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

April 12, 2000

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

SUBJECT: NRC PROBLEM IDENTIFICATION INSPECTION REPORT NO. 50-483/00-03

Dear Mr. Randolph:

This refers to the inspection conducted on January 31 through February 4, 2000, at the Callaway Plant facility. Inoffice inspection of certain records requested by the inspectors was also performed in the weeks preceding and following the onsite portion of the inspection. The purpose of the inspection was to review your facility's corrective action program, using the guidance provided in NRC Inspection Procedure 40500. The enclosed report presents the results of this inspection.

On the basis of the sample reviewed, your corrective action program was implemented with an appropriate threshold for identifying, classifying, and prioritizing adverse conditions. However, we note that during the past several months you have not met your timeliness goals for developing long-term corrective actions to prevent recurrence for a number of problems. For example, the root cause analysis to determine if additional long term actions were needed for the degraded switchyard voltage last summer was not initiated until mid-November. While your actions to date have been adequate and your current schedule supports resolution of this issue prior to the onset of similar conditions next summer, we are concerned about continued delays you have experienced in handling recurring or long-term problems, such as this. We understand you have recently addressed the timeliness issue through increased allocation of resources to your corrective action program. We will continue to monitor the effect of these actions.

An unresolved item concerning your actions in response to the reliability issues involving the essential service water system is discussed in Section E7.1 of the enclosure. We will further assess your actions, including any enforcement considerations, during a future inspection.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and enclosure will be placed in the NRC Public Document Room (PDR).

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

Sincerely,

original signed by

John L. Pellet, Chief
Operations Branch

Docket No.: 50-483
License No.: NPF-30

Enclosure:
NRC Inspection Report No.
50-483/00-03

cc w/enclosure:
Professional Nuclear Consulting, Inc.
19041 Raines Drive
Derwood, Maryland 20855

John O'Neill, Esq.
Shaw, Pittman, Potts & Trowbridge
2300 N. Street, N.W.
Washington, D.C. 20037

H. D. Bono, Supervising Engineer
Quality Assurance Regulatory Support
Union Electric Company
P.O. Box 620
Fulton, Missouri 65251

Manager - Electric Department
Missouri Public Service Commission
301 W. High
P.O. Box 360
Jefferson City, Missouri 65102

Ronald A. Kucera, Director
of Intergovernmental Cooperation
P.O. Box 176
Jefferson City, Missouri 65102

Otto L. Maynard, President and
Chief Executive Officer
Wolf Creek Nuclear Operating Corporation

P.O. Box 411
Burlington, Kansas 66839

Dan I. Bolef, President
Kay Drey, Representative
Board of Directors Coalition
for the Environment
6267 Delmar Boulevard
University City, Missouri 63130

Lee Fritz, Presiding Commissioner
Callaway County Court House
10 East Fifth Street
Fulton, Missouri 65151

Alan C. Passwater, Manager
Licensing and Fuels
AmerenUE
One Ameren Plaza
1901 Chouteau Avenue
P.O. Box 66149
St. Louis, Missouri 63166-6149

J. V. Laux, Manager
Quality Assurance
Union Electric Company
P.O. Box 620
Fulton, Missouri 65251

Jerry Uhlmann, Director
State Emergency Management Agency
P.O. Box 116
Jefferson City, Missouri 65101

bcc to DCD (IE01)
bcc electronic distribution from ADAMS by RIV:
Regional Administrator **(EWM)**
DRP Director **(KEB)**
DRS Director **(ATH)**
Senior Resident Inspector **(VGG)**
Branch Chief, DRP/B **(WDJ)**
Senior Project Engineer, DRP/B **(RAK1)**
Branch Chief, DRP/TSS **(LAY)**
RITS Coordinator **(NBH)**
D. Lange **(DJL)**
NRR Event Tracking System **(IPAS)**
Document Control Desk **(DOCDESK)**
CWY Site Secretary **(DVY)**

bcc hard copy:
RIV File Room

DOCUMENT NAME: R:_cw\cw003rp-hfb.wpd
To receive copy of document, indicate in box: "C" = Copy without enclosures **"E"** = Copy with enclosures **"N"** = No copy

RIV:SRE:OB	E	SRE:OB		RI:PBB		COB		AC:EMB		C:PBB		D:DRS	
HFBundy/lmb		SLMcCrory		JHanna		JLLPellet		DAPowers		WJohnson		ATHowell	
04/05/00		04/05/00		04/06/00		04/06/00		04/12/00		04/06/00		04/11/00	

OFFICIAL RECORD COPY

ENCLOSURE

U.S. NUCLEAR REGULATORY COMMISSION
REGION IV

Docket No.:	50-483
License No.:	NPF-30
Report No.:	50-483/00-03
Licensee:	Union Electric Company
Facility:	Callaway Plant
Location:	Junction Highway CC and Highway O Fulton, Missouri
Dates:	January 31 through February 4, 2000
Inspectors:	Howard F. Bundy, Senior Operations Engineer, Operations Branch Stephen L. McCrory, Senior Operations Engineer, Operations Branch John D. Hanna, Resident Inspector, Projects Branch B
Approved By:	John L. Pellet, Chief, Operations Branch Division of Reactor Safety

ATTACHMENT: Supplemental Information

EXECUTIVE SUMMARY

Callaway Plant
NRC Inspection Report No. 50-483/00-03

Two regional inspectors and a resident inspector performed a routine core inspection of the corrective action program implementation at the Callaway Plant from January 31 through February 4, 2000. The inspectors used NRC Inspection Procedure 40500 to evaluate the licensee's effectiveness in identifying, evaluating, resolving, and preventing problems that could affect safe plant operations.

Operations

- The licensee was effectively identifying safety issues and trends adverse to quality. Appropriate emphasis was placed on identifying issues related to repetitive problems.

  However, delays in implementing corrective actions to prevent recurrence for identified problems was a licensee identified issue. Several of these delays in implementation of corrective actions were contingent on completion of the root-cause analyses. The inspectors noted two examples for which completion of the root-cause analysis was delayed as follows: (1) the root-cause analysis for Suggestion-Occurrence-Solution 99-2042, relating to an adverse trend for recurring problems and dated September 30, 1999, was not completed by the end of the inspection; and (2) the root cause for an event relating to a degraded switchyard voltage condition (Licensee Event Report 99-003), which occurred on August 11, 1999, was not initiated until mid-November, even though intermediate term corrective actions had been implemented. Through review of licensee assessments and reports and interviews, the inspectors determined that activities competing for limited resources, such as the refueling outage, were the most likely causes for these delays (Section O7.1).

- Individuals interviewed discussed thresholds low enough to initiate action to correct conditions adverse to quality. A strong safety culture was evident at all levels of the organization. However, some personnel were not using the licensee's expected lower threshold for initiating suggestion-occurrence-solutions for all problems or concerns which could not be resolved immediately by face-to-face interaction (Section O7.1b.1).

- The inspectors concluded that licensee performance error rate related to workman's protection assurance activities had changed little from that observed in the previous inspection in 1998. Further, the licensee had only recently begun to apply corrective measures to a site-wide human performance error issue. However, the consequences of the human performance errors reviewed had low safety significance (Section O4.1c).

Maintenance

- The licensee's corrective actions, goal setting, and monitoring of the structures, systems, and components included in the maintenance rule were appropriate (Section M7.1c).

Engineering

- The corrective action system had been appropriately implemented for the systems reviewed, except not all inspector concerns were addressed with regard to reliability issues involving the essential service water system (Section E7.1c).

Report Details

Summary of Plant Status

Callaway Plant operated at approximately full power during the entire inspection period.

I. Operations

O4 Operator Knowledge and Performance

O4.1 Equipment Tagouts Errors and Component Mispositioning Events

a. Inspection Scope (40500)

During the inoffice documentation review of the licensee's program for identifying and correcting problems, the inspectors noted that a substantial number of problem reports dealt with errors in clearing components for maintenance and component mispostioning events. Therefore, the inspectors analyzed the trends for these types of events and the effectiveness and timeliness of the licensee's correct actions to prevent their recurrence.

