



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

July 24, 2001

EA-01-173

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 50-483/01-03

Dear Mr. Randolph:

On July 7, 2001, the NRC completed an inspection at your Callaway Plant. The enclosed report documents the inspection findings which were discussed with Mr. Ron Affolter and other members of your staff on July 9, 2001.

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 six 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 five of these issues. These violations are being treated as noncited violations (NCVs), consistent with Section VI.A of the Enforcement Policy. These NCVs are described in the subject inspection report. If you contest the violations or significance of these NCVs, 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 (PARS) component of NRC's document system (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/NRC/ADAMS/index.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/

William D. Johnson, Chief
Project Branch B
Division of Reactor Projects

Docket: 50-483
License: NPF-30

Enclosure:
NRC Inspection Report
50-483/01-03

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ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket: 50-483
License: NPF-30
Report No.: 50-483/01-03
Licensee: Union Electric Company
Facility: Callaway Plant
Location: Junction Highway CC and Highway O
Fulton, Missouri
Dates: April 1 through July 7, 2001
Inspectors: V. G. Gaddy, Senior Resident Inspector
J. D. Hanna, Resident Inspector
P. J. Elkmann, Emergency Preparedness Inspector
J. S. Dodson, Health Physicist
L. T. Ricketson, Senior Health Physicist
D. W. Schaefer, Physical Security Inspector
J. E. Whittemore, Senior Reactor Inspector
Approved By: W. D. Johnson, Chief, Project Branch B

ATTACHMENT: SUPPLEMENTAL INFORMATION

SUMMARY OF FINDINGS

Callaway Plant NRC Inspection Report 50-483/01-03

IR 05000483-01-03; on 04/01-07/07/2001; Union Electric Co; Callaway Plant. Integrated Resident & Regional Report; Flood Prot. Measures, Maint. Risk Assessment and Emergent Work Eval., Radiation Monitoring Instrumentation, and Problem Identification and Resolution.

The inspection was conducted by resident inspectors, two region-based health physicists, a region-based emergency preparedness inspector, a region-based physical security inspector, and a region-based reactor inspector. The inspection identified six Green findings, five of which were noncited violations. 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 V, occurred when the licensee failed to provide continuous monitoring of an open flood door that led into the safety injection pump and centrifugal charging pump Train B areas as required by Engineering Procedure EDP-ZZ-04107, "HVAC Pressure Boundary and Watertight Door Control," Revision 11.

This finding is more than minor because it had a credible impact on safety in that, if a fire water pipe break had occurred while the flood door was left open and unmonitored, fire water could affect operation of the safety injection pump and centrifugal charging pump Train B. This finding affects the mitigating system cornerstone. This finding was found to be only of very low safety significance because of the low likelihood of a fire water pipe break while the flood door was open and unmonitored and because of the availability of Train A equipment. Because this 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 200104044, it is being treated as a noncited violation consistent with Section VI.A of the NRC Enforcement Policy (Section 1R06.3).

- Green. A noncited violation (EA 01-173) of 10 CFR 50.65(a)(4) occurred when the licensee failed to adequately assess the risk when essential service water Train A was removed from service. Had the risk been adequately assessed, the licensee would have identified that the plant was actually in a higher risk category. The higher risk category required the development of contingency plans to manage the additional risk while essential service water Train A was out of service.

This finding is more than minor and had a credible impact on safety because, with essential service water out of service, a diesel generator would not be available to

perform its function in the event of a loss of all offsite power. This placed the plant in a higher risk category and the risk was not adequately assessed or managed. This finding affects the mitigating system cornerstone. This finding was evaluated using Appendix G (Shutdown Operations) of the reactor safety significance determination process and was determined to be of very low safety significance. The minimum equipment required by Appendix G remained available and the other diesel generator was operable. Because this finding is of very low safety significance, and the finding was entered into the licensee corrective action program as Callaway Action Request System Number 200103053, it is being treated as a noncited violation consistent with Section VI.A of the NRC Enforcement Policy (Section 1R13.2).

- Green. The flow accelerated corrosion program failed to detect degradation in multiple portions of feedwater piping inside the containment building and in the turbine building prior to degradation beyond design minimum wall thickness. Although the main feedwater degradation was identified and addressed by the licensee before failure, the extent of the degradation at the time of discovery and exposure time while in this condition was a safety concern. This finding included crosscutting aspects in the area of problem identification and resolution.

The finding was more than minor because it had an credible impact on safety and additionally could credibly affect the availability/reliability of a mitigating system (auxiliary feedwater). This finding was determined to be of very low safety significance using the reactor safety significance determination process because the degraded piping was determined to be operable. This issue is in the licensee's corrective action program as Callaway Action Request System Number 200102270 (Section 4OA2.1).

- 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 the turbine-driven auxiliary feedwater pump's steam trap and adjacent piping were not insulated. Insulating the steam trap and adjacent piping adversely affected the steam trap and caused the pump to become inoperable on June 12, 2001, when condensate level rose to the alarm setpoint while the steam line drain bypass level valve was out of service for maintenance. In August 1994, and on March 19, 2001, an insulated steam trap and/or adjacent piping also caused the turbine-driven auxiliary feedwater pump to become inoperable; however, the licensee failed to take corrective action following these two events to prevent the pump from becoming inoperable on June 12. This finding included crosscutting aspects in the area of problem identification and resolution.

The finding was more than minor because it had an actual impact on safety in that the turbine-driven auxiliary feedwater pump was rendered inoperable. The event was of very low safety significance because the pump was out of service for less than 4 hours and both motor-driven auxiliary feedwater pumps were available. 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 200103722, the associated violation is being treated as a noncited violation, consistent with Section VI.A of the NRC Enforcement Policy (Section 4OA2.2).

Cornerstone: Occupational Radiation Safety

- Green. The inspector found that the licensee had not evaluated the ability of its personnel contamination monitors, portable frisking instruments, and tool monitors to identify all radionuclides that might be present on items released from its control. Without this evaluation, the licensee could not ensure that release surveys were adequately performed. The licensee's failure to adequately survey items released from the radiologically controlled area was a violation of 10 CFR 20.1501(a). This violation is being treated as a noncited violation consistent with Section VI.A of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as Callaway Action Request System Number 200102126.

The significance of this violation was determined to be more than minor, because it could reasonably be viewed as a precursor to a significant event and it involved an occurrence in the radioactive material control program. This violation was processed through the public radiation safety significance determination process and determined to be of very low safety significance, because it did not result in public dose greater than 0.005 rem and there were no more than five related events (Section 2OS3).

- Green. On April 18, 2001, the inspector identified a survey instrument (RO-2A, SN 2365) which was tagged out of service as nonconforming on April 12, 2001. The description of the nonconformance was "reading 20 mr/hr in a 100 mr/hr field." Health Physics Departmental Procedure HDP-ZZ-04000, "Health Physics Instrumentation Program," Revision 16, requires, in part, that a review of the instrument use must be performed within one working day when a dose rate instrument is nonconforming. No review or evaluation had been conducted. The licensee's failure to conduct a review or evaluation of the use of the nonconforming dose rate instrument within one working day was a violation of Technical Specification 5.4.1.a. This violation is being treated as a noncited violation consistent with Section VI.A of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as Callaway Action Request System Number 200102148.

The significance of this violation was determined to be more than minor, because it could be reasonably viewed as a precursor to a significant event and it involved conditions contrary to licensee procedures which impact instrumentation related to measuring worker dose. This violation was processed through the occupational radiation safety significance determination process and determined to be of very low safety significance, because there was no overexposure, no substantial potential for overexposure because the instrument was removed from service, and the ability to assess dose was not compromised because the technician was wearing dosimetry (Section 2OS3).

