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A PRELIMINARY SEISMICITY STUDY OF THE SOUTHERN NEVADA REGION
FOR THE MONTH OF AUGUST 1972

U. S. DEPARTMENT OF COMMERCE
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
EARTH SCIENCES LABORATORIES

OCTOBER 1972

MASTER

PREPARED FOR THE U. S. ATOMIC ENERGY COMMISSION
NEVADA OPERATIONS OFFICE
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ABSTRACT

A cooperative (ESL, Sandia Laboratories, USGS) network of 21 seismic velocity sensitive stations is operated in the southern Nevada area; the stations are monitored by the NOAA/ESL Nevada Special Projects Party located in Las Vegas, Nevada.

There was no significant earthquake pattern that developed during the month of August 1972. Two seismicity maps are included; one of the southern Nevada region and the second of the seismicity on the Nevada Test Site (NTS).

This is the second in a series of monthly seismic bulletins covering the southern Nevada region, monitored by the Las Vegas, Nevada-based Special Projects Party. The output is listed in the Hypocenter Summary. The listing is the result of data scaled only from the local cooperative network, and solutions determined by a local epicenter program. A total of 70 epicenters is listed.

1. INTRODUCTION

This report contains a summary of earthquakes recorded by a network of 19 seismograph stations in the southern Nevada region, and 2 stations in central Nevada, for the month of August 1972. This is the second in a series of monthly seismicity reports, Bayer (1972), embracing southern Nevada and the border zones of Arizona, California, and Utah

The southern Nevada seismic network station locations are shown in figure 1. All stations are located in Nevada with the exception of Leeds (LEE) in Utah, and Darwin (DAC) in California. This net is operated by the three cooperating agencies listed in table 1. The data from all of the stations are recorded on 16 mm film and magnetic tape by the Nevada Special Projects Party (NSPP) of the National Oceanic and Atmospheric

TABLE I

SEISMIC STATION CONSTANTS

Code	* Station Name	Latitude (North)	Longitude (West)	Elev. (Meters)	Inst. Comp.	Approx. Magnification @ 1 Hz
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NOAA/ESL/NEVADA SEISMOGRAPH STATIONS

BTY	Beatty	36°53.63'	116°45.88'	1008	SPZ	100K
CPX	CP-1 (Control Point #1)	36°55.92'	116°03.33'	1285	SPZ	110K
ETS	Engine Test Stand	36°49.95'	116°18.50'	1158	SPZ	0.1K
LSM	Little Skull Mountain	36°44.32'	116°16.68'	1146	SPZ	220K
LVW	Las Vegas (West)	36°10.20'	115°11.25'	654	SPZ	3.3K
MCV	Mercury	36°38.01'	115°59.99'	1158	SPZ	100K
PRN	Pahroc Range	37°26.50'	115°04.00'	1524	SPZ	105K
SMN	Sleeping Mountain	37°08.60'	116°46.00'	1246	SPZ	25K
TSV	Twin Springs	38°12.10'	116°10.50'	1585	SPZ	105K

SANDIA LABORATORIES STATIONS

BMN	Battle Mountain	40°25.90'	117°13.30'	1524	SPZ	Variable
DAC	Darwin, California	36°16.62'	117°35.62'	1432	SPZ	
ELY	Ely	39°07.88'	114°53.52'	2012	SPZ	
LEE	Leeds, Utah	37°14.58'	113°22.60'	1067	SPZ	
NEL	Nelson	35°42.74'	114°50.61'	1052	SPZ	
TPH	Tonopah	38°04.29'	117°13.21'	1890	SPZ	

U. S. GEOLOGICAL SURVEY, YUCCA FLATS NEVADA STATIONS

NYC	Charley	37°09.30'	116°09.32'	1574	SPZ	1000K (20X Viewer)
NYJ	Joshua Tree	37°00.48'	115°58.48'	1195	SPZ	
NYM	Climax Mine	37°13.88'	116°03.14'	1489	SPZ	
NYR	Receiver Site	37°03.32'	116°05.50'	1188	SPZ	
NYS	Syncline Ridge	37°01.95'	116°10.13'	1402	SPZ	
NYV	Vern	37°06.77'	115°59.40'	1340	SPZ	

* Location in Nevada, unless otherwise specified.

