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QUARTERLY TECHNICAL REPORT 79-D

on

Earthquake Monitoring of the Hanford Region, Eastern Washington

October 1 through December 31, 1979

Geophysics Program

University of Washington

Seattle, Washington

PREPARED FOR THE U.S. DEPARTMENT OF ENERGY
UNDER CONTRACT NO. EY-76-S-06-2225
TASK AGREEMENT NO. 39

and

WASHINGTON PUBLIC POWER SUPPLY SYSTEM
CONTRACT NO. C-10976

February 11, 1980

Operations

There are thirty-nine stations presently operating in the eastern Washington seismic network. This includes the five new stations in the Ellensburg area, those in Goldendale, Rockport, and Newport, and the 32 regular stations which have been in operation over the past several years. The IRG station has not been relocated nor are the southern Cascade stations installed yet. We have been concentrating our efforts on maintaining and improving the quality of the data from the existing stations and developing the online computer recording system.

The online system began operations in an experimental sense on Christmas eve. It has been running from time to time since then. We are still in the developmental stages though we hope to do most of the seismogram picking in the first quarter of 1980 using data from this system. An example of a seismogram produced by this system is shown in figure 1. We have done very little in developing the off line processing for the data produced by the online part. We hope to have a preliminary version of the off line part ready by the end of next quarter. A complete description of the online system will be included in the annual technical report.

Data

One of the most active swarms of the past few years has

occurred this quarter. It began at the end of last quarter and has continued through most of December. It is located just northeast of the town of Royal City on State Route 26 north of the Saddle mountains. There have been 55 located events in this swarm, the largest a magnitude 3.4 earthquake on November 24. This swarm seems to be occurring in the same place as a swarm in 1970. There are at least another hundred earthquakes which record on only three stations well enough to locate. We are planning a temporal and size analysis using all of the events.

There was a magnitude 3.4 event near Selah just north of Yakima on December 10, which was felt in the immediate area. A small swarm occurred just west of Banks Lake in November; the first and largest event in this group was only magnitude 2.6. Only one earthquake occurred in the Cold Creek Valley swarm area. A new and very active blast site has been identified near Ice Harbor Dam.

Other Studies

Work on the crack analysis is proceeding fairly well. Geophysical well logs for DC-8, DC-6 and DC-1 are being digitized for the 3500 to 3700 foot level. A dynamic strength index (DSI) log is being computed from these data. Physical property data from laboratory work on the samples done by the Colorado School of Mines is being used as calibration. Computer routines are being developed to automatically analyze the well logs.

The first phase of the data collection for the broad-band study is complete. We are now about halfway through developing the software for analyzing the dozen or so earthquakes recorded. Additional recording time may be needed after the existing data are studied.

