



**UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
611 RYAN PLAZA DRIVE, SUITE 400
ARLINGTON, TEXAS 76011-8064**

May 1, 2002

EA-00-208

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

SUBJECT: CALLAWAY - NRC INSPECTION REPORT 50-483/01-07

Dear Mr. Randolph:

On April 6, 2002, the NRC completed an inspection at your Callaway Plant. The enclosed report documents the inspection findings which were discussed with Mr. R. D. Affolter and other members of your staff on April 8, 2002.

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 one issue that was evaluated under the risk significance determination process as having very low safety significance (Green). The NRC has also determined that a violation is associated with this issue. This violation is being treated as a noncited violation (NCV), consistent with Section VI.A of the Enforcement Policy. The NCV is described in the subject inspection report. If you contest the violation or significance of the NCV, 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 and its enclosure 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).

Union Electric Company

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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
50-483/01-07

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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
 REGION IV

Docket: 50-483
License: NPF-30
Report No.: 50-483/01-07
Licensee: Union Electric Company
Facility: Callaway Plant
Location: Junction Highway CC and Highway O
Fulton, Missouri
Dates: December 30, 2001, through April 6, 2002
Inspectors: V. G. Gaddy, Senior Resident Inspector
J. D. Hanna, Resident Inspector
P. J. Elkmann, Emergency Preparedness Inspector
D. R. Carter, Health Physicist
Approved By: D. N. Graves, Chief, Project Branch B

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUMMARY OF FINDINGS

Callaway Plant NRC Inspection Report 50-483/01-07

IR 05000483-01-07; on 12/30/2001-04/06/2002; Union Electric Co; Callaway Plant. Integrated Resident & Regional Report; Problem Identification and Resolution.

The inspection was conducted by resident inspectors, region based emergency preparedness and health physics inspectors and a region based operations engineer. The inspection identified one Green finding, which is a noncited violation. 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 are indicated by "No Color" or by the severity level of the applicable violation. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described at its Reactor Oversight Process website at <http://www.nrc.gov/NRR/OVERSIGHT/index.html>.

A. Inspector Identified Findings

Cornerstone: Mitigating Systems

- Green. A noncited violation of 10 CFR Part 50, Appendix B, Criterion XVI, occurred when the licensee failed to take corrective action to ensure that abnormally high vibration on both motor-driven trains of the auxiliary feedwater system was corrected. During the past 12 years, the licensee had identified this condition five times. The licensee did not determine the actual cause of auxiliary feedwater piping vibration and consequently did not take appropriate corrective action. This finding included crosscutting aspects in the area of problem identification and resolution.

The finding was more than minor because it had a credible impact on safety in that, if this vibration had occurred when auxiliary feedwater was needed, it could have affected operation of the system. This finding affects the mitigating system cornerstone. This finding was found to be only of very low safety significance because the likelihood that the system would be operated in the condition that caused the abnormally high vibrations was low, nondestructive examinations revealed no piping degradation, and no vibrations were observed on the turbine-driven auxiliary feedwater train. Because the finding is of very low safety significance, and the finding was entered into the licensee's corrective action program as Callaway Action Request System Number 200200881, the associated violation is being treated as a noncited violation, consistent with Section VI.A of the NRC Enforcement Policy (Section 40A2).

Report Details

Summary of Plant Status: On January 31, 2002, the licensee began a plant shutdown to Mode 4 to remove the floating diaphragm from the condensate storage tank. The floating diaphragm was identified as the source of foreign material in the auxiliary feedwater system. The unit was restarted on February 15 and reached full power on February 18. On February 28, the plant was placed in Technical Specification 3.0.3 because the steam generator water level instrument channels were inoperable due to a nonconservative steam generator low-low level setpoint. The plant shutdown began at 4:25 p.m. The power reduction was stopped at approximately 27 percent when engineering calculations indicated that at this power level the steam generator low-low level setpoint was no longer nonconservative. The setpoints were changed to account for the nonconservatism and the power increase commenced on March 1. The unit reached full power on March 4 and remained at full power for the remainder of the inspection period.

1. REACTOR SAFETY

Cornerstones: Initiating Events, Mitigating Systems, Barrier Integrity

1R04 Equipment Alignment (71111.04)

.1 Partial Walkdowns

a. Inspection Scope

On January 23, 2002, the inspectors performed a partial walkdown of centrifugal charging Train A while Train B was out of service for maintenance. The inspectors compared the as-found condition of the centrifugal charging system with the requirements of the Final Safety Analysis Report, Technical Specifications, and Drawing M22-BG03 (Q), "Piping and Instrumentation Diagram Chemical and Volume Control System," Revision 45.

