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

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

FROM: Arnold Lee
Equipment Qualification Branch
Division of Engineering

THRU: Charles H. Hofmayer, Section Leader
Equipment Qualification Branch
Division of Engineering

SUBJECT: TRIP REPORT FOR SEISMIC CRITERIA IMPLEMENTATION REVIEW MEETING WITH ALABAMA POWER COMPANY ON FARLEY 2 NUCLEAR GENERATING STATION

The Seismic Qualification Review Team (SQRT) made a site visit to Farley 2 Nuclear Generating Station at Dotham, Alabama, on July 7-10, 1980. The purpose of the visit was to conduct a plant site review of the qualification methods, procedures, and results for thirty four selected BOP Seismic Category I mechanical and electrical equipment, and their supporting structures. The intention was also to observe the field installations of the equipment, based on which judgements can be made on the validity of the equipment modelling employed in the qualification program, with respect to the equipment configuration and its mounting condition.

A list of attendees is contained in Attachment I. The thirty four pieces of equipment which were selected for the plant site review are listed in Attachment II. The objectives, review procedures, findings and conclusions of the meeting, and the required follow-up actions are summarized as follows:

I. Objectives

In the Safety Evaluation Report (SER) dated May 2, 1975, we stated that the Farley 2 BOP equipment qualification complied with IEEE 344-1971.

The licensing criteria with respect to seismic qualification have changed since publication of Standard Review Plan (SRP) Section 3.10. This SRP section references IEEE Standard 344-1975 and Regulatory Guide 1.100. The principal change in our criteria is to require consideration of equipment multi-mode response and multi-axis coupling effects. In view of these changes we considered it necessary to further review the Farley 2 equipment qualification program against SRP 3.10, to determine whether the original tests and analyses were adequate. A previous review of Westinghouse equipment for the Farley plant considered the effects of multi-mode response and multi-axis coupling and found this equipment adequately qualified. Therefore, for this plant site review only the qualification of BOP electrical and mechanical equipment was addressed.

II. Review Procedures

The review was conducted by dividing the selected equipment-mechanical and electrical - into buildings. All equipment in the Containment Building and part of the equipment in the Auxiliary Building were reviewed on July 7-8. This was then followed, on July 8-9, by the remainder in the Auxiliary Building, one in the Control Building, and three in the Diesel Generator Building. On July 9-10, the equipment in the Service Water Building and the River Water Building were reviewed. The above review of equipment qualification consisted of field observations of the actual equipment configuration and its mounted condition, followed by the review of test and/or analysis documents. A brief technical session was held, when necessary, after each review session to provide SQRT's feedback to the applicant on the qualification program for the equipment just reviewed. On the final day, July 10, an exit conference was held to summarize and conclude the plant site review.

III. Findings and Conclusions

The results of the SQRT review of the thirty four pieces of equipment are summarized in Attachment III. The review uncovered relatively few pieces of equipment for which it was not clear that the seismic qualification was acceptable in the light of the current licensing criteria. The items identified appear to be minor deficiencies which can be resolved with additional confirmation from the applicant. The applicant has committed to submit additional information and clarification for a followup review prior to approval of full power operation. The equipment for which additional confirmation is required is listed below. The specific items to be addressed is discussed in Attachment III for each piece of equipment. The remainder of the equipment in Attachment III has been found acceptable.

1. Control Room Power Supply (Control Room)
2. Battery Charger (Service Water Building)
3. Battery Rack (Service Water Building)
4. D.C. Distribution Cabinet (Service Water Building)
5. Solenoid Valves (River Water Building)
6. Service Water Pump (Service Water Building)
7. 4160 V Switchgear (Auxiliary Building)
8. Diesel Generator Relay Panel (Diesel Generator Building)
9. Relays for Diesel Generators (Diesel Generator Building)
10. Float Type Level Switch (Diesel Generator Building)
11. Emergency Air Compressor (Auxiliary Building).