Administration/Earth Sciences Laboratories (NOAA/ESL), Las Vegas, Nevada. The Hypocenter Summary (appendix) is the result of programming only data from the Nevada network to compute earthquake locations.

2. DISCUSSION

The principal objective of the monthly report is to distribute preliminary seismic data acquired from the Southern Nevada Network of Seismograph Stations. A more comprehensive bi-annual seismicity report similar to Bayer (1972), is planned for publication at a later time.

Recorded arrival times and amplitudes are scaled in Las Vegas. Periodically, the properly formatted data are keypunched at the Las Vegas office and run through a local earthquake program described by Bolt, et al (1964), using a three-layer model. In order to obtain a hypocenter solution with the local station program, P-phase arrival times from at least three stations and one S-phase arrival time for a given earthquake must be present. This compilation is preliminary and may be subject to later revision on the basis of current research.

The individual station readings, from which the hypocenter summary has been derived, are available upon request from the ESL Nevada Special Projects Party, 3060 South Highland Drive, Las Vegas, Nevada 89109. The phase times are also sent to the National Earthquake Information Center (NEIC), Boulder, Colorado, on punch cards in the NEIC format. The area monitored by the NSPP (for hypocenter locations), is from 35 to 39 degrees north and 113 to 119 degrees west (see fig. 1). Seismic body wave phases from earthquakes which fall in the regional and teleseismic range are also scaled and mailed to the NEIC.

In the Hypocenter Summary a "D" following the depth indicates it is a fixed depth solution obtained by choosing the 5 kilometer depth interval that optimized the travel time residuals and standard error. An "F" following the depth indicates the computer found a convergent solution in seven or less iterations by permitting the depth to move freely.

3. GENERAL SEISMICITY

Earthquakes recorded in the southern Nevada region during the month of August 1972, were more frequent than in the previous month; particularly in the Twin Springs, Nevada area, and on the Nevada Test Site. A total of 70 earthquakes were located by the NSPP. All earthquakes plotted on the seismicity map (fig. 2) occurred within the earth's crust (≤ 30 km). A preliminary evaluation of magnitudes suggests the great majority of the located events were microearthquakes ($1.0 \leq M \leq 3.0$).

Southern Nevada, Twin Springs Area. Seismic activity continued in the Kawich Range, some 20 km southwest of the Twin Springs seismic station. Additional activity occurred approximately 20 km northeast of the station along the east flank of the Pancake Range.

The north Pahroc Range, northeast of Hiko Junction, had renewed activity. The south Pahroc Range also had several small earthquakes east and southeast of Station PRN (Alamo area).

As indicated on figure 3, the Nevada Test Site and adjacent areas were unusually active during the month. There were 14 earthquakes located on the Test Site and 5

additional immediately adjacent to the Test Site. Of the 19 quakes, two occurred on Pahute Mesa (Area 20) and may have been the result of fault movement. Three small earthquakes occurred in the Belted Range at the north central perimeter of the Test Site. The most significant activities were the 8 earthquakes located from southwest to southeast of Station CPX. Six of the 8 quakes were recorded on the same day (August 23), and in an approximate time frame of 15 hours. These activities may be the result of minor strain release along the north-south trending Yucca Fault and accompanying branch faults near the lower (south) end of the fault system. The remainder of the earthquakes were apparently random events on and adjacent to the NTS.

Three earthquakes were located in the Spring Mountains, southwest of Las Vegas toward the California border.

The remainder of the Nevada region was quiescent, particularly the Hoover Dam-Lake Mead area, with only one located earthquake, approximately 10 km northwest of Hoover Dam.

