

Public Service
Electric and Gas
Company

Corbin A. McNeill, Jr.
Senior Vice President -
Nuclear

Public Service Electric and Gas Company P.O. Box 236, Hancocks Bridge, NJ 08038 609 339-4800

November 3, 1987
NLR-N87214

United States Nuclear Regulatory Commission
Document Control Desk
Washington, DC 20555

Gentlemen:

INVESTIGATION OF ERRONEOUS CONFIRMATION
OF 4KV BREAKER COORDINATION
SALEM GENERATING STATION
UNIT NOS. 1 AND 2
DOCKET NOS. 50-272 AND 50-311

As a followup to my telephone conversation with William F. Kane, Director, Division of Reactor Projects (NRC Region I) on October 23, 1987, I am providing the attached report documenting our independent investigation of the erroneous statement contained in our letter dated October 16, 1987 with respect to 4KV breaker coordination.

Should you have any questions, do not hesitate to contact us.

Sincerely,



Attachment

C Mr. W. T. Russell, Administrator
USNRC Region I

Mr. William F. Kane
Director, Division of Reactor Projects

Mr. T. Kenny
USNRC Senior Resident Inspector

Mr. D. C. Fischer
USNRC Licensing Project Manager

Mr. D. M. Scott, Chief
Bureau of Nuclear Engineering
Department of Environmental Protection
380 Scotch Road
Trenton, NJ 08628

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Corbin A. McNeill, Jr. Senior Vice President — Nuclear

November 3, 1987

To the Assistant Vice President - Nuclear
Operations Support

INVESTIGATION OF ERRONEOUS WRITTEN STATEMENT
PROVIDED TO THE NRC
4KV BREAKER COORDINATION
SALEM GENERATING STATION

I have accepted the attached independent investigation report.
You are directed to implement the recommendations by December 31,
1987.

Attachment

C Vice President - Nuclear Operations
All Nuclear Department General Managers



Public Service Electric and Gas Company P.O. Box 236 Hancocks Bridge, New Jersey 08038

Nuclear Department

November 3, 1987
Our Ref. NSR 87-060

To the Senior Vice President - Nuclear

**INVESTIGATION OF ERRONEOUS WRITTEN STATEMENT
PROVIDED TO THE NRC
4KV BREAKER COORDINATION
SALEM GENERATING STATION**

An independent investigation has been conducted at your direction, to determine why the October 16, 1987 letter to the NRC confirmed 4KV breaker coordination for both onsite and offsite power sources, when it was subsequently discovered to be in error. Specifically, Company Senior Management learned on October 22, 1987 that existing overload protective relay settings for the No. 2 Unit diesel generators were different from No. 1 Unit and did not agree with the input data used for breaker coordination evaluations. Therefore, coordination did not exist for No. 2 Unit's 4KV vital buses under all conditions.

After completion of our investigation, we have found no evidence to indicate that the erroneous statement in the October 16, 1987 cover letter confirming breaker coordination was made knowingly, willfully or with any intent to misrepresent the facts.

This report provides the details of that investigation to support our conclusions.

INVESTIGATION TEAM

I assembled and led a team to investigate this error. The team consisted of:

- C. P. Johnson, General Manager - Nuclear Quality Assurance , Team Leader
- E. A. Liden, Manager - Offsite Safety Review
- M. L. Bursztein, Principal Safety Review Engineer
- G. E. Englert, Principal Safety Review Engineer
- R. Fryling, Associate General Solicitor

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INVESTIGATION PROCESS

Initial familiarization for the team was conducted through a review of the documents, circumstances and issues surrounding this event. A list of primary interviewees was compiled from this information and provisions were included in our process to expand this list to others who were referred to us during the interviews.

The investigation process consisted of detailed interviews of selected individuals, conducted on an individual basis, normally with at least two team members. In some cases, certain individuals were contacted again as additional relevant information was acquired.

The team interviewed more than 20 individuals at essentially all organizational levels, from the engineer who initially identified the relay setting differences between Unit 1 and 2, up to and including yourself. The interviewees included those who wrote, reviewed and/or signed the October 16, 1987 letter and it's attached Safety Evaluation, as well as engineers in the plant and the Engineering and Plant Betterment Department who were involved in the breaker coordination evaluation or other related activities.

FINDINGS

The investigation team has determined that less than adequate procedural controls for relay settings existed in the 1974 to 1978 time frame (when the relay setpoints were last changed). The original diesel generator overload relay settings for both units were formally identified and authorized in March 1974, and the No. 1 Unit relays were set in June 1974 as part of the preoperational activities. In June 1976, the Engineering Department recommended changing these setpoints, but this request was only implemented on No. 1 Unit, as followup action on No. 2 Unit was inadequately identified. Thus, during preoperational activities on No. 2 Unit, the relays were set in accordance with the outdated March 1974 instructions.

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There did exist a high level of confidence among those involved with review and/or signoff of the October 16, 1987 cover letter that 4KV breaker coordination existed, based upon the Appendix R Breaker Coordination Study (September 18, 1987 draft, prepared by Tenera), the Nuclear Department's review of that report (including Engineering's independent confirmation on No. 1 Unit), and the assumption that the relay set points on both units were the same. The breaker coordination review and evaluation process, however, was insufficient to highlight the existing differences between relay settings on Unit 1 and 2 and the fact that these differences could have a negative impact on breaker coordination.

