

WASHINGTON DIVISION OF GEOLOGY AND EARTH RESOURCES  
Raymond Lasmanis, State Geologist

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# EARTHQUAKE HYPOCENTERS IN WASHINGTON AND NORTHERN OREGON—1980

by

ANTHONY QAMAR, ANNE RATHBUN, RUTH LUDWIN,  
ROBERT S. CROSSON, and STEPHEN D. MALONE

WASHINGTON DIVISION OF GEOLOGY AND EARTH RESOURCES  
INFORMATION CIRCULAR 82

1986

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# EARTHQUAKE HYPOCENTERS IN WASHINGTON AND NORTHERN OREGON — 1980

by

Anthony Qamar, Anne Rathbun, Ruth Ludwin,  
Robert S. Crosson, and Stephen D. Malone\*

## INTRODUCTION

The Geophysics Program at the University of Washington operates a continuously recording, telemetered seismograph network in Washington (Figs. 1 and 2). This report is the ninth in an annual series designed to provide a standardized compilation of earthquake locations. This is the first report to cover earthquakes for the whole state of Washington; previous reports covered earthquakes in western Washington only. Appendices I and II list hypocentral locations for 2,089 earthquakes and blasts exceeding coda-length magnitude  $M_c$  1.0 that occurred in 1980. "Hypocenter" refers to the subsurface point where the earthquake occurs, while "epicenter" indicates the point on the Earth's surface directly above the hypocenter. The distribution of earthquake epicenters in Washington during 1980 is shown in Figures 3 and 4. Minor earthquakes are shown in Figure 5, and blasts in Figure 6. Figure 7 shows earthquakes located in Washington that were reported as felt.

A companion document describing, in detail, the seismograph stations and their calibration, the processing of seismic data, and the development of crustal velocity models is in preparation.

The number of events located each year depends on four basic factors: the number of stations operating, the locations of earthquakes relative to recording stations, the earthquake magnitudes, and the number of earthquakes in the area monitored. Ignoring the inherent variability of the data may lead to incorrect interpretations. When used carefully, the data in this report may enhance evaluations of seismic hazard potential, as well as contribute to basic studies in seismology, Earth structure, and tectonics.

Compilations of earthquakes in western Washington have been published by the Washington Department of Natural Resources for the years 1970-1979 (Crosson, 1974, 1975; Crosson and Millard, 1975; Crosson and Noson, 1978a, 1978b, 1979; Noson and Crosson, 1980; Noson and others, 1985). Earthquakes in eastern Washington from 1969 to 1979 are covered in annual technical reports available from the University of Washington Geophysics Program (Malone, 1975, 1976, 1977, 1978, 1979). Data for eastern Washington earthquakes for 1969-1974 are given as an appendix in Malone (1979). A listing of larger historic earthquakes in Washington State from 1840 to 1965 was compiled by Rasmussen (1967).

\* The authors are members of the Geophysics Program at the University of Washington.



Table 1. Stations operating in 1980; see also Figures 1 and 2 for locations.

Station Designator	Latitude (dg mn sec)	Longitude (dg mn sec)	Elevation (km)	Station Name
APW	46 39 06.0	122 38 51.0	0.457	Alpha Peak
BDG	46 14 04.8	119 19 03.0	0.430	Badger Mt.
BFW	46 29 12.0	123 12 53.4	0.902	Boistfort Mountain
BLN	48 00 26.5	122 58 18.6	0.585	Blyn Mountain
BOW	46 28 30.0	123 13 41.0	0.870	Boistfort Mountain
CBW	47 48 25.5	120 01 57.6	1.160	Chelan Butte
CDF	46 06 58.2	122 02 51.0	0.780	Cedar Flat
CMM	46 26 07.0	122 30 21.0	0.620	Crazy Man Mountain
COW	46 29 27.6	122 00 43.6	0.305	Cowlitz River
CPW	46 58 25.8	123 08 10.8	0.792	Capitol Peak
CRF	46 49 30.6	119 23 18.0	0.260	Corfu
DAV	47 38 18.0	118 13 33.6	0.758	Davenport
DOG	46 12 22.2	122 10 30.0	2.317	Dogs Head
DYH	47 57 37.8	119 46 09.6	0.820	Dyer Hill
EDM	46 11 50.4	122 09 00.0	1.609	East Dome Mt. St. Helens
ELK	46 18 20.0	122 20 27.0	1.270	Elk Rock
ELL	46 54 35.0	120 34 06.0	0.805	Ellensburg
EPH	47 21 07.8	119 35 46.2	0.628	Ephrata
EST	47 14 16.8	121 12 21.8	0.756	Easton
ETP	46 27 53.4	119 03 32.4	0.250	Eltopia
ETT	47 39 18.0	120 17 36.0	0.439	Entiat
EUK	46 23 45.0	118 33 43.5	0.350	Eureka
FLT	46 11 21.3	122 21 22.5	1.387	Flat Top
FMW	46 55 54.0	121 40 19.2	1.890	Mt. Fremont
FPW	47 58 09.0	120 12 46.5	0.352	Fields Point
GBL	46 35 51.6	119 27 35.4	0.330	Gable Mountain
GHW	47 02 30.0	122 16 21.0	0.268	Garrison Hill
GLD	45 50 13.0	120 48 46.0	0.610	Goldendale
GMW	47 32 52.5	122 47 10.8	0.506	Gold Mountain
GSM	47 12 11.4	121 47 40.2	1.305	Grass Mountain
HDW	47 38 54.6	123 03 15.2	1.006	Hoodsport
HTW	47 48 12.5	121 46 08.6	0.829	Haystack Lookout
JCW	48 11 36.6	121 55 46.2	0.616	Jim Creek
JUN	46 08 48.0	122 09 10.8	1.049	June Lake
LMW	46 40 04.8	122 17 28.8	1.195	Ladd Mountain
LON	46 45 00.0	121 48 36.0	0.853	Longmire (WWSSN)
LVP	46 04 06.0	122 24 30.0	1.170	Lake View Peak
LYW	48 32 07.2	122 06 06.0	0.107	Lyman
MAS	46 08 41.0	121 35 30.7	1.370	Mt Adams South
MBW	48 47 02.4	121 53 58.8	1.676	Mt. Baker
MCW	48 40 46.8	122 49 56.4	0.693	Mt. Constitution
MDW	46 36 48.0	119 45 39.0	0.330	Midway
MFW	45 54 10.8	118 24 21.0	0.395	Milton-Freewater
MHD	45 23 51.0	121 42 10.5	2.231	Barrett Spur
MOW	47 50 46.9	122 02 52.9	0.180	Monroe
MTM	46 01 31.8	122 12 42.0	1.121	Mt. Mitchell
NAC	46 44 03.8	120 49 33.2	0.738	Naches
NEW	48 15 50.0	117 07 13.0	1.000	Newport Observatory (USGS)
OBC	48 02 07.1	124 04 39.0	0.938	Olympics - Bonidu Creek

