

SOUTHWEST RESEARCH INSTITUTE

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Department of Engineering Mechanics
February 11, 1983

U. S. Nuclear Regulatory Commission
ATTN: Dr. W. E. Campbell, Jr.
Office of Nuclear Regulatory Research
Washington, D.C. 20555

Reference: SwRI Project 06-6582, "Seismic Qualification of Nuclear Plant
Mechanical and Electrical Equipment," Contract NRC 04-81-185.

Gentlemen:

This document constitutes Monthly Progress Letter No. 14 for the referenced contract and covers the month of January 1983.

Technical Summary

Evaluate Past and Present Qualification Methods

The results of this effort have been published in Task I Summary Report II entitled "Evaluation of Methodology for Seismic Qualification of Nuclear Plant Electrical and Mechanical Equipment," dated February 1, 1983. The required copies of this report were submitted to the NRC Project Officer near the end of January. In addition, one copy was sent to each member of the Peer Review Group, and also to most members of the IEEE 344 Revision Working Group 2.5. Some results from this document also were presented by the SwRI Program Manager at an Equipment Qualification Panel Session at the IEEE Winter Annual Meeting in New York. Thus, a wide dissemination of the information has been achieved quickly after the data have become available.

Line Mounted Items

This activity constitutes Subtask 1.7 which was delayed because of difficulty in acquiring a valve specimen. During January, an agreement was reached with Rockwell International, Flow Control Division of Sulphur Springs, Texas, whereby they are to supply a valve specimen essentially free of charge to the program. We anticipate receiving the item about mid-February, and should be able to proceed with studies on this subtask rapidly thereafter.

Correlation of Qualification Methods

Efforts on this task have continued at a rapid pace, and should be completed on schedule to provide a draft summary report by mid-March. During January some limited fragility testing was performed on a Yarway Level Indicator/Switch. This device had originally been mounted on the equipment



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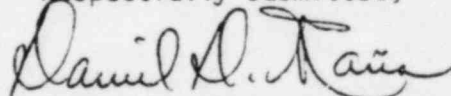
rack studied during Task 1 of the program, and observed to exhibit chatter failure during certain simulated seismic test runs. For fragility testing, the device was mounted on a rigid bookend directly on the seismic simulator. First, it was subjected to a broad band test motion whose TRS matched the response spectrum computed from the Rack Location 3 response time history recorded during the previous test runs. It was found that similar malfunctions in the form of contact chatter occurred. Thus, the validity of a device fragility test was confirmed. Next, a series of test runs aimed at developing a fragility function was performed. Sine wave excitation of fixed frequency were applied with increasing amplitude until failure was observed. Similarly, narrow band random excitation with fixed center frequency was applied with increasing amplitudes until failure was observed. Figures 2 and 3 show samples of some of the fragility functions which resulted. Peak acceleration values were used in Figure 2 and RMS acceleration values were used in Figure 3. It is obvious from the Figure 3 curves that RMS acceleration amplitude is a more universal parameter for developing the fragility function for this device. Furthermore, during the previous rack test runs, the failure occurred at 1.44 g RMS, which correlates very well with the observed data. Thus, it appears that we are well on the way of developing a useful correlation method for various types of tests.

Financial Summary

The following constitutes a cost report for the SwRI accounting period ending January 31, 1983.

<u>Cost Item</u>	<u>Cost this Period</u>	<u>Total to Date</u>
Direct Labor	\$5,134.15	\$73,888.75
Burden	1,796.95	25,778.53
Overhead	8,040.07	115,614.05
Telephone, Travel, etc.	707.32	8,517.12
Fee	1,254.28	17,903.85
	<u>\$16,932.77</u>	<u>\$241,702.30</u>

Respectfully submitted,



Daniel D. Kana, Ph.D., P.E.
Program Manager

DDK:dr
Attach.

cc: Dr. H. N. Abramson, SwRI
Mr. Kellogg V. Morton, NRC Contracts
Mr. S. H. Birgel, SwRI Contracts