IV. Follow-Up Actions

As mentioned above, the applicant has committed to submit additional information and clarification, for the items identified, in order that SQRT can complete its evaluation of the adequacy of the Farley 2 seismic qualification program. In addition, the SQRT has requested the applicant to provide pertinent documents as well as test and/or analysis reports for five (5) pieces of equipment in order that we can conduct a follow-up in-depth confirmatory review. These five items were identified to be the following.

1. Containment Air Cooler
2. 48" Purge Valve
3. 4160 V Switchgear
4. Relays for Diesel Generators
5. Service Water Pump

We will complete our review for the equipment as identified in Sections III and IV and require the applicant to resolve all outstanding items prior to full power operation of Farley 2.

Arnold Lee
Equipment Qualification Branch
Division of Engineering

Enclosures:
As stated

cc: R. Vollmer
V. Noonan
R. Tedesco
A. Schwencer
C. Hofmayer
L. Kintner
P. Chen
A. Lee
M. Reich, BNL
B. Saffell, INEL
J. Mulkey, IE
W. Bradford, IE

ATTACHMENT I

SQRT Plant Site Conference

Farley Unit 2

List of Attendees

NRC

Charles H. Hofmayer

Pei-Ying Chen

Jim Mulkey (NRC Resident Insp.)

W.H. Bradford (NRC Resident Insp.)

Arnold J. Lee

Alabama Power Company

C.L. Buck

J. D. Woodard

D.W. Herrin

W.G. Hairston

Bechtel

M.T. Lee

C.S. Hsu

G.M. Langford

Southern Company Service

W.C. Ramsey

D.P. Moore

N.R. Antonio

R.R. Lyon

N.J. Santoro

ATTACHMENT II

Equipment Selected for SQRT Plant Site Review

Farley Unit 2

Containment Building

1. Excess Flow Check Valve
2. Med. Voltage Electric Penetration
3. Containment Air Coolers
4. Reactor Cavity Hydrogen Dilution Fans
5. Sump Pump
6. 48" Purge Valves
7. Air Operated Globe Valve

Auxiliary Building

1. ESF Equipment Room Cooler Thermostats
2. Emergency Air Compressor
3. Limit Switch
4. 4160 V Switchgear
5. Power Center Transformer
6. AKD-5 Low Voltage Switchgear
7. Pressure and Differential Pressure Transmitters
8. Level Transmitter
9. Component Cooling Water Heat Exchanger
10. Boric Acid Tanks
11. 150# Relief Valves
12. Air Operated Globe Valve for Main Steam Atmospheric Relief Valves

River Water Building

1. Pressure Switches
2. Solenoid Valve
3. Differential Pressure Switches

River Water Building (Continued)

4. 60" Motor Operated Butterfly Valves
5. Level Transmitter

Service Water Building

1. Battery and Battery Charges
2. Battery Rack
3. D.C. Distribution Cabinet
4. Pressure Switch for Level Alarms
5. Pressure Switches
6. Service Water Pumps

Diesel Generator Building

1. Diesel Generator Relay Panel
2. Relays for Diesel Generator Panel
3. Float Type Level Switches

Control Building

1. Power Supply

ATTACHMENT III

Summary of SQRT Plant Site Review

Farley Unit 2

Containment Building

1. Excess Flow Check Valve (Document Reference V276592 (M58.3-604-01)

The equipment was qualified by a single frequency, biaxial test method. The input G level is 3g in all three directions, and is conservative. No physical damage nor malfunctions of the equipment were revealed during and after seismic excitations. Our review did not identify any concerns with the seismic qualification of this check valve.