On February 26, 2002, the inspectors performed a partial walkdown of emergency diesel generator Train A while Train B was out of service for maintenance. The inspectors compared the as-found condition of the emergency diesel generator with the requirements of the Final Safety Analysis Report; Technical Specifications; Drawing M22-KJ01 (Q), "Piping and Instrumentation Diagram Standby Diesel Generator 'A' Cooling Water System," Revision 16; and Drawing M22-KJ02, "Piping and Instrumentation Diagram Standby Diesel Generator 'A' Intake Exhaust, F.O. and Start Air System," Revision 17.

On March 12, 2002, the inspectors performed a partial walkdown of essential service water Train B while Train A was out of service for maintenance. The inspectors compared the as-found condition of the essential service water system with the requirements of the Final Safety Analysis Report, Technical Specifications, and Drawing M22-EF01 (Q), "Piping and Instrumentation Diagram Essential Service Water System," Revision 38.

b. Findings

No findings of significance were identified.

.2 Complete Equipment Walkdown

a. Inspection Scope

During the week of February 18, 2002, the inspectors performed a complete walkdown of the auxiliary feedwater system. The auxiliary feedwater system was selected due to the difficulty in obtaining an adequate fill and vent and due to vibrational problems that were observed while the plant was in Mode 4 to support removal of the floating diaphragm from the condensate storage tank. The inspectors verified that valves were positioned correctly, pipe supports and hangers were not damaged from system vibrations, support equipment was operational, and equipment installed to facilitate venting would not interfere with system performance. The inspectors also reviewed the modifications implemented to reduce system vibrations and to facilitate system venting. The inspectors evaluated the system condition against the criteria documented in Operations Procedure OTN-AL-00001, "Auxiliary Feedwater System," Revision 10; Drawing M-22AL01 (Q), "Piping and Instrumentation Diagram Auxiliary Feedwater System," Revision 17; Final Safety Analysis Report Section 10.4.9; and ASME Boiler and Pressure Vessel Code Section XI, 1989 Edition.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05)

.1 Routine Observations

a. Inspection Scope

The inspectors reviewed the following areas to determine if the licensee had implemented a fire protection program that adequately controlled combustibles and ignition sources within the plant, effectively maintained fire detection and suppression capabilities, and maintained passive fire protection features in good material condition. The areas reviewed were:

- Emergency exhaust system on January 9, 2002
- North electrical penetration room on January 10, 2002
- Main steam piping penetration room on January 14, 2002
- Essential service water Pump A area on January 16, 2002
- Emergency core cooling system Train A equipment room on January 17, 2002
- Residual heat removal system Train A on February 22, 2002

The inspectors assessed these areas and verified that combustibles that were noted were being controlled in accordance with the following:

- Final Safety Analysis Report, Appendix 9.5B, Fire Hazards Analysis

- Administrative Procedure APA-ZZ-00741, "Control of Combustible Material," Revision 16
- Administrative Procedure APA-ZZ-00701, "Control of Fire Protection Impairments," Revision 8
- Administrative Procedure APA-ZZ-00742, "Control of Ignition Sources," Revision 14

b. Findings

No findings of significance were identified.

.2 Control Room Halon Bank

a. Inspection Scope

The inspectors reviewed licensee actions with regard to an inoperable control room halon bank.

b. Findings

While reviewing corrective action documents on March 22, 2002, the inspectors noted that Callaway Action Request 200201889, initiated on March 20, documented that the control room halon bank was depressurized and inoperable. Actual halon bank pressure was 510 psig. The acceptance criteria was 540 psig. The 510 psig corresponded to less than 95 percent of the full charge weight (110 pounds). To address the condition, operations personnel initiated a fire impairment permit and returned the halon bank to an operable status on March 22. The halon pressure was recorded once each day by the secondary equipment operator.

The condition review committee had screened this document and assigned the issue a significance Level 3. This significance level was for conditions adverse to quality and for conditions that required apparent cause determinations and corrective action to fix the problem.

The inspectors determined that the halon bank provided fire suppression to nine cable trenches (3 inches deep) in the control room. The trenches ran underneath two control boards and continued up the height of the west wall in the control room and into the upper cable spread room.

