

QUARTERLY TECHNICAL REPORT 82-C

on

Earthquake Monitoring of Eastern Washington and Northern Oregon

July 1 through September 30, 1982

Geophysics Program

University of Washington

Seattle, Washington

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and

THE U.S. NUCLEAR REGULATORY AGENCY  
UNDER CONTRACT NO. NRC-04-81-177

## Operations

There were a number of changes made in the operation of the Eastern Washington - Northern Oregon network during the reporting period. One station, EUK, was discontinued. It has been a noisy site and contributed little useful data. Two new sites were added in east-central Oregon, JBO and SBO. In western Oregon, a new station was installed at KMO. These three new stations have improved station distribution for purposes of local and regional monitoring.

There have been several changes in the USGS Northern Oregon network and several of the stations will be closed. The remainder are to be integrated with the University of Washington seismic network and will be recorded only at the University. Planning is not complete at this time, so a map of the revised configuration is not presented here.

Most eastern Washington stations continued operation with little down time during the report period.

## Data

There were 171 events processed by the network in the Eastern Washington - Northern Oregon region. Of these 61 were known or suspected blasts and 110 were earthquakes. Only 2 of these were hand picked from film records because they were missed by the on-line computer system. This activity is about normal as compared to the previous reporting periods. In southwestern Washington, a large number of blasts have occurred in the last quarter, so some blasts may still contaminate the earthquake catalog. earthquakes may be blasts. Table I is the event catalog for this quarter and figures 1-4 show the epicenters for earthquakes separate from blasts in the two areas of interest.

There were three felt events in the report area during this quarter. A magnitude 2.3 earthquake was felt near Quincy in eastern Washington. On 18 August, a

magnitude 3.4 earthquake occurred northeast of Mt. Hood and was felt at Timberline Lodge. The third felt event ( $M=3.4$ ) occurred on the east flank of the Cascades and was felt by a few people in American River. In the central Pasco Basin, two small swarms of activity are evident. One of these occurred northeast of the Saddle Mountains and the other at Berg Ranch. The Berg Ranch area has experienced many swarms in the past. There was only a half a dozen earthquakes in each swarm with a maximum magnitude of 2.6. Twenty-four earthquakes were located in Northern Oregon; this level of activity is similar to that seen in the previous quarter.

#### **Downhole Seismometer Program**

Parts were ordered for the downhole seismometer. Design of downhole amplifier system was completed. Surface signal isolation amplifier package was also designed and parts ordered. Final phase of analysis of the cross-hole seismic data was completed, and the velocity model for the Plateau finalized (figures in annual report). Modeling of the ground response to waves impinging upon the Plateau (with our new velocity model) is now being performed.

