ENCLOSURE 2

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.:	50-483
License No.:	NPF-30
Report No.:	50-483/96-11
Licensee:	Union Electric Company
Facility:	Callaway Plant
Location:	Junction Highway CC and Highway O Fulton, Missouri
Dates:	October 13 through November 23, 1996
Inspectors:	D. G. Passehl, Senior Resident Inspector F. L. Brush, Resident Inspector
Approved By:	W. D. Johnson, Chief, Project Branch B

ATTACHMENT: Supplemental Information

EXECUTIVE SUMMARY

Callaway Plant
NRC Inspection Report 50-483/96-11

Operations

- The inspectors identified that the component cooling water system normal operating procedure did not provide adequate guidance for system operation. The failure of the procedure to provide adequate guidance was a violation (Section O3.1).

- The licensee identified that an operator inadvertently sent a blended flow of borated water to the reactor coolant system rather than the spent fuel pool. The failure to follow the spent fuel pool normal operating procedure was a noncited violation (Section O4.2).

- The licensee identified that an equipment operator incorrectly placed a worker protection tag on and pulled the closing power fuses for the centrifugal charging Pump A supply breaker. This was a noncited violation of the workman's protection assurance tagging procedure (Section O4.3).

- The quality assurance department performed an effective review of the plant shutdown and cooldown for the refueling outage (Section O7.1).

Engineering

- The inspectors identified that the component cooling water system Train A temperature was below the lower limit specified in the Final Safety Analysis Report (Section E1.1).

Report Details

Summary of Plant Status

The reactor began this inspection period shutdown for Refueling Outage 8.

On October 12, 1996, an unplanned engineered safety features auxiliary feedwater actuation occurred. The operating main feedwater pump tripped on high discharge pressure. All systems responded as required.

On November 11, 1996, operators closed the main generator output breaker to end Refueling Outage 8. The refueling outage was completed in 31 days.

Later on November 11, 1996, at approximately 15 percent reactor power, a feedwater isolation occurred which caused a turbine trip. In addition, high vibrations experienced on reactor coolant Pump B, following the turbine trip, required the operators to shut down the reactor.

On November 12, 1996, operators placed the unit back on line after plant personnel balanced the pump. On November 17, 1996, the plant reached full power.

I. Operations

O1 Conduct of Operations

O1.1 General Comments (71707)

Using Inspection Procedure 71707, the inspectors conducted frequent reviews of ongoing plant operations. In general, the conduct of operations was professional and safety-conscious. Problems that occurred during shutdown (Section O1.2) and startup (Section O2.1) are described below.

Plant status, operating problems, and work plans were appropriately addressed during daily turnover and plan-of-the-day meetings. Plant testing and maintenance requiring control room coordination were properly controlled.

O1.2 Inadvertent Auxiliary Feedwater Actuation

a. Inspection Scope (71707)

The inspectors reviewed the circumstances surrounding an inadvertent engineered safety features auxiliary feedwater actuation.

b. Observations and Findings

On October 12, 1996, during the plant shutdown for the refueling outage, an engineered safety features auxiliary feedwater actuation occurred. The operating main feedwater pump tripped on high discharge pressure and caused a motor driven auxiliary feedwater system actuation.

Control room personnel were performing a control rod drop time test in accordance with Procedure ETP-SF-ST001, "Control Rod Drop Time Test," Revision 0. In order to support this testing, plant operators realigned the main feedwater system to prevent automatic actuation of the feedwater system isolation valves and other components. The realignment resulted in isolation of the main feedwater system from the main feed pump discharge check valves to the main feedwater isolation valves. Main feedwater Pump A was aligned to recirculate to the main condenser.

With the feedwater system in this lineup, pressurizing of the feedwater system occurred from the combination of system residual heat and some small leakage through feedwater heater extraction steam isolation valves. This caused actuation of pressure switches for high discharge pressure of main feedwater Pump A. Actuation of the pressure switches tripped the operating main feedwater pump and caused the auxiliary feedwater actuation.

