

Callaway

3Q/2009 Plant Inspection Findings

Initiating Events

Significance:  Mar 24, 2009

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Inadequate Response to Feedwater Transient Results in Reactor Trip

The inspectors identified a self-revealing noncited violation of Technical Specification 5.4.1.a, "Procedures," after operator response to an electrical fault on the condensate Pump C motor resulted in an unplanned and unnecessary reactor trip, feedwater isolation, and auxiliary feedwater actuation. On December 11, 2008, Callaway Plant experienced an automatic turbine trip/reactor trip during a power reduction initiated by the operators' response to a loss of condensate Pump C. The control room supervisor directed a power reduction without immediately referencing Procedure OTO AE 00001 guidance and without specifying any magnitude or rate limitations on the power reduction. The balance of plant reactor operator, not aware of the procedural limitations, initiated the power reduction using the turbine controls 'load limiter' potentiometer. This method of turbine load control eliminated all automatic rate-limiting functions. The steam generator levels increased rapidly with sluggish main feedwater regulating valves slowing anticipatory response. The steam generator P-14 high-high level turbine trip/reactor trip occurred about 5 minutes after condensate Pump C had tripped.

This finding was greater than minor because it was associated with the Initiating Events cornerstone attribute of procedural quality and it affected the objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Using Manual Chapter 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," this finding was determined to be of very low safety significance since it did not affect the Technical Specification limit for reactor coolant system leakage or mitigation systems safety function, did not contribute to both the likelihood of a reactor trip and mitigation equipment or functions not being available, and did not increase the likelihood of a fire or internal/external flooding. The finding had a crosscutting aspect in the area of human performance associated with the work practices component because the licensee failed to effectively establish clear expectations and standards regarding procedurally directed actions versus actions viewed as necessary to stabilize a plant transient.

Inspection Report# : [2009002](#) (*pdf*)

Significance:  Mar 24, 2009

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Intermediate Range Hi Flux Reactor Protection System Actuation While Shutdown

The inspectors identified a self-revealing noncited violation of Technical Specification 5.4.1.a, "Procedures," after maintenance on intermediate range nuclear Instrument N36 resulted in an unanticipated reactor trip signal and feedwater isolation. On December 12, 2008, Callaway instrumentation and controls maintenance personnel performed work to replace a circuit card associated with the intermediate range nuclear Instrument P 6 bistable. At the time of the maintenance, the plant was in Mode 3 with the reactor trip breakers open. Shortly after beginning work, an intermediate range high flux reactor trip signal was generated. The trip signal was generated because the bypass of the reactor trip bistables is removed upon removal of the control power fuses. With instrument power removed, the solid state protection system perceived a high intermediate range neutron flux condition and generated a reactor trip signal and feedwater isolation. Control room operators responded to the feedwater isolation by starting both motor-driven auxiliary feedwater pumps and restoring steam generator water levels to the program band. The licensee later determined that instrumentation and controls maintenance personnel were unaware that pulling the control power fuses would cause a reactor trip signal and that the step in the work instruction that directed the removal of the control power fuses had not received an adequate review.

This finding was greater than minor because the finding impacted the Initiating Events cornerstone attribute of human

performance and affected the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions. Using Manual Chapter 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," this finding was determined to be of very low safety significance since it did not affect the Technical Specification limit for reactor coolant system leakage or mitigation systems safety function, did not contribute to both the likelihood of a reactor trip and mitigation equipment or functions not being available, and did not increase the likelihood of a fire or internal/external flooding. This issue was entered into the licensee's corrective action program as Callaway Action Request 200812681. The finding had a crosscutting aspect in the area of human performance associated with the work controls component because the licensee failed to coordinate the impact of changes to the work scope or activity, specifically, the licensee failed to fully evaluate the impact of removal of control power fuses on the work instructions.

Inspection Report# : [2009002](#) (pdf)

Significance:  Feb 27, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Correct Problems with Fire Protection Impairment Permits

An NRC identified violation of License Condition 2.C.(5), "Fire Protection," was identified for failing to effectively correct problems with the issuance and establishment of Fire Protection Impairment Permits. After problems were identified in 2006 and 2007, as a corrective action, the licensee conducted training in 2008 on the program requirements in the Maintenance and Operations Departments. Despite this corrective action, the licensee continued to experience failures to request a fire impairment and failures to implement pre-planned impairments. Some failures involved oversight problems for contract workers, who were not addressed in the training. Two procedural violations occurred in late 2008 that involved the failure to establish a Fire Protection Impairment Permit before performing hot work. The licensee has entered the issue into the corrective action program as Callaway Action Request (CAR) 200901638.

