July 8, 2004

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

SUBJECT: SALEM AND HOPE CREEK GENERATING STATIONS - FOLLOW UP INSPECTION FOR POTENTIAL INADEQUACY OF SIMULATOR TESTING - INSPECTION REPORT NOS 05000272/2004007; 05000311/2004007; 05000354/2004007

Dear Mr. Bakken:

On June 24, 2004, the US Nuclear Regulatory Commission (NRC) completed an inspection at your Salem and Hope Creek Generating Stations. The enclosed inspection report documents the inspection findings, which were discussed with Mr. J. Reid and other members of your staff on June 24, 2004.

The inspection examined activities conducted under your licenses as they relate to safety and compliance with the Commission's rules and regulations and with the conditions of your licenses. The inspectors reviewed selected procedures and records, and interviewed personnel associated with the performance and testing of the Salem and Hope Creek simulators.

The purpose of the inspection was to follow-up on an unresolved item identified during the biennial licensed operator requalification inspection that was conducted under Inspection Procedure IP 71111.11 from September 15-18, 2003. The unresolved item (URI 50-272&311/2003-07-01), was documented in Inspection Report IR 05000272/2003-007 and 05000311/2003-007 and related to potentially incomplete testing. Additionally, the inspectors questioned the testing methodology and determined that further review by NRC was required.

Based on the results of this follow-up inspection, three findings were identified. The first finding involved a violation of 10 CFR 55.46(c)(1) for the failure to properly model Hope Creek response to a Primary Containment Isolation Signal isolation of the Primary Containment Instrument Gas system that results in MSIVs drifting closed. The second and third findings involved performance deficiencies in the testing of the Salem and Hope Creek simulators, respectively. All of these findings are of very low safety significance (Green). The violation of 10 CFR 55.46(c)(1) has been entered into your corrective action program and is being treated as a non-cited violation, consistent with Section VI.A of the NRC Enforcement Policy. If you deny this non-cited violation, you should provide a response with the basis for your denial, within 30 days of the receipt of this letter, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, D.C. 20555-001; with copies to the Regional Administrator, Region 1; the Director, Office of Enforcement; and the Salem and Hope Creek NRC Resident Inspectors.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter and its enclosure 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 Web site at http://www.nrc.gov/reading-rm/adams.html (the Public Electronic Reading Room). Should you have any questions regarding this report, please contact Mr. Richard Conte at 610-337-5183.

Sincerely

/RA/

Richard J. Conte, Chief
Operational Safety Branch
Division of Reactor Safety

Docket Nos. 50-272, 50-311, 50-354
License Nos. DPR-70, DPR-75, NPF-57

Enclosure: Inspection Report Nos. 05000272/2004007; 05000311/2004007; 05000354/2004007

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REGION I

Docket Nos:	50-272, 50-311, 50-354
License Nos:	DPR-70, DPR-75, NPF-57
Report Nos:	05000272/2004007; 05000311/2004007; 05000354/2004007
Licensee:	PSEG Nuclear, LLC
Facility:	Salem and Hope Creek Generating Stations
Location:	Hancocks Bridge, New Jersey
Dates:	February 9, 2004 - February 10, 2004 (on-site inspection) May 13, 2004 (on-site inspection) February 11, 2004 - June 24, 2004 (in-office inspection)
Inspectors:	John G. Caruso, Senior Operations Engineer Lawrence Vick, Reactor Engineer Peter Presby, Operations Engineer
Approved by:	Richard J. Conte, Chief Operational Safety Branch Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000272/2004007; 05000311/2004007; 05000354/2004007; 2/9/04 - 6/24/04; Salem / Hope Creek Generating Stations; IP 71111.11B Licensed Operator Requalification Program Inspection.

The report covers an announced inspection by a region-based inspector, and a headquarters-based simulator specialist. Three Green findings were identified, one of which was a non-cited violation. The significance of the findings are indicated by their color (Green, White, Yellow, 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 3, dated July 2000.

A. NRC-Identified and Self-Revealing Findings

Cornerstone: Mitigating Systems

- Green. A self-revealing Green Non-Cited Violation(NCV) of 10 CFR 55.46(c)(1) was identified. It involved the failure of the Hope Creek simulator to correctly replicate the plant's response to a Primary Containment Isolation Signal (PCIS) isolation of the Primary Containment Instrument Gas (PCIG) system that results in MSIVs drifting closed.

  This finding is more than minor because it affected the human performance (human error) attribute of the mitigating systems cornerstone. Not correctly replicating the plant's response on the simulator provides the potential for negative operator training. The finding is of very low safety significance (Green) because the discrepancy did not have an adverse impact on operator actions such that safety related equipment was made inoperable during normal operations or in response to a plant transient.

