

RAINIER

SEISMIC VELOCITY STRUCTURE OF THE GREATER MOUNT RAINIER AREA

Submitted By

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PASSCAL Data Report 96-012



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Experiment Name: Seismic Velocity Structure of the Greater Mount Rainier Area

Principal Investigator: Dr. Stephen D Malone

Date of Start of Field Work: 7/16/94

End Date of Field Work: 8/19/94

Short Description of Experiment:

The goal of our experiment was to construct an east-west refraction profile across the Southern Washington Cascades, stretching from the Puget Sound basin across Mount Rainier to the Columbia River Plateau. The profile was unreversed; our only sources were from daily blasts at a coal-mining operation in Centralia, WA, on the western end of our profile. We occupied a total of 47 temporary sites for ~1 week at a time, including two sites at the coal mine that were in operation for all but the first week of the experiment (these two sites were used for origin time determination). Data from these sites were later combined with records from 15 permanent seismographs in the Pacific Northwest Seismic Network (PNSN) to form a composite record section along a ~175km-long line. 33 blasts of varying quality were recorded during our experiment. The temporary sites also recorded signals from 34 earthquakes that were well located by the PNSN, which are included in this dataset.

Number of Stations: 47

Coordinates of Refraction Line:

46N4560 122W5040

47N0300 119W5160

Recording Parameters:

Number of Channels: 3

Data Format: Compressed

Sample Interval: 100 samples/sec

Recording Mode: Triggered

Number of Channels for Trigger: 1

Normal Operating Parameters:

Pre-trigger window: 15 seconds

Post-trigger window: Nothing

Recording Length: 30 seconds

STA Length: 1 second

LTA Length: 20 seconds

Mean Removal: 10 seconds

Trigger Ratio: 2.7

Detrigger Ratio: Nothing

LTA Hold: Off

Approximate Amount of Data: 50 Mbytes

Known Problems in the Data:

1) The data from the blasts are of low quality. Only a few blasts generated good

impulsive arrivals at a significant number of stations, and the waveforms from blast to blast varied enough to make identification of secondary arrivals difficult on the composite record section.

2) For the first 2.5 weeks we had trouble with DAS acquisition shutting off after a few hours-to-days of recording time. We determined that the problem was caused by setting the dettrigger ratio to be something other than 0.0. Our solution was to not set the dettrigger ratio. This problem resulted in a significant loss of data.

Expected Date of Submission to DMC: 07/31/96

Format Data will be in?: SEG-Y

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STATION LIST

Station Latitude Longitude Elevation

Station	Latitude	Longitude	Elevation
RGHT	47.3496	-120.7660	1.018
WREK	47.3458	-120.7500	1.109
PINE	47.3326	-120.8360	0.821
TRGT	47.3438	-120.7720	0.970
INTR	47.3259	-120.8510	0.791
PATH	47.3307	-120.8452	0.809
EPHM	47.3349	-120.8270	0.848
GRAV	47.3469	-120.8031	0.903
SLSH	47.3477	-120.7919	0.921
COWP	47.3423	-120.8156	0.873
WREN	46.9021	-121.5522	1.079
TAMT	46.8902	-121.5961	1.167
WRCP	46.9013	-121.6487	1.333
XTAL	46.9309	-121.4745	1.345
KLAP	46.8482	-121.9197	1.236
CM24	46.8424	-121.9703	0.909
CM33	46.8548	-122.0579	0.833
MOW2	46.8757	-121.8202	2.455
MOW1	46.8741	-121.8139	2.515
LDGE	46.9363	-121.3544	1.042
FIFE	46.9627	-121.2851	1.030
VIEW	46.9914	-121.0781	0.982
LAWN	46.9961	-121.0303	1.279
CHIP	46.9510	-121.1934	0.921
NRTH	46.7656	-122.8349	0.110
SOTH	46.7379	-122.8193	0.110
RAVN	47.0255	-121.3349	1.806

BOLT	47.0350	-121.3111	1.612
FIRE	47.0344	-121.2899	1.479
CORD	47.0344	-121.2714	1.352
ELKS	47.0421	-121.2618	1.236
BURN	47.0435	-121.2428	1.152
KAYP	47.0327	-121.2176	1.067
HRPN	47.0343	-121.1975	1.061
RCKS	47.0291	-121.1771	0.927
BLOG	47.0250	-121.1583	0.897
SGBA	47.0093	-121.4991	1.300
FLAT	47.0092	-121.4877	1.500
CRLP	47.0140	-121.4698	1.700
CULV	46.9131	-121.4576	1.394
BPRW	46.9104	-121.4371	1.321
TREE	46.9160	-121.3912	1.090
VIEW	46.9914	-121.0781	0.982
LAWN	46.9961	-121.0304	1.279

Calibration Information Acquired:

We did not acquire any calibration information.

Timing Corrections Made to Data:

No corrections have been made to the data. Time was tracked by GPS receivers, and we saw no evidence for significant clock drift at any site.

Known Problems in the Data:

There are no problems with the data included in this report that we are aware of. However, two comments are worth making regarding problems we had recording the data:

1) The data from the blasts are of low quality. Only a few blasts generated good impulsive arrivals at a significant number of stations, and the waveforms from blast to blast varied enough to make identification of secondary arrivals difficult on the composite record section.