Table 1. Continued.

Station Designator	Latitude (dg mn sec)	Longitude (dg mn sec)	Elevation (km)	Station Name
OBH	47 19 34.5	123 51 57.0	0.383	Olympics - Burnt Hill
OCP	48 17 58.5	124 37 37.5	0.487	Cheela Pk
OCT	47 44 57.0	124 10 25.8	0.743	Mt Octopus
OCW	47 36 30.0	124 16 04.1	0.195	Clearwater
ODS	47 18 24.0	118 44 42.0	0.523	Odessa
OEM	48 07 46.5	124 18 13.5	0.712	Ellis Mt
OFK	47 57 00.0	124 21 28.1	0.134	Olympics - Forks
OHW	48 19 24.0	122 31 54.6	0.054	Oak Harbor
OLQ	47 30 58.1	123 48 31.5	0.121	Olympics - Lake Quinault
OMK	48 28 49.2	119 33 39.0	0.421	Omak
ONR	46 52 37.5	123 46 16.5	0.257	Olympics - North River
OSH	47 14 08.6	124 09 57.4	0.110	Sunset Hill
OTH	46 44 20.4	119 12 59.4	0.260	Othello
OZL	48 10 06.0	124 35 06.0	0.195	Ozette Lake
PEN	45 36 43.2	118 45 46.5	0.430	Pendleton
PLN	47 47 04.8	120 37 58.8	2.000	Plains
PRO	46 12 45.6	119 41 09.0	0.552	Prosser
RAN	46 24 30.0	121 51 49.0	1.620	Randle
RED	45 56 13.2	121 49 10.8	1.510	Red Mt.
RMW	47 27 35.0	121 48 19.2	1.024	Rattlesnake Mountain
RPW	48 26 54.0	121 30 49.0	0.850	Rockport
RSW	46 23 28.2	119 35 19.2	1.037	Rattlesnake Mountain
SAW	47 42 06.0	119 24 03.6	0.690	St. Andrews
SBL	46 20 25.2	122 02 19.8	1.665	Strawberry LO
SEA	47 39 18.0	122 18 30.0	0.030	Seattle, Univ. Wash.
SHW	46 11 33.0	122 14 12.0	1.423	Mount St. Helens
SMW	47 19 10.2	123 20 30.0	0.840	South Mountain
SOS	46 14 38.5	122 08 12.0	1.270	Source of Smith Creek
SPW	47 33 13.3	122 14 45.1	0.008	Seward Park
STW	48 09 00.8	123 40 12.0	0.308	Striped Peak
SYR	46 51 46.8	119 37 04.2	0.267	Smyrna
TBM	47 10 10.0	120 35 58.0	1.064	Table Mountain
TLK	45 57 44.0	121 35 3.0	0.756	Trout Lake
TRO	45 56 37.8	121 35 27.6	0.829	New Trout Lk
VGT	45 08 59.4	122 15 55.2	0.993	Goat Mtn.
VHE	45 19 45.0	121 39 57.0	1.646	Mt. Hood East
VTG	46 57 28.8	119 59 14.4	0.208	Vantage
WA2	46 45 24.2	119 33 45.5	0.230	Wahluke Slope
WAT	47 41 55.0	119 57 15.0	0.900	Waterville
WBW	48 01 04.2	119 08 13.8	0.825	Wilson Butte
WEN	47 31 46.2	120 11 39.0	1.061	Wenatchee
WGW	46 02 40.8	118 55 57.6	0.158	Wallula Gap
WIW	46 25 48.8	119 17 13.4	0.130	Wooded Island
WPW	46 41 53.4	121 32 48.0	1.250	White Pass
WRD	46 58 11.4	119 08 36.0	0.378	Warden
WTP	48 28 16.2	120 14 52.2	0.855	Winthrop
YAK	46 31 15.8	120 31 45.2	0.619	Yakima