The inspectors determined that failing to correct problems associated with the use of required Fire Protection Impairment Permits is a performance deficiency. The finding is more than minor because it affects the protection against external factors attribute of the initiating events cornerstone, and it directly affects the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Using the NRC Inspection Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," Phase 1 worksheet, the finding was determined to be of very low safety significance (Green) because the condition represented a low degradation of fire prevention and administrative controls. The cause of the finding is related to the Human Performance cross-cutting component of Work Practices, in that the licensee failed to effectively communicate expectations and personnel failed to follow procedures [H.4.b].

Inspection Report# : [2009006](#) (pdf)

Significance:  Dec 31, 2008

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Failure to maintain an adequate plant shutdown procedure

The inspectors identified a self-revealing noncited violation of Technical Specification 5.4.1.a, "Procedures," after improper isolation of the main steam isolation valves by the Callaway control room operators resulted in a reactor trip signal and auxiliary feedwater actuation on October 11, 2008. Procedure OTG ZZ 00006, "Plant Cooldown Hot Standby to Cold Shutdown," allowed premature main steam isolation valve closures just after entering Mode 4. The operator then decided to reopen main steam isolation Valve A and atmospheric Steam Dump A. This created a significant increase in steam flow from the steam generator which caused the steam generator level to swell up to the P 14 steam generator high level feedwater isolation setpoint. The steam generator levels all decreased to the steam generator narrow range low-low setpoint generating the need for auxiliary feedwater actuation.

This finding was greater than minor because it was associated with the Initiating Events cornerstone attribute of procedural quality and it affected the objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown as well as power operations. Using Manual Chapter 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," this finding is determined to be of very low safety

significance since this finding did not affect the Technical Specification limit for reactor coolant system leakage, did not contribute to both the likelihood of a reactor trip and mitigation equipment or functions not being available, and did not increase the likelihood of a fire or internal/external flooding. This finding had a crosscutting aspect in the area of human performance associated with the decision making component because the licensee failed to communicate, in a timely manner, decisions to personnel who have a need to know the information in order to perform work safely. Inspection Report# : [2008005](#) (pdf)

Significance: G Dec 31, 2008

Identified By: Self-Revealing

Item Type: FIN Finding

Failure to evaluate material equivalencies leads to a manual reactor trip

The inspectors identified a self-revealing finding for failure of the engineering department to perform a material equivalency evaluation to ensure replacement components do not adversely affect plant operations. On November 11, 2008, Callaway Plant experienced a trip of main feedwater Pump B due to low lube oil pressure. Since the reactor was at greater than 80 percent power, the plant operators inserted a manual reactor trip. Following the reactor trip, maintenance personnel discovered two pieces of o-ring foreign material within main feedwater Pump B bearing oil supply pressure regulating Valve FCV0970. The foreign material was found wrapped around the regulating spring which inhibited valve movement and caused the lube oil low pressure condition. The licensee determined that the ethylene propylene diene M-class type o-ring became pliable when exposed to lube oil and was allowed to fall and be introduced into the system as foreign material. The ethylene propylene diene M-class o-rings had been approved as an equivalent replacement in July 1999 for the vendor recommended Buna-N type o-rings without performing an engineering material equivalency evaluation. Buna-N material is approved for use in petroleum based systems while ethylene propylene diene M-class is not.

This finding is greater than minor because it is associated with the design control attribute of the Initiating Events cornerstone and affects the cornerstone objective to limit the likelihood of those events that upset plant stability and challenge critical safety functions during shutdown and power operations. Using Manual Chapter 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," the finding is determined to be potentially risk significant because it contributed to both the likelihood of a reactor trip and the likelihood that mitigation equipment or functions will not be available. When evaluated per Manual Chapter 0609 Appendix A, "Determining the Significance of Reactor Inspection Findings for At-Power Situations," and the Callaway Plant Phase 2 pre-solved table item "Failure to Reestablish Main Feedwater," the inspectors determined this finding to be of very low safety significance. This issue was entered into the licensee's corrective action program as Callaway Action Request 200811781. This finding was determined to not have a crosscutting aspect because the performance deficiency is not indicative of current licensee performance.

Inspection Report# : [2008005](#) (pdf)

Mitigating Systems

Significance: TBD Sep 30, 2009

Identified By: NRC

Item Type: AV Apparent Violation

Turbine-driven auxiliary feedwater pump inoperable due to inadequately lubricated trip throttle valve

The team identified a self-revealing apparent violation of Technical Specification 3.7.5, "Auxiliary Feedwater System," due to the failure to adequately lubricate turbine-driven auxiliary feedwater pump trip throttle valve FCHV0312. During May 25, 2009, surveillance testing, the turbine-driven auxiliary feedwater pump did not start as expected due to hardened grease on the valve spindle of FCHV0312. The previous lubrication preventative maintenance had been missed and lack of lubrication increased friction between the sliding nut and spindle preventing FCHV0312 from opening. Following lubrication FCHV0312 and the turbine-driven auxiliary feedwater pump tested satisfactorily. The licensee entered this deficiency in their corrective action program as Callaway Action Request 200904216.

