U.S. NUCLEAR REGULATORY COMMISSION

REGION I

Report No. 50-311/85-08

Docket No. 50-311

License No. DPR-75 Priority ____ Category ____

Licensee: Public Service Electric and Gas Company

P. O. Box 236

Hancocks Bridge, New Jersey 08038

Facility Name: Salem Generating Station

Inspection At: Hancocks Bridge, New Jersey

Inspection Conducted: March 21-22, 25-29, 1985

Inspectors: for T. Kenny, Senior Resident Inspector, Team Leader — 4-19-85 date

for A. Cerné, Senior Resident Inspector — 4-19-85 date

for W. Cook, Resident Inspector — 4-19-85 date

B. M. Hillman, Reactor Engineer — 4/22/85 date

Approved By: for Leif Norrholm, Chief, Reactor Project Section 2B, DRP — 4-22-85 date

Inspection Summary:

Inspection on March 21-22, 25-29, 1985 (Report No. 50-311/85-08)

A special team inspection composed of Region I Senior Resident Inspector from Indian Point Unit 2, Senior Resident Inspector from Seabrook, Resident Inspector from Ginna and a Reactor Engineer from Region I conducted a review of selected Design Change Requests (DCR) to ascertain that they were implemented in accordance with NRC regulations and site approved procedures. The inspection involved 116 hours on site by the team.

Results: A violation was identified in the program with regard to construction work being performed by the in-house maintenance organization. Also identified was missed communications in the transfer of information from engineering to the construction forces in the field, and an isolated instance of field changes not being documented. These results are described in detail within the body of the report.

DETAILS

1. Introduction and Inspection Objectives

A special inspection team composed of resident inspectors and a reactor engineer with expertise in construction (mechanical and electrical), start-up, and operations performed reviews of selected modifications that had been installed at Salem Generation Station Unit 2 during the forced six-month outage, to document that they were installed to NRC regulations and industry standards. The team primarily focused on the areas of procurement, welding, welder qualification, cable installation, quality assurance coverage, Q.C. control, operations upgrade to the new or modified systems, and overall training on the newly modified or installed systems. The team did not assess the Operations Department in the operations of the unit because the remaining unit at Salem had been in operation throughout the duration of the outage. Operators on the units at Salem rotate frequently from one unit to the other.

2. Identified Strong Points

The inspectors collectively agreed that the below-listed areas of the licensee's design change program were above average for an operating station:

-- The bi-annual review of operating, abnormal and emergency procedures.

-- Good communications between the operations, engineering and training departments to assure station operators and support personnel receive essential station modification information in a timely manner.

-- QA audits program is a comprehensive and well-structured program providing a valuable management feedback mechanism.

-- An agressive training program is conducted for plant operators in the area of plant modifications.

-- A computerized system to monitor tagging and lineup of plant systems is in use.

-- The licensee is rewriting the welding program to obtain an "R" stamp.

-- The completeness of contractor weld packages were found to be above average.

3. Identified Weak Points

The inspectors agreed that the below-listed weak points were areas that could lead to violations or installation in an incorrect manner. However, in all the cases examined by the inspectors there were no violations or incorrect installations.

-- The use of weld symbols between the engineering department and the field construction crews allowed for misinterpreted results.

-- Changes to welding procedures in the field with regard to non-essential variables are not always controlled.

4. Review of Design Change/Modification Program

The inspector reviewed the implementation of administrative procedures and controls for station design changes and modifications as prescribed by the licensee's current programs. It should be noted that the station administrative procedure, AP-8, was recently revised and that engineering procedure EDD-1 is presently being revised.

The licensee maintains good communication between the engineering and operations staff in the development and tracking of Design Change Requests (DCR's). Engineering personnel are assigned to specific DCR's in accordance with their system specialty or engineering discipline. Additional engineering staff members are specifically assigned to provide the necessary coordination and liaison with construction contractors and operations staff. Engineering staff DCR workloads appear to be evenly distributed.

The inspector interviewed the Station Quality Assurance Engineer (SQAE) to discuss the Quality Assurance (QA) organization and its interface with DCR's. Due to the acceptance of the station's major contractor's (CATALYTIC) QA program by the licensee, station QA conducts only spot check surveillances of routine DCR modification and Controlled Work Package (CWP) activities. The SQAE stated that additional station QA surveillance is conducted when the DCR involves more sensitive safety-related systems or components. Station QA does review DCR administrative development and final acceptance documentation of all DCR's. The inspector reviewed DCR surveillance checklists and Technical Specification surveillance schedules and found no discrepancies.

The identification of a lapse in the DCR station/contractor QA coverage in the maintenance area is discussed in paragraph 6 of this report.

