

# Callaway

## 3Q/2007 Plant Inspection Findings

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### Initiating Events

**Significance:**  Sep 22, 2007

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

#### **Failure to Follow Maintenance Instructions Affecting the Letdown Backpressure Control Valve.**

A self-revealing Green noncited violation of 10 CFR Part 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," was identified after the licensee failed to follow reassembly procedures for the letdown system backpressure control valve. In April 2007, during reassembly of letdown pressure control Valve BGPCV0131, Callaway maintenance personnel failed to install an alignment cage spacer. On September 7, 2007, a failed pressure transmitter combined with malfunctioning Valve BGPCV0131 caused upstream letdown relief Valve BG8117 to lift, diverting water into the pressurizer relief tank at a rate of 119 gpm until operators isolated letdown to stop the leakage.

This finding is greater than minor because, similar to Example 5b provided in Manual Chapter 0612, Appendix E, the licensee's failure to follow assembly procedures resulted in Valve BGPCV0131 being returned to service with a missing part. This finding, involving reactor coolant system letdown, affected the initiating events cornerstone equipment performance attribute and affected the objective to limit the likelihood of those events that upset plant stability and challenged critical safety functions during power operations. The inspectors used the Manual Chapter 0609, "Significant Determination Process," Phase 1 worksheet to analyze this finding. The inspectors determined this finding is of very low safety significance because it did not result in exceeding the Technical Specification limit for identified reactor coolant system leakage and did not affect any mitigating systems. This finding has a crosscutting aspect in the area of human performance associated with the work practices component because licensee personnel failed to follow established procedures (H.4(b)). This issue was entered into the licensee's corrective action program as Callaway Action Request 200708233.

Inspection Report# : [2007004](#) (*pdf*)

**Significance:**  Mar 24, 2007

Identified By: NRC

Item Type: FIN Finding

#### **Inadequate Management of an Operator Workaround Resulted in Unplanned Loss of Volume Control Tank Inventory**

The inspectors identified a finding after volume control tank inventory was inadvertently diverted from the reactor coolant system due to inadequate management of an operator workaround. On January 19 and March 22, 2007, operators had isolated the volume control tank from the demineralizer during resin transfer operations. However, volume control tank inventory was lost due to leakage past closed demineralizer isolation valves. Degraded Grinnell diaphragm valves have been a longstanding Callaway Plant material condition problem. Plant operations did not track nor effectively work around the degraded demineralizer valves.

This finding is greater than minor because the failure to adequately manage operator workarounds could reasonably be viewed as a precursor to a significant event. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 worksheet, the inspectors determined that this finding is only of very low significance because the condition did not result in the reactor coolant system technical specification leakage limit being exceeded, did not contribute to both the likelihood of a reactor trip and the likelihood that mitigating equipment or functions would be unavailable, and did not increase the likelihood of a fire or internal/external flood. This finding has a crosscutting aspect in the area of human performance associated with the work control component because AmerenUE did not plan work activities to support long-term equipment reliability by limiting operator workarounds (H.3(b)). The licensee entered this finding into their corrective action program as Callaway Action Request 200700517.

Inspection Report# : [2007002](#) (*pdf*)

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## Mitigating Systems

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**Significance:** Sep 22, 2007

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

### **Failure to Promptly Correct a Condition Adverse to Quality for Train B Motor-driven Auxiliary Feedwater Pump**

A self-revealing Green noncited violation of 10 CFR 50, Appendix B, Criteria XVI, "Corrective Action," was identified after the licensee allowed the Train B motor-driven auxiliary feedwater pump to be returned to service even though maintenance personnel could not meet the coupling shaft separation tolerance during a maintenance activity on April 12, 2007. Engineering personnel approved deviating from the coupling shaft separation tolerance without considering the impact on the motor thrust bearing. On July 4, 2007, motor disassembly revealed that there was damage to the thrust bearing caused by the inadequate shaft separation distance.

This finding is greater than minor because, similar to Example 5b provided in Manual Chapter 0612, Appendix E, the licensee's failure to address the impact of plant changes allowed the component to be returned to service prior to correcting the problem. This finding was associated with the mitigating systems cornerstone equipment performance attribute and affected the objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The inspectors used the Manual Chapter 0609, "Significant Determination Process," Phase 1 worksheet to analyze this finding. The inspectors determined this finding is of very low safety significance because it is not a design or qualification deficiency confirmed to result in loss of operability per Part 9900, Technical Guidance, "Operability Determination Process for Operability and Functional Assessment;" did not result in loss-of-safety function of a single train for greater than the Technical Specification allowed outage time; and was not a potentially risk significant seismic, flooding, or severe weather event. This finding has a crosscutting aspect in the area of problem identification and resolution associated with the corrective action program component because engineering personnel did not thoroughly evaluate the apparent problem with the coupling (P.1 (c)). This issue was entered into the licensee's corrective action program as Callaway Action Request 200708752.

Inspection Report# : [2007004](#) (*pdf*)

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**Significance:** Jun 23, 2007

Identified By: NRC

Item Type: NCV NonCited Violation

### **Ineffective Corrective Actions to Evaluate the Design Basis for an Ultimate Heat Sink Workaround**

The inspectors identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," after AmerenUE failed to implement effective corrective actions to correct discrepancies in the ultimate heat sink design basis. The system design basis required the ultimate heat sink automated temperature controller to align the cooling tower only when outside temperatures were above 80 degrees Fahrenheit. AmerenUE allowed manual operation of the system when temperatures were above 47 degrees Fahrenheit. The engineering staff and later the quality assurance staff independently identified that the design basis operating requirements had not been adequately evaluated. The inspectors identified that the corrective actions assigned had been closed out as complete without problem resolution and that the ultimate heat sink cooling towers were operated on April 3, 2007, when outside conditions were below 29 degrees Fahrenheit. The uncontrolled workaround resulted in AmerenUE subjecting the cooling tower fill material and fan to freezing conditions.