This finding is greater than minor because it was associated with the equipment performance 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. Using Manual Chapter 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," the issue screened as potentially risk significant since the finding represented a loss of system safety function because the turbine-driven auxiliary feedwater pump PAL02 failing eliminates the capability of the plant to cope with a station blackout. The finding required a Phase 2 analysis. When evaluated per Manual Chapter 0609, Appendix A, "Determining the Significance of Reactor Inspection Findings for At-Power Situations," and the Callaway Plant Phase 2 pre-solved table item "Turbine Driven Auxiliary Feedwater Pump Fails to Start," the inspectors determined this finding to be potentially risk significant. The finding was forwarded to a senior reactor analyst for review. The preliminary outcome of the Phase 3 significance determination analysis, Attachment 4, determined the finding was of low to moderate safety significance.

The inspectors determined that this finding had a crosscutting aspect in the area of human performance associated with the work practices component because the licensee failed to follow the procedural guidance provided when changing the scope of a preventive maintenance task.

Inspection Report# : [2009009](#) (*pdf*)

Significance:  Sep 30, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Maintain an Adequate Lubrication Procedure for Valve FCHV0312

The team identified a noncited violation of Technical Specification 5.4.1.a, "Procedures," for the failure to provide adequate procedural guidance for the lubrication of auxiliary feedwater pump turbine trip throttle valve FCHV0312. The inspectors found that 2002 corrective actions to improve the lubrication procedure were not fully developed and the procedure lubrication guidance was ambiguous in that it did not specify the amount of lubricant to apply or what valve subcomponents to lubricate. The licensee entered this deficiency in their corrective action program as Callaway Action Request 200905032.

This finding is greater than minor because it was associated with the Mitigating Systems Cornerstone attribute of procedural quality and it 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 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. This finding did not have a crosscutting aspect since the 2003 lubrication procedure revision was not reflective of current licensee performance.

Inspection Report# : [2009009](#) (*pdf*)

Significance:  Sep 30, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to adequately evaluate the use of Mobile 28 grease for the turbine-driven auxiliary feedwater pump trip throttle valve.

The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," for the failure to adequately evaluate the use of Mobile 28 grease for the turbine-driven auxiliary feedwater pump trip throttle valve. The licensee's 1995 evaluation included no documentation for the appropriate relubrication interval of the valve. Additionally, the inspectors identified that the valve exhibited temperatures ranging from 235°F to near 300°F compared to the 215°F valve temperature used in the evaluation. The inspectors questioned if the use of Mobile 28 grease was appropriate since operating experience suggests that Mobile 28 grease has a tendency to thicken and harden at temperatures exceeding 250°F and elevated temperatures increased the lubricant's tendency to lose oils and could result in increased stem friction. Following questioning by the inspectors, the licensee initiated Callaway Action Request 200905067 and Request for Resolution 200905651 to determine if Mobile 28 grease was an appropriate lubricant for valve FCHV0312.

This finding is greater than minor because it was associated with the Mitigating Systems Cornerstone attribute of design control and it 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 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. This finding did not to have a crosscutting aspect since the inadequate 1995 lubrication evaluation was not reflective of current licensee performance.

Inspection Report# : [2009009](#) (pdf)

Significance:  Sep 30, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to enter conditions adverse to quality associated with the turbine-driven auxiliary feedwater pump trip throttle valve into the corrective action program.

The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," regarding the licensee's failure to follow the requirements of Callaway Procedure APA ZZ 00500, "Corrective Action Program." Specifically, licensee personnel failed to initiate Callaway action requests for adverse conditions of high hand wheel forces, galled subcomponents, and hardened, gritty grease found during the 2007 rebuild of the spare turbine-driven auxiliary feedwater pump trip throttle valve FCHV0312. The licensee has entered this issue into their corrective action program as Callaway Action Request 200905053.

This finding is greater than minor because, if left uncorrected, failure to fully utilize the corrective action program could become a more significant safety concern. The inspectors determined that this finding impacted the Mitigating Systems Cornerstone attribute of procedural quality and it 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 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 cause of this finding is related to the problem identification and resolution crosscutting component of the corrective action program because licensee personnel failed to implement a corrective action program with a low threshold for identifying issues.