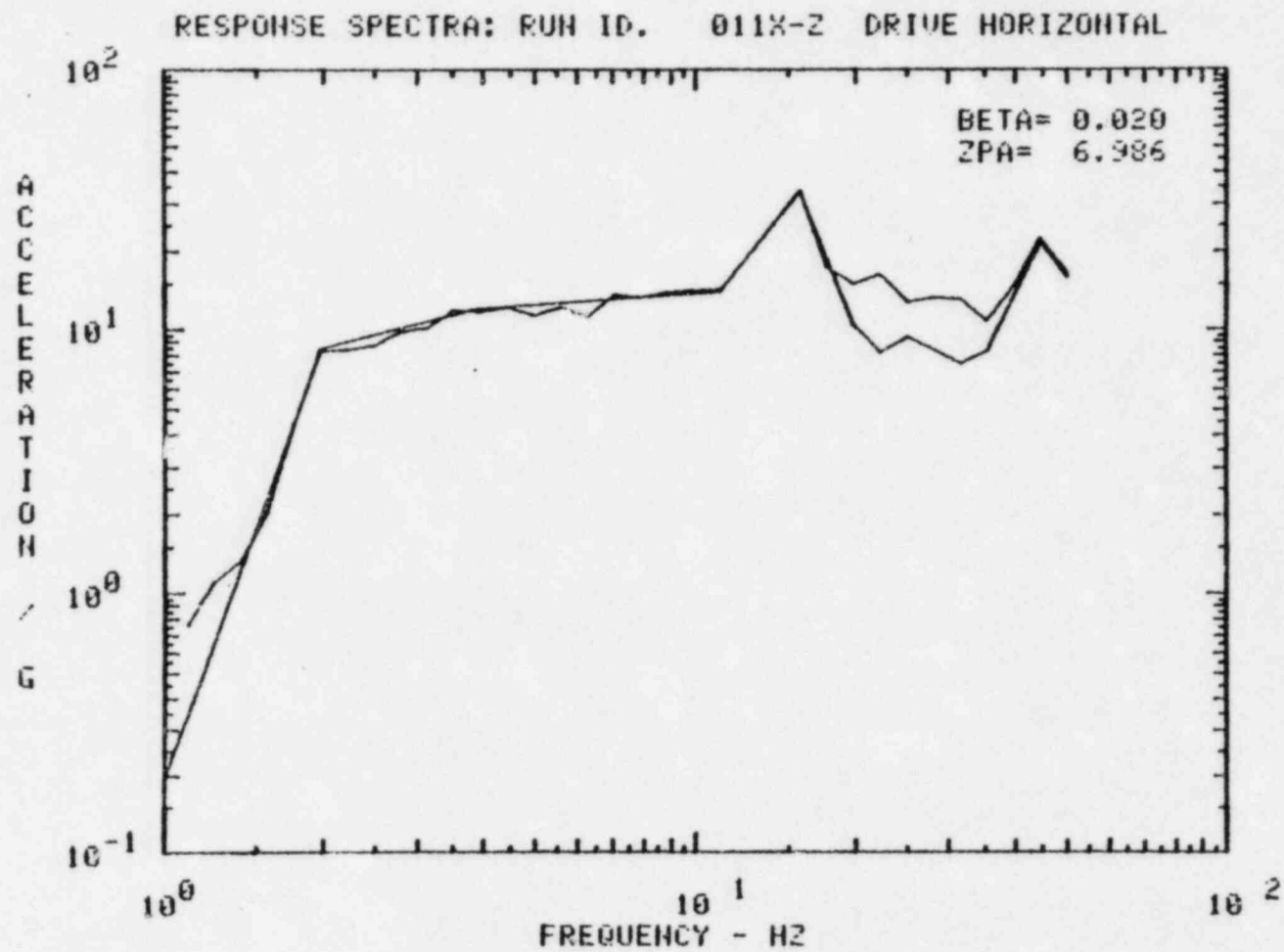


Figure 1. Matching of Response Spectra for Fragility Test of Yarway Level Indicator/Switch

