October 15, 2003

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

SUBJECT: SALEM NUCLEAR STATION - NRC SPECIAL INSPECTION REPORT NO. 05000272/2003006; 05000311/2003006

Dear Mr. Anderson:

On August 6, 2003, the NRC completed the onsite portion of its special inspection regarding leakage from the Unit 1 fuel handling building (FHB) and contamination of groundwater at Salem Nuclear Generating Station, Units 1 and 2. The enclosed report documents the inspection findings which were discussed with members of your staff during preliminary briefings on June 6, July 11, and August 6, 2003. A final exit briefing was held on September 17, 2003, with Messrs. J. Carlin and D. Garchow, and other licensee representatives.

The inspection team 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. In particular, the team reviewed the chronology and circumstances surrounding the leak, the extent of condition, mitigation and repair efforts, ground water sampling and characterization, possible sources of the contamination, FHB structural integrity, event evaluations including technical analyses, root cause investigation, and relevant performance history. The inspection assessed the significance and potential consequences associated with the contamination found in the ground adjacent to the Unit 1 spent fuel pool. Particular emphasis was placed on identification of potential radiological dose consequences to workers and members of the public

This report documents one self-revealing finding of very low safety significance (Green) associated with leakage of water through Unit 1 FHB walls. This finding was not greater than very low safety significance because the leakage did not result in any radiological exposure to workers or members of the public, and there was no evidence that the FHB structure had been adversely affected. Because the finding was of very low safety significance and because it was entered into your corrective action system, the NRC is treating the finding as a non-cited violation (NCV) consistent with Section VI.A of the NRC Enforcement Policy. If you contest the NCV in this report, you should provide a response within 30 days of the date of this inspection, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-001; with a copy to the Regional Administrator, Region I, the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-001; and the NRC Resident Inspector at Salem.

Based on our review, we concluded that the failure to more promptly identify and investigate the leakage is another example of a cross-cutting issue in the area of problem identification and resolution. As discussed in our annual assessment letter of March 3, 2003, and reiterated in our mid-year assessment of August 27, 2003, numerous NRC inspection findings have involved that cross-cutting area, particularly in regards to ineffective problem evaluation and untimely, ineffective corrective actions. Notwithstanding, PSEG's actions subsequent to identification of the leakage included stoppage of the identified leakage, sampling and characterization of the contamination, conduct of a comprehensive root cause investigation, and issuance of numerous corrective actions.

In accordance with 10 CFR 2.790 of the NRC's "Rules of Practice," a copy of this letter and its enclosures will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records (PARS) component of 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).

Sincerely,

/RA/

Wayne D. Lanning, Director
Division of Reactor Safety

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

Enclosure: Inspection Report 05000272/2003006 and 05000311/2003006

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REGION I

Docket Nos:	50-272, 50-311
License Nos:	DPR-70, DPR-75
Report Nos:	05000272/2003006, 05000311/2003006
Licensee:	PSEG LLC
Facility:	Salem Nuclear Generating Station, Units 1 & 2
Location:	P.O. Box 236 Hancocks Bridge, NJ 08038
Dates:	June 2 - August 6, 2003 July 25, and July 30 - 31, 2003 September 17, 2003
Inspectors:	R. Nimitz, CHP, Senior Health Physicist (Team Leader) S. Chaudhary, Reactor Inspector J. Jang, Ph.D, Senior Health Physicist E. Gray, Senior Reactor Inspector E. Cobey, Senior Reactor Analyst (part-time)
Approved by:	John R. White, Chief Radiation Safety and Safeguards Branch Division of Reactor Safety

Enclosure

SUMMARY OF FINDINGS

IR 05000272/2003-006; 05000311/2003-006; 06/02/2003 - 08/06/2003; Salem Nuclear Power Station, Unit 1 and Unit 2; Special Inspection of Leak In Unit 1 Spent Fuel Storage Pool.

The inspection was conducted by four regional inspectors, and one regional Senior Reactor Analyst. Representatives from the State of New Jersey's Bureau of Nuclear Engineering participated in selected aspects of the inspection. The inspection identified one self-revealing finding of very low safety significance that was a non-cited violation. The NRC's program for overseeing the safe operation of commercial nuclear reactors is described in NUREG-1649, "Reactor Oversight Process," Revision 3, dated July 2000.

A. NRC-Identified and Self-Revealing Findings

Cornerstones: Public Radiation Safety

No findings of significance were identified.

Cross-cutting: Problem Identification and Resolution

Green: A self-revealing violation of 10 CFR 50, Appendix B, Criterion XVI, was identified involving failure to promptly detect and correct a condition adverse to quality involving the undetected accumulation of borated, contaminated water behind Unit 1 fuel handling building (FHB) walls. Specifically, water leaked from the Unit 1 spent fuel pool (SFP) for an undetermined period of time through December 2002 and accumulated between the Unit 1 SFP liner and the Unit 1 FHB walls. The water subsequently leaked through the building walls presenting the potential for undetected releases of contaminated water to the Unrestricted Area and adverse effects on the FHB structure.

This finding was not suitable for SDP evaluation but was reviewed by NRC management and determined to be a violation of very low safety significance (Green). Specifically, the finding was more than minor because, if left uncorrected, the leakage would become a more significant safety concern if the condition eventually resulted in an unmonitored release to the environment or adversely affected the FHB. This finding was not greater than very low safety significance because there was no indication that Unit 1 FHB leakage had resulted in any radiological exposure to workers or members of the public, and there was no evidence that the FHB structure had been adversely affected such that it would not meet its design function. (Section 4OA3)

REPORT DETAILS

Purpose

The special inspection team conducted an inspection of the circumstances and PSEG's evaluations surrounding identified through wall leakage of the Unit 1 Fuel Handling Building (FHB). NRC Inspection Procedure 93812, "Special Inspection," was used by the team to provide guidance for the inspection. A Special Inspection Team Charter was also developed for this inspection and is included as Attachment 4 to this inspection report.

The team inspected and evaluated, among other matters, the chronology of the issue, the circumstances surrounding the leak, the risk significance of the leak, the evaluation of the extent of condition, the mitigation and repair efforts, and the potential dose consequences of the leak on members of the public and workers. The team reviewed the potential impact of the leak on the structural integrity of the FHB including aspects of the historical performance of the Unit 1 spent fuel pool (SFP), relative to prior leaks, and associated licensee actions and evaluations. The team also walked down and visually inspected locations where through wall water leakage was identified and reviewed other likely sources of the tritium contamination including previous spills and possible leaking systems.

Consistent with the guidance in NRC Inspection Procedure 93812, "Special Inspection," areas where no findings were identified are documented in greater detail than as required by NRC Inspection Manual Chapter 0612 due to the nature of special inspections.

Background

On September 18, 2002, PSEG found evidence of contaminated water leakage through a wall and onto the floor of the 78' elevation Unit 1, Auxiliary Building (AB) Mechanical Penetration Room, a Radiologically Controlled Area (RCA). The leak location (about 10 feet up a wall surface) was identified during follow-up of low-level shoe contamination of personnel who had traversed the area and had been identified as having contamination when they attempted to exit the RCA.

