

U.S. NUCLEAR REGULATORY COMMISSION
REGION I

Report Nos. 50-272/84-16 & 50-311/84-16

Docket Nos. 50-272 & 50-311

License No. DPR-70 & DPR-75 Priority _____ Category C

Licensee: Public Service Electric & Gas Company
80 Park Plaza
Newark, New Jersey 07101

Facility Name: Salem Nuclear Generating Station - Units 1 & 2

Inspection At: Hancocks Bridge, New Jersey

Inspection Conducted: April 30 - May 4, May 8 - 10, & May 18, 1984

Inspectors: T. L. Harpster
T. L. Harpster, Lead Reactor Engineer

6/26/84
date

C. H. Woodard
C. H. Woodard, Reactor Engineer

June 20, 1984
date

Leonard S. Cheung
L. S. Cheung, Reactor Engineer

June 20, 1984
date

Approved by: A. T. Gody
A. T. Gody, Chief, MRS, EPB, DETP

6/28/84
date

Inspection Summary: Inspection on April 30 - May 18, 1984 (Report Nos. 50-272/84-16 & 50-311/84-16)

Areas Inspected: Near-term follow up of responses to Generic Letter 83-28; inspection in areas of equipment classification, post-maintenance testing and procurement and material control.

The inspection involved 210 inspection hours by 3 region based inspectors.

Results: Two violations were identified (failure to take adequate corrective actions, paragraph 3.5 & failure to follow procedures, paragraph 5.3).

REPORT DETAILS

1. PERSONS CONTACTED

- M. Allicock, Lead Engineer
- G. Baranek, Maintenance Planning Coordinator
- P. Benini, Principal Quality Assurance Engineer
- W. Burke, Assistant Manager Procurement and Material Control
- P. Camino, Storekeeper
- W. Corman, Associate Engineer
- J. Cortez, Lead Engineer
- K. D'Souza, Lead Engineer
- M. Danak, Senior Engineer
- ** R. DeSantis, Manager Procurement and Material Control
- * R. Diaz, Senior Engineer
- *** J. Driscoll, Assistant General Manager Salem Operations
- J. Fitzgerald, Lead Engineer
- R. Gable, Nuclear Maintenance Planning Coordinator
- V. Gadzinski, Senior Maintenance Planning Supervisor
- L. Griffis, Engineer
- G. Harbin, Lead Engineer
- J. Hart, Warehouse Supervisor
- R. Hawkins, Technical Associate B
- *** G. Kapp, Principal Engineer
- C. Kinsley, Quality Assurance Engineer
- B. Leap, Senior Engineer
- *** E. Liden, Manager Licensing and Regulation
- H. Lowe, Senior Quality Assurance Engineer
- * L. Miller, Technical Manager
- * J. Morrison, Maintenance Staff Supervisor
- J. Morrison, Senior Engineer
- W. Nevins, Principal Staff Quality Assurance Engineer
- M. Ochs, Group Supervisor Technical Document Room
- A. Orticelle, Instrument and Control Engineer
- T. Patterson, Principal Engineer Nuclear Licensing
- * R. Patwell, Engineer
- J. Quather, Engineer
- W. Reuther, Principal Quality Assurance Engineer
- A. Robinson, Lead Quality Assurance Engineer
- L. Santonastaso, Lead Engineer
- ** W. Schultz, Programs and Audits Engineer
- * D. Tauber, Principal Engineer
- ** T. Taylor, Manager Engineering Control
- R. VanderDecker, Supervisor Instrument and Control Planning
- J. Vargas, Principal Engineer
- M. Williams, Instrument and Control Managed Maintenance Program Coordinator
- M. Ziegler, Quality Assurance Engineer
- ** J. Zupko, General Manager Salem Operations

NUCLEAR REGULATORY COMMISSION

- * J. Linville, Senior Resident Inspector
 - R. Summers, Resident Inspector
 - ** L. Norrholm, Chief Reactor Projects Section 2B
 - ** C. Anderson, Chief Plant Systems Section
- * Denotes those present at April 30, 1984 entrance meeting.
** Denotes those present at May 18, 1984 exit meeting.
*** Denotes those present at both meetings.

2. INSPECTION SUMMARY2.1 BACKGROUND

The reactor trip system, as part of the reactor protection system, is fundamental to reactor safety for all nuclear power reactor designs. Transient and accident analyses are predicated on the assumption that the reactor trip system will automatically initiate reactivity control systems on demand to assure that fuel design limits are not exceeded. The design and regulatory philosophies for attaining the high reliability required of the reactor trip system have been based primarily on the use of redundancy, periodic functional testing, and quality assurance.