This finding is greater than minor because it is associated with the mitigating systems cornerstone equipment performance attribute and affects the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 worksheet, this finding was determined to have very low safety significance because it affected the mitigating systems cornerstone, which was both a performance and design deficiency that did not represent a loss of a safety function, and did not affect seismic, flooding or severe weather initiating events. This finding has a crosscutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee did not thoroughly evaluate problems such that the resolution would address causes and extent of conditions, as necessary (P.1(c)). This issue was entered into the

licensee's corrective action program as Callaway Action Request 200703584.

Inspection Report# : [2007003](#) (*pdf*)

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**Significance:** Jun 23, 2007

Identified By: NRC

Item Type: NCV NonCited Violation

### **Failure to Identify and Correct Essential Service Water Pipe Wall Thinning**

The inspectors identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," after AmerenUE's past corrective actions were inadequate to identify and correct essential service water piping degradation due to corrosion. AmerenUE identified that nondestructive examinations were required to determine the extent of condition of microbiological influenced corrosion on the 30-inch and 8-inch essential service water piping. On May 3, 2007, operability determinations used to support Refueling Outage 15 restart stated that 100 percent of the low flow area accessible piping would be tested using nondestructive examination. On May 26, 2007, microbiological influenced corrosion caused a new through-wall leak in the control building low flow, accessible piping. The licensee's extent of condition review was not adequate to identify the corroded pipe prior to the through-wall leak.

This finding, associated with failure to implement corrective action, is greater than minor because, if left uncorrected, this finding would become a more significant safety concern. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 worksheet, this finding was determined to have very low safety significance because it affected the mitigating systems cornerstone, was both a performance and design deficiency that did not represent a loss of a safety function, and did not affect seismic, flooding or severe weather initiating events. This finding has a crosscutting aspect in the area of problem identification and resolution associated with the corrective action program component because the licensee did not thoroughly evaluate problems such that the resolution would address causes and extent of conditions, as necessary (P.1(c)). This issue was entered into the licensee's corrective action program as Callaway Action Request 200705489.

Inspection Report# : [2007003](#) (*pdf*)

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**Significance:** Mar 24, 2007

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

### **Inoperable Auxiliary Feedwater Pump due to an Inadequate Surveillance Procedure**

A self-revealing noncited violation of Technical Specification 5.4.1.a, "Procedures," was identified after an inadequate surveillance procedure resulted in the inadvertent defeat of the Train B turbine-driven auxiliary feedwater pump automatic start feature and an unplanned actuation of a cross-train control room ventilation isolation. On February 12, 2007, plant instrumentation and control technicians were performing a control room ventilation response time test. The procedure required the operator to block a high radiation test signal. The operator was unable to locate the block switch. A control room supervisor authorized a change to the procedure, which resulted in an incorrect block switch being used. The control room supervisor failed to verify correct block switch identification prior to authorizing the surveillance procedure change.

This finding is greater than minor because the failure to use an adequate surveillance procedure is associated with the mitigating systems cornerstone attribute of procedure quality and affects the objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 worksheet, the inspectors determined that this finding is only of very low significance because it was not a design or qualification deficiency, did not result in loss-of-safety function of a single train for greater than the technical specifications allowed outage time, and was not a potentially risk significant seismic, flooding, or severe weather event. This finding has a crosscutting aspect in the area of problem identification and resolution associated with the corrective action program component because the control room supervisor did not thoroughly evaluate the apparent procedure problem before approving the change (P.1(c)). This issue was entered into the licensee's corrective action program as Callaway Action Request 200701336.

Inspection Report# : [2007002](#) (*pdf*)

**G**

**Significance:** Mar 24, 2007

Identified By: NRC

Item Type: NCV NonCited Violation

### **Inadequate Corrective Actions to Preserve Essential Service Water System Material Condition**

The inspectors identified a noncited violation of 10 CFR Part 50, Appendix B, Criteria XVI, after past corrective actions were inadequate to preclude recurrence of essential service water piping degradation due to corrosion. On March 14 and 23, 2007, plant personnel identified through-wall leaks in the Train B large bore essential service water piping. Plant operators declared the essential service water train inoperable and implemented elevated plant risk and required implementation of risk management actions in both cases. Plant technicians performed non-destructive examinations on about 10 percent of the accessible large bore piping. Technicians identified 93 indications of less than minimum pipe wall thickness. The licensee concluded the pipe degradation resulted from microbiologically influenced corrosion. Poor material condition of the essential service water system has been a longstanding problem at the Callaway Plant. On March 23, 2005, plant personnel identified an essential service water through-wall leak in large bore piping, which required a technical specification required shutdown and on January 25, 2006, plant operators declared Train B of the essential service water system inoperable due to a through-wall pipe leak. These conditions were identified as significant conditions adverse to quality in the licensee's corrective action program. The licensee's extent of condition review and corrective actions following the March 23, 2005, and January 25, 2006, occurrences were not adequate to prevent further examples of degraded essential service water piping from microbiologically influenced corrosion.