Subsequent reviews by PSEG identified other locations where contaminated water was leaking through walls or penetrations into both the Unit 1 auxiliary building and the Unit 1 fuel handling building. Areas with through wall or penetration leakage were: 1) through wall leakage at 78' elevation Unit 1 AB mechanical penetration area; 2) penetration leakage at 92‘ elevation Unit 1 service water bay; and 3) through wall leakage at 84‘ elevation of the Unit 1 FHB. PSEG concluded the source of the contaminated water was likely the Unit 1 SFP or an associated system and initiated actions to identify specific leak locations, repair and mitigate the leak, and assess potential environmental and health and safety impacts. PSEG also identified apparent wall leakage at the 64' elevation Unit 1 AB switch gear room.

PSEG conducted prompt sampling and analysis of the environment, in a phased approach, to identify potential release of the water outside building confines. The ground water sampling, via test boring and sample analysis, subsequently identified, on February 6, 2003, tritium (H-3) contamination in close proximity to the Unit 1 FHB (see Attachment 3 for test locations). PSEG promptly reported this discovery to the State of New Jersey and the NRC. PSEG's evaluations did not identify any immediate health and safety consequences to onsite workers or members of the public. PSEG did not detect contamination, associated with this matter, outside the confines of its fenced and controlled Restricted Area. PSEG stopped the identified through wall leakage and was collecting fuel pool liner leakage with the installed leakage detection and collection system.

In addition to the Unit 1 FHB, PSEG had identified several historical spills which may have contributed to the tritium contamination. PSEG was reviewing underground piping for leaks. At the conclusion of the inspection, PSEG continued to evaluate and assess the condition and the potential causes.

Chronology and Details

On September 18, 2002, PSEG documented the discovery (Notification 20114071) of leakage of contaminated water through the Unit 1 - 78-foot mechanical penetration room wall in the Unit 1 auxiliary building. The leakage was identified during follow-up of personnel shoe contamination.

On September 25, 2002, PSEG initiated an evaluation (Notification 20114152) of potential sources of the contamination, established a Technical Issues Team to review the matter, and initiated sampling program development.

On October 2-4, 2002, PSEG collected various samples, including outdoor yard samples and samples of catch basins to search for the presence of outdoor contamination. No contamination was identified.

On November 6, 2002, PSEG identified a second water leak associated with the Unit 1 spent fuel pool cooling piping penetration at the 92' elevation (between the Unit 1 FHB and the Unit 1 auxiliary building) located within the Unit 1 service water bay. The first leak had been identified on September 18, 2002 (see above). PSEG subsequently expanded its Technical Issues Team to review the matter.

On November 20, 2002, PSEG informed the NRC resident inspectors of the leak and indicated that analysis of water from the leak was indicative of Unit 1 spent fuel pool water. NRC resident and regional staff initiated reviews of the matter.

On November 22, 2002, PSEG identified that additional ongoing sampling of the environment (catch basins, accessible building areas) showed no detectable contamination in the environment outside the Unit 1 FHB.

On November 29, 2002, PSEG began installation of a collection device to capture the leakage from under the Unit 1 SFP cooling line and directed this water to the contaminated drain and

liquid radwaste systems. (Note that PSEG identified later that water from this leak was believed to have entered, via a degraded water seal, a 6-inch seismic gap between the Unit 1 FHB and the Unit 1 AB.)

On December 11 -13, 2002, PSEG assigned a full-time team and developed an action plan to address the leaks. Two additional Notifications (20123998 and 20120815) were drafted to document associated corrective actions. PSEG collected and analyzed various samples from within and outside the RCA. PSEG also identified an additional location of wall contamination in the Unit 1 AB, 64' elevation switch gear room.

On December 12-13, 2002, PSEG collected water from normal onsite production wells. No contamination of production or observation wells was identified. No contamination of drinking water supplies was identified.

On December 19-20, 2002, two sample well points were installed in the styrofoam in the 6-inch seismic gap between the Unit 1 FHB and the Unit 1 AB.

On January 6, 2003, PSEG identified contamination on the wall surfaces above the tell tales in the 84' elevation of the Unit 1 FHB. (This FHB wall surface was also identified as a west wall of the Unit 1 SFP.)

On January 19-20, 2003, PSEG collected water from the seismic gap between the Unit 1 FHB and the Unit 1 AB and identified radionuclides characteristic of Unit 1 SFP water.

On February 3-7, 2003, PSEG cleaned, via a snaking method, and video scanned the Unit 1 tell-tale drains. The cleaning was effective in removing some blockage. The cleaning resulted in cessation of contaminated water leakage through walls and penetrations and a decrease in boron and tritium in the 6-inch seismic gap. In addition, the water from the tell-tale drains showed increasing characteristics of water within the Unit 1 SFP. The tell-tales for Unit 2 were later snaked and sampled indicating there was also some blockage. No through wall FHB contaminated leakage was evident in Unit 2.

On February 6, 2003, PSEG formally reported to the State of New Jersey that it had identified tritium (H-3) in two near field test locations (ground borings) (i.e., location N, and location O) at a depth of about 20 feet below the ground surface level of 100 feet. The sample location was in close proximity to the Unit 1 FHB and only went to a depth of 20 feet due to subsurface concrete support structures. The tritium was above the State of New Jersey's reporting requirement of 1.0 E-6 uCi/ml (1000 pCi/l). PSEG reported this matter to the State, which prompted a 10 CFR 50.72 report to the NRC (see Attachment 3, Figure 1, for locations).

On February 19, 2003, PSEG informed the NRC that two additional test locations were found to contain tritium (i.e., location M and location K). Location M was at depth of 20 feet below the ground surface level of 100 feet. These locations were also in close proximity to the Unit 1 FHB. Location K was at a depth of 80 feet below grade of 100 feet. The K location was between the Unit 2 Salem facility and the Hope Creek facility. PSEG had informed the State of New Jersey of this discovery on February 18, 2003.

PSEG's analysis of a sample, collected on February 26, 2003, from the R sample location near the Unit 1 FHB (fuel building east), was identified to exhibit tritium contamination.

As of June 6, 2003, PSEG identified five test boring locations with varying levels of tritium contamination. These were the K, M, N, O, and R locations. Locations M, N, O, and R abutted the Unit 1 FHB and exhibited tritium at 20 feet deep below the ground surface level of 100 feet. The fifth location, test boring K (located north of the Unit 2 containment) exhibited tritium at 80 feet below the 100-foot ground level.

During the period June 6 - July 22, 2003, PSEG initiated actions to establish additional test locations for drilling to better characterize the source and migration of tritium groundwater contamination. PSEG also reviewed methods to improve cleaning of the SFP tell-tales.

On July 23, 2003, PSEG identified elevated tritium ground water contamination (3.5 E-3 uCi/ml), as compared to previous sample results (1.0 E-6 uCi/ml), in a new test location ("S") location about 100 feet south of the Unit 1 FHB. The test location was at a depth of 35 foot below the surface. PSEG initiated actions to identify additional sampling locations to further characterize the tritium contamination as to its source and migration in light of this new sample result.

On July 25, 2003, PSEG provided a written update report to the State of New Jersey discussing the new results. PSEG subsequently made a 10 CFR 50.72 notification to the NRC the same day regarding notification of the State.

Subsequent to July 23, 2003, PSEG identified locations for 37 additional ground water sampling wells (Wells 1-37) to better characterize the extent of contamination of the onsite ground water and attempt to identify the source and age of the contamination. Thirty of the wells were drilled and the sample results identified additional areas with detectable tritium. The analyses did not identify release of tritium into the Unrestricted Areas.