## CATALOG

July 1982

DAY	TIME	SEC	LAT	LON	DEPTH	MAG	NS/NP	RMS	Q	MODEL	TYPE
1	3:40	13.72	47 43.52	120 18.45	4.65	1.1	6/09	0.14	AD	N1	
1	16:54	25.73	45 44.02	123 33.92	29.38#	1.5	17/17	0.17	BC	P1	
2	14:56	48.46	46 15.95	122 20.11	1.60	0.8	6/07	0.05	AC	S1	
2	21:50	14.85	46 16.51	122 19.38	1.82	0.7	13/16	0.22	BA	S1	P
3	4:41	61.13	47 45.10	120 2.79	5.11*	1.2	7/08	0.10	AB	N1	
3	21:23	65.82	46 13.93	122 18.19	0.45	1.1	16/17	0.12	AB	S1	
4	10:57	12.94	46 45.35	119 50.73	8.17	2.1	30/31	0.27	BC	E1	
6	12:56	33.47	46 53.31	120 46.36	12.58	2.1	26/27	0.23	BB	C1	
7	11:15	33.93	46 19.06	122 25.29	12.98	1.1	5/06	0.07	BD	S1	
7	20:33	43.88	45 26.23	121 35.21	1.57	2.2	17/17	0.30	BB	C1	P
7	20:59	65.23	46 16.53	122 21.09	0.04*	1.2	16/18	0.13	AA	C1	P
7	21:29	49.03	46 16.06	122 19.96	1.86	0.5	9/12	0.11	AB	S1	P
10	15:26	15.52	46 16.61	119 41.95	6.82	1.2	12/16	0.19	AB	E1	
10	16:37	22.22	46 15.13	122 20.14	1.62	0.9	14/17	0.13	AB	S1	P
10	17:50	61.95	45 26.83	121 34.43	0.10*	1.7	11/12	0.29	CB	C1	P
10	18: 7	34.95	46 14.21	122 19.95	1.94	0.7	13/15	0.11	AB	S1	
10	18:15	72.30	45 28.05	121 32.85	0.09*	1.5	6/07	0.53	DC	C1	P
10	19:21	69.00	46 16.19	119 41.58	7.32	1.0	10/12	0.27	BC	E1	
10	19:34	32.52	46 16.43	119 42.01	6.59#	1.1	9/12	0.22	BB	E1	
10	20:14	66.84	46 16.43	119 41.00	6.31	1.5	11/14	0.18	AB	E1	
11	9:56	64.27	46 49.26	119 25.12	2.00	2.3	22/23	0.25	AA	E1	
11	19:23	34.33	46 31.73	121 24.54	3.98	1.4	18/18	0.14	AC	C1	
13	8:42	44.97	48 20.49	121 21.96	5.01	1.5	6/06	0.27	CC	P1	
13	22:54	23.25	46 19.92	121 59.67	2.07	1.1	18/19	0.22	AA	S1	P
14	18:56	67.05	45 25.87	121 33.85	5.50	1.7	7/07	0.24	BC	C1	
14	22:46	49.69	46 4.09	122 27.39	0.23	0.7	11/12	0.14	AC	S1	P
15	3: 2	7.60	47 14.76	119 57.62	0.08*	2.3	22/23	0.29	BC	N1	F
16	5:47	68.09	47 40.36	120 11.06	0.03*	1.4	8/09	0.35	BB	N1	
18	2:33	64.81	46 48.77	119 19.54	0.54	1.2	11/13	0.24	AC	E1	
18	14: 5	31.01	46 31.85	121 24.89	6.94*	2.9	44/46	0.20	BC	C1	
19	23:34	23.21	46 14.26	122 20.23	2.29	0.5	8/08	0.10	AB	S1	
20	17:10	42.65	46 7.04	120 27.86	12.88	2.6	32/32	0.25	BC	C1	
20	17:17	48.04	46 6.93	120 27.74	5.44	1.6	17/17	0.22	AC	C1	
21	20:50	12.55	48 11.21	121 22.70	10.50	1.3	4/05	0.28	CD	P1	H
21	23:58	58.18	46 12.15	121 59.91	0.41	0.7	13/15	0.25	BC	S1	
22	23:16	49.91	46 14.56	122 18.06	2.08	0.6	9/11	0.09	AB	S1	
23	18:50	30.88	46 14.10	122 18.21	1.73	0.9	9/10	0.12	AB	S1	
23	19:20	49.17	46 20.51	121 55.08	6.71	0.	5/06	0.17	BD	S1	
23	22:32	66.51	46 14.33	122 18.07	1.24	0.7	14/16	0.14	AB	S1	
25	13:59	2.81	45 9.74	120 50.37	16.58	1.1	5/08	0.17	BD	C1	
25	15:44	26.87	45 10.01	120 50.16	16.27	1.3	7/09	0.17	AB	C1	
27	0:51	43.02	45 9.08	120 49.26	21.05*	1.4	11/12	0.27	BA	C1	
27	10:21	7.06	45 10.54	120 51.35	15.65*	1.5	11/13	0.21	BB	C1	
27	19: 7	36.01	45 26.36	121 37.81	1.60	1.7	17/17	0.30	BA	C1	
27	19:20	19.02	46 19.94	121 59.28	2.02	1.8	17/19	0.18	AB	S1	P
27	19:53	50.14	46 15.98	122 19.27	1.48	0.5	8/09	0.11	AB	S1	P

## July 1982

DAY	TIME	SEC	LAT	LON	DEPTH	MAG	NS/NP	RMS	Q	MODEL	TYPE
28	15:57	24.73	46 15.12	122 29.43	16.83	1.1	15/23	0.15	AB	S1	
28	23:11	48.37	46 6.73	121 57.94	1.95	2.4	25/25	0.19	AB	S1	P
29	8:5	36.48	46 22.50	122 25.91	20.33	1.4	6/06	0.02	AD	S1	
29	19:0	55.70	46 28.06	122 19.67	1.95	1.1	7/09	0.34	CD	S1	
29	22:0	63.59	45 27.44	121 33.82	0.74	0.8	5/05	0.11	BD	C1	P
30	6:56	48.17	46 57.58	118 50.62	0.08*	1.6	14/14	0.28	CC	E1	
30	7:52	48.56	46 7.25	122 34.98	9.56	0.8	14/17	0.12	AB	S1	
30	20:30	28.99	46 18.80	122 18.77	0.05*	0.1	5/06	0.05	BD	S1	P
31	15:40	23.02	46 30.49	121 24.34	3.17*	0.9	15/15	0.13	AC	C1	