B. Licensee Identified Findings

A violation of very low safety significance which was identified by the licensee has been reviewed by the inspectors. Corrective actions taken or planned by the licensee appear reasonable. This violation is listed in Section 4OA7 of this report.

Report Details

Summary of Plant Status: The plant began the inspection period at 92 percent power. On April 7, the licensee began refueling Outage 11. On May 21, the licensee closed the main generator output breaker ending the refueling outage. Total outage duration was 44 days.

1. **REACTOR SAFETY**

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

1R01 Adverse Weather Protection (71111.01)

a. Inspection Scope

During April 2001, the inspectors reviewed the licensee's procedure for responding to severe thunderstorms, high winds, and tornadoes. The inspectors verified that design features and implementation of the procedure were adequate to protect mitigating systems from the effects of adverse weather. On April 10, a tornado warning was issued for the site. The inspectors verified that the actions taken by the licensee were adequate to protect the plant. These actions were detailed in Emergency Procedure EIP-ZZ-00231, "Response to Severe Thunderstorm/High Winds/Tornado Watches and Warnings," Revision 10.

b. Findings

No findings of significance were identified.

1R04 Equipment Alignment (71111.04)

.1 Partial Equipment Walkdowns

a. Inspection Scope

The inspectors reviewed the equipment alignment of residual heat removal Train B and on May 9, 2001, performed a partial walkdown of the system. This system was selected due to its importance in providing decay heat removal capability while the plant was in Mode 5 with feedwater to the steam generators out of service. The inspectors reviewed and evaluated the condition of the system using the criteria documented in Procedure OTN-EJ-00001, "Residual Heat Removal System," Revision 15 and Drawing M-22EJ01(Q), "Piping and Instrumentation Diagram Residual Heat Removal System," Revision 43. Although direct inspection of certain portions of the residual heat removal system was restricted due to radiation levels, assessment was performed using indirect means (e.g., operator logs, video cameras, control board indications, etc.).

On June 11, the inspectors performed a partial walkdown of auxiliary building penetration room cooler Train A while Train B was out of service for maintenance. The inspectors compared the as-found condition of the ventilation system with the requirements of the Updated Final Safety Analysis Report, Technical Specification, and

Drawing M-22GL01, "Piping and Instrumentation Diagram Auxiliary Building HVAC," Revision 22. The room cooler, support equipment, and components cooled by the room cooler were located in Room 1410 of the auxiliary building.

On June 15, the inspectors performed a partial walkdown of electrohydraulic control system Train A while Train B was out of service for maintenance. The inspectors verified valve lineup from the electrohydraulic control system control reservoir to the main turbine stop valves. The inspectors compared system alignment to the Updated Final Safety Analysis Report, Drawing M-22CH01, "Piping and Instrumentation Diagram Main Turbine Hydraulic Control System," Revision 3, and Procedure OTN-CH-00001, "Main Turbine control Oil System," Revision 7.

b. Findings

No findings of significance were identified.

.2 Complete Equipment Walkdown

a. Inspection Scope

The inspectors reviewed the equipment alignment of the auxiliary feedwater system and, during the week of July 1, 2001, performed a complete walkdown of the system. This system was selected due to its importance in providing decay heat removal capability through the steam generators while the plant shuts down from an at-power condition. The inspectors reviewed and evaluated the condition of the system using the criteria documented in Procedure OTN-AL-00001, "Auxiliary Feedwater System," Revision 7, and Drawing M-22AL01(Q), "Piping and Instrumentation Diagram Auxiliary Feedwater System," Revision 17. The inspectors also reviewed the following for the system: outstanding maintenance work items, deficient conditions as documented in the Callaway Action Request System, and any temporary modifications.

b. Findings

No findings of significance were identified.

1R05 Fire Protection (71111.05)

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 following areas were reviewed:

- Safety-related Transformer B and associated electrical buses on April 9, 2001
- Control building upper cable spreading room on May 29, 2001

- South electrical penetration room on June 11, 2001
- Tours of turbine and containment buildings during welding and cutting of feedwater piping in April and May 2001
- Both diesel generator rooms on June 11, 2001

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"
- Procedure APA-ZZ-00741, "Control of Combustible Materials," Revision 15
- Procedure APA-ZZ-00701, "Control of Fire Protection Impairments," Revision 8
- Procedure APA-ZZ-00742, "Control of Ignition Sources," Revision 14

b. Findings

No findings of significance were identified.

1R06 Flood Protection Measures (71111.06)

.1 Periodic Flood Protection Evaluation

a. Inspection Scope

On April 11 and 12, 2001, the inspectors performed a periodic flood protection walkdown of the lower level of the auxiliary building. The inspectors evaluated flood protection features (e.g., holes or unsealed penetrations in floors and walls, adequacy of watertight doors, common drain systems and pumps) for the protection of risk-significant structures, systems, and components from flooding due to internal causes. The inspectors also reviewed the effect of fire protection impairments requiring doors be propped open on the residual heat removal system while the plant was in reduced inventory conditions (on or about April 30, 2001).

b. Findings

No findings of significance were identified.

.2 Seasonal Flood Protection Evaluation

a. Inspection Scope

During the weeks of June 4 and 11, 2001, the inspectors performed a seasonal review to determine the licensee's susceptibility to external flooding. Safety-related plant structures were located at elevation 840 feet. This is approximately 300 feet above the highest flood of record on the Missouri River near the site. Since the probability of Missouri River flooding was minimal, the inspectors focused on the effect that heavy,

sudden rains would have on the plant. An all season 6-hour rainfall with an accumulation of 25.4 inches was the governing probable maximum precipitation event affecting the surface runoff of safety-related structures. The inspectors reviewed the following to determine if the licensee had adequately evaluated the effect that the probable maximum precipitation event would have on the plant:

- Updated Final Safety Analysis Report
- Probable Maximum Precipitation Calculation SPA-18, Revision 0, and Addenda 1 and 2
- Topographical maps of the site and surrounding area
- Drawing C-2S0227, "ESF Transformers Structure Steel Plan and Section," Revision N/A
- Drawing C-2C0903, "Yard ESF Transformer Concrete Neat Line and Reinforcing Sections and Details," Revision 0

The inspectors toured the plant site to verify that the assumptions in the probable maximum precipitation calculation and other plant documents remained valid. In addition, the inspectors verified that the licensee had provisions for amending the probable maximum precipitation calculation if plant grading or drainage were changed.

b. Findings

No findings of significance were identified.

.3 Open and Unmonitored Flood Door

a. Inspection Scope

The inspectors identified that the flood door leading to the safety injection pump and centrifugal charging pump Train B had been left open and unmonitored. The inspectors performed an evaluation to determine the effect this condition had on the flooding analysis.

b. Findings

The inspectors identified that the licensee failed to provide a continuous flood watch when the flood door (Door 11081) leading into the safety injection pump and centrifugal charging pump Train B area was left open. This finding was of very low safety significance and was a noncited violation of 10 CFR Part 50, Appendix B, Criterion V.

While touring the 1974 foot elevation of the auxiliary building on June 26, 2001, the inspectors noted that Door 11081 was open and unmonitored. This door was the entry

point into the safety injection pump and centrifugal charging pump Train B areas. A placard on the door stated that a continuous flood watch was required if the door was blocked open per Request for Resolution 16409A.

Prior to entering the room, the inspectors observed that no one was present in the immediate vicinity to provide continuous monitoring of the door. The inspectors entered the room and noted that no one was present in the room to monitor the door. The inspectors located a nonlicensed operator and asked why the flood door was open. The operator stated he did not know why the flood door was open and he closed the door. The licensee was unsure how long the flood door had been open.

