U. S. NUCLEAR REGULATORY COMMISSION
REGION I

Report Nos. 50-272/90-17
50-311/90-17
50-354/90-11

Docket Nos. 50-272, 50-311, and 50-354

License Nos. DPR-70, DPR-75, and NPF-57

Licensee: Public Service Electric and Gas Company
80 Park Plaza - 17C
Newark, New Jersey

Facility Name: Salem Units 1 and 2 and Hope Creek Generating Stations
Inspection At: Hancocks Bridge, New Jersey

Inspection Dates: June 11-15, 1990

Inspectors: Leonard Cheung 7/25/90
L. S. Cheung, Senior Reactor Engineer, PSS, EB, DRS, Region I — date

Leonard Cheung for 7/25/90
R. K. Mathew, Reactor Engineer, PSS, EB — date

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Approved by: C J Anderson 7/25/90
C. J. Anderson, Chief, Plant Systems, Section EB, DRS — date

Inspection Summary: Inspection on June 11-15, 1990 (Combined Report Nos. 50-272/90-17, 50-311/90-17 and 50-354/90-11)

Areas Inspected: Routine inspection to review the licensee's engineering organization, staffing, communications, quality assurance, training and management support. Also included in the scope of this inspection was the licensee's control of design, design changes, modifications and temporary modifications.

Results: Of the areas inspected, no violations were identified.

Details

1.0 Persons Contacted

Public Service Electric and Gas Company (PSE&G)

*M. Alpaugh, Lead Engineer, Licensing and Regulator
*M. Bandeira, Nuclear Engineering Standards Manager
*R. Beckwith, Station Licensing Engineer, Hope Creek
*P. Benini, Principal Engineer, Audits
*A. Blum, Program Analysis Supervisor
*R. Brown, Principal Engineer, Nuclear Licensing and Regulation
*M. Burnstein, Nuclear Electrical Engineering Manager
R. Chronowski, System Engineer, Salem
*D. Dodson, Station Licensing Engineer
B. Hall, Hope Creek Technical Manager
*M. Massaro, Hope Creek I&C Engineering Supervisor
M. Morroni, Salem Technical Department Manager
*P. O'Donnell, Salem I&C Supervisor
*B. Preston, Manager, Licensing and Regulation
M. Raps, Standard and Assurance Supervisor
J. Ronafalvy, Manager, Nuclear Engineering Design
*E. Villar, Station Licensing Engineer, Salem
P. Walzer, Principal Training Supervisor
P. White, Project Manager
A. Foster, Closure Lead, Configuration Control

* Denotes personnel present at the exit meeting on June 15, 1990.

2.0 Purpose

The purpose of this inspection was to assess the adequacy of the licensee's program for engineering and technical support of plant operations including management support, interfaces with other internal and external organizations, staffing levels and experience, training, and quality assurance involvement in the engineering activities. Also included in this inspection was the licensee's control of design, design changes, plant modifications and temporary modifications.

3.0 Engineering Organization

Engineering and technical support for Salem and Hope Creek plants are provided from two engineering organizations, the onsite system engineering and the offsite corporate engineering groups.

3.1 Onsite System Engineering

Each plant has an onsite system engineering department which consists of six groups: the reactor and plant performance, electrical engineering, instrumentation and control, nuclear steam supply systems, balance of plant systems, and administration and planning. They are responsible for handling relatively small scale plant modifications, including temporary modifications, plant system specific engineering, and support of the plant maintenance departments.

3.2 Offsite Corporate Engineering

Corporate engineering is known as Engineering and Plant Betterment Organization (E&PB). Corporate engineering is responsible for engineering support of plant operations not performed by the System Engineering Group. This includes supporting operations such as: licensing, specialized technical expertise, management for major projects at each plant and for projects common to all plants and the site.

The E&PB Organization is divided into five functional areas under the direction of the Vice President, Nuclear Engineering. These areas are: Nuclear Engineering Project, Nuclear Engineering Design, Nuclear Licensing and Regulation, and Nuclear Fuel and Performance Enhancement. Each department is headed by a department manager. The five departments provide engineering support to the Hope Creek and Salem Plants. Their responsibilities are as follows:

3.2.1 Nuclear Engineering Projects

This department consists of three functional areas responsible for providing project management for planned modifications at each of the plants and for engineering activities common to all plants and the site.

3.2.2 Nuclear Engineering Design

This department is responsible to provide support for nuclear engineering projects in the areas of engineering and design standards, engineering procedures, mechanical, civil and electrical engineering, instrumentation and control, material, seismic and stress analyses, fire protection and engineering assessment. In addition, highly specialized technical consultants provide services to the E&PB through this department.