## Aug 1982

DAY	TIME	SEC	LAT	LON	DEPTH	MAG	NS/NP	RMS	Q	MODEL	TYPE
1	18:34	13.87	46 16.02	122 19.55	1.24*	0.2	8/09	0.14	AB	S1	P
3	22:17	17.72	45 41.71	121 31.65	7.58	1.3	10/10	0.20	BB	C1	
4	22:48	30.18	46 15.43	122 18.95	0.93	0.6	7/08	0.17	BB	S1	X
4	23:10	46.43	46 14.56	122 18.71	1.74	0.5	13/15	0.11	AB	S1	X
5	23:18	25.59	46 15.27	122 18.84	1.75	0.5	8/10	0.15	AB	S1	X
6	1:41	40.62	47 38.68	120 23.14	5.07	1.5	12/15	0.29	AB	N1	
6	14:44	16.18	46 14.77	122 22.11	0.08*	0.8	7/08	0.34	CC	S1	P
6	15:27	34.79	46 13.85	122 19.51	0.79	0.9	10/11	0.06	AB	S1	
6	19:49	65.28	46 15.30	122 21.42	0.07*	0.6	5/06	0.22	CD	S1	P
6	22:46	19.67	45 21.99	121 41.74	1.63	1.7	18/18	0.23	BA	C1	
7	22:44	47.06	46 15.95	122 19.17	1.87	0.5	7/08	0.10	AB	S1	P
9	0:38	70.60	46 21.63	122 29.61	8.05	0.7	8/08	0.24	BD	S1	
9	4:12	57.73	45 22.31	121 41.31	0.07*	0.8	7/08	0.15	BB	C1	
9	19:37	18.89	46 16.63	122 18.20	1.93	0.3	7/08	0.11	AC	S1	P
9	20:41	59.59	45 37.90	123 23.34	4.12	1.9	24/24	0.17	AC	P1	
10	0:31	32.58	46 20.58	121 53.48	1.89#	1.1	17/19	0.14	AC	S1	P
10	10:19	55.19	47 39.25	120 16.39	5.01	1.3	10/13	0.26	BB	N1	
10	16:41	29.59	46 8.78	122 19.46	9.64\$	0.7	8/10	0.25	BC	S1	
10	21:58	26.12	45 54.14	119 17.09	0.08*	1.6	10/10	0.24	CC	E1	P
10	22:54	60.09	45 26.08	121 37.60	3.33	2.5	23/23	0.28	BB	C1	P
11	12:40	36.80	44 57.17	122 34.18	14.30	1.1	7/07	0.12	CD	C1	
11	19:51	53.11	47 37.97	120 11.07	5.40	1.0	5/08	0.04	AD	N1	
11	22:48	32.37	45 50.57	121 46.98	0.05*	1.4	9/09	0.25	CC	C1	P
11	23:25	21.03	46 8.78	122 49.28	5.53	2.4	24/24	0.17	AB	P1	P
12	13:58	20.43	46 52.27	121 4.35	0.07*	2.0	13/14	0.15	BC	C1	
12	22:27	67.02	46 6.59	121 57.07	0.13	1.6	23/25	0.17	AB	S1	P
13	20:56	60.00	46 19.94	121 59.53	2.46	1.8	22/24	0.19	AB	S1	P
14	18:58	49.32	46 11.04	122 18.35	17.90	0.5	7/07	0.32	DD	S1	
14	20:33	44.27	46 16.39	122 20.73	0.99	1.8	21/24	0.20	AA	S1	P
15	1:58	20.95	47 39.88	120 7.25	0.05*	1.1	13/16	0.32	BC	N1	
15	7:22	37.27	46 5.87	122 31.29	16.54	1.2	17/20	0.13	AA	S1	
16	6:52	31.76	46 52.55	119 23.18	17.06	1.1	10/13	0.22	BC	E1	
16	23:13	58.49	45 25.20	121 26.28	5.17	2.6	19/19	0.26	BC	C1	P
17	14:21	31.63	45 54.02	119 16.53	0.04*	1.7	17/17	0.23	CC	E1	P
17	14:40	56.97	45 22.33	121 41.71	2.84	1.8	12/15	0.26	BB	C1	
17	17:38	35.38	45 27.85	121 40.82	0.07#	1.4	6/06	0.22	DC	C1	P
18	3:8	12.83	46 49.28	119 18.76	0.72	0.7	7/10	0.12	AC	E1	
18	9:54	70.36	46 25.84	122 23.63	11.26	1.9	17/23	0.14	AA	S1	
18	11:50	38.02	45 22.07	121 41.42	5.06*	3.4	29/30	0.26	BA	C1	F

