



UNITED STATES  
NUCLEAR REGULATORY COMMISSION  
REGION I  
475 ALLENDALE ROAD  
KING OF PRUSSIA, PENNSYLVANIA 19406-1415

September 2, 2011

Mr. Thomas P. Joyce  
President and Chief Nuclear Officer  
PSEG Nuclear LLC - N09  
P.O. Box 236  
Hancock's Bridge, NJ 08038

SUBJECT: SALEM NUCLEAR GENERATING STATION, UNIT NOS. 1 AND 2 –  
NRC PROBLEM IDENTIFICATION AND RESOLUTION INSPECTION REPORT  
05000272/2011009 AND 05000311/2011009

Dear Mr. Joyce:

On July 21, 2011, the U. S. Nuclear Regulatory Commission (NRC) completed an inspection at your Salem Nuclear Generating Station, Unit Nos. 1 and 2. The enclosed report documents the inspection results discussed with Mr. Carl Fricker and other members of your staff during an exit meeting on July 21 and with Mr. Fricker during a telephone call on September 2.

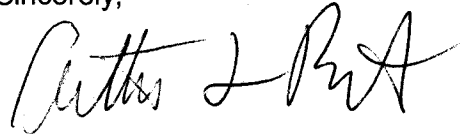
This inspection examined activities conducted under your license as they relate to identification and resolution of problems and compliance with the Commission's rules and regulations and conditions of your license. Within these areas, the inspection involved examination of selected procedures and representative records, observations of activities, and interviews with personnel.

Based on the samples selected for review, the inspectors concluded that PSEG was generally effective in identifying, evaluating, and resolving problems. PSEG personnel identified problems and entered them into the corrective action program at a low threshold. PSEG prioritized and evaluated issues commensurate with the safety significance of the problems and corrective actions were generally implemented in a timely manner.

However, the inspection identified one self-revealing finding for not completing timely corrective actions to repair excessive grooves discovered on the body wear surface for the 11 service water strainer. This issue resulted in an 11 service water strainer trip that rendered the 11 service water pump inoperable and unavailable and was determined to potentially have greater than very low safety significance. The safety significance determination process analysis for this issue was not completed at time of inspection report issuance. Although the finding has potential safety significance, it did not represent an immediate safety concern because it did not represent a complete loss of service water system operability on Unit 1. At the time, five out of the six Unit 1 service water pumps remained operable and available.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and your response (if any) will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of the NRC's document system (ADAMS). ADAMS is accessible from the NRC website at <http://www.nrc.gov/reading-rm/adams.html> (the Public Electronic Reading Room).

Sincerely,

A handwritten signature in dark ink, appearing to read "Arthur L. Burritt", written in a cursive style.

Arthur L. Burritt, Chief  
Projects Branch 3  
Division of Reactor Projects

Docket Nos: 50-272; 50-311  
License Nos: DPR-70; DPR-75

Enclosure: Inspection Report 05000272/2011009 and 05000311/2011009  
w/Attachment: Supplemental Information

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Sincerely,

/RA/

Arthur L. Burritt, Chief  
Projects Branch 3  
Division of Reactor Projects

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**U.S. NUCLEAR REGULATORY COMMISSION****REGION I**

Docket Nos: 50-272, 50-311

License Nos: DPR-70, DPR-75

Report No: 05000272/2011009 and 05000311/2011009

Licensee: PSEG Nuclear LLC (PSEG)

Facility: Salem Nuclear Generating Station, Unit Nos. 1 and 2

Location: P.O. Box 236  
Hancocks Bridge, NJ 08038

Dates: June 27 through July 1, 2011  
July 18 through July 22, 2011

Team Leader: Leonard Cline, Senior Project Engineer

Inspectors: Michael Modes, Senior Reactor Inspector  
Phillip McKenna, Resident Inspector  
Christopher Douglas, Project Engineer

Approved by: Arthur L. Burritt, Chief  
Projects Branch 3  
Division of Reactor Projects

Enclosure

## SUMMARY OF FINDINGS

IR 05000272/2011009, 05000311/2011009; 06/27/2011 - 07/15/2011; Salem Nuclear Generating Station, Unit Nos. 1 and 2; Biennial Baseline Inspection of Problem Identification and Resolution. The inspectors identified one finding in the area of implementation of corrective actions.

This NRC team inspection was performed by three regional inspectors and one resident inspector. The inspectors identified one finding of very low safety significance (Green) during this inspection and classified the finding as an NCV. The significance of most findings is indicated by their color (Green, White, Yellow, Red) using NRC Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or assigned a severity level after NRC management review. Cross-cutting aspects associated with findings are determined using IMC 0310, "Components Within the Cross-Cutting Areas." The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

### Problem Identification and Resolution

The inspectors concluded that PSEG was generally effective in identifying, evaluating, and resolving problems. PSEG personnel identified problems, entered them into the corrective action program at a low threshold, and prioritized issues commensurate with their safety significance. In most cases, PSEG appropriately screened issues for operability and reportability, and performed causal analyses that appropriately considered extent of condition and cause, generic issues, and previous occurrences. The inspectors also determined that PSEG typically implemented corrective actions to address identified problems in a timely manner. However, for one issue reviewed by the inspectors, the corrective actions completed by PSEG were not timely and the inspectors determined that this was a violation of NRC requirements, in the area of corrective action implementation.