Southeast California. The Owens Valley area was not particularly active during August. On the lower extremity of Owens Valley (Rose Valley), three earthquakes were recorded in the Sierra Nevada mountains west of Rose Valley. The other zone of interest for the month was in the Cottonwood Mountains, along the west flank of Death Valley, where four earthquakes were located.

Southwest Utah. Seismic activity continued in the Bull Valley Mountain area in the southwest corner of Utah. Four earthquakes were recorded from this area. Additionally, two earthquakes were located west of Parowan Valley.

A crustal model research project is underway in an attempt to obtain an idealized velocity/depth model for the southern Nevada seismic region. Future seismicity reports will reflect the outcome of this study.

There were no announced tests by the Atomic Energy Commission (AEC) in the southern Nevada region during the month of August 1972.

4. ACKNOWLEDGMENTS

The entire staff of the Nevada Special Projects Party participated in the operation and coordination of the NOAA/ESL seismograph network. Without the cooperation of the Sandia Laboratories and the U. S. Geological Survey, a large portion of the data that went into this report would not be available. The authors express grateful acknowledgment to Stanley R. Brockman for the computer processing, and to Thomas W. Bice for data plotting.

The operation of all the seismograph stations and the interpretations of the data from these stations are made possible through the financial support of the Nevada Operations Office of the United States Atomic Energy Commission (NVO/AEC), under Contract AT(29-2)-746.

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APPENDIX
HYPOCENTER SUMMARY

APPENDIX HYPOCENTER SUMMARY

August 1972	Origin Time GMT	Latitude North	Longitude West	Depth* (km)	Geographic Area
01	05 16 59.70	36.94°	117.55°	08.8 F	Dry Mtn.
01	22 40 09.18	36.02	114.81	00.0 D	Hoover Dam
02	00 28 36.32	36.03	115.42	00.0 F	Las Vegas
03	01 08 52.92	37.33	116.22	00.0 F	Silent Canyon
03	07 19 16.59	36.89	116.06	00.0 F	Lathrop Wells
03	09 42 12.93	36.91	117.49	15.5 F	Tin Mtn.
03	11 49 24.44	37.22	118.22	15.0 D	Blanco Mtn.
03	15 34 05.54	36.84	116.26	00.0 F	Lathrop Wells
03	20 52 49.41	37.41	117.84	25.0 D	Magruder Mtn.
04	12 44 43.21	35.26	117.17	10.0 D	Opal Mtn.
04	14 17 24.42	37.43	114.84	10.0 D	Delamar Mts.
04	18 59 52.75	36.89	116.04	00.0 F	Lathrop Wells
04	20 44 25.65	37.73	115.08	00.0 F	Hiko
04	21 50 06.09	36.10	115.37	00.0 D	Las Vegas
04	23 20 07.70	38.79	117.63	15.0 D	Paradise Peak
05	00 05 59.49	35.70	115.99	10.0 D	Clark Mtn.
05	11 15 48.78	37.99	113.16	10.0 D	Cedar City
05	12 37 13.35	36.52	116.08	25.0 D	Lathrop Wells
07	04 21 06.81	38.02	116.23	00.0 F	Warm Springs

APPENDIX
HYPOCENTER SUMMARY
(cont'd)