In February 1983, the Salem Nuclear Power Station experienced 2 failures of the reactor trip system on demand. Regulatory and industry task forces were formed to determine the safety significance and generic implications of these events. Based on these findings, certain actions were required of all licensees. These actions, transmitted in Generic Letter 83-28, fell into 4 areas: (1) post-trip review, (2) equipment classification and vendor interface, (3) post-maintenance testing, and (4) reactor trip system reliability improvements. This inspection included 2 of these areas, equipment classification and post-maintenance testing. The inspection also included the area of procurement and material control.

The basis for Public Service Electric and Gas's (PSE&G) response to Generic Letter 83-28 was the corrective action program submitted to the Commission by various letters in March and April 1983. The remedial actions included management issues associated with the Master Equipment List, procurement procedures, quality assurance improvement, and overall management capability and performance. Some of these actions included short term remedial actions to be completed prior to startup of the units, and others were longer term actions for which commitment dates were established for completion. The Commission Staff reviewed the corrective action program and determined that these actions provided sufficient assurance to recommend the restart of the units (SECY-83-98E). An Order Modifying the License was issued on May 6, 1983 incorporating the corrective actions and affirming the dates for their completion.

2.2 INSPECTION RESULTS

The safety evaluation report for the restart of units 1 and 2 identified 3 concerns with the Master Equipment List: (1) the accuracy and completeness of the document, (2) its issuance as a noncontrolled document, and (3) the lack of understanding of plant personnel of its proper use. As a result of the inspection, it was determined that 2 of these concerns have not been effectively resolved. A large number of discrepancies (improper classification) associated with the Q-listed systems continue to be identified in controlled copies of the Master Equipment List. Second, station personnel still exhibit some confusion or a lack of understanding in using the Master Equipment List. The failure of PSE&G to take adequate measures to effectively resolve these concerns is a violation.

In the area of procurement and material control, a violation of the technical specifications was identified for the failure to properly implement some quality requirements of the station procedures. Numerous examples were identified of materials which were not maintained in storage facilities conforming to their assigned classification levels, and of materials which were not properly identified in accordance with the procedural requirements. Similar concerns have been identified previously in both PSE&G audits and in NRC inspections. This violation is also an example of inadequate corrective actions.

3. EQUIPMENT CLASSIFICATION

3.1 REFERENCES

QAI 2-1, Revision 4, "Salem Q-List"
S-C-A900-NFD-080, Revision 4, "Controlled Distribution of Salem Master Equipment List - Units 1 & 2"
GM8-EMP-001, Revision 0, "Salem Master Equipment List"
CD-M-37, Revision 3, "Salem Nuclear Generating Station, Nos. 1 & 2 Units, Seismic and Environmental Classification, Instrumentation and Controls"
CD-M-60, "Salem Nuclear Generating Station, Units No. 1 & 2, Exceptions to Safety Related Design Requirements"
"Equipment Environmental Qualification Manual", Draft
March 8, 1983 letter, Uderitz to Starostecki
March 14, April 7 & 8, 1983 letters, Uderitz to Starostecki
SECY-83-98E, "Salem Restart Evaluation"
NUREG-1000, "Generic Implications of ATWS Events at the Salem Nuclear Power Plant"
AP-3, Revision 12, "Document Control Program"
AP-8, Revision 6, "Design Change, Test and Experiment Program"
AP-9, Revision 9, "Control of Station Maintenance"
AP-17, Revision 5, "The Electric Production Department Quality Assurance Program at Salem Generating Station"
AP-19, Revision 5, "Supplies and Material Procurement Program"
May 6, 1983 Order Modifying the License

3.2 PROGRAM REVIEW

The PSE&G program for equipment classification, described by references in section 3.1, was reviewed to determine:

- the criteria and source documents which form the bases for inputs to the Master Equipment List
- the extent to which NPRDS or other industry reporting systems are used as inputs
- the extent to which corrective actions or other PSE&G management information systems are used as inputs
- the assignment of responsibility for reviewing and updating the Master Equipment List
- the frequency and sources of revisions to the Master Equipment List
- the distribution and control of the Master Equipment List
- the training provided to both station and engineering personnel associated with the Master Equipment List.