The inspectors reviewed 134 suggestion-occurrence-solution reports (SOSs) related to the workman's protection assurance (WPA) program, 104 SOSs related to operations and operations training, 102 SOSs related to emergency preparedness training, and 16 SOSs related to reactivity management issues. All SOSs reviewed in this sample were issued on or after January 1, 1999. Discussions of the various categories of SOSs are included in Sections O7.1b.1 and O7.1b.2. Further, the inspectors reviewed the January-June 1999 and the draft of the July-December 1999 Quality Assurance Department Semiannual Trend Analysis Reports. Finally, the inspectors interviewed key licensee staff members involved in task team efforts focused on human performance issues.

b. Observations and Findings

The trend report for the first half of 1999 identified a potential adverse trend in inadvertent human performance. In recognition, the licensee had formed a task team to focus on component mispositioning events and a task team to focus on the WPA program.

Concurrently with formation of the task teams, the licensee began a training effort with station personnel focused on human performance awareness. The human performance training was prompted by the findings of an industry organization evaluation conducted at the request of the Callaway Plant management. Operators, craft personnel, and non-supervisory personnel attended a 1- day course while supervisors and managers attended a 2-day course during the past few months. The course content had been developed by the industry organization and modified to include specific Callaway Plant events or conditions. The inspectors reviewed the course materials used for the human performance training and determined that they were adequate in identifying the factors contributing to human performance errors and how to reduce the impact of those factors on human performance.

To gain a better understanding of the human performance issues, the inspectors interviewed various individuals involved in developing and implementing associated corrective actions. The human performance training supervisor stated that component mispositioning was identified as a significant human performance issue as early as 1989. While some decreases had been observed over the last 10 years, the condition remained overall adverse. The supervisor went on to say that the cultural identity of the site staff was to focus on production goals, sometimes to the detriment of work processes, which sometimes led to human performance errors, and that one of the goals of the human performance training discussed above was to modify this cultural identity to focus on preventing human errors.

The task team sponsor for mispositioning events acknowledged that mispositioning events were a long standing concern. He provided a summary of the action items developed to improve performance in this area which addressed the following issues: WPA process, procedure adherence and revision, improving the pre-job briefing process, improving supervisory oversight, and modifying Callaway Plant culture to increase communication with SOS and work request originators, reduce the negative image of event review team investigations, foster trust between work groups, and improve the change management implementation.

The task team sponsor for the WPA program acknowledged that the average number of SOS reports related to WPA had remained unchanged over recent years. He further indicated that human performance errors were the significant contributors to the number of WPA-related SOS initiations. He reported that the WPA procedure had been revised to eliminate procedure induced errors. He also stated that the use of physical restraints had begun to be used more extensively to “lock” the component in the tagged position. Restraints included tie wraps, locked chains, and other locking devises to prevent movement of the valve, breaker, or control switch. The overall impact of these actions had not been fully assessed.

The trending engineer stated that he had identified a significant adverse trend in human performance in the draft trend report for the second half of 1999, in that the number of SOSs addressing human performance errors for which a specific cause could not be determined had increased from 81 in the 1998 refueling outage to 369 in the 1999 refueling outage. The trending engineer pointed out that, in retrospect, he should have identified a significant adverse trend between the 1996 and 1998 refueling outages in that the number of undesignated human performance error related SOSs had increased from 36 to 81, respectively. The inspectors noted that the licensee had not had an opportunity to directly respond to this apparent significant adverse trend in human performance due to its recent discovery.

The inspectors observed in the 1999 Quality Assurance Department Semiannual Trend Analysis Report that the average number of SOSs initiated against WPA issues had remained unchanged since the second quarter of 1995, which confirmed the task team sponsor's statement.

The inspectors observed that the WPA and mispositioning events task teams had to address overlapping issues in that approximately 19 percent of the SOS reports issued in 1999 against the WPA program related to component mispositioning. This overlap was recognized by the task team leaders in that originally the assignment of one task team to cover both issues was considered and they were sharing common resources.

The inspectors observed that approximately 11 percent of the SOS reports issued against the WPA program related to hanging tags on the wrong component. The inspectors observed that in most cases, the human performance errors had no overt consequences, such as equipment damage, personnel injury, release of radioactive materials, loss-of-system fluids, or plant or system transient. The inspectors determined that the safety significance of the more serious examples was low. Some representative examples of human errors of consequence included:

- Running intake pumps tripped due to post-maintenance testing - backup pumps started (SOS 99-0219).
- Localized water hammer occurred near the steam generator blowdown non-regenerative heat exchanger after steam generator blowdown was isolated - no piping or support damage (SOS 99-0447).
- Auxiliary steam entered the demineralized water system - no equipment damage or personnel injury (SOS 99-1884).
- Drain down of stator cooling system - occurred during plant outage, no equipment damage (SOS 99-2368).
- Transfer of water from the volume control tank to the "A" safety injection pump line - occurred during plant outage, limited to 4 - 6 gallons, with no radiological release, no reactivity impact, no operability or reportability issues (SOS 99-2896)

For nearly all of the action items identified for the 1999 and later issues, the licensee set due dates in calendar year 2000 with the latest being in July 2000. Assessments of the effectiveness of the actions implemented by the end of the inspection had not been completed by the licensee.

The previous corrective action program inspection (NRC Inspection Report 50-483/98-20) reached the following conclusion regarding the WPA program:

> "The team concluded that because of the continuing identification of tagging errors, corrective actions for WPA performance deficiencies had not improved performance in this area."

c. Conclusions

The inspectors concluded that licensee performance error rate related to WPA activities had changed little from that observed in the previous inspection in 1998. Further, the licensee had only recently begun to apply corrective measures to a site-wide human performance error issue. However, the consequences of the human performance errors reviewed had low safety significance.

O7 Quality Assurance in Operations

O7.1 Condition Reporting Process and Corrective Actions

a. Inspection Scope (40500)

The inspection consisted of a review of the licensee's programs intended to identify and correct problems discovered at the facility. The review focused on the following seven specific areas: (1) the identification and reporting threshold for adverse conditions, (2) the setting of problem resolution priorities that were commensurate with operability and safety determinations, (3) program monitoring used by the licensee to assure continued program effectiveness, (4) program measurement or trending of adverse conditions, (5) the understanding of the program by all levels of station personnel, (6) the ability to identify and resolve repetitive problems, and (7) resolution of noncited violations.

The inspectors reviewed plant documents, interviewed management and working level personnel, and attended licensee meetings. The inspectors reviewed, in varying detail, SOS reports listed in the attachment to this inspection report, to ascertain the effectiveness of the licensee actions in resolving and preventing issues that degrade the quality of safe plant operations. The hardware related SOSs were selected, in part, on the basis of the risk significance of the system or components and focused on essential service water, component cooling water, residual heat removal, auxiliary feedwater, high pressure safety injection, safety injection recirculation, safety-related ac power, and main and extraction steam systems. The SOSs were also reviewed for the disposition and evaluation of operability issues, as well as, the adequacy of the root-cause analysis.

The inspectors reviewed the corrective action program interface with other lower-tier programs, such as procedure revisions and maintenance action items, that could result in corrective action. The inspectors monitored the performance of the licensee's SOS screening committee. The inspectors reviewed quality assurance audits, self assessments, and licensee's response to NRC and industry generic communications. The inspectors also reviewed a sample of licensee event reports for compliance with 10 CFR 50.73 and for the effectiveness of licensee personnel in identifying, resolving, and preventing the occurrence of problems that affect safe plant operations.

b. Observations and Findings

b.1 Threshold of Reporting

The inspectors assessed employee thresholds for reporting problems by reviewing the licensee's controlling procedure for initiating SOSs together with SOS initiation data, various corrective action documents, the results of a quality assurance surveillance, and interviewing selected licensee employees.

Procedure APA-ZZ-00500, "Corrective Action Program," stated that any employee could formally express a concern by initiating an SOS, either electronically or by completing a form. A concern, which related to plant safety and required corrective action, would be documented as an occurrence-type SOS. As discussed in Section O7.1b.2, occurrence-type SOSs would be further classified as Category 1, 2, or 3, depending on their safety impact, with Category 1 being the most safety significant. Employees could also initiate suggestion type SOSs for plant enhancement ideas or for improvement ideas not related to the plant. The licensee provided data indicating that employees initiated 3,503 SOSs in calendar year 1999. Of these, 2,446 were occurrences and 1,057 were suggestions. The number of occurrence-type SOSs issued was higher than those issued in 1998 (2207) and substantially higher than those issued in 1997 (1340). Overall, the data indicated an increasing trend in the number of occurrence-type SOSs issued over the last three years, which could be interpreted to indicate a lowering employee threshold for initiating SOSs, which supports the results in Surveillance SP00-083 discussed below.