## Network Operations

The seismograph network in Washington and northern Oregon (Figs. 1 and 2) operated by the University of Washington in 1980 consisted of as many as 94 short-period, vertical-component, telemetered seismograph stations, a three-component (both short-period and long-period) World Wide Standardized Seismograph Network (WWSSN) station at Longmire (LON) and two horizontal-component Wood-Anderson seismographs at Seattle (SEA). Station coordinates and elevations are given in Table 1. Each station, except WWSSN station LON, consisted of a vertical-component, short-period seismometer, an amplifier, a voltage-controlled oscillator and, at some stations, radiotelemetry equipment to transmit data to the central recording laboratory at the University of Washington.

Data from most of the seismograph stations in the network were recorded by three Geotech Develocorders on 16-mm film at a speed of 15 mm per minute. Early in the year we began digitally recording data from all stations in the network using a Digital Equipment Corporation PDP 11/34 computer. The computer operates in an "event triggered" mode, recording data (at 100 samples per second) only when a seismic event is detected. The digital recording is closely modeled after the CEDAR system developed at the California Institute of Technology by Johnson (1979).

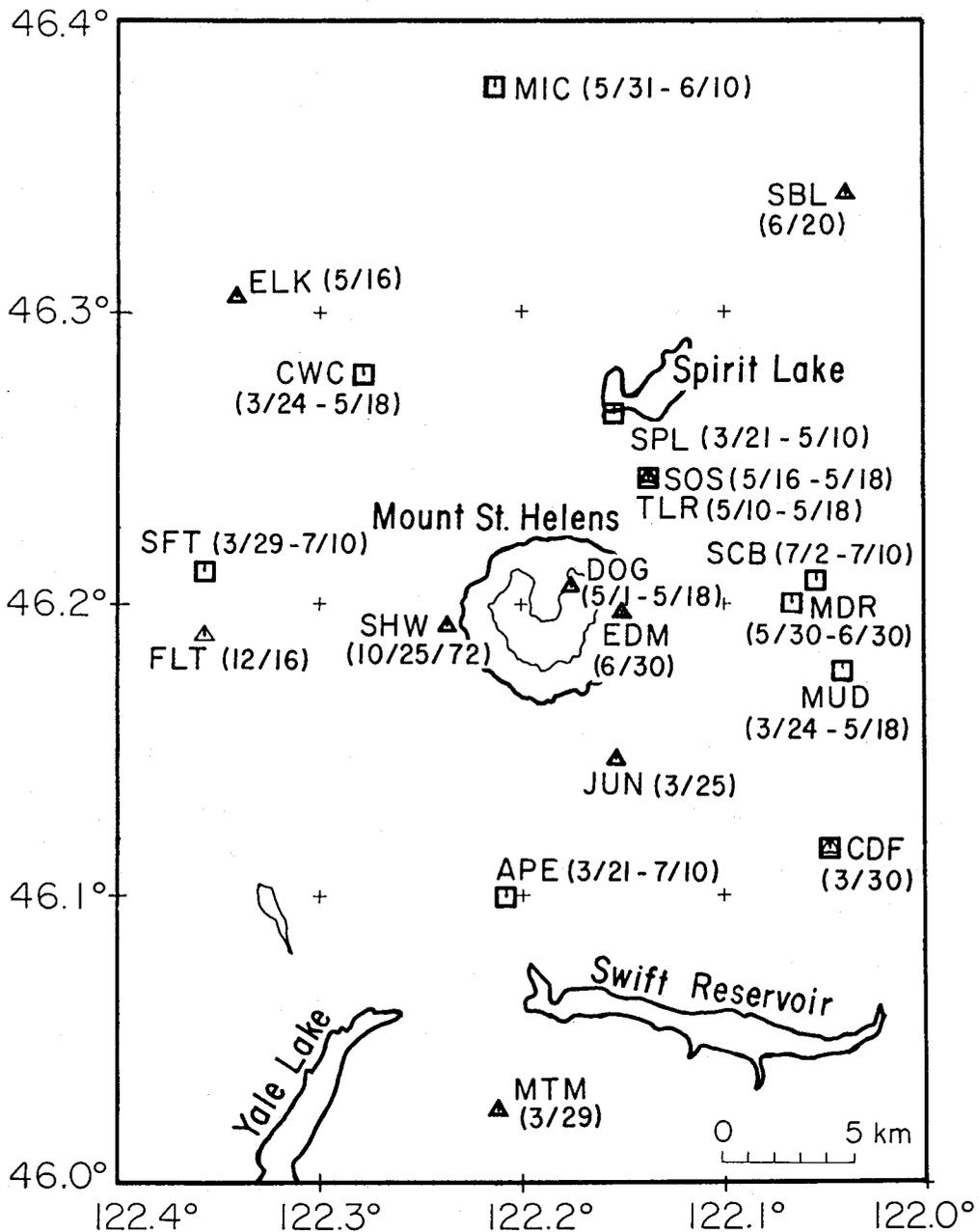
## Earthquake Analysis Procedure

Most of the earthquakes in 1980 were located from digital data recorded by our online PDP 11/34 computer. The reading of arrival times, first motion polarities, and signal durations was done using interactive computer programs on a PDP 11/70 computer. Some of the earthquakes, particularly those in early 1980, were read from the analog Develocorder film data. These earthquakes are designated as type "H" in the appendices.