The inspectors reviewed Request for Resolution 16409A and noted that it allowed the door to be blocked open if a continuous flood watch was established. Calculations in the request for resolution found that flooding from a fire water pipe break in the auxiliary building would begin to flow into the safety injection pump and centrifugal charging pump Train B area in approximately 10 minutes, thus necessitating the continuous flood watch. The requirements for the continuous flood watch were outlined in Attachment 5 of Engineering Procedure EDP-ZZ-04107, "HVAC Pressure Boundary and Watertight Door Control," Revision 11. Failing to post a continuous flood watch when Door 11081 was left open was a violation (50-483/01-03-01).

This finding is more than minor because it had a credible impact on safety in that, if a fire water pipe break occurred while the flood door was left open and unmonitored, fire water could affect operation of the safety injection and centrifugal charging pump Train B. This finding affects the mitigating system cornerstone. This finding was found to be only of very low safety significance (Green) using the reactor safety significance determination process because of the low likelihood of a fire water pipe break and because of the availability of Train A equipment.

Appendix B of 10 CFR Part 50, Criterion V, required, in part, that activities that affected quality be accomplished in accordance with written procedures. Attachment 5 of Engineering Procedure EDP-ZZ-04107, "HVAC Pressure Boundary and Watertight Door Control," required that a continuous flood watch be established whenever the flood door (Door 11081) leading into the safety injection pump and centrifugal charging pump Train B area is blocked open. On June 26, 2001, the inspectors identified that Door 11081 was left open and unmonitored for an unknown period of time. This violation is being treated as a noncited violation consistent with Section VI.A of the NRC Enforcement Policy. This findings was entered into the licensee's corrective action program as Callaway Action Request System Number 200104044.

1R07 Heat Sink Performance (71111.07)

a. Inspection Scope

On April 26 and May 1, 2001, the inspectors reviewed the licensee's performance of visual inspections of component cooling water heat Exchanger A and flow balance testing of essential service water Train B, respectively. This review was performed to verify that any potential heat exchanger deficiencies which could mask degraded

performance were identified. These specific tests were selected because they can reveal safety-related heat exchanger fouling or inadequate essential service water flow to component loads. The inspectors reviewed and evaluated the results of flow balance testing in accordance with Procedure ETP-EF-0002B, "Essential Service Water Train B Flow Verification," Revision 6. The inspections of component cooling water Heat Exchanger A ensured that the tubes were not blocked with debris or otherwise obstructed, interior surfaces were free of corrosion, and the component did not exhibit signs of leakage.

b. Findings

No findings of significance were identified.

1R08 Inservice Inspection Activities (71111.08)

.1 Performance of Nondestructive Examination (NDE) Activities

The Callaway Plant inservice inspection program was committed to the 1989 version of ASME Section XI Code, no addenda, and currently in the second period of the second interval of the program. The current outage was the second of three outages scheduled for the second period. The licensee had initiated and was implementing, a risk-informed inservice inspection program. This change was developed by a Strategic Teaming and Resource Sharing group from the Callaway Plant and four additional pressurized water reactor licensees, located in NRC Region IV. The licensee had submitted a request to significantly decrease the committed inservice inspection program requirements, but the NRC was in the review process and had not yet granted the requested exemption. During the current outage, the licensee was not performing any NDEs that were scheduled for the second period in the inservice inspection program plan. However, should the licensee's exemption request not be granted or only partially granted, missed examinations could be made up during the third outage of the second period.

a. Inspection Scope

There were no code-related, program-required, NDEs performed while the inspectors were on site. The inspectors requested that the licensee provide records of any ASME Section XI code-required inservice or preservice NDE performed prior to the inspectors' arrival. The inspectors reviewed work records and reports of examinations performed on prefabricated components and piping done in accordance with the repair and replacement section of the code. All the reports that were reviewed represented examinations of code Class 3 components and piping. The inspectors verified that the examinations performed met the inservice or preservice inspection code requirements and were conducted in accordance with valid procedures. The inspectors also observed licensee-contracted personnel perform the data collection for ultrasonic testing of electro-sleeving installed on steam generator tubes during the previous outage.

The inspectors reviewed the guidance referenced by the licensee in the development of the new program. These references included:

- EPRI Topical Report TR-112657, "Risk-Informed Inservice Inspection Evaluation Procedure, Revision B
- NRC Regulatory Guide 1.174, "An Approach for Using Probability Risk Assessment in Risk Informed Decisions on Plant-Specific Changes to the Licensing Basis," July 1998
- NRC Regulatory Guide 1.178, "An Approach for Plant-Specific Risk-Informed Decision Making: Inservice Inspection of Piping," September 1998

The inspectors then performed a detailed review of the licensee's exemption request and program description to verify that the intent of the referenced guidance had been met during the development of the following elements within the risk-informed program:

- Program scope
- Identification of piping segments
- Failure potential
- Failure consequence

Through further review of the Callaway Plant Second Interval Inservice Inspection Plan, Revision 3, and discussion with inservice inspection program personnel, the inspectors also verified that specific inspection commitments made by the licensee within the program would not be eliminated by the risk-informed program.

b. Findings

No findings of significance were identified.

.2 Problem Identification and Resolution

a. Inspection Scope

The inspectors performed a detailed review of a sample of Corrective Action Request System (CARS) documents. The corrective action request documents reviewed were all initiated from 1999 to the present to identify and correct problems related to the inservice inspection program issues below:

- Lost documentation for ASME Section XI replacement package
- Inadvertent documentation of wrong material traceability numbers
- NDEs not performed in accordance with correct code edition
- Poor material condition and corrosion conditions discovered during NDE visual inspections
- Identification of previously undiscovered flaw indications

- Section XI Inservice Inspection Plan errors
- Failure to properly document previous ASME Section XI weld repairs
- Failure to perform and document postrepair NDEs required by ASME Section XI

The review was conducted to ascertain that the licensee's corrective action program was identifying performance issues within the inservice inspection program. Further review assessed the effectiveness of cause determination, the appropriateness of applied corrective action, the adequacy of transportability review with subsequent identification of generic issues, and the overall corrective action program effectiveness in addressing previously identified administrative issues affecting the inservice inspection program.

b. Findings

No findings of significance were identified.

1R11 Licensed Operator Requalifications (71111.11)

a. Inspection Scope

On June 14, 2001, the inspectors observed a licensed operator simulator exercise. The simulator exercise evaluated operators' ability to recognize, diagnose, and respond to equipment problems in the main feedwater system, pressurizer level control system, digital rod position indication system, and on the offsite electrical grid. The inspectors evaluated crew communication, command and control, emergency plan usage, and fidelity of the simulator to the actual control room. In addition, the inspectors reviewed evaluators' critiques of the training exercise. The inspectors evaluated operator performance using the following: Emergency Procedure EIP-ZZ-00101, "Classification of Emergencies," Revision 28, Procedure ES-0.1, "Reactor Trip Response," Revision 1B3, Procedure E0, "Reactor Trip or Safety Injection," Revision 1B5, Off-Normal Procedure OTO-AE-0003, "Steam Generator Level Channel Failure," Revision 7, and Technical Specifications.

b. Findings

No findings of significance were identified.

