UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION IV
612 EAST LAMAR BLVD, SUITE 400
ARLINGTON, TEXAS 76011-4125

December 17, 2010

Mr. Adam C. Heflin, Senior Vice
President and Chief Nuclear Officer
Union Electric Company
P.O. Box 620
Fulton, MO 65251

SUBJECT: CALLAWAY PLANT - NRC BIENNIAL PROBLEM IDENTIFICATION AND RESOLUTION INSPECTION REPORT 05000483/2010006

Dear Mr. Heflin:

On November 5, 2010, the U.S. Nuclear Regulatory Commission (NRC) completed an inspection at your Callaway Plant. The enclosed report documents the inspection findings discussed with Mr. D. W. Neterer, Plant Director, and other members of your staff during an exit briefing on November 5, 2010. A second exit briefing was conducted with Mr. F. Diya, Vice President Nuclear Operations, and other members of your staff on November 15, 2010.

The inspection examined activities conducted under your license as they relate to identification and resolution of problems, safety and compliance with the Commission's rules and regulations, and with the conditions of your operating license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel. The inspectors also interviewed 40 plant workers regarding the condition of your safety-conscious work environment.

A part of this inspection also involved how your corrective action program identified, evaluated, and developed corrective actions for your security program. As such, security-related information is contained in the non-public enclosure to the inspection report.

This report documents three NRC-identified findings of very low safety significance (Green). Two of these findings were determined to involve violations of NRC requirements. Additionally, one licensee-identified violation, which was determined to be of very low safety significance (Green), is listed in this report. Because of the very low safety significance of the violations, and because the violations were entered into your corrective action program, the NRC is treating

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these as noncited violations consistent with the NRC Enforcement Policy. If you contest the noncited violations, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-0001; with copies to the Regional Administrator, Region IV, U.S. Nuclear Regulatory Commission, 612 E. Lamar Blvd, Suite 400, Arlington, Texas, 76011-4125; the Director, Office of Enforcement, U.S. Nuclear Regulatory Commission, Washington, D.C. 20555-0001; and the NRC Resident Inspector at Callaway Plant.

The NRC-identified finding also contained examples of security-related issues which were determined to also be of very low security significance (i.e., Green as determined by the physical protection significance determination process). All security-related deficiencies were promptly corrected or compensated for and the plant was in compliance with applicable physical protection and security requirements within the scope of this inspection before the inspectors left the site.

The team noted that the NRC-identified finding involved several instances in which your staff failed to follow the guidance for assigning Significance Levels to Callaway action requests. In these instances, sufficient resources were not always dedicated to identifying the cause of issues and had not taken effective corrective actions such that, in some cases, deficiencies recurred. We note that although your audits and self-assessments identified other issues, they were not effective in identifying this deficiency.

If you disagree with the crosscutting aspects assigned to the noncited violations or to the finding in this report, you should provide a response within 30 days of the date of this inspection report, with the basis for your disagreement, to the Regional Administrator, Region IV, and the NRC Resident Inspector at Callaway Plant.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and Enclosure 1 to this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the NRC's document system, ADAMS. ADAMS is accessible from the NRC Website at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room). However, because of the security-related concerns discussed in Enclosure 2 to this letter, and in accordance with 10 CFR 2.390, a copy of Enclosure 2 will not be available for public inspection.

In accordance with 10 CFR 2.390(b)(1)(ii), the NRC is waiving the affidavit requirements for your response, if any. This practice will ensure that your response will not be made available electronically for public inspection in the NRC Public Document Room or from the NRC's document system, ADAMS. If safeguards information is necessary to provide an acceptable response, please provide the level of protection described in 10 CFR 73.21. Otherwise, mark

your entire response "Security-Related Information-Withhold Under 10 CFR 2.390" and follow the instructions for withholding in 10 CFR 2.390(b)(1).

Sincerely,

/RA/

Michael C. Hay, Chief
Technical Support Branch
Division of Reactor Safety

Docket: 50-483
License: NPF-30

Enclosures:
(1) NRC Inspection Report 05000483/2010006
w/Attachment 1:Supplemental Information
(2) Nonpublic Security-Related Information

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Security Related – Attachment 2 of Inspection Report - OUO:
SUNSI Review Completed: JMR & GMV ADAMS: ☒ Yes Initials: JMR&GMV
☒ Non-Publicly Available ☒ Sensitive-Security- Related-Periodic Review Required

Letter, Inspection Report and Attachment 1 Only:
SUNSI Review Completed: JMR & GMV ADAMS: ☒ Yes Initials: JMR & GMV
☒ Publicly Available ☒ Non-Sensitive
R:\ ADAMS ML

RIV:TL:DRS/TSB	RI:DRP/PBB	PSI:PSB1	RE:EB1
MVasquez	JGroom	JRollins	PGoldberg
/RA/	***/RA/ by E***	***/RA/ by E***	***/RA/ by E***
12/6/2010	12/7/2010	12/7/2010	12/14/2010
C:DRP/PBB	RIV:C:DRS/PSB1	RIV:C:DRS/TSB	
DAllen	MShannon	MHay	
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12/15/2010	12/13/2010	12/17/2010	

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U.S. NUCLEAR REGULATORY COMMISSION

REGION IV

Docket:	05000483
License:	NPF-30
Report:	05000483/2010006
Licensee:	Union Electric Company
Facility:	Callaway Plant
Location:	Junction Highway CC and Highway O Fulton, Mo
Dates:	October 18 – November 5, 2010
Team Leader:	M. Vasquez, Senior Reactor Inspector
Inspectors:	P. Goldberg, Reactor Inspector J. Rollins, Physical Security Inspector J. Groom, Resident Inspector
Accompanied By:	Z. Hollcraft, Project Engineer
Approved By:	Michael C. Hay, Chief Technical Support Branch Division of Reactor Safety

"Enclosure 2 transmitted herewith contains SUNSI. When separated from Enclosure 2 of the transmittal letter, the transmittal document and Enclosure 1 are decontrolled."

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SUMMARY OF FINDINGS

IR 05000483/2010006, 10/18/2010 - 11/05/2010, Callaway Plant, "Biennial Baseline Inspection of the Identification and Resolution of Problems."

The report covers a 2-week period of onsite inspection by a senior reactor inspector, a reactor inspector, a physical security inspector, and a resident inspector. A project engineer also accompanied the inspection team during the first week. The findings from this inspection include two Green NRC-identified noncited violations and one Green NRC-identified finding. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using Inspection Manual Chapter 0609, “Significance Determination Process.” Findings for which the significance determination process does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG 1649, “Reactor Oversight Process,” Revision 4, dated December 2006.

Identification and Resolution of Problems

The team concluded that the corrective action program at the Callaway Plant was performing in a satisfactory manner to ensure safe plant operations. However, the team identified a number of instances in which the licensee did not follow its procedural guidance for assigning significance levels to problems identified and, as a result, did not adequately evaluate the causes and/or extent of conditions resulting in several repetitive issues.