3.2.3 Nuclear Licensing and Regulation

This department consists of four functional areas namely, Hope Creek Station Licensing, Environmental Licensing, Salem Licensing, and Nuclear Licensing.

3.2.4 Nuclear Fuel

This department consists of three functional areas responsible for providing nuclear fuel engineering analysis, safety evaluation, and licensing activities for the Hope Creek and Salem plants.

3.2.5 Performance Enhancement

This group is responsible for evaluating performance enhancement projects for the plants.

3.3 Conclusions

Based on the above, the inspectors determined that the licensee's engineering department is organized to provide adequate engineering services to the plants. The use of Project Managers assures that one individual is responsible for the correct design and installation of major modifications, and that the individuals responsible are knowledgeable of the specific plant configuration and requirements.

4.0 Staffing and Workload

In conjunction with the review of the organization, the inspectors examined the staffing and workload in the E&PB.

Engineering and Plant Betterment has 302 professional and technical staff, including about 50 supervisors and managers, and 59 support personnel. This staff is currently managing approximately 50% of the present workload. Contracted personnel are used for the balance of the work.

In general, all engineers and management personnel have degrees in the appropriate disciplines. In addition, there are approximately 74 individuals holding advanced degrees, including nine individuals who have doctorate degrees. There are 70 memberships in professional and technical societies and more than 10 individuals represent the licensee on various owner groups.

The average experience of the staff is about 11 years in the nuclear industry. At the time of the inspection, there were 17 unfilled positions.

Plant modification design change projects are normally initiated by the plant using Engineering Work Requests (EWR). The EWR is transmitted to the Manager, Nuclear Engineering Projects (NEP). NEP organizes a preliminary project team to evaluate the request and prepare a proposal including the engineering approach, cost and schedule for the plant managers approval. When approved the Project Manager organizes a project team consisting of individuals from the disciplines required to complete the project. The Project Manager determines the degree of quality assurance involvement on a specific project basis.

A review of open plant modification packages for all 3 plants showed that approximately 200 design change requests are in different phases of engineering design and about 750 open design change requests exist. The licensee stated that they have 450 design change packages completed and issued to the stations that are to be installed during the current 12 months period (June 1989-June 1990).

Staffing requirements for design change projects are determined by the Project Manager. A typical project team consists of from 5 to 10 individuals including the Project Manager. The plant system engineer is always part of the project team, and on safety related projects the quality assurance representative is from the plant staff. Other team members are assigned to projects by their supervisors at the request of the Project Manager. These team members work on the projects but do not receive technical or administrative direction from the Project Manager. However, based on the project schedule these team members are expected to give priority to the project during specified periods.

Conclusions

The use of a matrix organization in the engineering department allows the licensee to effectively schedule large tasks involving multidiscipline projects. This approach also allows the staff to be available through the unit supervisors to work on smaller projects. This flexibility combined with the system engineers serves to provide coverage for all of the plants. This approach depends largely on the accuracy of the schedules developed by the Project Managers and close cooperation of these Project Managers and the Engineering Supervisors. Plant involvement is assured by the system and QA engineers on project teams.

5.0 Priority System for Design Change Packages

The priority system for authorizing the design change activities is described in procedure NC-NA-AP-ZZ-0008 entitled "Control of design and configuration changes, tests and experiments." The prioritization of the design change packages is as follows:

Priority A: Emergency work requiring immediate action

Priority B: Design change Package Preparation in support of a unit shutdown

Priority 1: Design change needed for the safe operation of the plant

Priority 2: Scheduled design changes

Priority 3: General improvements which have a potential to develop into a larger problem

Priority 4: General improvements that are fairly small in scope

Priority 5: Personal safety

These priorities are assigned separately for each unit. This is initially done by the initiator and finally reviewed and approved by the review board. The design change packages that are needed for the outage are prioritized in a 3 priority system method which are: 1) modifications that require the unit to be out of service, 2) modifications that have the potential to develop into problems in the long term, and 3) modifications that are required for general improvement which require an outage to perform the work.

In order to reduce the existing backlog and improve the prioritization system and resource allocation process, the licensee is developing a program called Nuclear Department Resource Allocation Process (NDRAP). This consists of assigning a program sponsor, developing a program, creating an island-wide prioritization system, and training and indoctrination. The objective of this program is to establish consistent criteria for prioritization of work, such that highest priority items are worked first, and to improve the quality of engineering services to the plants.