5. Audits Review

The following Quality Assurance audits in the areas of engineering, design change requests, and training were reviewed by the inspector:

-- Audit No. S-81-2, Training Program (NRB)
-- Audit No. S-81-25, Quality Assurance Audit of Design Division
-- Audit No. S-83-2, Training Program
-- Audit No. S-84-2, Training Program (NRB)
-- Audit No. S-84-4, Nuclear Engineering Department
-- Audit No. S-84-30, Design Change Request

The inspector determined that the reviewed audits and 1985-1986 Audit Schedule, Revision 2, January 28, 1985 are consistent with Technical Specification requirements and FSAR commitments. Audit checklists were determined to be satisfactory and of adequate scope. Findings were well documented and appear to receive appropriate management distribution. A sampling of Corrective Action Reports and Quality Action Reports and their respective responses were reviewed. Responses are appropriate and timely.

The QA audits program is a comprehensive and well structured program providing a valuable management feedback mechanism.

No violations were identified.

6. Design Change/Modification Training

The inspector reviewed procedures and conducted interviews with the licensee's operations and training staffs to assess the adequacy of the licensee's training program regarding station modifications and design changes. The inspector determined that timely notification of design changes is accomplished through the Operations Department via the operation's daily newsletter, The Rising Sun. In addition, Operations Department Information Directives (IDs) have been established to summarize station design changes, equipment modifications, procedural changes and Technical Specification changes. Although not required reading, operators are held responsible for station changes and pertinent information promulgated in The Rising Sun. Operators acknowledge, in writing, having read and understood the ID's.

In addition to receiving input from the above documentation, the training staff receives direct input from the Engineering Department on design changes and modifications via the monthly DCR summary reports. This information, in total, is used to upgrade the licensed operator requalification program, new license operator training programs and required simulator modifications. Training supervisors are responsible for the incorporation of these changes into the lesson plans. The simulator training staff is currently implementing a computer-based Configuration Management System to assist the Simulator Change Control Board in tracking and prioritizing necessary simulator modifications.

Inspector discussions with the training staff regarding proposed changes to the DCR engineering control process governed by EDD-1 indicate that Training Department input and earlier awareness of station modifications will be incorporated into the DCR development and implementation phase of the program.

There appears to be good communication between the Operations, Engineering, and Training Departments to assure station operators and support personnel receive essential station modification information in a timely manner.

No violations were identified.

7. Design Changes and Modifications

The inspectors reviewed selected portions of the following Design Change Request (DCR) packages, to verify that the specifications of the appropriate design criteria for the requested modifications and for adherence to the requirements of Station Administrative Procedure (AP) No. 8, which controls the design change, test and experiment program.

-- 2EC-1305 (Changes to Charging System)

-- 2EC-1615 (Pressurizer Safety Valve Discharge Piping Modifications)

-- 2EC-1916 through 1919 (RCS RTD Bypass Loop Isolation Valve Replacement)

-- 2EC-1991 (Restoration of the Emergency Makeup Connection From the RWST to the Spent Fuel Pit)

-- 2EC-2003 (Replacement of the 2C Station Battery)

-- 2EC-2081 (Auxiliary Feedwater Pump Replacement)

-- DCR 2EC-1638 - Reactor Protection (shunt trip)

-- DCR 2EC-1677A - RCS (installation of RTD's)

-- DCR 2EC-1501 - DG Control System (black out bypass)

-- DCR 2EC-1559 - Safe shutdown NI installation

-- DCR 2EC-1967 - Upgraded RVLIS System

-- DCR 2EC-1406 - Replacement of 28 V Undervoltage Relays

The following design changes were selected for additional followup, to include verification of the design criteria against the appropriate code requirements, work implementation, appropriate QA/QC inspection coverage, and specific field installation work. A field inspection of the area around the Unit 2 Refueling Water Storage Tank (RWST) revealed that work on DCR 2EC-1991 had not yet been initiated. Interviews with a licensee outage coordinator revealed that this modification could be accomplished with the plant in operation, and therefore, was not a required modification prior to Unit 2 restart.

a. 2EC-1305

The inspector examined twelve (12) valves which had been modified to move them closer to the CVCS header discharge piping. Reattachment of these valves to the nozzle bosses on the header required weld preparation of the boss sockolet and the valve socket body for vee-groove full penetration welding. The inspector examined the as-welded conditions and checked the records for documentation of the required liquid penetrant testing and informational radiographic examinations.

