



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**

REGION I
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KING OF PRUSSIA, PA 19406-1415

December 11, 2008

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

**SUBJECT: SALEM NUCLEAR GENERATING STATION, UNIT 1 - NRC SUPPLEMENTAL
INSPECTION REPORT 05000272/2008008**

Dear Mr. Joyce:

On October 27, 2008, the U.S. Nuclear Regulatory Commission completed a supplemental inspection at the Salem Nuclear Generating Station, Unit 1. The enclosed report documents the inspection results discussed on October 27, 2008, with Mr. Robert Braun and other members of your staff.

This supplemental inspection was performed in accordance with Inspection Procedure 95002. The purpose of the inspection was to examine your problem identification, evaluation, and corrective action for the issues that led to the Yellow Mitigating Systems Performance Index (MSPI) performance indicator at Salem Unit 1 in the fourth quarter of 2007. This Yellow indicator placed Salem Unit 1 in the Degraded Cornerstone column of the NRC Reactor Oversight Process Action Matrix for the fourth quarter of 2007. In addition to a review of your root cause analysis, the inspection included an independent assessment of the extent of condition and extent of cause for the issues that resulted in the Yellow PI. It also assessed whether or not any safety culture components caused or significantly contributed to the issue. The inspection examined activities conducted under your license as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your license. The inspectors reviewed selected procedures and records, observed activities, and interviewed personnel.

The inspectors determined that you identified the issues that led to the Yellow MSPI performance indicator, appropriately identified root and contributing causes of the issues, and had taken or planned actions to address the identified causes and prevent recurrence. The inspectors determined that your extent of condition and extent of cause evaluations were adequate, and that you adequately evaluated whether any safety culture component caused or significantly contributed to the issues. Based on the evaluation and your completed and planned actions, the inspectors determined that additional agency follow-up beyond the baseline inspection program is not necessary for these issues.

T. Joyce

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Sincerely,

/RA/

David C. Lew, Director
Division of Reactor Projects

Docket Nos: 50-272
License Nos: DPR-70

Enclosure: Inspection Report 05000272/2008008
w/Attachment: Supplemental Information

cc w/encl:

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Sincerely,
 /RA/
 David C. Lew, Director
 Division of Reactor Projects

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U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Docket Nos: 50-272

License Nos: DPR-70

Report No: 05000272/2008008

Licensee: PSEG Nuclear LLC (PSEG)

Facility: Salem Nuclear Generating Station, Unit 1

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

Dates: September 29, 2008 through October 27, 2008

Inspectors: B. Welling, Hope Creek Senior Resident Inspector (Lead)
D. Orr, Senior Reactor Inspector
J. Ambrosini, Project Engineer
R. Moore, Project Engineer (Trainee)

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

SUMMARY OF FINDINGS

IR 05000272/2008008, 09/29/2008 – 10/27/2008; Salem Nuclear Generating Station Unit 1; Supplemental Inspection 95002 for Degraded Mitigating System Cornerstone.

This inspection was conducted by a senior resident inspector and two region-based inspectors. No findings of significance were identified. The significance of most findings is indicated by their color (Green, White, Yellow, or Red) using Inspection Manual Chapter (IMC) 0609, "Significance Determination Process" (SDP). Findings for which the SDP does not apply may be Green or be assigned a severity level after NRC management review. The NRC's program for overseeing the safe operation of commercial nuclear power reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 4, dated December 2006.

Cornerstone: Mitigating Systems

The NRC performed this supplemental inspection to assess PSEG's root cause evaluation and supporting information associated with the Salem Unit 1 Mitigating Systems Performance Index (MSPI) performance indicator for emergency AC power that transitioned from Green to Yellow in the fourth quarter of 2007.

The inspectors concluded that PSEG identified the issues that led to the Yellow MSPI performance indicator, appropriately identified root and contributing causes of the issues, and had taken or planned actions to address the identified causes and prevent recurrence of the issues. PSEG's evaluation determined that the root causes were insufficient knowledge of certain aspects of the MSPI and poor communications and knowledge of the Salem Probabilistic Risk Assessment (PRA). The inspectors noted that PSEG used a systematic method to arrive at the root and contributing causes; however, there were some minor discrepancies with adherence to PSEG's root cause analysis guidance and some gaps with respect to assessing the adequacy of the written guidance available on the MSPI.

