INTERIM REPORT

PRE-SCHOONER II

October 29, 1965

MASTER

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ROLAND F. BEERS, INC.
Alexandria, Virginia

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October 29, 1965

In Reply
Refer to
RFB-07120

Mr. Otto H. Roehlk, Director
Operational Safety Division
Nevada Operations Office
U. S. Atomic Energy Commission
P. O. Box 1676
Las Vegas, Nevada 89101

Attention: Mr. R. A. Johnson

SUBJECT: INTERIM REPORT - PROJECT PRE-SCHOONER II, NVO-1163-63

Dear Mr. Roehlk:

Enclosed are twenty-two (22) copies of Project Pre-Schooner II Interim Report. This report was prepared at the request of Mr. R. A. Johnson and in accordance with the Project Pre-Schooner II Technical Reporting Plan, Appendix C to Memorandum from Mr. James E. Reeves; Subject "Planning Directive (PL-15-6-65) Pre-Schooner II" dated July 7, 1965.

Very truly yours,

ROLAND F. BEERS, INC.

Sherwood B. Smith
Assistant Director
for Operations

SBS:ba

Enclosures

cc: L. R. West

INTERIM REPORT

PRE-SCHOONER II

Introduction

An initial examination has been made of the ground motion recordings made by US Coast & Geodetic Survey for the Pre-Schooner II experiment in the Bruneau River Area, Idaho.

Peak motions have been measured and plotted versus distance for comparison with predictions. Corrections for motions with frequencies in the portion of the spectrum where instrument response varies with frequency have not been made. This correction plus the derivation of acceleration and displacement from the velocity records and the derivation of velocity from the acceleration and displacement records will be accomplished at a later date.

Instrumentation

A total of eight recording stations were operated by USC&GS during the Pre-Schooner II experiment. The stations were located on two lines; one to the east and the other to the north.

The line to the east consisted of six stations, the closest at a distance of 2400 meters, the most distant in Twin Falls at a distance of 94.5 km. Strong-motion accelerographs, recording three components of acceleration and displacement, were used at the two closest stations (station 1E and 2E). The four other stations on this line consisted of NC-21 velocity meters, each station recording three components of particle velocity.

Only two recording stations were used on the north line. The closest station (7N) was located 13 km from ground zero and the distant station was placed in the town of Bruneau, about 57 km to the northwest. At each station, three components of particle velocity were recorded with NC-21 velocity meters.

The locations of all stations are shown on figure 1. USC&GS also placed three-component, long-period Electro-Tech displacement meters at stations 4E and 5E (in addition to the NC-21's).

Results

Good records were obtained at all six of the stations instrumented with the NC-21 velocity meters. At the strong-motion accelerograph stations, all three components of acceleration were recorded. However, at station 1E, only the vertical and transverse components of displacement were recorded and at station 2E, only radial and transverse components were recorded. No readable motions were recorded on the Electro-Tech long-period displacement meters.

Tables 1-3 lists the peak surface motions and slant distances from ground zero for each station. Peak motions are given for each component and for the resultant vector which was determined by analyzing the three components simultaneously in order to determine the absolute value of peak motion. Where only two components were recorded, a resultant vector was still computed as an approximation of the value that would be obtained had all three components been recorded.

The peak resultant vector of particle acceleration plotted versus slant distance is shown on figure 2 along with the pre-shot prediction line. With only two data points, it is not possible to evaluate the rate of attenuation of the acceleration. However, the general level of observed motion agrees very well with the prediction line. The vertical, radial, and transverse components of acceleration were also plotted versus slant distances and are shown on figures 3, 4 and 5 respectively.

The peak resultant vector of displacement is plotted versus slant distance on figure 6. The prediction line is also shown for comparison. As with the acceleration data, only two measurements of displacement are available and no conclusion can be made about the rate of attenuation.

The level of motion is higher than predicted by a factor of about 3 at station 1E and about 1.5 at station 2E. The transverse component of displacement is plotted versus slant distance on figure 7. Graphs for vertical and radial displacement are not included because only one value was obtained for each of these components.