The inspectors asked engineering personnel what affect the low halon pressure had on the halon suppression system's ability to perform its design function of suppressing a fire in the cable trenches. The licensee stated that although the control room halon bank was inoperable it could still perform its safety function.

The inspectors also asked how long the halon bank had been below the minimum acceptance criteria. Engineering personnel determined that the halon bank went below

the acceptance criteria on March 11, 2002. On this date the pressure reading was 530 psig. The pressure remained below the minimum acceptance criteria until March 22. The secondary equipment operator had noted on his logs that the pressure was low; however, operations personnel did not take any action to ensure that the halon bank was restored to an operable status.

Based on the questions asked by the inspectors, the licensee rescreened Callaway Action Request 200201889. This time the document was assigned a significance Level 2. This significance level was for significant conditions adverse to quality and for conditions that required a thorough root cause analysis, corrective action to prevent recurrence, and management oversight committee review and approval.

During preoperational testing, the licensee assumed that the total weight of halon needed to deliver the required halon concentration was 110 pounds. However, Administrative Procedure APA-ZZ-00703, "Fire Protection Operability Criteria and Surveillance Requirements," Revision 13, allowed the halon weight to be 95 percent of the full charge weight of 110 pounds. Since the acceptance criteria was below that allowed during preoperational testing, the inspectors asked what affect this had on the required halon concentration for the control room trenches and chases. At the conclusion of the inspection, this issue was still under evaluation. This issue will remain unresolved pending further NRC evaluation (Unresolved Item 50-483/0207-01).

1R06 Flood Protection Measures (71111.06)

a. Inspection Scope

On March 5, 2002, the inspectors performed a periodic flood protection walkdown of the Auxiliary and Control Buildings 1974' elevation. The inspectors verified that water-tight doors designed to mitigate flooding were closed and door seals were in good condition. The inspectors also evaluated other flood protection features (e.g., holes or unsealed penetrations in floors and walls, sump pumps and level detection systems, and floor drains) designed to protect risk significant systems, structures, and components from flooding due to internal causes.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalifications (71111.11)

a. Inspection Scope

On February 12, 2002, the inspectors observed a licensed operator simulator exercise. The simulator exercise evaluated the operator's ability to recognize, diagnose, and respond to equipment problems resulting from a pressurizer safety valve being stuck open. The inspectors evaluated operator performance using the following:

- Emergency Plan Implementing Procedure EIP-ZZ-00101, "Classification of Emergencies," Revision 29
- Emergency Operating Procedure ES-0.1, "Reactor Trip Response," Revision 1B3
- Emergency Operating Procedure E0, "Reactor Trip or Safety Injection," Revision 1B5
- Technical Specifications

The inspectors evaluated crew communications, command and control, emergency plan usage, and fidelity of the simulator to the actual control room. In addition, the inspectors reviewed the evaluator's critique of the training exercise.

b. Findings

No findings of significance were identified.

1R12 Maintenance Rule Implementation (71111.12)

a. Inspection Scope

During the inspection, the inspectors reviewed licensee implementation of the maintenance rule. The inspectors verified structure and component scoping, characterization, safety significance, performance criteria, and the appropriateness of goals and corrective action. The inspectors compared the licensee's implementation of the maintenance rule to the requirements outlined in 10 CFR 50.65; Administrative Procedure APA-ZZ-00303, "Classification of Systems," Revision 6; Engineering Procedure EDP-ZZ-01128, "Maintenance Rule and EPIX Programs," Revision 3; Regulatory Guide 1.160, "Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 2; and meeting minutes from various expert technical panel meetings. The inspectors reviewed the following components:

- Component cooling water from radwaste protection return isolation Valve A
- Containment atmosphere gaseous/particulate radioactivity detector
- Main steam line radiation monitors
- Essential service water supply to component cooling water isolation Valve B
- Plant computer Multiplexer B
- Main generator bushing

b. Findings

No findings of significance were identified.

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

.1 Routine Maintenance Risk Assessment Activities

a. Inspection Scope

The inspectors reviewed the licensee's assessment and management of selected maintenance activities to assess the effectiveness of risk management for planned and emergent 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 NUMARC 93-01, "Industry Guideline for Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 2; and Engineering Procedure EDP-ZZ-01129, "Callaway Plant Risk Assessment," Revision 1. The inspectors evaluated the following risk assessments:

January 4, 2002	Risk assessment for removing portions of component cooling water system from service
January 14, 2002	Weekly risk assessment for scheduled maintenance and surveillance
January 29, 2002	Risk assessment for removing control power from Emergency Diesel Generator B
February 21, 2002	Risk assessment for removing the turbine-driven auxiliary feedwater pump from service
February 25, 2002	Weekly risk assessment for scheduled maintenance and surveillance

b. Findings

No findings of significance were identified.