At the end of this inspection, PSEG continued efforts to evaluate and assess the potential sources of the tritium contamination.

4. OTHER ACTIVITIES (OA)

4OA2 Problem identification and Resolution

a. Inspection Scope

The inspection team reviewed various corrective action documents associated with the leakage of water through Unit 1 FHB walls to ensure that PSEG was identifying, evaluating, and correcting identified problems. The review was against applicable regulatory requirements.

b. Findings

One self-revealing violation, associated with the cross-cutting area of problem identification and resolution, was identified during this inspection. Specifically, a self-revealing violation of 10 CFR 50, Appendix B, Criterion XVI, was identified involving failure to promptly detect and correct a condition adverse to quality involving the undetected accumulation of borated, contaminated water behind Unit 1 fuel handling building (FHB) walls. The condition lead to accumulation of water between the Unit 1 spent fuel pool (SFP) liner and the Unit 1 FHB walls and leakage of contaminated water through the FHB walls presenting the potential for undetected releases to the Unrestricted Area and adverse effects on structures if left uncorrected. The finding is discussed in Section 4OA3.3 of this inspection report. The leakage is considered by PSEG as a potential cause of tritium contamination in ground water within the Restricted Area.

Upon recognition of this condition, PSEG established a Technical Issues Team to review the matter, initiated actions to stop the leak, conducted a detailed focused self-assessment of this issue, and initiated corrective actions including development of a Remedial Investigation Work Plan.

4OA3 Event Follow-up

.1 Reportability

a. Inspection Scope

The inspection team reviewed PSEG's reporting of the identification of tritium contamination in ground water around the Unit 1 FHB. The review was against reporting requirements contained in 10 CFR 50.72, Technical Specifications (TS), and the Offsite Dose Calculation Manual (ODCM).

b. Findings

No findings of significance were identified. PSEG made formal reports to the NRC consistent with regulatory requirements. PSEG also did notify and inform the NRC, and other regulatory bodies, regarding ongoing activities.

On February 6, 2003, PSEG received sample results for ground water outside the Unit 1 FHB (test location R) that indicated tritium contamination was above the State of New Jersey's lower limit of detection and reporting value (1.0 E-6 uCi/ml). PSEG promptly informed the State of New Jersey and NRC as required (see Attachment 3 for test locations). Subsequently, on July 23, 2003, PSEG identified tritium ground water contamination (3.5 E-3 uCi/ml) in the "S" test location, also outside the Unit 1 Fuel Handling Building but within the Restricted Area. PSEG subsequently provided an updated report on July 25, 2003, to the State of New Jersey discussing the new results and made a 10 CFR 50.72 notification to the NRC, that same day, regarding the State notification.

.2 Assessment of the Radiological Impact on the Environment and Projected Doses to the Public and Workers

a. Inspection Scope

The inspection team reviewed and assessed the radiological aspects of the Unit 1 FHB leakage and ground water contamination. In particular, the team evaluated the potential dose consequences to members of the public and workers. The following matters were reviewed:

- radiological measurement (gamma and tritium) results of the SFP water and the leaks, including analytical methodology and its adequacy;
- non-radiological measurement (chemicals such as boron, sodium, etc.) results of the SFP water and the leaks;
- tritium (H-3) measurement results for the observation and production well waters;
- radiological measurement results for newly installed monitoring wells;
- sampling for potential hard to detect radionuclides;
- non-radiological measurement results for newly installed monitoring wells;
- assessment of the ground water movement;
- assessment of the projected radiation doses to members of the public based on possible exposure pathways;
- radiological controls for workers and assessment of potential doses to onsite workers;
- maintenance of spill records in accordance with 10 CFR 50.75;
- development and implementation of enhanced periodic sampling of aquifers; and
- PSEG's Remedial Investigation Work Plan.

The evaluations in this area were against requirements contained within 10 CFR 20, Standards for Protection Against Radiation; Technical Specifications; and the Offsite Dose Calculation Manual (ODCM).

b. Findings

No findings of significance were identified. PSEG and the special inspection team did not identify any onsite or offsite dose consequences to workers or members of the public associated with the identification of tritium contamination of groundwater.

Upon discovery and review of the Unit 1 FHB leak, PSEG established a team devoted to: (1) identify the leak pathways; (2) conduct Unit 1 SFP water leak rate measurements; (3) evaluate and repair the leak; (4) conduct in-plant and outside radiological surveys; (5) selection and installation of environmental monitoring test locations; (6) perform radiological analyses of the test location water samples; (7) conduct geological and hydrological studies to determine the ground water flow rate; (8) determine possible release of radioactive materials to the environment; (9) perform corrective actions; and (10) assess the radiological impact.

PSEG conducted extensive sampling of onsite wells and test locations to identify and evaluate possible contamination. PSEG followed established procedures to perform radiological (e.g., tritium (H-3) and gamma radionuclides) and non-radiological (e.g., sodium and boron) measurements and did not identify any radionuclides in unrestricted areas attributable to the leak. PSEG validated its measurement results through its laboratory quality assurance and quality control (QA/QC) programs.

PSEG established a multi-phase sampling program to provide for prompt identification of potential environmental contamination after discovery of the leak. Initial sampling was conducted in a manner to evaluate and determine possible immediate safety concerns. PSEG later drilled eight test boring locations (called observation wells) within and outside a rigid cofferdam-like structure encircling the station within the restricted area. The outer wells went to a depth of 80 feet while the inner wells, due to a base mat, went to a depth of 20 feet. The wells were in an outer and inner perimeter around the Unit 1 FHB including between the site and river to assess possible migration.

PSEG identified tritium in the inner wells encircling the Unit 1 FHB. PSEG also identified tritium at a depth of 80 feet in a monitoring well (Location K) between the Salem Unit 2 facility and the Hope Creek station. Attachment 2 identifies sampling points with tritium levels exceeding the State of New Jersey's reporting level of 1.0 E-6 uCi/ml (1000 pCi/l) as of August 6, 2003 (see Attachment 3 for sample locations). The tritium activity of the initial eight wells remained generally stable since the time of the first measurements made in January 2003. However, one observation well (M) did show an increase in activity when re-drilled and sampled. The new results did not present any apparent radiological risk. PSEG was continuing to review the sample results.

PSEG had retained the services of technical experts in ground water hydrology and continued to drill additional test locations to better characterize the nature and source area of contamination. The additional sampling program was designed to sample at Unrestricted Area boundaries, possible underground flow paths, and near pipes to detect potential wicking. The results were also to be used to characterize subsurface hydrology including water gradient.

As a part of the ongoing investigation, PSEG submitted a "Remedial Investigation Work Plan" to the State of New Jersey in June 2003. This document contained detailed investigation objectives and also covered many aspects of the environmental impact study (e.g., determination of the ground water flow rate and tritium migration) and its remedial action plans.

On July 23, 2003, PSEG identified tritium in groundwater (3.5 E-3 uCi/ml) at the "S" test location (see Attachment 3). This sample result prompted development and identification of an expanded test program with additional locations to further characterize and identify the possible source of the tritium.