The inspectors concluded that, in general, PSEG adequately identified, reviewed, and applied relevant industry operating experience to Salem operations and identified appropriate corrective actions. In addition, based on those items selected for review, the inspectors determined that PSEG self-assessments and audits were thorough and appropriately used the corrective action program to initiate corrective actions for identified issues.

With respect to safety conscious work environment, based on interviews and reviews of the corrective action program and the employees concerns program (ECP) the inspectors did not identify conditions that negatively impacted the site's safety conscious work environment and determined that site personnel were willing to raise safety issues through multiple means.

### **Cornerstone: Initiating Events**

TBD. The inspectors identified a self-revealing apparent violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," because the 11 service water strainer overloads tripped on February 9, 2011, due to binding of the strainer rotating drum, which rendered the 11 service water strainer pump inoperable and unavailable. The binding occurred because PSEG did not complete timely corrective actions for a condition adverse to quality identified following an April 4, 2010, 11 service water strainer trip. Specifically, PSEG did not repair excessive grooves identified on the 11 service water strainer body wear surface by taking the actions specified in their corrective action program in January 2011. As a result, the grooves caused river grass to

become trapped between the rotating strainer drum and the body wear surface, which eventually bound and tripped the strainer overloads. As corrective action, before the next spring grassing season, PSEG will temporarily fill in the grooves on the 11 service water strainer body wear surface and then trend the body wear ring condition for future replacement with a monel wear ring. PSEG entered this issue into the corrective action program as 20523166.

This performance deficiency was more than minor because it was associated with the equipment performance attribute of the initiating events and mitigating systems cornerstones. The finding affected the cornerstones' objectives to limit the likelihood of those events that could upset plant stability and challenge critical safety functions during power operations and to ensure the availability and reliability of systems that respond to initiating events to prevent undesirable consequences. Specifically, not promptly correcting the excessive grooving identified on that strainer's body wear ring degraded the availability and reliability of the 11 service water train. The significance of this finding is designated as To Be Determined (TBD) until a regional senior reactor analyst completes a Phase 3 analysis, in accordance with IMC 0609, Appendix A, "Determining the Significance of Reactor Inspection Findings for At-Power Situations" (IMC 0609A). Phase 1 screened the finding to Phase 2 because the inspectors concluded that the finding contributed to both the likelihood of a reactor trip and the likelihood that mitigating systems would not have been available. This conclusion was based upon the increased chance of a loss of service water given one train being removed for strainer repairs and the loss of redundancy in the service water system to cool mitigating equipment over the assumed 53 hour exposure period. The Phase 3 analysis was required because the Salem Pre-solved Risk-Informed Inspection Notebook does not address the loss of one train of service water. This finding has a cross-cutting aspect in the area of problem identification and resolution, corrective action program, because PSEG did not take appropriate corrective actions to address a safety issue in a timely manner, commensurate with the safety-significance and complexity [P.1(d)]. Specifically, PSEG did not implement timely actions to repair excessive grooves identified in the 11 service water strainer body wear ring in January 2011 because work control documents were not correctly coded in July 2010. (4OA2.1c(3))

## REPORT DETAILS

### 4. OTHER ACTIVITIES (OA)

#### 4OA2 Problem Identification and Resolution (71152B)

This inspection constitutes one biennial sample of problem identification and resolution as defined by Inspection Procedure 71152. All documents reviewed during this inspection are listed in the Attachment to this report.

#### .1 Assessment of Corrective Action Program Effectiveness

##### a. Inspection Scope

The inspectors reviewed the procedures that described PSEG's corrective action program at Salem. To assess the effectiveness of the corrective action program, the inspectors reviewed performance in three primary areas: problem identification, prioritization and evaluation of issues, and corrective action implementation. The inspectors compared performance in these areas to the requirements and standards contained in 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," and PSEG procedure LS-AA-125, "Corrective Action Program Procedure." For each of these areas, the inspectors considered risk insights from the station's risk analysis and reviewed notifications selected across the seven cornerstones of safety in the NRC's Reactor Oversight Process. Included in this sample were notifications that documented PSEGs evaluation and corrective actions for a selective sample of NRC-identified non-cited violations and findings that had been identified since the last biennial problem identification and resolution inspection completed in June 2009. Additionally, the inspectors attended plan-of-the-day, station ownership committee, and management review committee meetings. The inspectors selected items from the following functional areas for review: engineering, operations, maintenance, emergency preparedness, radiation protection, chemistry and physical security.

##### (1) Effectiveness of Problem Identification

In addition to the items described above, the inspectors reviewed system health reports, a sample of completed corrective and preventative maintenance work orders, completed surveillance test procedures, operator logs, and periodic trend reports. The inspectors also completed field walkdowns of various systems on site, such as the service water, emergency diesel generator, safety injection and auxiliary feedwater systems. Additionally, the inspectors reviewed a sample of notifications written to document issues identified through internal self-assessments, audits, emergency preparedness drills, and the operating experience program. The inspectors completed this review to verify that PSEG entered conditions adverse to quality into their corrective action program as appropriate.

