selected work areas. The inspectors reviewed radiation work permit (RWP) and ALARA packages associated with Refueling Outage 12 work. The inspectors also observed the ALARA prejob briefing and radiological job coverage for an entry into the

reactor building at full power. The following items were reviewed and compared with regulatory requirements to assess the licensee's program to maintain occupational exposure ALARA:

- ALARA program procedures
- Processes used to estimate and track exposures
- Plant collective exposure history for the past 3 years, current exposure trends, and 3-year rolling average dose information
- Six RWP packages from Refueling Outage 12 work activities which resulted in the highest personnel collective exposures (RWP 253321MAN, "Steam Generator Manway Cover Removal and Installation;" RWP 253322INSTALL, "Installation of Steam Generator Nozzle Dams;" RWP 253323EC, "Steam Generator Tube Eddy Current Testing;" RWP 253323TEARDN, "Area and Equipment Teardown After Steam Generator Eddy Current Testing;" RWP 253323PLUG, "Steam Generator Tube Plugging and Remote Stabilizing;" and RWP W214779, "Repack BGLCV0460")
- Use of engineering controls to achieve dose reductions
- Hot spot tracking and reduction program and temporary shielding installations
- Radiological work planning
- A summary of ALARA and radiological worker performance-related corrective action reports written since March 1, 2002 (six items were reviewed in detail: Callaway Action Request System Numbers 20024351, 20024454, 20024820, 20026122, 20027298, and 20027522)
- Declared pregnant worker dose monitoring controls
- ALARA program controls portion of Quality Assurance Audit AP02-001; Self-Assessment Reports SA02-HP-001 and SA03-HP-004; and Surveillance Reports SP02-017 and SP02-052

b. Findings

No findings of significance were identified.

3. SAFEGUARDS Cornerstones: Physical Protection

3PP4 Security Plan Changes (71130.04)

a. Inspection Scope

The inspectors reviewed the following Physical Security Plan changes to determine if they decreased the effectiveness of the Physical Security Plan and to determine if requirements of 10 CFR 50.54(p) were met:

- Physical Security Plan, Revision 33, dated June 20, 2002, that integrated the Missouri State Highway Patrol as a response organization, allowed for different methods of verifying military work history, and clarified the power supply configuration
- Physical Security Plan, Revision 34, dated August 29, 2002, to reflect actions taken in response to the Interim Compensatory Measures

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification (71151)

a. Inspection Scope

The inspectors reviewed licensee data supporting submittals for three 2002 calendar year performance indicators. The inspectors used performance indicator definitions and guidance contained in Nuclear Energy Institute 99-02, "Regulatory Assessment Indicator Guideline," Revision 1, to verify the accuracy of the data reported during the period:

- Safety system unavailability - emergency ac power system
- Reactor coolant system specific activity
- Reactor coolant system leak rate

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems (71152)

a. Inspection Scope

The inspectors performed detailed in-office reviews and walkdowns of plant equipment related to five CARS documenting conditions adverse to quality. The inspectors reviewed the reports to verify that the full extent of the issues were identified, that the licensee performed appropriate evaluations, and that corrective actions were specified and prioritized. The inspectors evaluated the reports against the requirements of the licensee's corrective action program, Administrative Procedure APA-ZZ-00500, "Corrective Action Program," Revision 21, and 10 CFR Part 50, Appendix B. The inspectors reviewed the following items:

- Callaway Action Request System Number 200300889, reactor coolant leakage. The inspectors completed an in-office review and reactor building walkdown on February 14, 2003.
- Callaway Action Request System Number 200300970, the NRC identified overdue fire extinguishers and observed fire extinguisher special performance tests. The inspectors completed an in-office review and auxiliary building walkdown on February 14, 2003.
- Callaway Action Request System Number 200300164, dual indication for Valve EGHV0133. The inspectors completed an in-office review and auxiliary building walkdown on March 6, 2003.
- Callaway Action Request System Number 200301515, vibration data for residual heat removal Pump B in the action range. The inspectors completed an in-office review on March 6, 2003.
- Callaway Action Request System Number 200301806, weather warnings not updated in the safety monitor. The inspectors completed an in-office review on March 7, 2003.

b. Findings

No findings of significance were identified.

4OA3 Event Followup (71153)

- .1 (Closed) Licensee Event Report (LER) 50-483/2002-004-00: Reactor Protection System Actuation While Performing Main Turbine Shell Warming.