1R12 Maintenance Rule Implementation (71111.12)

a. Inspection Scope

During the inspection period, 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 actions. The inspectors compared the licensee's implementation of the maintenance rule to the requirements outlined in 10 CFR 50.65, Procedure

APA-ZZ-00303, "Classification of Systems," Revision 5; Procedure EDP-ZZ-01128, "Maintenance Rule and EPIX Programs, Revision 2; 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:

- Reactor makeup water to boric acid blending tee flow control valve
- Essential service water Pump B
- Main feeder breaker to control building Load Center NG01
- Lower medium voltage system Train B
- Reactor coolant system pressurizer safety relief Valves A, B, and C

b. Findings

No findings of significance were identified.

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

.1 Routine Risk Assessments

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, Engineering Procedure EDP-ZZ-01129, "Callaway Plant Risk Assessment," Revision 1, and the Refuel 11 Risk Analysis. The inspectors evaluated the following risk assessments:

April 8, 2001 Essential service water Pump B removed from service for containment cooler Train B draining

April 9, 2001 Risk assessment prior to reduced inventory conditions

April 30, 2001 Risk assessment while surveillance testing rendered emergency diesel Generator B and offsite Source B inoperable

May 11, 2001 Power-operated relief Valve B out of service for maintenance

June 4, 2001 Weekly risk assessment for scheduled maintenance and surveillance

b. Findings

No findings of significance were identified.

.2 Failure to Adequately Assess and Manage Risk When Essential Service Water was Removed from Service

a. Inspection Scope

The inspectors reviewed the licensee's assessment and management of risk when essential service water Train A was removed from service to facilitate maintenance. 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.

b. Findings

The inspectors found that the licensee failed to adequately assess and manage the risk associated with removing essential service water Train A from service. This finding was of very low safety significance and was a noncited violation of 10 CFR 50.65 (a)(4).

On May 10, 2001, while the plant was in Mode 5, operations personnel performed a shutdown safety assessment at the beginning of the day shift. This safety assessment assumed both diesel generators and offsite sources were available. Although maintenance was being performed on switchyard Bus B, the maintenance did not affect the operability of the offsite sources.

The safety assessment identified that plant risk at the beginning of the shift was at the lowest risk category. The licensee's shutdown safety assessment was based more on compliance with Technical Specifications than an actual quantification of risk. This risk category implied that the plant was fully capable of performing a safety function or that any reduced capability was acceptable. At 9:10 a.m., the licensee removed essential service water Train A from service for maintenance. The licensee did not update the risk assessment to account for the inoperable essential service water train. The inspectors asked how the inoperable essential service water train affected emergency power availability. Operations personnel stated that emergency power availability was not affected because, even though essential service water was not available to provide cooling to the diesel generator, nonsafety-related service water was still available to provide a source of cooling. Since service water was still available, operations personnel considered both diesel generators available to perform their function.

The inspectors reviewed Maintenance Procedure EDP-ZZ-1128, "Maintenance Rule and EPIX Programs," Revision 2, and noted that availability was defined as the amount of time that a system, structure, or component was capable of performing its intended function. Functionality was defined as that attribute that included the system, structure, or component within the scope of the maintenance rule. An attribute that scoped the diesel generators into the maintenance rule was the ability to provide power to safety-related equipment in the event of a loss of offsite power.

Nonsafety-related service water would not be available in the event of a loss of all offsite power. Following a discussion, the licensee representatives agreed that with essential service water Train A removed from service the diesel generator could not perform its function in the event of a loss of all offsite power.

The licensee should have performed a risk assessment prior to removing essential service water Train A from service to assess the risk impact as required by 10 CFR 50.65 (a)(4). Had the risk assessment been performed, it would have identified that removing essential service water Train A 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. Failing to adequately assess the risk when essential service water Train A was removed from service was a violation (50-483/01-03-02) (EA-01-173).

This finding is more than minor because it had an credible impact on safety in that a diesel generator was not available to perform its function in the event of a loss of all offsite power, placing the plant in a higher risk condition, and the risk was not assessed or managed. This finding affected the mitigating system cornerstone. The inspectors evaluated this finding using Appendix G (Shutdown Operation) of the reactor safety significance determination process. The evaluation assumed shutdown operations with a time-to-boil greater than 2 hours and inventory in the pressurizer. Using the checksheet from Appendix G, the inspectors determined that during the time period essential service water was out of service the minimum equipment required by the checksheet was available. Therefore, this finding was found to be only of very low safety significance (Green).

Part 10, Section 50.65(a)(4), of the Code of Federal Regulations required, in part, that before performing maintenance the licensee shall assess and manage the increase in risk that may result from the proposed maintenance activity. Prior to removing essential service water Train A from service on May 10, 2001, the licensee failed to adequately assess the risk associated with removing essential service water from service. Since the risk was not adequately assessed, the licensee did not identify that the inoperable essential service water train placed the plant into a higher risk configuration because diesel generator availability was affected. This violation of 10 CFR 50.65 (a)(4) is being treated as a noncited violation, consistent with Section VI.A of the NRC Enforcement Policy. This issue was entered into the licensee's corrective action program as Callaway Action Request System Number 200103053.

1R15 Operability Evaluations (71111.15)

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 or component. The inspectors verified that, although equipment was degraded, the operability evaluation provided adequate justification that the equipment could still meet its

Technical Specification, Updated Final Safety Analysis Report, and design bases requirements and that any potential risk increase attributed to the degraded equipment was thoroughly evaluated. The following evaluations were reviewed:

March 23, 2001	Condensate storage tank level indications
April 2, 2001	Degradation in 3-hour fire barrier between engineered safety features transformers
May 2, 2001,	Valve EFHV0050, essential service water Train B containment air cooler outer containment valve
May 5, 2001	Reactor coolant system heatup rate exceeded 100°F in a one-hour period
May 7, 2001	Valve EFHV0060, essential service water from component cooling water heat Exchanger B valve
May 17, 2001	Maximum condensate storage tank temperature

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, Updated Final Safety Analysis Report, Inservice Testing, and licensee administrative procedures. The inspectors verified testing results for the following components:

April 2, 2001	Residual heat removal Pump A room cooler
April 19, 2001	Lower medium voltage system transformer Train B
May 10, 2001	Essential service water Train B vibration
May 15, 2001	Turbine-driven auxiliary feedwater pump
June 1, 2001	Power-operated relief block valve
June 26, 2001	Containment spray pump and valves Train A

b. Findings

No findings of significance were identified.

1R20 Refueling and Outage Activities (71111.20)

a. Inspection Scope

Throughout the outage the inspectors observed and reviewed numerous refueling activities to ensure that the licensee adequately adhered to administrative risk reduction processes and developed risk reduction strategies to mitigate any potential losses of key safety functions. The inspectors verified that licensee actions met Operations Procedure EDP-ZZ-1128, "Callaway Plant Risk Assessment," Revision 1, Refuel 11 Risk Analysis, 10 CFR 50.65, and other licensee administrative procedures.

b. Findings

No findings of significance were identified.

1R22 Surveillance Testing (71111.22)

.1 Routine Surveillance Tests

a. Inspection Scope

The inspectors observed or reviewed the following 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 Updated Final Safety Analysis Report, and licensee procedural requirements:

April 8, 2001 Operations Procedure OSP-NE-0024B, "Standby Diesel Generator 'B' 24 Hours Run and Hot Restart," Revision 5

April 13, 2001 Maintenance Procedure MSE-NK-QB012, "Refueling Outage Inspection and Surveillance of NK12 Battery and Battery Charger NK22/26," Revision 9

May 2, 2001 Engineering Procedure ETP-EF-0002B, "Essential Service Water Train B Flow Verification," Revision 6

May 6, 2001 Maintenance Procedure ISP-SA-2413B, "Diesel Generator and Sequence Testing (Train B)," Revision 13

May 6, 2001 Maintenance Procedure ISP-SA-02414, "ESFAS Trip Actuating Device Test," Revision 10

June 4, 2001 Operations Procedure OSP-EJ-V001A, "Train B RHR Valve Inservice Test," Revision 13

b. Findings

No findings of significance were identified.