- Green. The inspectors identified that simulator performance testing on the Salem simulator did not meet the standards as specified in ANSI/ANS 3.5-1993 in that: (1) "best estimate" data for the simulator testing was not used; (2) some (4 of the 11 required) annual simulator transient tests were not performed and; (3) simulator test documentation did not include an evaluation and validation of test results.

  This finding is more than minor because it affects the human performance (human error) attribute of the mitigating systems cornerstone. Improperly conducted simulator testing brings simulator fidelity into question. The finding is of very low safety significance (Green) because the discrepancy did not have an adverse impact on operator actions such that safety related equipment was made inoperable during normal operations or in response to a plant transient.

- Green. The inspectors identified that simulator performance testing on the Hope Creek simulator did not meet the standards as specified in ANSI/ANS 3.5-1993 in that: (1) “best estimate” data for the simulator testing was not used; (2) a required annual simulator transient test was not performed, and; (3) simulator test documentation did not include an evaluation and validation of test results.

  This finding is more than minor because it affects the human performance (human error) attribute of the mitigating systems cornerstone. Improperly conducted simulator testing brings simulator fidelity into question. The finding is of very low safety significance (Green) because the discrepancy did not have an adverse impact on operator actions such that safety related equipment was made inoperable during normal operations or in response to a plant transient.

B. License-Identified Violation

None.

REPORT DETAILS

1. REACTOR SAFETY

Cornerstones: Mitigating Systems

1R11 Licensed Operator Requalification Program (71111.11)

Background

A biennial inspection of the Salem Licensed Operator Requalification Program, performed using Inspection Procedure Attachment 71111.11 in September 2003, was documented in IR 05000272/2003007 & 05000311/2003007. During the inspection an unresolved item was opened regarding the potential inadequacy of required simulator testing and documentation (Unresolved Item 05000272 & 311/2003-07-01). The purpose of this inspection was to follow-up the unresolved item and determine adequacy of simulator testing and documentation as it relates to 10 CFR 55.46 and to ANSI/ANS 3.5-1993. Also, on January 12, 2004, a plant event raised questions related to simulator fidelity for Hope Creek. The purpose of this inspection was to also follow-up on this issue.

Conformance With Simulator Requirements Specified in 10 CFR 55.46

a. Inspection Scope

The inspectors assessed the adequacy of the Salem and Hope Creek simulation facilities (simulators) for use in operator licensing examinations and training as prescribed in 10 CFR 55.46, "Simulation Facilities." The inspectors reviewed a sample of simulator performance test records (i.e., transient tests and discrepancy resolution validation tests), simulator discrepancy and modification records, and the process for ensuring continued assurance of simulator fidelity in accordance with 10 CFR 55.46. Open simulator discrepancies were reviewed for importance relative to the impact on 10 CFR 55.45 and 55.59 operator actions as well as on nuclear and thermal hydraulic operating characteristics. In addition, the inspectors conducted interviews with the licensee's simulator staff to discuss the configuration control process and used the IP 71111.11, Appendix C, checklist to evaluate whether or not the licensee's plant-referenced simulators were operating adequately as required by 10 CFR 55.46(c), (d) and ANSI/ANS-3.5-1993, "Nuclear Power Plant Simulators for Use in Operator Training and Examinations."

b. Findings

1. Failure of the Hope Creek Simulator to Demonstrate Expected Plant Response to Transient Conditions

Introduction. A self-revealing Significance Determination Process (SDP) Green Non-Cited Violation (NCV) of 10 CFR 55.46(c)(1), "Plant-referenced simulators" was

identified for failure of the Hope Creek simulator to correctly replicate the plant response to a Primary Containment Isolation Signal (PCIS) isolation of the Primary Containment Instrument Gas (PCIG) system that results in Main Steam Isolation Valves (MSIV) drifting closed.

Description. On January 12, 2004 the Hope Creek plant was manually tripped when two MSIVs started to drift closed after a Primary Containment Isolation Signal. An evaluation of the event determined that negative operator training had been conducted prior to the event on the Hope Creek simulator. The negative training occurred following changes incorporated into the simulator training load on August 11, 2003 that prevented the MSIVs from being affected by PCIG isolation. A Simulator Action Request (SAR# H-2003-081) documents that the simulator change was made based on information from a plant engineer, who stated that the MSIVs should remain open up to 12 hours before they would start drifting closed. An apparent cause evaluation (NUCR Order No. 70036240), conducted by the licensee, determined that the erroneous information provided to the training department came from an informal memorandum from Station Design Engineering and was the result of improper communication, lack of procedure adherence and the lack of a questioning attitude. This issue was self-revealing. Although negative training led operators to believe they had more time to restore the PCIG system than was actually available, the inspection determined that operator actions during the plant event were appropriate and timely. Following the event, PSEG staff modified simulator modeling of MSIV response to PCIG isolation to allow instructors to set the MSIV closure time following gas isolation to any desired value between 5 and 60 minutes, with a default value of 30 minutes.

