



# LONG ISLAND LIGHTING COMPANY

SHOREHAM NUCLEAR POWER STATION

P.O. BOX 618, NORTH COUNTRY ROAD • WADING RIVER, N.Y. 11792

Direct Dial Number

June 6, 1983

SNRC-902

Mr. Harold R. Denton, Director  
Office of Nuclear Reactor Regulation  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

Technical Justification of the  
Single Frequency/Single Axis Testing Method  
Shoreham Nuclear Power Station - Unit 1  
Docket No. 50-322

Reference: 1) Supplement Number 3 of the "Safety Evaluation Report Related to the Operation of the Shoreham Nuclear Power Station - Unit No. 1"

Dear Mr. Denton:

As stated in Section 3.10 of reference 1, the NRC has requested detailed technical justification for the use of the single frequency/single axis testing method for several representative components. In response, attachment 2 to this letter provides the technical justification.

LILCO believes this information should enable the NRC to resolve their equipment specific concerns regarding the applicability of the single frequency/single axis testing method for Shoreham.

If any additional information is required, please contact the undersigned.

Very truly yours,

J. L. Smith  
Manager, Special Projects  
Shoreham Nuclear Power Station

RT:bc

Attachment

cc; J. Higgins  
All Parties Listed in Attachment 1

Boo!  
1/1

ATTACHMENT 1

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SQRT SER Equipment Specific Item #2

Adequacy of single frequency/single axis testing method.

The applicant is to provide detailed technical justification for the use of single frequency/single axis testing method for the following representative equipment items, or their equivalent, by 30 days prior to fuel load.

- a) Local Panel Devices, B21-N055 (163C1292)
- b) Transmitter, Gauge Press. - Ship Loose Devices (163C1564)
- c) Limitorque Actuator Recirc. Discharge Valve (B31-FO31)

Response:

Single frequency/single axis testing is justified in accordance with IEEE Std. 344-1975 when certain conditions exist. If it can be shown that the equipment has no resonances, only one resonance, or resonances are widely spaced and do not interact to reduce the fragility level, or if otherwise justified, single-frequency tests may be used to fully test the equipment. Single frequency testing may also be used when the seismic ground motion has been filtered due to one predominant structural mode resulting in floor motion consisting of one predominant frequency.

Single-axis tests are allowed if the tests are designed to conservatively reflect the seismic event at the equipment mounting locations or if the equipment being tested can be shown to respond independently in each of the three orthogonal axes or otherwise withstand the seismic event at its mounting location. This is the case if the coupling is zero or very low or if other justification can be provided.

Based on these guidelines, single frequency/single axis testing is justified for the selected equipment items for the reasons summarized below. Excerpts from the SQRT documentation are also attached for reference.

- a) Local Panel Devices, B21-N055 (163C1292)

Since this device is being replaced, justification for panel mounted pressure switch, E21-N07 (159C4606) utilizing the same measurement principle is presented here.

The maximum expected accelerations at the device mounting location is 5.4g horizontal and 1.41g vertical as determined from panel transmissibility test data. The cutoff frequency is 60Hz. The device was qualified by sine dwell testing in each of the three principal axes. The dwells were held for 30 seconds

at 5Hz intervals between 2 and 30Hz. Acceleration levels were increased gradually at each frequency until a maximum level of 29g was reached with no evidence of failure. In addition, a resonance search between 2 and 33Hz showed no resonances. In order to extend the qualification to the cutoff frequency, a natural frequency calculation was performed. The lowest natural frequency of the device is 99Hz which indicates that the pressure switch is rigid in the frequency range of interest. Based on this fact and the severity of the test, single frequency/single axis testing is justified in accordance with IEEE 344-1975 requirements.

b) Transmitter, Gage Press.-Ship Loose Devices (163C1564)

The maximum expected accelerations are 1g horizontally and 1g vertically. The cutoff frequency is 60Hz. The device was tested by a 2g sine sweep from 4 to 70Hz in all three axes. Resonant dwells of 30 seconds each were held at the natural frequencies. The test showed that the device has two widely spaced resonances (7Hz and 50Hz) in the front to back direction with no cross-coupling. Therefore, single frequency/single axis testing is justified in accordance with IEEE 344-1975 requirements.

c) Limitorque Actuator Recirc. Discharge Valve, B31-F031

The maximum expected actuator accelerations are 6.56g horizontally and .87g vertically as determined from piping dynamic analysis. The cutoff frequency is 60Hz. The actuator was qualified by a sine beat test performed in accordance with IEEE 382-1980 guidelines. An acceleration of 10g was applied in each of the three principal axes in 1/3 octave intervals over the frequency range of 2 to 100Hz. The test also showed that the actuator has no resonances below the cutoff frequency and that no cross-coupling exists. Therefore, single frequency/single axis testing is justified in accordance with IEEE 344-1975 requirements.