Plant operator response was appropriate. All safety equipment performed as designed. The licensee convened an Event Review Team to investigate the facts and possible causes. The licensee identified a number of corrective actions that will be reviewed when the inspectors evaluate the associated Licensee Event Report.

c. Conclusions

The inspectors concluded that the licensee's initial response to the unanticipated motor driven auxiliary feedwater actuation was satisfactory.

O1.3 Plant Startup Observations

a. Inspection Scope (71707)

The inspectors observed portions of the reactor startup following the refueling outage.

b. Observations and Findings

The licensee conducted thorough pre-evolution briefings. Operator self checking was good. Shift personnel used proper communications. The shift supervisor exhibited good command and control. Licensee management was present in the control room for major evolutions associated with the startup. Management exhibited good involvement. The inspectors verified compliance to the Technical Specifications and Final Safety Analysis Report requirements by reviewing logs, touring main control boards and reviewing status boards.

O2 Operational Status of Facilities and Equipment

O2.1 Inadvertent Steam Generator Hi-Hi Level and Turbine Trip

a. Inspection Scope (71707)

The inspectors reviewed the licensee's response to an inadvertent hi-hi steam generator level turbine trip and a plant shutdown required by Technical Specifications due to high vibrations on reactor coolant Pump B.

b. Observations and Findings

On November 11, 1996, with the reactor at approximately 15 percent power, an inadvertent hi-hi level on Steam Generator A occurred which resulted in a turbine trip. Following the turbine trip, a motor-driven auxiliary feedwater system actuation and a feedwater isolation system actuation occurred. All systems responded as required.

The event occurred while the operators were attempting to stabilize steam generator levels following closure of the feedwater regulating bypass valves. Following the turbine trip, vibrations on reactor coolant Pump B increased to just over 15 mils with a rate of increase greater than two 2 mils in one hour.

The operators entered procedure OTO-BB-00002, "Reactor Coolant Pump Off-Normal," Revision 8. The operators tripped the reactor coolant pump and shut down the plant to Mode 3 as required by Procedure OTO-BB-00002 and Technical Specification 3.4.1.1.

The licensee convened an Event Review Team to investigate the facts and possible causes. The licensee identified a number of corrective actions that will be reviewed when the inspectors evaluate the associated Licensee Event Report.

O3 Operations Procedures and Documentation

O3.1 Inadequate Component Cooling Water System Normal Operating Procedure

a. Inspection Scope (71707)

The inspectors reviewed normal operating Procedure OTN-EG-00001, "Component Cooling Water System," Revision 14. This was a result of an inspector concern about system operation.

b. Observations and Findings

During a tour of the plant, the inspectors noted that the component cooling water flow rate to the lube oil coolers for centrifugal charging Pump A and safety injection

Pump A was above the normal range delineated on their respective flow instruments. Additionally, the component cooling water temperature at the outlet of the lube oil coolers for these pumps was approximately 50°F. The minimum component cooling water temperature in the Final Safety Analysis Report Section 9.2.2.2.3 was 60°F. Section E1.1 of this report discusses the licensee's operability analysis for the components serviced by component cooling water.

The component cooling water system is comprised of two independent safety related trains. Each train, in addition to its safety related loads, could be aligned to provide cooling water to nonsafety related components in the service loop. At the time of discovery, Train B was in service providing cooling water to the service loop. Train A was in service to support earlier operation of centrifugal charging Pump A. With centrifugal charging Pump A secured, component cooling water Train A was not required to be in operation.

Procedure OTN-EG-1, Step 2.7, stated that, during normal operation, the maximum component cooling water flow should not exceed 110 percent of the flow listed in Attachment 1 of the procedure. The basis for the 110 percent value was unclear. The attachment only listed minimum component cooling water flows. The table did not provide a range of flows for the components. During normal system operation, the component cooling water system flow through the various components listed in the attachment routinely exceeded 110 percent of the minimum value. Additionally, the flow sometimes also exceeded the "green band" on the local flow instruments.