Aug 1982											
DAY	TIME	SEC	LAT	LON	DEPTH	MAG	NS/NP	RMS	Q	MODEL	TYPE
18	21:32	42.91	46 8.62	122 28.14	0.04*	0.8	18/20	0.17	AB	S1	
19	1: 6	53.13	46 21.25	122 34.02	4.74	1.1	10/10	0.16	BC	S1	
19	17:58	4.01	45 25.49	119 59.81	1.05\$	2.0	19/20	0.50	CD	E1	
20	17:39	69.53	46 19.83	121 59.41	2.24	1.7	22/24	0.16	AA	S1	X
23	10:33	59.94	46 32.40	121 26.01	9.15	0.8	9/10	0.23	BB	C1	
24	0:24	8.41	45 6.13	121 51.48	0.10*	2.0	9/09	0.08	CC	C1	P
24	23: 3	29.84	47 21.21	120 21.69	10.09	1.3	7/09	0.23	BC	N1	
25	9:27	11.28	45 5.98	122 42.45	18.92	1.6	15/17	0.32	BD	C1	
25	11:11	15.32	46 7.22	122 41.23	12.82	1.0	19/24	0.13	AC	P1	
25	16:35	42.41	46 13.86	121 42.72	3.49	1.3	21/21	0.13	AC	C1	
25	17:59	45.48	46 13.80	122 19.61	1.34*	0.6	12/13	0.10	AB	S1	X
26	22:46	36.58	46 15.26	122 18.71	0.06*	0.5	9/13	0.16	AB	S1	X
28	13:31	31.56	46 31.96	121 24.44	4.48	1.1	7/07	0.16	BC	C1	
29	0:58	42.88	46 31.92	121 24.45	1.41	2.4	41/41	0.21	BC	C1	
29	15:37	59.85	46 31.89	121 25.04	4.37	1.4	7/07	0.09	AC	C1	
29	21:20	56.70	46 47.66	121 2.18	5.86	1.8	14/16	0.22	BC	C1	
29	22:26	2.73	47 53.75	120 54.67	10.32	1.7	4/07	0.14	AD	P1	H
30	0:42	31.26	46 32.25	121 24.44	5.84	1.7	12/13	0.21	BC	C1	
30	2: 5	36.86	46 4.08	120 30.23	4.92	2.6	27/28	0.23	AC	C1	
30	6:17	41.01	48 15.91	121 16.83	0.06*	2.2	19/19	0.42	CC	P1	
31	6:49	51.62	47 30.55	121 19.64	1.66	1.3	12/13	0.29	BC	P1	
31	8:33	54.83	46 31.27	121 24.22	3.77	1.4	14/15	0.19	BC	C1	
31	16:25	41.74	46 13.94	122 20.66	0.35	0.9	12/13	0.14	AA	S1	P
31	18:23	71.21	46 8.04	122 27.99	0.06*	1.2	18/21	0.21	BB	S1	P
31	22:35	43.27	46 19.94	121 59.89	0.40	1.6	23/27	0.22	BC	S1	P
31	23:12	24.45	45 12.30	121 35.82	6.16	1.5	8/09	0.19	BC	C1	P

