



UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

R. Lee PDR Lee

SSES

MAY 1 4 1981

50-387

MEMORANDUM FOR: Zoltan R. Rosztoczy, Chief
Equipment Qualification Branch
Division of Engineering

FROM: Arnold Lee
Equipment Qualification Branch
Division of Engineering

SUBJECT: TRIP REPORT FOR SEISMIC CRITERIA IMPLEMENTATION REVIEW
MEETING WITH PENNSYLVANIA POWER AND LIGHT COMPANY (PP&L)
ON SUSQUEHANNA STEAM ELECTRIC STATION (SSES)

The Seismic Qualification Review Team (SQRT), consisting of engineers from the Equipment Qualification Branch (EQB) and the Brookhaven National Laboratory (BNL), made a visit to SSES at Berwick, Pennsylvania, on March 16-20, 1981. The purpose of the visit was to conduct a plant site review of the qualification methods, procedures, and results for selected safety-related mechanical and electrical equipment and their supporting structures. The intention was also to observe the field installation of the equipment, to validate the equipment model employed in the SSES qualification program.

The background, review procedures, findings and conclusions of the meeting, and the required followup actions are summarized below. A list of attendees at the conferences is contained in Attachment I, and a list of the equipment selected for audit is shown in Attachment II.

1. Background

The applicant has described the equipment qualification program in Sections 3.9 and 3.10 of the Final Safety Analysis Report, consisting of dynamic testing and analysis, used to confirm the ability of safety-related mechanical and electrical (includes instrumentation, control and electrical) equipment and their supports, to function properly during and after the safe shutdown earthquake (SSE) specified for the plant. The applicant has also described the program for the qualification of safety-related equipment for the combined seismic hydrodynamic vibratory loads associated with the MARK II containment suppression pool.

In instances where components have been qualified by testing or analysis to other than current standards such as Institute of Electrical and Electronics Engineers Standard, 344-1975, "Recommended Practices for Seismic Qualification of Class IE Equipment for Nuclear Power Generating Stations," and Regulatory Guides 1.92, "Combining Modal Responses and Spatial Components in Seismic Response Analysis," and 1:100, "Seismic Qualification of Electric Equipment for Nuclear Power Plants," or where equipment is affected by and was not qualified for the suppression pool hydrodynamic loads, the applicant has undertaken a reevaluation and requalification program.

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The applicant has identified those items of nuclear steam supply system and balance-of-plant equipment requiring reevaluation, has described the methods and criteria used to determine the acceptability of equipment qualification to meet the required dynamic loads, and has submitted the up-to-date reevaluation and requalification results.

The plant site review was performed to determine the extent to which the qualification of equipment, as installed in SSES meets the current licensing criteria as described in the Standard Review Plan (SRP) Sections 3.9.2 and 3.10.

II. Review Procedures

Prior to the site visit, the SQR reviewed the equipment seismic qualification information contained in the pertinent FSAR sections and the reports referenced therein. A representative sample of 26 pieces of safety-related mechanical and electrical equipment, including both NSSS and BOP scopes as shown in Attachment II, were selected for the plant site review. This selection includes 12 NSSS equipment and 14 BOP equipment. The review consisted of field observations of the actual equipment configuration and its installation, followed by the review of the corresponding test and/or analysis documents. Brief technical discussions were held during the review sessions to provide SQR's feedback to the applicant on the equipment qualification. An exit conference was held on the final day, March 20, to summarize and conclude the plant site visit.

III. Findings and Conclusion

The review team was informed at the beginning of the audit that among the 26 pieces of equipment selected, six of them had not been completely qualified to the required hydrodynamic loads and therefore were not auditable. The SQR was further informed of the fact that the applicants had completed the qualification for only 35 percent of the total safety-related equipment components for the required loadings. Although this low percentage is partly attributable to the status of motor-operated valves with LIMITORQUE operators, whose requalification to seismic and hydrodynamic loads remains an outstanding issue for all Mark II plants, we consider the extent of completion of the applicant's qualification program to be insufficient to draw any conclusions with regard to the acceptability of all the safety-related equipment. We have, therefore, informed the applicants during the plant site audit that the review team will conduct an additional audit when the qualification program is complete.