The reactor protection system actuated, while in Mode 4, due to inadequate operating procedures. The licensee initiated Callaway Action Request System Number 200200965 for this issue. The inspectors reviewed the LER and did not identify any significant findings.

- .2 (Closed) Licensee Event Report 50-483/2001-003-00: Reactor Trip Due to the Loss of Both Rod Drive Motor Generators.

This event was discussed in NRC Inspection Report 50-483/01-02. The licensee initiated Callaway Action Request System Number 200100945 for this issue. The inspectors reviewed the LER and did not identify any significant findings.

- .3 (Closed) Unresolved Item 50-483/0107-03: No Acceptance Criteria Bases for Auxiliary Feedwater Pipe Venting.

This item was unresolved pending the licensee's completion of an operability analysis of gas entrapped in the auxiliary feedwater system. The licensee completed Dominion Engineering Calculation DEI-41521-001, Revision 1, December 19, 2002, to establish acceptable vented gas volumes in various auxiliary feedwater and emergency core cooling system locations. The calculation determined that the maximum acceptable gas voiding would not result in a flow degradation greater than 2 percent. This acceptance criteria concluded component operability based on the affect of dynamic gas pocket pressure waves with system piping. The licensee translated these limiting gas volumes into operating specifications and acceptance limits for the emergency core cooling and auxiliary feedwater systems. The licensee reviewed past vented gas volumes against the new limiting valves. The licensee did not identify any cases of past inoperable equipment based on the new acceptance criteria. The inspectors did not identify any significant findings during the review of the licensee's corrective actions.

- .4 (Closed) Unresolved Item 50-483/2002-006-02: Turbine-Driven Auxiliary Feedwater Pump Failure to Start.

a. Inspection Scope

This unresolved item involved the failure of the turbine-driven auxiliary feedwater pump to restart following a valid automatic actuation signal and an NRC issued Notice of Enforcement Discretion. On December 14, 2002, while in Mode 3, the licensee declared the turbine-driven auxiliary feedwater pump inoperable after its failure to restart on a valid low steam generator water level condition. The licensee estimated that the repair and postmaintenance testing may exceed the Technical Specification 72-hour completion time by up to 48 hours. On December 16, 2002, the licensee requested that the NRC exercise discretion not to enforce compliance with the actions required in Technical Specification 3.7.5, Action C.1, which required the licensee to enter Mode 4 within 12 hours.

The NRC granted the licensee's request for a Notice of Enforcement Discretion based on an evaluation of proposed compensatory measures and the NRC's conclusion that extension of the completion time did not have an adverse radiological impact on public health and safety.

b. Findings

Introduction. The inspectors concluded that the turbine-driven auxiliary feedwater pump failure resulted from the licensee's incorrect on-site manufacturing and installation of the turbine governor valve stem. The inspectors concluded this condition was a noncited violation of 10 CFR Part 50, Appendix B, Criterion V, and a finding of very low safety significance (Green).

Description. The turbine-driven auxiliary feedwater pump failed to restart following an automatic actuation signal during a reactor trip recovery on December 14, 2002. The turbine failed on overspeed during the restart sequence. The licensee determined that the overspeed condition resulted from governor valve binding. The binding was caused by a combination of an oversized valve stem and misalignment between the fulcrum support and the bonnet.

The turbine governor valve stem diameter exceeded design specifications. Valve design limited stem diameter tolerance to between 0.4987 and 0.4995 inches. The valve stem removed from the pump turbine measured between 0.4986 and 0.5008 inches. The licensee had manufactured the valve stem on site. The oversized stem diameter resulted in binding with the valve bonnet carbon bushings. The constriction was exacerbated after system heatup, due to thermal expansion of the stem. Nuclear Regulatory Commission Information Notice 98-24, "Stem Binding in Turbine Governor Valves in Reactor Core Isolation Cooling and Auxiliary Feedwater Systems," described the thermal binding of governor valves and the importance of maintaining correct dimensional tolerance between the stem and carbon bushings. The licensee had replaced the governor valve stem during Refueling Outage 12 in November 2002.