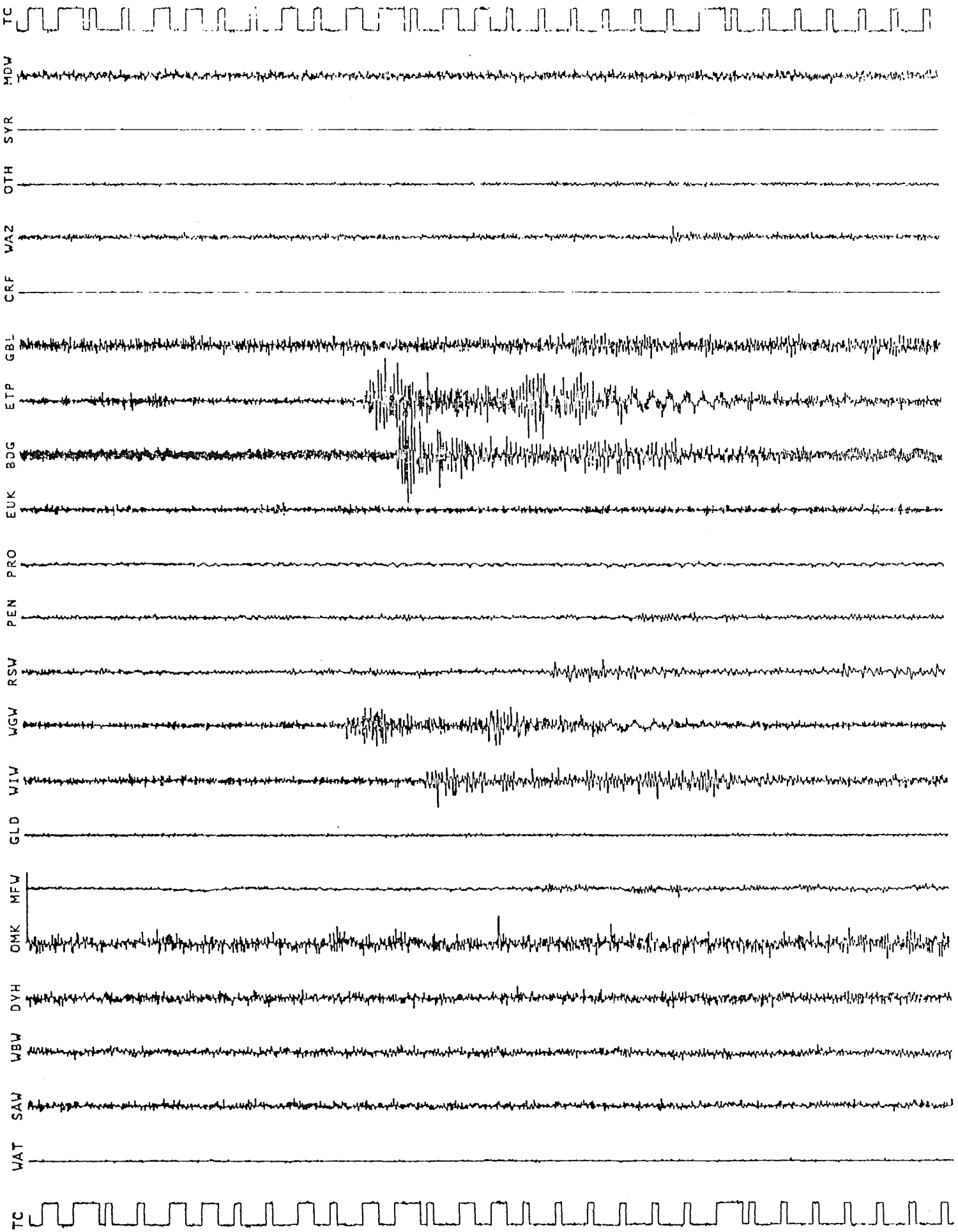
The down-hole equipment is ready and thoroughly tested. We are waiting on availability of DC-3.