The inspectors determined that the licensee evaluated industry operating experience for relevance to the facility and entered applicable items in the corrective action program. The inspectors noted that operating experience was considered in cause evaluations.

The team determined that the licensee had a healthy safety-conscious work environment in that workers felt free to raise safety concerns without fear of retaliation using all avenues available.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion XVI, for the licensee’s failure to correct in a timely manner degraded conditions affecting the essential service water system. Specifically, the licensee failed to resolve the combined effects of corrosion and waterhammer events resulting in system leaks. The licensee has experienced the waterhammer events since initial plant startup and has been experiencing problems with corrosion since the mid-1990s. As corrective actions for this issue, the licensee plans to implement two system modifications next refueling outage to mitigate the impacts of waterhammer

events. This noncited violation was entered into the corrective action program as Callaway Action Request 201010635.

The issue was more than minor because it affected the equipment performance attribute of the Mitigating Systems Cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Manual Chapter 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," the issue is determined to have very low safety significance because the finding is not a design or qualification issue confirmed not to result in a loss of operability or functionality; did not represent an actual loss of safety function of the system or train; did not result in the loss of one or more trains of nontechnical specification equipment; and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. The inspectors determined that the cause of the finding has a crosscutting aspect in the area of human performance associated with the component of resources because the licensee did not maintain the plant to minimize long-standing equipment issues [H.2(a)] (Section 4OA2.5a).

- Green. The team identified a green noncited violation of 10 CFR Part 50, Appendix B, Criterion XVI, involving the failure to promptly correct deficiencies affecting the steam generator atmospheric steam dump valves. In 2002, system engineers identified that the valves' current-to-pressure transducers were experiencing degradation because they were subjected to high vibration, and a proposed modification to move the transducers to a low vibration area occurred in 2006. The licensee experienced several additional failures in 2009 and determined that the reliable life of the transducers was 18 months in the high vibration areas. As of the date of the inspection, only one transducer of the four had been moved to a low vibration location, and the team determined that corrective actions for this condition adverse to quality have not been timely. The licensee plans to implement modifications to relocate the remaining three transducers to a lower vibration environment in 2011. The issue was entered into the licensee's corrective action program as Callaway Action Request 200910153.

  This issue was determined to be greater than minor because it impacted the Mitigating Systems Cornerstone attribute of human performance and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Manual Chapter 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," the inspectors found that even though the steam generator atmospheric steam dump valves were not able to meet their technical specification surveillance requirements of achieving the full open position the valves would open sufficiently to meet its intended safety function. Therefore, the issue was of very low safety significance since it was a design or qualification deficiency confirmed not to result in a loss of

functionality. This finding has a crosscutting aspect in the area of human performance associated with the resources component because the licensee failed to maintain long term plant safety by minimization of long-standing equipment issues associated with steam generator atmospheric steam dump valve current-to-pressure transducers [H.2(a)] (Section 4OA2.5b).

- Green. The team identified a finding involving the licensee's failure to follow the corrective action program procedure for assigning significance levels to Callaway action requests. This deficiency resulted in the licensee's failure to adequately evaluate the cause and extent of condition for a number of issues, and in some examples resulted in recurrences of the issues. In one example the licensee identified a jacket water leak on Emergency Diesel Generator B in 2008. This significant condition adverse to quality was assigned a Significance Level 3 which only required a lower tier cause evaluation, when the procedure identified a significant condition adverse to quality as an example of a Significance Level 1. The team identified additional examples involving degraded safety-related equipment and security-related issues. As corrective action, the licensee entered the issue into its corrective action program as Callaway Action Request 201010472.

  This issue was determined to be greater than minor because if left uncorrected, the issue could become a more significant safety concern. The inspectors determined that the issue involving Callaway Action Request 200812985, the failure of emergency diesel generator train B due to a leak in the jacket water system, was of very low safety significance because it was bounded by the significance of NCV 05000483/2009007-01, "Failure to Ensure Suitable Replacement Parts Essential for Emergency Diesel Generator Train B."

  The team evaluated the issue involving Callaway Action Request 200810379, the failure of engineered safety feature power supply SA036E, using Manual Chapter 0609.04, "Phase 1 – Initial Screening and Characterization of Findings." This issue screened as very low safety significance because it was not a design or qualification deficiency that resulted in a loss of operability or functionality, did not create a loss of system safety function of a single train for greater than the technical specification allowed outage time and did not affect seismic, flooding, or severe weather initiating events.

  The team also evaluated several security-related examples of this finding that are described in Enclosure 2 of this letter. These security issues were also determined to be of very low security significance. Based on the sensitivity of security issues, Enclosure 2 is not publicly available because it contains security-related information.

  This finding has a crosscutting aspect in the area of human performance associated with the component of training because training was needed for the screening

committee to better understand a significant condition adverse to quality and to better understand the significance of security issues [H.2(b)] (Section 40A2.5c).

B. Licensee-Identified Violations

A violation of very low safety significance, which was identified by the licensee, was reviewed by the inspectors. Corrective actions taken or planned by the licensee have been entered into the licensee's corrective action program. This violation and corrective action tracking number listed in Section 4OA7.

REPORT DETAILS

4. OTHER ACTIVITIES

4OA2 Problem Identification and Resolution (71152)

The team based the following conclusions on the sample of corrective action documents that were initiated in the assessment period, which ranged from March 15, 2008, to the end of the on-site portion of this inspection on November 5, 2010.

.1 Assessment of the Corrective Action Program Effectiveness

a. Inspection Scope

The team reviewed approximately 250 Callaway action requests, including associated root cause, apparent cause, and direct cause evaluations that were completed between March 15, 2008, and November 5, 2010, to determine if problems were being properly identified, characterized, and entered into the corrective action program for evaluation and resolution. The team also reviewed system health reports, operability determinations, self-assessments, trending reports, metrics, and various other documents related to the corrective action program. The team reviewed job requests and condition reports to assess the reporting threshold and prioritization processes. The team's review included verifying that the licensee considered the full extent of cause and extent of condition for problems, as well as how the licensee assessed generic implications and previous occurrences. The team assessed the timeliness and effectiveness of corrective actions, completed or planned, and looked for additional examples of similar problems.

The team also reviewed a sample of corrective action documents that addressed past NRC-identified violations to ensure that the corrective actions addressed the issues as described in the inspection reports. The inspectors reviewed a sample of corrective actions closed to other corrective action documents to verify that corrective actions were appropriate and timely.

The team considered risk insights to focus the sample selection and plant tours on risk significant systems and components. Based on this review, the samples reviewed by the inspectors focused on, but were not limited to, these systems. The team also expanded this review to include 5 years of evaluations involving portions of the essential service water system, the atmospheric steam dumps, and circuit card reliability associated with the reactor protection system and electrical safeguards equipment. The inspectors conducted a walkdown of accessible portions of these systems to assess whether problems were identified and entered into the corrective action program at the appropriate threshold.