2. Medium Voltage Electrical Penetration (Document Reference 7497-20E22-56-1)

The electrical penetration with model number 127D1643 was manufactured by General Electric Company. The component was welded circumferencially to the containment wall. The seismic test simulating the actual mounting condition was conducted at the General Electric Company San Jose test facility. The required accelerations in each direction are: Side-to-side, 0.12g; front-to-back, 0.11g; and vertical, 0.108g. Biaxial sine beat tests were performed with horizontal accelerations of 0.6g to 1.35g and vertical accelerations of 0.7g to 1.25g. Single axis sinusoidal tests were also conducted with accelerations from 0.5g to 0.9g. After the completion of all seismic tests, visual inspections, leak tests, electrical tests, and dye penetrant tests for nozzle welds were performed and no abnormal conditions or damages were found to exist. Our review did not identify any concerns with the seismic qualification of this electrical penetration.

3. Reactor Containment Air Cooler Units (Document Reference 7597-20M12-5-3, American Air Filter PEP495).

The applicant indicated that the whole unit was qualified by analysis for the combined Loss of Coolant Accident (LOCA) loads and Safe Shutdown Earthquake (SSE) loads. Although no specific concerns were identified, the staff has requested that the qualification report for this equipment be submitted for a follow-up indepth confirmatory review.

4. Reactor Cavity Hydrogen Dilution Fans (Document Reference - Joy Manufacturing Co. Eng. Calcs dated 10/20/75, revised 8/5/76)

These fans were qualified by analysis for 1.38g in the E-W dir., 1.28g in the N-S dir and 0.85g in the vert. dir. The two horizontal directions were combined by SRSS and then combined with the vertical direction. The required accelerations for frequencies greater than 33 hz were .1g horizontal and 0.067g vertical. The peaks of the required floor spectra occurred between 10-15 hz with accelerations of approximately 1.4g horizontal and .63g vertical. The maximum stresses and deflections of the critical elements were significantly less than the allowables. Our review did not identify any concerns with the seismic qualification of these fans.

5. Sump Pump (Document Reference - Chem. Pump - A-18219 dated 10/15/75)

Nine sump pumps with varying dimensions were qualified by analysis. The design used OBE allowables with SSE input quantities based on the peak of the floor spectra. The highest input considered accelerations of 2.24g horizontal and .95g vertical. The maximum stresses and deflections were found to be within the allowable limits. Our review did not identify any concerns with the seismic qualification of these sump pumps.

6. Containment Purge Isolation Valve (Document Reference - Henry Pratt Co. Report #D-0007 dated 1/25/73)

The 48" purge valves manufactured by the Henry Pratt Co. were qualified by

analysis for 3g's simultainously applied in each of three perpendicular directions. The actuator's for these valves were manufactured by Bettis and were qualified for 5g's (Document Reference - "Seismic Analysis for Bettis Robotarm Actuator Spring Return" dated 6/13/73). The design accelerations are significantly higher than the peaks of the required floor response spectra. The maximum stresses for the critical structural elements were found to be less than the allowables. Although no specific concerns have been identified, the staff has requested that the applicant submit the qualification reports for the valve and its actuator for a follow-up indepth confirmatory review.

7. Air Operated Globe Valve (Document Reference M004.04-0236 thru 0274, Hammell-Dahl Report DR-550)

A 6" air operated globe valve by Hammell-Dahl Valve Company was qualified by analysis for 3 g's which is higher than the required acceleration in each of the three orthogonal directions. The maximum stresses and deflection at the critical structural elements were found to be less than the allowable. Our review did not identify any concerns with the seismic qualification of this valve.

Auxiliary Building

1. ESF Equipment Room Cooler Thermostats (Document Reference 7597-20-M87-97-2)

The equipment was qualified by a single axis, single frequency sinusoidal test, with frequency ranges of 10-60 Hz via magnet excitation and 1-6 Hz via manual excitation. The output accelerameter was mounted on the controller fixture such that it monitored the acceleration in the direction of excitation. The maximum accelerations applied to the controller was reviewed and found acceptable. The relay mounting bracket was reinforced with two No. 8 - 32 x 4" machine screws to prevent the relay from popping out of the mounting bracket. This relay assembly remained

intact for all tests. In no case during the tests did the contacts show signs of closure, nor did the sensor resistance change. Our review did not identify any concerns with the seismic qualification of this controller.