The review team conducted the plant site review for the remaining 20 pieces of equipment which were available for audit. The review identified the need to clarify the details of the qualification for some pieces of equipment. The applicant has committed to submit additional information and clarification for a followup review prior to approval of plant operation. The equipment for which additional information is required and the specific items to be addressed are discussed in Section IV, Followup Actions.

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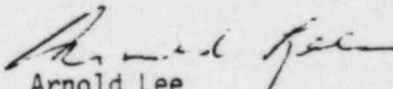
Based on the results of the review to date, we conclude that an appropriate seismic and dynamic qualification program has been defined for the equipment audited which will provide adequate assurance that such equipment will function properly during and after the excitation imposed by the Safe Shutdown Earthquake or hydrodynamic loads associated with discharges into the suppression pool, or by the combined earthquake and hydrodynamic loads. Because of the extent of completion of the program, however, we cannot conclude that an appropriate overall qualification program has been implemented for all the safety-related mechanical and electrical equipment which will provide the same assurance of functionality.

IV. Followup Actions

In order to proceed with our review we have requested the applicant to provide the following information:

- (1) Provide an updated list and the completion schedules for equipment which was not qualified at the time of the site visit.
- (2) Provide the four-page review team summary forms for the nuclear steam system supplier equipment which was audited and the four-page summary forms for all the nuclear steam system supplier and balance-of-plant equipment which was not qualified as identified in (1).
- (3) For the valves audited, provide a comparison between the acceleration 'g' values used in the qualification and those obtained from the final as-built piping analysis.
- (4) Provide the technical bases for concluding that none of the equipment will be damaged as a result of potential fatigue cycling effects due to safety relief valve loadings.
- (5) Provide clarifying details concerning the qualification of some pieces of equipment as listed in Attachment III, and detailed in BNL's evaluation report.

The review of the applicant's implementation of the equipment qualification program is continuing and the applicant is required to resolve all outstanding items as identified in Section IV above. As stated in Section III, the review team will conduct an additional audit when the qualification program is complete.


 Arnold Lee
 Equipment Qualification Branch
 Division of Engineering

Enclosures:
As stated

- cc: R. Vollmer M. Haughey
 W. Johnston R. Riggs
 R. Tedesco M. Stolzenberg
 B. Younablood A. Lee
 R. Stark M. Reich, BNL
 T. Y. Chang J. Singh, INEL
 R. LaGrange

ATTACHMENT 1
SORT PLANT SITE AUDIT
SUSQUEHANNA STEAM ELECTRIC STATION

Plant Site Conference
March 20, 1981

LIST OF ATTENDEES

NRC

Arnold Lee
T. Y. Chang

Brookhaven National Laboratory

John Curreri
Mano Subudhi
A. J. Philippacopoulos

Pennsylvania Power & Light Company

R. W. McNamara
R. H. Featenby
F. Jackson
F. J. Lahovski
P. W. Brady
Rob Betslin
R. A. Beckley
M. S. Gorski
C. T. Coddington
R. E. Moyer
S. Hoopes
G. Kalinowski
Neil Covington

General Electric

N. David Weiss
N. G. Luria
Geo. Heinold
Jim Cleveland
Clyde Nieh
Daniel Hardesty
George Samstad
Mim Mokri
C. V. Subramanian