Sept 1982											
DAY	TIME	SEC	LAT	LON	DEPTH	MAG	NS/NP	RMS	Q	MODEL	TYPE
1	22:37	68.02	46 14.15	122 20.43	1.18	1.0	16/18	0.12	AB	S1	X
3	0:24	39.97	46 6.41	121 57.91	2.11	2.1	19/19	0.16	AB	S1	P
3	16:30	32.39	46 31.81	121 24.63	3.54*	1.4	13/14	0.19	BC	C1	
4	1:20	56.59	46 33.13	121 25.76	8.07*	0.3	7/07	0.08	BB	C1	
4	1:21	3.41	46 31.23	121 24.83	3.85*	1.1	9/10	0.13	BC	C1	
5	10:39	68.17	46 22.16	121 53.28	10.69	0.9	13/18	0.09	AC	C1	
5	17:12	68.19	46 35.58	119 41.00	0.10*	0.9	9/12	0.35	BB	E1	
6	3:52	59.73	46 33.40	121 24.88	0.49	2.2	28/29	0.18	AC	C1	
6	5: 4	42.53	46 33.88	121 25.27	6.99	1.3	7/07	0.07	AC	C1	
7	19: 1	20.93	46 20.93	122 33.99	0.05*	1.1	10/12	0.22	BC	S1	P
8	16: 3	53.96	47 46.09	120 17.15	0.52	-0.3	4/06	0.08	BD	N1	
8	22:40	19.80	46 15.34	122 19.13	1.24	0.7	8/10	0.06	AB	S1	P
10	0:44	26.02	46 49.70	119 24.89	1.64	2.6	29/30	0.40	BA	E1	
11	4:14	56.21	46 1.78	122 43.39	15.09	1.2	15/19	0.15	AB	P1	
11	10:51	65.05	48 12.31	120 26.30	0.03*	1.6	20/21	0.59	BC	N1	
11	21:10	11.63	48 12.01	120 26.89	0.08*	1.3	10/10	0.25	CC	N1	
13	14: 1	15.05	46 33.65	119 42.53	18.28	0.9	7/10	0.11	AC	E1	
14	16: 5	29.84	46 11.89	122 20.12	1.26	0.6	13/13	0.13	AB	S1	P
15	10:21	39.53	46 38.98	119 8.04	0.07*	1.3	12/16	0.13	AC	E1	
15	10:22	10.94	46 39.33	119 6.86	0.05*	2.4	24/27	0.26	AC	E1	
15	10:23	13.98	46 38.74	119 8.84	0.05*	0.9	10/12	0.15	BC	E1	
15	10:23	44.24	46 39.26	119 6.76	0.04*	1.0	9/12	0.20	BC	E1	

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DAY	TIME	SEC	LAT	LON	DEPTH	MAG	NS/NP	RMS	Q	MODEL	TYPE
15	19: 8	17.13	46 21.53	122 32.56	0.07*	1.5	9/09	0.16	BB	S1	X
15	21:19	68.97	46 11.86	122 20.02	1.09	0.3	9/09	0.10	AB	S1	X
16	21:38	26.11	46 39.20	119 7.92	0.07*	1.2	12/14	0.12	AC	E1	
16	22:16	44.11	45 12.88	121 49.45	6.73	1.9	9/09	0.24	BC	C1	P
18	3:28	59.57	45 10.96	123 20.19	24.75	2.3	21/23	0.26	AB	P1	
19	4: 7	28.19	45 10.17	120 51.58	10.58\$	1.6	6/06	0.11	CC	C1	
19	4:12	49.98	45 11.01	120 52.26	8.00	2.1	8/10	0.12	BC	C1	
19	21: 4	14.36	47 40.20	120 2.54	8.64	1.1	6/07	0.13	BC	N1	
20	22:18	39.33	46 11.70	121 59.84	0.25*	2.3	20/22	0.16	AB	S1	P
20	23: 4	14.81	46 6.50	121 57.67	1.75	1.7	14/14	0.16	BB	S1	P
20	23:21	54.95	46 13.79	122 20.44	1.09*	0.9	12/13	0.10	AB	S1	X
21	19: 4	48.23	46 21.15	122 33.48	0.09*	1.2	11/12	0.25	CC	S1	X
22	9:19	60.30	46 39.24	119 6.72	0.05*	1.4	14/17	0.19	AC	E1	
22	13:41	43.68	47 44.38	120 14.38	0.60	1.1	7/11	0.09	AC	N1	
22	22: 5	19.58	45 29.10	121 35.21	1.13	1.8	7/07	0.23	BC	C1	
22	22:45	74.15	46 13.94	122 20.47	0.06*	0.4	13/18	0.16	AA	S1	
22	23:54	16.70	46 16.20	122 19.47	0.21	1.0	9/13	0.08	AB	S1	X
23	9:33	10.95	45 11.33	120 52.47	7.03	1.5	8/10	0.20	BC	C1	
23	23:46	33.09	46 15.68	122 19.76	1.42	0.5	11/11	0.17	AC	S1	P
24	3:39	55.98	44 51.99	122 31.52	14.68	1.1	6/08	0.12	AC	C1	
24	19:11	31.41	46 44.04	121 3.14	1.47	1.4	12/12	0.15	AC	C1	P
24	20:16	65.43	45 12.84	121 32.28	7.76	2.1	8/09	0.17	AB	C1	P
24	20:54	30.06	46 11.93	122 21.63	0.06*	0.3	12/13	0.27	BB	S1	P
25	0:18	63.93	46 19.89	121 59.56	0.09*	1.6	23/25	0.24	BC	S1	P
26	10: 9	23.89	46 52.38	121 4.36	4.29	3.4	53/56	0.20	AC	C1	F
26	10:13	66.25	46 52.06	121 4.49	4.97	1.3	9/10	0.09	AC	C1	
26	10:14	43.45	46 52.19	121 4.63	3.04	1.6	14/17	0.11	AC	C1	
27	21:18	23.25	45 18.86	121 38.12	35.02	2.1	7/07	0.26	BB	C1	P
29	10:42	11.70	45 10.55	120 51.59	10.00	1.4	8/09	0.10	BC	C1	

