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ENCLOSURE

Response to informal request from NRC for additional information regarding seismic requalification testing of safety-related electrical equipment outside the containment.....

PLANT NAME: Diablo Units 1 & 2
RJL 12/29/77 (1-P) (3-P)

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ATTORNEYS

December 21, 1977

Mr. John F. Stolz, Chief
Light Water Reactors Branch No. 1
Division of Project Management
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Re: Docket No. 50-275-OL
Docket No. 50-323-OL
Diablo Canyon Units 1 & 2

Dear Mr. Stolz:

This letter responds to an informal request from the NRC Regulatory Staff for additional information regarding seismic requalification testing of safety-related electrical equipment outside the containment.

The seismic qualification of such equipment has been reviewed by PGandE, and all equipment requiring requalification testing has been identified. The testing will be conducted by Wyle Laboratories. A brief discussion of the testing program and a list of equipment to be requalified is attached.

Kindly acknowledge receipt of the above material on the enclosed copy of this letter and return it to me in the enclosed addressed envelope.

Very truly yours,

Philip A. Crane, Jr.

Attachments (40)
CC w/attachment: Service List

The following equipment, listed by test grouping, will undergo requalification testing.

TABLE I

IDENTIFICATION OF TEST SPECIMENS

GROUP I	Vital Relay BD 4160 Switchgear
GROUP II	Diesel Generator Control Cabinet Diesel Generator Excitation Cubicle
GROUP III	Ventilation System Relay Panel Ventilation System Logic Panel Main Annunciator
GROUP IV	Local Starter LPG37 Fire Pump Controller 125-250vdc M.C.C. DC Switchgear Battery Charger
GROUP V	Fischer Controller Local Starter LPG65 Vital Load Center (480v)
GROUP VI	Local Starter LPF36 Limit Switches

Each group of test specimens shall be subjected to the following tests according to the sequence described below.

A low level (approximately 0.2g) sine sweep from 1 to 33 Hz will be performed in each orthogonal axis to establish major resonances of the test specimen. The frequency sweep rate will be one octave per minute. Up to six response accelerometers will be attached to the test specimens (the locations of the response accelerometers will be determined at the time of testing) to determine the major resonances. The output of each accelerometer will be recorded on a direct readout recorder.

Qualification tests will be conducted biaxially. That is, each horizontal axes will be excited separately, but each one will be excited simultaneously with the vertical axis (longitudinal simultaneous with vertical, then lateral simultaneous with vertical).

The test specimen will be subjected to a seismic random motion which is amplitude controlled in one-third octave increments from 1.25 to 33 Hz. A selected 30-second recording of random signal will be used as the input source. This input signal will be tuned with a bank of parallel one-third octave filters with individual output attenuators to meet the required response spectra where independent signal sources will be used for the horizontal and vertical axes so that input motion phasing will be random.

If the response spectra are such that the required response spectra cannot be enveloped with just a random excitation input, it is then proposed to meet the required envelope spectra by producing a "background" random excitation and superimposing sine beat excitation one frequency at a time at one-third octave frequency intervals. The "background" random excitation will be adjusted in the vertical axis and in the horizontal axis to produce a response spectrum to a high enough level but not to raise the zero period acceleration to too high a level. Sine beats will then be superimposed on the random signal at one-third octave frequency intervals over the range of frequencies that the "background" random excitation falls below the required spectra. The sine beats of approximately 20 oscillations per beat will be applied at each frequency interval. The sine beats will be applied biaxially. The sine beats will be adjusted so that the response spectrum of each sine beat will envelop the required spectrum over its one-third octave interval. The resultant composite spectrum will then envelop the entire required response spectrum for each axis. The sine beats will be applied as expeditiously as possible to minimize the total time of the "background" random excitation.

The seismic response analysis will be performed by a shock analyzer generating the maximum response amplitudes at one-sixth octave intervals from 1.1 Hz to 100 Hz. Damping of 3% and 5% will be used in the analysis of the table motion.

With the test specimen mounted so its longitudinal horizontal axis is parallel to the horizontal axis of excitation, a sine sweep will be performed horizontally. A vertical axis sine sweep will then be performed, followed by the biaxial random test, five OBE's and two SSE's. Three OBE tests and one SSE test will be conducted with the equipment de-energized and two OBE tests and one SSE test will be conducted with the equipment energized.

The test specimen and fixture will be reoriented so that its lateral axis is parallel to the horizontal axis of excitation and a horizontal sine sweep will be conducted, followed by the biaxial random test.

A visual examination of each test specimen shall be performed prior to and after each series of seismic tests. The test sequence for the functional monitoring and seismic testing is shown in Table II below:

TABLE II

TEST SEQUENCE

1. Receiving Inspection

2. Test Specimen Inspection (prior to and upon completion of each seismic test)

3. Functional (prior to, during, and upon completion of testing)

4. Seismic Tests

5. Test Sequence of Groups

Group No.	Test No.	Group No.	Test No.
1	6	4	5
2	2	5	3
3	4	6	1

In the event of a test specimen failure, notification will be made immediately to the cognizant customer representative. A Notice of Deviation will be written within 24 hours describing the incident and test specimen disposition, and forwarded to PG&E.

The records will be checked for equality of performance after each test. The specimen will be examined for possible damage following each phase of testing and at other appropriate times. All important vibration effects will be logged. Photographs will be taken of any noticeable physical damage that may occur.

A certification type report will be issued subsequent to the completion of testing. This report will be signed by a registered professional engineer and will include: Test levels, details concerning deficiencies and repairs, accelerometer responses and photographs of test setups and failures. This report will also contain a list of pertinent test equipment and calibrations.

Measuring and test equipment to be utilized in the performance of this contract will be calibrated by the Wyle Laboratories Standards Laboratory, or a commercial facility utilizing reference standards (or interim standards) whose calibration has been certified as being traceable to the National Bureau of Standards. All reference standards utilized in the above calibration system are supported by certificates, reports, or data sheets attesting to the date, accuracy, and conditions under which the results furnished were obtained. All subordinate standards, and measuring and test equipment are supported by like data when such information is essential to achieve the accuracy control required by the subject contract.

Wyle Laboratories attests that the commercial sources providing calibration services on the above referenced equipment, other than the National Bureau of Standards, are in fact capable of performing the required services to the satisfaction of the Wyle Laboratories Quality Control Department. Certificates and reports of all calibrations performed are retained in the Wyle Laboratories Quality Control files and are available for inspection by the customer or government representative.