PSEG identified several additional test locations for sampling to better characterize the July 23, 2003, sample results. During the inspection, PSEG drilled 30 new locations. The team reviewed the analytical sample results for the new test locations. The sample results, for all areas sampled, including the 30 new locations, ranged from background to 3.5 E-3uCi/ml (July 23, 2003 at S well sample). The test locations included collection of samples along potentially affected Unrestricted Area boundaries. The sample results from all wells, including the 30 additional wells, characterized a general area of tritium contamination extending about 250 feet inside the south coffer dam abutting the Unit 1 FHB and extending out about 250 feet south of the Unit 1 FHB. The total area was estimated by PSEG to be about an acre.

Although PSEG's 30 additional sample results identified additional locations of contamination within the Restricted Area, the results did not identify significant levels of tritium in close proximity to Unrestricted Area boundaries. PSEG did not identify tritium contamination beyond the Restricted Area boundary.

PSEG conducted pressure testing on July 30, 2003, of a non-routinely used liquid radwaste discharge line in the vicinity of the "S" test location to determine if it was a likely source of the tritium. The testing did not identify a leak in the line.

PSEG analyzed samples from normal production and observation wells throughout the Salem/Hope Creek site for tritium and gamma radionuclides to review and assess the water quality and the potential radiological contamination. Onsite sources of water were drawn from an aquifer well below the surface. No contamination was identified in the samples.

The team reviewed boron and sodium analytical results for water samples collected from the 6-inch seismic gap (filled with Styrofoam) between the Unit 1 FHB and Unit 1 AB. The sample results reviewed were from prior to and subsequent to cleaning of the tell tales in January 2003 and pump out of 45 gallons of water from the 6-inch seismic gap on February 13, 2003. The results indicated that there had been communication between the 6-inch gap and ground or rain water. Since the cleaning of the tell tale drain lines, leakage into the 6-inch gap has not been observed.

The NRC had conducted an inspection of PSEG's Radiological Environmental Monitoring Program (REMP) in February 2003 including environmental sample results

for locations south and west of the Unit 1 facility (Reference NRC Combined Inspection Report 50-272/2003-003; 50-311/2003-003). No anomalus results were identified and no radionuclides were identified in the Unrestricted Area via the REMP program associated with this issue.

The team also completed projected dose calculations, using the NRC's PCDose computer code and the applicable parameters specified in PSEG's NRC approved Offsite Dose Calculation Manual (ODCM). The calculations identified no offsite radiological dose consequences to members of the public.

The team reviewed onsite radiological controls for workers outside the Radiological Controlled Area (RCA) and the likelihood of workers coming in contact with tritium contaminated water outside the normally defined RCA. PSEG did not identify contamination concerns or personnel exposure concerns.

The team identified that PSEG did not maintain records, in accordance with the requirements of 10 CFR 50.75(g), of spills or other unusual occurrences involving the spread of contamination around the facility, equipment, or site. PSEG's focused self-assessment identified nine apparent historical spills for review as possible contributors of the tritium contamination. As of August 6, 2003, the team could not identify complete records for five of the spills and the licensee was not able to provide the records or any reference to them indicating the significance of the spills, known information on identification of involved radionuclides, quantities, forms, concentrations, or locations of possible inaccessible contamination. PSEG was also not able to provide a formal program to provide for documentation of required information consistent with 10 CFR 50.75(g).

The lack of a complete 10 CFR 50.75(g) file was subject to traditional enforcement because failure to have a complete record of spills could impact the NRC's ability to provide effective oversight of decommissioning activities such as evaluation of residual contamination and post license termination dose assessments. This finding was considered minor in that it did not have any actual safety consequences, the issue was not a precursor to a significant event, if left uncorrected it was not likely to become a more significant event, the issue did not relate to a performance indicator, and the issue was not directly associated with one of the cornerstones. Although this issue constitutes a violation of minor significance that is not subject to enforcement action in accordance with Section IV of the Enforcement Policy, it is being documented because it is associated with an issue of agency wide concern (i.e., control of radioactive contamination). PSEG placed this issue in its corrective action program (Notification 20154863 dated August 6, 2003), and planned to enter information on the identified contamination into its decommissioning planning files in accordance with 10 CFR 50.75(g).

.3 Maintenance, Surveillance, and Modifications

a. Inspection Scope

The team reviewed and evaluated the maintenance and surveillance of the Unit 1 FHB structure and the integral Unit 1 SFP leak detection and collection system.

The team reviewed relevant correspondence, notifications, maintenance and surveillance procedures, implemented and proposed corrective actions, and conformance with applicable regulatory requirements.

b. Findings

Introduction

A self-revealing violation of 10 CFR 50, Appendix B, Criterion XVI, was identified involving failure to promptly detect and correct a condition adverse to quality involving the undetected accumulation of borated, contaminated water behind Unit 1 FHB walls. Specifically, for an unknown period of time through December 2002, water leaking from the Unit 1 spent fuel pool (SFP) collected between the Unit 1 SFP liner and the Unit 1 FHB walls resulting in the potential for undetected leakage to the Unrestricted Area and the potential for adverse effects on the FHB walls.

Description

The FHB is identified as a Class I structure in PSEG's Updated Final Safety Analysis Report (UFSAR Section 3.2.1) as a structure whose failure could result in an uncontrolled release of excessive amounts of radioactivity. Accordingly, the criteria of 10 CFR 50 Appendix B apply. PSEG applied its operational quality assurance program to the structure as described in UFSAR Section 17.2. The collection, removal, and monitoring of leakage from the FHB structure was important in that a 1997 PSEG engineering evaluation (A-0-ZZ-SEE-1160) identified the possibility of water accumulation between the SFP liner and the concrete walls, and stated that, because concrete was resistive to chemical attack by acids only to approximately a pH of 5.5, any prolonged contact with fuel pool water (pH 4) would soften the concrete and corrode the embedded reinforcing steel. Hence, PSEG established a monitoring program for the FHB.

The Unit 1 FHB and SFP were designed with an integral leak detection and collection system to collect and remove water from the structure. SFP liner leakage collected in 3 inch by 5 inch stainless steel drainage channels located under the pool liner between the liner and the structural concrete walls and base which included FHB walls. The collected leakage was designed to be routed through 17 one-inch diameter pipe drains (called tell-tales) which drain through the walls of the FHB to a collection sump and eventually to the radioactive liquid waste processing system.

PSEG had identified that the condition of the interior of the FHB/SFP walls could be monitored by evaluation of the condition of concrete in the collection sump for degradation. This had been specified in engineering evaluation A-O-ZZ-SEE-1160, Rev.0, "Establishment of Requirements for Monitoring the Condition of Structures."

PSEG experienced long term leakage of its Unit 1 SFP since early plant operation and had been monitoring the leakage via an operational surveillance (S2.OP-DL.ZZ.0006(Q)). Engineering evaluations had been conducted authorizing the continuing leakage which was initially greater than 100 gallons per day. Over the years, the amount of monitored leakage decreased to about 5-6 gallons per day. However, the surveillance was not effective in identifying that the tell-tale system was likely becoming clogged, was not properly draining, and water was collecting behind the FHB walls structure. PSEG did not detect the decrease in monitored leakage, identify where else the leakage could be going, evaluate the potential impact of the monitored water accumulation on FHB walls or identify that an adverse condition existed. PSEG's Focused Self-Assessment of this issue indicated unsatisfactory conditions had been signed-off via the operations surveillance logs.