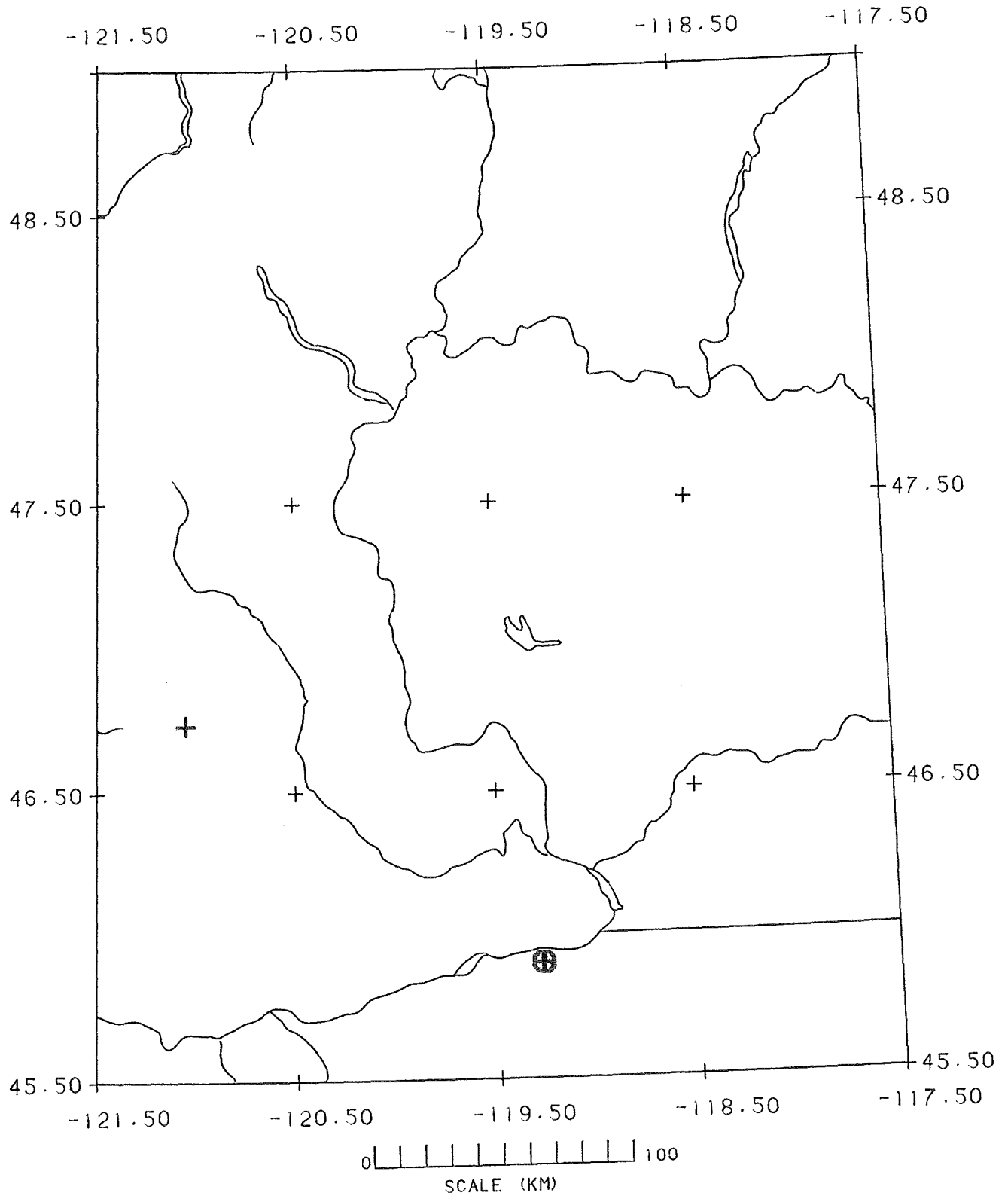


Figure 1. Eastern Washington known and probable explosions.