In order to assess the licensee's safety-conscious work environment, the team also conducted four safety culture focus groups involving a total of 40 plant workers. The team questioned workers on how comfortable workers felt raising safety concerns without fear of retaliation using all avenues available to them (e.g., raising issues to their supervisors and managers, to plant management using the Callaway Action Request program, to the licensee's employee concerns program and to the NRC). Other aspects of safety culture were also discussed.

b. Assessments

Assessment - Effectiveness of Problem Identification

The team concluded that problems were identified and documented in accordance with the requirements of the licensee's corrective action program. The team also determined that the licensee was identifying problems at an appropriately low threshold. The team determined that the procedures and program documents that implement this aspect of the corrective action program were adequately established and followed. The team did note that while conducting a root cause evaluation, Callaway identified 13 instances where degraded or failed current-to-pressure transducers related to the atmospheric steam dumps were not identified in the corrective action program; however, these examples were beyond the two-year time frame considered for current performance (Section 40A2.5b).

Assessment - Effectiveness of Prioritization and Evaluation of Issues

Overall, the team concluded that Callaway's staff was correctly prioritizing and evaluating issues. However, the team identified a number of instances where the licensee was not following its procedural guidance contained in APA-ZZ-00500, "Corrective Action Program," Revisions 45-51, for assigning the significance levels to Callaway action requests. While the team fully expects flexibility within a licensee's procedure for assigning significance levels, the team determined that deviations from procedural guidance must be justified and not arbitrary. As a result of failing to follow its procedural guidance, the licensee had not identified the causes of some problems and had not taken effective corrective actions such that, in some cases, deficiencies recurred. As a result, the team identified a single finding involving multiple examples in which the licensee did not adhere to its procedure for assigning significance levels without justification for the changes (Section 40A2.5b). The following are examples where the licensee failed to appropriately prioritize problems in accordance with its corrective action procedure:

- Callaway Action Request 200812985 involved Emergency Diesel Generator B inoperability due to a jacket water leak. The Licensee Procedure APA-ZZ-00500,

Corrective Action Program," Revisions 45-51, listed examples of Significant Conditions Adverse to quality as Significance Level 1, yet the licensee assigned Significance Level 3 to the Callaway action request without justification. Licensee representatives informed the team that during the root cause evaluation for why this performance indicator went white (Callaway Action Request 201003236), the licensee concluded Callaway Action Request 200812985 should have been assigned a Significance Level 1. As a result, the licensee took actions to train the screening committee and provide aids to the committee on risk-significant equipment. However, the licensee did not evaluate whether additional training was needed for other cornerstone areas such as security, radiation protection, and emergency planning.

- Callaway Action Request 200810379 documented a failure of engineered safety feature actuation signal (ESFAS) power supply SA036E, which occurred while the plant was shut down. Power Supply SA036E powers the actuation logic for containment purge isolation system, fuel building isolation, control room emergency ventilation system, auxiliary feedwater actuation system (train A) and the swapover logic of auxiliary feedwater from the condensate storage tank to essential service water. The issue was assigned Significance Level 4 which was inappropriate because the condition did not meet the definition of a Significance Level 4. Specifically, according to Procedure APA-ZZ-00500, "Corrective Action Program," Revisions 45-51, Significance Level 4 issues are "… adverse conditions where the cause may be obvious or management has determined that the issue is minor enough to not expend resources on the cause evaluation." The team determined that failures affecting ESFAS are not minor and the cause of the failure was not obvious. Additionally, the team noted that a subsequent ESFAS power supply which failed during power operations was assigned a Significance Level 1.

- In 2008, the NRC issued a Notice of Violation for a Severity Level III violation. APA-ZZ-00500, "Corrective Action Program," Revisions 45-51, lists an example of a Significance Level 1 as "NRC Notice of Violation – escalated enforcement action." The associated Callaway action request was assigned a Significance Level 3 without justification. Licensee representatives stated that the screening committee did not recognize the Severity Level III violation as escalated enforcement.

- Additional examples were identified, but are security-related and are not being made publicly available [reference Enclosure 2 to the transmittal letter].

The team's review of these issues found other weaknesses in the licensee's process in that: (1) the licensee did not fully evaluate trends for security issues possibly due to the screening committee's tendency to not consider a long enough time frame for the trend; (2) there was insufficient guidance and/or training for the screening committee to identify when repetitive findings warrant a higher significance level such that a more thorough

cause evaluation was warranted; (3) not all committee members were familiar with all the terms used as examples in the procedure for assigning significance levels (e.g., significant condition adverse to quality, escalated enforcement, and safeguards event); and (4) while observing the screening committee on November 4, very few individuals used Procedure APA-ZZ-00500, "Corrective Action Program," for reference to ensure the correct significance levels were being assigned.

Assessment – Effectiveness of Corrective Action Program

The team concluded that the licensee took effective actions to correct conditions adverse to quality. However, the team found that Callaway has a history of equipment problems (primarily nonsafety-related) that recur. Some of these were due to equipment where the manufacturer no longer exists and obtaining parts is a challenge. As a result, the licensee implemented an equipment reliability program to prioritize these historical equipment problems and to effectively correct them. The licensee was effective at resolving the most immediate safety-related equipment problems that had an immediate impact on the plant. The licensee was effective at reacting to important equipment problems but was not effective in proactively preventing issues from arising or from preventing repetitive issues. The team noted that workers at Callaway also expressed a similar view during focus group interviews (refer to Section 40A2.4).

In evaluating the corrective actions to NRC-issued noncited violations, the team found that the licensee was generally effective in its corrective actions; however, the licensee experienced repetitive security-related issues which the team concluded resulted from inappropriate significance levels being assigned to the problems (discussed in the previous section).

Some examples of deficiencies with corrective actions included:

- Callaway Action Request 200603324 identified an inadequate technical specification in that the range of frequencies allowed for the emergency diesel generator was 60 Hz ± 2 percent. However, the accident analysis was conducted for a generator frequency of only 60 Hz and no bounding calculation was performed for the range of allowed frequencies. The licensee has contracted for a reanalysis and a topical paper is expected to be provided to the NRC by the end of the year. However, the team's concern is that Callaway Action Request 200603324 was closed without an adequate basis and, as a result, corrective actions have not been timely (Section 4OA7).

- The licensee has failed to correct, in a timely manner, a degraded and nonconforming condition which has been impacting essential service water system since the mid-1990s. Specifically, the essential service water system has been experiencing waterhammer events which, coupled with corrosion problems, has

caused leaks in heat exchanger tubes, fittings, and other components. Although the licensee has taken actions to mitigate the effects of waterhammer events caused by ESFAS testing, the licensee has not taken timely corrective actions to mitigate the effects of waterhammer events during unplanned loss of power events (Section 40A2.5a).