In August 1998, PSEG initiated installation of a design change package (Change Package 1EE-0391) which provided for capping flanges for the drains (tell-tales) in the event excess leakage from the spent fuel pool liner occurred. The drains extended through the 84' elevation of the FHB. The package's 10 CFR 50.59 applicability review stated that the proposed modification changes the facility as described in the safety analysis report and constituted a significant change to the facility such that the change would be added to the safety analysis report. The package installation procedure provided for application of a silicone sealant to flanges for drain extensions applied to the walls of 84' elevation of the FHB and indicated that piping should be left open, verified free of debris, and allowed for liner leakoff. The document did not identify how this was to be accomplished.

PSEG's review identified that the modification resulted in the sealant extruding into the drain lines partially or completely blocking a number of the drain lines contributing to the undetected accumulation of SFP water behind the interior walls of the FHB. The team identified that PSEG's corrective action program did not promptly detect and correct this adverse condition despite the modification package indicating that piping was to be left open and verified to be free of debris to allow for liner leakoff.

In March 2001, Notification 20060592 was issued regarding groundwater leakage into the 84' elevation of the Unit 1 FHB. In June 2002, a work order was created and a contractor was to conduct repairs of presumed groundwater in-leakage. On July 10, 2002, PSEG conducted radiological work surveys in the area and identified contamination on the wall surface during radiological surveys for repair of leakage of the wall surface. PSEG did not conduct an engineering evaluation of the condition (i.e., what was the source of contaminated leakage or its impact on the structure) or explore the matter further. PSEG later patched the leak as leak repair of ground water leakage. The leak was later confirmed to be through-wall leakage from the SFP through the FHB 84' wall. A second notification was written. The team identified that the location of the leak (84‘ elevation east wall of the Unit 1 FHB) did not abut an exterior wall, and was not likely attributable to ground water leakage.

PSEG concluded that the drain lines were partially or completely clogged by dried boron from the spent fuel pool and the leak sealant. The team concluded that the clogging by

the boron and the sealant eliminated PSEG's identified method of providing an indication of the condition of interior surfaces of the FHB. Specifically, the condition of the tell-tale drain sump concrete had been identified as a means to be used to give an indication of the condition of concrete behind the FHB walls. The team learned that this indicator (degradation of concrete within the sump) was never incorporated into applicable surveillance procedures despite its identification in engineering evaluation A-O-ZZ-SEE-1160, Rev.0, "Establishment of Requirements for Monitoring the Condition of Structures."

Based on the above examples, PSEG's corrective action process did not promptly detect and correct unsatisfactory conditions which lead to accumulation of water behind the Unit 1 FHB walls nor did it detect the actual accumulation of water behind the walls, a condition adverse to quality. Specifically, long term fuel pool liner leakage had continued without a full understanding of possible consequences, operational surveillance procedures did not detect and prompt an evaluation of unexplained reduction in identified leakage, quality controls did not detect blockage of tell-tale pipes during modifications, and through wall leakage, indicative of accumulation of water behind the Unit 1 FHB walls, was not evaluated.

Analysis

The team determined that this finding was a performance deficiency since PSEG did not meet a requirement which was reasonably within its ability to detect and correct. Specifically, evidence was present that an unsatisfactory condition existed involving the FHB that was not effectively understood or resolved. Traditional enforcement does not apply since the finding did not have any operational safety consequence, did not impact NRC's regulatory function, and was not willful.

Since a Significance Determination Process does not currently exist for evaluating findings involving structures, systems, and components associated with spent fuel handling and storage, this matter was reviewed by NRC management and determined to be of more than minor safety significance because, if left uncorrected, the leakage would become a more significant safety concern if it resulted in unmonitored release of radioactive material to the environment; or adversely affected FHB systems or structures. This finding was not greater than very low safety significance because there was no indication that the FHB through wall leakage had resulted in radiological exposure to workers or members of the public, and there was no evidence that the structure had been adversely affected such that it would not meet its design function.

This finding involved the cross-cutting area of problem identification and resolution.

Enforcement

10 CFR50, Appendix B, Criterion XVI, "Corrective Action," requires that measures be established and implemented to assure that conditions adverse to quality such as failures, malfunctions or deficiencies are promptly identified and corrected. Contrary to this requirement, PSEG did not promptly detect and correct the accumulation of SFP

water behind FHB walls, a condition adverse to quality. As a result, for an undetermined period of time through December 2002, undetected leakage from the Unit 1 SFP accumulated between the SFP liner and the walls of the Unit 1 FHB ultimately making its way through the FHB walls to adjoining areas and contaminating ground or rain water in the seismic space between buildings. This resulted in the potential for undetected release of radioactive material to the Unrestricted Area and adverse effects on the FHB.

This violation is associated with an inspection finding that is characterized to be of very low safety significance (Green) and is being treated as a non-cited violation consistent with Section VI.A of the NRC Enforcement Policy. This violation is in PSEG's corrective action system as various notification numbers and described and evaluated in PSEG Focused Self-Assessment No. 80061006-0010. PSEG also issued notification 20146037 regarding adequacy of frequency and criteria for inspection of the concrete structure and issued notification 20146560 regarding corrective actions for follow-up on operator surveillance of the drains. **(NCV 05000272/2003006-01; Failure to promptly identify and correct an issue adverse to quality associated with the Unit 1 FHB.)**

.4 Root and Contributing Causes of the Unit 1 Spent Fuel Pool Leak and Corrective Actions

a. Inspection Scope

The team reviewed PSEG's event evaluation reports and cause analyses associated with the Unit 1 FHB leak. The team also independently assessed the root and causal factors for the event and discussed planned corrective actions. The team reviewed data and corrective action program documents, conducted plant tours, and interviewed personnel, including station management.

b. Findings

PSEG's actions, subsequent to this leak, included a comprehensive root cause investigation and issuance of numerous corrective action documents associated with its investigation. PSEG's investigation identified several contributing causes including: organizational weaknesses in responding to the spent fuel pool leakage; procedures and surveillances were not effective in determining potential leakage to the environment; there were missed opportunities to investigate the system degradation; there were ineffective corrective actions; and personnel did not display a questioning attitude. PSEG entered these matters, and other matters, into its corrective action program.

The team's review of the event details, including PSEG's Focused Self-Assessment of the issue, identified the following root and contributing causes for accumulation of water behind the Unit 1 FHB walls.

a. *System Maintenance:* There was no periodic maintenance of the SFP leakage detection and collection system to ensure channels and drain pipes remained free and clear to allow the system to perform its design function and preclude accumulation of water behind FHB walls.

b. *Evaluation of Ongoing Leakage:* There was no effective program to trend and evaluate leakage from the spent fuel pool leak detection and collection system to identify changes in leak rate and potential adverse impact on the FHB structure or identify potential leakage to the environment.

c. *Controls for a 1998 Modification:* A 1998 modification package did not provide effective controls to prevent and identify the blocking of SFP leak detection and collection system drains to preclude accumulation of water behind FHB walls.

d. *Evaluation of Through Wall Leaks:* Opportunities were missed to evaluate through wall contaminated leakage as an indicator of accumulation of possible leakage behind the Unit 1 FHB (e.g., July 10, 2002).

PSEG has not yet established, with certainty, the source of the tritium contamination in the ground water. PSEG reviewed the extent of condition and identified some blockage of Unit 2 leak detection and leak collection drains but no similar accumulation of water was identified. The Hope Creek station does not use dissolved boron in its SFP and no active leak was identified at Hope Creek.