Inspection Report# : [2009009](#) (pdf)

Significance:  Sep 30, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to ensure turbine-driven auxiliary feedwater pump is operable prior to entry into Mode 3.

The team identified a noncited violation of Technical Specification Limiting Condition for Operation 3.0.4 for entering Mode 3 with the turbine-driven auxiliary feedwater pump inoperable. Specifically, on November 3, 2008, while in Mode 4 for Refueling Outage 16, an unexpected overspeed trip of the turbine occurred during postmaintenance testing. Callaway operations staff inappropriately concluded that a water slug from the auxiliary steam line was the cause of the turbine overspeed. Following entry into Mode 3, during preparations for turbine-driven auxiliary feedwater pump testing, the licensee found the servo control valve installed during the outage was faulty. When questioned by the inspectors, the licensee determined that the faulty servo control valve discovered in Mode 3 was responsible for the overspeed of the turbine-driven auxiliary feedwater pump that occurred in Mode 4 and that the equipment was inoperable during the mode change that occurred on November 4, 2008. The licensee entered this deficiency in their corrective action program as Callaway Action Request 200905313.

This finding is greater than minor because it is associated with the Mitigating Systems Cornerstone attribute of equipment performance and it 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 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 inspectors determined that this finding has a crosscutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee failed to fully evaluate the overspeed of the turbine-driven auxiliary feedwater pump that occurred on November 3, 2008.

Inspection Report# : [2009009](#) (*pdf*)

Significance:  Sep 23, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

Inadequate Corrective Actions for Essential Service Water Pump Cable Underground Electrical Vault Seals

The inspectors identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," associated with the licensee's failure to take prompt corrective actions prevent continuous submergence of essential service water pump kerite insulated power cables. The continuously submerged environment for these cables existed because the two vaults containing these cables (MH-01N and MH-01S) had inadequate seals needed to protect the vaults from incoming surface water. Callaway Action Request 200201916 stated that all medium voltage cables of concern were located more than 4 feet above the basemat of the vault and thus were not in a submerged condition. The Callaway action request noted that the seals at the top lid were the source of water intrusion and that the seal design was inadequate. On July 9 and 22, 2009, the resident inspectors, along with Callaway plant engineers, inspected the two essential service water underground vaults. The north vault (train A) was found to have water covering the two safety related upper cable trays. Contrary to the Callaway Action Request 200201916 evaluation, the cable trays were about 2.5 feet and 3.5 feet from the basemat of the vault floor. During these 2009 inspections it was noted that the same lid design deficiency identified in Callaway Action Request 200201916 still existed. This led to the discovery that the Callaway Action Request actions from 2002 had not been completely performed. The only significant corrective action had been to increase the inspection frequency to once every three years.

The licensee has subsequently taken measures to improve the seals and written Callaway Action Request/Request for Resolution 200905838 to further evaluate this issue. This finding is more than minor because it affected the Mitigating Systems Cornerstone attribute of design control for ensuring the availability, reliability, and capability of safety systems. Using Manual Chapter 0609.04, “Phase 1 – Initial screening and Characterization of Findings,” this finding was determined to be of very low safety significance because the degraded seals were a design or qualification deficiency confirmed not to result in loss of operability. The inspectors determined that the finding has no crosscutting aspect as the performance deficiencies were not reflective of current performance. The licensee entered this item into their corrective action program as Callaway Action Request 200908855.

Inspection Report# : [2009004](#) (*pdf*)

Significance: SL-IV Sep 23, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Correctly Identify Safety System Functional Failures in a Licensee Event Report

The inspectors identified a Severity Level IV noncited violation of 10 CFR 50.73(a)(2)(v), “Licensee Event Report System,” for a failure to report two examples of safety system functional failures in licensee event reports within 60 days after discovery of events requiring a report. The two examples were:

- March 26, 2008, discovery that operation of containment air coolers in fast speed, during a period of higher than normal containment pressure, could open the air coolers' fast speed thermal overload device rendering all the coolers incapable of automatically restarting in slow speed
- May 21, 2008, discovery of a 6.6 cubic foot void of air in the common suction piping capable of affecting the function of both of the safety injection system pumps

For each example, the inspectors reviewed the licensee's reportability evaluation and associated past operability

reviews and determined each event was reportable per 10 CFR 50.73(a)(2)(v) since each example resulted in a condition which affected both trains of a system described in the Final Safety Analysis Report that was needed to mitigate the consequences of an accident. Alternate safety systems accident mitigation is not permitted as a reason to not report the discovery of the conditions. The licensee also failed to report these failures to the NRC performance indicator database because of the failure to include the safety system functional failure in each respective licensee event report.