Analysis. The inspectors concluded that the licensee's failure to properly manufacture and install the valve stem was a performance deficiency. The finding was more than minor because it was associated with the mitigating system equipment performance cornerstone attributes and it affected the availability/reliability cornerstone objective. In assessing the significance of this condition, the inspectors reviewed the licensee's evaluation that concluded that the auxiliary feedwater pump would have been capable of completing the design basis 24-hour mission time if not shutdown after the initial starting of the pump. Because this finding involved the degradation of a mitigating system, the finding was evaluated using the significance determination process for at-power situations. The inspector concluded the condition finding was of very low safety significance because the finding:

- was not a design or qualification deficiency
- did not represent the actual loss of a safety function of a system
- did not represent the actual loss of a safety function of a single train for greater than its Technical Specification allowed outage time

- did not represent the loss of a non-Technical Specification related train (designated as risk significant per 10 CFR 50.65 a(4)) for greater than 24 hours
- did not screen as potentially risk significant due to a seismic, fire, flooding, or severe weather initiating event

Enforcement. Title 10 of the Code of Federal Regulations, Part 50, Appendix B, Criteria V, "Instructions, Procedures, and Drawings," required that activities affecting quality be accomplished in accordance with approved instructions, procedures, or drawings of a type appropriate to the circumstances. Contrary to the above, the licensee failed to correctly manufacture and install the turbine-driven auxiliary feedwater pump governor valve stem in accordance with approved procedures and drawings. Because of the very low safety significance and the licensee's action to place the issue in their corrective action program (Callaway Action Request System Number 200208352), this violation is being treated as a noncited violation in accordance with Section VI.A.1 of the Enforcement Policy (50-483/0303-03; EA 03-068).

- .5 (Closed) LER 50-483/2002-014-00: Reactor Trip while Removing Condensate Pump C from Service.

The reactor trip was due to an incorrect gain setting on the overtemperature delta temperature flux amplifier. This condition resulted in a Green finding and was discussed in NRC Inspection Report 50-483/02-06. This LER also discussed the failure of the turbine-driven auxiliary feedwater pump to restart. This issue was discussed in Section 4OA3.4 of this report. The inspectors reviewed the LER and no additional significant findings were identified.

- .6 (Closed) LER 50-483/2002-005-00: Inaccurate Steam Generator Low-Low Level Setpoints due to Vendor Design Calculation Error.

Westinghouse transmitted Nuclear Safety Advisory Letter 02-03 regarding an error in the steam generator water level setpoint analysis. This error was due to pressure across a middeck plate internal to the steam generator separator not being accounted for in the analysis. The inspectors reviewed the LER and no significant findings were identified. The licensee initiated Callaway Action Request System Number 200201328 for this issue.

- .7 (Closed) Licensee Event Report 50-483/2001-005-00: Auxiliary Feedwater Actuation due to Loss of DC Bus PK01.

The auxiliary feedwater system actuated when a nonsafety dc electrical bus was inadvertently deenergized during maintenance. The inspectors reviewed the LER and no significant findings were identified. The licensee initiated Callaway Action Request System Number 200105835 for this issue.

40A6 Management Meetings

Exit Meeting Summary

On March 21, 2003, the resident inspectors presented the inspection results to Mr. G. Randolph, Senior Vice President, Generation and Chief Nuclear Operating Officer, and other members of his staff who acknowledged the findings.

On January 31, 2003, the Health Physics inspectors presented the inspection results to Mr. W. Witt, Plant Manager, and other members of his staff and on February 13, 2003, to Mr. J. Laux, Manager, Operations Support and other members of his staff (during a telephonic exit meeting) who acknowledged the findings.

On February 21, 2003, the Physical Security inspectors presented the inspection results to Mr. M. Dunbar, Superintendent Protective Services, via telephone. He acknowledged the findings.

On March 3, 2003, the Emergency Preparedness inspectors presented the inspection results to Mr. L. Graessle, Superintendent, Protective Services, and other members of his staff who acknowledged the findings.

40A7 Licensee Identified Violations

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

- Callaway Plant Technical Specification 5.4.1 and Regulatory Guide 1.33 required that written procedures be implemented for operation of the auxiliary feedwater system. On January 15, 2003, the licensee performed Operations Surveillance Procedure OSP-SA-0005A, "Train 'A' SLIS Slave Relay Test," Revision 10, without meeting the required initial conditions. This action resulted in the unplanned isolation of both steam supplies to the turbine-driven auxiliary feedwater pump for 15 hours. This event was described in the licensee's corrective action program as Callaway Action Request 200300381. This violation was not more than of very low significance because the auxiliary feedwater pump inoperability duration did not exceed the Technical Specification out-of-service time. This finding is being treated as a noncited violation.
- Title 10 of the Code of Federal Regulations, Section 50.65 a(4), required the licensee to assess and manage increase in risk resulting from the proposed maintenance activities. On March 7, 2003, the licensee performed Operations Procedure OSP-SA-0005A, "Train 'A' SLIS Slave Relay Test," Revision 10, which resulted in elevated plant risk due to the inoperability of the turbine-driven auxiliary feedwater pump. Control room operators were unaware of the elevated risk condition and did not implement appropriate risk management compensatory

actions. This event was described in the licensee's corrective action program as Callaway Action Request 200302049. This finding is being treated as a noncited violation.