.2 Failure to Assess and Manage Risk When Condenser Steam Dump Valve was Removed From Service

a. Inspection Scope

The inspectors reviewed the licensee's assessment and management of risk while the computer-based risk monitor was out of service. 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 NUMARC 93-01, "Industry Guidelines for the Monitoring the Effectiveness of Maintenance at Nuclear Power Plants," Revision 2; and Engineering Procedure EDP-ZZ-01129, "Callaway Plant Risk Assessment," Revision 1.

b. Findings

On the evening of March 18, 2002, operations personnel lost the ability to calculate risk based on core damage frequency due to a computer problem. (The licensee did estimate plant risk using core damage frequency via the backup manual method until the ability to use the computer-based program was restored.) On March 19, at approximately 6:30 a.m., the inspectors inquired as to the plant's risk configuration while the computer was out of service. The inspectors questioned whether any routine or emergent work may have caused plant risk to be elevated above the normal level. At approximately 4 p.m. the licensee found that, using the large early release frequency, the plant was in an elevated risk condition due to corrective maintenance on low pressure condenser main steam dump control Valve ABUV-0035. This valve had been removed from service at 1:39 a.m. and restored at 4:15 p.m. During this time, the plant risk based on core damage frequency was normal.

The licensee had not historically performed a calculation of plant risk based on large early release frequency. The licensee had been performing risk evaluations solely based on core damage frequency. (A large early release frequency calculation estimated the likelihood of a radiological release that would bypass containment and be transported to the public or environment. Core damage frequency was an evaluation of the risk of damage to the reactor core, without evaluating the probability of a subsequent release to the public or environment.) Based on a review of work control records, the inspectors determined that one or all three low pressure condenser main steam dump control valves (ABUV-0034, -35, & -36) had been removed from service 12 times since January 2000. The licensee was reviewing whether there were previous instances when the plant risk based on large early release frequency was elevated and core damage frequency risk was normal.

10 CFR 50.65 (a)(4) requires that licensees assess and manage the increase in risk that may result from a maintenance activity. Had the risk assessment been performed, it would have identified that removing the low pressure condenser main steam dump control valve from service placed the plant in a higher risk category. This risk category required the development of contingency plans to manage the additional risk while in this plant condition.

This issue will remain unresolved pending additional NRC review (Unresolved Item 50-483/0107-02). This issue was entered in the licensee's corrective action program as Callaway Action Request 200201856.

1R14 Personnel Performance During Nonroutine Evolutions and Events (71111.14)

a. Inspection Scope

On January 31, 2002, the inspectors observed the control room staff perform a plant shutdown to Mode 4 to remove the floating diaphragm from the condensate storage tank. The inspectors observed command and control, communications, procedural usage, and reactivity management during the shutdown. The inspectors verified that the plant shutdown was conducted in accordance with the following procedures:

- Operating Procedure OTG-ZZ-00004, "Power Operations," Revision 35
- Operating Procedure OTG-ZZ-00005, "Plant Shutdown 20% Power to Hot Standby," Revision 18
- Operating Procedure OTG-ZZ-00006, "Plant Cooldown Hot Standby to Cold Shutdown," Revision 35

b. Findings

No findings of significance were identified.

1R15 Operability Evaluations (71111.15)

.1 Routine Operability Evaluations

a. Inspection Scope

The inspectors reviewed the technical adequacy of several operability evaluations to verify that they were sufficient to justify continued operation of a system, structure, or component. The inspectors verified that, although equipment was degraded, the operability evaluation provided adequate technical justification that the equipment could still meet its Technical Specification, Final Safety Analysis Report, and design bases requirements and that any potential risk increase attributed to the degraded equipment was thoroughly evaluated. Operability evaluations for the following components or structures were reviewed:

January 30, 2002	Security barriers invalidate site flooding calculations
February 7, 2002	Misalignment between pump and motor of motor-driven auxiliary feedwater Pump A
February 15, 2002	Nonconservative steam generator level setpoints associated with moisture separator mid-deck plate
March 12, 2002	Pressurizer power-operated relief valve and block valve cables adjacent in the same fire area

b. Findings

No findings of significance were identified.