For three (3) of the examined valves, the inspector noted that the existence of a reducer socket fitting precluded achieving the vee-groove weld specified in the design criteria. Instead, a modified single bevel groove weld had been installed. After questioning by the inspector, a Field Questionnaire (FQ 032936) was generated to document acceptability of these conditions. The inspector verified the quality of these welds and confirmed that appropriate NDE had been performed. The inspector then had discussions with the licensee with respect to specified design requirements being deviated from without prior authorization. The licensee's engineering personnel stated that the programmatic controls, along with proper initiation of field questionnaires to account for different field conditions, are intended to prevent such deviations. The inspector determined that, since no other examples of a variance were identified, this is considered to be an isolated concern. However, he suggested that additional licensee attention to adequate design control of encountered field conditions is warranted.

The inspector also examined the applicable Welding Procedure Specification (WPS) (Catalytic Procedure M13A-7) and the supporting Procedure Qualification Records to verify conformance to the criteria of the ASME Boiler and Pressure Vessel Code, Section IX. While no violations or deviations were identified, the inspector noted that three nonessential variables, listed in Section IX as applicable to the Gas Tungsten Arc Welding (GTAW) process, were specified on the WPS, but were not followed in the subject valve welding. Failure to adhere to these nonessential variables (QW 402.5, 404.3, and 408.5) does not compromise the quality of the welds or qualification of the WPS, but does deviate from the guidance for WPS control in Section IX. The licensee indicated that a new PSE&G welding/brazing manual is currently in review and scheduled for implementation in conjunction with the PSE&G application for "R" and "NR" Certificates. The inspector noted that the proposed welding program addresses nonessential variables in greater detail and considers licensee initiative in this area to be a strength. However, with respect to the deviation from the variables identified in the current program, inspector followup is warranted to verify the adequacy of existing controls, as well as the future program changes (85-08-01).

In addition to the valve welds discussed above, the inspector examined one pipe support (2A-CVCG-449) installed under this DCR. Configuration, expansion bolting, member sizes and welds were checked. While no violations were identified, the inspector did note the installed weld lengths deviated from the design details delineated on drawing D-4279-10, as modified by DCR-2EC-1305, M27/1. The cause of this deviation was traced to a communication problem between the engineer and construction personnel because of misinterpretation of welding symbols. Standard AISC/AWS weld symbols are utilized at Salem and should have precluded the identified problem. Thus, this communication problem appears to be an example of possible program weakness.

The licensee evaluated the subject support and determined that it was structurally sound, despite the missing welds. The licensee also conducted a sample inspection of other pipe supports to determine if the subject symbol interpretation, regarding intermittent fillet welds, represented a generic concern. No other concerns were identified. The inspector examined additional intermittent fillet welding in connection with another modification and found it acceptable. The inspector concluded that the subject support welding concern is an isolated case. With greater licensee attention both to the standard welding symbols in use at Salem and to better communication between engineering and construction personnel, further problems, potentially affecting the quality of installed hardware, can be eliminated.

Overall, with respect to DCR 2EC-1305, program strengths were identified in the areas of the completeness of the contractor welding records and the licensee welding manual and program changes in conjunction with their "R" and "NR" certificate applications. A program weakness, as exemplified above in the change of the valve vee-groove configuration, the deviation of field welding conditions from listed Section IX nonessential variables, and the support welding discrepancies, appears to exist in the area of communications between engineering and construction personnel, as it affects field modifications.

b. <u>2EC-2003</u>

The inspector reviewed the DCR Package to include any Operational Design Change Notices, and the following Allied C&D Power Systems documents:

-- C&D Stationary Battery Installation and Operating Instructions (PSBP-301960)

-- Drawing M-8683 (PSBP-304333)

-- Battery Discharge Characteristics (PSBP-304331)

The inspector examined the new 2C station battery installation cable terminations; intercell, intertier, and interrack connections; battery rack bolting and mounting; and seismic foundation details. Documentation for the battery 2-hour discharge and 8-hour service tests were reviewed and QA coverage was verified. Selected technical details (eg: intercell connector torques and material requirements) from the C&D installation manual were spot-checked against the record of proper installation. With regard to the battery installation itself, no violations were identified.

However, with regard to the battery rack installation process, the licensee could produce no objective evidence that the seismic design details had been followed or that QA/QC coverage of the installation process had been provided. The battery rack installation included special processes, such as Hilti drop-in anchorages and high-strength bolting for the rack structural steel. This work was contracted by the PSE&G Maintenance Department to a site contractor. The contractor did not provide a record of in-process work and apparently no QC coverage of this work was provided. The contractor did not have its own QA program and the PSE&G QA Department handled the rack installation as a routine maintenance activity, for which QC coverage was not necessarily required.