ATTACHMENT
SUPPLEMENTAL INFORMATION
KEY POINTS OF CONTACT

Licensee

J. Blosser, Manager, Regulatory Affairs
S. Bond, Superintendent, Nuclear Engineering Systems
R. Farnam, Supervisor, Health Physics Operations
K. Gilliam, Supervisor, Radiation/Chemistry
L. Graessle, Superintendent, Protective Services
J. Hiller, Engineer, Regional Regulatory Affairs
J. Laux, Manager, Operations Support
M. Reidmeyer, Supervisor, Regional Regulatory Affairs
R. Roselius, Superintendent, Health Physics
W. Witt, Plant Manager

ITEMS OPENED AND CLOSED

Opened

50-483/0303-01	NCV	Failure to isolate an inoperable containment penetration flow path (Section 1R15)
50-483/0303-02	NCV	Failure to perform radiological surveys (Section 2OS1)
50-483/0303-03	NCV	Turbine-driven auxiliary feedwater pump failure to start (Section 4OA3.4)

Closed

50-483/0303-01	NCV	Failure to isolate an inoperable containment penetration flow path (Section 1R15)
50-483/0303-02	NCV	Failure to perform radiological surveys (Section 2OS1)
50-483/2002-004-00	LER	Reactor protection system actuation while performing main turbine shell warming (Section 4OA3.1)
50-483/2001-003-00	LER	Reactor trip due to the loss of both rod drive motor generators (Section 4OA3.2)
50-483/0107-03	URI	No acceptance criteria bases for auxiliary feedwater pipe venting (Section 4OA3.3)
50-483/0303-03	NCV	Turbine-driven auxiliary feedwater pump failure to start (Section 4OA3.4)

50-483/2002-006-02	URI	Turbine-driven auxiliary feedwater pump failure to start (Section 4OA3.4)
50-483/2002-014-00	LER	Reactor trip while removing condensate Pump C from service (Section 4OA3.5)
50-483/2002-005-00	LER	Inaccurate steam generator low-low level setpoints due to vendor design calculation error (Section 4OA3.6)
50-483/2001-005-00	LER	Auxiliary feedwater actuation due to loss of dc Bus PK01 (Section 4OA3.7)

DOCUMENTS REVIEWED

The following documents were selected and reviewed by the inspectors to accomplish the objectives and scope of the inspection and to support any findings:

Callaway Action Request System Numbers

200302063	200300545
200300397	200301451

Diagrams

M-22AL01, "Piping and Instrumentation Diagrams Auxiliary Feedwater System," Revision 24
M-021-00173, "Valve Governor Stem," Revision 0
M-021-00066, "Governor Valve and Linkage Section," Revision 2
M-021-00132, "Diagram-Trip System," Revision 8

Calculations

Archon Engineering Calculation ARC-262, "Review of Whip Restraint FC-1 as a Common Pipe Restraint," Revision 0

Archon Engineering Calculation ARC-266, "TDAFW Governor Valve Thermal Transient Analysis," Revision 0

Archon Engineering Calculation ARC-267, "TDAFW Governor Valve Thermal Expansion," Revision 0

Archon Engineering Calculation ARC-268, "TDAFW Governor Valve Misalignment," Revision 0

Bechtel Engineering Calculation P-060, "Auxiliary Feedwater Pump Turbine - Steam Inlet Side," dated June 25, 1983

Bechtel Engineering Calculation FC01-28, "Pipe Support for Structural Stability," dated February 12, 1982

Miscellaneous

Callaway Plant Technical Specification 3.7.5, "Auxiliary Feedwater (AFW) System," and associated Technical Specification Bases Section

Control Room operating logs from December 14, 2002

Control Room operating logs from January 15 and 16, 2003

Equipment Out-of-Service Log 10438, "Turbine-Driven Auxiliary Feedwater Pump," entered on December 14, 2002

Request for Resolution 22598, Install Pipe Whip Restraint FC-1

Root Cause Analysis for Callaway Action Request System Number 200208352 (TDAFW Electrical Overspeed Trip)