.2 Auxiliary Feedwater System Venting

a. Inspection Scope

The inspectors reviewed licensee actions to determine if gas vented from the auxiliary feedwater system would affect system operability.

b. Findings

During the plant shutdown on December 3, 2001, the licensee determined that motor-driven auxiliary feedwater Pump A became gas bound. As corrective action, the licensee issued a night order that directed operations personnel to vent the casing and recirculation line on each auxiliary feedwater pump on a shiftly basis. The night order was dated December 5, 2001. If any gas was vented, operations personnel were directed to document the occurrence on a corrective action document. If gas was vented from any location for greater than 10 seconds, operations personnel were directed to notify chemistry personnel to sample the gas and also to notify the emergency duty officer and engineering personnel to discuss system operability. On February 15, 2002, the venting interval was changed to daily.

On February 16, operations personnel vented gas from each train of the auxiliary feedwater system. The maximum vent time in any location was 4 seconds. This occurrence was documented in Callaway Action Request 20021064. The approximate size of the gas void was not determined since the gas was not captured and quantified. Since gas was vented for less than 10 seconds, operations personnel concluded the system was operable. During subsequent venting evolutions, no gas was vented from the auxiliary feedwater system.

On February 21, the inspectors asked engineering and operations personnel what the basis was for the 10-second venting criteria and if there was an evaluation that specified the quantity of gas that would affect auxiliary feedwater system operability. The licensee stated that there was not a basis for the 10 seconds and that there was not an evaluation that specified the quantity of gas that would affect system operability. The inspectors then asked what the basis was for operability if there was no evaluation that quantified the gas void that would make the system inoperable. Engineering and operations personnel stated that, based on engineering judgement, they did not believe that the gas vented was sufficient to affect system operability. However, there was no technical evaluation to support the licensee's belief.

The inspectors then asked how it was possible to accurately quantify gas that was vented from the system since the gas was not captured and since there was no standard venting methodology.

In NRC Inspection Report 50-483/00-01, the inspectors questioned the basis for the 30-second criteria for emergency core cooling system venting. Operations Procedure OSP-SA-0003, "Emergency Core Cooling System Flow Path Verification and Venting," Revision 15, required a corrective action document to be written if gas was vented for more than 10 seconds from a vent location. If gas was vented for 30 seconds, the procedure required the chemistry department to sample for hydrogen. The inspectors asked what the basis was for the 10 and 30 second criteria and what size gas void would affect operability of the emergency core cooling system. The licensee did not have a basis for the 10 and 30 seconds, nor has an analysis been performed that specified the quantity of gas that would affect system operability.

At the conclusion of the inspection period, the licensee had not completed an analysis to determine the volume of entrapped gas that would affect operability of the auxiliary feedwater and emergency core cooling system. This issue will remain unresolved pending completion of that analysis (Unresolved Item 50-483/0107-03).

1R16 Operator Workarounds (71111.16)

a. Inspection Scope

The inspectors reviewed the cumulative effects of existing operator workarounds on the reliability, availability, and potential for misoperation of a system, the potential for increasing the frequency of an initiating event that could affect multiple mitigating systems, and the effects on the ability of operations personnel to respond in a correct and timely manner to plant transients and accidents. The reviews were performed on April 1, 2002. The operator workarounds were evaluated using the guidance in NRC Inspection Manual Part 9900, "Resolution of Degraded and Non-Conforming Conditions."

b. Findings

No findings of significance were identified.

1R17 Permanent Plant Modifications (71111.17)

a. Inspection Scope

The inspectors reviewed the modification that installed vent valves on certain auxiliary feedwater pump suction check valves. The vent valves were installed to facilitate system venting. The inspectors reviewed the modification to ensure the changes did not adversely affect the design and licensing basis. The inspectors also performed a field walkdown to ensure the vent valves had been installed in accordance with the modification package.

b. Findings

No findings of significance were identified.