The new proposed priority system has 10 priority ratings: Priority 1 project being the most important and 10 being the least. These priorities are determined by a scoring team consisting of the General Managers from Salem and Hope Creek, the General Manager of Quality Assurance/Nuclear Safety Review (QA/NSR), and the Manager of Nuclear Engineering Design.

The scoring is done by the use of weighting factors such as nuclear safety, and regulatory requirements as described in the proposed NDRAP. The design packages are then assigned these scoring numbers and the work list generated in priority sequence. The licensee is planning to implement this new priority system by the end of this year after proper review and validation.

6.0 Communications

The inspectors interviewed managers and engineers to determine the extent and effectiveness of communications between the E&PB and the plants and between the managers within the E&PB. The basic means of communication is through daily morning meetings at the plant level progressing through weekly meetings with the plant managers up to monthly meetings with the highest management levels on site. The Vice President, Chief Nuclear Officer, holds weekly meetings with his staff, including the Vice President, Nuclear Operations; Vice President, Nuclear Engineering; and the General Manager from Quality Assurance, the plant managers and other equivalent level managers. In addition to the formal weekly and monthly meetings, there is considerable day to day interaction between the engineering and the plant staff on specific projects and tasks.

The Project Managers are required to provide the status and schedule for their assigned projects to the engineering managers and supervisors to resolve any scheduling conflicts.

The inspectors determined that these meetings provide adequate communications for management control of the various projects and tasks in E&PB. Individual communications between project team members and the Project Manager appear satisfactory for accomplishing the major projects.

7.0 Quality Assurance (QA) Audits

The Quality Assurance area was reviewed by the inspectors to evaluate QA involvement in assessing the quality of engineering services. Quality Assurance audits are performed by the PSE&G Nuclear Quality Assurance Audit group on a bi-yearly basis. Procedure No. GM9-QAP-6-1 identifies the requirements deemed necessary to effectively prepare, perform, report and follow-up activities associated with QA audits. The inspectors reviewed QA Audit Nos. 88-35 and 89-100. The audits identified several findings in the engineering design change process. As a result, many implementing procedures were revised to address QA findings. During this review, the inspectors noted that there has been a significant improvement during the last two years in addressing and resolving the issues in a timely manner. The inspectors determined that QA involvement in monitoring engineering effectiveness is adequate. No unacceptable conditions were identified.

8.0 Deficiency Reports

In assessing the quality of work done by engineering in the technical support area, selected nonconformance reports (deficiency reports) were reviewed. Deficiency reports are processed in accordance with the licensee's nuclear department administrative procedure NC.NA-AP-ZZ-008. To assess the adequacy of this procedure and compliance to the requirements, the inspectors randomly selected the following deficiency reports for a detailed review:

1) DR#SMD-90-203: Improper thread engagement on the yoke, packing gland and bonnet nuts for 1SJ-5 valve.

2) DR#SMD-90-201: The replacement breaker, 225044, for motor operated valve does not meet the trip time requirements.

The engineering disposition associated with the above deficiency reports were descriptive and sufficient technical justification was provided in the 10 CFR 50.59 evaluations for the disposition of these deficiency reports.

No unacceptable conditions were identified during this review.

9.0 Technical Training

The licensee has established an extensive six months technical training program for both the on-site system engineers and the off-site E&PB engineers. This program provides technical training in BWR and PWR

technology. This training is provided primarily to the on-site system engineers on both sites. All newly hired system engineers receive this training prior to starting their work in their hired positions. The licensee stated that this program is mandatory for all the on-site system engineers and is available for the off-site corporate engineers.

This program consists of two weeks of introductory entry level BWR/PWR technology, eight weeks of engineering fundamentals and sixteen weeks of system engineering and administrative type of work. This program is offered once a year (six months for PWR and six months for BWR) for the licensee's engineers. Also, basic level training is given to all engineers in the areas of administrative procedures, QA/QC, station qualified reviewer works, and GET and plant access training.

The licensee indicated that their training programs were in compliance with NUREG 1122 and 1123 and ANS 3.1-1981 and ANSI 18.1-1971 standards. These programs have been developed using the documents: INPO 88-002, 89-003, 89-004 and 85-033. At present, 90% of the on-site and 7% of the off-site technical personnel have been trained with this program. During the inspection, the inspectors visited the Licensee Technical Training Center located in Salem, New Jersey. This center has twenty seven (27) classrooms and five (5) laboratories which are well equipped for electrical, instrumentation and control, chemical, mechanical, radiological and radiation measurement counting. The emergency response center and the simulators for Salem and Hope Creek are also accommodated in the same complex.