This finding is greater than minor because it is associated with the reactor safety mitigating systems cornerstone and affects the cornerstone objective to ensure the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 worksheet, this finding was determined to have very low safety significance because it only affected the mitigating systems cornerstone and was not a design deficiency, did not represent a loss of a safety function, and did not affect seismic, flooding or severe weather initiating events. This finding has a crosscutting aspect in the area of problem identification and resolution associated with the corrective action program component because AmerenUE did not fully evaluate essential service water corrosion issues to ensure that the resolutions adequately addressed the causes and extent of condition needed to ensure nuclear safety (P.1(c)). This issue was entered into the licensee's corrective action program as Callaway Action Request 200702724.

Inspection Report# : [2007002](#) (*pdf*)



**Significance:** G Jan 12, 2007

Identified By: NRC

Item Type: NCV NonCited Violation

### **Inadequate Refueling Water Storage Tank Vent Sizing Calculation**

The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion III, Design Control, for an inadequate refueling water storage tank vent sizing calculation. The calculation assumed that only one low head safety injection pump would operate when it should have assumed that all six emergency core cooling and containment spray pumps would take suction from the tank. When corrected, the revised calculation resulted in reducing the allowable vent blockage area from approximately 68 percent to 30 percent. In response to the teams concerns, the licensee inspected the vent and found a small mesh screen on the vent's exterior, which reduced the available design margin to approximately 5 percent. Subsequently, the licensee performed a new finite element analysis to demonstrate that sufficient margin existed to account for screen blockage scenarios, such as freezing rain. The licensee has entered this finding into their corrective action program as Callaway Action Requests 200610359 and 200700115.

The failure to meet design control requirements associated with the refueling water storage tank vent design was a performance deficiency. This finding is more than minor because it affected the mitigating system cornerstone objective (design control attribute) to ensure the reliability and capability of the equipment needed to mitigate initiating events. The finding also affected the barrier integrity cornerstone objective (design control attribute) of providing physical design barriers, such as containment, to protect the public from radio nuclide releases caused by accidents or events. The team used the Manual Chapter 0609, Significance Determination Process Phase 1 screening worksheet and determined that the finding required a Phase 2 significance determination because it impacted two different cornerstones (mitigating systems and barrier integrity). The team performed a Phase 2 significance determination and determined that the finding was of very low safety significance. Only the large break loss-of-coolant accident sequence was affected. In addition, the safety injection and containment spray systems remained available.

Inspection Report# : [2006009](#) (*pdf*)

**G****Significance:** Jan 12, 2007

Identified By: NRC

Item Type: NCV NonCited Violation

**Inadequate Emergency Diesel Generator Fuel Oil Verification**

The team identified a noncited violation of Technical Specifications Surveillance Requirement 3.8.3.3 for the failure to verify that fuel oil testing results were within the specified limits. Consequently, fuel oil that was transferred to the Train A storage tank in October 2005 was out of specification for cetane and no actions were taken to evaluate or otherwise address the concern until identified by the NRC. The licensee has entered this finding into their corrective action program as Callaway Action Request 200700100.

The failure to follow plant technical specifications and properly verify that the cetane level of new fuel oil was within the limits of the Diesel Fuel Oil Testing Program was a performance deficiency. The finding was more than minor because it was associated with the mitigating systems cornerstone objective (human performance attribute) of ensuring the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. Using the Manual Chapter 0609, Phase 1 screening worksheet, the issue screened as having very low safety significance because it was a design deficiency confirmed not to result in loss-of-operability in accordance with NRC Manual Chapter Part 9900, Technical Guidance, Operability Determination Process for Operability and Functional Assessment. This finding had a crosscutting aspect in the area of human performance (work practices attribute), in that the chemistry technician failed to use appropriate self-checking work practices when verifying the sample results H.4(a).

Inspection Report# : [2006009](#) (*pdf*)**G****Significance:** Jan 12, 2007

Identified By: NRC

Item Type: NCV NonCited Violation

**Inadequate Emergency Diesel Generator Heat Exchanger Tube Plugging Calculation**

The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion III, Design Control, for the failure to properly calculate the tube plugging limit for the emergency diesel generator intercooler, jacket water, and lube oil cooler heat exchangers. The calculation determined that approximately 1/3 of the tubes could be plugged without challenging emergency diesel generator operability under worst case design basis conditions. When corrected, the revised calculation resulted in reducing the allowable number of plugged tubes by approximately 40 percent. The licensee has entered this finding into their corrective action program as Callaway Action Requests 200700063 and 200700096.

The failure to implement appropriate design controls for safety-related tube plugging calculations was a performance deficiency. This finding is more than minor because it affected the mitigating system cornerstone objective (Design Control) to ensure the reliability and capability of the equipment needed to mitigate initiating events. In addition, the finding was more than minor because, if left uncorrected, it could result in a more significant safety concern. Specifically, if the heat exchanger tubes were plugged to the limit the heat exchangers may be inoperable under certain design basis conditions (i.e., higher essential service water temperatures). Using the Manual Chapter 0609, Phase 1 screening worksheet, the issue screened as having very low safety significance because it was a design deficiency confirmed not to result in loss-of-operability in accordance with NRC Manual Chapter Part 9900, Technical Guidance, Operability Determination Process for Operability and Functional Assessment.