2) For the first 2.5 weeks we had trouble with DAS acquisition shutting off after a few hours-to-days of recording time. We determined that the problem was caused by setting the detriquer ratio to be something other than 0.0. Our solution was to not set the detriquer ratio. This problem resulted in a significant loss of data.

LIST OF EVENTS:

Blasts from Centralia Coal Mine:

Date	Time(*)	Latitude(**)	Longitude	Depth
9407182224	55.85	46.7725	-122.8385	-0.10
9407192203	10.52	46.7725	-122.8385	-0.10
9407202147	63.94	46.7725	-122.8385	-0.10
9407212151	15.93	46.7725	-122.8385	-0.10
9407221646	24.05	46.7725	-122.8385	-0.10
9407222203	37.75	46.7725	-122.8385	-0.10
9407262314	50.03	46.7725	-122.8385	-0.10
9407272139	62.12	46.7725	-122.8385	-0.10
9407282126	12.58	46.7725	-122.8385	-0.10
9407292128	60.42	46.7725	-122.8385	-0.10

9407302144	49.32	46.7725	-122.8385	-0.10
9407311816	46.92	46.7725	-122.8385	-0.10
9408012147	41.42	46.7725	-122.8385	-0.10
9408022101	62.17	46.7725	-122.8385	-0.10
9408032103	37.62	46.7725	-122.8385	-0.10
9408041847	21.86	46.7725	-122.8385	-0.10
9408042159	58.91	46.7725	-122.8385	-0.10
9408052122	55.06	46.7725	-122.8385	-0.10
9408062006	65.21	46.7725	-122.8385	-0.10
9408062154	63.41	46.7725	-122.8385	-0.10
9408082122	20.31	46.7725	-122.8385	-0.10
9408092204	71.59	46.7725	-122.8385	-0.10
9408102137	55.88	46.7725	-122.8385	-0.10
9408112111	29.89	46.7725	-122.8385	-0.10
9408122140	55.56	46.7725	-122.8385	-0.10
9408131635	70.08	46.7725	-122.8385	-0.10
9408132117	55.05	46.7725	-122.8385	-0.10
9408142124	51.57	46.7725	-122.8385	-0.10
9408142233	48.25	46.7725	-122.8385	-0.10
9408152124	70.47	46.7725	-122.8385	-0.10
9408162133	56.36	46.7725	-122.8385	-0.10
9408172211	43.52	46.7725	-122.8385	-0.10
9408182236	42.17	46.7725	-122.8385	-0.10

(*) Origin time is from network locations, & may be in error. We calculated origin times by computing travel time from source to nearest receiver (NRTN) and subtracting this from arrival time at receiver.

(**) Latitude and longitude and depth are for the coordinates and elevation of the center of the coal mine pit, which is roughly 1 km long (east-west) by 0.25 km wide. We never received surveyed locations from the coal mine, so these locations represent our best estimate. Depth is relative to sea level.

Earthquakes:

Date	Time	Latitude(*)	Longitude	Depth
9407201506	55.59	46.7887	-120.0078	0.02
9407220557	54.86	46.6488	-121.0093	5.75
9407220956	58.99	47.6293	-122.0087	6.04
9407221141	24.11	47.6303	-122.0088	8.21
9407221335	14.61	47.6368	-122.0073	11.87
9407221445	15.71	47.6288	-122.0073	2.70
9407221725	21.92	46.8583	-119.0032	2.02
9407271311	25.97	46.7997	-121.0093	5.88
9407282012	54.66	47.9168	-122.0163	23.16
9407282020	58.95	47.0288	-122.0032	5.18
9407300909	52.83	46.7390	-121.0090	9.18
9407301925	68.11	46.8527	-121.0092	12.79
9408010534	62.47	46.5202	-122.0043	18.18
9408011458	51.05	46.0210	-122.0107	6.77
9408060643	53.26	47.3797	-122.0065	22.62
9408070517	66.19	47.6582	-120.0165	5.95
9408080230	14.99	46.8530	-121.0095	13.52
9408080638	30.47	46.9718	-123.0053	32.58
9408091403	20.07	48.3115	-123.0038	19.92
9408100725	9.09	47.5205	-121.0080	13.16
9408100726	67.63	46.8573	-121.0075	3.59
9408122043	19.33	46.9628	-120.0090	3.77
9408130224	17.95	46.7857	-120.0080	0.58
9408130443	10.17	46.9718	-120.0090	2.98
9408130635	53.74	46.6465	-122.0052	14.39

9408131149	27.90	46.7568	-121.0090	11.67
9408131221	17.88	46.7808	-120.0078	1.28
9408140329	11.30	47.2812	-122.0037	14.39
9408141608	22.30	46.3383	-122.0023	10.13
9408151504	54.99	46.7025	-122.0108	17.67
9408160639	41.91	47.5873	-121.0095	12.70
9408170515	43.61	46.5175	-122.0042	20.20
9408171256	21.97	46.8628	-121.0073	0.02
9408172050	43.76	47.6313	-121.0033	19.37

(*) Time and locations were determined by the PNSN using permanent PNSN stations only. Depth is relative to an elevation of 1 km above sea level (the average PNSN station elevation).