This training center provides the required classroom instructions and on-the-job training for various engineering disciplines.

The licensee indicated that each engineer is budgeted to attend one seminar or symposium a year besides their training. They are encouraged to participate in IEEE, ANS and other technical committees. In addition, the engineering managers are given separate management training courses by both in-house and outside management firms.

10.0 Design Change and Modifications (37700 and 37828)

The objective of this review was to ascertain that design changes and modifications are in conformance with the requirements of the Technical Specifications (TS), 10 CFR, the Safety Analysis Report, and the licensee's Quality Assurance program. This objective was accomplished by performing a detailed review of eight selected modifications, four for the Salem plants, four for the Hope Creek plant. The modification packages and the installation of plant design changes were reviewed to verify that:

- Modifications were reviewed and approved by on-site and off-site review committee.
- Design changes and modifications were controlled by Approved Procedures.

- Post Modification Test Procedures and Results were adequately reviewed.
- Station Procedure modifications were made prior to the modification being declared operable.
- Operator training was conducted prior to declaring the modification operable.
- Marked up copies of as-built drawings were distributed prior to declaring the modification operable. Also, administrative controls were established to maintain as-built drawings.
- Preventive maintenance and test programs were properly updated.
- Installation of modifications conformed with Design Change Package.

During this inspection, the inspectors verified installation and tests of modifications which were completed.

Temporary modifications were also selected for review. These modifications were reviewed to verify the following additional factors:

- A formal record was maintained for temporary modifications.
- Independent verification of temporary modification installation and removal was established.
- Functional tests were performed following installation or removal, if required.
- Periodic reviews of outstanding temporary modifications were performed.

10.1 Plant Modifications Package Reviews

Plant modifications (both major and minor modifications) are performed by the E&PB group in accordance with the engineering change workbook procedures DE-WB-ZZ-001,2,3,4 and 5. These procedures were developed about 18 months ago. However, minor modifications were previously performed by the station's systems engineering group in accordance with the applicable procedures at that time.

The design change procedure workbook No. 1 provides detailed and comprehensive instructions to develop a good design change package. The system appears to be working well. During this inspection, modifications were reviewed that were prepared by the old and the new format.

Procedures listed in Attachment A were reviewed in detail for adherence to requirements, clarity of instructions and levels of responsibility and authority assigned to various groups and

positions. The following randomly selected modification packages were reviewed to verify the adequacy of the design, design changes and modifications.

(1) DCR/DCP No. 1SM006: The subject DCP has replaced Salem Unit #1 degraded 125 vdc Class 1E batteries from C&D battery type LC-33 and LCU-33 to type LCR-33.

(2) DCR No. 2EC-1891/DCP No. 1: This modification (for Salem Units) provides the design for two loops of wide range reactor coolant temperature indications that are required for alternate shutdown to show adequate reactor cooling and subcooling margin to meet Appendix R requirements.

(3) DCR No. 2SC-2259: This modification provides the design for the Salem RHR venting adequacy concerns addressed in LER-89-019-00 "Loss of RHR event due to accumulator nitrogen dump."

(4) DCR No. 1SM-0369: This design change provides the necessary design details to change the motor operated valve wiring and limit switch settings for the open torque switch bypasses and light indications to resolve concerns identified in information notice 86-29.

(5) DCR No. 4HC-00116: Replacement of Tobar with Rosemount transmitters. This work was done to reduce the transmitter error, sensitivity and drift problems of Westinghouse Tobar Transmitters in the accumulator level control and indication system.

(6) DCR No. 4HC-00242: Installation of test jacks and test switches and program coordination with SCRAM frequency reduction and I&C surveillance group. Original testing was performed by connecting the existing instrument termination and SCRAM circuitry with test equipment which might lead to possible accidental SCRAM. By this modification separate test jacks and devices were provided to facilitate the periodic testing without directly connecting to the SCRAM circuit and its devices.

(7) DCR No. 4HC-0282: Install Synchro-check relays to Emergency Diesel Generator. This modification was done based on the experience of Salem Unit to avoid out of phase manual synchronization of the Diesel Generator with the Emergency Bus.

(8) DCR No. 4HC-0242: Hydrogen Water Chemistry (HWC) Injection. This work involved the installation of the permanent Non-Q GE Hydrogen Water Chemistry System and Upscaling the trip set points and methodology for main steam line radiation monitoring corresponding to the operation of the HWC System.