.2 Notice of Enforcement Discretion

(Closed) Unresolved Item 50-483/0014-03: Inadequate surveillance test to demonstrate the interlock between Valves BNHV8812A and EJHV8811A

In NRC Inspection Report 50-483/00-14 the inspectors documented that the licensee did not have an adequate surveillance test that demonstrated the interlock between Valve BNHV8812A (residual heat removal Pump A suction from the refueling water storage tank) and Valve EJHV8811A (containment recirculation Sump A). Specifically, a safety injection coincident with low level in the refueling water storage tank would cause Valve EJHV8811A to open. When Valve EJHV8811A was full open, a limit switch on the valve sent a closure signal to Valve BNHV8812A. This requirement was specified in Technical Specification Surveillance Requirement 3.5.2.5.

Technical Specification Surveillance Requirement 3.5.2.5 required that valves in the emergency core cooling system actuate to their correct position on an actual or simulated actuation signal. This surveillance requirement had an 18-month frequency. The licensee determined that the last time the test was satisfactorily performed was April 1998.

The licensee indicated that this test could not be performed at power because opening the containment recirculation sump Valve EJHV8811A would drain the residual heat removal header into the containment sump and render the residual heat removal pump inoperable. On September 7, 2000, the licensee requested enforcement discretion from the surveillance requirement.

The NRC evaluated the licensee's request for enforcement discretion and granted the request (NOED 00-6-010) on September 8, 2000, stating that the staff would not enforce compliance with the action statements of Technical Specification Surveillance Request 3.5.2.5 because of the failure to test the automatic closure of Valve BNHV8812A until either: (1) there was a plant shutdown to Mode 5 (cold shutdown) when the closure function of Valve BNHV8812A would be tested or (2) an exigent Technical Specification amendment was approved (no later than 4 weeks from September 8, 2000). The exigent Technical Specification was approved on October 6, 2000.

During the refueling outage, the inspectors verified that the licensee successfully tested the interlock between Valves BNHV8812A and EJHV8811A. The interlock was verified using Operations Procedure OSP-EJ-V0002A, "RHR Pump Containment Sump Suction and RWST Suction Operability Test," Revision 15, on April 23, 2001.

Failing to perform the surveillance requirement within the required 18-month frequency was a violation of Technical Specification Surveillance Requirement 3.5.2.5. This violation was determined to be of minor significance because the interlock performed

properly when tested. Although this issue should be corrected, it constitutes a violation of minor significance that is not subject to enforcement action in accordance with Section VI of the NRC's Enforcement Policy.

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

a. Inspection Scope

The inspectors reviewed Revision 24 to the Callaway Radiological Emergency Response Plan, submitted February 22, 2001; Revision 24 to Change Notice 01-001; and Revision 28 to Procedure EIP-ZZ-00101, "Classification of Emergencies," submitted February 27, 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.

2. **RADIATION SAFETY**
Cornerstone: Occupational Radiation Safety

2OS3 Radiation Monitoring Instrumentation (71121.03)

a. Inspection Scope

The inspectors interviewed cognizant licensee personnel and reviewed the following items to ensure that the licensee's activities conformed to regulatory requirements:

- Calibration, operability, and alarm setpoints, when applicable, of portable radiation detection instrumentation, selected area radiation monitors (SDRE-0023, 0024, 0039, 0047), temporary area radiation monitors, continuous air monitors, containment high range monitors (GTRT-0059, 0060), whole-body counting equipment, electronic alarming dosimeters, teledosimetry, and personnel contamination monitors
- Calibration expiration and source response check currency on radiation detection instruments staged for use
- Calibration source accountability and traceability
- The licensee's capability for refilling and transporting self-contained breathing apparatus air bottles to and from the control room and operations support center during emergency conditions
- Control room operator and emergency response personnel training and qualifications for use of a self-contained breathing apparatus

- The status and surveillance records of self-contained breathing apparatuses staged and ready for use in the plant
- Selected exposure-significant radiological incidents that involved internal exposures, radiation monitoring instrument deficiencies, or self-contained breathing apparatuses since the last inspection in this area
- Licensee self-assessments and audits (QA Audits AP00-004, 006, and 008) focusing on radiological incidents that involved personnel internal exposures, radiation monitoring instrument deficiencies, or self-contained breathing apparatuses since the last inspection in this area
- CARS reports (2000-01355, 01369, 01537, 01541, 01598, 01680, 01778, 02603, 02948, 01969, 01972, 02447; and 2001-00176, 00839, 01162, 01288)

b. Findings

The inspectors identified that the licensee had not adequately surveyed items released from the radiologically controlled area. This finding was a violation of 10 CFR 20.1501(a). The inspectors also identified that the licensee failed to review or evaluate the use of a nonconforming dose rate instrument. This finding was a violation of Technical Specification 5.4.1(a). These findings were of very low safety significance and were noncited violations.

The inspectors identified that the licensee had not evaluated personnel contamination monitors, portable frisking instruments, and tool monitors to determine their capability of detecting all radionuclides that could be released from the radiologically controlled area. To determine which radionuclides should have been considered in such an evaluation, the inspectors reviewed the current dry active waste stream analysis results. The dry active waste stream analysis was used to classify radioactive waste, in accordance with 10 CFR 61.55, and indicated the types and relative abundances of radionuclides present as contamination in the licensee's facility. This analysis confirmed that the primary isotope of interest in the waste stream was Iron-55. Since Iron-55 decays by electron capture and emits only a low energy x-ray, this makes it difficult to detect utilizing the licensee's instruments. The licensee had not evaluated the ability of its personnel contamination monitors, portable frisking instruments, and tool monitors to identify all radionuclides that might be present on items released from its control. Without this evaluation, the licensee could not ensure that release surveys were adequately performed.

Part 10, Section 20.1003, of the Code of Federal Regulations defines a survey as a means of evaluation of the radiological conditions and potential hazards. Part 10, Section 20.1501(a), of the Code of Federal Regulations requires each licensee to make or cause to be made, surveys that may be necessary for the licensee to comply with the regulations in 10 CFR Part 20 and 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.

The licensee's failure to adequately survey items released from the radiologically controlled area was a violation of 10 CFR 20.1501(a). This violation is being treated as a noncited violation consistent with Section VI.A of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as Callaway Action Request System Number 200102126 (50-483/01-03-03).

The significance of this violation was determined to be more than minor, because it could be reasonably viewed as a precursor to a significant event and it involved an occurrence in the radioactive material control program. This violation was processed through the public radiation safety significance determination process and determined to be of very low safety significance (Green), because it did not result in public dose greater than 0.005 rem, and there were no more than five related events.

During a field observation on April 18, 2001, the inspector identified a survey instrument (RO-2A, SN 2365) which was tagged out of service as nonconforming on April 12, 2001. The description of the nonconformance was, "reading 20 mr/hr in a 100 mr/hr field." Health Physics Departmental Procedure HDP-ZZ-04000, "Health Physics Instrumentation Program," Revision 16, requires, in part, that a review of the instrument use must be performed within one working day when a dose rate instrument is nonconforming. The licensee determined that there was no documentation of any review or evaluation as of April 18, 2001, as required by the procedure.

Technical Specification 5.4.1.a states, in part, that written procedures shall be established, implemented, and maintained covering the procedures recommended in Regulatory Guide 1.33, Revision 2, Appendix A, February 1978. Regulatory Guide 1.33, Revision 2, Appendix A, February 1978, Section 7.e, is "Radiation Protection Procedures."