Inspection Report# : [2006009](#) (*pdf*)**G****Significance:** Jan 12, 2007

Identified By: NRC

Item Type: NCV NonCited Violation

**Failure to Translate Essential Service Water Cooling Tower Design Basis Information into Specifications and Procedures.**

The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion III, Design Control, for the failure to properly translate design requirements into procedures and instructions. Specifically, the cooling tower sizing calculation specified that a flow rate of 15,000 gallons per minute was necessary to meet design basis accident needs but flow balance procedures only required a flow rate of 11,724 gallons per minute. The licensee has entered this finding into their corrective action program as Callaway Action Request 200700218.

The team determined that the failure to properly translate design information (essential service water flow rate through the cooling tower) into specifications and procedures was a performance deficiency. This finding was more than minor because it affected the mitigating system cornerstone objective (Procedure Quality Attribute) to ensure the reliability and capability of the equipment needed to mitigate initiating events. Further, if left uncorrected, it could lead to a more significant issue. Specifically, information from the calculation could be used in other design documents and operability determinations. Over-predicting cooling tower capability could mask other operational issues. Using the Manual Chapter 0609, Phase 1 screening worksheet, the team determined that the finding had very low safety significance (Green) because the finding was a design deficiency confirmed not to result in loss of operability in accordance with Part 9900 Technical Guidance, Operability Determination Process for Operability and Functional Assessment.

Inspection Report# : [2006009](#) (*pdf*)

**G**

**Significance:** Jan 12, 2007

Identified By: NRC

Item Type: NCV NonCited Violation

### **Failure to Initiate an Operability Evaluation for Water Hammer Concerns.**

The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion V, Procedures, for the failure to follow Callaway Plant procedure requirements associated with operability determinations. Specifically, engineers had identified that a water hammer was causing two residual heat removal system relief valves to fail and that the water hammer would likely recur in certain situations. The engineers failed to take the procedurally required actions to initiate a formal operability determination to evaluate the potential impact to the residual heat removal system pressure boundary. The licensee has entered this finding into their corrective action program as Callaway Action Request 200609805.

The failure to follow a Callaway Plant procedure was a performance deficiency. The finding was more than minor because it was associated with the mitigating systems cornerstone objective (Equipment Performance Attribute) of ensuring the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. Using the Manual Chapter 0609, Phase 1 screening worksheet, the issue screened as having very low safety significance because it was a design deficiency confirmed not to result in loss-of-operability in accordance with NRC Manual Chapter Part 9900, Technical Guidance, Operability Determination Process for Operability and Functional Assessment. This finding had a crosscutting aspect in the area of problem identification and resolution (corrective action program component), in that engineers failed to performed the necessary proceduralized corrective actions to ensure that operability was properly evaluated P.1.(c)).

Inspection Report# : [2006009](#) (*pdf*)

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**Significance:** Dec 31, 2006

Identified By: NRC

Item Type: NCV NonCited Violation

### **Failure to Identify a Degraded Fire Barrier**

On November 21, 2006, the inspectors identified a noncited violation of Technical Specification 5.4.1.d, "Fire Protection Program," after AmerenUE failed to identify and correct a degraded auxiliary building fire door. The inspectors identified that the latching mechanism on Fire Door 15031 would not engage because the double door had not been pinned. Failure of the door to latch resulted in a reduction in fire confinement capability. The door was required to provide a 3-hour fire barrier. The licensee had several prior opportunities to identify the degraded fire door. Security and operations personnel passed through the door several times each shift. The inspectors previously identified that the latch on Fire Door 15031 was degraded. Following the previous finding, AmerenUE implemented actions to increase the sensitivity of plant personnel to degraded fire doors. These actions were not effective to ensure that licensee personnel would recognize and enter the degraded fire door into the Corrective Action Program.

This finding is greater than minor because the degraded fire barrier affected the mitigating systems cornerstone external factors attribute objective to prevent undesirable consequences due to fire. Using Manual Chapter 0609, Appendix F, "Fire Protection Significance Determination Process," the inspectors determined this finding is in the fire confinement category and that the barrier was moderately degraded because the door latch was not functional. This finding is of very low safety significance because the exposed fire area contained no potential damage targets that are unique from those in the exposing fire area. The inspectors concluded that this finding has a problem identification

and resolution crosscutting aspect associated with the corrective action program component because the licensee did not implement the corrective action program with a low threshold to identify the degraded door. The licensee entered this issue into the Corrective Action Program as Callaway Action Request CAR 20060962.

Inspection Report# : [2006005](#) (*pdf*)

**Significance:**  Dec 31, 2006

Identified By: NRC

Item Type: NCV NonCited Violation

### **Failure to Properly Categorize a Maintenance Preventable Functional Failure**

The inspectors identified a noncited violation of 10 CFR 50.65(a)(2) after AmerenUE failed to categorize the failure of motor-operated valve auxiliary contacts as a maintenance preventable functional failure and to monitor the component as required by 10 CFR 50.65(a)(1). On May 22, 2006, safety injection system motor-operated Valve EMHV8814A failed to open during surveillance testing due to stuck auxiliary contacts. On June 29, 2006, the Callaway maintenance rule expert panel concluded the failure was not a maintenance preventable functional failure. The inspectors reviewed the maintenance history of station motor-operated valves and determined eighteen previous auxiliary contact failures had occurred since 2002. Also, AmerenUE had initiated a modification to compensate for motor-operated valve electrical cubicle obsolescence and corrective action to address auxiliary contact failures. The inspectors determined that the June 29, 2006, expert panel incorrectly concluded that the auxiliary contact failures were not maintenance preventable. AmerenUE failed to perform an evaluation as required by 10 CFR 50.65(a)(1). On November 16, 2006 the expert panel reevaluated the failure of Valve EMHV8814A and five other auxiliary contact failures and concluded the failures were maintenance preventable functional failures and placed the auxiliary contacts system in 10 CFR 50.65(a)(1).