Figure 8 shows the peak resultant vector of particle velocity versus slant distance in comparison with the prediction lines. The closest four velocity stations were located on hardrock, either basalt or the Idavada formation, while the two most distant were located in Bruneau and Twin Falls on the thick alluvium of the Snake River Valley. Hence, two prediction lines are shown; one for the hardrock stations and one for the alluvium. The data measured on hardrock show a rate of attenuation that is greater than predicted. However, a firm conclusion about the rate of attenuation is not justified with only four data points. The level of motion at all four stations was higher than predicted by a factor ranging from about 1.7 to 4. With only two stations on alluvium, no conclusion can be reached concerning the rate of attenuation. The observed motion at Twin Falls (6E) falls exactly on the prediction line, while the motion at Bruneau is approximately $2\frac{1}{2}$ times the predicted value. The vertical, radial, and transverse components of particle velocity are shown versus slant distance on figures 8, 9 and 10 respectively.

Conclusions

Usable data were obtained at all eight stations. These data will be helpful in the future for making predictions for the Schooner event.

The two stations which recorded acceleration provided data which agree quite well with predictions.

The observed displacements and velocities were both higher than predicted.

Additional processing to correct for frequency response characteristics of the instruments and to derive accelerations, displacements, and velocities at each station will provide considerably more information. More meaningful conclusions can be drawn at that time, particularly concerning the significance of these results on the predicting capability for the Schooner event.

Table 1. Peak Surface Particle Acceleration

Station	Slant Distance (meters)	Bearing from GZ	Acceleration (g)			
			Vertical	Radial	Transverse	Resultant Vector
1E	2400	N79°E	0.0108	0.0127	0.00643	0.0133
2E	4720	N79°E	0.00348	0.00597	0.00413	0.00699

Table 2. Peak Surface Particle Displacement

Station	Slant Distance (meters)	Bearing from GZ	Displacement (cm)			
			Vertical	Radial	Transverse	Resultant Vector
1E	2400	N79°E	0.119	-	0.0120	0.120
2E	4720	N79°E	-	0.0171	0.0116	0.0184
4E	18890	N72°E	-	-	-	-
5E	44650	N64°E	-	-	-	-

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Table 3. Peak Surface Particle Velocity

Station	Slant Distance (meters)	Bearing from GZ	Velocity (cm/sec)			
			Vertical	Radial	Transverse	Resultant Vector
3E	10700	N82°E	0.0940	0.0841	0.111	0.124
4E	18890	N72°E	0.0338	0.0220	0.0275	0.0400
5E	44650	N64°E	0.00346	0.00250	0.00202	0.00351
6E*	94500	N77°E	0.000693	0.00167	0.000547	0.00171
7N	13000	N7°E	0.0279	0.0316	0.0359	0.0379
8N*	56800	N19°W	0.00574	0.00638	0.0106	0.0117

*6E in Twin Falls and 8N in Bruneau are both on alluvium, all the other stations on hardrock.

Figure 1 Station Location Map

Figure 2. Resultant Vector of Peak Surface Particle Acceleration versus Slant Distance, Pre-Schooner II, 100 tons HE.

Figure 3. Vertical Component of Peak Surface Particle Acceleration versus Slant Distance, Pre-Schooner II, 100 tons HE.

Figure 4. Radial Component of Peak Surface Particle Acceleration versus Slant Distance, Pre-Schooner II, 100 tons HE.

Figure 5. Transverse Component of Peak Surface Particle Acceleration versus Slant Distance, Pre-Schooner II, 100 tons HE.

Figure 6. Resultant Vector of Peak Surface Particle Displacement versus Slant Distance, Pre-Schooner II, 100 tons HE.

Figure 7. Transverse Component of Peak Surface Particle Displacement versus Slant Distance, Pre-Schooner II, 100 tons HE.

Figure 8. Resultant Vector of Peak Surface Particle Velocity versus Slant Distance, Pre-Schooner II, 100 tons HE.

Figure 9. Vertical Component of Peak Surface Particle Velocity versus Slant Distance, Pre-Schooner II, 100 tons HE.

Figure 10. Radial Component of Peak Surface Particle Velocity versus Slant Distance, Pre-Schooner II, 100 tons HB.

Figure 11. Transverse Component of Peak Surface Particle Velocity versus Slant Distance, Pre-Schooner II, 100 tons HB.