During the inspectors' tour on November 12, 1996, the inspectors found the component cooling water flow from the centrifugal charging Pump A lube oil cooler to be pegged high on a local instrument. This was above the "green band" upper limit of 34,500 lbm/hr on the local instrument. The minimum flow listed in Attachment 1 of Procedure OTN-EG-1 was 27,500 lbm/hr. The actual flow through the lube oil cooler exceeded 27,500 lbm/hr by more than 10 percent.

The inspectors identified that the procedure did not adequately address component cooling water system operation with respect to component flow and temperature during normal plant operation. Procedure OTN-EG-00001 was inadequate in that it did not give information required for proper operation of the component cooling system as required by Technical Specification 6.8.1.a. This is a violation of Technical Specification 6.8.1.a (483/9611-01).

The licensee was reviewing the engineering flow balance for the system to verify the throttle positions for component cooling water valves that regulate flow to various safety related equipment. During the initial review, the licensee believed that no operability concerns existed.

c. Conclusions

The inspectors concluded that the procedure for operating the component cooling water system was inadequate.

O4 Operator Knowledge and Performance

O4.1 Refueling operations

a. Inspection Scope (71707)

The inspectors observed fuel assembly movement during core offload.

b. Observations and Findings

Communications between personnel on the refueling machine, in the control room, and at other stations were good. Personnel actions were conservative when moving fuel assemblies. Foreign material exclusion controls around the reactor cavity and on the refueling machine were satisfactory.

O4.2 Inadvertent Injection of Borated Water to the Reactor Coolant System

a. Inspection Scope (71707)

The inspectors reviewed an event in which a reactor operator inadvertently injected borated water into the reactor coolant system.

b. Observations and Findings

On November 20, 1996, while intending to inject blended makeup flow to the spent fuel pool, the reactor operator injected the flow to the reactor coolant system. After several minutes the reactor operator noticed the volume control tank level start to increase and secured the flow. Reactor coolant system average temperature decreased approximately 1.3°F as a result of the borated water addition.

The reactor operator's immediate action was to dilute the reactor coolant system with 263 gallons of makeup water to restore temperature. There were no other adverse effects on the reactor coolant system.

The licensee initiated an investigation of the event using the corrective action process. The inspectors found that the licensee's initial and followup corrective actions were appropriate.

The inspectors reviewed the procedure for filling the spent fuel pool. Normal Operating Procedure OTN-EC-00001, "Fuel Pool Cooling and Cleanup System,

Revision 11, Step 5.8.9, required that the operator select hard close on the following handswitches when filling the spent fuel pool with blended flow:

- BG-HIS-110B, volume control tank outlet header BGFCV0110B handswitch
- BG-HIS-111B, volume control tank inlet header BGFCV0111B handswitch

Instead of taking the handswitches to hard close, the operator went to hard open by mistake. This opened the volume control tank outlet and inlet header Valves BGFCV0110B and BGFCV0111B, respectively. The opening of these valves established the flow to the reactor coolant system through normal charging.

The failure to adhere to Procedure OTN-EC-00001 Step 5.8.9 is considered a violation of the licensee's operating procedures. This licensee-identified and corrected violation is being treated as a noncited violation, consistent with Section VII.B.1 of the NRC Enforcement Policy (483/9611-02).

c. Conclusions

The inspectors concluded that the failure to transfer borated water to the spent fuel pool was due to personnel error. The licensee's actions were appropriate.