This finding is greater than minor because the failure of the expert panel to perform adequate evaluations would become a more significant safety concern if left uncorrected. This issue is similar to Example 7.b provided in Manual Chapter 0612, Appendix E. The inspectors analyzed this finding using the Manual Chapter 0609, "Significance Determination Process," Phase 1 worksheet. The inspectors determined this finding is of very low safety significance because, this finding is not a design or qualification deficiency, did not result in loss of safety function of a single train for greater than the allowed Technical Specification outage time and was not related to a seismic, flooding, or severe weather event. This finding has a crosscutting aspect in the area of problem identification and resolution associated with the corrective action program component because the expert panel did not thoroughly or adequately evaluate the failure of the valve to address the causes and extent of condition. The licensee entered this issue into the Corrective Action Program as Callaway Action Request 200609603.

Inspection Report# : [2006005](#) (*pdf*)

**Significance:**  Dec 31, 2006

Identified By: NRC

Item Type: NCV NonCited Violation

### **Failure to Adequately Manage Increased Risk During a Maintenance Activity**

On September 26, 2006, the inspectors identified a noncited violation of 10 CFR 50.65(a)(4) after AmerenUE failed to adequately manage the risk associated with maintenance on the turbine-driven auxiliary feedwater pump. AmerenUE removed the turbine-driven auxiliary feedwater pump from service for planned maintenance. The licensee determined this activity increased plant risk into the next higher risk configuration (Yellow). Procedure APA-ZZ-00315, "Configuration Risk Management Program," required AmerenUE to take actions to protect redundant/diverse safety systems and components. Procedure APA-ZZ-00315 also stated that, if work could result in a risk-significant configuration or loss of system functions, consider use of physical barriers, such as ropes and/or signs to protect redundant/diverse components. AmerenUE did not take adequate protective actions or use physical barriers on the redundant Train B motor-driven auxiliary feedwater pump. Plant workers passing through the motor-driven auxiliary feedwater pump room inadvertently rendered the pump inoperable by disabling the room cooler. The licensee determined that disabling the room cooler increased plant risk into the next higher risk configuration (Orange).

This finding is greater than minor because the licensee failed to implement prescribed significant compensatory measures during planned maintenance activity. This finding is similar to Example 7.g. provided in Manual Chapter 0612, Appendix E, because the auxiliary feedwater system key safety function was degraded. The inspectors used Manual Chapter 0609, Appendix K, "Maintenance Risk Assessment and Risk Management Significance Determination Process," Flowchart 2, "Assessment of Risk Management Actions," to analyze this finding. The

inspectors calculated an incremental core damage probability of  $6.8 \times 10^{-8}$  for the event, based a one-hour risk exposure duration and an increase of core damage probability from  $1.8 \times 10^{-4}$  to  $7.1 \times 10^{-4}$  after the Train B motor-driven auxiliary feedwater pump inadvertently rendered the pump inoperable. The inspectors determined the finding is of very low safety significance because incremental core damage probability  $6.8 \times 10^{-8}$  was less than  $1.0 \times 10^{-6}$ . This finding has a crosscutting aspect in the area of human performance associated with the work control component because the licensee failed to appropriately plan work activities by incorporating risk insights and compensatory actions. The licensee entered this issue into the Corrective Action Program as Callaway Action Request 20070284. Inspection Report# : [2006005](#) (*pdf*)

**Significance:** SL-IV Dec 31, 2006

Identified By: NRC

Item Type: NCV NonCited Violation

**Failure to Obtain Prior NRC Approval Before Removing Technical Specifications Limiting Condition for Operations**

On October 6, 2006, the inspectors identified a Severity Level IV noncited violation of 10 CFR 50.59 after AmerenUE failed to obtain prior NRC approval before removing the steam generator blowdown valve Limiting Condition for Operations requirement from the facility Technical Specifications. Part 50.36 of Title 10 of the Code of Federal Regulations, "Technical Specifications," required AmerenUE to establish a Limiting Condition for Operations for components that are required to mitigate a design basis accident. The Callaway Plant accident analysis required the steam generator blowdown valves close to mitigate the steam line break accident and to ensure the auxiliary feedwater system safety function. AmerenUE met this requirement by including the blowdown valves in Technical Specification 3.6.3, "Containment Isolation Valves," as referenced in FSAR Table 16.6-1, "Containment Isolation Valves." On May 10, 2006, AmerenUE implemented FSAR Change Notice 02-012 which removed the blowdown valves from Table 16.6-1. This change removed the blowdown valves from within the scope the Technical Specifications Limiting Condition for Operations. The 50.59 safety evaluation supporting Change Notice 02-012 failed to identify that removal of the blowdown valves involved a change to the plant Technical Specifications and required prior NRC approval.