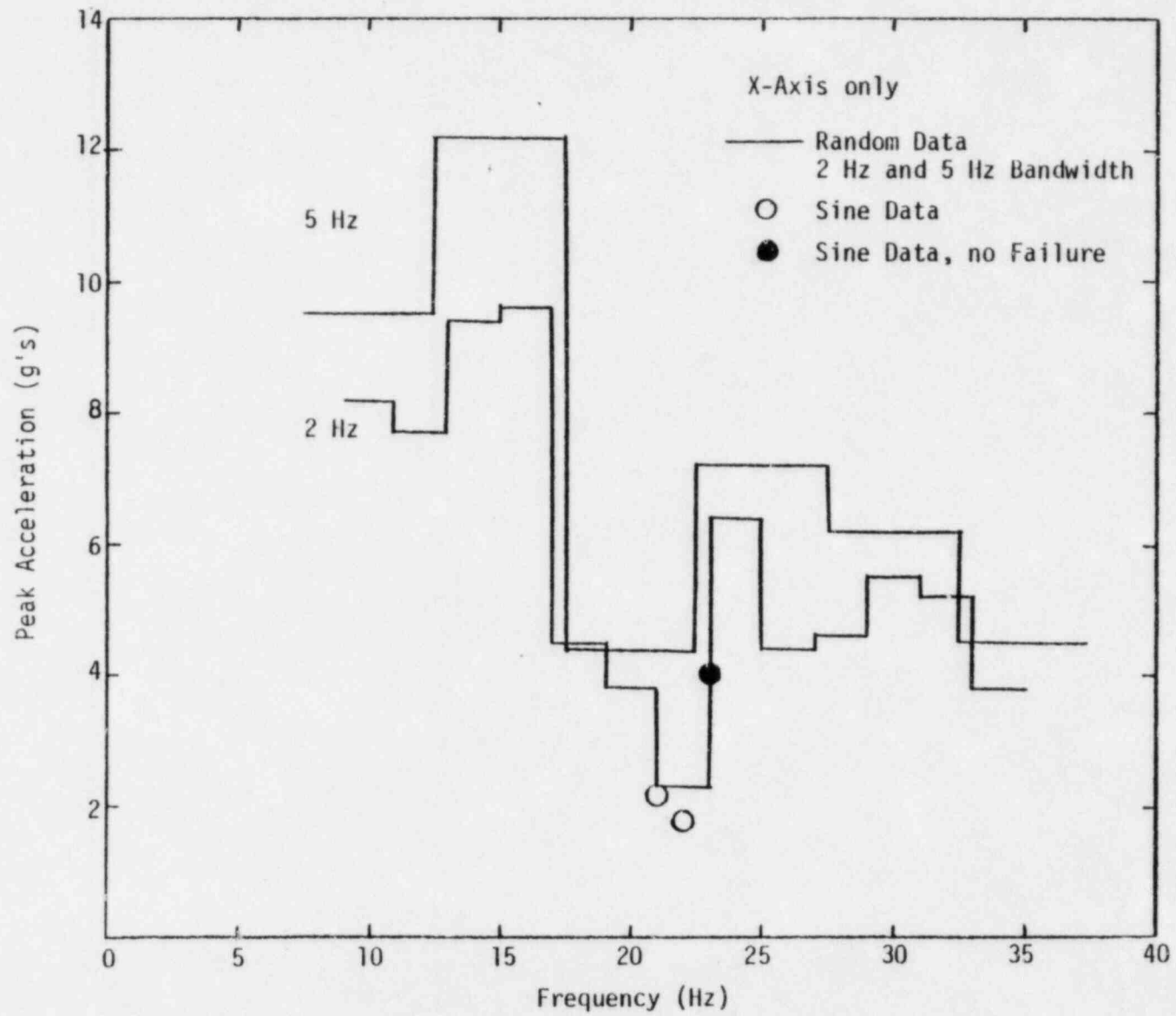


Figure 2. Peak Acceleration Fragility Function for Yarway Level Indicator/Switch