The inspectors determined that PSEG's extent of condition and extent of cause evaluations were adequate, but the extent of cause evaluation did not consider the interface between the PRA and plant operating procedures. Consequently, PSEG did not fully evaluate whether the root cause of poor communications and knowledge of the PRA may have an impact on the operating procedures and the assumptions related to operator actions credited in the PRA. This issue was minor because none of the assumptions were determined to be invalid and PSEG had plans to review the all credited operator actions.

PSEG's evaluation adequately considered all thirteen safety culture components and whether they caused or significantly contributed to the issues. However, the inspectors observed that one of the safety culture components, "Continuous Learning Environment," played a larger role than was characterized in the evaluation. Specifically, the inspectors noted that deficiencies in knowledge transfer, training, and communication of information about industry issues contributed to the root causes associated with the lack of knowledge regarding MSPI and PRA.

PSEG has taken action to address the root causes and associated causal factors. These actions included plans to reduce the risk contribution of the EAC power system through plant modifications. The inspectors determined that PSEG's identified actions to address the

associated causes and causal factors were adequate, and that PSEG appropriately adjusted its corrective action plan based on the inspector observations documented in this inspection report. Therefore, based on the adequacy of PSEG's corrective actions, including those completed to date and the scope of remaining planned actions, the inspectors determined that no additional agency follow-up beyond the baseline inspection program is necessary for this event.

A. Findings

No findings of significance.

B. Licensee-Identified Violations

None.

REPORT DETAILS

01 INSPECTION SCOPE

The NRC conducted this supplemental inspection in accordance with NRC Inspection Procedure 95002, "Inspection for One Degraded Cornerstone or Any Three White Inputs in a Strategic Performance Area," to assess PSEG's evaluation for a degraded Mitigating Systems cornerstone due to a Yellow Mitigating Systems Performance Index (MSPI) performance indicator for emergency AC power (EAC) in the fourth quarter of 2007.

On December 10, 2007, Salem Unit 1 entered the Degraded Cornerstone column of the NRC's Action Matrix as a result of a failure of the 1C emergency diesel generator (EDG). This event, combined with two previous EDG failures in 2005 and 2007, caused the MSPI performance indicator for EAC to transition from Green to Yellow.

This MSPI performance indicator (PI) is calculated based on the availability and reliability of EAC sources, namely the EDGs, for the previous 12 calendar quarters. The EAC MSPI is a risk-informed PI that uses plant-specific risk models to determine the cumulative significance of EDG failures and unavailability over the monitored time period. The calculation used to determine MSPI is based upon data collected by PSEG staff and coefficients developed from the Salem Probabilistic Risk Assessment (PRA). The color of the MSPI PI (Green (low significance), White, Yellow, Red (high significance)) is based on the results of the calculation. Under certain conditions, a plant can invoke a risk cap that accounts for normal variations in the calculated PI that sometimes exceed the Green/White threshold and cause the risk of certain events to be overstated. Under these conditions, when specific criteria are met, a calculated value of "White" is reported as "Green" for the overall PI result.

In the case of Salem Unit 1, the calculated result of the EAC MSPI PI had been White for several quarters, but had been reported as Green due to the use of this risk cap. However, PSEG staff and management did not recognize that the risk cap would be removed if the calculated result was not with the Green or White performance bands (e.g., Yellow or Red). The failure in December 2007, combined with previous failures, caused the calculated value of the PI to degrade to Yellow; therefore, the reported value transitioned directly from Green to Yellow.

PSEG performed a root cause evaluation to identify the root causes and the contributing causes and factors that led to the Yellow MSPI PI. PSEG also completed evaluations of the individual EDG failures that occurred during the monitored time period of the MSPI, as well as additional evaluations in support of or as a result of the root cause evaluation.

