

# Salem 2

## 4Q/2008 Plant Inspection Findings

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### Initiating Events

**Significance:**  Jun 30, 2008

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

#### **SALEM UNIT 2 LOSS OF ALL THREE CHILLERS**

A self-revealing non-cited violation of Technical Specification (TS) 6.8.1.a, "Procedures and Programs," was identified because PSEG did not maintain adequate control of the system configuration for the Unit 2 chill water system during maintenance on the 21 chiller. Specifically, on May 27, 2008, all three Unit 2 chill water system chillers tripped due to an error in the safety tagging sequence specified by the work control documents for maintenance on the 21 chiller.

This finding is more than minor because it is associated with the configuration control attribute of the Initiating Events cornerstone, and it adversely affected 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. Specifically, unavailability of all three chillers increased the likelihood of a loss of control air that could result in a complicated plant trip. Per Inspection Manual Chapter (IMC) 0609, Attachment 0609.04, initial screening and characterization of findings, the inspectors conducted a Phase 1 analysis and determined that this finding required a Phase 2 analysis because the finding contributed to both the likelihood of a reactor trip and the likelihood that mitigation equipment or functions will not be available. The inspector determined that the finding was of very low safety significance (Green) using the Salem plant specific Phase 2 pre-solved worksheets in accordance with IMC 0609, Appendix A, "Determining the Significance of Reactor Inspection Findings for At-Power Situations."

This finding has a cross-cutting aspect in the area of human performance because PSEG personnel did not follow procedures [H.4(b)]. Specifically, revisions to the work control document for tagging the 21 chiller did not comply with the requirements of PSEG procedure SH.OP-AP.ZZ-0051, "Safety Tagging Operations."

Inspection Report# : [2008003](#) (*pdf*)

**Significance:**  Mar 31, 2008

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

#### **SALEM UNIT 2 LOSS OF ALL THREE CHILLERS**

The inspectors identified a self-revealing non-cited violation of Technical Specification 6.8.1.a, "Procedures and Programs" when the 23 chiller failed to start on January 22, 2008. PSEG personnel did not start the 23 chiller and verify proper operation before removing the 21 and 22 chillers from service. This resulted in the plant operating for five hours with all three chillers out of service. The inspectors determined that the procedure for chiller operation was inadequate because it did not provide sufficient guidance to operators when removing two chillers from service. PSEG's corrective actions included revising the chiller operating procedure and replacement of the solenoid valve that caused the 23 chiller not to start.

The finding is more than minor because it is associated with the configuration control attribute of the Initiating Events cornerstone, and it adversely affected 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. Specifically, unavailability of all three chillers increased the likelihood of a loss of control air. The inspectors determined that the finding was of very low safety significance using the Salem plant-specific Phase 2 pre-solved worksheets in accordance with IMC 0609, Appendix A, "Determining the Significance of Reactor Inspection Findings for At-Power Situations."

This performance deficiency has a cross-cutting aspect in the area of human performance because PSEG personnel did not effectively communicate human error prevention techniques, such as holding pre-job briefings, self checking, and peer checking, and these techniques were not used commensurate with the risk of the assigned task [H.4(a)]. Specifically, PSEG personnel did not verify the proper operation of the 23 chiller before removing the 21 and 22 chillers from service.

Inspection Report# : [2008002](#) (*pdf*)

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## Mitigating Systems

**Significance:**  Dec 30, 2008

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

### **SALEM UNIT 2 HIGH STEAM FLOW PROTECTION CHANNELS INOPERABLE**

A self-revealing NCV of 10 CFR 50, Appendix B, Criteria XI, "Test Control," was identified because all Unit 2 high steam flow protection channels were discovered inoperable on May 12, 2008. Specifically, following steam generator replacement on Unit 2, PSEG did not perform adequate post-modification acceptance testing and, as a result, did not maintain Technical Specification (TS) required steam flow instrumentation operable. PSEG entered this issue into the corrective action program and implemented corrective actions that included specifying testing requirements and acceptance criteria for the steam line instrumentation, enforcing procedure use standards and heightened managerial oversight of power ascension testing.