The team has determined that the following specific details led to the errors contained in the October 16, 1987 letter:

Part of the Nuclear Department's electrical design review program included evaluation of breaker coordination. Although the contractor's draft report was available and utilized, the intent of this evaluation was to independently perform a breaker coordination verification which would, among other objectives, confirm the contractor's report. In mid-September, an engineer had been assigned to verify that the input data provided to the contractor was correct. He reviewed actual field data for both units and discovered a difference between the No. 1 and No. 2 unit diesel generator overload relay settings. The engineer reported his findings to his supervisor, although he was not aware of any breaker coordination impact.

His supervisor requested that the differences be explored with the corporate relay protection group, which is responsible for the calculation of all protective relay settings and the applications of these settings to the relays. Although no specific reason could be found at that time for the differences, the relay protection group indicated that they would initiate a change to provide consistency between the two units. The supervisor did not associate the difference in relay settings with breaker coordination. He was also confident that the ongoing review process would resolve any impact associated with this discrepancy, as the process would include No. 2 Unit.

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The electrical manager became aware that differences were identified but was informed that the relay protection group agreed to change the settings and that this change process had been initiated.

A relay test order was subsequently issued in late September by the relay protection group to revise the No. 2 Unit relay settings to be consistent with those of No. 1 Unit. The relay setting changes were then to be implemented through the normal design change process.

The system analysis group was responsible for revising the Safety Evaluation attached to the October 16, 1987 cover letter. Their focus, with respect to breaker coordination, was on confirmation with respect to offsite sources. They reviewed documentation provided by the electrical group related to coordination with offsite power sources and revised the Safety Evaluation accordingly.

The cover letter was prepared by the licensing group, which did not perform a detailed review of the Safety Evaluation. The letter was prepared based on a commitment at the meeting with the NRC at the Region I office on October 7, 1987 that confirmation of both onsite and offsite 4KV breaker coordination was to be included in the Safety Evaluation. This understanding was consistent with that of senior management.

When the electrical manager was requested to sign off on the cover letter, he was convinced that 4KV coordination was satisfactory based upon his group's confirmation on No. 1 Unit and his belief that the difference between the two units had been resolved, including implementation of the necessary changes. Furthermore, he consulted with certain members of his staff to assure himself that no problems existed prior to his signoff.

Senior management had understood, through verbal reports, that 4KV breaker coordination had been confirmed, and also observed that responsible managers had signed off on the file copy. Senior management, therefore, signed the letter.

CONCLUSIONS

The team has completed all the interviews that it considers necessary, and has concluded that the following caused or contributed to the erroneous statement:

1. Although the relay setting differences were identified in the mid-September, 1987 time frame, neither the engineer discovering these differences nor his supervisor recognized the potential impact on the breaker coordination evaluation. We conclude that the process used to identify, track, and insure proper review and closure of concerns associated with breaker coordination was not sufficiently rigorous to preclude such a situation from occurring.
2. The periodic updates provided to management regarding the status of the internal reviews associated with breaker coordination relied too much on oral communication and simplistic written reports. These methods did not provide management with well organized, cogent data suitable for meaningful review and analysis. We conclude that a higher quality reporting process would have identified that all planned activities for Unit 2 were not completed.
3. Inconsistencies exist between the cover letter and the attached Safety Evaluation. Specifically, the cover letter states that confirmation of onsite and offsite 4KV coordination is included, but the revised Safety Evaluation only stated that the evaluation had demonstrated coordination with offsite sources. We conclude that the process for the review of interrelated documents being provided to the NRC requires improvement to assure that any inconsistencies are identified and eliminated prior to submittal.

RECOMMENDATIONS

The following recommendations and suggested responsibilities are provided for your consideration:

1. Establish a formal corrective action program within Engineering and Plant Betterment to identify and document discrepancies and concerns which arise during

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engineering activities. This system should provide sufficient followup and management review to insure items are properly resolved.

Responsibility: Manager - E&PB Controls

2. Revise the status reporting associated with the electrical design review program to provide management with more formally structured and quality periodic reports.

Responsibility: Manager - Plant Engineering

3. Review and revise the process for NRC submittals to include provisions to identify and eliminate inconsistencies between interrelated documents.

Responsibility: Manager - Nuclear Licensing and Regulation

Upon completion of our extensive interview process, and subsequent team deliberations, we are unanimously convinced that the individuals involved in the preparation, review and approval of the October 16, 1987 letter and it's attached Safety Evaluation firmly believed that the erroneous statement was correct at the time. Furthermore, those involved not only believed the statement was correct, but consulted other technical personnel to confirm that the information to be provided was correct.

The team members and I are completely satisfied that we have identified the causes for the erroneous statement and are convinced that there was no intent on anyone's part to misrepresent the facts.



C. P. Johnson
General Manager -
Nuclear Quality Assurance

CPJ/EAL:es