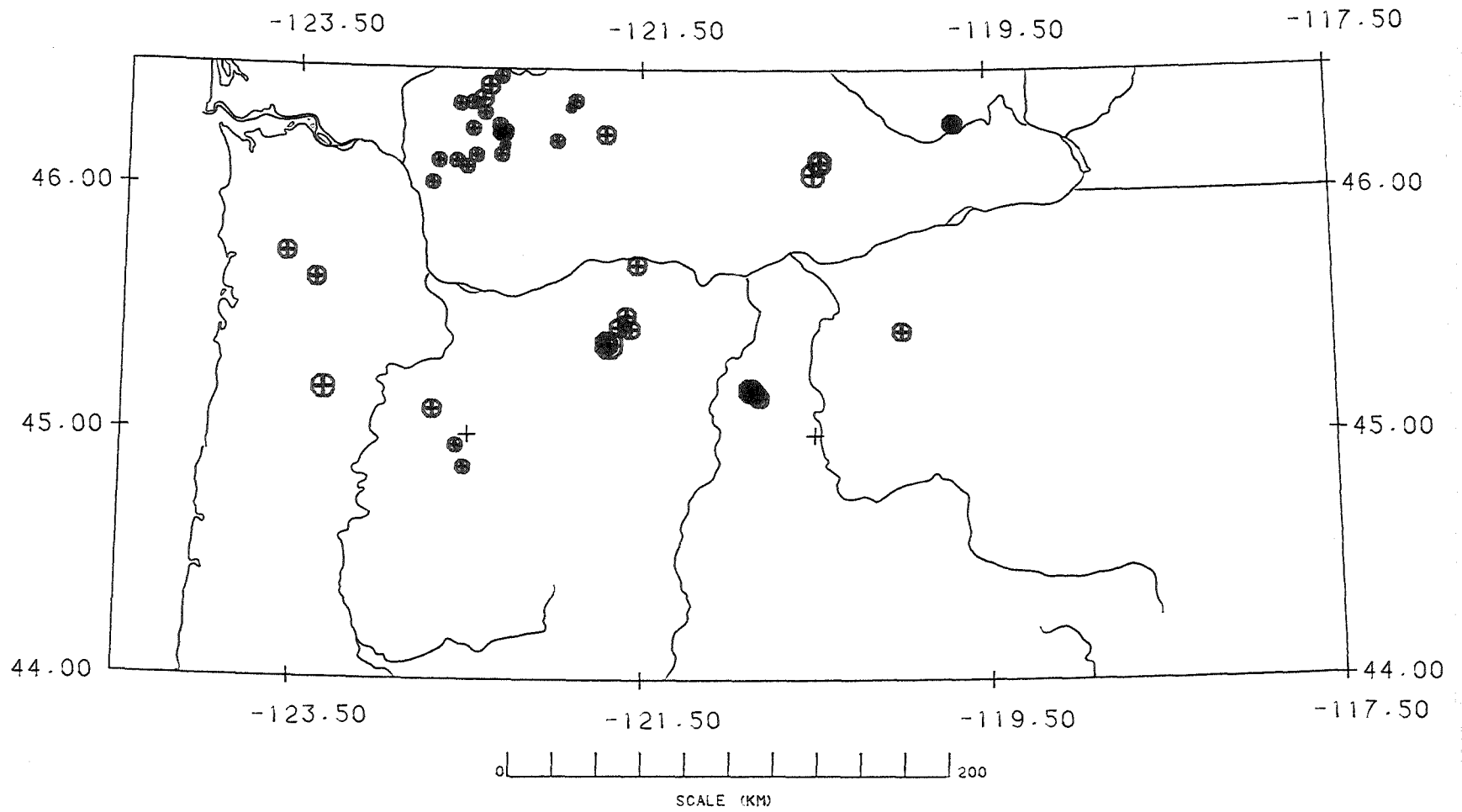


Figure 4. Southern Washington - Northern Oregon earthquakes Jul - Sep 1982