Detected events were classified and entered into a processing list in the following categories: teleseisms (epicentral distance greater than 1,000 km), regionals (distance less than 1,000 km), and local events (epicenter within the network). Most local events large enough to be well recorded on at least three stations were analyzed, and readings were collected for computer location runs. Locations determined for 1980 appear in Appendices I and II.

The location program, based on the standard non-linear least squares inversion scheme of Geiger (1912), has been optimized for use with Washington array data. The accuracy of locations determined with this program depends on the accuracy of the crustal model, the station distribution around the epicenter, station spacing, number of stations used, and quality of arrival time data.

We have used a different velocity model and set of station corrections for each of five regions in Washington and Oregon. The regions are shown as an inset on Figure 1. As a general rule, we locate earthquakes by giving full weight to P arrival times at stations within  $(50+d)$  km of the epicenter (where  $d$  = the distance from the epicenter to the nearest station) and reduced weight to P readings at more distant stations. Usually, P readings at stations farther than  $(150+d)$  km from the epicenter are not used. Well-recorded S readings are also used from stations within 50 km of the epicenter. These guidelines may be relaxed for very deep earthquakes or earthquakes near the edge of the seismograph net.



**Figure 2.** Seismograph stations in the Mount St. Helens region and dates of operation during 1980. Triangles are telemetry stations, and squares are portable seismographs equipped with analog tape recorders at the site. Where only one date is shown, the station continued to operate until the end of 1980. Stations ELK, CWC, SOS, TLR, DOG, and MUD were destroyed during the eruption of May 18, 1980. ELK operated on May 16-18, May 24-25, and from June 12 to the end of 1980. Station SHW has operated on the flank of Mount St. Helens since 1972. It was the only seismograph in the region prior to March 1980. Station CMM (Fig. 1) was a portable seismograph from April 9 to June 15 and a telemetered station thereafter. Two elevation contours are shown on Mount St. Helens: 1,500 m above mean sea level, as in Figure 4; and 1,950 m, showing the crater floor after the eruption of May 18, 1980.