##### (2) Effectiveness of Prioritization and Evaluation of Issues

The inspectors reviewed the evaluation and prioritization of a sample of notifications issued since the last NRC biennial Problem Identification and Resolution inspection completed in June 2009. The inspectors also reviewed notifications that were assigned lower levels of significance that did not include formal cause evaluations to ensure that

they were properly classified. The inspectors' review included the appropriateness of the assigned significance, the scope and depth of the causal analysis, and the timeliness of resolution. The inspectors assessed whether the evaluations identified likely causes for the issues and developed appropriate corrective actions to address the identified causes. The inspectors also verified that, when necessary, issue evaluations addressed equipment operability, NRC reporting requirements, and other areas potentially affected by the identified performance deficiencies.

### (3) Effectiveness of Corrective Actions

The inspectors reviewed PSEG's completed corrective actions through documentation review and, in some cases, field walkdowns to determine whether the actions addressed the identified causes of the problems. The inspectors also reviewed notifications for adverse trends and repetitive problems to determine whether corrective actions were effective in addressing the broader issues. The inspectors reviewed PSEG's timeliness in implementing corrective actions and effectiveness in precluding recurrence for significant conditions adverse to quality. The inspectors also reviewed a sample of notifications associated with selected non-cited violations and findings to verify that PSEG personnel properly evaluated and resolved these issues. In addition, the inspectors expanded the corrective action review to five years to evaluate PSEG actions related to service water and circulating water grassing, control air system moisture, control room chillers, safety injection pump bearings, and residual heat removal system oil leaks.

#### b. Assessment

##### (1) Effectiveness of Problem Identification

PSEG staff at Salem initiated approximately 11,800 notifications between June 2009 and May 2011. For this inspection, as part of the scope described above, the inspectors reviewed the documentation associated with approximately 150 of these notifications. Based on the samples selected for review, the inspectors determined that PSEG identified problems and entered them into the corrective action program at a low threshold.

The inspectors observed supervisors at the plan-of-the-day, station ownership committee, and management review committee meetings appropriately questioning and challenging notifications to ensure clarification of the issues that allowed for appropriate assignments for follow-up actions. The inspectors also concluded that PSEG trended equipment and programmatic issues at a low level, and appropriately documented problems identified through trending in the site's corrective action program.

The inspectors determined that, when appropriate, in response to inspector observations during this inspection, PSEG personnel promptly initiated notifications and took immediate action to address the issues of concern. In addition, based on the scope of issues reviewed by the inspectors, the inspectors did not identify concerns that were not appropriately entered into the corrective action program for evaluation and resolution.

##### (2) Effectiveness of Prioritization and Evaluation of Issues

The inspectors determined that, in general, PSEG appropriately prioritized and evaluated issues commensurate with the safety significance of the identified problem.



PSEG screened notifications for operability and reportability, categorized the notifications by significance, and assigned actions to the appropriate department for evaluation and resolution. The notification screening process considered human performance issues, radiological safety concerns, repetitiveness, adverse trends, and potential impact on the safety conscious work environment.

Items reviewed by the inspectors during the inspection were categorized for evaluation and resolution commensurate with the significance of the issues. Guidance provided by PSEG procedure LS-AA-120, "Issue Identification and Screening Process," for categorization appeared sufficient to ensure consistent implementation based on the sample of notifications reviewed by the inspectors. In general, issues were appropriately screened and prioritized commensurate with their safety significance.

The inspectors reviewed 15 root cause analyses, 26 apparent cause analyses, 6 common cause evaluations and approximately 20 work group evaluations. For the evaluations reviewed, the inspectors noted that PSEG's evaluations were generally thorough. Operability and reportability determinations were generally documented when conditions warranted and in most cases, the evaluations supported the conclusion. Causal analyses appropriately considered the extent of condition or problem, generic issues, and previous occurrences of the issue.

### (3) Effectiveness of Corrective Actions

The inspectors reviewed notification disposition documentation and verification of corrective action implementation through reviews of implementing orders and discussions with personnel involved for over 150 PSEG notifications. The inspectors concluded, based on the samples reviewed, that corrective actions for identified deficiencies were typically timely and adequately implemented and that for significant conditions adverse to quality, PSEG identified actions to prevent recurrence and performed in-depth effectiveness reviews to verify that implemented corrective actions were effective. However, in one case, as a result of a review of PSEG's corrective actions for repetitive trips of service water strainers during periods of high river water grass since 2006, the inspectors identified one example of more than minor significance where PSEG did not implement timely corrective actions. This finding is documented below.

#### c. Findings

##### (1) Untimely Completion of Corrective Actions Results in No. 11 Service Water Strainer Trip Due To Grassing

Introduction. The inspectors identified a self-revealing apparent violation of 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," because the 11 service water strainer overloads tripped on February 9, 2011, due to binding of the strainer rotating drum, which rendered the 11 service water pump inoperable and unavailable. The binding occurred because PSEG did not complete timely corrective actions for a condition adverse to quality identified following an April 4, 2010, 11 service water strainer trip. Specifically, PSEG did not repair excessive grooves on the strainer body wear surface by taking the actions specified in the corrective action program in January 2011. The grooves caused river grass to become trapped between the rotating strainer drum and body wear surface, which eventually bound and tripped the strainer overloads.