The licensee's failure to conduct a review or evaluation of the use of the nonconforming dose rate instrument within one working day was a violation of Technical Specification 5.4.1.a. This violation is being treated as a noncited violation consistent with Section VI.A of the NRC Enforcement Policy. This violation is in the licensee's corrective action program as Callaway Action Request System Number 200102148 (50-483/01-03-04).

The significance of this violation was determined to be more than minor, because it could be reasonably viewed as a precursor to a significant event and it involved conditions contrary to licensee procedures which impact instrumentation related to measuring worker dose. This violation was processed through the occupational radiation safety significance determination process and determined to be of very low safety significance (Green), because there was no over exposure, no substantial potential for overexposure because the instrument was removed from service, and the ability to assess dose was not compromised because the technician was wearing dosimetry.

2PS1 Radioactive Gaseous and Liquid Effluent Treatment and Monitoring Systems (71122.01)

a. Inspection Scope

The inspector interviewed cognizant personnel and walked down the major components of the gaseous and liquid release systems to observe ongoing activities, equipment material condition, and the system configuration, as compared to the description in the Final Safety Analysis Report. The following items were reviewed to determine whether the licensee had met the objective of this cornerstone to ensure adequate protection of public health and safety from exposure to radioactive material released into the public domain:

- 1999 and 2000 Radiological Effluent Release Report
- Changes to the Offsite Dose Calculation Manual and to the radioactive waste system design and operation
- Anomalous results, if any, reported in the Radiological Effluent Release Report
- Effluent radiological occurrence performance indicator incidents, if applicable
- Sample collection and analysis of liquid and gaseous effluents
- Selected radioactive liquid waste release permits and associated projected doses to members of the public
- Compensatory sampling and radiological analyses conducted when effluent monitors were declared out-of-service
- Monthly, quarterly, and annual dose calculations
- Air cleaning system surveillance test results
- Surveillance test results for the stack and vent flow rates
- Records of instrument calibrations performed since the last inspection for each point of discharge effluent radiation monitor and flow measurement device
- Effluent radiation monitor alarm setpoint values
- Calibration records of counting room instrumentation associated with effluent monitoring and release activities
- Quality control records for the counting room instruments
- Audits (AP00-004) and self-assessments (SA00-HP-003) related to the radioactive effluent treatment and monitoring program

- Special Report 2000-003
- Corrective action documents related to the radioactive effluent treatment and monitoring program (CARS 200000880, 200001313, 200001480, 200001550, 200001551, 200001618, 200001688, and 200001865)

b. Findings

No findings of significance were identified.

3. **SAFEGUARDS**
Cornerstone: Physical Protection

3PP1 Access Authorization (71130.01)

a. Inspection Scope

The inspectors performed the following inspection activities:

- reviewed licensee event reports and safeguards event logs to identify problems in the access authorization program
- reviewed procedures, audits, and self-assessments of the following programs/areas: behavior observation, access authorization, fitness-for-duty, supervisor and escort training, and requalification training
- interviewed five supervisors/managers and six individuals who had escorted visitors into the protected and/or vital areas to determine their knowledge and understanding of their responsibilities in the behavior observation program
- reviewed corrective action documents, licensee event reports, safeguards event logs, audits, selected security event reports, and self-assessments for the licensee's access authorization program to determine the licensee's ability to identify and resolve problems

b. Findings

No findings of significance were identified.

3PP2 Access Control (71130.02)

a. Inspection Scope

The inspectors performed the following inspection activities:

- reviewed licensee event reports and safeguards event logs to identify problems with access control equipment

- reviewed procedures and audits for testing and maintenance of access control equipment and for granting and revoking unescorted access to protected and vital areas
- interviewed security personnel concerning the proper operation of the explosive and metal detectors, X-ray devices, and key card readers
- observed licensee testing of access control equipment and the ability of security personnel to control personnel, packages, and vehicles entering the protected area
- reviewed procedures to verify that a program was in place for controlling and accounting for hard keys to vital areas
- reviewed the licensee's process for granting access to vital equipment and vital areas to authorized personnel having an identified need for that access
- reviewed corrective action documents, licensee event reports, safeguards event logs, audits, selected security event reports, and self-assessments for the licensee's access control program in order to assess the licensee's ability to identify and resolve problems with the access control program
- interviewed key security department and plant support personnel to determine their knowledge and use of the corrective action reports and resolution of problems regarding repair of security equipment

b. Findings

No findings of significance were identified.

3PP4 Security Plan Changes (71130.04)

a. Inspection Scope

The inspectors completed review of:

- the Physical Security Plan, Revisions 30A, 31, and 32, dated November 21 and December 7, 2000, and April 5, 2001, respectively, to determine if requirements of 10 CFR 50.54 (p) had been met
- the safeguards event logs from October 1, 2000 to May 20, 2001, and interviewed security personnel to determine their knowledge and use of the corrective action program and resolution of problems related to making changes to the licensing documents

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 first quarter 2001 performance indicator data submittal to verify its accuracy and completeness. The inspectors reviewed control rooms logs, maintenance documents, security logs and corrective action reports to verify that the data was properly submitted. The inspectors verified the following indicators:

- Unplanned scrams per 7000 hours critical
- Scrams with loss of normal heat removal
- Unplanned power changes per 7000 critical hours
- Protected area security equipment
- Personnel screening program performance
- Fitness-for-duty/personnel reliability program performance
- Reactor coolant system activity

b. Findings

No findings of significance were identified.

4OA2 Identification and Resolution of Problems

.1 Feedwater Piping Thinning

a. Inspection Scope

On April 19, 2001, during refueling Outage 11, the licensee ultrasonically tested main feedwater piping to assess the effects of erosion-corrosion from flowing water (single-phase fluid) and water/steam mixtures (two-phase fluid). These effects are commonly referred to as flow-accelerated corrosion. The inspections identified several instances of localized wall thinning to below the minimum thickness required by the design codes in both safety- and nonsafety-related portions. These sections of piping were located in both the turbine building and the containment building. The inspectors reviewed the licensee's flow-accelerated corrosion program as described in Engineering Procedure EDP-ZZ-01115, "Flow Accelerated Corrosion of Piping and Components Predictive Performance Manual," Revision 16, to verify it was consistent with Generic Letter 89-08, "Erosion/Corrosion - Induced Pipe Wall Thinning," May 2, 1989, and with industry standards.

b. Findings

The inspectors found that the licensee's flow accelerated corrosion program was deficient in that it failed to detect degradation in multiple portions of feedwater piping prior to degradation beyond the design minimum wall thickness. This finding was of very low safety significance.

The licensee expanded and upgraded their flow accelerated corrosion program following an August 11, 1999, event in which an 8-inch moisture separator reheater drain line failed causing operators to manually trip the reactor. The upgraded and expanded flow accelerated corrosion program, utilizing CHECWORKS™, Revision F, software, predicted wall thinning in the main feedwater system. However, the licensee had not previously monitored the main feedwater piping for wall thickness degradation and, without wall thickness trending data, the software was not able to accurately predict the extent of degradation. The wall thickness trending data necessary to deterministically calculate pipe wall thickness would have been an initial and at least one set of subsequent pipe wall thickness values. After performing inspections during refueling Outage 11, the licensee found the main feedwater piping degradation to be more extensive than anticipated.

Based on the licensee's initial findings and additional industry information, flow accelerated corrosion inspections were expanded to include portions of the condensate system, auxiliary feedwater system, feedwater heaters, and other areas. Additional degradation was found in piping associated with the feedwater heaters.