Bechtel

W. S. Tseng
P. Gupta
G. H. Shah
R. Roberts
L. B. Pulley
R. C. Soderholm
O. A. Nossardi
M. Castillo
J. Hershey

ATTACHMENT II
EQUIPMENT LIST FOR
SQRT PLANT SITE AUDIT

NSSS

- ✓ 1. E11 - C002 - RHR Pump/Motor
- ✓ 2. E41 - C001 - HPCI Pump
- ✓ 3. H12 - Control Panel - Specifically, P601
- ✓ 4. H23 - Control Panel - Specifically, P001 & P007
- ✓ 5. E32 - C001 or E32-C002 - MSIV Blower

- ✓ 6. E51 - C001 - RCIC Pump
- ✓ 7. E21 - C001 - Core Spray Pump Motor
- ✓ 8. B31 - F023 - Recirc Gate Valve
- ✓ 9. B21 - F013 Safety Relief Valve
- 10. H23 - P00~~8~~⁴ - Reactor Vessel Level & Pressure Control Panel B
- ✓ 11. H23 - P010 - Jet Pump Local Panel B
- ✓ 12. H12 - P700 - Term Cabinets Assembly

BOP

- 1. E-109 - 4KV Switchgear
- 2. E-152 - Automatic Transfer Switch
- ✓ 3. J-3A - Field Mounted Electronic Pressure Transmitter
- 4. *J-05A - Control Panels - Specifically, 1C-681 & 2C-681
- ✓ 5. M-11 - Emergency Water Pump
- 6. *J-69 - Pilot Solenoid Valve
- ✓ 7. M-30 - Engine Driven Water Pump
- ✓ 8. M-30 - D-G Intake/Exhaust Expansion Joint
- ✓ 9. M-30 - Pre-Lube Pump
- 10. *M-149 - Containment Vacuum Relief Valve
- 11. *M-159 - Nuclear Safety & Relief Valves - Specifically, PSV-E51 - 1F017

12. *P-12 (Part I) - Motor Operated Gate Valves 150# & 300#.
13. *P-14B - Motor Operated Gate Valve (2")
14. P-16 (Part II) Gear Operated Butterfly Valve (150#)

*Equipment which had not been completely qualified to the required hydrodynamic loads at the time of site audit.

ATTACHMENT III

SPECIFIC INFORMATION NEEDED FOR SOME EQUIPMENT

✓ BOP
• GE

1. E11-C002 - RHR Pump/Motor

- 7 • a) Provide reanalysis to show that the top motor bearing is not overstressed.
- 2 • b) Provide resolution for the overstressed foundation bolts

2. E32-C001 or E32-C002 - MSIV Blower

- ✓ a) Provide an explanation of how the steel support frame is analyzed. *natural freqs > 80 Hz in 7-d.c.*
- ✓ b) Provide assurance that the hold down bolts are adequately designed.

3. E51-C001 - ~~RHR~~ Pump/Motor *Reactor Core Spring*

- 2 • a) Provide resolution for the overstressed top motor bearing

4. B31-F023 - Recirc. Gate Valve

- 2 • a) Provide natural frequencies from the updated piping analysis being performed to reduce "g" loads at the discharge valve and bypass valve. *(for phase II load)*
- 2 • b) Provide "G" value at the gate valve obtained from the updated analysis.

5. B21-F013 - Safety Relief Valve

- a) Provide assurance that the structural integrity of the pipe welding area around the valve will be maintained under the loadings considered.

6. E-109 - 4KV Switchgear

- ✓ a) Provide a list of anomalies observed during the test and provide the resolution action plan.
- ✓ b) Confirm that HP analyzer had been calibrated for damping measurement
- ✓ c) Provide natural frequency and the associated damping value table for review.
- ✓ d) Provide an updated qualification report for review, which incorporates specific new paragraphs identified during the audit.

7. J3A-Field Mounted Electronic Press Transmitter

- ✓ a) Provide information regarding the effect on qualification of the manifold attached at the bottom of the support, and the effect of small tubes connecting the transmitter and the manifold. Assess every transmitter throughout the plant for the similar effects. *(worst case calculation)*

6/2/82