Description. The Salem service water system is designed to supply cooling water to safety-related equipment under all credible environmental and weather-related conditions. The system consists of six pumps divided into two redundant trains, three pumps each. The pumps take suction from the Delaware River through trash racks and traveling screens designed to protect the pumps from river debris, while each pump discharges through an automatic self-cleaning strainer designed to protect the system's heat exchangers from tube blockage.

On February 9, 2011, the 11 service water strainer thermal overloads tripped due to binding caused by river grass that wedged between the strainer drum and body. Tripping of a service water strainer due to binding makes the associated service water pump inoperable. PSEG determined that the cause of the binding was not installing a previously approved strainer design change intended to improve the service water strainers resistance to grass binding.

Each service water strainer assembly consists of a vertical mounted conical shaped drum with 1104 strainer media elements. The strainer drum rotates inside the strainer body with 0.015 to 0.063 inches of clearance between the drum and body to ensure the drum rotates freely. This clearance also allows a small amount of flow to bypass the strainer elements. Because this bypass flow results in river debris reaching and potentially fouling system safety-related heat exchangers, it is important to minimize it by maintaining the clearance between the drum and body small. In 2000, due to repetitive heat exchanger fouling and strainer binding issues caused by this bypass flow, PSEG modified the design of the bottom of the service water strainer drum with a wear ring that included an embedded rubber o-ring that decreased the clearance between the drum and the body.

After this design change, PSEG determined that, due to the silt entrained in the river water, even the small amount of bypass flow around the newly installed o-ring caused wear on the strainer drum and body. This wear over time increased the size of the gap between the drum and body and caused grooves on the body wear surface around the o-ring. The increasing gap, if not monitored and managed, caused higher bypass flow that both allowed grass and debris to bypass the strainer elements and drew grass and debris into the gap where it accumulated due to the tight clearances and o-ring wear grooves on the strainer body wear surface. The accumulation of grass in this area was not cleared during strainer backwash cycles and when it built up, caused increased friction between the drum and body. This increased the amount of current needed to rotate the strainer drum and eventually caused the thermal overload to trip due to the higher current. This was what caused the 11 strainer to trip on February 9, 2011.

PSEG determined that maintaining the strainer bodies was critical to preventing excessive bypass flow that could lead to grass accumulation and accelerated strainer wear. PSEG controls the gap between the strainer drum and body to within the vendor recommendations by performing preventative maintenance to inspect and adjust the service water strainer clearances every six months. Adjustments to the strainer during performance of this preventative maintenance were completed based upon the system engineer's reviews of the gap measurements and wear grooves. In addition, to further control the gap, PSEG performed the industry standard, every six year, service water strainer internal inspections every three years due to the harsh river water conditions at Salem. In the early 2000s, due to excessive wear grooves that were developing on the strainer body wear surfaces from the o-ring, PSEG issued a design change to modify the strainer bodies to include a monel wear ring. The intent of the design change was that

the new wear ring material would increase the hardness of the wear surface increasing the wear surfaces durability and wear resistance and reducing the frequency of wear ring repairs. This modification was not installed on the 11 strainer at the time of the February 9, 2011, trip.

PSEG identified, during its cause evaluation for the February 2011 trip, that a similar trip of the 11 service water strainer had occurred one year earlier on April 4, 2010. The apparent cause evaluation for that trip determined the cause of the trip was untimely replacement of the 11 service water strainer body wear ring. The 11 service water strainer body configuration at the time of the April 2010 and February 2011 trips was the configuration provided by the 1993 strainer replacement project. Because the monel wear ring was not installed, without interim corrective action, over time, due to the o-ring an excessive groove developed on the strainer body, which increased the susceptibility of the strainer to grass clogging. The groove on the 11 strainer body wear surface was a condition adverse to quality that PSEG identified in April 2010. At the time of the April 2010 trip, the groove was approximately 180 mils deep and 375 mils wide and by February 2011, due to no corrective actions being completed, the groove width increased to 500 mils with no increase in depth. After the April 2010 11 service water trip, PSEG determined that, in addition to the 11 strainer, five other strainers did not have the monel wear ring design change (14, 16, 23, 24, and 26) installed.

As documented in order 70109406, PSEG's corrective action for the April 2010 11 service water strainer trip was to develop and schedule the replacement plan for the six strainers that did not have the monel wear ring installed. This corrective action was documented as completed based on scheduling the work orders for the body replacement for all six strainers. The 11 strainer work was scheduled to be completed in January 2011. However, due to limited resources, the work was re-scheduled to January 2012. PSEG determined that the rescheduling was allowed to occur because the work was not properly coded as a plant health committee significant issue or as a grassing readiness priority in accordance with WC-AA-101-1002, "On-line Work Schedule Process." As a result, the identified condition adverse to quality was not promptly corrected and the 11 service water strainer tripped on February 9, 2011, due to grass binding, making the 11 service water pump inoperable and unavailable for 53 hours.