1R19 Postmaintenance Testing (71111.19)

a. Inspection Scope

The inspectors verified that postmaintenance tests were adequate to verify system operability and functional capabilities. The inspectors verified that testing met design and licensing basis requirements, Technical Specifications, the Final Safety Analysis Report, Inservice Testing, and licensee administrative procedures. The inspectors reviewed testing results for the following components:

January 23, 2002	Centrifugal charging Pump B suction from refueling water storage tank isolation valve
February 6, 2002	Motor-driven auxiliary feedwater Pump A to steam Generator B valve
February 6, 2002	Motor-driven auxiliary feedwater Pump A to steam Generator C valve
February 15, 2002	Turbine-driven auxiliary feedwater pump
March 8, 2002	Steam Generator D main feedwater supply bypass flow valve
March 26, 2002	Steam Generator A main feedwater supply bypass flow valve

b. Findings

No findings of significance were identified.

1R20 Refueling and Outage Activities (71111.20)

a. Inspection Scope

While the plant was shut down to remove the floating diaphragm from the condensate storage tank, the inspectors observed and reviewed numerous activities to ensure that the licensee adequately adhered to risk reduction processes and developed risk reduction strategies to mitigate any potential losses of key safety functions. The inspectors verified that licensee actions were consistent with Engineering Procedure EDP-ZZ-01129, Callaway Plant Risk Assessment, Revision 1, and 10 CFR 50.65.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

a. Inspection Scope

The inspectors observed or reviewed the following surveillance tests to ensure 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:

- January 3, 2002 Operations Procedure OSP-EN-P001B, "Containment Spray Pump B Inservice Test," Revision 22

- January 9, 2002 Operations Procedure OSP-BG-P005A, "Centrifugal Charging Pump A In-service Test," Revision 24
- February 7, 2002 Operations Procedure OSP-AL-V0002, "Auxiliary Feedwater Valve Operability," Revision 14
- February 15, 2002 Operations Procedure OSP-AL-P0002, "Turbine Drive Auxiliary Feedwater Pump Operability Inservice Test," Revision 32
- March 4, 2002 Operations Procedure OSP-SA-00003, "Emergency Core Cooling System Flow Path Verification And Venting," Revision 15
- March 19, 2002 Operations Procedure OSP-EJ-P001B, "RHR Train B Inservice Test," Revision 29

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 24, Change Notice 01-005, to the Callaway Radiological Emergency Response Plan, submitted November 26, 2001, and Revision 29 to Emergency Plan Implementing Procedure EIP-ZZ-00101, "Classification of Emergencies," submitted October 25, 2001, against 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.

1EP4 Drill Evaluation (71114.06)

a. Inspection Scope

The inspectors observed the simulator exercise conducted on January 31, 2002. The purpose of these observations was to evaluate operator performance, licensee event classification, notification of state and local authorities, and adequacy of protective action recommendations. The inspectors also reviewed the licensee's critique of the exercise to determine if they were self-critical in the identification of strengths and performance issues.

b. Findings

No findings of significance were identified.

2. RADIATION SAFETY

Cornerstone: Occupational Radiation Safety

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 following items were reviewed and compared with regulatory requirements to assess the licensee's program to maintain occupational exposure as low as reasonably achievable (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
- Three radiation work permit packages from the condensate storage tank/ auxiliary feedwater forced outage and radwaste filter shearing work activities which resulted in the highest personnel collective exposures (Radiation Work Permit 02-02920, "Access to DHRA's Outside the Reactor Building," Radiation Work Permit 02-03120, "Reactor Building Work During Forced Outage," and Radiation Work Permit 02-02320, "Filter Shearing Operations in the Radwaste Building Truck Bay")
- 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 August 1, 2001 (10 Callaway Action Requests were reviewed in detail: 200104131, 200105212, 20016147, 20017146, 200107339, 200200710, 200200957, 200201106, 200201138, and 200201374)
- Declared pregnant worker dose monitoring controls

- ALARA program controls portion of Quality Assurance Audits AP01-002, AP01-003, and AP01-006 and Optimized Site-Specific ALARA Assessment SA01-HP-02

b. Findings

No findings of significance were identified.

4. OTHER ACTIVITIES

4OA1 Performance Indicator Verification 71151

a. Inspection Scope

The inspectors reviewed the licensee's fourth quarter 2001 performance indicator data submittal to verify its accuracy and completeness. The inspectors reviewed control room logs, maintenance documents, surveillance tests, and corrective action documents to verify that the data was properly collected and reported in accordance with NEI 99-02, "Regulatory Assessment Performance Indicator Guidelines," Revision 2. The following performance indicators were reviewed:

- Unplanned power changes per 7000 critical hours
- Unplanned scrams per 7000 critical hours
- Safety system unavailability for auxiliary feedwater system

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems

a. Inspection Scope

The inspectors reviewed the circumstances that caused abnormally high vibration on two trains of the auxiliary feedwater system. The inspectors also evaluated similar incidents from 1990 to present in which vibration and system pressure fluctuations had occurred. This review was performed to assess the effectiveness of prior corrective action as required by 10 CFR Part 50, Appendix B, Criterion XVI.

b. Findings

The licensee failed to implement corrective action that could have prevented a condition adverse to quality. This finding was of very low safety significance and was a noncited violation of 10 CFR Part 50, Appendix B, Criterion XVI.