However, GAP-5.3, 'Inspection Program', of the Nuclear Operations Quality Assurance Manual, requires certain minimum Inspection Hold Points (IHP). One of the IHP's, as delineated in Attachment 1 to the QAP requires verification of bolt torque on foundations and seismic restraints. Since no waiver of this IHP was documented, the lack of QC coverage of the seismic battery rack installation, represents a violation of the PSE&G QA program and also of 10 CFR 50, Appendix B, Criterion II. (85-08-02)

Since this example appeared to be related to the fact that the Work Order (84-12-20-063-2) for this work referred only to the DCR and not to any existing Maintenance Work Procedure with established IHP's, a concern was raised regarding a potentially generic deficiency in the QA coverage of maintenance work, where new construction, and not typical maintenance, is encountered. QA signatures on both the DCR package and the Work Order apparently represent recognition of the work implementation and the records review, and not necessarily of the need for QA/QC coverage, where required. This appears to be a program weakness since its impact could extend beyond the battery rack example cited in the above violation.

With respect to the battery racks specifically, the licensee conducted a re-inspection of the racks, checking for high-strength bolt torque and proper Hilti anchorage. No improper installation conditions were identified. Thus, while the licensee has confirmed the

adequacy of the existing installation, the programmatic controls which allowed the lack of in-process records and QC coverage to go undetected remains a concern.

With the exception of the battery rack installation, the other controls, design, and work in regard to the new battery installation in accordance with DCR 2EC-2003 appeared to be adequate and well documented.

c. 2EC-2081

The inspector reviewed parts of the Design Change Package for the in-process work of replacing the existing Byron-Jackson auxiliary feedwater pump #22 with an equivalent Ingersoll-Rand pump. Specific design details on the pump foundation modification were inspected and field work examined which included verification of proper member sizes, weld sizes and lengths, configuration and material requirements.

Involvement of the Authorized Nuclear Inspection Agency for this work was noted. The specification of design criteria for piping rework, to include hydrostatic testing, was verified. Weld rod material control for some pipe fitting installation was observed in-process and found acceptable.

With regard to the sampled documentation and field work done in accordance with this DCR, no violations were identified.

d. 2EC-1638,1559,1501,1677A

The inspector verified by package review and system walkdowns that the subject design changes were installed using the standards set forth in IEEE Electrical Standards, the FSAR, and approved station procedures. The inspector also verified that the post maintenance testing as delineated in the design documents was performed in accordance with approved procedures by qualified personnel.

With respect to these DCR's, no violations were identified.

8. Operational Verification of Design Changes

The inspector selected the following design changes to verify that the control room annunciator windows, control buttons and physical changes required by the design changes were in place:

-- 2EC-1559 - Nuclear Instrumentation System - installation of two new detectors to meet Appendix R

-- 2EC-1991 - Safety Injection System - installation of 3-inch T

-- 2EC-1638 - Reactor Protection - addition of Reactor Trip Breaker Shunt Trip

-- 2EC-1789 - Valve Motor Upgrade for Various Valves - environmental qualification

-- 2EC-1967 - RVLIS - seismic upgrade

-- 2EC-1835, 1677A - Reactor Coolant System - seismic and environmental upgrade

-- 2EC-1724, 1305 - Chemical and Volume Control - new globe valves and deletion of vent and drain valve

-- 2EC-1501 - Diesel Generator Control System - provide remote diesel start

-- 2SC-1014 - Steam Generator Feed Pump - power supply change to preclude voltage spikes

-- 2SC-1412A - Annunciator System - delete redundant condenser low vacuum alarm

-- 2EC-1108A - Control Room Console - replace push button tags

The inspector also reviewed:

-- Control room drawings to verify that the controlled drawings were annotated with the current system design.

-- Operating procedures to verify that the necessary changes had been incorporated.

-- Valve line up checkoff lists to verify that the affected valving had been incorporated into the list.

In all the above cases, the proper changes had been made in accordance with station approved procedures.

The inspector reviewed the valve lineups and the verification valve lineups of the Safety Injection System, Chemical and Volume Control System and Reactor Coolant System to confirm that the lineups had been updated by the operations staff. The inspector verified that the valve lineup was performed properly.

One finding, with regard to valve lineups, was identified that can be considered an isolated case, but is nevertheless, an issue that should be addressed by the licensee. A design change, which added a valve to the

RWST within the Safety Injection System, was scheduled to be performed during the outage; however, the change was not implemented and the checklist was updated to show the new valve. The valve lineup checklist performed prior to startup did not have the valve on it, but the next revision of the valve checklist did. No other documents within the control of the operations staff had been changed.