To address the performance deficiency, PSEG scheduled an interim design change for the 11 service water strainer to plasma spray the body wear ring before the next spring grassing season in January 2012. The plasma spray process will temporarily re-fill the groove in the strainer body wear ring. PSEG will then trend the 11 strainer body wear ring condition for future replacement with the monel wear ring. The monel wear ring design change on the 11 service water strainer is currently scheduled to be completed in April 2013.

PSEGs cause evaluation for the February 2011 strainer trip also identified four other strainers (14, 16, 23, and 26) that still did not have the monel wear ring design change installed. Before the next spring grassing season, PSEG will either install the monel wear ring design change or complete temporary repairs if excessive grooving (greater than 0.125 inches deep) exists on the body wear surfaces for these strainers. PSEG will then monitor the strainers condition until the permanent repairs can be completed. In addition to the strainer repairs, PSEG revised service water system abnormal operating procedures to require operators to place the intake traveling screens in manual and the

strainers in continuous blowdown operation during heavy grassing periods. This resulted in no strainer trips caused by grassing during the April 2011 grass peak.

Analysis. The inspectors concluded that not completing timely repairs for excessive grooves identified on the 11 service water strainer body wear surface after the April 4, 2010, strainer trip was a performance deficiency. The untimely corrective actions resulted in the February 9, 2011, 11 service water strainer trip. This performance deficiency was more than minor because it was associated with the equipment performance attribute of the initiating events and mitigating systems cornerstones. The finding affected the cornerstones' objectives to limit the likelihood of those events that could upset plant stability and challenge critical safety functions during power operations and to ensure the availability and reliability of systems that respond to initiating events to prevent undesirable consequences. Specifically, not completing timely corrective actions for excessive grooving identified on 11 strainer's body wear ring in January 2011 degraded the availability and reliability of the 11 service water pump.

The significance of this finding is designated as To Be Determined (TBD) until a regional senior reactor analyst completes a Phase 3 analysis, in accordance with IMC 0609, Appendix A, "Determining the Significance of Reactor Inspection Findings for At-Power Situations." Phase 1 screened the finding to Phase 2 because the inspectors concluded that the finding contributed to both the likelihood of a reactor trip and the likelihood that mitigating systems would not have been available. This conclusion was based upon the increased chance of a loss of service water given one train being removed for strainer repairs and the loss of redundancy in the service water system to cool mitigating equipment over the assumed 53 hour exposure period. The Phase 3 analysis was required because the Salem Pre-solved Risk-Informed Inspection Notebook does not address the loss of one train of service water. The Phase 3 analysis was not completed at the time of inspection report issuance. The analysis will be completed following determination of the proper assumptions for the increase in the loss of service water event frequency and the increase in the common cause failure probability, given the performance deficiency.

This finding has a cross-cutting aspect in the area of problem identification and resolution, corrective action program, because PSEG did not take appropriate corrective actions to address a safety issue in a timely manner, commensurate with the safety-significance and complexity [P.1(d)]. Specifically, PSEG did not implement timely actions to repair excessive grooves identified in the 11 service water strainer body wear ring in January 2011 because work control documents were not correctly coded in July 2010.

Enforcement. 10 CFR 50, Appendix B, Criterion XVI, "Corrective Action," requires, in part, that measures shall be established to assure that conditions adverse to quality, such as failures, malfunctions, deficiencies, deviations, defective material and equipment, and non-conformances are promptly identified and corrected. Contrary to the above, in July 2010, PSEG did not establish adequate measures to assure that a condition adverse to quality identified on the 11 service water strainer was promptly corrected. Specifically, because work control documents were not correctly coded in July 2010, PSEG did not repair excessive grooves identified on the 11 service water strainer body wear ring in January 2011. As a result, on February 9, 2011, the 11 service water strainer overloads tripped due to binding of the strainer rotating drum. PSEG entered the issue into the corrective action program as NOTF 20523166. Pending completion of the safety significance determination process analysis for this

issue, the finding was identified as an apparent violation. **(AV 05000272/3112011009-01, Untimely Completion of Corrective Actions Results in No. 11 Service Water Strainer Trip Due To Grassing)**

.2 Assessment of the Use of Operating Experience

a. Inspection Scope

The inspectors reviewed a sample of notifications associated with review of industry operating experience to verify that PSEG appropriately evaluated the operating experience information for applicability to Salem and had taken appropriate actions, when warranted. The inspectors also reviewed evaluations of operating experience documents associated with a sample of NRC generic communications to ensure that Salem adequately considered the underlying problems associated with the issues for resolution via their corrective action program.

b. Assessment

The inspectors determined that PSEG appropriately considered industry operating experience information for applicability, and used the information for corrective and preventive actions to identify and prevent similar issues when appropriate. The inspectors determined that operating experience was appropriately applied and lessons learned were communicated and incorporated into plant operations and procedures when applicable. The inspectors also observed that industry operating experience was routinely discussed and considered during the conduct of Plan-of-the-Day meetings and pre-job briefs.

c. Findings

No findings were identified.