PSEG cleaned the SFP drains to release the water but as of September 17, 2003, Unit 1 tell-tale evaluations indicated 8 of 17 tell-tales were blocked and 12 of 17 tell-tales for Unit 2 were partially (7) or completely (5) blocked. The leak rate for the Unit 1 SFP liner was about 5-6 gallons per day before cleaning and about 100 gallons per day after cleaning of the drains. The Unit 2 SFP liner exhibited about 1.4 gallons per day leakage after cleaning. No Unit 2 pre-cleaning value was determined by PSEG.

At the conclusion of this inspection, PSEG had collected samples from the drains to identify the chemical compounds that may be restricting the draining of the tell-tales to aid in develop of an effective cleaning method. PSEG was developing mock-ups of the tell-tales and channels to aid in testing various tooling to negotiate the channels to clean them and to finalize development of the cleaning method for mock-up testing later in 2003 with proposed cleaning of the actual tell-tales in early 2004.

PSEG engaged a consultant to further review, analyze, and evaluate the condition of the Unit 1 spent fuel pool structure. The NRC will review the results of the structural evaluation of the Unit 1 Spent fuel pool. **(URI 05000219/2003006-02)**

4OA4 Cross Cutting Aspects of Findings

One finding was identified which involved the cross-cutting area of problem identification and resolution. The finding is discussed in Section 4OA3.3 of this report.

4OA5 Other

(Closed) URI 05000272/2002009-06: Determine if PSEG met all ODCM and 10 CFR 20 effluent release requirements associated with the Unit 1 FHB Leak. This item was opened to evaluate the safety and risk significance of contaminated ground water around the Unit 1 FHB. This item is discussed in Section 4OA3.2. The team did not identify ground water contamination that resulted in PSEG exceeding applicable NRC public dose or Unrestricted Area effluent release limits.

4OA6 Meetings, including Exit

.1 Exit Meeting Summary

The inspectors presented preliminary inspection results to licensee representatives on June 6, July 11, and August 6, 2003. The final inspection results were provided, by telephone, to Messrs. J. Carlin and D. Garchow on September 17, 2003. The licensee acknowledged the findings presented. Based upon discussions with the licensee, none of the information presented at the exit meeting and included in this report was considered proprietary.

Attachment 1

SUPPLEMENTAL INFORMATION

Key Points of Contact

Licensee Personnel

K. Augustine, Reliability Engineering
J. Carlin, Vice-President, Engineering
J. Carey, Safety Manager
P. Cusick, Engineering Programs Self-Assessment Coordinator
S. Harvey, Manager, Chemistry
R. Keating, MPR Associates Inc.
P. Kusick, ISI Inspector
M. Petrowski, Radiation Protection Supervisor
J. Riddle, Chemistry Engineer
T. Roberts, Code Assurance Supervisor
S. Robitzski, Manager, Engineering Programs
G. Salamon, Manager, Licensing
J. Simons, MPR Associates Inc.
T. Taylor, Project Manager
E. Villar, Licensing Engineer

NRC Personnel

D. Orr, Senior Resident Inspector, Salem
F. Bower, Resident Inspector, Salem
G. Meyer, Chief, Reactor Projects Branch 3

Others

J. Lipoti, State of New Jersey
K. Tosch, State of New Jersey
K. Tuccillo, State of New Jersey
E. Rosenfeld, State of New Jersey

List of Items Opened, Closed and Discussed

Opened

05000219/2003006-02	URI	NRC to review results of Unit 1 spent fuel pool structural integrity analysis.

Closed

05000272/2002009-06:	URI	Determine if PSEG met all ODCM and 10 CFR 20 effluent release requirements associated with the Unit 1 Spent fuel pool Leak.

Opened/Closed:

05000219/2003006-01	NCV	The corrective action program did not identify clogging of Unit 1 spent fuel pool leak detection and collection system drain lines.

List of Documents Reviewed

Procedures

- Condition Monitoring of Structures (various revisions/changes); SH.SE-TS.ZZ-0001(Z)-REV. 1, SH.RA-AP.ZZ-0002(Z)-REV. 0, SH.RA-AP.ZZ–0117(Z)-REV. 1; NC.NA-AP.ZZ-0021(Z)-REV. 4 AND 5
- Condition Monitoring of Structures, Concrete Elements Examination Checklist, 06/19/96
- Primary Plant Logs (S1.OP-DL.ZZ-0006(Q)) (October 1, 2001, September 17, 2001, September 24, 2001)
- Spent Fuel Pool Tell-tale Pipe Cleaning, SC.MD-PM.SF-0008(Q)-Rev.0

Calculations/Engineering Evaluations

- Engineering Evaluation; A-0-ZZ-SEE-1160, Rev. 0, Establishment of Requirements for Monitoring the Condition of structures.
- MPR Assoc. Specification No. 0108-0275-06, Concrete and Reinforcing Steel Testing for Salem Nuclear Generating Station Spent Fuel Pool.

Bases

- Maintenance Rule Periodic Evaluation for Effectiveness, 1999 and 2001.
- Maintenance Rule Scoping Document for Fuel Handling Building and Fuel Pool Cooling, Rev. 10
- Maintenance Rule System Function and Risk Significance Guide, SE.MR.SA.01, Rev. 12

Notifications

PIRS No. 00950811263, Seismic Issues Associated with U1 SFP, 08/14/95
PIRS No. 00951201204, Long Term Options SFP Leakage, 03.01/96.
000020001192, Create Work Orders to Perform DCP 1EE-03, 21.07/99
891222074, dated 12/22/1989, SPF PIT Tell-Tale Tubes Leaking sample
900704056, dated 07/01/1990, SPF PIT Tell-Tale Tubes Leaking
950807233, dated 08/07/1995, Unit 1 SFP Reracking Project
951201204, dated 12/01/1995, Lack of Guidance on to Ops on Tell-Tale leak
951207356, dated 12/07/1995, Review SFP Liner for Operability