Analysis. The inspectors determined that the failure of the Hope Creek simulator to correctly replicate the plant response to a PCIS isolation of the Primary Containment Instrument Gas system that results in MSIVs drifting closed is a performance deficiency. There was a failure to meet the requirements of 10 CFR 55.46(c)(1), "Plant-referenced simulators." Traditional enforcement does not apply because the issue did not have any actual safety consequences or potential for impacting the NRC's regulatory function and was not the result of any willful violation of NRC requirements or PSEG procedures. This finding is more than minor because it affects the human performance (human error) attribute of the mitigating systems cornerstone.

This finding was evaluated using the Operator Requalification Human Performance SDP (MC 0609 Appendix I) because it is a requalification training issue related to simulator fidelity. The SDP, Appendix I, Block 12, requires the inspector to determine if deviations between the plant and simulator could result in negative training or could have a negative impact on operator actions. "Negative Training" is defined, in ANSI/ANS 3.5-1993, "Nuclear Power Plant Simulators For Use In Operator Training And Examination", as "Training on a simulator whose configuration or performance leads the operator to incorrect response or understanding of the reference unit." In this case the simulator modeled the MSIVs as being unaffected by isolation of Primary Containment Instrument Gas. Training on the simulator provided licensed operators with an incorrect understanding of the response of the MSIVs on the reference unit to the event. Therefore, the answer to the Block 12 question is yes, which resulted in a finding of very

low safety significance (Green). The finding is of very low safety significance (Green) because the discrepancy did not have an adverse impact on operator actions such that safety related equipment was made inoperable during normal operations or in response to a plant transient.

Enforcement. 10 CFR 55.46(c)(1) requires, in part, that "the simulator must demonstrate expected plant response to transient conditions." Contrary to this requirement, the Hope Creek simulator did not demonstrate expected plant response to the January 12, 2004 Primary Containment Instrument Gas isolation. Specifically, the MSIVs on the simulator remained open while the MSIVs in the plant drifted closed. The failure of the simulator to accurately replicate and model plant response resulted in negative operator training. The failure to ensure that the simulator correctly replicates expected plant response to transient conditions is of very low safety significance and was corrected under Simulator Action Request # H-2004-029 and incorporated into the training load on March 22, 2004. This violation is being treated as an NCV, consistent with Section VI.A of the NRC Enforcement Policy: **NCV 05000354/2004007-01, Failure of the Hope Creek Simulator to Demonstrate Expected Plant Response to Transient Conditions**.

2. Failure to Conduct Salem Simulator Testing in Accordance With ANSI/ANS 3.5-1993

Introduction. The inspectors identified a Green finding with three examples of failing to conduct simulator performance testing in accordance with the standards of ANSI/ANS 3.5-1993. The examples are:

(a) PSEG compared the current year simulator transient test data to the previous year simulator transient test data rather than to "best estimate" data.
(b) Some (4 of the 11 required) annual simulator transient tests were not performed.
(c) Simulator test documentation did not include an evaluation and validation of test results.

PSEG has entered these examples as deficiencies into their corrective action program (NUCR #70036769).

Description

Use of Previous Year Simulator Data Instead of "Best Estimate" Data

The inspectors reviewed several annual simulator transient performance test procedures, including the following:

- Test PTP-001, "Manual Reactor Trip",
- Test PTP-004, "Simultaneous Trip of All Reactor Coolant Pumps",
- Test PTP-009, "Main Steam Line Rupture - 24 SG".

Based on this review and interviews with Salem simulator staff, the inspectors determined that the current year annual simulator transient performance test results

were compared to the previous year test results instead of using the best estimate data required by ANSI/ANS 3.5-1993 as endorsed by Regulatory Guide 1.149 Revision 2.

Salem testing methodology has been based on simulator benchmark testing completed during the initial site simulator acceptance testing. For all annual transient tests, these initial simulator test runs have become the "best estimate" data for the next performance of transient tests. Annually, the tests have been performed, data has been evaluated by comparison to the previous year test data and, if needed, deficiency reports have been written and dispositioned. Following completion of a given set of annual tests, those test results were accepted as the baseline for the next planned test performance.