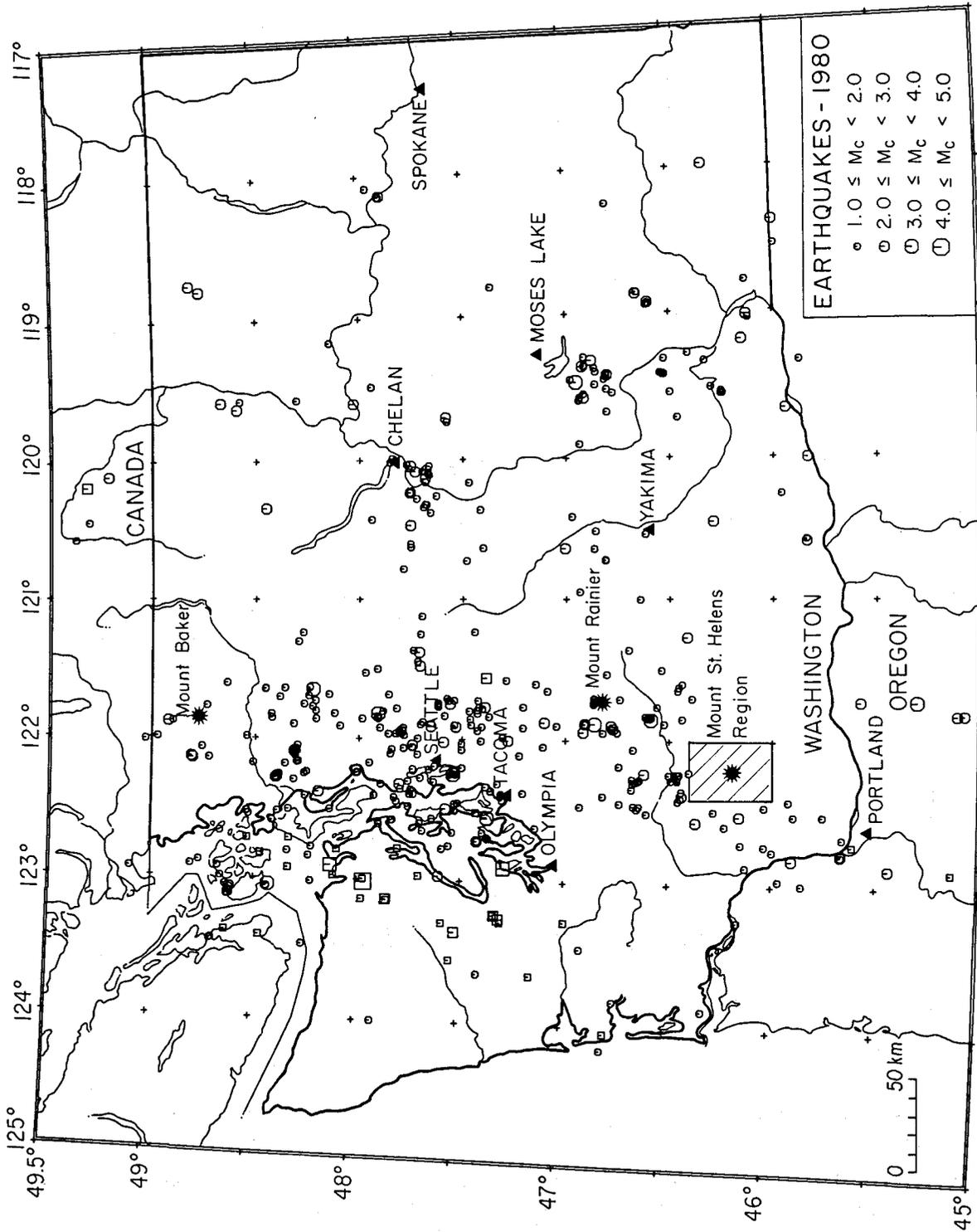
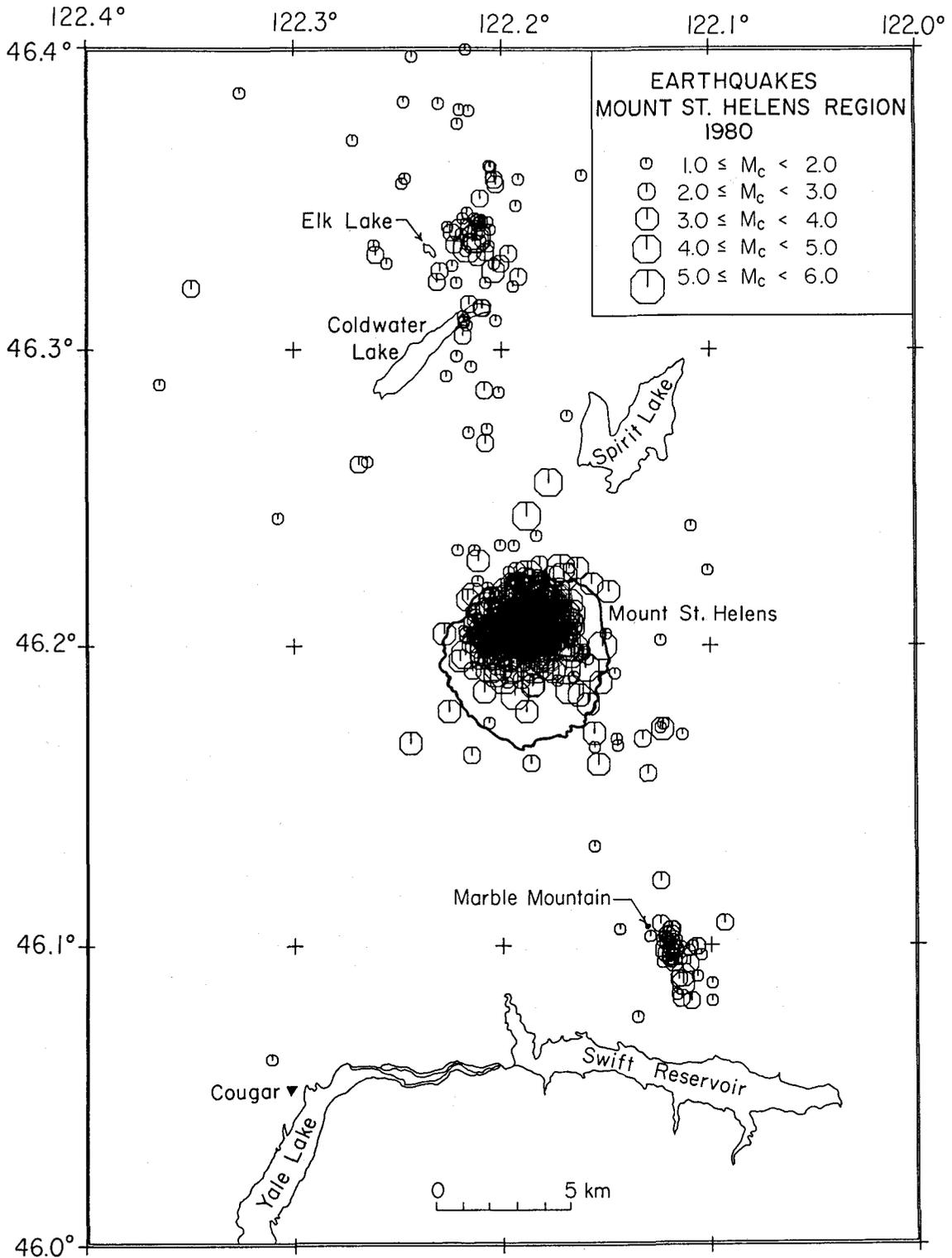


Figure 3. Earthquake epicenters for Washington and northern Oregon in 1980,  $M_c \geq 1$ . Earthquakes deeper than 30 km are shown as squares. Equal-sized octagons and squares represent equal-magnitude earthquakes. Earthquakes in the Mount St. Helens region are shown in Figure 4. Asterisks indicate selected volcanoes.