LOCATED EVENTS 1979-D

DATE	DAY	TIME	LAT	LONG	DEPTH	MAG	#	Q	TYPE
10/ 6/79	279	134:54.0	46-55.65	119-34.12	3.3	1.9	10	B	
10/ 6/79	279	135:49.7	46-55.87	119-35.99	1.1	2.1	14	C	
10/ 6/79	279	144:38.0	46-55.67	119-33.98	1.5	1.6	10	C	
10/ 6/79	279	156:41.0	46-57.77	119-35.46	4.6	1.3	6	D	
10/ 6/79	279	336:45.5	46-56.12	119-34.60	3.7	1.2	5	C	
10/ 6/79	279	337:37.7	46-56.61	119-32.89	3.2	1.2	7	C	
10/ 6/79	279	22 5:41.2	46-55.17	119-34.01	3.0	1.8	13	B	
10/ 7/79	280	148: 1.8	46-58.44	119-34.61	3.0	1.7	7	D	
10/ 8/79	281	618:30.0	47-41.72	120- 1.32	8.5	1.1	9	B	
10/14/79	287	2121: 9.0	46-48.42	119-23.35	3.0	0.6	6	B	
10/14/79	287	2151:38.9	46-48.29	119-23.17	0.7	0.9	6	B	
10/17/79	290	544:52.2	46-46.56	119-20.38	3.0	1.3	6	C	
10/27/79	300	1745:32.0	46-54.97	119-34.29	1.5	2.0	11	B	
10/28/79	301	427:39.2	46-58.38	119-35.85	3.5	1.5	4	C	
10/29/79	302	1140:53.9	46-55.53	119-34.11	1.3	1.1	6	D	
10/31/79	304	10 7:46.8	46- 4.22	118-48.52	7.4	1.4	8	C	
10/31/79	304	21 2:29.9	46-53.31	119-18.19	2.6	0.7	7	C	
11/ 2/79	306	433: 9.0	46-55.31	119-34.18	0.8	1.7	12	B	
11/ 2/79	306	1217:38.8	46-54.81	119-34.14	2.4	1.9	11	B	
11/ 2/79	306	2317:55.1	46-17.93	118-31.97	3.0	2.5	13	C	P
11/ 3/79	307	1911:59.2	46-54.92	119-34.12	1.5	1.4	6	D	
11/ 3/79	307	2321:21.6	46-54.71	119-34.44	1.8	1.6	8	D	
11/ 4/79	308	1158:40.5	46-29.94	119-37.41	3.2	1.5	10	B	
11/ 8/79	312	050: 6.4	45-38.33	118-56.47	3.0	2.0	7	C	P
11/ 8/79	312	1224:51.9	46-55.26	119-34.91	4.2	1.3	6	C	
11/ 8/79	312	1544:10.5	46-48.84	119-33.76	3.7	1.1	6	C	
11/10/79	314	029:53.3	46-53.52	119-34.27	2.7	1.4	7	D	
11/10/79	314	453:29.8	47-43.18	120- 3.41	0.1	3.1	18	B	
11/10/79	314	1931:15.0	46-54.42	119-34.38	4.0	1.7	6	D	
11/11/79	315	043: 9.5	47-46.11	119-24.66	0.2	2.6	8	C	
11/11/79	315	047:26.3	47-44.98	119-24.68	9.7	1.5	5	D	
11/11/79	315	344:17.8	47-45.84	119-25.74	3.0	1.6	6	C	
11/11/79	315	1938:13.8	47-45.93	119-24.95	3.0	1.7	8	B	
11/11/79	315	1943:36.7	47-46.46	119-24.95	0.4	1.8	7	C	
11/12/79	316	213:46.3	47-42.37	120- 3.62	9.0	1.4	10	B	
11/12/79	316	350:54.8	46-54.84	119-34.56	3.2	1.7	10	C	
11/12/79	316	6 8:33.4	46-55.08	119-34.48	0.9	2.7	13	B	
11/12/79	316	610:41.2	46-54.89	119-34.94	2.9	1.7	9	B	
11/12/79	316	1352:15.2	46-55.02	119-34.89	2.3	1.8	10	C	
11/14/79	318	2218:54.3	48- 7.90	119-12.19	7.4	1.5	5	D	P
11/17/79	321	816:34.8	47-46.00	119-24.60	3.0	2.1	9	B	
11/17/79	321	855:52.4	47-50.18	119-20.35	7.4	1.7	6	C	
11/17/79	321	1447:40.3	46-55.48	119-34.93	3.3	1.6	7	C	
11/17/79	321	2137:37.4	46-53.50	119-34.39	0.8	2.0	7	D	
11/17/79	321	23 5: 5.1	46-55.23	119-34.78	0.3	2.0	9	C	