August 1972	Origin Time GMT	Latitude North	Longitude West	Depth* (km)	Geographic Area
08	06 23 35.46	37.00°	116.28°	00.0 F	Silent Canyon
09	15 39 31.37	37.46	113.70	00.0 D	St. George
09	20 25 52.95	35.86	117.76	20.0 D	Little Lake
11	11 48 32.98	38.01	116.23	00.0 D	Warm Springs
13	05 34 12.62	37.70	115.09	19.6 F	Hiko
13	09 07 51.79	38.62	117.25	15.0 D	Toiyabe Dome
13	14 01 39.30	37.40	114.66	18.0 F	Delamar Mts.
13	16 52 17.43	37.56	114.05	00.0 D	Ely Range
13	20 13 40.58	36.91	116.08	00.0 D	Lathrop Wells
14	07 59 45.76	37.20	117.54	15.0 D	Magruder Mtn.
14	18 01 25.85	37.25	114.97	12.7 F	Delamar Mts.
15	03 36 42.10	37.70	116.01	00.0 D	Quartzite Mtn
15	07 12 51.34	38.77	117.96	20.0 D	Paradise Peak
15	18 28 51.75	37.48	115.29	00.0 F	Alamo
16	02 40 34.23	36.37	116.13	00.0 D	Ash Meadows
16	06 17 56.17	37.25	116.45	00.0 F	Silent Canyon
16	11 13 01.81	38.01	113.45	10.0 D	Milford
16	19 34 24.69	37.52	117.07	05.0 D	Goldfield
19	03 32 30.98	38.26	117.07	25.0 D	Tonopah
19	10 28 07.86	37.02	116.49	25.0 D	Silent Canyon

APPENDIX
HYPOCENTER SUMMARY
(cont'd)

August 1972	Origin Time GMT	Latitude North	Longitude West	Depth*	Geographic Area
19	15 13 49.83	37.26°	114.71°	00.0 F	Delamar Mts.
19	20 12 00.79	35.95	115.53	15.0 D	Clark Mtn.
19	23 01 51.99	36.89	117.88	07.2 F	Dry Mtn.
20	01 20 34.84	36.67	116.20	20.0 D	Lathrop Wells
22	02 14 56.21	38.47	116.05	00.0 F	Warm Springs
22	10 58 07.99	38.19	117.07	25.0 D	Tonopah
22	12 19 44.85	37.28	116.18	20.0 D	Silent Canyon
22	13 50 18.28	37.62	114.04	04.9 F	Ely Range
23	08 06 30.61	36.88	116.00	00.0 F	Mercury
23	08 58 43.35	36.92	116.07	00.0 D	Lathrop Wells
23	10 56 22.18	36.86	115.94	10.0 D	Mercury
23	12 36 52.15	36.88	115.99	00.0 F	Mercury
23	20 59 33.37	36.89	116.01	15.0 D	Lathrop Wells
23	23 20 52.30	36.82	115.90	15.0 D	Mercury
24	02 20 04.40	37.73	114.97	16.9 F	Highland Peak
24	18 20 57.60	36.06	118.25	00.0 D	Kern Peak
24	18 22 35.65	36.05	118.24	00.0 D	Kern Peak
24	18 23 41.16	36.13	118.19	10.0 D	Kern Peak
25	03 28 32.78	37.16	116.10	00.0 F	Silent Canyon

APPENDIX
HYPOCENTER SUMMARY
(cont'd)

August 1972	Origin Time GMT	Latitude North	Longitude West	Depth * (km)	Geographic Area
25	10 04 02.26	36.90°	116.04°	00.0 F	Lathrop Wells
25	23 09 24.01	38.08	116.20	20.0 D	Warm Springs
26	00 02 07.45	37.36	116.21	00.0 F	Silent Canyon
26	04 41 11.55	37.28	116.43	00.0 D	Silent Canyon
27	11 17 10.80	38.20	115.85	25.0 D	Troy Canyon
27	11 31 02.71	38.23	115.94	05.0 D	Troy Canyon
27	17 23 29.66	38.23	115.94	00.0 F	Troy Canyon
28	23 36 04.20	37.26	113.85	10.2 F	St. George
29	04 15 15.47	36.37	116.87	00.0 F	Furnace Creek
29	04 41 22.69	36.66	117.25	15.0 D	Tin Mtn.
31	11 23 30.57	37.49	116.39	00.0 D	Silent Canyon
31	21 36 37.92	36.87	117.42	16.4 F	Tin Mtn.

* D = Fixed Depth Solution
F = Free Depth Solution

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