**Figure 4.** Earthquakes in the Mount St. Helens region in 1980. No D-quality earthquake epicenters are shown. All earthquakes have depths less than 30 km. (See descriptions of appendices.) Solid line around Mount St. Helens is the 1,500-m elevation contour.

In the computer location procedure the hypocentral parameters (that is, location and occurrence time) are modified until arrival time residuals (the observed minus the predicted P or S arrival times) are minimized. The root mean square (RMS) residual is one indicator of the overall quality of the solution. It is obtained by squaring each residual, summing the squares, dividing by the number of observations minus 4, and taking the square root of that quantity. A RMS residual is included with each event solution in Appendices I and II. Values less than 0.1 sec indicate a solution that fits the observed arrival-time data very well. Values greater than 0.5 sec usually indicate a poor solution. Earthquakes located with only three or four readings have RMS values of zero because there is only enough information to determine a unique solution. The RMS does not indicate the quality of the location unless more than four P or S readings are available. In addition, two quality factors, each rated A to D, are assigned to every event. The first factor is based on the RMS residual and horizontal and vertical location error estimates. The second factor depends on number of stations read, largest angular gap between stations, and distance from the epicenter to the nearest station. In each case, A is the highest and D the lowest quality.

Explosions are identified in the data set wherever possible. Criteria useful in distinguishing explosions are: shallow depths, positive P-wave polarity, clustering, time of day of occurrence, frequency, and, of course, direct verification. When explosions occur in unusual locations and are nonrepetitive, positive identification is difficult. Suspected or possible explosions are indicated in Appendices I and II as type "P". Confirmed explosions are indicated as type "X".

The magnitude of earthquakes is determined using a coda or signal duration technique. See equation (1) below. The method used is described by Crosson (1972), and the magnitude is referred to as coda magnitude or  $M_C$  to distinguish it from magnitudes determined by other methods.

## DISCUSSION OF EARTHQUAKE ACTIVITY

Figures 3 and 4 and the two earthquake catalogs, in Appendices I and II, summarize earthquakes for 1980 that had magnitudes  $M_C \geq 1$ . Because the Mount St. Helens region was so active in 1980, it is illustrated in a separate figure. Minor earthquakes having magnitudes  $M_C < 1$  are plotted in Figure 5. In all, we located 3,231 earthquakes and blasts having  $M_C \geq 0.0$  in 1980. For  $M_C \geq 1.0$ , we located 1,349 tectonic and volcanic earthquakes in the Mount St. Helens region (Fig. 4) and 455 earthquakes and 285 blasts in the rest of the state (Figs. 3 and 6).

Figure 3 shows that deep earthquakes are principally confined to northwest Washington, commonly in the western part of the Puget Sound area although, farther east, very deep earthquakes occur occasionally. The deep earthquakes in the Puget Sound area are often taken as evidence that the Juan de Fuca plate is subducting toward the east, beneath Washington (Taber and Smith, 1985). The 96-km-deep earthquake of February 4, 1980 ( $M_C$  2.4), whose epicenter was located southwest of Snoqualmie Pass, is the deepest known earthquake in Washington. The largest deep earthquake during 1980 was the magnitude 4.2 earthquake on June 8 (depth 49 km) whose epicenter was 30 km southwest of Port Townsend. It had a normal-fault mechanism (Taber and Smith, 1985) indicating north-south tension near the hypocenter. Shallow earthquakes (depth less than 30 km) are more widely distributed in Washington. The crustal faults responsible for these earthquakes are not well documented.