The corrective action initiation threshold was assessed by licensee quality assurance in Surveillance Report SP00-083 in December 1999. It noted that the majority of departments (18 of 27) generated as many or more SOSs in 1999 than they did in 1998. It also noted the SOS initiation threshold had become lower in maintenance and operations in 1999.

During the SOS review, the inspectors observed items that reflected low thresholds of condition reporting. Low threshold examples included SOS 99-0428, "Individual Left Site Without Signing Off WPA," SOS 99-0695, "Procedure Not Clear on Use of Local Control for Cranes," SOS 99-1780, "Provide Time for Critiques After Scenarios," and SOS 99-1893 "Challenge Crews to be 'Pro-active' During Simulator Scenarios."

As discussed in Section O7.1b.5 below, the inspectors determined through interviews that there was a divergence between departments as to the threshold for initiating an SOS and that for employees in several departments, the threshold for initiating SOSs was higher than management expectations. However, the interviews revealed that employees would use available vehicles to initiate action to resolve safety issues. Alternate methods for obtaining corrective action included initiating work requests, which would be assigned to the maintenance or instrumentation and control departments, or requests for resolution, which would be assigned to an engineering department.

The inspectors concluded that employee threshold for reporting problems by initiating SOS reports was higher than management expectations in some departments, such as electrical and mechanical maintenance and instrumentation and control, but low enough to capture conditions adverse to quality. A strong safety culture was evident at all levels of the organization.

b.2 Priority of Resolution

The inspectors reviewed applicable administrative procedures to determine how the priority assignment process should work, interviewed several individuals in the corrective action group to determine how priority was assigned, and reviewed approximately 85 SOSs to determine if appropriate priorities for resolution had been assigned.

Procedure APA-ZZ-00500, "Corrective Action Program," covered assignment of priorities of resolution for SOSs. As discussed in Section O7.1b.1, occurrence-type SOSs were designated Category 1 (highest priority SOS, which encompassed all significant conditions adverse to quality), Category 2, or Category 3. Category 3 SOSs were assigned "trend only." Priority numbers for Category 1 and 2 SOSs were assigned by a quality assurance engineer through application of a complex prioritization process based on both safety and commercial considerations after initial screening by an SOS screening committee - the higher the priority number the higher the priority. All Category 1 and 2 SOSs with a priority greater than 14 were assigned an initial response period of 30 days or less. All other Category 2 SOSs were assigned a response period of 60 days or less. All Category 1 and 2 SOSs required development of corrective actions to prevent recurrence. For suggestions, other than safety suggestions, quality assurance assigned a 180-day period for the action department head to read and document a preliminary evaluation of the recommendation. Category 3 (trend only) SOSs were closed upon the determination by the corrective action group that appropriate actions had been completed.

The inspectors did not identify any inconsistencies in the priority assignments for the 85 occurrence-type SOSs, which they reviewed. However, as discussed in Section O7.1b.3, because of extensions of action due dates for corrective actions related to major long-term projects, assignment of an appropriate priority did not necessarily result in completion of corrective actions within the expected time frame.

b.3 Effectiveness of Program

The inspectors observed that the licensee was evaluating the effectiveness of its corrective action program by several diverse methods, including semi-annual trend analyses, quality assurance audits and surveillances, task force committees, and third party assessments. The inspectors determined that, through these vehicles, the licensee had effectively identified all major issues and challenges affecting the corrective action program. The challenge most often cited in the licensee's reports was delays in completion of major corrective action projects due to resource limitations. Licensee reports of this challenge, together with examples identified by the inspectors, as well as, other inspector program effectiveness observations are discussed below.

Delays in identifying and implementing corrective actions to prevent recurrence were identified in licensee Audits AP98-011, AP99-007, and 99-008. Suggestion-Occurrence-Solution 98-3086, issued pursuant to Audit AP 98-011 cited delays in implementing the following: SOS screening team; training responders, clarifying role of event review team, and completing computer enhancements. Suggestion-Occurrence-Solution 99-1505 was referenced to Audit AP 99-007 and cited delayed maintenance responses to four SOSs. Suggestion-Occurrence-Solution 99-1312 was referenced to Audit 99-008 and concluded that major program issues seemed to be taking a long time to effectively resolve. In addition, it noted that efforts did not seem to be well coordinated and clearly focused on getting the issues resolved promptly. In responding, quality assurance cited inadequate resources assigned to the corrective action function.

In an independent assessment dated December 16, 1999, it was noted that for the last 6 months of 1998, the average time to complete root-cause analyses was 111 days compared to an expectation of 30 days. It was also noted that currently, 30 percent were past dues with an average age of 70 days.

Quality assurance trend analysis and reporting was performed in accordance with Procedure GDP-ZZ-00220, “Quality Assurance Trend Analysis and Reporting,” which provided instructions for analyzing SOS occurrences collectively on at least a semiannual basis to reveal potentially ineffective corrective actions, provide an indicator of the effectiveness of the corrective action program, and identify potential adverse quality trends. The inspectors reviewed Quality Assurance Department Semiannual Trend Analysis Report January-June 1999, and determined that it identified several corrective action effectiveness issues. The most notable of these issues related to an adverse trend for recurring problems. Category 1, SOS 99-2042, was initiated on September 30, 1999, to address this issue. However, corrective actions to prevent recurrence of this trend had not been identified and the upward trend of recurring problems continued through the second half of 1999 and was identified in the draft trend report for the second half of 1999. The inspectors were informed that the assigned root-cause analyst was placed on special assignment during the recent refueling outage, which precluded him from completing the root-cause analysis for this issue. The next progress update was scheduled for March 15, 2000. The inspectors noted that NRC Inspection Report 50-483/99-15 documented a similar delay in performing a root-cause analysis. This root-cause analysis related to a degraded switchyard voltage condition following a plant trip on August 11, 1999. The root-cause analysis had not been initiated until mid-November because of assignment of the root-cause analyst to other duties during the refueling outage.

Another issue resulting from the January-June 1999 trend report was documented in SOS 99-1199 on July 16, 1999. It identified that trending had not been performed for the work request database since July 23, 1997. This issue is discussed further in Section O7.1b4. The SOS had been assigned to the engineering technical trending task team for development of a corrective action plan. However, the task team leader told the inspectors that little progress had been made in resolving this issue because of higher priority assignments related to the refueling outage. The due date for submittal of the corrective action plan had been extended to March 15, 2000. The failure to reduce the rate of human performance errors discussed in Section O4.1 is a long standing issue, identified by the licensee's trend analyses, for which most of the action due dates extended into the year 2000.

The strategic corrective action committee monthly report dated January 7, 2000, stated that action to resolve the following issues had not been started because of resource limitations: procedure revision, trending program review, event review team review, formal root-cause analysis process review, and corrective action program-human performance-self assessment interface. One of the back logged study issues for the strategic corrective action committee related to considering a program for routinely performing effectiveness reviews for individual SOSs.

The inspectors observed that the licensee effectively implemented immediate corrective actions for conditions adverse to quality. However, a recurring theme in the licensee's assessments was delay in implementing corrective actions to prevent recurrence for long-term issues. Resource limitations were the reason the licensee usually identified for these delays. The inspectors noted that heavy work load caused by the refueling outage and the improved technical specifications implementation was a common reason given when requesting extensions to corrective action due dates. The responding department managers could unilaterally extend action completion dates and the inspectors could find little evidence of higher level oversight of these completion date changes.

Corrective action personnel indicated that it was a goal to be able to establish corrective actions to prevent recurrence within the 30-day response time for the more significant conditions. However, this was often not achievable if a formal root-cause analysis was required. Management indicated that they planned to apply additional resources to development of root-cause analyses.

The inspectors noted that a corrective action group led by a supervising engineer had recently been established and substantially more personnel had been assigned to the corrective action function. In conjunction with this reorganization, an SOS screening committee had been established on a trial basis. The pilot SOS screening team was screening all SOSs and assigning Category 1 designations when appropriate. The Category 1 and 2 SOSs were then forwarded to a quality assurance employee for assignment of numerical priorities as discussed in Section O7b.2. The corrective action group supervisor stated that they were considering implementing a simplified prioritization system in which the priorities would be assigned by the SOS screening committee. By attending several meetings, the inspectors determined that the SOS screening committee was functioning effectively to establish the proper categorization of individual SOSs, determine that there was sufficient information to process the SOS, and establish the responsible action departments. However, it was too early to fully access the impact of organizational changes.