Several instances of main feedwater system wall thinning were identified in risk-important sections of 14-inch ASME Code Class 2 safety-related piping components inside containment. The licensee identified six 90-degree elbows, two 45-degree elbows, one 14 to 16-inch expander, and a 6-foot section of piping that had degraded to less than ASME Code minimum design allowable wall thickness or that were projected to degrade below allowance during the upcoming cycle. The as-found wall thickness, for those components degraded below allowance, ranged from 75 to 96 percent of the minimum allowable code required thickness. These degraded areas were identified in sections of piping that would affect both auxiliary feedwater flow and main feedwater flow in the event of a pipe rupture. All safety-related components in containment that were below the minimum wall thickness (or were predicted to degrade to below this value during the upcoming cycle) were replaced. Some degraded nonsafety-related components, outside of containment, were repaired instead of being replaced.

Although the main feedwater degradation was identified and addressed by the licensee before failure, the extent of the degradation at the time of discovery and exposure time while in this condition was a safety concern. In a June 28, 1989, response to Generic Letter 89-08, the licensee reported the implementation of a long-term erosion/corrosion monitoring program that "meets or exceeds NUMARC recommendations." This program addressed both single-phase and two-phase carbon steel piping systems and included safety-related and nonsafety-related piping. The erosion/corrosion monitoring program was administratively controlled through documented procedures under the

licensee's predictive performance program. However, this flow accelerated corrosion program failed to detect degradation in multiple portions of feedwater piping prior to degradation beyond the design minimum wall thickness. This finding included crosscutting aspects in the area of problem identification and resolution.

The finding was more than minor because it had an credible impact on safety and additionally could credibly affect the availability/reliability of a mitigating system (auxiliary feedwater). This finding was determined to be of very low safety significance (Green) using the reactor safety significance determination process because evaluation determined that the degraded piping was operable. This issue is documented in CARS Number 200102270.

.2 Turbine-Driven Auxiliary Feedwater Pump

a. Inspection Scope

The inspectors reviewed the circumstances that caused the turbine-driven auxiliary feedwater pump to become inoperable. The inspectors also evaluated two prior instances in which the turbine-driven auxiliary feedwater pump was rendered inoperable to assess the effectiveness of prior corrective actions as required by 10 CFR Part 50, Appendix B, Criterion XVI.

b. Findings

The licensee failed to implement effective corrective action to ensure that the turbine-driven auxiliary feedwater pump steam trap and its adjacent piping were not insulated. Insulating the steam trap and its adjacent piping caused the turbine-driven auxiliary feedwater pump to become inoperable. This finding was of very low safety significance and was a noncited violation of 10 CFR Part 50, Appendix B, Criterion XVI.

On June 12, 2001, at 3:45 a.m., the licensee removed Valve FCLV0010 (turbine-driven auxiliary feedwater pump steam line drain bypass level valve) from service for a loop calibration. With this valve removed from service, the steam trap (FCST0001) was relied on to remove moisture from the main steam supply to the turbine-driven auxiliary feedwater pump. At 6:56 a.m., Annunciator 128F (turbine-driven auxiliary feedwater pump steam trap level high) alarmed. This annunciator was indicative of a high steam trap level and/or a malfunctioning steam trap. Either the steam line drain bypass level valve or the steam trap was required for pump operability as discussed in Operations Procedure ODP-ZZ-00002, "Equipment Status Control," Revision 19.

With Valve FCLV0010 removed from service and with the steam trap not functioning properly, the licensee declared the turbine-driven auxiliary feedwater pump inoperable and entered Technical Specification 3.7.5.C. At 8:17 a.m., Valve FCLV0010 was returned to service, moisture was drained from the steam supply to the turbine-driven auxiliary feedwater pump, and Technical Specification 3.7.5.C was exited.

The licensee determined that with both Valve FCLV0010 and the steam trap out of service the turbine-driven auxiliary feedwater pump was inoperable because any

condensate present in the steam supply had the potential to overspeed the pump on a valid start signal. Although, in this instance, the licensee did not believe any condensation entered the pump.

The licensee determined that the steam trap was inoperable because it, along with its adjacent piping, had been inadvertently insulated, which adversely affected its operation. If the temperature being sensed by the steam trap was cool (indicative of condensate) the steam trap would open and drain the condensate from the steam supply. If the temperature being sensed by the steam trap was hot (indicative of steam), the steam trap remained closed. Although steam had condensed in the steam supply, the insulation maintained temperature high enough to prevent the steam trap from opening and draining the condensate from the steam supply header. As a result, condensate accumulated in the steam supply. The licensee could not positively determine when the steam trap and adjacent piping had been insulated.

The licensee performed an evaluation and determined that a similar incident occurred in August 1994. This occurrence was documented in Suggestion-Occurrence-Solution Report 94-1232. In this occurrence, turbine-driven auxiliary feedwater steam line drain bypass Valve FCLV0010 was removed from service for maintenance. With the valve out of service, Annunciator 128F alarmed and the pump was declared inoperable. The licensee determined that the steam trap and its adjacent piping were insulated. The insulation was removed and the steam trap operated as designed. A corrective action for this incident was to revise Maintenance Procedure MTT-ZZ-I0011, "Installation of Insulation," Revision 4, to state that steam traps should not be insulated because insulation affects the steam trap operation. However, this corrective action was not implemented.

Previously, on March 19, 2001, the licensee removed the turbine-driven auxiliary feedwater steam line drain valve (FCLV0010) from service for a loop calibration. Shortly after the valve was removed from service, Annunciator 128F alarmed. The licensee indicated that the pump was already inoperable due to a problem with the pump's discharge check valve. To clear the annunciator the licensee returned the turbine-driven auxiliary feedwater steam line drain valve (FCLV0010) to service. The licensee stated that the problem with the discharge check valve had a higher priority than the problem that caused Annunciator 128F; therefore, no corrective action document or in-depth evaluation was performed to determine the reason for the annunciator. The annunciator alarmed because the piping immediately adjacent to the steam trap was insulated, affecting its operation.

While reviewing documentation related to the March 19 issue, the inspectors identified that the problem with the discharge check valve had been corrected prior to Annunciator 128F alarming. As a result, the licensee should have declared the pump inoperable as required by Operations Procedure ODP-ZZ-0002 and initiated a corrective action document as required by Administrative Procedure APA-ZZ-00500, "Corrective Action Program," Revision 31. By failing to declare the pump inoperable and initiate a corrective action document, the licensee missed another opportunity to identify that the steam trap was being adversely affected by the insulation.

Failing to take adequate corrective action to preclude insulating the turbine-driven auxiliary feedwater pump's steam trap and adjacent piping was a violation (50-483/01-03-05).

This finding is more than minor; it had an actual impact on safety because the turbine-driven auxiliary feedwater pump was rendered inoperable due to the same conditions that had previously caused the pump to become inoperable. Corrective action for these prior incidences was ineffective. This finding affected the mitigating system cornerstone. The finding was found to be only of very low safety significance (Green) using the reactor safety significance determination process, because the pump was out of service for less than 4 hours and both motor-driven auxiliary feedwater pumps were available. This finding included crosscutting aspects in the area of problem identification and resolution.

Appendix B of 10 CFR Part 50, Criterion XVI, required, in part, that conditions adverse to quality be promptly identified and corrected. On June 12, 2001, the turbine-driven auxiliary feedwater pump was rendered inoperable due to its steam trap and adjacent piping being insulated. The insulation affected the operation of the steam trap preventing condensation from draining from the steam supply to the turbine-driven auxiliary feedwater pump. Similar instances of insulated steam traps and adjacent piping had occurred in August 1994 and in March 2001, rendering the pump inoperable. However, the licensee failed to take adequate corrective actions to preclude insulating the steam traps. This violation of 10 CFR Part 50, Appendix B, Criterion XVI, is being treated as a noncited violation consistent with Section VI.A of the NRC Enforcement Policy. This issue is documented in the licensee's corrective action program as Callaway Action Request System Number 200103722.