O4.3 Worker Protection Tag Placed on the Wrong Component

a. Inspection Scope (71707)

The inspectors reviewed an unplanned Technical Specification 3.5.2 entry when an equipment operator pulled the closing power fuses for centrifugal charging Pump A supply Breaker NB0104. The equipment operator was supposed to pull the closing power fuses for spent fuel pool cooling Pump A supply Breaker NG0104.

b. Observations and Findings

While intending to place a worker protection tag on closing power fuses for spent fuel pool cooling Pump A supply Breaker NG0104, an equipment operator incorrectly placed the worker protection tag on the closing power fuses for centrifugal charging Pump A supply Breaker NB0104. This action made centrifugal charging Pump A inoperable and placed the plant in a 72 hour shutdown action Statement per Technical Specification 3.5.2.

When the equipment operator pulled the closing power fuses for centrifugal charging Pump A supply Breaker NB0104, the control room received an engineered safety features actuation system alarm. Control room personnel realized that the equipment operator pulled the wrong closing power fuses and contacted the equipment operator. Control room personnel directed the equipment operator to replace the closing power fuses for centrifugal charging Pump A. The licensee

started the centrifugal charging pump to ensure operability and exited the Technical Specification Action Statement. The charging pump was inoperable for approximately 9 minutes.

The licensee initiated an investigation of the event using the corrective action process.

The licensee identified the following causes:

- Failure to perform dual verification of the tag. The equipment operator did not arrange for a second person to verify that the tag was on the correct component.
- Misreading of the component identification number.
- Failure to read the noun description of the component being tagged.

Administrative Procedure ODP-ZZ-00310, "Workman's Protection Assurance Tagging", Revision 2, Step 4.1.10.3, required that the method and order specified on the tagout control sheet be followed when hanging tags.

The tagout control sheet for Workman's Protection Assurance 21271, Tag 2, specified that a tag be hung on closing power fuses for spent fuel pool cooling Pump A supply breaker. Failure to adhere to this requirement is considered a violation of the licensee's administrative procedures. This licensee-identified and corrected violation is being treated as a noncited violation, consistent with Section VII.B.1 of the NRC Enforcement Policy (483/9611-03).

c. Conclusions

The inspectors concluded that the failure to pull the correct fuses was due to personnel error. The inspectors found that the licensee's initial and followup actions were appropriate.

O7 Quality Assurance in Operations

O7.1 Review of Quality Assurance Department Surveillance of Plant Shutdown and Cooldown

a. Inspection Scope (71707)

The inspectors reviewed the quality assurance department's Surveillance Report SP96-084 for a surveillance conducted from October 11, 1996, through October 14, 1996. Quality assurance personnel performed observations of control room activities during shutdown of the plant from Mode 1 to Mode 6 in preparation for Refueling Outage 8.

b. Observations and Findings

Quality assurance personnel provided a good assessment of the major evolutions that occurred during the shutdown. Quality assurance personnel observed control rod drop time testing, the new methods employed for the plant cooldown using all steam dumps and pressurizer auxiliary spray, and drain down of the reactor coolant system to 6 inches below the reactor vessel flange.

Quality assurance personnel found good use of procedures, shift turnover meetings, pre-evolution briefings, and communications. In addition, they verified compliance with Final Safety Analysis Report and Technical Specification requirements through work control database reviews, log reviews, and walkdowns of the main control boards. Quality assurance personnel also identified observations that were appropriately documented for followup.

c. Conclusions

The quality assurance department's review of the plant shutdown and cooldown for the refueling outage was good.

II. Maintenance

M1 Conduct of Maintenance

M1.1 General Comments - Maintenance

a. Inspection Scope (62703)

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

- Work Document W174699 - Replace Reactor Coolant Pump D internals;
- Work Document P402569 - Replace Reactor Coolant Pump D motor;
- Work Document C557751 - Replace Main Feedwater Pump B discharge check valve;
- Work Document C557753 - Replace Main Feedwater Pump A discharge check valve;
- Work Document C580902 - Remove Low Pressure Feedwater Heater 2A vent head and tube bundle;
- Work Document C580884 - Remove Low Pressure Feedwater Heater 2C vent head and tube bundle;

- Work Document C580890 - Install Low Pressure Feedwater Heater 2C tube bundle; and

- Work Document C580908 - Install Low Pressure Feedwater Heater 2A tube bundle.

b. Observations and Findings

The inspectors found the work performed under these activities to be professional and thorough. All work observed was performed with the work packages present and in active use. The inspectors frequently observed supervisors and system engineers monitoring job progress, and quality control personnel were present when required. Housekeeping and foreign material exclusion controls were satisfactory.