- The licensee has failed to correct, in a timely manner, a condition adverse to quality involving repetitive failures of current-to-pressure transducers which have caused the steam generator atmospheric steam dump valves to become inoperable. In 2002, licensee engineers determined that current-to-pressure transducers had been experiencing premature failures due to the fact they were located in a high vibration environment. As early as 2006, the licensee had proposed modifications to move the transducers to lower vibration locations as a unit health risk (rather than a corrective action for a condition adverse to quality). In 2009, after experiencing two failures of the steam generator atmospheric steam dumps, the licensee determined that the reliable life of these transducers was only about 18 months in the currently installed configuration. At the time of the inspection, only one of the four transducers had been relocated to a low vibration location and the team concluded that the licensee's corrective actions had not been timely for this condition. Licensee staff informed the team that the proposed modification to relocate the remaining three transducers was scheduled for 2011 (Section 40A2.5b).

- The licensee has continued to experience foreign material-induced equipment issues. Examples included a reactor trip due to foreign material in the feedwater system (Callaway Action Request 200811781), the failure of main turbine control valve Number 1 due to foreigh material (Callaway Action Request 200903016), and the failure of the control rod at location H-2 to fully insert during testing also caused by foreign material (Callaway Action Request 201005096).

.2 Assessment of the Use of Operating Experience

a. Inspection Scope

The inspectors examined the licensee's program for reviewing industry operating experience, including reviewing the governing procedure and self-assessments. The team reviewed a sample of condition reports examining operating experience documents that had been issued during the assessment period to assess whether the licensee had appropriately evaluated it for relevance to the facility. The inspectors also examined whether the licensee had entered those items into their corrective action program and assigned actions to address the issues. The inspectors reviewed a sample of root cause evaluations and significant condition reports to verify if the licensee had appropriately included industry operating experience.

b. Assessment

Overall, the inspectors determined that the licensee had appropriately evaluated industry operating experience for relevance to the facility and had entered applicable items in the corrective action program. Both internal and external operating experience was being incorporated into lessons learned for training and pre-job briefs.

.3 Assessment of Self-Assessments and Audits

a. Inspection Scope

The inspectors reviewed a sample of licensee self-assessments and audits to assess whether the licensee was regularly identifying performance trends and effectively addressing them. The inspectors also reviewed audit reports to assess the effectiveness of assessments in specific areas. The specific self-assessment documents and audits reviewed are listed in the attachment.

b. Assessment

The inspectors concluded that the licensee had an effective self-assessment process. Licensee management was involved in developing the topics and objectives of self-assessments. Attention was given to assigning auditors with the proper skills and experience to do an effective self-assessment and to include people from outside organizations. Audits were self-critical and identified deficiencies in various programs such as the corrective action program and root cause evaluations. However, the team noted that audits had not identified the issues related to the licensee's failure to follow its guidance for assigning appropriate Significance Levels to Callaway action requests (refer to Section 4OA2.1b).

.4 Assessment of Safety-Conscious Work Environment

a. Inspection Scope

The inspection team conducted four focus group discussions, each consisting of 10 individuals randomly chosen from the following plant organizations: operations, maintenance, security, and system engineers. The discussions were designed to elicit a qualitative assessment of the degree to which the participants believed station management had established and maintained a safety-conscious work environment and were based upon the NRC's definition of a safety-conscious work environment:

An environment in which employees feel free to raise safety concerns, both to their management and to the NRC, without fear of retaliation and where such

concerns are promptly reviewed, given the proper priority based on their potential safety significance, and appropriately resolved with timely feedback to employees.

In addition, focus group participants were asked questions in order for the team to make a qualitative assessment of the safety culture as defined by the crosscutting aspects described in NRC's Manual Chapter 0310. The team reviewed the results of the licensee's 2008 and 2009 Nuclear Safety Culture Assessment results, as well as the licensee's actions to address identified concerns.

b. Assessment

Based on the results of the safety culture surveys and the focus groups, the team found that the licensee had established a healthy safety-conscious work environment in that every worker who had been interviewed by the team indicated they felt free to raise safety concerns both to their management and to the NRC without fear of retaliation. Workers felt comfortable using all avenues available to them in raising concerns that included writing a Callaway action request, informing their supervisor, informing management, and raising concerns with the NRC. There was some confusion by a few workers about the role of the Employee Concerns Program (ECP). Some thought it was a management tool to address issues and stated they were not inclined to use ECP and would rather take issues to the NRC rather than ECP. Because the ECP coordinator recently changed, only a few workers knew the name of the new ECP coordinator; but most knew where the ECP coordinator was located.

Overall, each focus group to various degrees indicated that some equipment issues are not being effectively resolved. Workers believed that the plant effectively addresses safety-related and risk important systems, and that the long-standing equipment problems involved nonsafety systems. There was recognition that the plant was challenged in obtaining parts for some old equipment where the manufacturer no longer exists as well as in delays in the design modification process.

Focus group participants stated that these equipment problems have also resulted in extra operator workarounds or reliance on manual action or compensatory measures. All workers stated they would raise important nuclear safety issues, but some expressed a sense of futility in raising issues because they felt they had been raising many of the same equipment issues for several years and the issues have not been effectively addressed. In addition, workers stated there were problems and inefficiencies with work processes; namely with schedule changes, scope changes, and not freezing work scopes appropriately. In addition, some engineers stated that the definition of significance levels for Callaway action requests is not clear which could lead to inconsistent and inappropriate prioritization.

.5 Specific Issues Identified During This Inspection

a. Failure to Correct Degraded Conditions with Essential Service Water in a Timely Manner

Introduction. The inspectors identified a Green noncited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," for the licensee's failure to assure that conditions adverse to quality were corrected in a timely manner commensurate with the safety significance of the condition. Specifically, the licensee failed to resolve waterhammer and corrosion issues from adversely affecting the essential service water system in a timely manner.

Description. The team reviewed a degraded and nonconforming condition which has been impacting essential service water system components for many years, at least since the mid-1990s. Specifically, the essential service water system has been experiencing waterhammer events which, coupled with corrosion affecting the system, has caused leaks in heat exchanger tubes, fittings, and other components.

Waterhammer events have occurred during a loss of power event and during required ESFAS testing every cycle. The service water pumps stop, the cross-connect valve between the service water and the essential service water closes, and there is a delay of about 30 to 35 seconds until essential service water pumps start. During this delay, water drains from the highest levels of the system piping causing voids in the essential service water piping. When the essential service water pumps start, the resultant flow through the voided piping causes the waterhammer events throughout the system. Because corrosion in the system has weakened portions of piping, heat exchanger tubes, etc., the waterhammer events have caused leaks in these weakened components.