2. Emergency Air Compressor (Document Reference 75-97-20-M4-6-33-1, Wyle Laboratories 42746-1).

The air compressor with model number 10T3NLE10 by Ingersoll-Rand Company was qualified by multi-axis and multi-frequency excitation tests. Because the presentation of the test results (test response spectra, TRS) used a different damping value from that for the required response spectra (RRS), it was not clear whether the TRS envelopes the RRS. The applicant agreed to look into this matter further and provide additional information to support the qualification of this item.

3. Limit Switch (Document Reference 7597-20-M107-121-1)

The equipment was qualified by a single frequency, single axis sine dwell test, with a frequency range of 1-35 Hz. No resonance frequency was found within this frequency range using sine sweep and one octave per minute interval. A fragility test using sine dwell, with 1/3 Octave bands over 1-35 Hz was conducted. The input G level is conservative, at 0.6g to 9.52g over the frequency range. The switch was tripped from the unactuated (stay for 15 seconds) to the actuated position (for 30 seconds) and back to the unactuated position (for another 15 seconds) during the fragility test procedure and monitored for contact opening. The contact opening was observed to be less than 2 millisecond. The limit control switches performed satisfactorily. Our review did not identify any concerns with the seismic qualification of this limit switch.

4. 4.16 KV Switchgear (Document Reference 7597-20E5.1-223-1)

Resonance search at 0.2g input and 0.5 Octave/min. indicated resonances at 9 Hz, 13 Hz etc. No resonances in the vertical direction was observed. Single axis single frequency sine dwell tests were conducted, using a conservative input level, of 0.5g in each of the three directions, at integral frequencies for frequencies above 10 Hz, and 0.5 Hz for frequencies below 10 Hz.

The test results indicated no structural damage, however, some relay chatters were observed. The applicant was asked to provide justification for the acceptability of such chatter with regard to the function of the equipment. The staff also requested the applicant to submit this report for further review.

5. Power Center Transformer (Document Reference 7597-20E6.1-225-3)

The equipment was qualified by a combination of test and analysis methods. The test was conducted using a single frequency (sine beat) and single axis method. The test procedure and test input (0.5g at 1-5 Hz, 1.0g at 5-10 Hz, and 0.5g at 10-25 Hz) are found acceptable and no structural damage of the equipment occurred. The power center is tied to the transformer by five (5) bolts. The latter, in turn, is intermittently welded to the floor. A static hand calculation showed that the stresses induced in the tie plate under seismic conditions remained within allowable. Our review did not identify any concerns with the seismic qualification of this equipment.

6. AKD-5 Low Voltage Switchgear (Document Reference 7597-20E11-92-2)

The equipment was qualified by a single frequency and single axis test. While no resonance was observed below 5 Hz, a conservative input of 0.5g was applied over a frequency range of 5 - 500 Hz for each of the 3 directions. The test was conducted for both breaker open and close positions. No structural damage was observed and the equipment remained functional. Our review did not identify any concerns with the seismic qualification of the switchgear.

7. Pressure and Differential Pressure Transformers (Document Reference M213.1-0064-01)

The equipment was qualified by a single frequency (sine beat) and single axis test. A sine sweep frequency search showed resonances below 35 Hz. The test was conducted using very conservative input motions of 0.5 to 4.0g in the horizontal directions and 0.33 to 2.8g in the vertical over a frequency range of 1.0-35 Hz. The equipment performed satisfactorily (mechanically and electrically) under the test condition. Our review did not identify any concerns with the seismic qualification of the transmitter.