This methodology for continually updating the comparison baseline is not described in the station simulator test program documentation and is contrary to ANSI/ANS-3.5-1993, which defines “best estimate” as “predicted reference unit performance data derived from engineering evaluation or operational assessment by subject matter experts for specific conditions.” PSEG did not perform any comparison of current year’s data to actual or predicted plant performance. Comparison of test data to previous test data can highlight differences in simulator performance year-to-year for the purposes of revealing unanticipated effects of recent modeling changes. However, small changes in simulator performance over several years could lead to unacceptable differences in performance between the simulator and the expected reference unit response. Proper verification of simulator fidelity is not assured without direct comparison of simulator transient test data to the reference unit best estimate.

4 of 11 Required Simulator Transient Performance Tests Were Not Performed

ANSI/ANS 3.5-1993 Appendix B lists 11 transient performance tests under PWR Simulator Operability Test Requirements. RG 1.149 Revision 2 endorses the 1993 standard with exceptions, one of which states that the appendices to the Standard should be considered integral parts of the standard.

Contrary to the standard, PSEG did not perform the following annual transient tests:

- Simultaneous trip of all feedwater pumps,
- Maximum rate power ramp from 100% down to approximately 75% and back up to 100%,
- Slow primary system depressurization to saturated condition using pressurizer relief or safety valve stuck open (Inhibit activation of high pressure Emergency Core Cooling System),
- Load rejection.

Simulator Test Documentation Did Not Include An Evaluation And Validation Of Test Results

ANSI/ANS 3.5-1993 Appendix A states that simulator test documentation should include an evaluation and validation of test results. Contrary to this standard, PSEG has not been documenting an evaluation or validation of test results for the annual transient

tests. If any problems are noted during a transient test, simulator staff generate a deficiency report (referred to as a SAR) to track resolution of the issue. This constitutes the only documentation that an evaluation of test results has been performed.

The associated PSEG corrective action report (NUCR #70036769) states that the decision to begin documenting deviations to annual tests rather than an analysis of the test results was made in 1998. This decision was based on the rationale that scenarios were validated prior to training for accuracy and that scenario validation was the bulk of the testing program.

PSEG maintains the Salem simulator to the 1993 version of ANSI/ANS 3.5. This standard, as endorsed by Reg Guide 1.149 Revision 2, requires performance and documentation of annual transient tests in accordance with ANSI/ANS 3.5-1993 Appendix A and Appendix B. No provision is made for replacement of transient test documentation with training scenario validation.

In the area of malfunction testing, inspectors observed weaknesses in documentation of evaluation or validation of test results in that the licensee used the malfunction cause and effect document as the description of expected plant response for the tests. Inspectors found examples of malfunction tests where the described expected plant response was dependent on conditions that are not provided in the test document. Tests did not include initial plant conditions and did not identify which procedures and subsections would be utilized. For malfunctions where a single cause and effect covers multiple pieces of equipment (such as AF0181A and AF0181B, one for each train's pump), tests do not specify which component should be tested.

For example, the malfunction test for AF0181, "Aux Feedwater Pump Trip" states that the pump will trip if initially running and will not start in response to manual or auto actuation if initially not running. The test does not describe desired initial plant conditions for the test (i.e., whether or not the AFW pump should be running when the malfunction is activated). Completion of the test is indicated by 5 check blocks, stating that the simulator meets various criteria of the standard, such as allowing use of applicable reference procedures.

Given this limited documentation, it is not possible to determine what was expected of the person performing the test. It is also not possible to determine the scope of testing conducted. Using the Aux Feedwater (AFW) Pump Trip again as an example, the check mark labeled "The simulator allows use of applicable reference unit procedures" could apply to Alarm Response Procedures if pump was running when the malfunction was inserted. If the test was instead performed with the AFW pump off and an event in progress, then it could mean that Emergency Operating Procedures were performed to align alternate water sources to the steam generators.

Analysis. The inspectors determined that this finding is a performance deficiency because PSEG has committed to conduct simulator testing in accordance with the ANSI/ANS 3.5-1993 standard as endorsed by Regulatory Guide 1.149, Revision 2 (PSEG Simulator Certification Letter LRN-00-0495 to the NRC in December 2000).

Specifically, the simulator performance testing did not meet the standards specified in ANSI/ANS 3.5-1993 in that: (1) “best estimate” data for the simulator testing was not used; (2) some (4 of the 11 required) annual simulator transient tests were not performed and; (3) simulator test documentation did not include an evaluation and validation of test results.

Traditional enforcement does not apply because the issues did not have any actual safety consequence or potential for affecting the NRC’s regulatory function and were not the result of any willful violation of NRC requirements or licensee procedures. The performance deficiency is more than minor because it affected the ability of the Salem simulator transient tests to detect replication problems and affects the Human Performance (Human Error) attribute of the Mitigating Systems cornerstone.