This finding affects the Mitigating Systems Cornerstone and is greater than minor because the NRC relies on licensees to identify and report conditions or events meeting the criteria specified in the regulations in order to perform its regulatory function. Consistent with the guidance in Section IV.A.3 and Supplement VII, Paragraph D.1 of the NRC Enforcement Policy, this finding was determined to be a Severity Level IV noncited violation. The licensee planned to update the associated license event reports as described in Callaway Action Request 200904980. This finding has a crosscutting aspect in the area of human performance associated with the resources component because the licensee failed to ensure, through adequate training, that its staff understood the guidance documents pertaining to the 10 CFR 50.73 rule.

Inspection Report# : [2009004](#) (*pdf*)

Significance: SL-IV Jun 23, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Submit Complete and Accurate Risk Information for a Requested License Amendment

The inspectors identified a noncited violation of 10 CFR 50.9, "Completeness and Accuracy of Information," when AmerenUE failed to submit complete and accurate quantification of risk contributors associated with a license amendment supporting a modification to replace the underground portion of the essential service water system Train B piping with high density polyethelene pipe. The inspectors questioned the risk impact of a possible control room fire which led to the discovery that the licensee had not followed their process for screening out fire areas. The licensee entered this item into their corrective action program as Callaway Action Request 200902810 and also submitted an update to License Amendment 191 to correctly account for the control room fire risk.

This finding affects the Mitigating Systems cornerstone and is greater than minor because the NRC relies on licensees to identify and report conditions or events meeting the criteria specified in the regulations in order to perform its regulatory function. Consistent with the guidance in Section IV.A.3 and Supplement VII, Paragraph D.1 of the NRC Enforcement Policy, this finding was determined to be a Severity Level IV noncited violation. This finding has no crosscutting aspect because the licensee's failure to thoroughly review and submit the risk for control room fires was not part of a corrective action process, but instead an oversight by the licensing review process.

Inspection Report# : [2009003](#) (*pdf*)

Significance:  Jun 23, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

Inadequate Controls of Crane Work Above the Protected Train of Essential Service Water

The inspectors identified a noncited violation of 10 CFR 50.65(a)(4) associated with the licensee's failure to adequately assess and manage risk associated with crane work over the essential service water system Train A. On March 31, 2009, the licensee performed work in the vicinity of the protected essential service water system train which included movement of 1800 pound sand bags over the protected train piping. After questioning by the resident inspectors, the licensee determined that the lifts were not conducted in accordance with station procedures since the requirements of a required engineering judgment memo were not translated into work documents. The licensee entered this item into their corrective action program as Callaway Action Request 200902726.

The finding affected the Mitigating Systems cornerstone and was determined to be more than minor because the licensee failed to implement the prescribed significant compensatory measures associated with crane work in the vicinity of safe shutdown equipment. This finding had a crosscutting aspect in the area of human performance associated with the work controls component because the licensee failed to include appropriate risk insights in planned work activities.

Inspection Report# : [2009003](#) (*pdf*)

Significance: **G** Jun 23, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

Inadequate, At Power, Risk Assessment for Maintenance Activities on One Train of Essential Service Water and Emergency Diesel Generator

The inspectors identified a noncited violation of 10 CFR 50.65(a)(4) associated with the licensee's failure to perform an adequate risk assessment for planned maintenance on the emergency diesel generator Train A and essential service water pump Train A. On April 28, 2009, Callaway Plant operators removed the emergency diesel generator Train A and essential service water pump Train A from service. The inspectors' review of the plant risk profile for the in-progress maintenance activity uncovered that this risk had not been accounted for by the plant safety monitor tool. The licensee entered this item into their corrective action program as Callaway Action Request 200903480

The finding is more than minor because the risk, when correctly assessed, put the plant into a higher risk category for large early release frequency. Also the licensee risk assessment failed to consider risk significant systems, structures, and components and support systems that were unavailable during the maintenance. This finding had a crosscutting aspect in the area of human performance associated with the work controls component because the licensee failed to appropriately plan work activities consistent with nuclear safety by incorporating risk insights.

Inspection Report# : [2009003](#) (pdf)

Significance: **G** Apr 30, 2009

Identified By: NRC

Item Type: NCV NonCited Violation

Failure to Ensure Suitable Replacement Parts Essential for Emergency Diesel Generator Train B

The inspectors identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control" after the licensee failed to adequately select suitable replacement parts essential to the operation of emergency diesel generator Train B. On December 24, 2008, during performance of Procedure OSP-NE-0001B, "Standby Diesel Generator B Periodic Tests," Callaway operations personnel identified that the emergency diesel generator Train B had an approximately 0.82 gallon per minute jacket water leak resulting in operators declaring the equipment inoperable. Upon removal, the gasket was found to be soft and extruding from the flange edge. The licensee originally concluded the gasket failed due to vibrations associated with engine shutdown but altered that conclusion after discussions with the resident inspectors and additional investigation. The licensee ultimately determined that the cause of the failure was due to incorrect gasket material being used during Job W200773 performed on October 16, 1999. The gasket was 1/8" thick which resulted in a lack of compression. Since the gaskets are composed of an aramid fibrous material, the lack of compression allowed the gasket to absorb water and soften. The leak identified on December 24, 2008, developed once the gasket softened sufficiently to extrude from the flange edge. This issue has been entered into the licensee's corrective action program as Callaway Action Request 200812985.