This issue involved traditional enforcement because AmerenUE did not receive prior NRC approval before changing the facility Technical Specifications. The inspectors evaluated this issue using Manual Chapter 0612, Appendix B. This issue is more than minor because the mitigating systems cornerstone attribute of equipment performance, reliability, and capability is impacted based on removal of the blowdown valve out-of-service time limits from the Technical Specifications. The inspectors used Manual Chapter 0609, "Significance Determination Process," Phase 1, to analyze the safety significance of the violation. The inspectors concluded that the violation is of very low safety significance because the issue was not a design or qualification deficiency confirmed to result in loss of operability, did not represent a loss of system safety function or an actual loss of safety function of one or more non-Technical Specification risk-significant equipment trains, and did not screen as potentially risk significant due to a seismic, flooding, or severe weather initiating event. The issue has a problem identification and resolution crosscutting aspect associated with the corrective action program because the licensee's safety evaluation did not thoroughly evaluate the change such that the resolutions address causes and extent of conditions, as necessary. The licensee entered this issue into the Corrective Action Program as Callaway Action Request 200608902.

Inspection Report# : [2006005](#) (*pdf*)

**Significance:**  Dec 31, 2006

Identified By: NRC

Item Type: NCV NonCited Violation

**Inadequate Evaluation of an Operator Workaround Resulted in an Inoperable Safety Injection Accumulator**

The inspectors identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion XVI, "Corrective Action," after the licensee failed to adequately evaluate and promptly correct an operator workaround that resulted in the loss of nitrogen pressure on a safety injection accumulator. On December 3, 2006, Accumulator D was rendered inoperable due to low pressure. The low pressure condition occurred as plant operators attempted to add nitrogen to the accumulator. Plant operator efforts to work around degraded containment isolation and pressure relief valves during the filling operation resulted in an inoperable accumulator. The accumulator pressure had dropped below the minimum allowed Technical Specification pressure of 602 psig.

This issue is greater than minor because this finding is associated with the reactor safety mitigating systems cornerstone attribute of equipment performance and affects the objective to ensure the availability, reliability, and

capability of systems that respond to initiating events to prevent undesirable consequences. Using the Manual Chapter 0609, "Significance Determination Process," Phase 1 worksheet, the inspectors determined that this finding is of very low significance because, although the condition did involve the loss of operability, it did not result in a loss of system safety train or function, and did not involve a seismic, flooding or severe weather event. This finding, which involved an inadequate evaluation of an operator workaround, has a crosscutting aspect in the area of problem identification and resolution associated with the corrective action program component because AmerenUE did not thoroughly evaluate problems such that resolutions addressed the causes and extent of conditions, as necessary. The licensee entered this issue into the Corrective Action Program as Callaway Action Request 200700286.

Inspection Report# : [2006005](#) (*pdf*)

**Significance:**  Nov 30, 2006

Identified By: NRC

Item Type: NCV NonCited Violation

### **Failure to initiate Callaway Action Request**

The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion XVI, for failure to initiate Callaway Action Requests for conditions adverse to quality that affected the reliability of mitigating systems. Specifically, on August 17, 2005, and on May 30, 2006, the licensee discovered a high point air trap in the Train A safety injection discharge piping and decreasing water level in Steam Generators A and D; however, the licensee failed to enter these conditions adverse to quality into their corrective action program. The water in the main steam line contributed to a water hammer and the void had the potential to impact operability of the safety injection system. The licensee entered this deficiency into their corrective action program as Callaway Action Request 200609812.

The performance deficiency involved the failure to initiate corrective action documents for identified conditions adverse to quality, as required. This finding is more than minor because it is associated with the equipment performance attribute of the mitigating systems cornerstone and affects the associated cornerstone objective to ensure the reliability and availability of systems that respond to initiating events. Using Manual Chapter 0609, "Significance Determination Process," Phase 1 worksheet, the finding was determined to have very low safety significance because it only affected the mitigating systems cornerstone, was not a design or qualification deficiency, did not represent a loss of a safety function, and did not affect seismic, flooding or severe weather initiating events. The finding has cross-cutting aspects related to problem identification and resolution, in that, personnel did not identify issues at a low threshold and in a timely manner commensurate with their safety significance.

Inspection Report# : [2006012](#) (*pdf*)

**Significance:**  Nov 30, 2006

Identified By: NRC

Item Type: NCV NonCited Violation

### **Failure to identify conditions adverse to quality**

The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion V, and the corrective action program because licensee personnel failed to recognize and to identify two separate examples as conditions adverse to quality. Specifically, on April 13, 2006, and on October 17, 2006, licensee personnel did not identify blocked containment cooler tubes and a dirty emergency diesel generator turbocharger air intake filter, respectively, as conditions adverse to quality. Failure to recognize these conditions as degraded and identify them as conditions adverse to quality, delayed the immediate evaluation of operability and implementation of corrective actions. The licensee entered this deficiency into their corrective action program as Callaway Action Request 200609813.

The performance deficiency involved the failure to promptly identify and correct conditions adverse to quality. The inappropriate classification of Callaway Action Requests 200602989 and 200608806 as Action Notice Callaway Action Requests delayed and prevented actions required by the corrective action program. This finding is greater than minor because a later evaluation by the licensee determined that safety related equipment had been adversely affected. [This deficiency is similar to Manual Chapter 0612, Appendix E, Example 4.a.] Using Manual Chapter 0609, "Significance Determination Process," Phase 1 worksheet, the finding was determined to have very low safety significance because it only affected the mitigating systems cornerstone and was not a design or qualification deficiency, did not represent a loss of a safety function, and did not affect seismic, flooding or severe weather initiating events. The finding has cross-cutting aspects related to problem identification and resolution, in that, personnel did not identify issues at a low threshold and in a timely manner commensurate with their safety significance.