8. Level Transmitter (Document Reference - Testing Lab, Inc. Report dated 1/29/74)

Two level transmitters manufactured by Delaval Gems Sensors Division were qualified by multi-axis, single frequency tests. These level transmitters are installed at approximately the 110' elev. in the containment building. The peaks of the floor spectra at the 129' elev. of the containment are approximately 1.1g horizontal (10-15 Hz). The tests included a resonant frequency search between 1 and 33 hz and sine dwell tests at the resonant frequencies. The vibration table was adjusted to vibrate at an angle of 34° off the horizontal. A number of tests were run with different effective lengths. The most severe test was run with accelerations of 3.8g hor., 2.8g vert. at the natural frequency of 15 Hz. The equipment was observed to perform satisfactorily

during all tests. Our review did not identify any concerns with the seismic qualification of these transmitters.

9. Component Cooling Water Heat Exchanger (Document Reference 7597-20-M42-30-1)

The equipment was qualified by a static analysis method using both a computer code and hand calculations. The stresses at the saddle portion of the shell, under seismic and pressure loadings, are within the allowable. An oversized hole, at one of the two concrete pedestals, for the connecting bolt is designed to accomodate the thermal expansion effects. The stresses calculated in the bolts were also found to be within the allowable under the loading conditions considered. Our review did not identify any concerns with the seismic qualification of the heat exchanger.

10. Boric Acid Tanks (Document Reference - "Seismic and API Code Analysis of Boric Acid Tanks" by Mitternight Boilerworks, Inc. dated 10/73)

The two boric acid tanks manufactured by Mitternight Boiler Works, Inc. were qualified by dynamic analysis utilizing the response spectrum technique and a five mass model. The analysis considered cases with the tank full, the tank empty and the tank full with sloshing effect. The stresses in the critical elements were found to be within the allowables. The calculations were verified by URS/John A. Blume Assoc. Our review did not identify any concerns with seismic qualification of these tanks.

11. Relief Valve (Document Reference - Lonergan-"Safety and Relief Valves for APC" dated 8/30/78)

The 3/4" x 1", 150# angle relief valves manufactured by Lonergan were qualified by analysis for 3g's. The horizontal and vertical responses were added directly. The stresses were found to be well within the allowables. Our review did not identify any concerns with the seismic qualification of these valves.

12. Air Operated Globe Valve (Document Reference M004.06-0015-01)

A 6" EP 667 Size 80 Fisher Controls globe valve was qualified by analysis using a three dimensional finite element model for 3 g's which is higher than the required acceleration in each direction. The results indicate that stresses and deflections are within the allowable. Our review did not identify any concerns with the seismic qualification of this valve.

River Water Building

1. Pressure Switches (Document Reference U-162934)

This equipment was qualified by a single frequency single axis test at 3g level in a frequency range of 5 - 150 - 5 Hz.
No resonsance was found in this frequency range. The procedure and input were found acceptable. No electrical contact-chatter or premature actuation due to vibration occurred. Our review did not identify any concerns with the seismic qualification of the switch.

2. Solenoid Valves (Document Reference Asco Test Report No. 1357-4)

Tests were conducted using a vibration fatigue tester for these equipment. Test frequency ranges between 20 to 60 Hz. Maximum g level is 22g and is very conservative. No valve malfunction was observed. The applicant was requested to provide justification for not conducting the test below 20 Hz.

3. Differential Pressure Switches (Document Reference U-162767)

The equipment was qualified by a single frequency, single axis test using sine dwell. No resonances were detected in Switch No. 1, and some resonance were detected at frequencies equal to and higher than 29 Hz in Switch No. 2.

In the dwell tests conducted between 10 to 58 Hz chatter occurred in the switch No. 2 relay. Due to conservatism of the input motion (3g) and the high frequencies (greater than 33 Hz) at which the chatter occurred, the qualification is considered acceptable.