This finding was greater than minor because it was associated with the mitigating systems cornerstone attribute of design control and affects the associated 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," this finding was determined to represent an actual loss of safety function of a single train for greater than its Technical Specification allowed outage time. When evaluated per Manual Chapter 0609 Appendix A, "Determining the Significance of Reactor Inspection Finding for At-Power Situations," and the Callaway Plant P has 2 pre-solved table item "Diesel Generator Fails to Run after Start," the inspectors determined this finding to be potentially risk significant. This finding was forwarded to a senior reactor analyst for review. The results of the senior reactor analyst's Phase 3 analysis determined the finding to be of very low safety significance. This finding did not have a crosscutting aspect since it was not a performance deficiency indicative of current licensee performance.

Inspection Report# : [2009007](#) (pdf)

Significance: **G** Dec 31, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

Inadequate shutdown risk assessment for maintenance activities in the reactor building.

The inspectors identified a noncited violation of 10 CFR 50.65(a)(4), for failure to adequately assess and manage shutdown risk associated with maintenance activities in the reactor building. Specifically, on October 15, 2008, the inspectors found foreign material exclusion covers installed on the Train B containment recirculation sump. The covers were installed on October 14, 2008, per the direction of the containment coordinator without notification to the control room. The covers were installed to prevent debris from entering the sump. Following discussions with operations personnel, the inspectors found that the Train B containment recirculation sump was inappropriately credited in the licensee's shutdown safety assessment. An updated shutdown safety assessment was performed and it was determined that plant risk remained yellow.

This finding is greater than minor because the licensee's risk assessment inappropriately credited risk-significant structures, systems and components that were unavailable during maintenance. This finding affected the Mitigating Systems cornerstone. Using Manual Chapter 0609, Appendix G, "Shutdown Operations Significance Determination Process," the finding was found to be of very low safety significance because the licensee maintained two trains of decay heat removal operable and adequate equipment was available to support feed and bleed operations for at least 24 hours. This issue was entered into the licensee's corrective action program as Callaway Action Request 200810540. This finding had a crosscutting aspect in the area of human performance associated with the decision making component because the licensee failed to obtain interdisciplinary input on safety-significant or risk-significant decisions. Specifically, the containment coordinator made a decision affecting the availability of the containment recirculation sumps without consulting the control room to determine the impact on plant risk.

Inspection Report# : [2008005](#) (pdf)

Significance:  Dec 31, 2008

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Failure to ensure the suitability of the design of the residual heat removal Train A pump room cooler

The inspectors identified a self-revealing Green noncited violation of 10 CFR Part 50, Appendix B, Criterion III, "Design Control," after a trip of the residual heat removal Train A room cooler fan revealed that AmerenUE had not adequately selected and reviewed the suitability of the newly installed fan motor thermal overloads. Additionally, the NRC inspectors identified that the postmaintenance testing prescribed for the modified fan motor breaker did not allow sufficient time to challenge the thermal overload settings. On October 8, 2008, residual heat removal Train A room cooler fan shut down after only 22 minutes of run time. The breaker replacement modification used a calculation originally performed for the initial design of the old breaker which did not account for the cooler fan motor being a 20 horsepower motor nameplated down to a 10 horsepower rating.

This finding is greater than minor because it is similar to Manual Chapter 0612 "Examples of Minor Issues," Example 3j, in that the engineering calculation error resulted in a condition where there was a reasonable doubt on the operability of the component and a significant programmatic deficiency associated with postmaintenance test requirements was identified that could lead to worse errors if uncorrected. The inspectors determined that the finding impacted the Mitigating Systems cornerstone. Using Manual Chapter 0609.04, "Phase 1 – Initial Screening and Characterization of Findings," the 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 Technical Specification allowed outage time and did not affect seismic, flooding, or severe weather initiating events. This issue was entered into the licensee's corrective action program as Callaway Action Request 200810223. The inspectors determined that this finding had a crosscutting aspect in the area of problem identification and resolution associated with the corrective action component because the AmerenUE modification for certain motor control center breakers failed to have a low enough threshold to identify fan motor rating and thermal overload setting errors.