4OA3 Event Followup (71153)

(Closed) Licensee Event Report 50-483/2001-004-00: failure to maintain a posted security compensatory measure during a declared tornado warning. For 23 minutes while the plant was under a tornado warning issued by the National Weather Service, a compensatory security officer stationed in the turbine building was moved to the nearby control building. The licensee event report addressed corrective actions to preclude similar events in the future. The licensee event report was reviewed and no findings of significance were identified. This licensee event report is closed.

4OA5 Other

On May 14, 2001, the NRC issued a Notice of Violation and Proposed Imposition of Civil Penalty - \$55,000 to the Union Electric Company. This action (EA-01-005) involved a violation of 10 CFR 50.7(a), which prohibits discrimination by a Commission licensee against an employee for engaging in certain protected activities. The ADAMS accession number for this document is ML011340385.

40A6 Management Meetings

Exit Meeting Summary

The emergency preparedness inspector presented inspection results to Mr. Michael Evans, Manager, Operations Support, and other members of licensee management in a telephone conversation on March 28, 2001.

The health physics inspector presented inspection results to Mr. Garry Randolph, Senior Vice President and Chief Nuclear Officer, and other members of licensee management at the conclusion of the inspection on April 20, 2001.

The reactor inspector presented the inspection results to Mr. Garry Randolph, Senior Vice President and Chief Nuclear Officer, and other members of licensee management on April 20, 2001.

The emergency preparedness inspector presented inspection results to Mr. Mark Reidmeyer, Supervisor, Regional Regulatory Affairs, and other members of licensee management in a telephone conversation on May 29, 2001.

The physical security inspector presented the inspection results to Mr. Michael Evans, Manager, Operations Support, and other members of licensee management at the conclusion of the inspection on June 8, 2001.

The health physics inspector presented the inspection results to Mr. W. Witt, Plant Manager, and other members of licensee management at the conclusion of the inspection on June 22, 2001.

The resident inspectors presented the inspection results to Mr. Ron Affolter, Vice President, Nuclear, and other members of licensee management at the conclusion of the inspection on July 9, 2001.

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

40A7 Licensee Identified Violations

The following finding of very low safety significance was identified by the licensee and is a violation of NRC requirements, which meets the criteria of Section VI of the NRC Enforcement Policy, NUREG-1600, for being dispositioned as a Noncited Violation (NCV).

If you deny this noncited violation, 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, Region IV; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; and the NRC Resident Inspector at the Callaway Plant.

NCV Tracking Number

Requirement Licensee Failed to Meet

50-483/01-03-06

10 CFR 20.1703(a) states, in part, that the licensee shall use only respiratory protection equipment that is tested and certified by the National Institute for Occupational Safety and Health (NIOSH). From late 1992 to August 2000, self-contained breathing apparatus harness straps and belts were used, which were not NIOSH certified for the type of SCBA in use at Callaway, as described in the licensee's corrective action program (Callaway Action Request System Number 200001969).

ATTACHMENT

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee

R. Affolter, Vice President, Nuclear
J. Blosser, Manager, Regulatory Affairs
L. David, Supervisor, Key Control
P. Davis, Nurse, Fitness for Duty
M. Evans, Manager, Operations Support
M. Faulkner, Assistant Superintendent, Security
K. French, Nurse, Fitness for Duty
C. Graham, Supervisor, Health Physics Technical Support
J. Hiller, Engineer, Regulatory Support
A. Lee, Supervisor, Access Control
J. Kerrigan, Senior Health Physicist
J. Kovar, Engineer, Quality Assurance
J. Laux, Manager, Quality Assurance
B. Montgomery, Program Engineer, Inservice Inspection
G. Pendergraff, Evaluator, Protective Services
R. Pohlman, Consulting Systems Engineer
G. Randolph, Senior Vice President and Chief Nuclear Officer
M. Reidmeyer, Supervisor, Regional Regulatory Affairs
R. Rist, Superintendent, Administration
R. Roselius, Superintendent, Radiation Protection and Chemistry
S. Sandbothe, Superintendent, Operations
K. Schoolcraft, Senior Engineer, Quality Assurance Regulatory Services
K. Shaw, Supervisor, Administration
M. Taylor, Manager, Nuclear Engineering
D. Thompson, Supervisor, Radiation Protection / Chemistry
M. Trusty, Supervisor, Chemistry
W. Witt, Plant Manager

Contractor

J. Coash, Supervisor, Security Training, Wackenhut Corporation
M. Dunbar, Project Manager, Wackenhut Corporation
R. Watts, Supervisor, Security Operations, Wackenhut Corporation

ITEMS OPENED AND CLOSED

Opened

50-483/01-03-01 NCV Flood door left open and unmonitored (Section 1R06.3)

50-483/01-03-02	NCV	Failure to adequately assess and manage risk when an essential service water pump was removed from service (Section 1R13.2)
50-483/01-03-03	NCV	Failure to adequately survey items released from the radiologically controlled area (Section 2OS3)
50-483/01-03-04	NCV	Failure to review or evaluate the use of a nonconforming dose rate instrument (Section 2OS3)
50-483/01-03-05	NCV	Inadequate corrective action to address turbine-driven auxiliary feedwater pump inoperability (Section 4OA2.2)
50-483/01-03-06	NCV	Failure to use NIOSH certified harness straps and belts on all self contained breathing apparatuses (Section 4OA7)

Closed

50-483/01-03-01	NCV	Floor door left open and unmonitored (Section 1R06.3)
50-483/01-03-02	NCV	Failure to adequately assess and manage risk when an essential service water pump was removed from service (Section 1R13.2)
50-483/0014-03	URI	Inadequate surveillance test to demonstrate the interlock between Valves BNHV8812A and EJHV8811A (Section 1R22.2)
50-483/0103-03	NCV	Failure to adequately survey items released from the radiologically controlled area (Section 2OS3)
50-483/0103-04	NCV	Failure to review or evaluate the use of a nonconforming dose rate instrument (Section 2OS3)
50-483/01-03-05	NCV	Inadequate corrective action to address turbine-driven auxiliary feedwater pump inoperability (Section 4OA2.2)
50-483/0103-06	NCV	Failure to use NIOSH certified harness straps and belts on all self contained breathing apparatuses (Section 4OA7)
50-483/2001-004-00	LER	Failure to maintain a posted security compensatory measure during a declared tornado warning (Section 4OA3)

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 Requests

199901324	199902339	200001213	200002531
199901799	199903113	200002157	
199902304			

NDE Reports

02943	03011	04601	04625
02944	03012	04609	04633
02950	03023	04610	04634
02951	03024	04623	

Miscellaneous Documents

Callaway Plant 2nd Interval inservice Inspection Plan, Revision 3

Framatome Technologies, Inc. Topical Report BAW-10219P, Electro Sleeving Qualification for PWR Recirculating Steam Generator Tube Repair, Revision 4 (Proprietary)

Risk-Informed Inservice Inspection Plan, Callaway Plant, Revision 2

Callaway License Amendment Request ULNRC 4391, dated February 15, 2001

NRC Information Notice 2001-09: Main Feedwater System Degradation in Safety-Related ASME Code Class 2 Piping Inside the Containment of a Pressurized Water Reactor, dated June 12, 2001