Overall, the inspectors observed that effectiveness of the corrective action program was adequate. The licensee had effectively identified major corrective action program issues. However, it was challenged in meeting its timeliness goals for implementation of corrective actions to prevent recurrence for long-term projects.

b.4 Program Measurement

Quality assurance program measurement was accomplished in accordance with Procedure GDP-ZZ-00220. It provided the process for coding occurrence-type SOSs, analyzing the effectiveness of corrective actions, and preparing and issuing periodic summary reports to management. The inspectors reviewed the semiannual trend analysis report for January to June 1999. It identified issues for nuclear division management focus, including the adverse trend of recurring problems discussed in Section O7.1b.6. Other focus areas included reactivity management, axial offset anomaly, mispositioned components, and contractor control. As discussed in Section O4.1b, the draft trend analysis report for the second half of 1999 identified a significant adverse trend in human performance-related SOSs.

In general, the corrective action metrics were comprehensive and significant corrective action issues were being properly identified. Components were being appropriately classified and monitored in accordance with maintenance rule criteria as discussed in Section M7.1. However, the licensee had initiated SOS 99-1199 to address the issue that not all equipment problems were being trended because work requests without associated SOSs were not trended.

b.5 Program Understanding

The licensee required that conditions adverse to quality and significant conditions adverse to quality, as defined by NRC regulations, be entered into the SOS system. Policy 2.2.3, "Guidelines for SOS Generation," encouraged employees to discuss problems with their supervisors and try to resolve problems face-to-face prior to writing SOSs. For problems which could not be resolved by face-to-face interaction and were not otherwise required to be entered in the SOS system, an employee was encouraged to initiate an SOS in accordance with Procedure APA-ZZ-00500. It could be initiated either through an online computer program or by completion of a hard copy form. The various types and categories of SOSs were discussed in Sections O7.1b.1 and O7.1b.2. Management indicated that it expected SOSs to be initiated for all problems or concerns which could not be resolved immediately by face-to-face interaction.

Although an SOS could be used to identify any problem or concern, there were numerous other documents which could also be used to identify minor concerns or suggestions. The inspectors reviewed Attachment 3 to Audit Report AP98-011 (Nuclear Division Action Documents Matrix), which listed 54 documents that were used in some capacity for identifying problems one of the departments needed to evaluate. Of the 54, disposition of 6 other document types might result in issuance of an SOS. The matrix contained a significant amount of information, including references to applicable procedures. It appeared it could be useful for directing employees to the proper vehicle for reporting problems. However, as an attachment to an audit report, this matrix was not available for general usage. Also, it was not clear that there was universal agreement on its accuracy. Other corrective action documents and processes included work requests, requests for engineering review, procedure revision requests, and the training action tracking system.

The inspectors interviewed approximately 10 site personnel to determine their knowledge of the corrective action program and, specifically, use of the SOS program. All personnel interviewed displayed a basic understanding of the SOS program and the various corrective action processes available. Utilization of the SOS program varied significantly between departments. It was not clear that all personnel understood when a problem crossed the threshold to become a condition adverse to quality, which should be entered in the SOS system. The emergency preparedness department and independent safety evaluation group used the SOS program almost exclusively to document problems and concerns. On the other hand, electrical and mechanical maintenance technicians and instrument and control technicians did not believe the SOS program was as useful for resolving most of their problems and concerns. They indicated that they had used it on occasion to document suggestions and in some instances had not obtained satisfactory results. They further explained that for problems which could not be resolved by face-to-face contact with supervision, control room operators, or engineering personnel, they would initiate work requests or requests for resolution. The technicians stated that occasionally SOSs were issued by others for problems which they identified. During interviews with the system engineers for the high pressure safety injection and auxiliary feedwater systems, the inspectors presented the system engineers with a broad spectrum of conditions requiring action from housekeeping issues and valve-stem leaks to component failures. For each situation the system engineers stated that they would enter the condition into a corrective action process. However, inconsistent with management expectations, they indicated a preference for corrective action systems that had less visibility than the SOS system, such as the work request or request for engineering review systems.

The inspectors observed that regardless of the methods used, all personnel interviewed displayed an understanding of how to get conditions adverse to safety resolved. A strong safety culture was evident at all levels of the plant staff. The inspectors noted that personnel were invited to raise safety issues at the beginning of most meetings. However, inconsistent use of the expected method for identifying problems and concerns and the large number of available methods could undermine the program by making it more difficult to ensure the proper rigor was employed in identifying and resolving problems and to accurately trend correct action issues.

b.6 Repetitive Problems

The inspectors noted that repetitive problems were regularly identified in individual SOSs and additional resources were applied to analyzing the causes. For example, SOS 99-0615 identified a crack in an essential service water valve yoke as repetitive to maintenance rule functional failures identified in SOSs 96-1894 and 98-1666. Suggestion-Occurrence-Solution 99-0615 also identified that piping vibration was the root cause and SOS 98-3967 was being used to address this issue.

Likewise, SOS 99-0662 identified that a pinhole leak in a piping butt weld was a repeat problem of corrosion caused leaks in the essential service water system. Suggestion-Occurrence-Solution 99-2598 identified another pinhole leak problem in essential service water piping and it was referenced to SOS 99-0662. Suggestion-Occurrence-Solution 99-0662 identified that the corrective action to prevent recurrence was to replace approximately 3000 linear feet of essential service water piping. Action Plan 99-106 was developed to control the piping replacement and a task team was established to implement the action plan.

Suggestion-Occurrence-Solution 99-1418 identified that the disk-to-stem separation for Valve EFV0072 was similar to failure of Valve EFV0040, as discussed in SOS 99-0148. The root cause for both failures was identified as corrosion. Inspections of similar valves were conducted and it was determined that to prevent recurrence of similar problems, it was necessary to replace carbon steel valves with stainless steel valves. The licensee decided to accomplish these valve replacements in conjunction with piping replacement under Action Plan 99-106.

Finally, SOS 99-0419 identified actuation of a high/low flow annunciator for component cooling water flow to the reactor coolant pumps as a recurring problem. It was extremely difficult to clear the low flow alarm for Reactor Coolant Pump C without receiving high flow alarms for Reactor Coolant Pumps A and B. The licensee's investigation revealed that the installed throttle valves were not designed to throttle the flow to the range desired. Request for Resolution 18422B was approved to implement a modification that would replace the throttle valves with different style valves that would provide better flow control.

The semiannual trend analysis report issued by the quality assurance department addressed repetitive problems. The report for the first 6 months of calendar year 1999, issued September 28, 1999, identified an adverse trend of recurring problems, which was documented in SOS 99-2042. The data indicated that the number of recurring problems increased from 67 in the second half of 1998 to 87 in the first half of 1999. The next highest number of examples of recurring problems was 71 during the first half of 1996. Of the 87 examples of recurring problems, 42 involved equipment failures. The trend report stated that some of the problems were originally documented on work requests, "trend only" SOSs or suggestions. There were some instances where no action or root cause had been identified. Suggestion-Occurrence-Solution 99-2042 was referred to the strategic corrective action committee, which had representatives from engineering, operations, maintenance, and other departments. The licensee's effectiveness in dealing with the recurring problems issue was discussed further in Section O7.1b.3. As discussed in Section O7.1b.3, although it was under consideration, the licensee did not routinely perform effectiveness reviews for individual SOSs. The inspectors observed that the lack of routine effectiveness reviews for SOSs may have been relevant to the increasing trend of SOSs related to recurring problems.

The inspectors observed a corrective action screening committee meeting in which potentially repetitive problems were identified and appropriate corrective action recommendations were made.

The licensee was effectively identifying repetitive problems by a number of methods including background review by the SOS initiator and reviewers, semi-annual trend reports, and corrective action screening committee meetings, but as discussed in Section O7B.3, had been less effective resolving them.

b.7 Notice Of Violation/Noncited Violation Followup

The inspectors reviewed the licensee's open items, which had not previously been reviewed for adequacy of corrective action by the NRC and had potential to affect risk significant systems to determine if they were entered into the corrective action program and resolved or were being resolved in a timely manner as follows:

- Licensee Event Report 99-006-00 was placed in the corrective action program as SOS 99-1636 for the actuation of an engineered safety feature. On August 13, 1999, while in Mode 3, the licensee mechanically isolated and tagged the inlet to the startup feedwater pump, which necessitated the manual actuation of the motor-driven auxiliary feedwater pumps. The inspectors noted that the last corrective action addressed in the licensee event report, revision of the reportability guidance in Procedure APA-ZZ-00520, was approved on February 3, 2000.