The essential service water system cools a number of safety-related heat exchangers including containment coolers, emergency diesel generator heat exchangers, residual heat removal room coolers, and control room coolers. The team reviewed a number of Callaway action requests regarding fixes to components from the waterhammer event. During Refueling Outage 6, the licensee modified 30 pipe supports in the reactor building as a result of observed waterhammer during cycle five. During Refueling Outage 15, the licensee issued eight Callaway action requests due to damage to components caused by waterhammer which included water leaks in safety-related coolers and leaks in gaskets and joints. In Refueling Outage 16, eight Callaway action requests were generated for damage caused by the waterhammer events. The damage included tube leaks and leaks from the component cooling water heat exchanger end bell, the residual heat removal heat exchanger, and other similar leaks. Licensee representatives stated the waterhammer will not cause the essential service water system or components to lose function because the system is designed to withstand

peak pressures (approximately 600 psi for the containment coolers which are the limiting case) much higher than could be expected by the waterhammer events (estimated to be a maximum instantaneous pressure of 275 psi). The licensee accepts the facts that a waterhammer will occur due to the system design, and maintained the position that the waterhammer events are not a significant unanalyzed condition that significantly degrades the safety of the plant. The team noted that the various leaks were fixed, but the cause of the problems, the combined effects of corrosion and waterhammer, was not.

The licensee's position was that its response to Generic Letter 96-06 satisfactorily addressed the waterhammer events with the NRC. Specifically, Callaway addressed waterhammer events on stresses to piping structures through the course of several letters with the NRC. The Callaway Plant's calculations were acceptable for the piping stresses, and the NRC closed the waterhammer and two-phase flow issues in Generic Letter 96-06 by letter, dated November 30, 1999.

However, the team noted that the analysis and correspondence only considered stresses on the piping and did not explicitly consider the impacts to other components, such as the heat exchangers (coolers). In addition, the analysis did not consider the combined effects of waterhammer events and corrosion in the essential service water system. The team noted that licensee engineers stated that the heat exchanger vendors were not contacted to help assess the combined effects of waterhammer and corrosion on the heat exchangers.

The team noted that Generic Letter 96-06 states that the hydrodynamic loads imposed by waterhammer can be substantial, challenging the integrity and function of the piping. If systems are found to be susceptible to the conditions discussed in the generic letter, licensees are expected to assess the operability of the affected systems and take corrective action as appropriate in accordance with the requirements in 10 CFR Part 50, Appendix B, and as required by the plant technical specifications. In fact, Supplement 1 to Generic Letter 96-06, dated November 13, 1997, contains additional discussion on the interim guidance for degraded and nonconforming conditions involving piping and pipe supports until permanent actions have been identified and approved by the NRC as applicable for resolving the Generic Letter 96-06 issues. Both Generic Letter 96-06 and its supplement note that Generic Letter 91-18 states that the timeliness of corrective actions should be commensurate with the safety significance of the issue. (The guidance in Generic Letter 91-18 has since been superseded by Regulatory Issues Summary 2005-020.)

The licensee has taken actions to mitigate the effects of waterhammer events during ESFAS testing, but these mitigating actions would not be present during an unplanned loss of power event. The licensee also planned to implement plant modifications during

the next refueling outage to mitigate the effects of waterhammer events and the licensee considered these as enhancements to the system and not necessary remedial actions.

The team concluded that the waterhammer events coupled with the corrosion issues in essential service water had been causing system degradation and which constituted a condition adverse to quality that has existed for several years. As a result, the licensee's corrective actions have not been timely.

Analysis. The inspectors determined that the failure to take timely corrective actions for conditions adverse to quality was a performance deficiency. The issue was more than minor because it affected the equipment performance attribute of the Mitigating Systems Cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Manual Chapter 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," the issue is determined to have very low safety significance because the finding is not a design or qualification issue confirmed not to result in a loss of operability or functionality; did not represent an actual loss of safety function of the system or train; did not result in the loss of one or more trains of nontechnical specification equipment; and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. The inspectors determined that the finding has a crosscutting aspect in the area of human performance associated with the component resources because the licensee did not maintain the plant to minimize long-standing equipment issues [H.2(a)].

Enforcement. Title 10 of the Code of Federal Regulations, Part 50, Appendix B, Criterion XVI, requires in part that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. Contrary to the above, as of November 5, 2010, the licensee's measures failed to assure that conditions adverse to quality (i.e., the combined effects of waterhammer and corrosion on the essential service water system components) have been promptly corrected commensurate with their safety significance. These issues have existed since the mid-1990s and have resulted in system degradations, such as system leaks and other damage to components during waterhammer events. Because this finding is of very low safety significance and has been entered into the licensee's corrective action program as Callaway Action Request 201010634, this violation is being treated as a noncited violation consistent with NRC Enforcement Policy: NCV 05000483/2010006-01, "Failure to Correct Degraded Conditions in Essential Service Water System a Timely Manner."

b. Failure to Correct Repetitive Failures in Steam Generator Atmospheric Dump Valves in a Timely Manner

Introduction. The team identified a green noncited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," involving the failure to promptly correct a condition adverse to quality. Specifically, the licensee failed to promptly correct repetitive failures of current-to-pressure transducers which have caused the steam generator atmospheric steam dump valves to become inoperable.

Description. On December 10, 2009, Callaway initiated Callaway Action Request 200910153 to document that the Steam Generator C atmospheric steam dump Valve ABPV0003 was inoperable because the valve failed to meet its technical specification surveillance requirements. Initial troubleshooting revealed the possibility of foreign material in the valve's air line. The NRC resident inspectors challenged the licensee if the foreign material represented a potential common cause failure mechanism. To address this, the licensee elected to stroke the remaining steam generator atmospheric steam dump valves. During testing to determine the extent of condition, the licensee found that the Steam Generator B atmospheric steam dump Valve ABPV0002 was also inoperable. Troubleshooting for Valve ABPV0002 revealed that the current-to-pressure transducer was erratic and actuator leakage was in excess of the allowable rate. The valve's current-to-pressure transducer and diaphragm were replaced. Subsequent review by the licensee determined that Valve ABPV0002 had been inoperable for a time longer than permitted by Technical Specification 3.7.4, "Atmospheric Steam Dump Valves." Although valve ABPV0002 did not achieve its full open position and therefore failed the technical specification surveillance requirement, the valve did open about 85 percent which, based on licensee calculations, provided sufficient heat removal capability to cool the plant.

The licensee performed a root cause analysis to determine the cause of the failures of the steam generator atmospheric steam dump valves. The licensee reviewed the valve's failure history which revealed that between 1994 and 2007 the licensee had replaced thirty-seven current-to-pressure transducers due to significant degradation or failure. The root cause of the repetitive failures was attributed to the fact that the original installation and configuration rendered the valve's current-to-pressure transducer susceptible to degradation due to vibration. The root cause also concluded that the reliable life of current to pressure transducers is no more than 18 months in the currently installed configuration. The licensee initiated corrective actions to prevent recurrence by developing a modification to move the current to pressure transducers to an area of lower vibration. The team noted that the proposed modification to move the valves transducer had been identified as early as 2006 as a unit health risk, but implementation was inappropriately delayed due to the desire to couple the corrective actions with an

enhancement to the valve positioner design. As a result, the licensee's corrective actions had not been timely.