The finding was more than minor because it was associated with the equipment performance attribute of the Mitigating Systems cornerstone and because it affected the cornerstone objective of ensuring the availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, all channels of the Unit 2 engineered safety feature actuation system (ESFAS) high steam flow protective function were not correctly calibrated after completion of steam generator replacement. As a result, operators declared the affected ESFAS channels inoperable and shutdown the plant in accordance with TS requirements. Per Inspection Manual Chapter (IMC) 0609.04, "Initial Screening and Characterization of Findings," the inspectors conducted a Phase 1 screen and determined the finding to be of very low safety significance (Green) because the performance deficiency was a qualification deficiency confirmed to result in loss of operability that did not result in an actual loss of safety function and did not screen as potentially risk significant due to external initiating events. This finding had a cross-cutting aspect in the area of human performance because PSEG did not provide complete, accurate and up-to-date design documentation, procedures, and work packages [H.2(c)]. Specifically, PSEG did not specify adequate testing requirements and acceptance criteria for steam flow instrumentation in the design change package 80083522, Supplement 12 as required by PSEG design change implementation procedure guidance.

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

**Significance:**  Dec 30, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

### **INADEQUATE IMPLEMENTATION OF RISK MANAGEMENT ACTIONS ASSOCIATED WITH PLANNED MAINTENANCE ON THE UNIT 2 PRESSURIZER POWER OPERATED RELIEF VALVES**

The inspectors identified a Green NCV of 10 CFR 50.65(a)(4) because PSEG did not implement prescribed risk management actions (RMA) while both Unit 2 pressurizer (PZR) power operated relief valves (PORV) were isolated. PSEG's corrective actions included adding the requirement for operators to record protected SSCs in the control room narrative log and training operators on the risk assessment process.

This finding was more than minor because PSEG did not implement a prescribed significant compensatory measure for an identified yellow risk condition. Specifically, PSEG did not implement equipment risk awareness and control measures while both PZR PORVs were isolated, and conducted testing on a protected component without the required

written authorization and supervision. The inspectors completed a Phase 1 screening of the finding per Appendix K of Inspection Manual Chapter (IMC) 0609, "Maintenance Risk Assessment and Risk Management Significance Determination Process." The inspector determined that the incremental core damage probability (ICDP), based on PSEG's risk analysis of the event, was 5.6E-8. Therefore, the inspectors determined the finding to be of very low safety significance (Green) because the ICDP for the event did not exceed 1.0E-6. The finding had a cross-cutting aspect in the area of human performance because PSEG did not define and effectively communicate expectations regarding procedural compliance and personnel did not follow procedures [H.4(b)]. Specifically, operators did not implement the RMAs specified by an approved risk assessment per PSEG work management and operations procedures.

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

**G**

**Significance:** Dec 30, 2008

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

**INADEQUATE DESIGN CONTROL FOR NO. 22 COMPONENT COOLING WATER HEAT EXCHANGER SERVICE WATER OUTLET TEMPERATURE CONTROL VALVE**

The inspectors identified a self-revealing NCV of 10 CFR 50, Appendix B, Criterion III, Design Control, because the No. 22 component cooling water heat exchanger (CCWHX) service water (SW) outlet temperature control valve (22SW127) did not stroke open when the 22 CCWHX was placed in service following a high flow flush on November 18, 2008. Specifically, PSEG did not ensure that the design basis was correctly translated into valve set-up instructions for the 22SW127 valve. PSEG's corrective actions included mechanical adjustment to the valve's stroke, revising the valve's set-up instructions, and an extent of condition review.

The finding was more than minor because it was associated with the design control attribute of the Mitigating Systems cornerstone and adversely affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. Specifically, the improper valve set-up instructions caused the 22SW127 to operate not as expected resulting in an unexpected rise in component cooling water (CCW) system temperatures after the 22CCWHX was placed in service on November 18, 2008. As a result operators declared the 22CCWHX inoperable and documented the condition in the corrective action program. In accordance with NRC IMC 0609 the inspectors determined the finding was of very low safety significance (Green) because it was a design deficiency that was confirmed not to result in a loss of CCW train operability. The finding has a cross-cutting aspect in the area of human performance, resources, because PSEG did not ensure that adequate resources were available to maintain complete, accurate and up-to-date design documentation, procedures, and work packages [H.2(c)]. Specifically, PSEG did not maintain the 22SW127 ICD card and valve set-up work order up-to-date in accordance with the valve's design basis documentation.