951207356, dated 12/07/1995, Root cause SFP Liner Buckling
950811263, dated 03/11/1997, Seismic issues Associated with U1 SFP
AR971217047, dated 12/17/1997, Ground water leaking through wall in U/1 78' Mechanical Penetration
980604098, dated 08/05/1999, Ground water leakage
20001833, dated 08/29/1999, Ground water leaking through wall
TS980914209, dated 03/01/2000, PM for SFP Tell-Tale leakoff drain lines
20035910, dated 07/27/2000, Aux Building Seal Leak 12 SW Piping Room
20052629, dated 01/06/2001, Ground water leak into #22 SWR PEN
20060404, dated 03/23/2001, Wall leaking groundwater on electrical panel807-1A
20060592, dated 03/25/2001, Unit 1 Fuel handling area 84 foot elevation
20114071, dated 09/24/2002, U/1 78' NPP Wall Leak (70027139)
20114152, dated 09/25/2002, U/1 78' NPP Wall Leak N1 20114071
20120815, dated 11/07/2002, Water seal needed Between FHB and Aux Bldg
20120818, dated 11/07/2002, Install diverter for SF wall leak
20123998, dated 12/06/2002, SF Pool leak continued assessment
20124610, dated 12/12/2002, Investigate source of contaminated water
20124862, dated 12/14/2002, Expansion joint leaking
20125135, dated 12/17/2002, Penetration waterstop seal damaged
20125181, dated 12/17/2002, Eng Support for U/1 SF Pool testing
20125259, dated 12/18/2002, Perform pms and install weir gates
20125864, dated 12/24/2002, Excessive water leak Unit 1
20127831, dated 01/13/2003, FHB Sump pump not pumping
20127288, dated 01/09/2003, Evaluate use of mini rover in SFP
20127831, dated 01/13/2003, FHB Sump pump not Pumping
20129937, dated 01/29/2003, Found fuel oil in excavation area
20131106, dated 02/06/2003, Unit 2 SFP Tell tales blocked
20131139, dated 02/06/2003, Tritium found in monitoring wells
20132136, dated 02/14/2003, Perform a secondary structural analysis
20132459, dated 02/19/2003, Radiation protection program - Site Philosophy
20133348, dated 02/26/2003, Unit 1SFP Tell tales blocked
20135332, dated 03/12/2003, Pump SPF Well No 1 Unit 1
20135882, dated 03/17/2003, Need to create nucm order for core bore
20140783, dated 04/21/2003, Spent fuel pool drain cleaning fund*
20143073, dated 05/05/2003, Expansion joint leaking - Replace joint
20145634, dated 05/20/2003, 1EE-0391 Teco'ed without Part b closure
20145635, dated 05/20/2003, Problems Encountered with 1EE-0391*
20145718, dated 05/21/2003, Re-evaluate S1.OP-AB.SF-0001(Q) Basis
20145945, dated 05/22/2003, Perform Crod of FHB Structure
20146037, dated 05/23/2003, Potential Missed NRC Commitment
20146257, dated 05/27/2003, Unknown Substance in Spent fuel pool
20146439, dated 05/27/2003, Request Install of Water Deflector
20146560, dated 05/29/2003, Spent fuel pool human performance issues
20147205, dated 06/03/2003, Evaluate Historical Spills
20147295, dated 06/04/2003, Inadequate Extent of Condition Evaluation
20147423, dated 06/05/2003, Chemistry recommendations from SFP SA

Work Orders:

30070161, 5Y Condition Monitor S2 SWI &PEN AREA, 06/05/2003
19991115 NRC Commitment to Seismically Qualify SFP
TS980914209 PM for SFP Tell-tale leakoff drain lines
000030020529, Clean and Inspect SFP Drn pipe and cap threads, 4/4/2001
000030083046, Clean and Inspect SFP Drn pipe and cap threads, 7/2004

Licensing/Regulatory Documents:

- Salem Unit 1 Technical Specifications
- Updated Safety Analysis Report - Salem Nuclear Station
- NRC/PSEG Meeting Notes dated June 20, 1996, Subject - Meeting to discuss Structural Analyses of the Spent Fuel Pools.
- NRC Document - Resolution of Spent Fuel Pool Storage Issues, dated September 27, 1996
- TS980119178, dated 08/28/1999, NRC Commitment to seismically qualify SFP
- Letter (PSEG to New Jersey Department of Environmental Protection) Subject: Discharge Confirmation Report, dated March 7, 2003.

Quality Assurance/Oversight

- NRB presentation, Salem Spent Fuel Pool leak, June 4, 2003
- NRB meeting minutes (February 12, 2003) and Presentation - Spent Fuel Pool leak (January 15, 2003)
- QA Assessment Monitoring Feed back, March 10, 2003, Purpose-Observe Unit 1 Spent Fuel Pool leak response activities and progress.

Drawings

- Index of Buildings and Land
- Salem Yard, Roadways and Finished Grading
- Salem 1 and 2 Fuel Handling Area
- Salem Unit 1 Fuel Handling Area Air and Water Piping
- Salem Unit 1 Spent Fuel Pit Liner Drains
- Artificial Island Yard - well locations
- Unit 1 Spent Fuel Pit - liners - embedded steel
- Salem 1 and 2 Aux. Bldg. and Reactor Containment el. 64

Miscellaneous Documents:

- PSEG Spent Fuel Pool Task Plan, dated June 3, 2003
- PSEG Spent Fuel Pool leak Action Items, dated June 5, 2003
- EPRI Technical Report, Boric Acid Corrosion Guidebook, Rev.1

List of Acronyms Used

AB	Auxiliary Building
CFR	Code of Federal Regulations
EPRI	Electric Power Research Institute
FHB	Fuel Handling Building
FW	Feedwater
IMC	Inspection Manual Chapter
NCV	Non-cited Violation
NRC	Nuclear Regulatory Commission
ODCM	Offsite Dose Calculation Manual
QA/QC	Quality Assurance/Quality Control
RCA	Radiologically Controlled Area
REMP	Radiological Environmental Monitoring Program
SDP	Significance Determination Process
SFP	Spent Fuel Pool
TS	Technical Specifications
URI	Unresolved Item

Attachment 2

Table 1 - Well Sample Locations and Results (microcuries per milliliter (uCi/ml))		
Location	Maximum Sample result (uCi/ml)	Comments
OW-K well 80 ft. depth	1.17E-6	No water available for sample at 20 feet. Samples at 40 and 60 feet below reporting level
OW-L well 80 ft. depth	No activity above reporting level.	Samples collected at 20, 40, 60, 80 feet.
OW-M well 20 ft. depth	1.87E-5	Multiple re-samples collected.
OW-N well 20 ft. depth	5.84E-4	Multiple re-samples collected.
OW-O well 20 ft. depth	1.24E-6	Multiple re-samples collected.
OW-P well 80 ft depth	No activity above reporting level.	Multiple re-samples collected
OW-Q well 80 ft. depth	No activity above reporting level.	Samples collected at 20, 40, 60, 80 feet.
OW-R well 20 ft. depth	1.39E-5	Multiple re-samples collected
OW-S well 35ft. Depth	3.5E-3	Multiple re-samples collected

Note 1: Reporting level - 1.0E-6 uCi/ml (1000 pCi/l)(State of New Jersey required lower limit of detection (LLD))
Note 2:Those well samples that indicated a tritium concentration greater than 1.0E-6uCi/ml were counted for gamma emitting radionuclides. No gamma emitting radionuclides were identified.
Note 3: See Attachment 3, Figure 1 for observation well (OW) sample locations.