.3 Assessment of Self-Assessments and Audits

a. Inspection Scope

The inspectors reviewed a sample of audits, including the most recent audit of the corrective action program, departmental self-assessments, and assessments performed by independent organizations. Inspectors performed these reviews to determine if PSEG entered problems identified through these assessments into the corrective action program, when appropriate, and whether PSEG initiated corrective actions to address identified deficiencies. The inspectors evaluated the effectiveness of the audits and assessments by comparing audit and assessment results against self-revealing and NRC-identified observations made during the inspection.

b. Assessment

The inspectors concluded that self-assessments, audits, and other internal PSEG assessments were generally critical, thorough, and effective in identifying issues. The inspectors observed that PSEG personnel knowledgeable in the subject completed these audits and self-assessments in a methodical manner. PSEG completed these audits and self-assessments to a sufficient depth to identify issues which were then entered into the corrective action program for evaluation. In general, the station

implemented corrective actions associated with the identified issues commensurate with their safety significance.

c. Findings

No findings were identified.

.4 Assessment of Safety Conscious Work Environment (SCWE)

a. Inspection Scope

During interviews with station personnel, the inspectors assessed the safety conscious work environment at Salem. Specifically, the inspectors interviewed personnel to determine whether they were hesitant to raise safety concerns to their management and/or the NRC. The inspectors reviewed implementation of the site employee concerns program (ECP). Specifically, the inspectors reviewed the site procedure for conducting ECP investigations and reviewed a sample of ECP files to assess the program's effectiveness at addressing potential safety issues and to verify that PSEG entered issues into the corrective action program when appropriate. The inspectors also reviewed the results of the contractor-performed January 2011 Nuclear Safety Culture Assessment and PSEG's December 2009 Nuclear Safety Culture Principles Self-Assessment. The review included a discussion of the corrective actions identified by PSEG to address issues uncovered during the assessments.

b. Assessment

Based on interviews and reviews of the corrective action program and the ECP, the inspectors determined that site personnel were willing to identify and raise safety issues. All persons interviewed demonstrated an adequate knowledge of the avenues available for raising safety concerns including the corrective action program and ECP. The inspectors also determined that the results of the nuclear safety culture surveys conducted in December 2009 and January 2011 provided PSEG insights into the safety culture of the site workforce.

c. Findings

No findings were identified.

4OA6 Meetings, Including Exit

On July 21, 2011, the inspectors presented the inspection results to Mr. C. Fricker, Salem Site Vice President, and other members of the Salem staff. The inspectors verified that no proprietary information was retained by the inspectors or documented in this report.

On September 2, 2011, during a telephone call with Mr. C. Fricker, the inspectors discussed the status of the phase 3 significance determination process analysis for the finding related to untimely completion of corrective actions for 11 SW strainer. At that time the inspectors informed Mr. Fricker that the report would document the significance

of the finding as TBD pending determination of the proper assumptions for the increase in the loss of service water event frequency and the increase in the common cause failure probability relative to the performance deficiency.

ATTACHMENT: SUPPLEMENTAL INFORMATION

Enclosure

**SUPPLEMENTAL INFORMATION****KEY POINTS OF CONTACT****Licensee Personnel**

C. Fricker, Site Vice President  
 L. Wagner, Plant Manager  
 M. Bruecks, Director Security  
 R. DeSanctis, Director Maintenance  
 J. Garecht, Director Operations  
 L. Rajkowski, Director Engineering  
 M. Headrick, Manager Employee Concerns  
 J. Kandasamy, Manager Regulatory Assurance  
 J. Stavely, Manager Nuclear Oversight  
 S. Taylor, Manager Radiation Protection  
 M. Wagner, Performance Improvement Manager  
 J. Arena, Performance Improvement Support  
 H. Berrick, Regulatory Compliance  
 T. Cachaza, Performance Improvement Support  
 E. Villar, Regulatory Compliance  
 J. Arena, Performance Improvement Support

**LIST OF ITEMS OPENED, CLOSED, DISCUSSED, AND UPDATED****Opened and Closed**

05000272, 311/2011009-01	AV	Untimely Completion of Corrective Actions Results in No. 11 Service Water Strainer Trip Due To Grassing
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**LIST OF DOCUMENTS REVIEWED****Section 40A2: Problem Identification and Resolution****Audits and Self-Assessments**

70095327, Boric Acid Corrosion Control Functional Area Self-Assessment (FASA), 04/16/09  
 70096371, Contamination Control Self-Assessment, 09/03/09  
 70098506, 2009 Maintenance Resource Management FASA, 07/13/09  
 70106832, Salem Emergency Preparedness and its Implementing Procedure Self-Assessment,  
 04/30/2010  
 80101252, Emergency Preparedness Audit, 04/14/2010  
 80102024, Engineering Programs and Station Blackout Audit, 08/11/10  
 80103001, Security Plan, FFD, Access Authorization, and PADS Audit, 02/02/11  
 70118428, 2011 Problem Identification and Resolution FASA, 03/04/11  
 70098602, Nuclear Safety Culture Principles Self Assessment, 12/11/09  
 80103804, Corrective Action Program Audit Report, 05/18/2011  
 70109034, Component Design Bases Inspection FASA, 09/15/10  
 70092328, Adverse Condition Monitoring Effectiveness, 09/18/09