- Licensee Event Reports 99-004-00 (titled, "Missed Technical Specifications Surveillance Due to Erroneous Procedure Guidance," and addressed by SOS 99-1558) and 98-010-00 (titled, "Callaway Plant Re-Evaluation Determines Additional Valves To Be Added To Technical Specifications Requirements," and addressed by SOS 98-3836) were found to be entered into the corrective action program and resolved in a timely and technically adequate manner.

c. Conclusions

The licensee was effectively identifying safety issues and trends adverse to quality. Appropriate emphasis was placed on identifying issues related to repetitive problems.

However, delays in implementing corrective actions to prevent recurrence for identified problems were a licensee-identified issue. Several of these delays in implementation of corrective actions were contingent on completion of the root-cause analyses. The inspectors noted two examples for which completion of the root-cause analysis was delayed as follows: (1) the root-cause analysis for SOS 99-2042, relating to an adverse trend for recurring problems and dated September 30, 1999, was not completed by the end of the inspection; and (2) the root cause for an event relating to a degraded switchyard voltage condition (Licensee Event Report 99-003), which occurred on August 11, 1999, was not initiated until mid-November, even though intermediate term corrective actions had been implemented. Through reviews of the licensee's assessments and reports and interviews, the inspectors determined that activities competing for limited resources, such as the refueling outage, were the most likely causes for these delays.

Individuals interviewed discussed thresholds low enough to initiate action to correct conditions adverse to quality. A strong safety culture was evident at all levels of the organization. However, some personnel were not using the licensee's expected lower threshold for initiating SOSs for problems or concerns, which could not be resolved immediately by face-to-face interaction.

The licensee was effectively identifying repetitive problems by a number of methods, including background review by the SOS initiator and reviewers, semi-annual trend reports, and corrective action screening committee meetings.

Noncited violations were properly entered into the corrective action program and were being satisfactorily resolved.

II. Maintenance

M2 Maintenance and Material Condition of Facilities and Equipment

See Section E7.1.

M7 Quality Assurance in Maintenance Activities

M7.1 Maintenance Rule

a. Inspection Scope (40500)

The inspectors reviewed the licensees' monitoring of the structures, systems, and components that were within the scope of the Maintenance Rule. This monitoring was reviewed to determine if the corrective actions, goals, and monitoring of structures, systems, and components that were in 10 CFR 50.65(a)(1) were adequate and that components were assigned the monitoring requirements of 10 CFR 50.65(a)(1), when appropriate.

b. Observations and Findings

The inspectors reviewed the Maintenance Rule activities by selecting 8 out of 16 Maintenance Rule-related SOS documents involving structures, systems and components that were classified as Category (a)(1) of 10 CFR 50.65. This review was conducted to determine if corrective actions, goals, and monitoring of structures, systems, and components were consistent with regulatory requirements.

The inspectors noted that the licensee's program required that whenever a performance measure was not met, such that a structure, system, or component was placed in Category (a)(1) status, an SOS was written. This action placed the issue into the corrective action program for disposition. The system engineers determined the appropriate goal and submitted their recommended goal to the expert panel for review. In addition, the inspectors noted that a quarterly report titled, "Predictive Performance Program Summary," was issued. This package assured that management was informed of the systems that were not meeting their performance measures and that the goal setting was adequate for proper resolution. For each of the selected items, the inspectors found that the corrective actions were adequate and that the goal setting and monitoring were consistent with regulatory requirements.

The inspectors also noted that the majority of occasions when a structure, system, or component was placed in the Category (a)(1) occurred due to high unavailability hours, rather than reliability. Of the four structures, systems, and components, which were in Category (a)(1), only one (Cutler-Hammer Type-30 switches) had been placed there based strictly on reliability considerations. This observation was discussed with the Maintenance Rule coordinator and the applicable system engineers. As the result of these discussions, the inspectors determined that a significant contributor to the high unavailability time was planning problems (e.g., scheduling, staging of work, etc.). Based on the result of their review, the inspectors considered this to be an isolated issue in an otherwise effective program. The specifics of this issue are discussed further in Section M8.3b. The essential service water system was placed in Category (a)(1) because of several vibration-induced component failures causing the system to exceed its allowed outage hours and is discussed further in Section E.7.1.

c. Conclusions

The licensee's corrective actions, goal setting, and monitoring of the structures, systems, and components included in the Maintenance Rule were appropriate.

M8 Miscellaneous Maintenance Issues (92902)

M8.1 (Closed) Violation 50-483/9711-01: Failure to Assure Appropriate Preventative Maintenance

a. Background

During the NRC Maintenance Rule Baseline Inspection of August 18-22, 1997, the team identified three violations. The first violation identified the licensee's failure to demonstrate that appropriate preventive maintenance had assured the reliability of the containment integrity function of the containment isolation valves. The integrity function was not adequately monitored by the licensee's program because a maintenance rule functional failure of a containment isolation valve, due to test leakage, was not recognizable until the limit of 0.6 L_a (imposed by Technical Specification 6.8.4.g) was reached. Therefore, preventive maintenance could not positively assure the reliability of the containment isolation valves to maintain containment integrity because it did not allow for early detection of degradation.

Additionally, the licensee had failed to demonstrate that the performance or condition of nonsafety-significant systems and components, whose failure could impose a plant transient, was effectively controlled through the performance of preventive maintenance.

The licensee had not demonstrated that adequate reliability measures were in place to assure that the structures, systems, and components remained capable of performing their functions identified in the licensee's Maintenance Rule Program. Specifically, the heater drain pump mechanical seals were operated in a run-to-failure mode, without an evaluation to determine the consequences of their failure or degradation on plant safety.

b. Inspection Followup

The inspectors conducted a review of the licensee's responses to the Notice of Violation, including Union Electric letters ULNRC-3709 and ULNRC-3809. This review was performed to verify the timeliness, completeness, and adequacy of the licensee's corrective actions. The inspectors also conducted interviews with the licensee's Maintenance Rule staff. As part of the licensee's corrective action, the licensee modified the containment isolation function's performance criteria and enhanced the run-to-failure evaluation for the heater drain pump mechanical seals. The inspectors found the corrective actions taken by the licensee to be adequate. This violation is closed.

M8.2 (Closed) Violation 50-483/9711-02: Inadequate Evaluation of Equipment Failures

a. Background

The second violation arising from the NRC Maintenance Rule Baseline Inspection of August 18-22, 1997, documented the licensee's failure to demonstrate that the performance of structures, systems, and components, within the scope of 10 CFR 50.65, had been effectively controlled through the performance of appropriate preventive maintenance. Specifically, the licensee did not adequately evaluate the failures of the equipment listed below with regard to the effectiveness of preventive maintenance.

1. Essential Service Water Valve EFV0090 experienced a through-wall crack in the yoke on April 14, 1997.

2. High pressure safety injection pump miniflow recirculation Valve EMHV8814A failed to open while performing Surveillance OSP-EM-V001A on June 4, 1997.

3. Valve EMHV8814A was inadvertently closed and not immediately reopened during a functional check for troubleshooting on June 11, 1997.

a. Inspection Followup

The inspectors conducted a review of the licensee's responses to the Notice of Violation, including Union Electric letters ULNRC-3709 and ULNRC-3809. This review was performed to verify the timeliness, completeness, and adequacy of the licensee's corrective actions. The inspectors also conducted interviews with the licensee's Maintenance Rule staff. As part of the corrective actions, the licensee modified its procedures to enhance the definition of a functional failure. This definition included a loss-of-intended function(s) as a functional failure. The licensee also trained the quality assurance regulatory support group on proper identification of functional failures. The inspectors found the corrective actions taken by the licensee to be adequate. This violation is closed.

III. Engineering

E7 Quality Assurance in Engineering Activities

E7.1 System Reviews

a. Inspection Scope (40500)

The inspectors reviewed the corrective action processes as they related to several selected plant systems. These systems included: (1) essential service water, (2) component cooling water, (3) residual heat removal, (4) safety-related ac power, (5) main and extraction steam, (6) auxiliary feedwater, (7) high pressure safety injection, and (8) safety injection recirculation. These reviews consisted primarily of review of the SOSs issued for each system in 1999 and interviews with the system engineers for selected systems. For the essential service water system, the inspectors also reviewed various other documents, including raw water steering committee meeting minutes and reports and Action Plan 99-106, which addressed improving the essential service water system. The inspectors also interviewed selected members of the raw water steering committee and performed an in-plant walkdown of the essential service water system with system engineers.

b. Observations and Findings

Except for essential service water system, the inspectors found that the corrective action processes for prioritization, trending, and disposition of corrective actions for these systems to be appropriate.