3.3 PROGRAM IMPLEMENTATION

A number of components were selected for review that have finite lifetimes because of wear, environment, etc. For these components:

- the Master Equipment List was checked for proper classification (for each component)
- procurement documents, including engineering specifications; were sampled for proper classification, inspection, storage and other quality requirements
- work orders, design changes, and maintenance schedules were sampled to observe proper classification, preplanning for replacement and quality involvement
- associated documentation was sampled to observe preplanning for procurement, storage, maintenance, preventative maintenance, and replacement
- associated documentation was sampled to observe interfaces between engineering and station personnel

The components selected included:

- limit switch 1SJ78, NAMCO Model EA-180 (safety injection system)
- solenoid valve SV-513, ASCO NP-1 Series (solenoid valve for sampling system containment isolation valve)
- control valve 24SS094, Masoneilan (sampling system containment isolation valve)
- motor operated valve 11SJ40, Limatorque (safety injection system)
- pressure transmitter PA 0734, Rosemount 1153 Series D (protective system function for main, reheat, and turbine bypass steam system).

One additional electrical component was selected: the plug-in unit in motor control center E155 for the pressurizer power operated relief stop valve.

3.4 TRAINING

The ATWS event identified the need for PSE&G to strengthen their employees' knowledge of and adherence to procedures and quality assurance requirements. A short term indoctrination program was conducted for appropriate personnel regarding equipment classification, work orders, procurement and vendor technical document controls. Quizzes were conducted following the training to assure comprehension of the material. These corrective actions, described in April 7 & 8, 1983 submittals to the Commission, formed part of the basis for the restart safety evaluation report (SECY-83-98E).

During the review of documentation associated with this training, some inconsistencies were identified in grading, the criteria for satisfactory demonstration of knowledge, and the followup actions for personnel who didn't appear to pass the quizzes. The quizzes (627) were regraded by the licensee. Thirty instances of grading errors and 11 additional failures were identified. Five of the failures were technical personnel whose job functions could involve classification activities. Four of the personnel were orally retested and passed. The fifth was on vacation and was to be retested on his return. The inspector had no further concerns.

A similar problem was identified by PSE&G audit S-84-2 in March 1984. There was no procedure for notifying the responsible management of personnel who failed training, and the administrative program did not address followup actions for personnel who fail training. The audit finding remains open (corrective actions have not been agreed on).

3.5 FINDINGS

One violation was identified for the failure to take adequate corrective actions. PSE&G's corrective actions, implemented by the May 6, 1983 Order Modifying the License, have not been effective in assuring that discrepancies in the Master Equipment List are properly and promptly resolved. There is still confusion regarding the proper use of this document.

PSE&G is developing a comprehensive preventative maintenance program, i.e., a "Managed Maintenance Program". An extensive review is being performed of plant systems and components to develop maintenance recommendations. During this review, a large number of discrepancies are being identified in the classification of safety-related components in the Master Equipment List. These discrepancies are transmitted to the Engineering Department, where they are reviewed and then design changes are initiated to correct the Master Equipment List as appropriate. There have been several hundred transmittals from two groups performing the reviews within the Maintenance Department and the Technical Department (I&C).

PSE&G, as part of the corrective action program submitted to the NRC in April 7 & 8, 1983 letters, committed to assure that the Master Equipment List provided an accurate document. Items C.2.4-7 described the commitment to complete the component listing of the remaining Q-listed systems, and to independently verify the proper classification of these data entries by

May 1983. However, a large number of safety-related deficiencies continue to be identified in the Master Equipment List, and the Managed Maintenance Program reviews are only partially complete.

The large number of discrepancies that have been identified after completion of the independent verification by the Engineering Department raises the question of the adequacy of training, specifically in the functional and systems interactions of the plant systems. There is no training program to provide system sponsor engineers this training.

A review of the cycle from identification of a safety-related discrepancy to correction of the data entry in the controlled copy of the Master Equipment List, indicated that the time interval may be several months. For example, F-0661/FE-540 (a feed flow nozzle that provides a reactor protective system trip function) was identified as improperly classified nonsafety-related in January 1984. An Operational Design Change Notice (C-549) was issued in March 1984, correcting the classification. At the time of the inspection, the controlled copies of the Master Equipment List used to classify work orders and procurement documents still improperly classified this nozzle as nonsafety-related. The computer status had been updated as a result of the design change, however there is no temporary change mechanism to update the controlled copies of the Master Equipment List prior to the next bulk printing (twice annually). The distribution on the design change notice does not include the station Technical Document Room, thus this information is not distributed to personnel using the controlled copies of the Master Equipment List, e.g., station QA (who use the Master Equipment List to verify classifications), or to the maintenance planners who do the classification of work orders.