DATE	DAY	TIME	LAT	LONG	DEPTH	MAG	#	Q	TYPE
11/18/79	322	049:55.5	46-56.41	119-34.90	3.0	1.5	6	C	
11/18/79	322	2 8:45.5	46-53.26	119-34.03	1.1	3.1	15	B	
11/18/79	322	431: 6.8	46-55.77	119-33.71	1.3	1.3	8	D	
11/18/79	322	949:32.2	46-55.33	119-34.74	3.2	1.8	9	B	
11/19/79	323	532:52.9	46-55.01	119-34.52	1.8	1.5	7	D	
11/19/79	323	933:18.0	46-56.81	119-34.32	1.9	1.5	7	D	
11/20/79	324	334:53.1	46-42.27	119-21.27	3.1	1.4	10	C	
11/20/79	324	1031:37.2	46-54.77	119-34.58	3.0	1.2	6	C	
11/21/79	325	2 7: 6.6	46-55.01	119-34.51	1.5	2.8	18	B	
11/21/79	325	947:37.4	46-59.11	119-37.43	0.6	1.7	6	D	
11/22/79	326	1917:12.6	46-55.40	119-34.79	0.9	2.6	15	B	
11/24/79	328	752:26.0	46-56.66	119-36.09	0.1	1.4	6	D	
11/24/79	328	1148:31.5	46-55.85	119-35.28	0.0	2.5	14	B	
11/24/79	328	1151:14.0	46-55.86	119-33.96	0.4	3.4	20	C	
11/24/79	328	1157:26.5	46-55.00	119-35.00	2.9	1.3	6	C	
11/24/79	328	1241:29.6	46-56.02	119-34.84	1.2	1.4	6	D	
11/25/79	329	1231:33.6	46-55.02	119-35.23	3.0	1.8	8	B	
11/29/79	333	1942:37.6	47-52.92	118- 6.98	0.4	1.9	9	D	X
11/30/79	334	137:51.8	47-39.83	120-24.66	1.6	1.6	9	C	
11/30/79	334	145:11.2	47-39.80	120-25.56	0.6	0.5	7	D	
12/ 1/79	335	1547:55.8	46-55.92	119-33.73	1.0	2.6	12	C	
12/ 4/79	338	2131:23.7	47-44.54	120- 3.69	9.3	2.6	10	A	
12/ 5/79	339	2111:41.4	46-35.35	118-58.21	3.0	2.0	9	D	P
12/ 7/79	341	434:46.0	46-54.70	119-34.97	1.0	1.8	7	C	
12/ 8/79	342	345:37.2	47-46.30	119-25.75	1.5	1.3	6	B	
12/10/79	344	540: 7.5	46-39.40	120-34.51	5.1	3.4	16	C	F
12/10/79	344	2325:37.5	45-58.18	118-49.09	0.0	2.1	6	D	P
12/13/79	347	1742: 5.2	46-53.93	119-33.93	2.4	1.6	5	D	
12/16/79	350	15 9:12.8	47-38.42	120-12.34	5.9	0.9	6	B	
12/16/79	350	2016:13.4	47-40.81	120-19.50	2.7	1.9	9	C	
12/17/79	351	1243:47.5	46-47.90	119-25.09	1.5	0.8	8	C	
12/17/79	351	1450:34.3	46-55.95	119-33.16	1.6	1.3	8	D	
12/17/79	351	2346:36.3	46-35.18	118-56.32	3.0	1.5	8	C	
12/17/79	351	2356:54.6	46-35.87	118-57.58	3.0	2.0	12	C	
12/18/79	352	1728:38.2	48-17.55	119-32.89	0.5	1.6	7	C	
12/21/79	355	1730: 3.9	46-35.94	118-57.67	3.0	1.9	11	C	
12/22/79	356	21 2:52.8	46-55.03	119-35.56	2.7	1.7	8	C	
12/22/79	356	21 4:34.2	46-55.56	119-36.31	0.4	1.8	9	B	
12/22/79	356	2220:31.9	46-55.62	119-35.47	2.0	1.3	6	D	
12/22/79	356	2310: 2.5	47-45.75	119-24.63	3.0	1.5	6	B	
12/23/79	357	23 0:11.6	45-38.56	118-57.40	1.8	2.1	6	C	X
12/25/79	359	637:37.4	46-55.50	119-36.29	0.8	2.0	11	B	
12/25/79	359	641:49.0	46-55.05	119-36.45	1.5	1.8	7	C	
12/25/79	359	1030: 9.3	47-39.63	120-19.09	3.5	0.6	6	C	
12/25/79	359	1247:58.6	46-55.12	119-36.42	0.1	1.6	8	C	