**Significance:**  Nov 30, 2006

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

**Failure to effectively implement actions to prevent recurrence**

A self-revealing noncited violation of 10 CFR Part 50, Appendix B, Criterion XVI, resulted from the failure to correct, and preclude repetition of (evaluate extent of condition), a significant condition adverse to quality related to identification of high spots in horizontal safety injection system discharge piping. Specifically, the licensee failed to identify all high spots in the susceptible discharge piping in February 2005; consequently, a modification did not prevent recurrence of voids collecting in high spots. The licensee entered the deficiency into their corrective action program as Callaway Action Request 200608644.

The performance deficiency involved the failure to effectively evaluate all susceptible points in the Train A safety injection discharge piping. This finding is more than minor because it is associated with the equipment performance attribute of the mitigating systems cornerstone and affects the cornerstone objective of ensuring the availability of systems that respond to initiating events. The failure of the design change affected the reliability of the safety injection system. Using Manual Chapter 0609, "Significance Determination Process," Phase 1 worksheet, the finding was determined to have very low safety significance because it only affected the mitigating systems cornerstone and was not a design or qualification deficiency, did not represent a loss of a safety function, and did not affect seismic, flooding or severe weather initiating events. This finding has a cross-cutting aspect related to problem identification and resolution, in that, the licensee did not thoroughly evaluate the voiding problems such that the resolutions addressed the extent of condition.

Inspection Report# : [2006012](#) (pdf)

**Significance:**  Nov 30, 2006

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

**Failure to promptly correct a condition adverse to quality.**

A self-revealing noncited violation of 10 CFR Part 50, Appendix B, Criterion XVI resulted after operations personnel failed to implement corrective actions. Specifically, the licensee failed to modify Procedure OSP-AL-V0003, "Auxiliary Feedwater Pump Discharge Check Valve (ALV0054) Closure Test," to ensure that upstream piping would be vented prior to performing the test to prevent overpressurizing the turbine-driven auxiliary feedwater pump suction pipe. The licensee entered this deficiency into their corrective action program as Callaway Action Request 200509277.

The performance deficiency involved the failure to change a procedure as recommended in a corrective action to prevent recurrence. This finding associated with failure to implement corrective action is greater than minor because, if left uncorrected, the finding would become a more significant safety concern. Using Manual Chapter 0609, "Significance Determination Process," Phase 1 worksheet, the finding was determined to have very low safety significance because it only affected the mitigating systems cornerstone and was not a design or qualification deficiency, did not represent a loss of a safety function, and did not affect seismic, flooding or severe weather initiating events. This finding has a crosscutting aspect in the area of human performance associated with resources because the licensee did not ensure complete, accurate, up-to-date procedures were available to plant operators.

Inspection Report# : [2006012](#) (pdf)

**Significance:** N/A Oct 13, 2006

Identified By: NRC

Item Type: FIN Finding

**Supplemental inspection following a white mitigating systems performance index heat removal system performance indicator.**

The U.S. Nuclear Regulatory Commission performed this supplemental inspection to assess the licensee's evaluation associated with a performance indicator (Mitigating Systems Performance Index Heat Removal System) that became White with the initial implementation of the Mitigating Systems Performance Index performance indicators during the second quarter of 2006. The primary reason for this performance indicator being characterized as White was system reliability for the auxiliary feedwater system. The licensee performed a comprehensive evaluation that identified three

primary root causes for the degraded reliability of the auxiliary feedwater system: poor implementation of maintenance programs to improve quality; a lack of training for maintenance personnel; and poor coordination of personnel and resources. During this supplemental inspection, performed in accordance with Inspection Procedure 95001, the inspector determined that the licensee, in general, adequately determined the root and contributing causes of the White performance indicator and established appropriate corrective actions. In addition, the licensee conducted an extent of cause review, which included a performance assessment of the remaining mitigating systems.  
Inspection Report# : [2006013](#) (*pdf*)

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## Barrier Integrity

**G**

**Significance:** Jun 23, 2007

Identified By: NRC

Item Type: NCV NonCited Violation

### **Failure to Implement Foreign Material Controls for the Refueling Cavity with Reactor Head Removed**

The inspectors identified a noncited violation of 10 CFR 50, Appendix B, Criterion V, "Instructions, Procedures, and Drawings," after refueling personnel did not maintain procedurally required foreign material exclusion barriers. AmerenUE's foreign material exclusion procedure specified attaching foreign material exclusion curtains to the plant north end of the reactor head missile shield to ensure no foreign material was introduced into the reactor vessel. On April 19, 2007, the inspectors observed the reactor refueling task and noted that there were no curtains acting as the north refueling cavity boundary.

This finding is greater than minor because, if left uncorrected, introduction of foreign material into the reactor cavity would become a more significant safety concern. The barrier integrity cornerstone human performance attribute is used to ensure foreign material and loose parts do not challenge fuel cladding. The inspectors determined this finding to be of very low safety significance using the significance determination process for at-power reactor situations. The inspectors used the at-power significance determination process because of the concern with foreign material impact on an operating reactor core. This finding is of very low safety significance per Inspection Manual Chapter 0609 because the condition was a fuel barrier issue. This finding had a crosscutting aspect in the area of human performance associated with the resources component because plant operators failed to follow procedures established to prevent the introduction of foreign material into the reactor vessel (H.4(b)). This issue was entered into the licensee's corrective action program as Callaway Action Request 200704169.