Similar classification discrepancies had also been identified with other feed flow nozzles in January 1984, e.g., several feed flow nozzles were classified differently between units 1 and 2. During removal of the #23 feedwater nozzle spool piece on April 29, 1984 the work order was improperly classified nonsafety-related by the initiator. The classification was questioned and the system sponsor engineer was contacted. The sponsor engineer classified it nonsafety-related. The quality assurance engineer who was responsible for verifying the correct classification questioned it and called his supervisor. The supervisor agreed it was nonsafety-related. The error was subsequently identified by the NRC Resident Inspector. PSE&G design memorandum CD-M-60, "Exceptions to Safety-Related Design Requirements", June 1976 designates the correct classification of the feed flow nozzles as safety-related functionally in order to enhance the reliability of the protective function performed.

PSE&G correspondence reviewed indicated that management was aware of some of these problems. A December 22, 1983 memorandum (6 months after the commitment date) from the Manager Nuclear Operations Quality Assurance to the General Manager Nuclear Support states:

"It has come to our attention that there is little/no response or corrective action being taken on discrepancy reports originating from

the Maintenance Review Group on matters concerning the MEL listing. Deficiencies dating back to July, 1983 have not yet been reflected in the current revision of the MEL. The major problem we are concerned with is safety-related items being classified as nonsafety-related items; therefore the reliability of the MEL is in question. This presents us with a very serious problem, as far as, being able to properly classify work orders. In view of this, we feel that prompt attention concerning this matter on your part would be appreciated."

A second example of the existing discrepancies and the resulting confusion is provided by a May 8, 1984 transmittal from the Maintenance Planning Coordinator to the Engineering Department. Transmittal #281 states:

"Please be informed that safety classifications do not agree between various valves listed in both the Mechanical MEL and the Control Valve MEL. An example of some of these valves are as follows:

CAA001	CAA002	CAA009	CAA010	CAA011	CAA012	CAA013
CAA021	CBV011	Cbv012	CBV013	WG008	WG036	WG038

This discrepancy poses the following questions:

Should control valves be listed in both the Mechanical MEL and the Control Valve MEL? If so, this condition does not currently exist for all control valves. Likewise, shouldn't the safety classifications agree with each other? Outside of any subsequent corrective action on the above matter, I do need to know which MEL should be referenced under the Managed Maintenance Program when such a disparity exists with safety classifications."

A review of the quality assurance audits for 1983 indicated that 10 inprocess work orders (audit S-83-7, Jun 1983) and 25 approved purchase requisitions (audit S-83-4, April 1983) had been checked for proper classification. No audits, however, were conducted to verify the accuracy or completeness of the Master Equipment List. No audits were conducted of the engineering - station interfaces to determine if the program for resolving discrepancies was resulting in prompt corrections to the controlled copies of the Master Equipment List.

10CFR50, Appendix B, Criterion XVI requires that measures be established to assure that conditions adverse to quality are promptly identified and corrected. In the case of significant conditions adverse to quality, the measures shall assure that the cause of the condition is determined and corrective action taken to preclude repetition. Contrary to these requirements, PSE&G management failed to take adequate measures to correct discrepancies in the Master Equipment List, so that the list is complete, accurate and that personnel clearly understand its proper use.

4. POST MAINTENANCE TESTING

4.1 REFERENCES

March 8, 1983 letter, Uderitz to Starostecki
March 14, April 7 & 8, 1983 letters, Uderitz to Eisenhut
April 11, 1983 "Salem Restart Evaluation", SECY-83-98E
NUREG-1000, "Generic Implications of ATWS Events at the Salem Nuclear Power Plant"
AP-9, Revision 9, "Control of Station Maintenance"
AP-17, Revision 5, "The Electric Production Department Quality Assurance Program at Salem Generating Station"
A-21, Revision 2, "Maintenance Department Testing & Retest Notification Procedure"
OD-10, Revision 4, "Removal & Return of Safety Related Equipment to an Operable Status"

4.2 PROGRAM REVIEW

The references in section, 4.1 were reviewed to determine that PSE&G is implementing a post-maintenance testing program which includes the following:

- written procedures for initiating requests for post-maintenance testing
- criteria and responsibilities for review and approval of post-maintenance testing
- criteria and responsibilities to performing inspection of post-maintenance testing activities
- methods for performing functional testing following maintenance & prior to returning to service
- requirements for adequate documentation of the above reviews, approvals, inspections and tests

4.3 PROGRAM IMPLEMENTATION

Twenty in process work orders were reviewed to determine if post-maintenance testing activities were being conducted in accordance with the above requirements.