Inspection Report# : [2008005](#) (pdf)

Significance:  Dec 31, 2008

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Failure to adequately implement plant equipment control tagout procedure

The inspectors identified a self-revealing noncited violation of Technical Specification 5.4.1.a, "Procedures," after improper restoration of the essential service water supply to the emergency diesel generator Train A lubricating oil cooler resulted in significant water flow into the emergency diesel room on October 22, 2008. Two restoration evolutions associated with the essential service water and the emergency diesel generator systems had been proceeding in parallel. The reactor operator restoring the emergency diesel generator assumed the essential service water supply was to remain isolated to the emergency diesel generator and thus changed the already approved worker protection assurance Clearance 71899 to leave the oil cooler drain valve open with no tag. Starting the essential service water pump pressurized the drain valve and produced significant water spray flow into the emergency diesel generator room until noticed by a diesel vendor representative about 30 minutes later.

This finding was greater than minor because if left uncorrected the deficiencies could become a more significant safety concern. The finding affected the Mitigating Systems cornerstone. Using Manual Chapter 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," this finding is determined to be of very low safety significance since this finding was not a design or qualification deficiency, did not represent a loss of system or train safety function and did not screen as potentially risk significant due to a flooding initiating event using the criteria on the characterization worksheet. This finding had a crosscutting aspect in the area of human performance associated with the work practices component because the licensee's pre-job briefing, self- and peer-checking, and proper documentation of activity were inadequate to overcome worker protection assurance clearance process problems and an inexperienced operating supervisor. These less than adequate worker practices resulted in personnel proceeding in the face of uncertainty.

Inspection Report# : [2008005](#) (pdf)

Barrier Integrity

Significance:  Dec 31, 2008

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Inadequate maintenance procedure resulted in residual heat removal mechanical seal failure

The inspectors identified a self-revealing noncited violation of Technical Specification 5.4.1a, "Procedures," for inadequate procedural guidance that resulted in the failure of the residual heat removal Train A pump mechanical seal. On October 22, 2008, the licensee discovered a solid stream of water issuing from the residual heat removal Train A pump mechanical seal. The failure occurred because of installation difficulties encountered on October 8, 2008, when the seal sleeve was installed with the seal locking collar engaged. This configuration resulted in increased loading on the seal seating surfaces that resulted in surface chipping and led to seal failure after approximately 48 hours of shutdown cooling operation. Mechanical seal replacement Procedure MPM EJ QP001, "Residual Heat Removal Pump Overhaul," did not specify that the seal sleeve needed to be installed prior to installing the seal-locking collar. Additionally, the installation procedure did not specify any post-installation acceptance criteria to ensure the seal is properly seated. An analysis of the seal failure determined that leakage would not exceed the 2 gallon per minute Technical Specification limit but would exceed the 1 gallon per minute administrative limit for emergency core cooling system leakage outside containment.

This finding is more than minor because it was associated with the Barrier Integrity cornerstone attribute of procedural quality and affects the associated cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radio nuclide releases caused by accidents or releases. Using Manual Chapter 0609, Appendix H, "Containment Integrity Significance Determination Process," this finding was determined to be a Type B finding since it was related to a degraded condition that has potentially important implications for the integrity of the containment, without affecting the likelihood of core damage. This finding was found to be of very low safety significance since the 2 gallon per minute limit assumed in the post accident dose calculation was preserved and therefore the degraded condition would have no impact on large early release frequency. This issue was entered into the licensee's corrective action program as Callaway Action Request 200810933. This finding did not have a crosscutting aspect since it was not a performance deficiency indicative of current licensee performance.

Significance:  Dec 31, 2008

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Failure to terminate refueling water storage tank recirculation results in inadvertent loss of spent fuel pool inventory

The inspectors identified a self-revealing noncited violation of Technical Specification 5.4.1a, "Procedures," for the failure to close Valve BNV0002 during a fill of the spent fuel pool resulting in approximately 2000 gallons of water being inadvertently transferred from the spent fuel pool to the refueling water storage tank. On November 7, 2008, Procedure OTN EC 00001 was performed to add makeup water to the spent fuel pool. Prior to performing the evolution, operations briefed that the refueling water storage tank was on recirculation and that this alignment needed to be secured prior to performing a fill of the spent fuel pool. Following termination of the refueling water storage tank recirculation lineup and after a fill of the spent fuel pool was initiated, the control room received annunciator "RWST Lev HILO." The crew recognized that an inadvertent transfer of spent fuel pool water to the refueling water storage tank was in progress and directed that Valves ECV0076 and BNV0002 be closed. It was later discovered that poor communication between operators on the status of Valve BNV0002 resulted in the refueling water storage tank remaining on recirculation during the fill operation.