Essential Service Water

In reviewing the 1999 SOSs, the inspectors identified adverse trends of vibration and corrosion induced component and piping failures. Vibration induced failures included: (1) a cracked valve yoke (99-0615), (2) a hand wheel fell off a valve (99-0885), (3) a broken hanger (99-0961), and (4) a snubber would not properly stroke (99-1071). Corrosion induced failures included: (1) a valve disk separated from stem (99-0148, 99-1418), (2) a pin hole leak on essential service water piping (99-0645, 99-0746, 99-2598), and (3) a pin hole leak on a weld (99-0662, 99-0744). After further review, the inspectors determined that these trends, together with corrective action plans, had been previously identified by the licensee.

The licensee documented the root causes for the vibration induced failures in SOS 98-3967, which was initiated in response to an NRC concern documented in NRC Inspection Report 50-483/98-18. A significant factor discussed in the SOS was implementing changes in components and operating configuration since 1988, with little regard for system vibration levels. Several of these changes were made in response to lower system flows due to containment cooler fouling, due to deposition of suspended solids, and pieces of floating debris, such as plastic and wood pieces from the flocculator discharge water (a screen had been installed on the flocculator discharge), microbiologically induced (MIC) corrosion, and under-deposit galvanic corrosion. Eleven SOSs relating to vibration and corrosion induced failures going back to 1996 were closed to this SOS. This SOS stated that an interim solution, involving resizing of Flow Orifices EFFO0001 and EFFO0002, along with designating Valves EFHV0059 and EFHFV0060 as throttle valves, had reduced the vibration to desirable levels. However, as evidenced by the further vibration induced component failures in 1999 discussed above, vibration levels in certain sections of the piping remained too high. Other corrective actions to decrease system flow resistance and improve system flow characteristics were transferred to Action Plan 99-106.

The corrosion induced valve failures were addressed generically in SOS 99-0148. Valve inspections and plans to replace a substantial number of carbon steel valves with stainless steel valves were documented and actions were transferred to Action Plan 99-106. Also, the corrosion induced leaks were addressed generically in SOS 99-0662 and plans to replace approximately 3,000 linear feet of carbon steel piping with stainless steel piping were transferred to Action Plan 99-106.

The inspectors discussed Action Plan 99-106 with members of the raw water steering committee. The committee members made the following points:

a. The system is low pressure and based on their engineering judgment, the piping pressure boundary is not subject to catastrophic failure. Because of improved chemistry control over the last several years, there is no longer MIC corrosion.

b. They plan on replacing 38 4-inch and under valves, 4 10-inch valves, and 14 globe valves (carbon to stainless steel). They will also install 17 new stainless steel isolation valves to enhance maintenance capability and system reliability. The valves will be replaced in conjunction with replacement of approximately 3,000 linear feet of carbon steel piping with stainless steel piping. This will include all 6 inch and smaller piping and some 8-inch piping. This work will be accomplished over next 2 refueling outages.

c. The valves in question are normally open and have failed only during maintenance when the system is already out-of-service.

d. Coils in the containment coolers will be replaced over the next two outages.

e. Corrosion monitoring is being performed by a consultant at 14 locations under the guidance of the steering committee. Dedicated grid points had been established for the last 5 years. No problems have been identified in high flow areas. The increase in number of thin spots is localized near welds or previous MIC colonies.

f. Other system parameters are being trended, including system flows and strainer differential pressures.

g. There have been no problems with stainless steel piping and components.

h. There have been increased system walkdowns. Routine vibration monitoring is performed for rotating equipment and vibration for piping is performed on demand. Most vibration readings are within code guidance and exceptions are dispositioned on a case-by-case basis. No fatigue failure potential has been identified.

i. A vendor analysis is being performed to allow reduction of flow to the containment coolers and is scheduled for completion by May 31, 2000. If successful, this will allow installation of smaller orifices in the piping to the ultimate heat sink pond. In turn, this will allow reduction of differential pressure across certain valves, which will result in lower vibration levels.

The inspectors asked whether the corrosion induced valve failures had caused or could cause portions of the essential service water system to become inoperable. The supervising engineer for safety-related mechanical systems stated that the valves in question were all normally open valves, which were installed to allow isolation of room coolers, and no failures of the disks into the flow stream had occurred. He said that all the failures had occurred during reopening attempts after the valves had been closed for system maintenance. Therefore, the portions of the system affected were already out-of- service. The valve failures prevented prompt return of those portions of the system to service. The inspectors observed that Valves EFV0040 (SOS 99-0148) and EFV0072 (SOS 99-1418) failed in 1999 and they were room cooler manual isolation valves, which had been closed for room cooler maintenance. The licensee failed to achieve rated flow to the room coolers when they attempted to reopen the valves, informed the control room, and initiated the SOSs. Repairs were made prior to returning the valves to service and, as discussed above, corrective actions to prevent recurrence were transferred to Action Plan 99-106.

The inspectors expressed concerns regarding possible ancillary damage, which might be caused by future piping leaks. For example, as a result of an earlier leak, a containment spray pump had been sprayed with essential service water. The inspectors noted that the piping configuration was similar for the other train. The licensee's corrective action had consisted of repairing the leak at the elbow weld and inspecting the interior of the piping on both trains for other potential leak sites. The licensee had concluded that based on measured erosion trends, occurrence of a similar leak was very unlikely. No contingency plans were developed to address a similar problem. The inspectors found no evidence that damage to other components caused by spray or flooding from leaking essential service water lines in shared spaces had been considered.

During the system walkdown, the inspectors surveyed other components for potential essential service water damage. The inspectors identified a potential vulnerability in Room 3101 of the control building. If the floor drains did not adequately discharge water from an essential service water line leak, the swap over valves for switching the cooling water source from service water to essential service water during an accident could be flooded. Failure of these valves would make the essential service water system inoperable. The inspectors informed the system engineers and licensee management of this concern. The system engineers noted that there had been no essential service water leaks, which had challenged floor drains. The licensee acknowledged the concern, but made no commitments for followup action.

The issues of long-term reliability of the essential service water system, as well as potential previous missed opportunities for the licensee to implement system reliability improvements, are unresolved pending further review by the NRC (50-483/00003-01).

c. Conclusions

The corrective action system had been appropriately implemented for the systems reviewed, except as noted. However, the essential service water system had been allowed to deteriorate and issues associated with its future reliability, as well as potential previous missed opportunities for the licensee to implement system reliability improvements, are unresolved pending further review by the NRC.

V. Management Meetings

X1 Exit Meeting Summary

The inspectors discussed the progress of the inspection on a daily basis and presented the inspection results to members of licensee management at the conclusion of the onsite inspection on February 4, 2000. A telephonic conference was conducted on April 12, 2000, to cover issues identified after the onsite meeting. The licensee’s representatives acknowledged the findings presented.

The inspectors asked the licensee staff and management whether any materials examined during the inspection should be considered proprietary. Identified proprietary information is not discussed within and is not relevant to report conclusions.