Attachment 3
Figure 1
Sample Locations

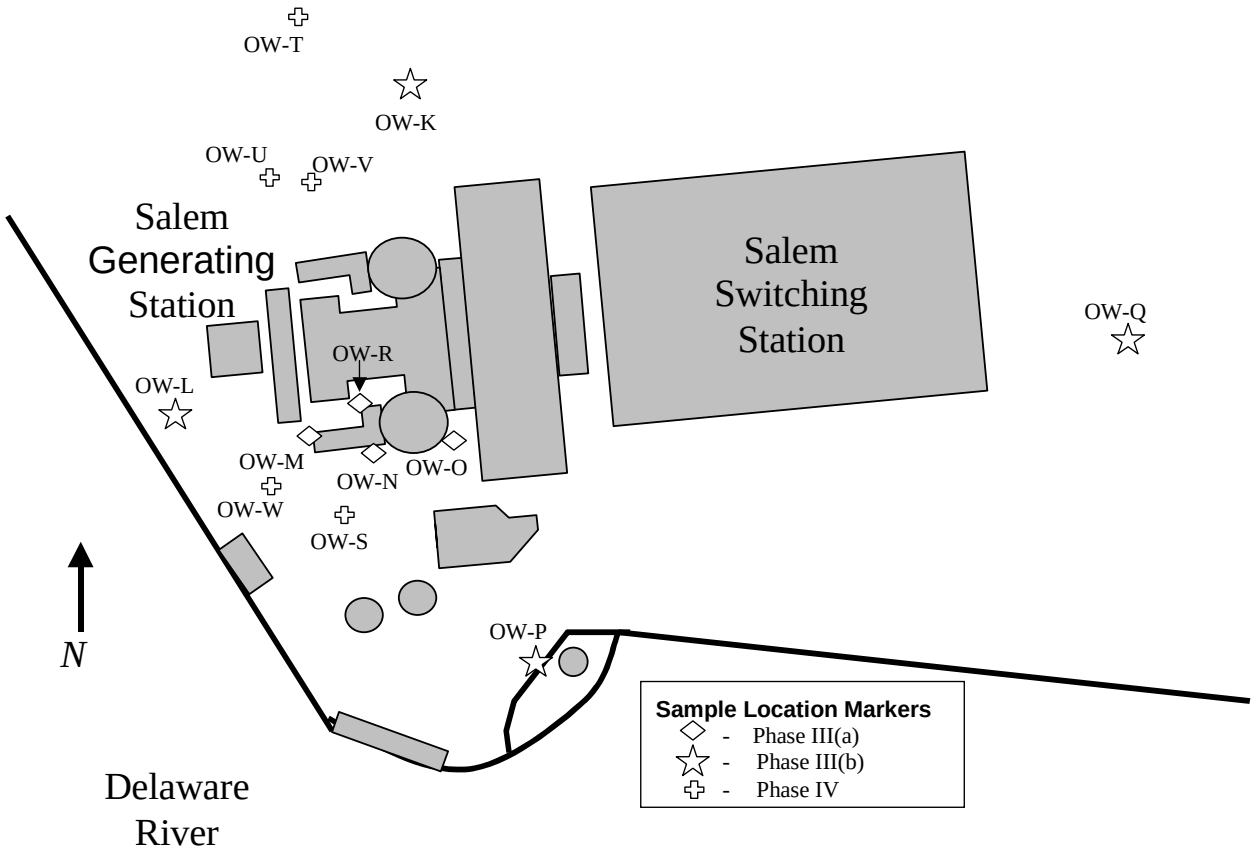

Figure 1 depicts observation well (OW) sample locations for ground water sampling. See Table 1 for results. Locations R, M, N, O are located inside the coffer dam. (Figure provided by PSEG)

Note: PSEG subsequently collected and analyzed an additional 30 samples from new test locations to better characterize the area of the contamination. The results identified an area of about 250 X 250 feet south of and abutting the Unit 1 FHB. The area surrounded the S well location.

Attachment 4

Team Charter

April 2, 2003

MEMORANDUM TO: Ronald Nimitz, Leader
Special Inspection

FROM: Wayne Lanning, Director ***/RA/***
Division of Reactor Safety

SUBJECT: SPECIAL INSPECTION CHARTER - SALEM UNIT NO. 1

Background:

On November 20, 2002, the NRC residents were informed that water leaking through a wall on the 78' elevation of the Unit 1 Auxiliary Building was contaminated and that the water appeared to be from the Unit 1 spent fuel pool. Subsequent NRC and licensee reviews identified through wall and penetration leakage of contaminated water, attributed to spent fuel pool water, in various locations in the Auxiliary Building. Environmental sampling has identified unrecognized contaminated ground water at locations near the Unit 1 spent fuel building. The Unit 1 spent fuel pool leaks may be the source of the contamination. No immediate onsite or offsite health or safety impacts were identified relative to workers or the public.

Objective:

A special inspection has been established to inspect and assess the causes, circumstances, licensee evaluations, corrective actions, and generic implications associated with the Salem Unit 1 spent fuel pool wall leaks. This special inspection was initiated in accordance with NRC Inspection Procedure 71153, "Event Follow-up," and NRC Management Directive 8.3, "NRC Incident Investigation Program." The decision to perform this special inspection was based on the belief that the ongoing spent fuel pool leak involved a deficiency in operations having potential generic safety implications which may have led to an unrecognized radiological release to an unrestricted area of byproduct material. The inspection will be performed in accordance with the guidance of NRC Inspection Procedure 93812, "Special Inspection," and the inspection report will be issued within 45 days following the exit meeting for the inspection.

Scope:

This inspection will: 1) review licensee evaluations that concluded ongoing fuel pool leaks would be acceptable and would not compromise the safety of the spent fuel pool; 2) evaluate design change processes that resulted in apparent plugging of spent fuel pool tell-tale drains; 3) review the licensee's evaluation of the structural integrity of the pool; 4) evaluate ongoing surveillance activities of the pool leakage; 5) evaluate corrective actions; and 6) evaluate the environmental impact of the spent fuel pool leak. A Team Charter is attached that provides the full inspection scope. Questions regarding the objectives of the attached charter may be directed to Ron Nimitz (610-337-5267).

Attachment

Team Composition:

The team will be:

Manager:	Wayne Lanning, Director DRS
Leader:	Ronald Nimitz, DRS
Members:	Harold Gray, DRS Suresh Chaudhary, DRS Jason Jang, DRS Eugene Cobey, Senior Risk Analyst - Part Time

Schedule:

The onsite portion of the inspection will be performed the week of June 2-6, 2003. The preceding week will be dedicated to inspection preparation with the week following the onsite portion dedicated to documentation. A pre-inspection meeting will be held prior to commencement of the on site inspection to provide for inspection coordination and initial document collection for review during inspection preparation.

Attachment: Special Inspection Charter

Special Inspection Charter
Salem Unit 1 No. 1
Salem Unit 1 Spent Fuel Pool Leak

The objectives of the inspection are to determine the facts and assess the conditions surrounding the Unit 1 Spent Fuel Pool (SFP) leak identified on November 20, 2002. Specifically the inspection should:

a. Develop a Sequence of Events Associated with the spent pool leakage management, pool modifications, and present leak identification and management.

b. Assess the adequacy of the PSEG's extent of condition review and corrective actions for the condition.

c. Assess the effectiveness of prior corrective actions for previous leaks including the adequacy of the evaluation authorizing ongoing leakage.

d. Evaluate the PSEG's assessment of the risk significance of the condition, including evaluation of all input assumptions.

e. Independently evaluate the risk significance of the condition.

f. Assess the effectiveness of PSEG's inspection program.

g. Review the calculation and disposition of known SFP liner leak in 1995.

h. Evaluate Circa 1995 tell-tale drain design change package (DCP) involving the fouling of the drainage path.

i. Evaluate operator management/use of the tell-tale drains and ongoing surveillance and maintenance of tell-tales drains.

j. Evaluate current mitigation strategy for the SFP liner leak.

k. Evaluate repair strategy and time line for the SFP liner leak.

l. Evaluate impact on environment.

m. Document the inspection findings and conclusions in a special inspection report in accordance with Inspection Procedure 93812 within 45 days of the exit meeting for the inspection. Periodic updates will be provided as the inspection is ongoing.

n. Evaluate the need to document draft generic correspondence (e.g., Information Notice) to inform the industry of this matter. Generate such document, as necessary.

Attachment