4. 60" Motor Operated Butterfly Valve (Document Reference - Henry Pratt Co. Report)

The 60" motor operated butterfly valves in the river water structure manufactured by the Henry Pratt Co. were qualified by analysis for 3g's simultaneously applied in each of three mutually perpendicular directions. The applicant provided a report for the qualification of 54" butterfly valves and later confirmed that the qualification methodology for the 60" valves was identical to the 54" valves. Our review also confirmed that the methodology for the 54" valves was the same as that used for the 48" purge valves which were discussed above. However, these valves utilize Limitorque actuators. The design accelerations for these valves are higher than the peaks of the floor response spectra and the maximum stresses for the critical structural elements were less than the allowables. Our review did not identify any concerns with the seismic qualification of these valves. As noted above we intend to perform a more detailed review of the 48" valves. This review will further confirm the qualification of these valves since the same methodology was used.

5. Level Transmitters (Document Reference U-187022)

The equipment was qualified by a single frequency, single axis test using sine dwell. Some resonances were detected (with panel mounting basket) at frequencies approaching 33 Hz, using sine sweep at 1 Octave/min. The dwell test using a conservative input motion of 3g in each of the three directions in a frequency range of 5-70 Hz, for 30 seconds, indicated

no transmitter malfunction. Our review did not identify any concerns with the seismic qualification of these transmitters.

Service Water Building

1. Batteries and Battery Chargers (Document Reference - TTI Testing Laboratories, Inc. Report on Seismic Test in Two (2) 3-DCU-3 Batteries and One (1) ARR130 AC3 Charger for C&D Batteries dated 10/26/73)

The Service Water Building batteries and battery chargers manufactured by C&D Batteries were qualified by multi-axis, single frequency tests. The required accelerations in the horizontal direction were .16g (ZPA) and in the vertical direction .15g (ZPA). The peak of the required floor spectra was approximately 1.6g (1 Hz) horizontal and 1.5g (5-6 Hz) vertical. The batteries and battery charger were tested at the same time. The tests included a resonant frequency search between 1 and 33 Hz and sine dwell tests at 33 Hz (1.4g vert. and 1.5g hor.) and 27 Hz (1.4g vert. and 1.6g hor.). No malfunctions were observed during the tests. While the tests appeared acceptable, our review of the test report indicated that the battery charger was mounted flat on the test table, while it is cantilevered from a wall in its actual field installation. We requested the applicant to reconcile the difference between the field condition and the test condition and to verify that the connecting bolts were checked in the field mounted condition. We also requested the applicant to clarify the purpose of a box which is loosely mounted to the bottom of the battery charger. Our review did not identify any concerns with the seismic qualification of the batteries. The applicant agreed to provide additional information to support the qualification of the battery charger.

2. Battery Rack (Document Reference - Analysis by C&D Batteries dated 5/3/73)

The battery racks in the service water building were manufactured by C&D batteries and qualified by analysis. The analysis assumed 2 - 3/8" dia. bolts at the top tying the rack to the wall. This support was not observed in the field. We requested the applicant to review the analysis and reconcile the differences between the field installation and the analytical assumptions. Furthermore, we stated that the applicant should review all battery rack designs for the plant to determine if this problem exists for other racks. The applicant agreed to investigate this matter and to inform the staff of the resolution.

3. D.C. Distribution Cabinet (Document Reference SCSE - 15 ITE Imperial Corp. - Report R-STS-6)

The resonance search indicated that there is a natural frequency of 12 Hz in the Front-to-Back (F/B) direction. Multi-axis continued sinusoidal vibration tests were performed with accelerations Front-to-Back 0.65g, Side-to-Side 0.55g and vertical 0.47g. The required accelerations are 0.16g horizontal and 0.15g vertical. Additional random vibration tests were also performed with a Root-Mean-Square acceleration of 1g. Functional operability was verified. However, a discrepancy was found between the number of 3/8" bolts used in the field and that in the test. The applicant agreed to look into the matter and provide resolution.