ATTACHMENT

SUPPLEMENTAL INFORMATION

PARTIAL LIST OF PERSONS CONTACTED

Licensee

R. Affolter, Plant Manager
T. Atweiler, Construction Supervisor, Maintenance Rule/Valve Program
J. Blosser, Manager, Operations Support
D. Carstens, Senior Engineer, safety-related Mechanical Systems
J. Cunningham, Human Performance Supervisor
F. Forck, Quality Assurance Scientist
R. Foust, Construction Supervisor
G. Gilbert, Senior Engineer, Corrective Action Group
J. Gloe, Superintendent Training
G. Hamilton, Supervising Engineer, Quality Assurance Self-Assessment
D. Heinlein, Supervising Engineer, Computer/Electrical Systems
S. Hogan, Independent Safety Evaluation Group Engineer
J. Hogg, Supervising Engineer, Technical Support Engineering
A. Hollabaugh, Superintendent Design Engineering
T. Hooper, Senior Engineer, Computer/Electrical Systems
G. Hughes, Supervisor, Independent Safety Evaluation Group
J. Laux, Manager, Quality Assurance
J. McGraw, Superintendent Technical Support Engineering
T. Moser, Superintendent System Engineering
R. Myatt, Technical Support Engineer
J. Patterson, Superintendent, Maintenance
G. Randolph, Vice President and Chief Nuclear Officer
B. Reed, Engineer, Safety-Related Mechanical Systems
R. Roselius, Superintendent, Radiation Protection and Chemistry
J. Schnack, Supervising Engineer, Quality Assurance Corrective Action Group
K. Schoolcraft, Engineer, Quality Assurance Regulatory Support
T. Sharkey, Supervising Engineer, Safety-Related Mechanical Systems
W. Stendebach, System Engineer
M. Taylor, Manager, Nuclear Engineering
R. Wink, Senior Engineer, Safety-Related Mechanical Systems
W. Witt, Assistant Plant Manager

NRC

V. Gaddy, Senior Resident Inspector
J. Whitemore, Senior Reactor Inspector

INSPECTION PROCEDURES USED

IP 40500	Effectiveness of Licensee Controls in Identifying, Resolving, and Preventing Problems
IP 92902	Followup - Maintenance

ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

50-483/0003-01	URI	Essential service water reliability issues (Section E7.1).

Closed

50-483/9711-01	VIO	Failure to assure appropriate preventative maintenance (Section M8.1).
50-483/9711-02	VIO	Inadequate evaluation of equipment failures (Section M8.2).

DOCUMENTS REVIEWED

Action Plans

99-106, “Improve Essential Service Water (ESW) System,” dated November 19, 1999
“ESW Corrosion Monitoring Plan,” dated January 28, 2000
“Configuration Control Task Team Action Plan,” Revision 002

Audit Reports

AP98-011, “Quality Assurance Audit of Corrective Action,” dated August 11, 1998

AP99-001, “Quality Assurance Audit of the Station Blackout Supplemental QA Program,” dated February 2, 1999

AP99-002, “Quality Assurance Audit of Radiation Protection and Radwaste,” dated February 9, 1999

AP99-003, “Quality Assurance Audit of Records Management and Document Control,” dated April 15, 1999

AP99-004, “Quality Assurance Audit of Inservice Testing,” dated April 7, 1999

AP99-005, “Quality Assurance Audit of Operations,” dated March 31, 1999

AP99-007, “Quality Assurance Audit of Maintenance/Activities,” dated September 3, 1999

AP99-008, “Quality Assurance Audit of Independent Assessment of Callaway Plant’s Operating Quality Assurance Program (OQAP),” dated August 5, 1999

Committee Reports

OQC 99-0118, “Strategic Corrective Action Committee Monthly Report,” dated November 2, 1999

OQC 99-0127, “Strategic Corrective Action Committee Monthly Report,” dated December 9, 1999

“Corrective Action Program Update,” dated January 7, 2000

UOTCR 98-112, “Cycle 9 Raw Water Report,” dated November 20, 1998

Event Review Team Reports

SOS 99-0314 (UOMO 99-0017), “Motor Shot Blue Flame when Painters were Working in Area,” dated February 16, 1999

SOS 99-0826 (UOTCR 99-0061), “Incorrect Fuse Pulled,” dated May 17, 1999

SOS 99-2456 (USEP 990055), “Unplanned Entry into OTO Due to Inadvertent HVAC Actuations During Test,” dated October 11, 1999

SOS 99-2465, “Loss of Freeze Seal Refrigeration,” dated October 13, 1999

SOS 99-2739 (USEP 99-0064), “Electrician Received Pinched Fingers While Performing Breaker PM,” dated October 17, 1999

SOS 99-2819 (OQC 99-124), “Unexpected Impacts Resulting from Deenergization of Bus NN04,” dated November 19, 1999

“WPA for SGK03C Inadvertently Included in tagout for SGE03C (SOS 99-0258),” February 2, 1999

“Failure to sign-on to a WPA (SOS 99-0255),” February 22, 1999

“Startup Feedwater Pump Trip (SOS 99-1636),” August 23, 1999

“Unexpected DRPI alarms during ESFAS testing (SOS 99-2189),” October 10, 1999

“Work Performed Without Proper WPA Sign-on (SOS 99-2299),” October 10, 1999

“Two Tags Discovered as Not Installed When Clearing WPA (SOS 99-2432),” October 11, 1999

“Inadvertent CRVIS, CPIS, and FBVIS during ITM-ZZ-00016 (SOS 99-2456),” October 11, 1999

“Inadvertent Draining from the RWST while restoring WPA (SOS 99-2599),” October 13, 1999

“Failure to Reinstall WPA for SI Pumps During Shutdown (SOS 99-3025),” November 5, 1999

“Unexpected Impacts Resulting from Deenergization of Bus NN04 (SOS 99-2819),” November 19. 1999

“Operators Iinadvertently Opened EFHV0033 on 10/27/99 (SOS 99-3082),” December 166, 1999

Miscellaneous

OQC 99-0128, Root Cause Evaluation for SOS 99-0857 (Electrician Injured), dated December 15, 1999

Engineering Technical Trending Task Team Charter, 1st Draft May 1999

T68.4000.6, “Human Performance Fundamentals Course - Introduction,” September 22, 1999

T68.4030.6, “Human Performance Fundamentals Course - Organization,” October 4, 1999

Night Orders from January 25 through December 22, 1999

On-Site Review Committee Minutes from January 7 through December 28, 1999

Bruce H. Little to Vice President and Chief Nuclear Officer, “Independent Effectiveness Evaluation of the Corrective Action Program,” dated December 16, 1999

Licensee Event Report 98-010-00, “Callaway Plant Re-evaluation Determines Additional Valves to Be Added to Technical Specification Requirements,” submitted December 18, 1999

Licensee Event Report 99-004-00, “Missed Technical Specification Surveillance Due to Erroneous Procedure Guidance,” submitted September 7, 1999

Licensee Event Report 99-006-00, “Manual Actuation of Engineered Safety Feature Components Due to Personnel Error,” submitted September 13, 1999

Response and Supplemental Response Letters to Notice of Violation NRC Inspection Report No. 50-483/97011 Callaway Plant Union Electric Company

Maintenance Preventable Functional Failure Database for Cycles 8, 9, and 10

Policies

UEND-ASSESSMENT-01, “Self-Assessment Policy,” Revision 000
OPS-ASSESSMENT-02, “Event Free Operation,” Revision 001
2.2.3, “Guidelines for SOS Generation,” Revision 0
UEND-Suggestions-01, “Suggestions,” Revision 000

Procedures

APA-ZZ-00303, “Classification of Systems,” Revision 5

APA-ZZ-00310, “Workman’s Protection Assurance and Caution Tagging,” Revision 13

APA-ZZ-00320, “Processing Work Requests,” Revision 24

APA-ZZ-00500, Corrective Action Program, Revision 28

APA-ZZ-00520, “Reporting Requirements and Responsibilities,” Revision 15

APA-ZZ-00604, “Requests for Resolution,” Revision 16

EDP-ZZ-01128, “Maintenance Rule and EPIX Programs,” Revision 1

GDP-ZZ-00220, “Quality Assurance Trend Analysis and Reporting,” Revision 011

GDP-ZZ-01630, “Request for Corrective Action,” Revision 03

GDP-ZZ-01690, “Administration of Suggestion, Occurrence, Solution (SOS) Corrective Action Program”

GDP-ZZ-01810, “Quality Assurance Assessment Coverage,” Revision 20

OSP-BG-V001C, “NCP Discharge Check Valves Closure Test,” Revisions 5, 6 & TCN 99-0344

WDP-ZZ-00022, “Deficiency Reporting,” Revision 2

ODP-ZZ-00008, “Night Order Book,” Revision 004

APA-ZZ-00010, “Conduct of Operations - Operations,” Revision 014

ODP-ZZ-00001, “Operations Department - Code of Conduct,” Revision 007, TCN 97-0009

APA-ZZ-00925, “Training Guide and Training Department Procedures,” Revision 7

SOSs

99-0118, “Control Room Air Conditioner Tripped During Condenser Flush,” initiated February 1, 1999

99-0148, “Evaluation of Service Water Valve Failures,” initiated January 23, 1999

99-0174, “Work Package Specified Wrong Packing for Valves,” initiated January 27, 1999

99-0282, “Incorrect Mounting Brackets on UHS Sump Heaters,” initiated February 9, 1999