This finding was evaluated using the Operator Requalification Human Performance SDP (MC 0609 Appendix I) because it is a requalification training issue related to simulator fidelity. The SDP, Appendix I, Block 12, requires the inspector to determine if deviations between the plant and simulator could result in negative training or could have a negative impact on operator actions. “Negative Training” is defined in the standard (ANSI/ANS 3.5-1993), as “Training on a simulator whose configuration or performance leads the operator to incorrect response or understanding of the reference unit.” The Office of Nuclear Reactor Regulation, (NRR) was requested to review and clarify the requirement that negative training could have occurred verses did occur. Based on the review, NRR determined that negative training did not have to occur but, there had to be a potential for negative training based on the difference between the simulator and plant. Therefore, based on this clarification, if differences between the simulator and plant could negatively impact operator actions or potentially result in negative training then the finding is Green. Specifically, in this case the failure to adequately perform required testing had the potential to result in not identifying replication issues. This reduced the overall simulator fidelity and as a consequence, has the potential to result in negative operator training and improper operator response to a plant transient. Therefore, the answer to the Block 12 question is yes which resulted in a finding of very low safety significance (Green). The finding is of very low safety significance (Green) because the discrepancy did not have an adverse impact on operator actions such that safety related equipment was made inoperable during normal operations or in response to a plant transient.

Enforcement. No violation of regulatory requirements occurred. The inspectors determined that the finding did not represent a noncompliance because PSEG performed testing; however, the testing was not sufficient in scope, as specified in ANSI/ANS-3.5-1993, to identify potential discrepancies and replication issues and ANSI/ANS-3.5-1993 is not a regulatory requirement. **FIN 05000272, 311/2004007-02, Failure to Conduct Salem Simulator Testing in Accordance With ANSI/ANS 3.5-1993**.

3. Failure to Conduct Hope Creek Simulator Testing in Accordance With ANSI/ANS 3.5-1993

Introduction. The inspectors identified a Green finding with three examples of failing to conduct simulator performance testing in accordance with the standards of ANSI/ANS 3.5-1993. The examples are:

(a) PSEG compared the current year simulator transient test data to the previous year simulator transient test data rather than to “best estimate” data.
(b) A required annual simulator transient test was not performed.
(c) Simulator test documentation did not include an evaluation and validation of test results.

PSEG has entered these examples as deficiencies into their corrective action program (NUCR #70036769).

Description

Use of Previous Year Simulator Data Instead of “Best Estimate” Data

The inspectors interviewed PSEG staff about testing methodology used on the Hope Creek simulator. It was determined that the current year annual simulator transient performance test results were compared to the previous year test results instead of using the best estimate data required by ANSI/ANS 3.5-1993 as endorsed by Regulatory Guide 1.149 Revision 2.

Simulator testing methodology has been based on simulator benchmark testing completed during the initial site simulator acceptance testing. For all annual transient tests, these initial simulator test runs have become the "best estimate" data for the next performance of transient tests. Annually, the tests have been performed, data has been evaluated by comparison to the previous year test data and, if needed, deficiency reports have been written and dispositioned. Following completion of a given set of annual tests, those test results were accepted as the baseline for the next planned test performance.

This methodology for continually updating the comparison baseline is not described in the station simulator test program documentation and is contrary to ANSI/ANS-3.5-1993, which defines “best estimate” as “predicted reference unit performance data derived from engineering evaluation or operational assessment by subject matter experts for specific conditions.” PSEG did not perform any comparison of current year’s data to actual or predicted plant performance. Comparison of test data to previous test data can highlight differences in simulator performance year-to-year for the purposes of revealing unanticipated effects of recent modeling changes. However, small changes in simulator performance over several years could lead to unacceptable differences in performance between the simulator and the expected reference unit response. Proper verification of simulator fidelity is not assured without direct comparison of simulator transient test data to the reference unit best estimate.

A Required Simulator Transient Performance Test Was Not Performed

ANSI/ANS 3.5-1993 Appendix B lists 10 transient performance tests under BWR Simulator Operability Test Requirements. RG 1.149 Revision 2 endorses the 1993 standard with exceptions, one of which states that the appendices to the Standard should be considered integral parts of the standard.

Contrary to the standard, PSEG did not perform the annual transient test for maximum rate power ramp from 100% down to approximately 75% and back up to 100%.

Simulator Test Documentation Did Not Include An Evaluation And Validation Of Test Results

ANSI/ANS 3.5-1993 Appendix A states that simulator test documentation should include an evaluation and validation of test results. Contrary to this standard, PSEG has not been documenting an evaluation or validation of test results for the annual transient tests. If any problems are noted during a transient test, simulator staff generate a deficiency report (referred to as a SAR) to track resolution of the issue. This constitutes the only documentation that an evaluation of test results has been performed.