The team interviewed the members of the root cause team and the system engineer and found that plant engineers determined as early as 2002 that vibration was causing the premature failures of the transducers. When originally discovered in 2002, no Callaway action request was initiated to document the adverse condition. Additionally, the root cause noted that there were thirteen separate occurrences where the licensee found degraded or inoperable current-to-pressure transducers for steam generator atmospheric steam dump valves and no Callaway action request had been generated. The failure to adequately enter known adverse conditions into the corrective action program contributed to the untimely long-term corrective actions because it inhibited accurate trending steam generator atmospheric steam dump valve deficiencies.

As of the close of the inspection, the long-term corrective actions to relocate the current to pressure transducers to an area of lower vibration had been completed on only one of four valves. The licensee informed the inspectors that the corrective actions to move the transducers were scheduled to be complete in the first quarter 2011.

Analysis. The licensee's failure to promptly correct a condition adverse to quality is a performance deficiency. This issue was determined to be greater than minor because it impacted the Mitigating Systems Cornerstone attribute of human performance and affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using Manual Chapter 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," the inspectors found that even though the steam generator atmospheric steam dump valves were not able to meet their technical specification surveillance requirements of achieving the full open position, the valves opened about 85 percent which provided sufficient heat removal capability to meet its intended safety function. Therefore, the issue was of very low safety significance since it was a design or qualification deficiency confirmed not to result in a loss of functionality. This finding has a crosscutting aspect in the area of human performance associated with the resources component because the licensee failed to maintain long term plant safety by minimization of long-standing equipment issues associated with steam generator atmospheric steam dump valve current-to-pressure transducers [H.2(a)].

Enforcement. Title 10 of the Code of Federal Regulations, Part 50, Appendix B, Criterion XVI, "Corrective Actions," requires, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and nonconformances are promptly identified and corrected. Contrary to the above, from 2002 through November 5, 2010, the licensee identified a condition adverse to quality in that the steam generator atmospheric steam dump valves were susceptible to degradation due to vibration, but

failed to implement corrective actions in a timely fashion. Specifically, the licensee failed to implement, in a timely fashion, a modification to relocate the current-to-pressure transducers for the steam generator atmospheric steam dump valves to an area of lower vibration. Because of the very low safety significance and has been entered into the licensee's corrective action program as Callaway Action Request 200910153, this violation is being treated as a noncited violation in accordance with the Enforcement Policy: NCV 05000483/2010006-02, "Failure to Correct Repetitive Failures in Steam Generator Atmospheric Steam Dump Valves in a Timely Manner."

b. Failure to Follow the Corrective Action Program Procedure

Introduction. The team identified a Green finding involving the licensee's failure to follow its corrective action procedure when assigning significance levels to Callaway action requests.

Description. Section 4.4 of APA-ZZ-00500, "Corrective Action Program," Revisions 45-51 provided the definitions of significance levels to assign to Callaway action requests, as well as the actions that must be taken for the various significance levels. Section 4.4 to this procedure defined Significance Levels 1-5, with Significance Level 1 defined as Significant Adverse Condition – Root Cause Evaluation and Significance Level 5 as non-significant issues. For example, a Significance Level 1 involved an incident or event resulting in a significant operating event, any condition which has caused a significant unit capacity/reliability concern, an actual or potential significant condition adverse to quality event. A Significance Level 1 required a root cause evaluation, an extent of condition evaluation, an extent of cause evaluation, and an evaluation of operating experience. This also required the development of corrective actions to prevent recurrence (the highest level of corrective actions), as well as management review through the corrective action review board. Attachment 1 to the procedure contains specific examples for each of the significance levels.

The significance level assigned to a Callaway action request impacts the allocation of resources to determine the cause of the issue, whether an extent of condition evaluation is performed, the degree of corrective actions that are taken (e.g., whether corrective actions taken to prevent recurrence), and whether the issue receives management attention through the corrective action review board. The team expected that the licensee would have flexibility in implementing its guidance for assigning significance levels; however, when the licensee deviates from its guidance it should justify the deviation. The licensee's failures to adhere to its guidance resulted in inappropriate cause evaluations such that the causes were not or may not have been fully determined and, in some cases, resulted in repetitive problems.

The specific examples include:

- In 2008, an incorrect significance level was assigned to Callaway Action Request 200812985 which involved Emergency Diesel Generator B being declared inoperable because of a jacket water leak. An example of a Significance Level 1 includes a "significant condition adverse to quality." Instead, the licensee assigned a Significance Level 3 to the Callaway action request which only required a lower tier cause evaluation. Licensee personnel informed the team that in 2010, after the Mitigating System Performance Indicator for Emergency AC Power indicated "White," the licensee performed a root cause evaluation where it determined that the wrong significance level had been assigned to Callaway Action Request 200812985. It should have been assigned a Significance Level 1. As a result, additional training was provided to the screening committee including job aids to help identify which equipment is the most risk significant and should be considered for a significant condition adverse to quality as used in 10 CFR Part 50, Appendix B, Criterion XVI.

- Callaway Action Request 200810379 documented a failure of ESFAS Power Supply SA036E, which occurred while the plant was shut down. SA036E powers the actuation logic for containment purge isolation system, fuel building isolation, control room emergency ventilation system, auxiliary feedwater actuation system, train A, and the swapover logic of auxiliary feedwater from the condensate storage tank to essential service water. The issue was assigned a Significance Level of 4 which was inappropriate for this Functional Identification Determination 1 component because the condition did not meet the definition of a Significance Level 4. Specifically, according to APA-ZZ-00500, "Corrective Action Program," Revisions 45-51, Significance Level 4 "… are adverse conditions where the cause may be obvious or management has determined that the issue is minor enough to not expend resources on the cause evaluation." Failures to this safety-related component are not minor (e.g., given its safety significance) and the cause of the failure was not obvious. Additionally, the team noted that a subsequent ESFAS power supply that failed during power operations was assigned a Significance Level 1.

- In 2008, the NRC issued a Severity Level III violation and Callaway action request was assigned a Significance Level of 3. However, the corrective action program procedure states that an example of a Significance Level 1 is "NRC Notice of Violation – Escalated Enforcement Action." Licensee representatives stated the screening committee considered a Significance Level 2, but decided against that since a Significance Level 3 had been assigned to the issue when it was first identified. The screening committee did not recognize a Notice of Violation at Severity Level III as an escalated enforcement action. Nevertheless, the licensee did not have justification for deviating from its procedural guidance.

- The team identified several other security issues. However, the specific details are contained in Enclosure 2 to the transmittal letter of this report. These security issues

showed repetitive security violations of very low safety significance that recurred over a period of time and the licensee inappropriately assigned a lower significance level for the issues which arose. As a result, the licensee did not devote sufficient resources identifying the cause of the problems and preventing the number of recurrences.

Analysis. This issue was determined to be greater than minor because if left uncorrected, the issue could become a more significant safety concern. The inspectors determined that the issue involving Callaway Action Request 200812985, the failure of emergency diesel generator train B due to a leak in the jacket water system, was of very low safety significance because it was bounded by the significance of NCV 05000483/2009007-01, "Failure to Ensure Suitable Replacement Parts Essential for Emergency Diesel Generator Train B."