This finding is more than minor because it was associated with the Barrier Integrity cornerstone attribute of human performance and affects the associated cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radio nuclide releases caused by accidents or releases. Using Manual Chapter 0609.04, "Phase 1 - Initial Screening and Characterization of Findings," this finding was determined to be of very low safety significance because it only represents a degradation of the radiological barrier function provided by the spent fuel pool. This issue was entered into the licensee's corrective action program as Callaway Action Request 200811692. This finding had a crosscutting aspect in the area of human performance associated with the work control component because operations personnel failed to effectively communicate work status to the control room.

Inspection Report# : [2008005](#) (pdf)

Emergency Preparedness

Occupational Radiation Safety

Significance:  Jun 23, 2009

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Failure to Comply with Radiation Work Permit Requirements

The inspectors reviewed a self-revealing, noncited violation of Technical Specification 5.4.1.a, which resulted from a failure to comply with radiation work permit instructions. Specifically, on November 2, 2008, during a change out of the chemical and volume control system reactor coolant Filter FBG06, the technicians failed to follow radiation work permit instructions that required notification of the ALARA specialist if the vent port radiation monitor reading was greater than or equal to 1500 millirem per hour to determine if additional briefing requirements were needed. The licensee entered this item into their corrective action program as Callaway Action Request 200811469. As corrective action, the licensee has modified the briefing procedure and modified the radiation work permits to include a requirement to notify radiation protection supervision to evaluate dose rate readings of the vent port and filter housing. Other corrective actions are being evaluated.

Failure to comply with radiation work permit requirements is a performance deficiency. The finding is greater than minor because it is associated with the cornerstone attribute of exposure control and affected the cornerstone objective, in that, the failure to follow radiation work permit requirements increases the potential for increased dose. The finding involved workers' unplanned, unintended doses or potential of such a dose (resulting from actions or

conditions contrary to the radiation work permit). Using the Occupational Radiation Safety Significance Determination Process, the inspectors determined the finding to have very low safety significance because (1) it was not associated with ALARA planning or work controls, (2) there was no overexposure, (3) there was no substantial potential for an overexposure, and (4) the ability to assess dose was not compromised. Additionally, the finding had a crosscutting aspect in the area of human performance, work practices, because the licensee failed to communicate human error prevention techniques during the prejob briefing and ensure that all personnel understood limits stated in the radiation work permit. In addition, personnel proceeded with the filter change out even though radiation levels were significantly higher than anticipated.

Inspection Report# : [2009003](#) (*pdf*)

Significance:  Dec 31, 2008

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

Failure to comply wity high radiation area entry requirements.

The inspectors reviewed a self-revealing, noncited violation of Technical Specification 5.7.1, which resulted from a failure of three individuals to comply with high radiation area entry requirements. Specifically, on October 20, 2008, three engineers touring the reactor building entered a posted high radiation area without signing in on a radiation work permit which allowed entry into a high radiation area, and did not receive a briefing on dose rates in the high radiation area. Shortly after entering the high radiation area, one of the engineers received an electronic dosimeter rate alarm when dose rates in the area exceeded the 50 millirem per hour setpoint. The licensee entered this event into their corrective action program and conducted an Event Review Team meeting to determine the probable causes that led to the event and recommend corrective actions to prevent the event from happening in the future.

Failure to comply with high radiation area entry requirements is a performance deficiency. This finding is greater than minor because it was associated with the cornerstone attribute of exposure control and affected the cornerstone objective, in that, the failure to meet high radiation area entry requirements increases the potential for increased radiation dose. This finding involved an individual workers' unplanned, unintended dose or potential of such dose (resulting from actions or conditions contrary to Technical Specifications) which could have been significantly greater as a result of a single minor, reasonable alteration of the circumstances. Using the Occupational Radiation Safety Significance Determination Process, the inspectors determined the finding to have very low safety significance because (1) it was not associated with ALARA planning or work controls, (2) there was no overexposure, (3) there was no substantial potential for an overexposure, and (4) the ability to assess dose was not compromised. Additionally, the finding had a crosscutting aspect in the area of human performance, work practices component, because the workers failed to use error prevention tools such as self- and peer-checking.

Inspection Report# : [2008005](#) (*pdf*)

Public Radiation Safety

Physical Protection

Although the NRC is actively overseeing the Security cornerstone, the Commission has decided that certain findings pertaining to security cornerstone will not be publicly available to ensure that potentially useful information is not provided to a possible adversary. Therefore, the [cover letters](#) to security inspection reports may be viewed.

Miscellaneous

Last modified : December 10, 2009