The inspectors reviewed the root cause evaluation and supporting evaluations, and confirmed that corrective actions were taken or planned to address the identified causes. The inspectors interviewed PSEG personnel to ensure that the root and contributing causes, including any safety culture components, were understood, and that corrective actions taken or planned were appropriate to address the causes and prevent recurrence. The inspectors also independently assessed the extent of condition and extent of cause for the identified issues. Additionally, the inspectors performed an

independent review to determine if any safety culture components caused or significantly contributed to the issues. The documents reviewed are listed in the Attachment.

The specific inspection objectives were:

- To provide assurance that root and contributing causes were understood for the risk significant performance issues;
- To independently assess the extent of condition and the extent of cause for the risk significant performance issues;
- To independently determine if safety culture components caused or significantly contributed to the risk significant performance issues; and
- To provide assurance that corrective actions were sufficient to address the root causes and contributing causes, and to prevent recurrence.

02 EVALUATION OF INSPECTION REQUIREMENTS

02.01 Problem Identification

a. Determination of who identified the issue and under what conditions

In mid-December 2007, PSEG identified that the failure of the 1C EDG on December 10, 2007, caused the EAC MSPI performance indicator to cross the Yellow threshold for the fourth quarter of 2007. PSEG staff informed the resident inspectors and reported the performance indicator results in January 2008, as required.

During the preparation of the root cause evaluation, PSEG identified that the underlying performance issue was poor understanding and management of the risk margin for the EAC system, or “margin management.” PSEG determined that station staff did not understand that, due to the high risk significance of the EAC system, the PI was susceptible to large changes in value due to relatively small changes in availability and reliability of the EDGs.

The inspectors determined that PSEG’s evaluation appropriately assessed the circumstances surrounding the identification of the issue.

b. Determination of how long the issue existed and prior opportunities for identification

PSEG noted that station staff had prior opportunities to identify the underlying performance issue of the understanding and management of the risk margin of the EAC system through two separate activities. First, PSEG developed a revision to the PRA in 2006 that increased the risk contribution of the emergency AC system to the overall core damage frequency. The rollout of the PRA revision included briefings for staff and management. Secondly, throughout the implementation of the MSPI in 2006 and 2007, the MSPI program manager and data stewards had opportunities to recognize the implications of the risk cap and there were tools available to determine how the PI result may change with an additional failure. However, PSEG staff did not utilize the tools, nor

did they fully understand the risk cap. Prior to December 2007, PSEG believed that an additional EDG failure would require them to report the PI value as White not Yellow, because they believed the risk cap would still be in place.

The inspectors identified some minor gaps in the root cause evaluation with respect to assessing the written information available on the MSPI risk cap concept. Specifically, NUREG 1816, "Independent Verification of the Mitigating Systems Performance Index (MSPI) Results for the Pilot Plants," describes a scenario where the MSPI can transition from Green to Yellow without first being White. In Appendix D to the NUREG, Section D.6.3, Case 3 describes how the frontstop/risk cap will be withdrawn when the MSPI crosses the Yellow threshold. Additionally, PSEG did not fully assess the information available in NEI 99-02, "Regulatory Performance Indicator Guideline." PSEG's root cause evaluation did not identify these as missed opportunities to understand the implications of the risk cap. PSEG entered this observation in the corrective action program.

Overall, the inspectors concluded that PSEG's evaluation appropriately identified how long the issue existed and considered missed opportunities for identification.

- c. Determination of the plant-specific risk consequences and compliance concerns associated with the issue

The EAC MSPI is an indicator of the availability and reliability of the EAC system, which is designed to provide power to safety-related buses following a loss of offsite power. The Yellow PI was the result of the relative importance of the system to the station's PRA. The high risk significance is due to the following factors: the Salem EAC system has three EDGs but two carry the majority of the safety-related loads; the Salem EAC system has no capability to cross-connect the EDGs between units; and the Salem EAC system does not include a "swing diesel" that can be used by either unit. As a result of the Yellow PI, PSEG initiated actions to reduce the risk contribution of the system through plant modifications.