The team evaluated the issue involving Callaway Action Request 200810379, the failure of engineered safety feature power supply SA036E, using Manual Chapter 0609.04, "Phase 1 – Initial Screening and Characterization of Findings." This issue screened as very low safety significance because it was not a design or qualification deficiency that resulted in a loss of operability or functionality, did not create a loss of system safety function of a single train for greater than the technical specification allowed outage time and did not affect seismic, flooding, or severe weather initiating events.

The team also evaluated several security-related examples of this finding and which are described in Enclosure 2 to the transmittal letter. These security issues were also determined to be of very low security significance. Based on the sensitivity of security issues, Enclosure 2 is not publicly available because it contains security-related information.

This finding has a crosscutting aspect in the area of human performance associated with the component of training because training was needed for the screening committee to better understand a significant condition adverse to quality and to better understand the significance of security issues [H.2(b)].

Enforcement. This finding does not involve enforcement action because no violation of regulatory requirements was identified. Because this finding does not involve a violation and has very low safety significance, it is identified as: FIN 05000483/2010006-03, "Failure to Follow the Corrective Action Program Procedure." The licensee placed this issue in its corrective action program as Callaway Action Request 201010472.

4OA6 Meetings

Exit Meeting Summary

On November 5, 2010, the inspectors presented the inspection results to Mr. D. W. Neterer, Plant Director, and other members of the licensee staff. The licensee acknowledged the issues presented. The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. One proprietary document was identified and returned to the licensee. On November 15, 2010, the inspectors conducted a follow-up exit briefing with Mr. F. M. Diya and other members of the licensee staff.

4OA7 Licensee-Identified Violations

The following violation of very low safety significance (Green) was identified by the licensee and is a violation of NRC requirements which meets the criteria of the NRC Enforcement Policy for being dispositioned as noncited violations.

> 10 CFR Part 50, Appendix B, Criterion III, requires, in part, that measures be established to assure that applicable regulatory requirements and the design basis for structures, systems, and components are correctly translated into specifications, drawings, procedures, and instructions. Contrary to the above, on April 27, 2006, the licensee failed to properly translate the technical specification allowable range of emergency diesel generator frequency allowed by technical specifications into the safety analysis. Specifically, the Callaway Plant technical specifications allow unrestricted plant operation with emergency diesel generator frequency range between 58.8 and 61.2 Hertz (60 ±2 percent). This range is not accounted for in the safety analysis. The performance of motor-operated pumps varies with the speed of the motor which is directly affected by the frequency of the emergency diesel generator's alternating current. Diesel operation with frequency at the low end of the technical specification surveillance requirement acceptance criteria will result in a lower flow rate and lower developed head for the associated centrifugal pumps. This was entered in the licensee's corrective action program as Callaway Action Request 200603324 which was subsequently closed with no corrective actions. The licensee developed corrective actions at a later time outside of the corrective action program. This finding is more than minor because it was associated with the design control attribute of the mitigating systems cornerstone and adversely affected the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. This finding is of very low safety significance because it was not a design or qualification deficiency resulting in a loss of operability or functionality, did not represent a loss of system safety function for greater than its Technical Specification allowed outage time, did not result in an actual loss of safety function of non-technical specification risk significant equipment for greater than 24 hours, and did not screen as risk significant due to a seismic, flooding, or severe weather initiating event.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

M. Daly, Supervising Engineer, Corrective Action Program
F. Diya, Vice President Nuclear Operations
J. Dowling, Manager, Equipment Reliability
M. Dunbar, Assistant Manager, Protective Services
T. Elwood, Supervising Engineer, Regulatory Affairs/Licensing
M. Hall, Assistant Manager, Plant Engineering
L. Kanuckel, Manager Plant Engineering
S. Maglio, Manager, Regulatory Affairs
D. Martin, Supervising Engineer, Risk Assessment
D. Neterer, Plant Director
S. Olson, Manager, Corrective Action Program
J. Pitts, Supervising Engineer
A. Schnitz, Regulatory Affairs

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened and Closed

05000483/2010006-01	NCV	Failure to Correct Degraded Conditions in Essential Service Water System in a Timely Manner (4OA2.5a)
05000483/2010006-02	NCV	Failure to Correct Repetitive Failures in Steam Generator Atmospheric Dump Valves in a Timely Manner (Section 4OA2.5b)
05000483/2010006-03	FIN	Failure to Follow the Corrective Action Program procedure (Section 4OA2.5c)

LIST OF DOCUMENTS REVIEWED

CALLAWAY ACTION REQUESTS

200405081	200504163	200505079	200505572	200508255
200600074	200601837	200603324	200608089	200609289
200610063	200700224	200701600	200703132	200703155
200705072	200705149	200710349	200710824	200711067
200800298	200802019	200802042	200802050	200802264
200802365	200803108	200803300	200803806	200804000
200808609	200810222	200810293	200810379	200810664
200812606	200901036	200901286	200901391	200901626
200901694	200901896	200902714	200904796	200908220
200909274	200909354	200909462	200910153	201000641
201001054	201001579	201001813	201001930	201002062
201003154	201003268	201004078	201004669	201004826
201004937	201005096	201009024	201009108	201010059
201010334	201010336	200806676	200802248	200809240
200803519	200810432	200905205	201002183	201008303
201009797	200609772	200701674	200704132	200705061
200709828	200803433	200809803	200811615	200811682
200906079	200302275	200304225	200306176	200307861
200402774	200403746	200404363	200404364	200408408
200409109	200501910	200502720	200505512	200509347
200509928	200608422	200704335	200709981	200800648
200805789	200809027	201000227	201003752	201004360
201004882	201004929	201006376	200802264	200802365
200909701	200802348	200812252	200810384	201004406
201004404	200810384	200810475	200810529	200811289
200811463	200811606	200810348	201004406	200811463
200811289	200811606	201008970	201006446	201005199
201003864	200905929	200811557	201002521	200803302
200802395	200803301	200800461	2010003391	200910206
200808738	200805682	200806084	200813029	200901345
200902498	200903947	201000647	201000757	200904384
200800461	200602526	200810129	200808492	200803462
201006359	201006362	200807591		

JOBS

04501196	08000815	08004477	08511844	08512524
04501197	08004462	08511089	08511871	
07504910	08004469	08511807	08512183	
07504955	08004470	08511808	08512299	
07505266	08004471	08511843	08512424	

PROCEDURES

NUMBER	TITLE	REVISION
APA-ZZ-00001	Nuclear Generation Organization and Responsibility	30
APA-ZZ-00100	Written Instruction Use and Adherence	26
APA-ZZ-00108	Primary Licensing Documents: Change/Revision Process	19
APA-ZZ-00320	Work Execution	38, 39
APA-ZZ-00500	Corrective Action Program	51
APA-ZZ-00500, Appendix 17	Screening Process Guidelines	11
APA-ZZ-00500, Appendix 1	Operability and Functionality Determinations	11
APA-ZZ-00741	Control of Combustible Materials	19
EDP-ZZ-01114	Motor Operated Valve Program Guide	18
FPP-ZZ-00004	Control Building and Communications Corridor Prefire Strategies	16
ODP-ZZ-00001	Operations Department – Code of Conduct	59