The associated PSEG corrective action report (NUCR #70036769) states that the decision to begin documenting deviations to annual tests rather than an analysis of the test results was made in 1998. This decision was based on the rationale that scenarios were validated prior to training for accuracy and that scenario validation was the bulk of the testing program.

PSEG maintains the Hope Creek simulator to the 1993 version of ANSI/ANS 3.5. This standard, as endorsed by Reg Guide 1.149 Revision 2, requires performance and documentation of annual transient tests in accordance with ANSI/ANS 3.5-1993 Appendix A and Appendix B. No provision is made for replacement of transient test documentation with training scenario validation.

Analysis. The inspectors determined that this finding is a performance deficiency because PSEG has committed to conduct simulator testing in accordance with the ANSI/ANS 3.5-1993 standard as endorsed by Regulatory Guide 1.149, Revision 2 (PSEG Simulator Certification Letter LRN-00-0495 to the NRC in December 2000). Specifically, the simulator performance testing did not meet the standards specified in ANSI/ANS 3.5-1993 in that: (1) “best estimate” data for the simulator testing was not used; (2) a required annual simulator transient test (1 of the 10) was not being performed and; (3) simulator test documentation did not include an evaluation and validation of test results.

Traditional enforcement does not apply because the issues did not have any actual safety consequence or potential for affecting the NRC’s regulatory function and were not the result of any willful violation of NRC requirements or licensee procedures. The performance deficiency is more than minor because it affected the ability of the Hope Creek simulator transient tests to detect replication problems and affects the Human Performance (Human Error) attribute of the Mitigating Systems cornerstone.

This finding was evaluated using the Operator Requalification Human Performance SDP (MC 0609 Appendix I) because it is a requalification training issue related to simulator fidelity. The SDP, Appendix I, Block 12, requires the inspector to determine if deviations between the plant and simulator could result in negative training or could have a negative impact on operator actions. "Negative Training" is defined in the standard (ANSI/ANS 3.5-1993), as "Training on a simulator whose configuration or performance leads the operator to incorrect response or understanding of the reference unit." The Office of Nuclear Reactor Regulation, (NRR) was requested to review and clarify the requirement that negative training could have occurred verses did occur. Based on the review, NRR determined that negative training did not have to occur but, there had to be a potential for negative training based on the difference between the simulator and plant. Therefore, based on this clarification, if differences between the simulator and plant could negatively impact operator actions or potentially result in negative training then the finding is Green. Specifically, in this case the failure to adequately perform required testing had the potential to result in not identifying replication issues. This reduced the overall simulator fidelity and as a consequence, has the potential to result in negative operator training and improper operator response to a plant transient. Therefore, the answer to the Block 12 question is yes which resulted in a finding of very low safety significance (Green). The finding is of very low safety significance (Green) because the discrepancy did not have an adverse impact on operator actions such that safety related equipment was made inoperable during normal operations or in response to a plant transient.

Enforcement. No violation of regulatory requirements occurred. The inspectors determined that the finding did not represent a noncompliance because PSEG performed testing; however, the testing was not sufficient in scope, as specified in ANSI/ANS-3.5-1993, to identify potential discrepancies and replication issues and ANSI/ANS-3.5-1993 is not a regulatory requirement. **FIN 05000354/2004007-03, Failure to Conduct Hope Creek Simulator Testing in Accordance With ANSI/ANS 3.5-1993**.

4. Salem Simulator Fidelity Issue Regarding Containment Level Response to Flooding

During review of simulator transient test data, the NRC identified a potential simulator fidelity/negative training issue. Inspectors questioned the indicated plateau in containment sump level during the injection phase of a large break loss of coolant accident simulation (see Figure 1). The plateau is observable in the Loss of Coolant Accident (LOCA) With Loss of Power (LOP) annual transient test results. It was determined that the plateau is based on the station's containment flood analysis.