The inspectors determined there were no compliance concerns with the issue. PSEG properly reported the PI results consistent with the guidance in NEI 99-02, "Regulatory Performance Indicator Guideline." The inspectors performed a sampling review of the PI data and identified no discrepancies. The inspectors also reviewed PSEG's evaluations and corrective actions for the EDG failures that contributed to the Yellow PI and identified no violations or findings of significance.

02.02 Root Cause and Extent of Condition Evaluation

- a. Evaluation of method(s) used to identify the root causes(s) and contributing cause(s)

PSEG utilized a factor tree methodology to identify the root and contributing causes of this issue. A factor tree is an analysis tool used to determine which conditions were necessary and sufficient for a given consequence. This is a generally accepted root cause method, although not specifically listed in PSEG procedure LS-AA-125-1001, "Root Cause Analysis Manual."

The inspectors concluded that PSEG used an appropriate, systematic method to arrive at the root and contributing causes. However, the inspectors noted some minor discrepancies in adherence to the guidance in the Root Cause Analysis Manual. For example, contrary to the guidance, there was no documented basis for not using an event and causal factor chart.

The inspectors also noted that PSEG used barrier analysis and missed opportunity matrix techniques as complements to the factor tree, but the linkages were not clear. As a result, PSEG revised the barrier analysis of the root cause evaluation. This revision reconciled differences between the barrier analysis and the root cause manual guidance and included corrective actions for failed barriers.

b. Level of detail of the root cause evaluation

The inspectors determined that PSEG's root cause evaluation and supporting evaluations provided a level of detail appropriate for identifying root and contributing causes for this issue. In addition to the main root cause evaluation for the Yellow PI result, PSEG performed two separate root cause evaluations to review the issues associated with MPSI program management and the 1C EDG failure. The inspectors concluded that these supporting evaluations were sufficiently detailed to identify risk significant and related issues.

c. Consideration of prior occurrences of the problem and knowledge of prior operating experience

The transition of the Salem Unit 1 EAC MSPI performance indicator directly from Green to Yellow was the first known occurrence of this type for the MSPI indicator. As such, Salem did not have an opportunity to consider prior occurrences of this specific problem, nor did Salem have an opportunity to take action based on knowledge of prior operating experience.

d. Consideration of potential common cause(s) and extent of condition of the problem

The inspectors determined that PSEG's extent of condition and extent of cause evaluations systematically identified potential areas where similar problems might exist. Similarly, the inspectors determined that PSEG systematically reviewed whether similar conditions actually existed or whether similar causes had actually impacted other plant programs and processes. PSEG appropriately applied its guidance contained in procedures LS-AA-125-1001, "Root Cause Analysis Manual," and LS-AA-125-1003, "Apparent Cause Evaluation Manual."

For the extent of condition evaluation, PSEG considered the potential for all aspects of plant operation to have been affected by challenges in their margin management program. The term "margin management" applies to risk and design margins. PSEG completed its evaluation in two phases. The first phase searched the corrective action program for margin management issues, and all issues were then categorized and evaluated for potential weaknesses in margin management. For example, a number of notifications dealt with air operated valve (AOV) design margin issues. PSEG then reevaluated the operability review of all documented AOV issues and verified the AOV issues were appropriately included or considered in its margin management program.

PSEG maintains several administrative procedures relative to margin management and the two principal procedures are CC-AA-13, "Margin Management," and ER-AA-2007, "Evaluating Margins."

In the second phase of the extent of condition evaluation, PSEG screened the entire root cause factor tree for those factors that could include an extent of condition issue. For example, one root cause factor tree box dealt with the quality of benchmarking. PSEG considered this an extent of condition issue that was not already being addressed in the corrective action program. That is, the extent of condition potential issue was: other aspects of plant operation being negatively impacted by low quality benchmarking.

For the extent of cause evaluation, PSEG considered both root causes:

- Salem lacked sufficient depth of knowledge through participation on MSPI to understand the implications of risk cap; and
- Poor communications between the PRA organization and the Salem site at large coupled with a lack of site understanding of the PRA.