On February 8, 2002, during postmaintenance testing, the licensee observed vibration in the Train B motor-driven auxiliary feedwater piping. The licensee also observed pump

suction pressure oscillations as well as noise described as banging emanating from the system. This condition occurred when both flow control valves (ALHV-0005 and 0007) were being used as the isolation for the steam generators with the pump operating solely on recirculation flow. The maximum vibration level recorded was 3.8 inches/second. The screening criteria vibration level in accordance with ASME Standard OM-3 is 0.5 inches/second. If this vibration level was exceeded, an evaluation was to be conducted to determine the affect on system piping.

The licensee subsequently found the same vibration problem when flow control Valve ALHV-0009 was used to isolate steam Generator B with motor-driven auxiliary feedwater Pump A in operation. The maximum vibration level recorded was 25 inches/second at Valve ALV-0009, the essential service water to the motor-driven auxiliary feedwater Pump A check valve.

The licensee determined that the vibrations, which only occurred during low flow conditions, were due to hydraulic instabilities that occurred when fluid leaked by the closed flow control valves. This leakage interacted with motor-driven pump discharge check Valves ALV-0030 and ALV-0042. Movement of these disks excited the natural frequency of the auxiliary feedwater system, causing the piping to resonate.

The inspectors noted that Emergency Operating Procedure E-2, "Faulted Steam Generator Isolation," Revision 1B1, allowed closing the flow control valves to isolate flow to the steam generators during emergency conditions. Using the flow control valves to secure flow to the steam generators established the conditions where abnormal vibrations were known to occur.

Operating history revealed that there were previous occurrences of vibration and system pressure fluctuations observed on both motor-driven auxiliary feedwater trains. The following is a list of previous occurrences, including the attributed cause and the associated corrective action documents:

- 1990; air entrainment in the system; Request For Resolution 08755A
- 1995; air entrainment in the system; Callaway Action Request 199500996
- 1999; no cause determined; Callaway Action Request 199903183
- 2000; no cause determined; Callaway Action Request System Number 200000066
- 2001; motor-driven auxiliary feedwater Pump B recirculation check Valve ALV-0041 being forced closed when both pumps were operating; Callaway Action Request 200103262

Since the vibration levels were not quantified, the licensee could not determine whether or not the vibration screening criteria had been exceeded. The vibration problems described in the these corrective action documents were identified as conditions adverse to quality

The licensee corrected the vibration problem by performing maintenance on the three affected flow control valves (ALHV-0005, -7 and -9) to stop the leakage. The licensee did not identify the actual cause of previous auxiliary feedwater piping vibration and pressure fluctuations and, consequently, did not take appropriate corrective action. Failing to take corrective action to prevent a condition adverse to quality from recurring was a violation (50-483/0107-04).

The finding is more than minor because it had a credible impact on safety in that, if this vibration had occurred when auxiliary feedwater was needed, it could have affected operation of the system. This finding affected the mitigating systems cornerstone. This finding was found to be of very low safety significance (Green) using the reactor safety significance determination process. This is because the likelihood was low that the system would be operated in the condition that caused the abnormally high vibration, the lack of damage evident (as observed through nondestructive examinations) subsequent to these vibration events, and no vibrations were observed on the turbine-driven auxiliary feedwater train. This finding included cross-cutting aspects in the area of problem identification and resolution.

Appendix B of 10 CFR Part 50, Criterion XVI, requires, in part, that conditions adverse to quality be promptly identified and corrected. On February 8, 2002, the licensee observed excessive vibration on the motor-driven auxiliary feedwater system piping. Although the condition had been identified five times in the past 12 years, the corrective action taken by the licensee was inadequate and did not prevent recurrence. This violation of Appendix B of 10 CFR Part 50, Criterion XVI, is being treated as a noncited violation consistent with Section VI.A on the NRC Enforcement Policy. This issue is documented in the licensee's corrective action program as Callaway Action Request 200200881.