DATE	DAY	TIME	LAT	LONG	DEPTH	MAG	#	Q	TYPE
12/26/79	360	045:40.2	46-57.03	119-37.88	1.5	1.8	5	D	
12/26/79	360	046:17.6	46-55.44	119-36.36	2.0	1.7	8	B	
12/26/79	360	536:37.4	46-55.76	119-35.74	3.0	1.6	9	C	
12/26/79	360	1314:21.3	46-55.51	119-35.79	3.0	1.7	8	C	
12/26/79	360	1322:38.4	46-55.29	119-35.92	2.1	1.5	7	C	
12/27/79	361	139:28.5	46-42.51	119-21.04	0.8	1.5	8	C	
12/28/79	362	1730:19.3	46-15.15	118-53.57	1.5	1.3	6	C	X
12/28/79	362	2022:38.2	48-17.98	119-32.81	0.6	1.3	8	B	
12/28/79	362	2047:53.5	46-15.22	118-53.96	0.3	1.3	7	D	X
12/28/79	362	2328:26.2	46-15.11	118-55.04	3.0	1.5	9	C	X
12/29/79	363	19 7: 3.3	46-14.49	118-55.70	4.5	1.4	6	C	X
12/29/79	363	2115: 5.7	46-14.70	118-54.74	1.7	1.5	9	C	X
12/29/79	363	2345:27.3	46-15.38	118-54.17	0.6	1.4	7	C	X
12/31/79	365	7 0:44.3	47-51.68	119-59.91	3.0	1.3	8	B	
12/31/79	365	727:48.8	47-51.86	119-59.73	3.8	2.6	13	B	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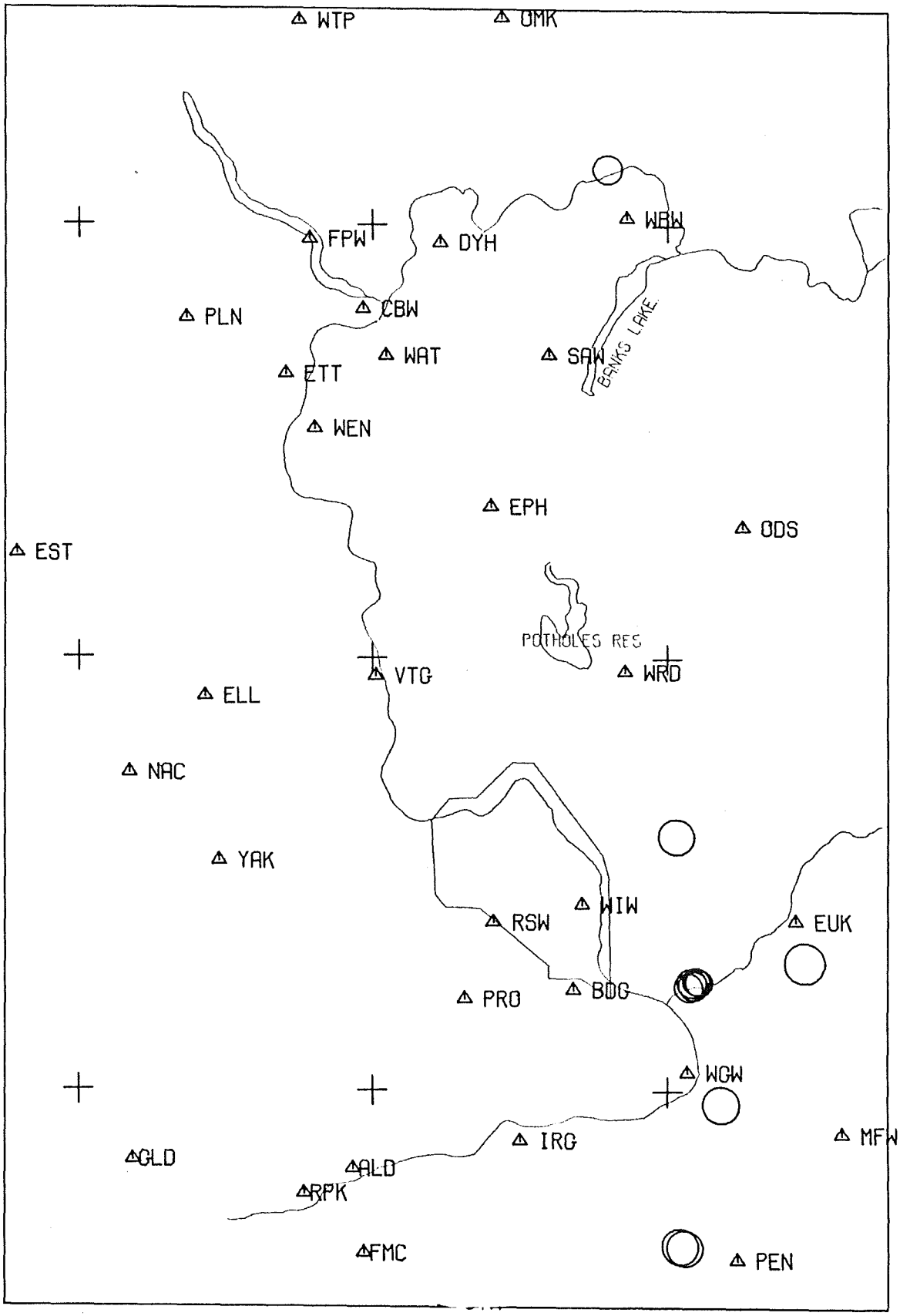
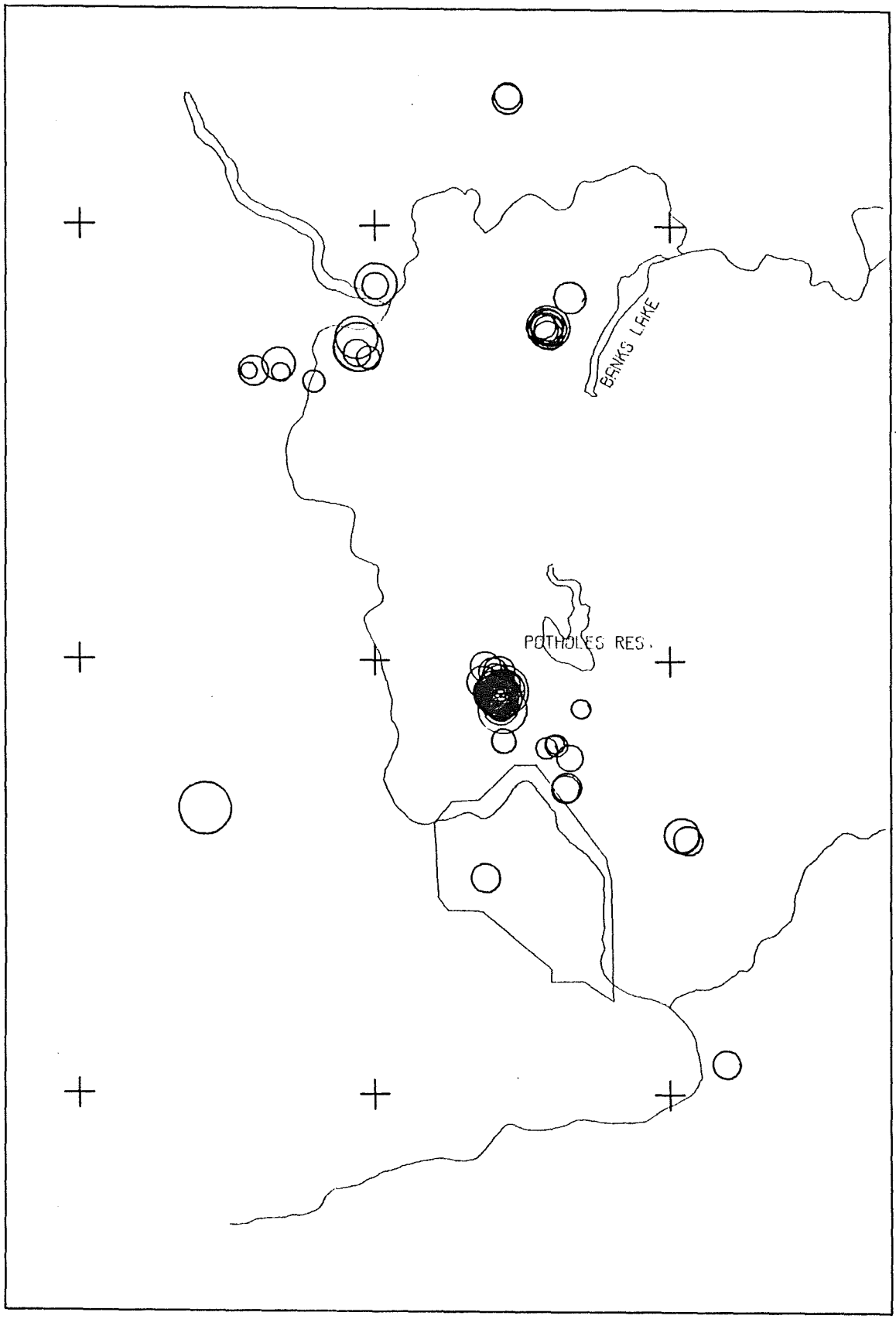


EASTERN WASHINGTON BLASTS AND STATIONS 1979
CENTER OF MAP IS 47.00 N 119.75 W

MAGNITUDE KEY o 0.0 ○ 1.3 ○ 2.7 ○ 4.0



EASTERN WASHINGTON EARTHQUAKES OCT. - DEC., 1979
CENTER OF MAP IS 47.00 N 119.75 W

MAGNITUDE KEY o 0.0 ○ 1.3 ○ 2.7 ○ 4.0