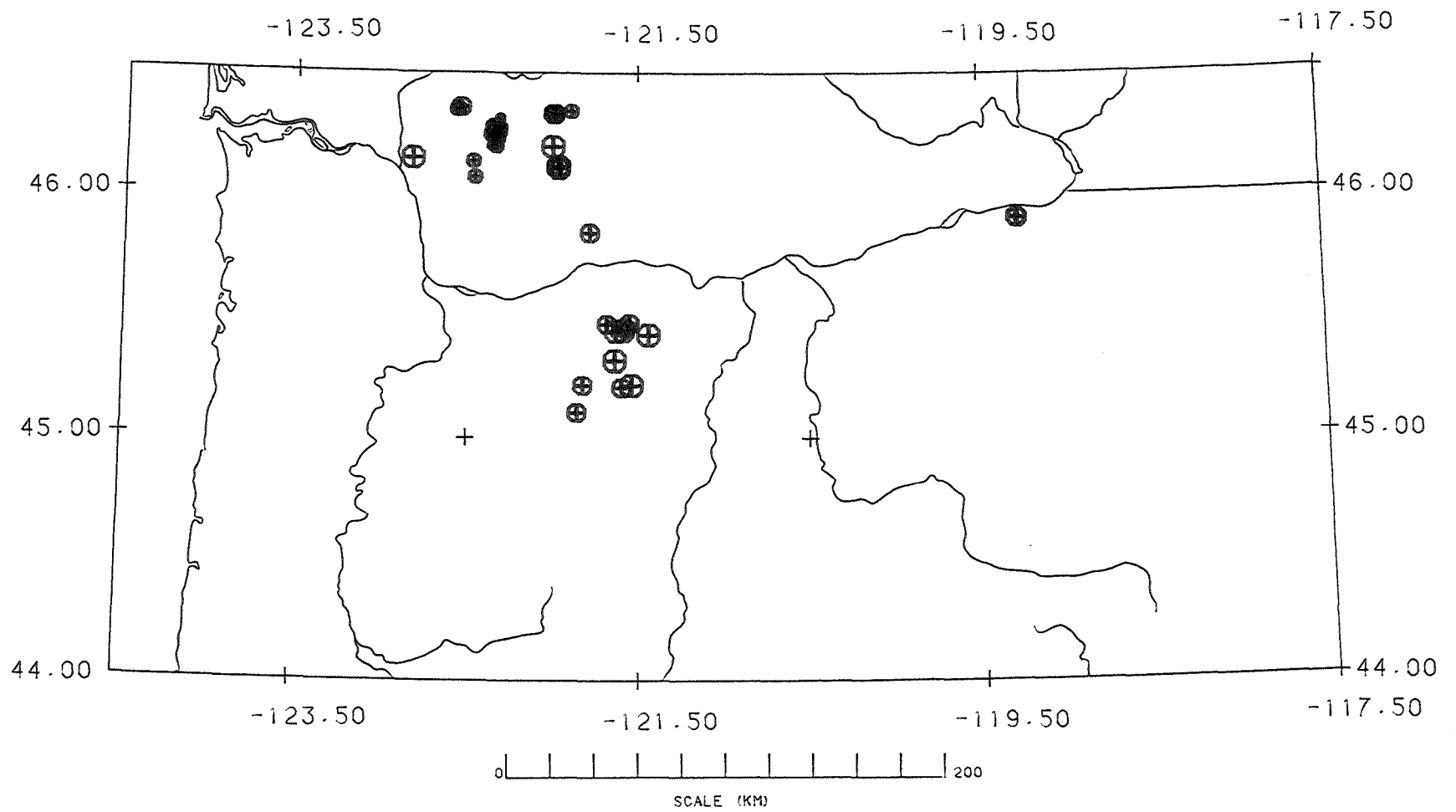


Figure 3. Southern Washington - Northern Oregon known and probable explosions.