4OA3 Event Followup

- .1 (Closed) Licensee Event Report 50-483/00-003-00: pressurizer safety valves setpoint pressure low

The licensee initiated Callaway Action Request 200000441. The licensee event report was reviewed and no findings of significance were identified. This licensee event report is closed.

- .2 (Closed) Violation 05000483/00-17-01(EA-00-208): The inspectors reviewed the licensee's root cause determination and associated corrective action documents (Corrective Action Requests 200000377 and 200102520) pertaining to the 10 CFR 20.1101 (b) violation. The licensee's evaluation identified the primary root causes of the performance issues to be: (1) management's failure to establish expectations for keeping doses ALARA, (2) management's failure to communicate a priority for keeping doses ALARA, (3) a culture that did not support the ALARA concept, and (4) administrative controls that did not assure documented ALARA concerns would receive proper priority, appropriate consideration, and comprehensive resolution.

On May 10, 2001, the NRC completed Supplemental Inspection Procedure 95002 and documented the inspection findings in NRC Inspection Report 50-483/01-08. The inspectors concluded that the completed corrective actions were effective in addressing the associated root causes. However, many of the corrective actions were not institutionalized (e.g., not governed by plant procedures) to prevent recurrence. The licensee acknowledged this potential problem and initiated Corrective Action Request 200102520.

The inspectors determined that the licensee's corrective action adequately addressed the root cause and procedure modifications to institutionalize the corrective action. NRC Inspection Reports 50-483/00-17 and 50-483/01-08, documented the details associated with this violation.

40A5 Other

During the inspection period, the inspectors reviewed the Callaway Plant evaluation performed by the Institute of Nuclear Power Operations conducted during the weeks of January 22 and 29, 2001.

40A6 Management Meetings

Exit Meeting Summary

The emergency preparedness inspector presented the inspection results to Mr. L. Graessle, Superintendent, Protective Services, and other members of licensee management during a telephonic exit interview conducted on January 3, 2002.

The health physics inspector presented the inspection results to Mr. G. Randolph, Senior Vice President and Chief Nuclear Officer, and other members of licensee management at the conclusion of the inspection on March 8, 2002.

The operations engineer presented the inspection results to Mr. M. Taylor, Manager, Quality Assurance, and other members of licensee management at the conclusion of the inspection on April 4, 2002.

The resident inspectors presented their inspection results to Mr. R. Affolter, Vice President - Nuclear, and other members of licensee management on April 8, 2002.

The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was identified.

ATTACHMENT

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

R. Affolter, Vice President, Nuclear
J. Blosser, Manager, Regulatory Affairs
S. Bond, Acting Superintendent, Systems Engineering
M. Elliott, Shift Supervisor, Security
M. Evans, Manager, Nuclear Engineering
R. Farnam, Supervisor, Health Physics Operations
K. Gilliam, Supervisor, Radiation/Chemistry
L. Graessle, Superintendent, Protective Services
J. Hiller, Engineer, Regional Regulatory Affairs
G. Hughes, Supervisor Engineer, Quality Assurance
J. Laux, Manager, Quality Assurance
J. Peevy, Manager, STARS
G. Randolph, Senior Vice President and Chief Nuclear Officer
M. Reidmeyer, Supervisor, Regional Regulatory Affairs
R. Roselius, Superintendent, Health Physics
S. Sandbothe, Superintendent, Operations
K. Schoolcraft, Senior Engineer, Quality Assurance Regulatory Services
C. Slizewski, Supervising Engineer, Quality Assurance Audit Group
M. Taylor, Manager, Quality Assurance
W. Witt, Plant Manager

ITEMS OPENED AND CLOSED

Opened

50-483/01-07-01	URI	Inoperable control room halon bank (Section 1R05.2)
50-483/01-07-02	URI	Failure to assess and manage risk (Section 1R13.2)
50-483/01-07-03	URI	Auxiliary feedwater system venting (1R15.2)
50-483/01-07-04	NCV	Inadequate corrective action to address auxiliary feedwater system vibration (Section 4OA2)

Closed

50-483/01-07-04	NCV	Inadequate corrective action to address auxiliary feedwater system vibration (Section 4OA2)
50-483/00-03-00	LER	Pressurizer safety valves set point pressure low (Section 4OA3)

Audit Report #AP01-007, Audit of Callaway Plant's Fitness-for-Duty Program, dated December 16, 2001