PSEG also considered the contributing causes:

- The MSPI indicators were new to the industry, and Salem appears to have been the first plant to have consequential difficulty with the risk cap; and
- The Salem PRA inaccurately modeled the EAC System between 1994 and 2006 with the result that Salem CDF was incorrectly reported as lower than it actually was.

PSEG examined each root cause and contributing cause and considered plant programs and aspects of plant operation that could be affected in a manner similar to the performance of the EAC system and the Yellow MSPI PI.

02.03 Corrective Actions

a. Appropriateness of corrective actions

PSEG developed several corrective actions to prevent recurrence (CAPRs) and other corrective actions to resolve issues related to the Yellow EAC MSPI. PSEG took actions to address the root causes associated with knowledge and communications for the MSPI and PRA. Additionally PSEG initiated actions to improve the risk margin of the EAC system. The inspectors concluded that the corrective actions were appropriate and sufficient to address the causes and conditions and would prevent recurrence.

Nonetheless, the inspectors noted some minor issues associated with the documentation of the corrective actions. For example, the root cause evaluation did not link the corrective actions to the associated root causes, contributing factors, and contributing conditions. Additionally, some key corrective actions and CAPRs were captured partially in action items, that, in accordance with PSEG administrative procedures are not tracked as rigorously as corrective actions. Specifically, the first root cause statement places emphasis on involvement in MSPI industry activities, but the procedure change to establish the responsibility to participate in industry training and workshops was located in an action item. Likewise, it was not apparent how the CAPRs

consisting of changes to an MSPI procedure and completing a PRA revision would prevent recurrence of the second root cause of deficiencies in site-wide knowledge and communications on PRA. The inspectors determined that the actions were addressed, but were not clearly documented.

b. Prioritization of corrective actions

The inspectors determined that PSEG established appropriate priorities for corrective actions based on sound criteria, including risk significance. PSEG completed most corrective actions associated with the root causes. Additionally, PSEG initiated actions to improve the risk margin of the EAC system, including modifications to the plant. The inspectors identified no significant concerns with PSEG's prioritization of corrective actions.

c. Schedule for implementing and completing the corrective actions

At the time of this supplemental inspection, all of PSEG's corrective actions had either been implemented or scheduled. Procedural changes and program management changes were completed, and design changes were in the planning stages. The inspectors considered the schedule for completion of the remainder of the corrective actions to be appropriate.

d. Measures of success for determining the effectiveness of the corrective actions to prevent recurrence

PSEG planned several effectiveness reviews to ensure the corrective actions to prevent recurrence are complete and appropriate. These effectiveness reviews are intended to verify that corrective actions have restored MSPI margin for all MSPI systems in a low margin condition (emergency AC, high pressure injection, and cooling water) and will verify that PRA knowledge is appropriately used by the staff. In addition, PSEG planned effectiveness reviews to evaluate the program management failures associated with the Yellow MSPI that include the use of resources external to PSEG to validate the results. The corrective actions for safety culture aspects of the Yellow MSPI issue also will be reviewed for effectiveness.

The inspectors determined that PSEG's plans contained sufficient methods and measures of success for determining the effectiveness of the corrective actions to prevent recurrence.

02.04 Independent Assessment of Extent of Condition and Extent of Cause

a. Inspection Scope

The inspectors conducted an independent extent of condition and extent of cause review of the performance issues associated with the Yellow PI to assess the validity of PSEG's conclusions regarding the extent of condition and extent of cause for the issues. For the extent of cause review, the inspectors focused on the primary root cause statements:

- Salem lacked sufficient depth of knowledge through participation on MSPI to understand the implications of risk cap.

- Poor communications between the PRA organization and the Salem site at large coupled with a lack of site understanding of the PRA.

For the extent of condition review, the inspectors focused on the root cause problem statement:

- Underlying issue for analysis is the failure to manage EAC margin.