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

**G**

**Significance:** Aug 08, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

**INADEQUATE DESIGN CONTROL FOR MOTOR OPERATED VALVE CAPABILITY ASSESSMENTS**

The team identified a finding of very low safety significance (Green) involving a non-cited violation of 10 CFR 50, Appendix B, Criterion III, Design Control, in that PSEG had used non-conservative inputs and methodologies in calculating terminal voltages to safety related motor operated valve (MOV) motors during design basis events. Specifically, PSEG had not evaluated the effect of lower transient voltages which would exist for safety injection (SI) actuated MOVs prior to voltage recovery on the upstream 4Kv buses. PSEG entered the issue into their corrective action program and performed a review of all SI actuated valves to determine the impact on their margin to operate when considering transient voltage conditions.

The finding is more than minor because the deficiency represented reasonable doubt on the operability of several charging safety injection system valves which had minimal margin. The finding was associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the

availability, reliability and capability of systems that respond to initiating events to prevent undesirable consequences. The team determined the finding was of very low safety significance (Green) because it was a design deficiency confirmed not to result in the loss of the charging system safety function.

Inspection Report# : [2008007](#) (*pdf*)

**Significance:**  Aug 08, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

### **INADEQUATE DESIGN CONTROL FOR MOTOR OPERATED VALVE THERMAL OVERLOAD PROTECTION DEVICES**

The team identified a finding of very low safety significance (Green) involving a non-cited violation of 10 CFR 50, Appendix B, Criterion III, Design Control, in that PSEG had not implemented measures to verify that thermal overloads (TOLs) on safety-related MOV circuits were sized properly and periodically tested to verify the adequacy of the design. PSEG entered the issue into their corrective action program, completed an operability assessment for the affected equipment and will evaluate implementing testing or bypassing the TOLs during accident conditions to verify the adequacy of the design.

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The finding is more than minor because it is associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The team determined that the failure to assure that TOLs would not needlessly prevent safety related valves from performing their function, could affect the ability of MOVs to respond to initiating events. The team determined the finding was of very low safety significance (Green) because it was a design deficiency confirmed not to result in a loss of safety related valve operability.

Inspection Report# : [2008007](#) (*pdf*)

**Significance:**  Aug 08, 2008

Identified By: NRC

Item Type: NCV NonCited Violation

### **INADEQUATE DESIGN CONTROL FOR UNIT 2 CONTAINMENT SUMP VALVE DESIGN DP DETERMINATION**

The team identified a finding of very low safety significance (Green) involving a non-cited violation of 10 CFR 50, Appendix B, Criterion III, Design Control, in that PSEG had not validated a key design input regarding the assumed RHR pump operation time during a small break loss of coolant accident (SBLOCA) scenario. This design input was used to establish a new design basis differential pressure for the Unit 2 containment sump suction valves. PSEG entered the issue into the corrective action program, completed an operability assessment for the sump valves, and will evaluate long term actions to further evaluate design margin for the valves.

The finding is more than minor because the deficiency represented reasonable doubt on the operability of the containment sump valves with respect to a SBLOCA scenario. The finding is associated with the design control attribute of the Mitigating Systems Cornerstone and affected the cornerstone objective of ensuring the availability, reliability, and capability of systems that respond to initiating events to prevent undesirable consequences. The team determined the finding was of very low safety significance (Green) because it was a design deficiency that was confirmed not to result in a loss of containment sump suction valve operability. The finding had a cross-cutting aspect in the area of Human Performance, Resources, which requires licensees to ensure personnel, equipment, procedures, and other resources are available and adequate to assure nuclear safety. This issue is related to a design calculation not being complete in that PSEG had not verified that design inputs were conservative when establishing a revised design differential pressure for the Unit 2 containment sump suction valves.

Inspection Report# : [2008007](#) (pdf)

**G**

**Significance:** Jun 30, 2008

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

### **SALEM UNIT 2 LOSS OF REACTOR VESSEL LEVEL INDICATION SYSTEM**

A self-revealing non-cited violation of Technical Specification (TS) 6.8.1.a, "Procedures and Programs," was identified because PSEG did not adequately maintain the calibration of the Unit 2 reactor vessel level indication system (RVLIS). Specifically, scaling for both RVLIS dynamic range channels was not completed when required. This resulted in Unit 2 RVLIS being inoperable for 13-days.