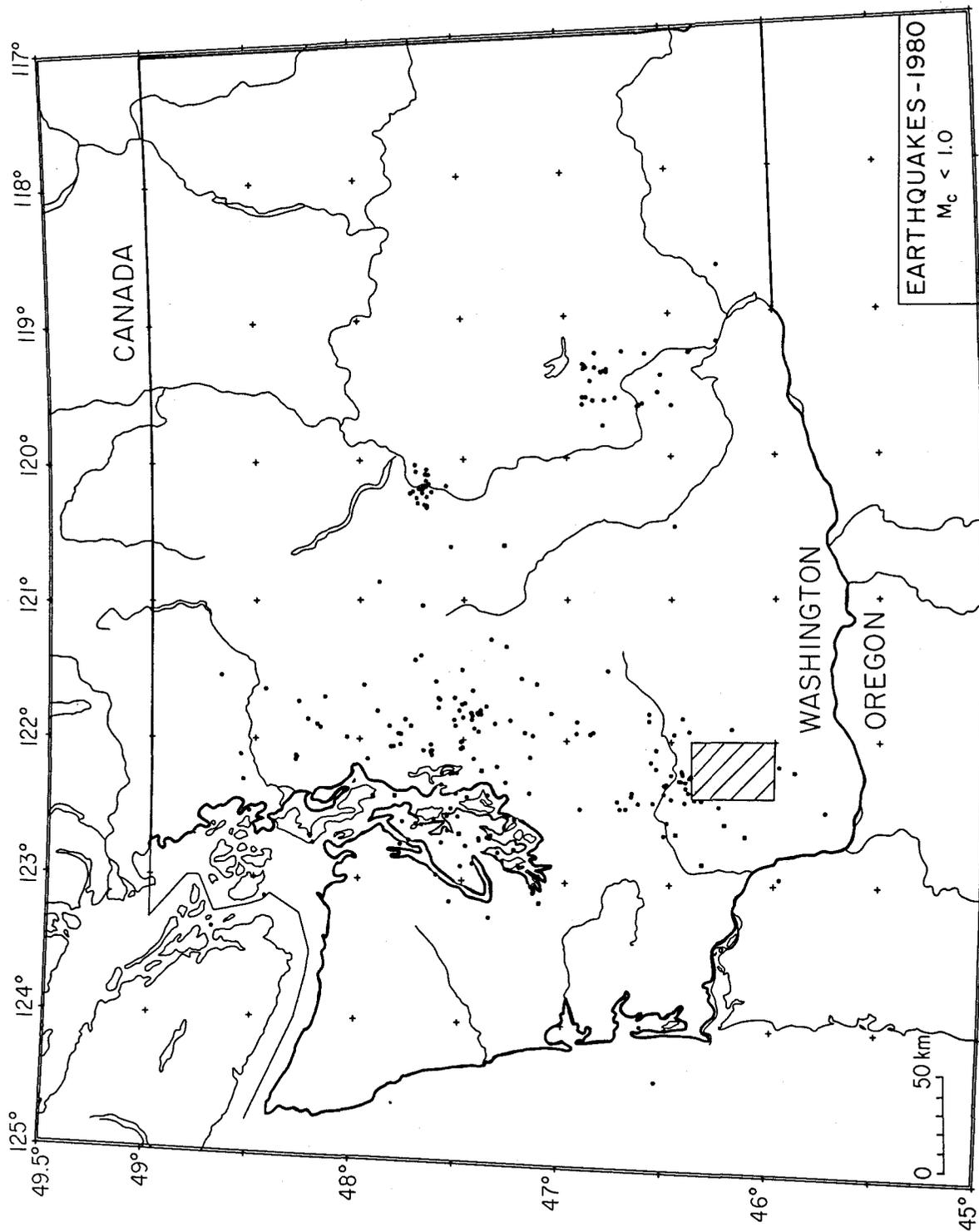


Figure 5. Minor earthquakes in Washington and northern Oregon in 1980,  $M_c < 1$ . Minor earthquakes in the Mount St. Helens region (shaded) are not shown.