Condition Reports

20417280	20267714	20406749	20479582	20446414
20417626	20388347	20407953	20483408	20445647
20425928	20397713	20409949	20482161	20510037
20435006	20413128	20418071	20483619	20510035
20443188	20419423	20428645	20487750	20510034
20457965	20498433	20430169	20487842	20509262
20462560	20505452	20433213	20490787	20509184
20483570	20505453	20439278	20494178	20508042
20491696	20451912	20439815	20495260	20507968
20494419	20187133	20440514	20495818	20510255
20505378	20262270	20451211	20495922	20448538
20512712	20277684	20452701	20499967	20448540
20367060	20284783	20452998	20504540	20405289
20324061	20294705	20454116	20504544	20506132
20419661	20330790	20464750	20504911	20505836
20267714	20330961	20465141	20505092	20505720
20388347	20332776	20467120	20449195	20502800
20397713	20339102	20469515	20422673	20301686
20413128	20347302	20470602	20501675	20501037
20419423	20356908	20472533	20506984	20499642
20498433	20361055	20472897	20508494	20506137
20505452	20361916	20457056	20510374	20451229
20505453	20366420	20476809	20097981	20434554
20451912	20379814	20476813	20205100	20465672
20358322	20382427	20476814	20227288	20419661
20354920	20382938	20476815	20264009	20401134
20367060	20383151	20476816	20254414	20478887
20324061	20386825	20476817	20451940	20437047

Cause Evaluations

70051392	70120414	70110851	70120053	70116493
70077526	70122605	70112123	70120420	70106673
70092295	70112239	70112241	70120534	70103591
70122711	70103430	70112630	70120414	70112241
70124648	70100173	70114571	70120882	70112239
70124565	70045133	70115067	70121613	70111625
70111159	70094482	70115200	70121619	70111537
70115587	70070964	70115231	70121621	70109827
70121626	70071995	70116446	70122004	70106627
70122719	70087882	70116452	70122594	70106293
70123045	70094138	70117931	70122739	70090887
70107468	70096332	70119028	70123710	70118218
70079931	70096759	70119029	70122874	70120968
70078030	70098506	70119042	70105118	70109406
70048918	70102030	70119150	70105604	70066657
70074694	70104321	70119153	70110652	
70112680	70110664	70119155	70115842	
70119080	70110650	70119723	70115228	

### Drawings

205200, Unit 1 Control Air – Turbine Building, Sh.1, Revision 51  
 205243, Unit 1 Control Air – Auxiliary Building, Sh. 1, Revision 47  
 205247, Unit 1 Control Air – Reactor Control & Penetration Area, Sh. 1, Revision 49  
 205332, Unit 2 Residual Heat Removal PI&D, Sh. 1, Revision 36  
 604495, Units 1&2 Control Air Yard Area - Station Blackout, Revision 2

### Operating Experience

70109152, Post Tritium Report  
 70109718, 11A Circ Water Pump Casing Cracked  
 70109788, NRC Information Notice 2010-04  
 70119956, NRC Information Notice 2010-20  
 70078424, Intake Cooling Water Blockage Corrective Action Effectiveness Review  
 70123625, Inconsistent Implementation of Operating Experience Procedure  
 70118713, Operating Experience Review From CDBI Self Assessment  
 70123261, Service Water Piping Issues  
 70109106, Auxiliary Feed Pump Actuation

### NCVs and Findings

05000272/2009003-02, Inadequate maintenance of the 13 AFW pump governor  
 05000311/2009003-01, Improper MR scoping of the service water intake structure sump system  
 05000272/311/2009007-01, Failure to establish goals and monitor for (a)(1) service water system  
 05000311/2009005-01, Unit 2 Degradation of Shutdown Cooling Caused by Failure of 22RH18  
 05000311/2009005-02, Inadequate Maintenance of the 22 CCHX Service Water Outlet Butterfly Valve  
 05000272/311/2010002-01, Chillers Inoperability Exceeds TS AOT  
 05000272/311/2010003-02, 21 SGFP Trip  
 05000272/311/2010005-01, 13 TDAFW pump trip mechanism  
 05000272/311/2011007-01, Inadequate Calculations for Degraded Voltage Relay Set Point  
 05000272/311/2011007-02, Failure to Perform a TS Required Battery Performance Test  
 05000272/311/2009403-01, Failure to Detect Penetration or Attempted Penetration at the Protected Area Boundary  
 05000272/311/2009403-02, Inadequate Protected Area Entry Search  
 05000272/311/2011007-03, Failure to Identify and Correct A Condition Adverse to Quality Affecting CREACS Expansion Joints

### LEERS

05000272/2010-001-0, Automatic Start of the 1C Emergency Diesel Generator (EDG)  
 05000272/2010-002-0, Missed Containment Spray Valve Surveillance Per Technical Specification 4.0.5  
 05000272/2010-004-0, Technical Specification 3.0.4.b Non-Compliance  
 05000272/2008-002-0, Automatic Reactor Trip Due to Main Power Transformer Bushing Failure