A review of this calculation (Containment Volume Vs. Flood Level Analysis Design Calculation S-C-A900-MDC-0082, Rev. 1) shows that the plateau is expected to begin when the sump level reaches 81 feet 9 inches (approximately 67% indicated) because any further water addition to the sump will spill over into the area that provides access to the reactor sump and reactor coolant drain tank (RCDT) areas. The indicated level is calculated to remain at 81 feet 9 inches until 92,730 gallons of water spills over, filling the reactor sump and RCDT areas. This calculation assumes the water spills over primarily through a wire mesh door that acts to block entry into the area of the stairway to the reactor sump. Photographs were obtained from Radiation Protection showing

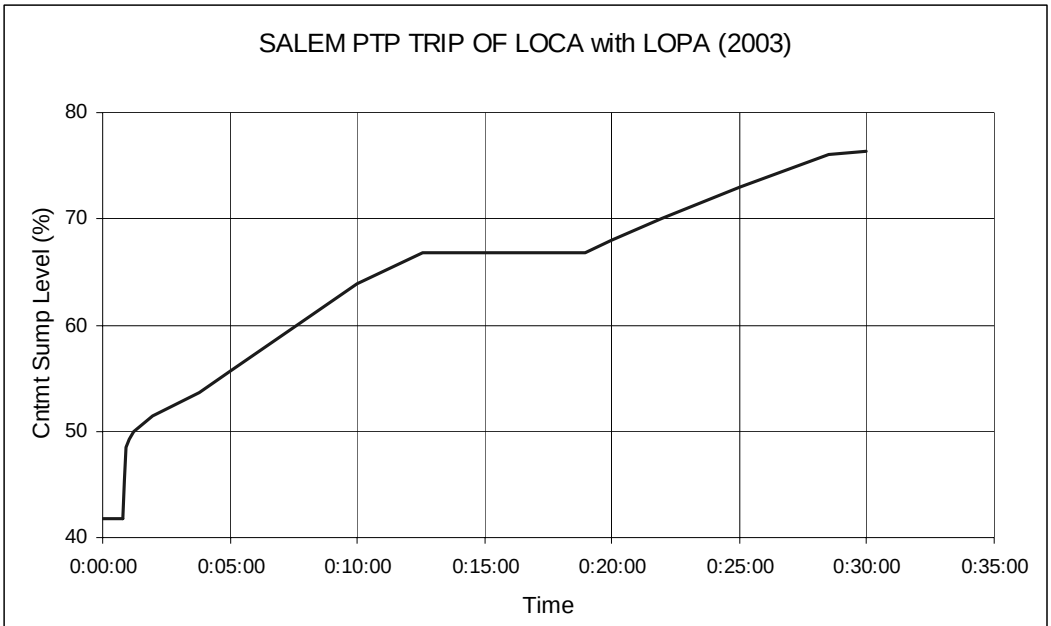

Figure 1, Containment Sump Level

that, while Unit 1 has a wire mesh door, Unit 2 actually has a metal plate door. The assumption used in the calculation, that water will flow un-impeded through the closed door, is apparently not correct for Unit 2, which is the reference plant for the simulator. PSEG generated a condition report (CR #70037479) to review and correct the calculation and the erroneous drawing which states the Unit 2 door is wire mesh construction. The response documented in the condition report indicates that alternate paths exist for water to travel to the reactor sump and RCDT areas, other than through the door. These paths were not credited in the original calculation.

During the exit meeting, PSEG personnel explained that they will expedite the corrective action to revise the calculation and will forward results to the NRC. This item is unresolved pending a review of the revised containment flooding calculation and the simulator sump level response. **URI 05000272, 311/2004007-04, Salem Simulator Fidelity Concern Regarding Containment Level Response to Flooding.**

4OA5 Other

(Closed) URI 05000272, 311/2003-07-01: Potential Inadequacy of Required Simulator Testing and Documentation

A baseline inspection was performed on the Salem Licensed Operator Requalification Program between September 15 and October 2, 2003 using Inspection Procedure Attachment 71111.11. During this inspection, NRC staff personnel identified that four of the annual transient tests specified in ANSI/ANS 3.5-1993 were not being performed. In addition, it appeared that malfunction testing was being credited through use of a scenario-based testing methodology not described by ANSI/ANS 3.5-1993. Acceptability of the testing program approach was questioned and opened as an unresolved item that was potentially more than minor.

The inspection described by this report was conducted to follow up on this unresolved item. A further review of the Salem and Hope Creek simulator test program documentation and methodology resulted in identification of one NCV green finding and two other green findings. These findings are discussed earlier in this report under Section 1R11. URI 05000272, 311/2003-07-01 is closed through completion of this inspection and the findings documented in this report.

4OA6 Meetings, Including Exit

The inspectors met with PSEG representatives on February 10, 2004 and periodically to review the purpose and scope of the inspection and to discuss the team's preliminary findings. PSEG acknowledged the team's preliminary inspection findings and did not take issue with the findings' preliminary characterizations. At an interim telecom exit on April 16, 2004, the NRC staff questioned simulator fidelity in light of incomplete simulator testing and analysis of results with respect to the upcoming Salem initial license exam. The licensee's representatives committed to complete testing and analysis using system matter expert prior to the Salem initial exam validation week. Subsequently, the inspectors reviewed these results on May 13, 2004. The final exit meeting was conducted telecom on June 24, 2004.