Inspection Report# : [2007003](#) (*pdf*)

**G**

**Significance:** Jan 12, 2007

Identified By: NRC

Item Type: NCV NonCited Violation

### **Inadequate Corrective Action for Refueling Water Storage Tank Vortexing Concerns**

The team identified a noncited violation of 10 CFR Part 50, Appendix B, Criterion XVI (Corrective Action) for the failure to take adequate corrective actions following the identification of a condition adverse to quality. Specifically, the licensee had identified, in part, that a safety-related refueling water storage tank sizing calculation had failed to consider vortexing at the tank suction inlet piping. This phenomena can cause air entrainment in pumps, which can lead to pump failure. The corrective measures were inadequate because engineers inappropriately used the margin associated with instrument uncertainty as if it were available design margin. The licensee has entered this finding into their corrective action program as Callaway Action Request 200700224.

The team determined that the failure to take effective corrective measures to address a condition adverse to quality (failure to address vortexing in the refueling water storage tank sizing calculation) was a performance deficiency. The finding was more than minor because it affected the barrier integrity cornerstone objective (design control attribute) to provide reasonable assurance that physical design barriers (including the containment) protect the public from radio nuclide releases caused by accidents or events. The finding had crosscutting aspects in the area of problem identification and resolution (Operating Experience Attribute), in that the licensee had failed to adequately address the industry operating experience P.2(b)).

Inspection Report# : [2006009](#) (*pdf*)

**Significance:** Nov 30, 2006

Identified By: NRC

Item Type: NCV NonCited Violation

### **Inadequate operability determination of a degraded main steam isolation valve**

The team identified a noncited violation of Technical Specification 3.7.2, after operations personnel failed to enter and implement required Technical Specification 3.7.2 actions. Specifically, the licensee had performed an inadequate operability determination related to a degraded main steam isolation valve that resulted in exceeding the allowed Technical Specifications out-of-service time between December 29 and 31, 2004. On October 19, 2006, the NRC determined that the licensee should have declared the main steam isolation valve and its actuation channel inoperable after removing one of two hydraulic actuators from service. The licensee entered this deficiency into their corrective action program as Callaway Action Request 200609233.

The performance deficiency involved the failure to perform an adequate operability evaluation of degraded plant equipment. As a result, the licensee failed to comply with the Technical Specifications. This finding is greater than minor because the configuration control attribute of the barrier integrity cornerstone objective to provide reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events is affected. The team used the "At Power Significance Determination Process," of Manual Chapter 0609. The team concluded that a Phase 2 analysis was required because this finding affects both the fuel and containment barriers.

The team performed a Phase 2 analysis using the "Risk-Informed Inspection Notebook for Callaway Nuclear Generating Station Unit 1," Revision 2. The team assumed that (1) one of two actuator trains was unavailable on one main steam isolation valve for less than 3 days and (2) the degraded actuator did not reduce the remaining main steam isolation valve mitigation capability credit to less than full mitigation credit. Based on the results of the Phase 2 analysis, this finding is determined to have very low safety significance. This finding has a cross-cutting aspect in the area of problem identification and resolution because the licensee did not thoroughly and correctly evaluate the operability of the degraded main steam isolation valve.

Inspection Report# : [2006012](#) (*pdf*)

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## **Emergency Preparedness**

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## **Occupational Radiation Safety**

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## **Public Radiation Safety**

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## **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.

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## **Miscellaneous**

**Significance:** N/A Nov 03, 2006

Identified By: NRC

Item Type: FIN Finding

### **Identification and Resolution of Problems**

The team reviewed 230 Callaway Action Requests, several job orders, engineering evaluations, associated root and apparent cause evaluations, and other supporting documentation to assess problem identification and resolution activities. The team concluded that, generally, the licensee effectively identified, evaluated and prioritized, and implemented effective corrective actions for conditions adverse to quality. However, the team identified that additional effort is needed in all three areas. The team identified some instances of failure to initiate corrective action documents and numerous examples of failure to appropriately classify deficiencies as conditions adverse to quality. The team determined that quality and documentation for operability assessments has not improved significantly over the course of the evaluation period. Further, on occasion personnel were not self-critical as reflected by poor operational decision making. Two examples of findings reflect the condition of the corrective action problem evaluation activities in the mid portion of the assessment period. The team remained concerned that a lack of understanding of the detailed design and licensing basis continued to be evident in problem resolution. The team concluded that the licensee, generally, implemented timely, effective corrective actions, although some examples indicate continuing weakness in this area.

The team determined that the licensee had increased efforts to evaluate existing industry operating experience for relevance to the facility, and had entered identified items in the corrective action program; however, the team identified some examples that contributed to plant events.

The extensive performance improvement plan developed to address the substantive cross-cutting issue in human performance has addressed daily worker practice issues very well, although recent events occurred that indicate challenges remain. The increased management involvement in the corrective action program and in daily activities assisted in the improved performance. The team determined that licensee audits and assessments became more detailed, probing and self-critical with better assessments at the end of the assessment period. The licensee used benchmarking of industry best practices and third party evaluations that improved the corrective action program during this assessment period. While some of the changes were too recent to evaluate, the team concluded that improvements in the significant root cause process, Corrective Action Review Board graded approach, and scope and timing of corrective actions had improved.

On the basis of formal and informal interviews conducted during this inspection, the team determined that employees will raise issues to their supervision, use the corrective action program, and if necessary, bring concerns to the employee concerns program. The team concluded that the licensee established an acceptable and improving safety-conscious work environment. However, some indication exists that additional effort is needed to encourage the free flow of information to ensure safety issues are resolved promptly.

Inspection Report# : [2006012](#) (*pdf*)

Last modified : December 07, 2007