The finding is more than minor because it is associated with the equipment performance attribute of the Mitigating Systems cornerstone and because it affected the cornerstone objective of ensuring the reliability of systems that respond to initiating events to prevent undesirable consequences. Specifically, operators were not aware that both channels of RVLIS were inoperable and could have taken non-conservative actions during an inadequate core cooling or loss of coolant inventory event. Per inspection manual chapter (IMC) 0609.04, "Initial Screening and Characterization of Findings," the inspectors conducted a Phase 1 screen and determined the finding to be of very low safety significance (Green).

This finding has a cross-cutting aspect in the area of human performance because PSEG did not appropriately coordinate work activities as necessary to keep personnel apprised of work status and the operational impact of work activities [H.3(b)]. Specifically, PSEG did not ensure RVLIS scaling was completed per the established work control process because engineering did not adequately communicate the importance of entering the new dynamic range coefficients to the operability of the RVLIS system.

Inspection Report# : [2008003](#) (pdf)

**G**

**Significance:** Mar 31, 2008

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

### **25SW24 FAILURE CAUSED 25 SERVICE WATER PUMP UNAVAILABILITY**

The inspectors identified a self-revealing non-cited violation of Technical Specification 6.8.1.a, "Procedures and Programs." The inspectors determined that maintenance procedures for the 25 service water strainer (SWS) blow down valve (25SW24) were inadequate because they did not ensure proper alignment of the valve and actuator. This resulted in the 25 service water pump (SWP) being inoperable for approximately 35 hours. PSEG returned the 25 SW train to service following completion of corrective maintenance on the blow down valve and verification of proper alignment of the valve and actuator. PSEG also revised the applicable maintenance procedures for future maintenance activities.

The finding is more than minor because it is associated with the procedure quality 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. In accordance with IMC 0609, Appendix A, "Significance Determination of Reactor Inspection Findings for At-Power Situations," the inspectors conducted a Phase 1 screen and determined that this finding was of very low safety significance.

The finding has a cross-cutting aspect in the area of problem identification and resolution because PSEG did not implement and institutionalize operating experience, including internally generated lessons learned, through changes to station processes, procedures, equipment, and training programs [P.2(b)]. Specifically, PSEG procedures did not incorporate internal operating experience to ensure proper alignment between the service water strainer blow down valve actuator and valve stem.

Inspection Report# : [2008002](#) (pdf)

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## Barrier Integrity

**Significance:**  Jun 30, 2008

Identified By: Self-Revealing

Item Type: NCV NonCited Violation

### **SALEM UNIT 2 22 CFCU VALVES MISPOSITIONED**

A self-revealing non-cited violation of TS 6.8.1.a, “Procedures and Programs” was identified because the 22 Containment Fan Coil Unit (CFCU) had cooling water flow to the motor cooler inadvertently isolated during a routine surveillance test. Specifically, the surveillance procedure did not include steps to operate specific gage isolation valves to place a test gage in service, and as a result technicians repositioned the wrong valves.

This finding is more than minor because it is associated with the system, structure, and component (SSC) and barrier performance attribute of the Barrier Integrity cornerstone and it affects the cornerstone objective of providing reasonable assurance that physical design barriers protect the public from radionuclide releases caused by accidents or events. Specifically, unavailability of the 22 CFCU represented an actual loss of defense in depth of a system that controls containment pressure. Per inspection manual chapter (IMC) 0609, Attachment 0609.04, “Determining the Significance of Reactor Inspection Findings for at-power Situations,” the inspectors conducted a Phase 1 screen and determined the finding to be of very low safety significance (Green) because the finding did not represent an actual open pathway in the physical integrity of reactor containment isolation system and heat removal components, did not involve an actual reduction in function of hydrogen igniters in containment, and did not screen as potentially risk significant due to external initiating events.

This finding has a cross-cutting aspect in the area of human resources because PSEG did not provide complete and accurate procedures for the performance of this surveillance test [H.2(c)]. Specifically, the continuous use procedure “Service Water Fouling Monitoring Containment Fan Coil Units”, revised on May 31, 2008, did not contain procedure steps to direct the opening and closing of valves that must be manipulated to successfully perform the procedure.

Inspection Report# : [2008003](#) (*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

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