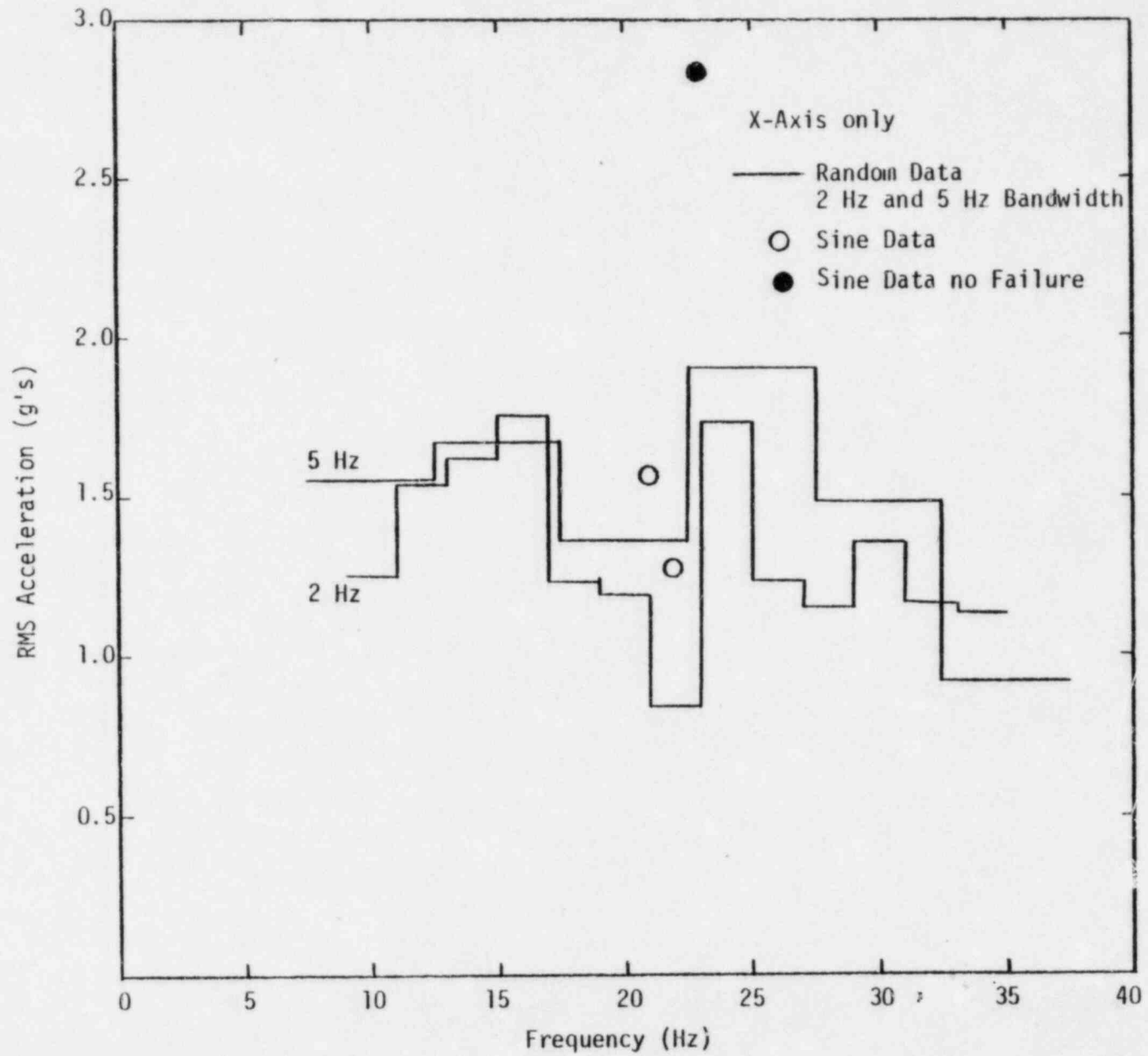


Figure 3. RMS Acceleration Fragility Function for Yarway Level Indicator/Switch