M1.2 General Comments - Surveillance

a. Inspection Scope (61726)

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

- Surveillance Procedure OSP-EJ-00003, Containment Recirculation Sump Inspection

- Surveillance Procedure OSP-EN-P001A, Section XI - Containment Spray Pump Operability

- Surveillance Procedure MSM-AB-QV001, Main Steam Safety Valve Testing

b. Observations and Findings

Surveillance testing observed during this inspection period was conducted satisfactorily in accordance with the licensee's approved programs and the Technical Specifications.

M8 Miscellaneous Maintenance Issues

M8.1 (Closed) Violation 483/95006-01: the licensee failed to prevent the entry of foreign material into safety-related systems as identified below:

- On April 4, 1995, the licensee identified a latex glove inside safety injection system to reactor coolant system check Valve BB8949A (483/95006-01a).

- On April 20, 1995, after the sumps had been inspected and made available for service the NRC inspectors identified multiple pieces of foreign material in the containment emergency sumps (483/95006-01b).

The inspectors observed foreign material exclusion practices during the refueling outage and noted only minor problems. In addition, the inspectors accompanied licensee personnel on the final closeout inspection of the containment recirculation sumps. The inspectors found the sumps to be very clean.

III. Engineering

E1 Conduct of Engineering

E1.1 Component Cooling Water System Water Temperature and Flow

a. Inspection Scope (37551)

The inspectors noted that the component cooling water system Train A temperature was below the lower limit of 60°F specified in the Final Safety Analysis Report. Additionally, the inspectors noted that the component cooling water flow rate to the lube oil coolers for centrifugal charging Pump A and safety injection Pump A was above the normal range delineated on their respective flow instruments. The inspectors reviewed the licensee's response to these issues.

b. Observations and Findings

During a tour of centrifugal charging pump Room A, the inspectors noted that the temperature of the component cooling water coming from the lube oil heat exchanger on centrifugal charging Pump A was approximately 50°F. The component cooling water temperature from safety injection Pump A was also at approximately 50°F.

Also, the inspectors found the component cooling water flow from the centrifugal charging Pump A and safety injection Pump A lube oil coolers to be above the "green band" limit on the local instruments. Normal Operating Procedure OTN-EG-1, Revision 14, "Component Cooling Water," did not provide adequate operating instructions to ensure the component cooling water system was properly operated with respect to component flow and temperature. Section 03.1 discusses the operational aspects of this issue.

The lower limit for component cooling water temperature in the Final Safety Analysis Report, Section 9.2.2.2.3, was 60°F. The inspectors asked the licensee if the low water temperature could affect the operability of the components serviced by component cooling water. The licensee did not believe there was an immediate operability concern based on other in-house design information in addition to the Final Safety Analysis Report.

The licensee performed a safety evaluation which concluded that the various components would be operable as long as the component cooling water

temperature remained above 40°F. The licensee determined that, during periods of cold weather, the CCW temperature would go below 60°F when operating in the Mode 1 lineup. Following the safety evaluation, the licensee changed the minimum component cooling water temperature in the Final Safety Analysis Report from 60°F to 40°F.

The licensee was performing additional evaluations on the effect of high flow rates and cool water temperatures on the components serviced by component cooling water.

c. Conclusions

The inspectors concluded that the component cooling water system was not being operated as described in the Final Safety Analysis Report due to an inadequate procedure. The Final Safety Analysis Report was revised to reflect the allowed minimum component cooling water system temperature.