### Procedures

LS-AA-115, Operating Experience Program, Revision 12  
 LS-AA-115-1001, Manual for Processing OE1 Documents, Revision 1  
 LS-AA-115-1002, Manual for Processing OE2 Documents, Revision 0  
 LS-AA-115-1003, Manual for Processing OE3 Documents, Revision 0  
 LS-AA-115-1004, Manual for Processing OE4 Documents, Revision 0  
 ER-AA-3130-1005, Maintenance Rule Dispositioning between (a)(1) and (a)(2), Revision 7

ER-AA-310, Implementation of the Maintenance Rule, Revision 8  
 LS-AA-120, Issue Identification and Screening Process, Revision 10  
 LS-AA-125, Corrective Action Program (CAP) Procedure, Revision 13  
 LS-AA-125-1002, Common Cause Analysis Manual, Revision 7  
 LS-AA-125-1003, Apparent Cause Evaluation Manual, Revision 11  
 LS-AA-125-1004, Effectiveness Review Manual, Revision 4  
 LS-AA-126, Self-Assessment Program, Revision 9  
 LS-AA-126-1001, Focused Area Self-Assessments, Revision 5  
 LS-AA-126-1005, Check-In Self-Assessments, Revision 4  
 SC.IC-TI.CA-0001, Control Air Dryers Preventative Maintenance, Revision 3  
 SC.MD-PM.AF-0007, 13 and 23 Auxiliary Feedwater Turbine Linkage Inspection and Lubrication, Revision 2  
 WC-AA-106, Work Screening and Processing, Revision 11  
 LS-AA-125-1001, Root Cause Evaluation Manual, Revision 8  
 LS-AA-125-1005, Coding and Analysis Manual, Revision 6  
 LS-AA-125-1006, Department and Station Roll-up Meetings (DRUM SRUM), Revision 2  
 LS-AA-125-F1, Salem/Hope Creek MRC Evaluation and Effectiveness Checklist and Grading Sheet, Revision 2  
 LS-AA-125-F2, Salem/Hope Creek Long Term Corrective Action Request (LTCA)  
 LS-AA-125-F4, Work Group Evaluation (WGE)  
 LS-AA-126-1002, Management Observation of Activities, Revision 2

#### Maintenance Work Orders

60060469	30117617	50141282	60087672	60093560
60080965	30184482	40026546	60087673	60083756
60083302	30189127	30188428	60087602	60085587
60084441	50127727	30192058	30186829	60089150
60086615	50127830	30192351	60086708	30182608
60080388	50138541	30193195	30176991	60089757
30164377	50139495	30193210	30190777	60083368
30076957	50139801	30186321	30079595	
30174943	50140351	60091716	60078098	

#### Completed Surveillances

S1.OP-ST.DG-002, 1B Diesel Generator Surveillance Test, Completed 06/13/11  
 S1.OP-ST.DG-0014, 1C Diesel Generator Endurance Run, Completed 03/16/11  
 S2.OP-ST.DG-004, 21 Fuel Oil Transfer System Operability Test, Completed 06/13/11  
 S2.OP-ST.DG-0019, 2A Diesel Generator Hot Restart Test, Completed 02/04/11  
 S2.OP-ST.DG-004, 21 Fuel Oil Transfer System Operability Test, Completed 07/11/11  
 S1.OP-ST.AF-0003, Inservice Testing – 13 Auxiliary Feedwater Pump, 06/30/11  
 S1.OP-ST.AF-0004, Inservice Testing - Auxiliary Feedwater Valves, 06/13/11  
 S1.OP-ST.AF-0008, Auxiliary Feedwater Valve Verification Modes 1-3, 06/20/11  
 S2.OP-ST.AF-0003, Inservice Testing – 23 Auxiliary Feedwater Pump, 05/06/11  
 S2.OP-ST.AF-0006, Inservice Testing - Auxiliary Feedwater Valves, 05/24/11  
 S2.OP-ST.AF-0009, Plant Systems – Auxiliary Feedwater, 05/04/11

Miscellaneous

Station Air System Health Report- 2<sup>nd</sup> Quarter 2011  
 Unit 1 Auxiliary Feedwater System Health Report– 2<sup>nd</sup> Quarter 2011  
 Unit 2 Auxiliary Feedwater System Health Report – 2<sup>nd</sup> Quarter 2011  
 Unit 1 Residual Heat Removal System Health Report – 2<sup>nd</sup> Quarter 2011  
 Unit 2 Residual Heat Removal System Health Report – 2<sup>nd</sup> Quarter 2011  
 Salem Control Air Quality Test Results, September, 2009 to June 2011  
 Emergency Preparedness Training Drill Critique Report (S11-02), 05/25/2011  
 Order 80102809, Provide Range for Oil Levels in RHR Pump Motor Oil Reservoirs, 11/19/2010  
 CMP-1SW-7 “#13 Containment Fan Coil Unit Service Water Outlet Check Valves to the Service  
 Water Discharge Header CM Plan (Unit 1)

**LIST OF ACRONYMS**

ADAMS	Agency-wide Documents Access and Management System
CFR	Code of Federal Regulations
ECP	Employee Concerns Program
IMC	Inspection Manual Chapter
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
PARS	Publicly Available Records System
PSEG	PSEG Nuclear LLC
SCWE	Safety Conscious Work Environment
SDP	Significance Determination Process
SPAR	Standardized Plant Analysis Risk