The inspectors assessed whether PSEG's extent of condition and extent of cause sufficiently identified and bounded all PRA and margin management performance issues. Likewise, the inspectors assessed whether PSEG had sufficiently reviewed their participation and benchmarking in other industry initiatives and working groups. In conducting this independent assessment, the inspectors interviewed station management and personnel, reviewed margin management program and process documentation, observed a plant health committee, reviewed all current NRC PIs and PSEG Salem Manager's Review Meeting PIs, and performed word searches in the corrective action program for similar conditions to the identified problem. Additionally, to specifically evaluate PSEG's extent of cause review for the root cause of "Poor communications between the PRA organization and the Salem site at large coupled with a lack of site understanding of the PRA," the inspectors walked down two PRA credited operator actions.

b. Findings and Assessment

The inspectors' independent assessment did not identify any substantive extent of condition and extent of cause issues that PSEG had not already identified. However, the inspectors noted one extent of cause area that was not fully evaluated by PSEG. Specifically, the inspectors' independent review determined that PSEG did not appropriately consider plant operating procedures as a program that utilizes PRA results. PSEG had considered seven other programs that utilize PRA results: maintenance rule scoping, maintenance rule risk assessments, regulatory oversight process, risk informed technical specifications, technical specification applications, ASME applications, and valve programs.

In order to assess PSEG's failure to evaluate the extent of cause on plant operating procedures, the inspectors walked down two operator credited actions: manually closing the turbine building service water header motor operated valve (SW26) for a partial loss of offsite power (LOOP) event, and installation of demineralized water hoses to the centrifugal charging pumps for a loss of service water event. The inspectors did not identify any discrepancies with the demineralized water hose operator action. However, the inspectors identified a non-conservatism in regards to the timeline for manually closing SW26.

The service water pump vendor provided information to PSEG that SW26 should be closed within 30 minutes to prevent damage to a single operating service water pump that would experience run-out conditions during some partial LOOP scenarios. SW26 is a 30-inch butterfly valve with a 734-turn actuator. The inspectors queried PSEG valve engineers and they stated that the valve could be manually closed in about 12 to 15 minutes. However, the timeline in the PRA was based on operator interviews, and it indicated that the valve could be closed in 10 minutes including operator transit time.

The PRA also included a simulator scenario observation that the time to direct closure of SW26 was 10 minutes. The simulator observation, combined with the valve engineer input, would leave only 5 minutes for an operator to transit to the service water intake structure. Although the inspectors determined that a 5 minute transit time was possible, the inspectors considered the 5 minute transit time optimistic and not conservative.

The inspectors concluded that the PSEG PRA was optimistic with respect to closing SW26 in 30 minutes. Based on the inspectors' discovery of a non-conservatism in the PRA for credited operator actions, PSEG initiated notification 20386559 and reviewed other credited operator actions. PSEG identified another similar issue with an assumed 4 minute action time to complete actions to isolate letdown following a loss of component cooling water. PSEG determined that the 4 minute action time may be overly optimistic.

Nevertheless, the inspectors concluded that these were minor issues because the timelines were a very small contribution to the PRA, the operator actions could be completed within the necessary times, and the associated plant operating procedures provided adequate instruction. The inspectors also noted that PSEG intended to perform a validation of these credited operator action timelines as part of a PRA Regulatory Guide 1.200 review scheduled to begin in November 2008.

The inspectors also assessed the corrective actions associated with the extent of condition and extent of cause evaluations. In the area of corrective actions for extent of condition, the inspectors identified that corrective actions were limited for an extent of condition issue in the quality of benchmarking. PSEG documented an action item for benchmarking coordinators to review a lessons learned document associated with EAC strategies. However, there were other lessons learned from the root cause evaluation in regards to the quality of benchmarking that were not captured in the actions. PSEG revised its corrective actions to address the quality of benchmarking to be more complete and consistent with the root cause evaluation.

Based on the results of the independent assessment, the inspectors concluded that PSEG's extent of condition and extent of cause evaluations were adequate and that inspector observations were appropriately entered into PSEG's corrective action process.