The inspectors asked the licensee whether any materials examined during the inspection should be considered proprietary. No proprietary information was reviewed during this inspection.

SUPPLEMENTAL INFORMATION

KEY POINTS OF CONTACT

Licensee Personnel

N. Conicella, Director, Salem / Hope Creek Training
S. Mannon, Licensing Manager
J. Reid, Operations Training Manager
M. Kafantaris, Salem Operations Training Supervisor
H. Swartz, Salem / Hope Creek Simulator Supervisor

NRC Personnel

J. Caruso, Senior Operations Engineer, Region I
P. Presby, Operations Engineer, Region I
L. Vick, Reactor Engineer, NRR

LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED

Opened

05000272, 311/2004007-04	URI	Salem Simulator Fidelity Concern Regarding Containment Level Response to Flooding (Section 1R11)

Opened and Closed

05000354/2004007-01	NCV	Failure of the Hope Creek Simulator to Demonstrate Expected Plant Response to Transient Conditions (Section 1R11)
05000272, 311/2004007-02	FIN	Failure to Conduct Salem Simulator Testing in Accordance With ANSI/ANS 3.5-1993 (Section 1R11)
05000354/2004007-03	FIN	Failure to Conduct Hope Creek Simulator Testing in Accordance With ANSI/ANS 3.5-1993 (Section 1R11)

Closed

05000272, 311/2003-07-01	URI	Potential Inadequacy of Simulator Testing (Section 4OA5)

LIST OF DOCUMENTS REVIEWED

- LRN-00-0495, Simulator Facility Certification Letter for Salem and Hope Creek, Dec 2000
- PSE&G Simulation Facility Program, Revision 02, dated November 19, 1996
- Salem Simulator Core Physics Tests Results Cycle 14 (data sheet)
- Salem Generating Station / System Engineering Procedure SC.RE-IO-0002(Q) - Rev.3, "Low Power Physics Testing and Power Ascension"
- PSE&G Nuclear Business Unit Procedure NC.TQ-TC.ZZ-0029(Z) -Rev.1, "Simulator Action Request"
- Salem Performance Database - List of Malfunctions, as of February 09, 2004
- SAR # H-2003-081, Hope Creek MSIV PCIG Simulator Fidelity Issue, July 7, 2003
- Salem Simulator Test PTP-001 "Manual Reactor Trip" (2003 vs. 2002)
- Salem Simulator Test PTP-004 "Simultaneous Trip of All Reactor Coolant Pumps" (1997)
- Salem Simulator Test "Loss of All Feed-water Pumps" (1999), (2000)
- Salem Simulator Test PTP-009 "Main Steam Line Rupture - 24 SG" (1997)
- Salem Simulator Test PTP-010 "Slow Primary System Depressurization to Saturated Conditions."(1997)
- Salem Simulator Transient Test Plot PTP Trip of LOCA with LOPA (2000),(2001),(2002)(2003)
- Salem Simulator Transient Test Plot PTP Main Steam Line Rupture (2000), (2001),(2002)(2003)
- Salem Simulator Malfunction Test Results - AF0181, Auxiliary Feedwater Pump Trip
- Salem Simulator Malfunction Test Results - EL0134, Loss of All 500KV Off-site Power
- Salem Simulator Malfunction Tests Results - RC0011, RCP Loss of CCW to Upper Lube Oil Cooler
- Salem Simulator Malfunction Tests Results - RD0267, Any Rod(s) Inadvertently Drops
- Salem Simulator Malfunction Tests Results - RH0026, 21 RHR Pump Trip
- Salem Simulator Malfunction Tests Results - SG0078, Steam generator Tube Rupture
- Simulator Action Request #S-2002-108; #S-2000-112;

LIST OF ACRONYMS USED

AFW	Auxiliary Feedwater
ANS	American Nuclear Standard
ANSI	American National Standards Institute
CAP	Corrective Action Program
CFR	Code of Federal Regulations
CR	Condition Report
FIN	Finding
IMC	Inspection Manual Chapter
IR	Inspection Report
LOCA	Loss of Coolant Accident
LOP	Loss of Power
MSIV	Main Steam Isolation Valve
NCV	Non-Cited Violation
NRC	Nuclear Regulatory Commission
NRR	Office of Nuclear Reactor Regulation
PCIG	Primary Containment Instrument Gas
PCIS	Primary Containment Isolation Signal
PSEG	Public Service Electric & Gas
PWR	Pressurized Water Reactor
SAR	Simulator Action Request
SDP	Significance Determination Process
URI	Unresolved Item