PROCEDURES

NUMBER	TITLE	REVISION
ODP-ZZ-00001, Addendum 1	Annunciator Response	6
ODP-ZZ-00001, Addendum 2	Briefs	8
ODP-ZZ-00001, Addendum 5	Operation Focus/Operating Philosophy	5
ODP-ZZ-00001, Addendum 6	Operations Department Communications	8
ODP-ZZ-00001, Addendum 10	Reactivity Management	14
ODP-ZZ-00001	Control Room Shift and Daily Log reading and Channel Checks	73
ODP-ZZ-00001, Addendum 11	Control Room Decorum	10
ODP-ZZ-00001, Addendum 12	Operator Burdens and Workarounds	2
ODP-ZZ-00001, Addendum 13	Shift Manager Communications	9
ODP-ZZ-00001, Addendum 14	Operations Management Expectations	7
ODP-ZZ-00001, Addendum 16	Operations Skill of the Craft	3
ODP-ZZ-00003	Shift Relief and Turnover	28

PROCEDURES

NUMBER	TITLE	REVISION
ODP-ZZ-00006	Operations Department Narrative Logs	15
ODP-ZZ-00008	Night Orders – Standing Orders – Operations Information Reports	13
ODP-ZZ-00016	Reactor Operator Watchstation Practices and Logs	70
ODP-ZZ-00017	Annunciator Status and Tracking	19
ODP-ZZ-00025	EOP/OTO User's Guide	13
ODP-ZZ-00035	Plant Status Control	10
OSP-VV-VL003	RCS to RHR Pressure Isolation Valves Inservice Test – IPTE	18
OSP-BB-VL005	BBV0001, BBV0022, BBV0040, BBV0059, and EM8815 Inservice Test – IPTE	18
OSP-BB-VL006	RCS Pressure Isolation Valves Inservice Tests – IPTE	38
OSP-SA-00003	Emergency Core Cooling System Flow Path Verification and Venting	38
OSP-SA-2413A	Train A Diesel Generator and Sequencer Testing	12
OSP-SA-2413B	Train B Diesel Generator and Sequencer Testing	15
OSP-ZZ-00001	Control Room Shift and Daily Log Readings and Channel Checks	73
OTN-BG-00001	Chemical and Volume Control System	46
OTN-EM-00001	Safety Injection System	31

PROCEDURES

NUMBER	TITLE	REVISION
OTN-EN-00001	Containment Spray System	17
OTO-BB-00010	Shutdown LOCA	0
OTO-BB-00010	Shutdown LOCA	1
OTO-BB-00010	Shutdown LOCA	2
OTO-KC-00001	Fire Response	7
ESP-EF-0002B	Essential Service Water Train B Flow Verification	14
ESP-EF-0002A	Essential Service Water Train A Flow Verification	11
APA-ZZ-00500 Appendix 2	Non-Conforming Materials Report	9
APA-ZZ-00500 Appendix 8	Corrective Action Program Training Requirements	7
EDP-ZZ-01007	Mechanical Snubber Program	23

DRAWINGS

NUMBER	TITLE	REVISION
C-2C5112(Q)	Diesel Generator Building Concrete Plan 2000'-0" thru 2066'-0"	0
F42911	8" Type 7613 Butterfly Valve Fisher Shaft 'C-3' 300# ANSI W/656-40 Diaphragm Actuator I.D. No. 8BA74R	6
M-018-00096	Fuel Oil System	12

PROCEDURES

NUMBER	TITLE	REVISION
M-22LE02(Q)	Piping and Instrumentation Diagram Control and Diesel Gen. Bldg. Oily Waste System	5
M-OP5111	Drainage System (LE) Diesel Gen's. Bldg. El. 2000'-0"	1

CALCULATIONS

NUMBER	TITLE	REVISION / DATE
AL-57	Air Transport Time to ALV0001 Following a CST Postulated Line Break	0
ARC-582	Backup Nitrogen Supply System Design Pressure Losses	0
KA-37	Backup Nitrogen Supply System Design Pressure Losses (TKA02, TKA03, TKA04, TKA05 and TKA06)	0
NK-05	Class 1E Battery Capacity	6
NK-05	Class 1E Battery Capacity	7
NK-10	NK System DC Voltage Drop	2
GN-17	Containment Cooler Waterhammer analysis	0
Letter Report No. 240-1	Review of Callaway Waterhammer and Two Phase Flow Analysis	June 1999
32-9032925-001	Acceptance Criteria Used in Essential Service Water Flow Balance Procedures	September 26, 2008

PROCEDURES

NUMBER	TITLE	REVISION / DATE
00171-C-001	Altran Calculation to Examine Conservatism in Callaway Calculation GN-17 in Response to Generic Letter 96-06	0
GN-19	Waterhammer Analysis for ESW	0
GN-18	ESW to Containment Cooler Waterhammer Stress Analysis	0
P-147	Replace existing Snubber with a “Snubber Replacement”	4

MISCELLANEOUS DOCUMENTS

NUMBER	TITLE	REVISION / DATE
AP 06-006	Quality Assurance Audit of Design Control	July 31, 2006
AP 08-03	Quality Assurance Audit of Design Control	April 10, 2008
IEEE Std 485-1997	IEEE Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications	September 11, 2003
	Engine Combustion Report AmerenUE PC2.5 V-14 Unit 1A	May 9, 2010
RFR 20547A	Evaluate Fire Hazards Analysis for Diesel Gen Room	May 22, 2001
RFR 200802936	Approve use of Viton O-Rings for EDG Jacket Water System	July 28, 2008
RFR 200908444	Remote Mount ASD I/Ps	October 1, 2009

PROCEDURES

NUMBER	TITLE	REVISION / DATE
Regulatory Guide 1.9	Application and Testing of Safety-Related Diesel Generators in Nuclear Power Plants	4
Letter ULNRC-05528	Reply to Notice of Violation: EA-08-190 Inspection Report No. 50-483/2008003 Callaway Plant Unit 1 Union Electric Co.	
	Worker Protection Assurance 77332, 77356, 77547, 77059, 77329 and 77349	
NRC GL 9606	Assurance of Equipment Operability and Containment Integrity During Design-Basis Accident Conditions	September 30, 1996
ULNRC-05658	Licensee Event Report 2008-001-01 Container Cooler Inoperability	September 29, 2009
MP 09-0056	Change Package for CCW HX Plate Repair	000.5
MP 00-1018	Replace the Containment Cooler Coils with Cleanable Coils	A
MP 08-0029	Containment Sump Strainers Base Plate Replacement	0