99-0325, “Valve Position Lost at the MCB for EFHV0059,” initiated February 17, 1999

99-0569, “Torque Switches on Valves Set Too High,” initiated March 26, 1999

99-0615, “Crack in Yoke for Valve EFV0058,” initiated April 5, 1999

99-0645, “Pin Hole Leak on ESW Piping at 1988 of Aux Building,” initiated April 9, 1999

99-0662, “Pin Hole Leak in Weld at FEF02A/EFPDV0019 Piping Spool,” initiated April 12, 1999

99-0672, “Hoses Needed to Perform Flush Were Missing,” initiated April 13, 1999

99-0744, “Leak at Weld Toe of Valve EGV0355,” initiated April 21, 1999

99-0746, “Pin Hole Leak on Line 88HBC4 in Room 1110,” initiated April 21, 1999

99-0885, “Handwheel Fell off Valve EFHV0059,” initiated May 14, 1999

99-0961, “Broken Hanger,” initiated May 24, 1999

99-1071, “Snubber will not Stroke by Hand,” initiated June 9, 1999

99-1408, “Failure of ESW Valve EFV0072,” initiated July 21, 1999

99-1414, “Failure of ESW Valve EFV0072,” initiated July 21, 1999

99-1415, “Control Room Did Not Perform Offsite Power Source Verifications After Taking ESW Pump to PTL,” initiated July 21, 1999

99-1418, “Valve EFVOO72 Appears to Have Disk and Stem Separation,” initiated July 21, 1999

99-1921, “Wiring Terminated Improperly at NG08FDF4,” initiated September 15, 1999

99-1922, “ESW Flow to CCW Heat Exchanger Below Target Flow,” initiated September 15, 1999

99-2482, “Corrosion on Pipe,” initiated October 11, 1999

99-2598, “Leak in ESW Line EF-036-HBC-8," initiated October 13, 1999

99-2688, “Spent Fuel High Temperature Alarm,” initiated October 17, 1999

99-3015, “Drawing Revised in Violation of Procedure,” initiated October 25, 1999

99-3165, “Workers Did Not Have Correct Drawings,” initiated October 29, 1999

99-0284, “Delay in Restoring A Train CCW to Operable,” initiated February 10, 1999

99-0285, “Over Ranged New Gauge,” initiated February 10, 1999

99-0290, “Valve Stroke Distance in Procedure not Adequate to Meet Acceptance Criteria,” initiated February 10, 1999

99-0334, “Air Entrainment in A CCW System,” initiated February 22, 1999

99-0419, “Could Not Balance CCW Flow to RCPs,” initiated March 5, 1999

99-0839, “Valve for Flow Balance in Incorrect Position,” initiated May 5, 1999

99-1474, “Valve Stroke Appear to Not Meet TS Acceptance Criteria,” initiated July 28, 1999

99-2278, “CCW Surge Tank Alarm Received During LLRT Testing,” initiated October 6, 1999

99-0250, “Portion of Control Circuit for Valve EJHV8804A Removed,” initiated February 4, 1999

99-0316, “Loose Bolts on Limitorque Operator,” initiated February 16, 1999

99-2349, “RHR Injection Flow Path Check Valve Deficiency,” initiated October 8, 1999

99-2355, “Surveillance Procedure Could Not be Performed as Written,” initiated October 8, 1999

99-2465, “Freeze Seal Plug Lost,” initiated October 11, 1999

99-3157, “Gouges on Flange Surface,” initiated October 29, 1999

98-3967, “Concerns With Component Vibration in ESW System,” initiated December 4, 1998

99-2042, “Adverse Trend for SOSs with the Key Word Recurrence,” initiated September 30, 1999

99-1505, “Untimely Responses to SOSs,” initiated August 3, 1999

98-3086, “Actions Taken by the Corrective Action Task Team Have Not Been Completed in a Timely Manner,” initiated August 7, 1998

99-1312, “Recommendations for Improving Timeliness of Corrective Actions,” initiated August 2, 1999

97-1027, “Functional Failures Identified During Maint. Rule Baseline Inspection,” initiated September 3, 1997

97-1028, “Classification of Risk Significant SSC’s Identified During Maint. Rule Baseline Inspection,” initiated September 3, 1997

97-1029, “Several Problems Identified During Maint. Rule Baseline Inspection,” initiated September 3, 1997

98-0081, “Broken Actuator on Essential Service Water Valve,” initiated January 22, 1998

98-0230, “Essential Service Water Exceeded Maint. Rule Availability,” initiated February 20, 1998

98-1666, “Cracked Yoke on Essential Service Water Throttle Valve,” initiated April 19, 1998

98-3022, “Essential Service Water Exceeded Maintenance Rule Reliability,” initiated July 8, 1998

99-0856, “Essential Service Water Exceeded Maint. Rule Reliability,” initiated April 14, 1999

99-1423, “Adequacy of Postings Required by 10 CFR 19.11,” initiated July 20, 1999

99-1636, “Startup Feed Pump Tripped due to Workman’s Protect. Isol.,” initiated August 13, 1999

99-3676, “Low Jacket Water Temperature on ‘A’ EDG,” initiated December 21, 1999

00-0170, “Valid Data Recovery of Wind Speed, Wind Direction, and Ambient Temperature,” initiated January 10, 2000

00-0172, “Equipment & Coordination Problems Associated with ‘A’ Intake Pump Work,” initiated January 14, 2000

00-0203, “Callaway Records Information System Problems,” initiated January 28, 2000

00-0204, “Various Procedures Missing from the Drive Master Folder,” initiated January 28, 2000

00-0205, “Form Not Updated when Temp. Change Notice Written,” initiated January 28, 2000

00-0219, “Thermogram Performance in Auxiliary Building,” initiated January 21, 2000

00-0225, “Standardize Maintenance Department Policy for Containment Entries at Power,” initiated January 31, 2000

00-0229, “Fire Brigade Member Qualifications,” initiated January 31, 2000

00-0230, “Defective Ignition Switch on Vehicle Inside the Prot. Area,” initiated January 28, 2000

00-0231, “Power Loss Phone Removal from EOF,” initiated February 1, 2000

00-0232, “Fire Protection Alarm & Control Panel,” initiated January 26, 2000

00-0234, “Containment ΔP Shiftly Readings Logged Incorrectly,” initiated February 1, 2000

99-1199, “Failure to Perform Trending Using Work Request Database Since July 23, 19997,” initiated July 16, 1999

97-0643, “Training Action Tracking System Deficiencies,” May 16, 1997

98-3022, “ESW Train A Exceeded MR Reliability Performance Criteria in Cycle 9,” July 20, 1998

98-3050, “Training Action Tracking System Procedural Guidance,” July 1, 1998

98-3876, “Secondary Plant Equipment Problems Identified in Mode 3,” November 29, 1998

99-0868, “SER 8-95, Millstone Valve Misposition Event,” May 10, 1999

99-0418, “Enrichment Allowance for Storage of New Fuel,” March 5, 1999

99-0950, “NRC IN 98-02 - Cold Weather Problems and Protection,” June 10, 1998

99-1054, “Employee Experienced Chest Pain on the Job,” June 7, 1999

99-1229, “1999 INPO Assessment Interim Report of 3/18/99 - Finding MA.2-1,” June 29, 1999

99-1268, “SRO’s Lacked Current Respirator fit at time of Licensing,” June 25, 1999

99-1353, “1999 INPO Assessment Interim Report issued March 18, 1999,” July 13, 1999

99-1472, “Resident Inspector Discovered Valve BGV0305 Mispositioned,” July 28, 1999

99-1639, “Gammametrics Source Range Channel Failed Channel Check,” August 14, 1999

99-1649, “Valve Position Indication Lost during performance of OSP-BM-V0001,” August 18, 1999

99-1885, “Line Management Involvement in Department Training Programs,” September 2, 1999

99-3524, “Vogtle SI Pump Venting Event on 9/26/99,” December 1, 1999

Surveillance Reports

SP99-024, “Assess Effectiveness of Responses and Corrective Action Implementation,” dated April 16, 1999

SP99-039, “Effectiveness of Formal Root Cause Analysis,” dated September 24, 1999

SP99-083, “Corrective Action Initiation Threshold,” dated January 28, 2000

Trend Reports

Quality Assurance Department Semiannual Trend Analysis Report January-June 1999, dated September 28, 1999

Quality Assurance Department Semiannual Trend Analysis Report July-December 1999 (Draft)