For those design change packages reviewed, the inspectors found them to be well organized, complete and in accordance with the applicable procedures. Materials, process parts and equipment were identified properly and suitable for application. The applicable design inputs were correctly incorporated into the design. Applicable design check lists were appropriately identified for any potential safety hazards. The required independent reviews were performed by other than the original designer. 10 CFR 50.59 applicability review and safety evaluations were performed as required. The safety evaluation was descriptive and supported the conclusions. The applicable modifications were reviewed and approved by SORC. The design drawings and operating procedures were revised for the completed work packages. The required report of modifications was done in accordance with 10 CFR 50.59(b) on a monthly basis.

The inspectors also verified the installation and post modification test documents for Modification Packages Nos. DCP 1SM 1006, 4HC-00116 and 4HC-0282. The installation and tests were performed correctly and in accordance with the procedures identified in the work package. The test results met the acceptance criteria described in the applicable test procedures. No unacceptable conditions were identified.

10.2 Temporary Modifications (Salem Plants)

Temporary modifications are performed by system engineering at the Salem plants. Station Procedure AP-13 entitled "Temporary Modification Control Program," Revision 9, was used to control Salem plant's temporary modification activities. A new procedure, NC.NA-AP.ZZ-0013(Q) entitled "Control of Temporary Modification" has been developed and approved for use on March 2, 1990. However, the training for the use of this new procedure was just completed, and Salem is still in the transition period for using the new procedure. According to the licensee, the new procedure will provide clearer guidance and is easier to use than the old one. The new procedure follows the format of the corporate procedure NC.NA-AP.ZZ-0008(Q) which is in use for controlling the permanent modification. The inspector selected the following temporary modifications for review:

1) Temporary Modification No. 90043, dated March 27, 1990 was developed to add a temporary pneumatic manual controller to manually position an air-operated valve (non-safety related). The coversheet indicates that the nuclear shift supervisor approved and verified installation before the site operation review committee (SORC) approval and before the system engineer's and the job supervisor's signatures. The licensee explained that for an emergency temporary modification, such as this one, installation is allowed before SORC review.

2) Temporary Modification #88-088 for Salem Unit 1 dated October 30, 1988 (Work Order #948590, Safety Related) for making jumpers to provide inputs to the reactivity computer for reactor engineering testing and monitoring. This temporary modification was first started on April 5, 1984. SORC approval and proper signatures were observed for this temporary modification. The inspector asked why this temporary modification has been in place for more than 6 years. The licensee stated that there is no limit on how long a temporary modification can be in-place. However, they are in the process of changing this temporary modification into a permanent modification.

3) Temporary Modification No. 88-089 dated October 30, 1988 (Work Order No. 48591). Same as Temporary Modification No. 88-088, except that this one is for Unit 2.

4) Temporary Modification No. 90-051 for Salem Unit 2 (Work Order No. 900125151) for installing blind flanges to electrical penetration 2-5B to allow eddy current test cable to pass through for steam generator eddy current test.

Although no significant deficiencies were identified in this review, the inspector found that two of the four temporary modifications reviewed had been in place for a long time (over six years). This was because the licensee did not set a time limitation for temporary modification. The May 1990 Integrated Performance Assessment Team inspection (50-272/90-81; 50-311/90-81) identified that the licensee tends to use the temporary modification process in lieu of permanent plant modifications. These examples provide additional evidence of the NRC's previous findings.

10.3 Hope Creek Temporary Modifications

For the Hope Creek plant, Station Procedure SA-AP.ZZ-013-1 is used to control the temporary modification activities. This procedure is very similar to the new procedure (NC.NA-AP.ZZ-0013) described above. The licensee stated that eventually (sometime this year) SA-AP.ZZ-013-1 will be replaced by NC.NA-AP.ZZ-0013, such that both Salem and Hope Creek will use the same procedure to control their temporary modification activities. The inspector selected for review Temporary Modification No. 89-077 dated December 4, 1989 (Work Order No. 891264121). This temporary modification involved bypassing a failed vibration monitoring probe (IBBVE-7910B2) on the "B" reactor recirculation pump, thus eliminating the nuisance overhead annunciator alarm in the control room until a replacement probe can be installed. No deficiencies were identified during this review.

11.0 Exit Interview

At the conclusion of the inspection on June 15, 1990, the inspector met with the licensee representatives denoted in Section 1.0. The inspector summarized the scope and results of the inspection at that time.

At no time during this inspection was written material given to the licensee.