Through discussions with licensed and non-licensed operators, the inspector verified that all those interviewed had received training and were aware of the plant modifications that had been installed during the forced outage.

No violations were identified.

9. Management Interview

An entrance interview was conducted on March 25, 1985 to apprise the plant staff of the purpose and scope of the inspection. At times during the inspection various members of the plant staff were contacted covering initial findings. (See Attachment 1 for persons contacted). An exit interview was conducted on March 29, 1985 to discuss the team's findings (Entrance and Exit Attendees may be found on Attachments 3 and 4). No information provided to the inspectors was identified as proprietary at the exit meeting.

Attachment 1

Persons Contacted During Inspection 85-08

J. Barger, Quality Assurance Engineer
S. Cornman, Engineer, Operations Department
J. Cortez, Senior Staff Engineer
C. Frew, Welding Engineer
V. Getsinger, Senior Maintenance Supervisor
J. Hannracker, Electrical Engineer (Stone & Webster)
R. Heaton, Engineer, Instrumentation & Controls Dept.
R. Hettmannsperger, Engineer, Maintenance Department
S. Hooks, Engineer, Maintenance Department
C. Hassler, Lead Engineer, Maintenance Department
S. Hassler, Electrician, Maintenance Department
R. Jorgenson, Quality Assurance Auditor
G. Kapp, Principal Engineer
R. Kazunas, Engineer, Operational Test Group
G. Lipsey, Outage Coordinator (MAC)
A. Parmelee, Engineer, Nuclear Construction Support
C. Perez, Field Welding Engineer (Catalytic Inc)
D. Perkins, Station Quality Assurance Engineer
G. Ruane, NCS Engineer
W. Schultz, Programs & Audits Engineer, Q. A.
W. Straubmuller, Chief Designer, Mechanical
T. Taylor, Manager, Nuclear Engineering Control

Attachment 2

Documents Reviewed During Inspection 85-08

1. Administrative Procedures:

   No. 3, "Document Control Program"
   No. 4, "Station Operations Review Committee"
   No. 5, "Operating Practices Program"
   No. 8, "Design Change, Test and Equipment Program"
   No. 14, "Station Training Program"
   No. 18, "Vendor Manual Upgrade Program"

2. Nuclear Quality Assurance Manual, GM-9

   - Quality Assurance Procedure 2.2, "Design Change Request/Package Review

   - Quality Assurance Procedure 7-1, "Corrective Action"

3. SALEM FSAR

4. Engineering Department Directive #1 (EDD-1), "Operational Design Change Control, Salem Nuclear Generating Station"

5. Operations Department Administrative Directives

6. Training Procedures:

   No. 305, "NRC Licensed Operator Requalification Program"
   No. 306, "Plant Design Change Review Program"

7. Technical Specifications

8. 10 CFR

9. IEEE Electrical Standards

Attachment 3

Entrance Meeting Held March 25, 1985 - Attendance For Inspection 85-08

Name	Title
A. C. Cerne	Sr. Resident Inspector-Seabrook
W. A. Cook	Resident Inspector-Ginna
B. M. Hillman	Reactor Engineer
T. J. Kenny	Senior Resident Inspector
R. J. Summers	Resident Inspector-Salem
D. J. Jagt	Nuclear Engineer
E. A. Liden	Manager-Nuclear Licensing Regulation
G. E. Lipsey	Outage Manager-Salem
D. A. Perkins	Site Quality Assurance Engineer
B. W. Smith, Jr.	Technical Staff-Associate Engineer
J. M. Zupko. Jr.	General Manager-Salem Operations

Attachment 4

Exit Meeting Held March 29, 1985 - Attendance For Inspection 85-08

Name	Title
A. C. Cerne	Senior Resident Inspector-Seabrook
W. A. Cook	Resident Inspector-Ginna
B. M. Hillman	Reactor Engineer-Region I
T. J. Kenny	Senior Resident Inspector
L. Norrholm	Chief, RPS 2B, Region I
R. J. Summers	Resident Inspector-Salem
M. O. Bandeira	Assistant Manager,Nuclear Systems Eng.
D. W. Dodson	Engineer, Nuclear Licensing & Reg.
L. Fink	Site Representative (Atlantic Electric)
J. E. Gallagher	Maintenance Manager,Salem Operations
J. N. Leech	Principal Engineer, Nuclear Licensing
G. Lipscy	Outage Services
L. K. Miller	Assistant Engineer, Salem Operations
W. O'Brien	Engineer, Salem Operations
D. A. Perkins	Site Quality Assurance Engineer
B. W. Smith, Jr.	Associate Engineer, Technical Staff
P. White	Outage Services
J. M. Zupko, Jr.	General Manager,Salem Operations