4. Pressure Switch for Level Alarms (Document Reference U-187133, Custom Components Sw. Inc. QTR604GCJR05155-01)

The switch was mounted on a 4" x 4" steel box column on the roof of the service water structure. Single axis, single frequency continuous sine tests were performed with accelerations from 0.64g to 3g in each of the three directions. The required accelerations is 0.17g for the Safe Shutdown Earthquake. No electrical contact chatter, premature activation, or resonant

frequencies was observed. Our review did not identify any concerns with the seismic qualification of the pressure switch.

5. Pressure Switches

Similarily qualified as Item 1 in the river water building.

6. Service Water Pump (Document Reference 7597-20-M43-12-1g Nicherson/Brown Consulting Engineers Report).

The pump having model number 27CC is manufactured by Johnston Pump Company. The equipment was qualified by analysis. The original analysis indicated inadequacy of supports and hence some modifications were made. However, nc nozzle loads were considered in the analysis. The applicant agreed to provide additional information concerning the nozzle loads. The staff has also requested that the applicant submit the qualification report for a follow-up indepth confirmatory review.

Diesel Generator Building

1. Diesel Generator Relay Panel (Document Reference SCSE-5, Wyle Labs Report No. 42613-1)

The relay panel, including relays CFVB, HFA, HEA, RRX147, 1AV, GFD12, 1HCV, 1AC, 1CW, CEH51A, and switch M4, was qualified by multi-axis single frequency sine beat tests at the required accelerations of 0.2g horizontally and 0.12g vertically. The results indicated that the structural integrity and performance were adequately demonstrated except the CFVB relay chattered at 1.5, 2, 4, and 5 Hz. The applicant indicated that this chattering was not a concern and agreed to provide further justification for the use of this relay panel.

2. Relays for Diesel Generators (Document Reference SCSE-9, Wyle Labs Report 43375-1)

Agastat relays with model numbers 7012 PCL and 7022 PE were tested with multi-frequency and multi-axis excitations. The test response spectra (TRS) enveloped the required response spectra, (RRS). In some cases where fragility tests were performed, substantial margin exists in the testing level compared to the required level for the Farley 2 plant. Test results indicated that (1) for the 7012 PCL relay, no time delay error occurred during the tests. However, the normally-closed contacts of the microswitch attached to the 7012 PCL did exhibit contact chatter at test levels as low as 45% of the RRS, and, (2) the 7022 PE relay did not have chatter of greater than 100 micro-second, but it had time delay error greater than 15%. The staff has requested that the applicant submit this report for further review and to provide further justification in the use of the relays in the light of the chattering and time delay errors indicated in the reports.

3. Float Type Level Switch (Document Reference U-167260 Ogden Technology Lab. Inc. Job #70682)

The level switch was tested with a sinusodial vibration having accelerations of 1.5g to 5.0g in each direction in the frequency range of 5 to 33 Hz. The required accelerations are 0.2g horizontal and 0.13g vertical. Test results indicated that chattering occurred on the No. 1 switch. The applicant indicated that this chattering was not a concern and agreed to provide further justification for the use of this level switch.

Control Building

1. Power Supply (Document Reference - North Electric Co. 662-1780-1961 - Results of Evaluation dated 6/22/71)

Two power supplies (Model #N11048) manufactured by North Electric Co. and installed in the Control Room were qualified by single axis, single frequency tests. The required accelerations in the horizontal direction were .18g (ZPA) and in the vertical direction .095g (ZPA). The peak of the required floor spectra was approximately 2.5g (6 - 10 Hz) horizontal and 0.97g (6 - 10 Hz) vertical. The test motion was applied for 45 minutes in each of three perpendicular directions. The input accelerations range from .172g to 2.32g. The test report indicated that the equipment performed satisfactorily before, during and after the test. Based on our review we requested that the applicant clarify (1) whether electric voltage was monitored during the test and (2) how the equipment was attached to the test frame. The applicant agreed to provide this information.