4.4 FINDINGS

No violations were identified.

5. PROCUREMENT & MATERIAL CONTROL

5.1 REFERENCES

VPN-PRP-01, Revision 1, "Nuclear Department Procurement
M11-P-410, Revision 1, "Receive Material"
M11-P-500, Revision 0, "Classification & Storage of Material"
AP-19, Revision 5, "Supplies & Material Procurement"
SRP-3, Superseded, "Storeroom Procedure"

5.2 PROGRAM REVIEW & IMPLEMENTATION

Procurement documents were reviewed to determine if PSE&G's procurement activities were implemented in accordance with the requirements of the references in Section 5.1.

Material Order/Item Classification (MOIC) forms were reviewed for:

- proper system & component identification & classification
- engineering & quality assurance review & approval
- commercial item designation
- applicable quality assurance provisions
- 10 CFR 21 requirements.

Purchase orders were reviewed for inclusion of MOIC requirements & the appropriate engineering and quality assurance approvals. Receipt inspection records were reviewed to determine quality assurance acceptance, identification of deficiencies and deficiency resolution.

Equipment in bins and storage areas was selected at random to review identification, classification, quality assurance acceptance, storage requirements, shelf life, segregation, and preventative maintenance. Warehouse tags attached to components and tags attached to bins of small parts such as nuts, bolts, and gaskets were examined. Shelf life tags with expiration dates were examined for some diaphragms and gaskets. Preventative maintenance cards for the Inspection Order System were examined for 4 items.

5.3 Findings

Procedure M11-P-500, "Classification and Storage of Material" states in part, that: "The Storekeeper shall assure that the material is maintained according to the classification levels in storage facilities conforming to the following requirements....."

Level A - Items shall be stored under special conditions similar to those described for Level B, but with the following additional requirements:

- a. Temperature Control - 60-90° F
- b. Relative Humidity Control - not to exceed 55%
- c. Filtered Ventilation to provide an atmosphere relatively free of dust and harmful vapors.

Level B - Items shall be stored within a fire resistant, tear resistant, weathertight, and well ventilated building or equivalent enclosure."

Contrary to these requirements, during a tour of the warehouse on May 9, 1984 two safety-related components (Chemical pump - folio #33-7033 and type D regulator-folio #40-8131) were identified, which were assigned storage level "A", but were stored in a warehouse which does not meet level "A" storage requirements. The inspector also identified several items (e.g.

folios #60-6270 & 60-6273) which required level "B" storage, but were stored outdoors.

The failure to implement the requirements of procedure M11-P-500 is a violation of Technical Specification 6.8.1 (failure to follow procedures).

Numerous instances were also identified of safety-related items not properly classified for storage (e.g. folio Nos. 38-0726, 60-8168, 40-2295), green tags not signed by the inspector and/or the date of receipt not properly filled in (e.g. folio Nos. 60-2614, 60-8168, 33-7033, 60-6273), and green tags lying loose in various places. Some tags were in bins containing different items (e.g. folio Nos. 60-8168, 60-8322, P.O. Nos. 015869 and P2-005629).

PSE&G audit S-83-4 in April 1983 identified similar tagging deficiencies. Corrective action was to review and revise the tagging procedures as needed. NRC inspection 50-272/83-15 in October 1983 again identified tagging deficiencies. The PSE&G position at that time was that corrective action was being taken to affix tags to each safety-related item or component with the exception of lots of nuts, bolts and small fittings. The warehouse was to be rearranged to provide unique storage for each item or component. This was to be completed by January 1984. PSE&G reaudited this area in April 1984, audit S-84-39, and identified no deficiencies. This is an example of PSE&G's failure to adequately evaluate the effectiveness of its corrective actions.

6. Management meetings

PSE&G management was informed of the purpose and scope of the inspection at the entrance meeting on April 30, 1984. Preliminary findings of the inspection were discussed with PSE&G representatives periodically during the inspection.

An exit meeting was held on May 18, 1984, at which time the findings of the inspection were presented to PSE&G management. PSE&G management discussed the status of the vendor manual review program and stated that the program would be complete by January 1985.

At no time during the course of this inspection was written material provided to the licensee by the inspectors.