E2 Engineering Support of Facilities and Equipment

E2.1 Review of Facility Conformance to Updated Final Safety Analysis Report Commitments

A recent discovery of a licensee operating their facility in a manner contrary to the Final Safety Analysis Report description highlighted the need for a special focused review that compares plant practices, procedures, and/or parameters to the Final Safety Analysis Report description. While performing the inspections discussed in this report, the inspectors reviewed the applicable portions of the Final Safety Analysis Report that related to the areas inspected. The following inconsistency was noted between the wording of the Updated Safety Analysis Report and the plant practices, procedures, and/or parameters observed by the inspectors.

As discussed in Section E1.1, the inspectors identified that a discrepancy existed between the as-built component cooling water system operation and the Final Safety Analysis Report.

IV. Plant Support

R2 Status of RP&C Facilities and Equipment

R2.1 Containment Building Closeout Inspection

a. Inspection Scope (71750)

The inspectors performed a reactor containment building housekeeping and materiel condition inspection prior to the plant entering Mode 4 following Refueling Outage 8.

b. Observations and Findings

The inspectors found that the licensee's cleanup of the reactor containment building was satisfactory. Overall, most areas of containment were clean and free of debris, although the inspectors noted a small number of tie wraps, duct tape, screws, wire and other similar items. The items were not of sufficient size and quantity to affect safety related equipment during a design basis accident. The licensee removed these items during the closeout tour.

Also, the inspectors noted boric acid crystal buildup on three valves in the safety injection system test lines. The licensee cleaned the valves and, after the plant was taken to normal operating temperature and pressure, reinspected the valves. There was no sign of additional leakage.

c. Conclusions

The inspectors did not note any items or issues that could have affected safety related equipment operation.

V. Management Meetings

X1 Exit Meeting Summary

The exit meeting was conducted on November 25, 1996. The licensee did not express a position on any of the inspection findings documented in this report and did not identify any information as proprietary.

ATTACHMENT

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

R. D. Affolter, Manager, Callaway Plant
J. D. Blosser, Manager, Operations Support
H. D. Bono, Supervising Engineer, Licensing Fuels and Site Licensing
G. J. Czeschin, Superintendent, Training
M. S. Evans, Superintendent, Health Physics
G. A. Hughes, Supervising Engineer, Independent Safety Engineering Group
K. W. Kucchenmeister, Superintendent, Design Engineering
J. V. Laux, Manager, Quality Assurance
J. A. McGraw, Superintendent, Nuclear Engineering Systems
C. D. Naslund, Manager, Nuclear Engineering
D. W. Neterer, Shift Supervisor
J. T. Patterson, Shift Supervisor
J. R. Peevy, Manager, Emergency Preparedness and Organizational Support
G. L. Randolph, Vice President, Nuclear Operations
M. A. Reidmeyer, Engineer, Quality Assurance
R. R. Roselius, Superintendent, Chemistry and Rad Waste
M. E. Taylor, Assistant Manager, Work Control
W. A. Witt, Superintendent, Technical Support

The above personnel attended the exit meeting. In addition to these personnel, the inspectors contacted other personnel during this inspection period.

INSPECTION PROCEDURES USED

IP 37551:	Onsite Engineering
IP 61726:	Surveillance Observations
IP 62707:	Maintenance Observations
IP 71707:	Plant Operations
IP 71750:	Plant Support Activities

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-483/9611-01	VIO	Inadequate component cooling water normal operating procedure (Section O3.1)
50-483/9611-02	NCV	Failure to follow procedure during boric water transfer to spent fuel pool (Section O4.2)
50-483/9611-03	NCV	Failure to adhere to tagout procedure (Section O4.3)

Closed

50-483/9506-01	VIO	Failure to prevent foreign materials from entering safety related systems (Section M8.1)
50-483/9611-02	NCV	Failure to follow procedure during boric water transfer to spent fuel pool (Section O4.2)
50-483/9611-03	NCV	Failure to adhere to tagout procedure (Section O4.3)