02.05 Safety Culture Considerations

a. Inspection Scope

The inspectors performed an independent review to determine if safety culture components caused or significantly contributed to the risk significant performance issues. The inspectors reviewed selected procedures and documents, including safety culture survey results, and interviewed personnel.

b. Findings and Assessment

As part of its overall root cause evaluation effort, PSEG reviewed the root and contributing causes in the context of the safety culture components in NRC Inspection Manual Chapter 0305, "Operating Reactor Assessment Program." The evaluation noted that organizational change management and the corrective action program were contributors.

The inspectors concluded that PSEG's evaluation adequately considered whether safety culture components caused or significantly contributed to the performance issues. However, the inspectors' independent review identified one component area that the PSEG's safety culture review did not fully address as a contributor, "Continuous Learning Environment."

PSEG's root cause evaluation considered the Continuous Learning Environment safety culture component, but the inspectors' review indicated that it played a larger role than was characterized in PSEG's report. The inspectors determined that a more robust learning environment, given the fact that MSPI was new and quite complicated, could have provided PSEG an earlier opportunity to identify a misunderstanding of the risk cap concept.

The first subcomponent under Continuous Learning Environment covers training and knowledge transfer. The inspectors noted that there were missed opportunities for MSPI staff members to gain information on margin management and the risk cap through training or other means, and these were not fully explored in PSEG's evaluation.

The second subcomponent addresses the adequacy of communication on information learned from internal and external sources about industry and plant issues. With respect to information on MSPI, specific information on the risk cap was provided to PSEG's representatives on MSPI working groups, but this information apparently was not communicated effectively to the site. Additionally, the MSPI calculation "derivation report" contained very important information on when the risk cap is invoked; it stated that the risk cap does not apply when the calculated value of MSPI is greater than $1E-5$. This information was either not understood or not properly communicated by the PSEG MSPI program owner to others onsite. The MSPI data stewards and other engineering personnel and managers did not strive to improve their knowledge of the risk cap, even though an internal PSEG report indicated that the risk cap was invoked and there was zero margin for a run failure.

The inspectors also determined that deficiencies within the Continuous Learning Environment component were contributing factors in the second root cause, which involved site knowledge and communication of the PRA. These deficiencies were captured to a degree in PSEG's root cause factor tree, but they were not explicitly analyzed in the root cause evaluation. More thorough knowledge transfer and communication could have provided an opportunity for management to more fully understand the risk importance of the EAC system, and thereby increase the urgency of improvements to the PRA and the EAC system. Inspector observations were appropriately entered into PSEG's corrective action process.

03 **MANAGEMENT MEETINGS**

Exit Meeting Summary

The inspectors presented the results of the supplemental inspection to Mr. Robert Braun and other members of PSEG staff on October 27, 2008. The inspectors confirmed that proprietary material reviewed by the inspectors was returned to PSEG following the inspection.

ATTACHMENT: SUPPLEMENTAL INFORMATION

Enclosure

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

R. Braun, Site Vice President
S. Crampton, System Engineer
E. Eiola, Acting Engineering Director
G. Gellrich, Plant Manager
D. Kolasinski, System Engineer
W. Mattingly, Regulatory Assurance Manager
T. Mulholland, System Engineer
C. Neely, Licensing Director
L. Oberembt, Engineering Branch Manager
G. Sosson, Engineering Services Director
B. Thomas, Senior Engineer, Regulatory Assurance
J. Wearne, Licensing Technical Advisor
V. Zabielski, Associate General Counsel

LIST OF DOCUMENTS REVIEWED

In addition to the documents identified in the body of this report, the inspectors reviewed the following documents and records:

Procedures

LS-AA-125-1001, Root Cause Analysis Manual, Revisions 6 and 7
LS-AA-125-1003, Apparent Cause Evaluation Manual, Revision 8
LS-AA-125-1004, Effectiveness Review Manual, Revision 2
ER-AA-2001, Plant Health Committee, Revision 9
ER-AA-2003, System Performance Monitoring and Analysis, Revision 5
LS-AA-2200, MSPI Data Acquisition and Reporting, Revision 2
ER-AA-2020, Equipment Performance and Information Exchange and MSPI Failure Determination Evaluation, Revision 3
HU-AA-1212, Technical Task Risk/Rigor Assessment, Pre-Job Brief, Independent Third Party Review and Post-Job Brief, Revision 3
CC-AA-13, Margin Management, Revision 0
LS-AA-125, Corrective Action Program Procedure, Revision 12
LS-AA-120, Issue Identification and Screening Process, Revision 8
LS-AA-2001, Collecting and Reporting of NRC Performance Indicator Data, Revision 10
ER-AA-2007, Evaluating Margins, Revision 1
ER-AA-600-1011, Risk Management Program, Revision 5
1-EOP-TRIP-2-, Reactor Trip Response, Revision 24
S1.OP-AB.SW-0005, Loss of All Service Water, Revision 4

Notifications

20386559	20307569	20386036	20385383	20385118	20384857
20363280	20353532	20342675	20376563	20379543	20350852
20276691	20348670	20349230	20351583	20363280	20385947
20339151	20353382	20349214	20349216	20349217	20352135

Orders

60075009	70086875	70088183	70054463	70077963	70076115
70078780	70055569	70050150	70057896	70067766	70079734
70078112	70079887	70056903	80088797		

Assessments and Audits

PSEG NOS 08-016, Nuclear Oversight Readiness for NRC 95002, dated August 29, 2008
PSEG Certification of Readiness for NRC 95002 Inspection, dated September 23, 2008
PSEG - Focus Area Self Assessment, NRC Inspection 95002 Readiness

Other Documents

Root Cause Analysis Report, EAC MSPI ROP Indicator Degraded to Yellow 12/10/2007, dated August 27, 2008, and Revision 1 dated October 2, 2008
PSEG Nuclear: Salem Station, MSPI Performance Indicator Statistics, September 2008
NRC Public Meeting Summary on the Reactor Oversight Process, held on May 17, 2006, dated May 23, 2006
Diagram – Corporate Functional Area Manager/Subject Matter Expert Support and Oversight of Salem MSPI
MSPI Data for Emergency AC Power (various time periods)
Salem MSPI Basis Document, dated June 2008
Salem PRA, Revision 4.0, Executive Summary
NOS05PIE018-05, Salem Licensed Operator Training, Operating Experience, Design Changes and Procedure Changes, dated 6/20/07
NOS05TFP002-04, Salem Licensed Operator Training, EOP-TRIP-2, Reactor Trip Response, dated 1/18/08
NOS05ABSW4-02, Salem Licensed Operator Training, Loss of All Service Water, dated 7/22/06
SA PRA – 2008 – 00, Salem PRA Notebook, Revisions 0 & 4
Letter from Johnston Pump Company to PSEG, Operation of the Johnston 28 NMC Service Water Pumps at Extreme Run Out Condition, dated 7/31/07
PSEG Safety Culture Survey Results, Executive Summary Report, October 2008
Salem Station Business Plan Performance Report, dated 6/08
Salem Equipment Reliability Management Review Meeting Slides, dated 8/22/06
Salem Plant Health Committee Meeting Minutes, dated 8/4/08 & 9/22/08
Salem PHC Subcommittee Meeting Minutes, dated 7/30/08
PHC Training Slides, Margin Management Program, dated 8/4/08
Project Review Committee Meeting Minutes for 05/15/08 and 9/16/08
Salem Low Margin Issues Matrix, dated 9/9/2008

LIST OF ACRONYMS

AC	Alternating Current
AOV	Air Operated Valve
ASME	American Society of Mechanical Engineers
CAP	Corrective Action Program
CDF	Core Damage Frequency
EAC	Emergency AC Power
EDG	Emergency Diesel Generator
kV	Kilo Volt
LOOP	Loss of Offsite Power
MSPI	Mitigating Systems Performance Index
NEI	Nuclear Energy Institute
NRC	Nuclear Regulatory Commission
PARS	Publicly Available Records
PI	Performance Indicator
PRA	Probabilistic Risk Assessment
PSEG	Public Service Enterprise Group Nuclear LLC
SBO	Station Blackout
SDP	Significance Determination Process
SW	Service Water
TS	Technical Specification