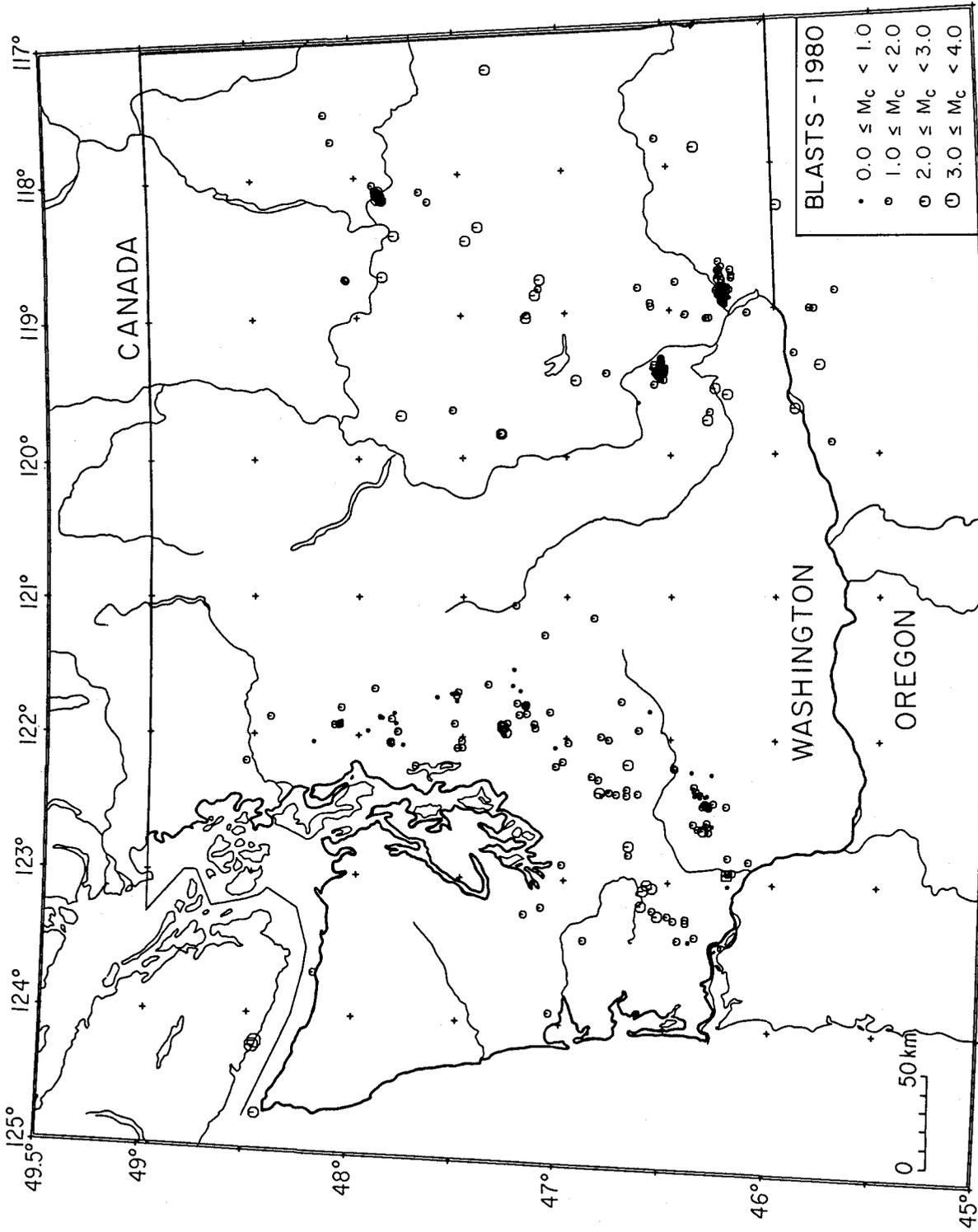


Figure 6. Blasts and probable blasts in Washington and northern Oregon in 1980,  $M_c \geq 0$ .

In eastern Washington clusters of earthquakes occurred southwest of Moses Lake and at Entiat (south of Lake Chelan). The Moses Lake activity may be associated with the east-west-trending Saddle Mountains fold. The region near Entiat is a persistent source of earthquakes.

In western Washington, shallow earthquakes were common in the Puget Lowland. A band of epicenters extends north-south along the western edge of the Cascades at longitude  $122^{\circ}$  W from the vicinity of Mount Baker to a point south of Mount Rainier. These earthquakes have not yet been reliably associated with surface faults. In an area farther south, Weaver and Smith (1983) have proposed the existence of the Mount St. Helens seismic zone because of the many shallow earthquakes whose epicenters trend northwest through Mount St. Helens for a distance of at least 90 km. This zone was very active in 1980 and was the site of earthquakes at Mount St. Helens, Elk Lake, and Marble Mountain (Fig. 4). Also, in 1980, a number of earthquakes were recorded in an area north of Portland, Oregon.

### FELT EARTHQUAKES

On April 16, a 50-km-deep ( $M_C$  3.8) earthquake occurred west of Port Townsend; it was reported felt at Esquimalt, B.C. (intensity I-II). Two earthquakes near Tacoma were felt, on April 27 ( $M_C$  3.7) and May 6 ( $M_C$  3.0); the first was felt (intensity IV) from Tacoma to Seattle and as far east as Bellevue. (See Figure 7 for locations of these and other felt earthquakes.)

The earthquake that accompanied the cataclysmic eruption of Mount St. Helens on May 18, 1980 ( $M_C$  5.7 and  $M_{NEW}$  5.0), was reported felt throughout Washington and Oregon in the 1980 edition of United States Earthquakes (Stover and Von Hake, 1982). (The Newport, Washington, magnitude  $M_{NEW}$  is defined in a later section of this report.) The accompanying eruption was also reported heard in Washington, Oregon, Idaho, Montana, California, and Canada (Fairfield, 1980).

In tabulating felt reports of the May 18, 1980, earthquake at 15:32 UT, it was often difficult to distinguish between the effects of sound waves and ground shaking. The available evidence (for example, Rosenbaum and Waitt, 1981) indicates that the earthquake was felt by only a few persons near the mountain. Nearly 300 volcanic earthquakes exceeding coda magnitude 4.0 (100 exceeding  $M_{NEW}$  4.0) occurred prior to the May 18 eruption. Although many of these were felt on or near the mountain, far fewer were reported felt than might be expected. Because shallow volcanic earthquakes tend to radiate low-frequency waves (producing low acceleration ground vibrations), they are more difficult to feel. Several of the larger volcanic earthquakes were felt by individuals on or very near the mountain between March 20 and May 18, but, away from the mountain, they were usually felt only if their magnitude exceeded 4.5 (Qamar and others, 1983).

The May 18 eruption apparently triggered a swarm of tectonic earthquakes near Elk Lake, 17 km north of the volcano. These are summarized in a later section, but three Elk Lake earthquakes were reported felt on May 23 ( $M_C$  4.1) and May 28 ( $M_C$  4.1 and 4.0).

On June 8 another deep (49 km) earthquake occurred on the Olympic Peninsula and had a magnitude of 4.1. This was the largest Washington earthquake to occur in 1980 outside of the Mount St. Helens region. It was felt in Victoria,

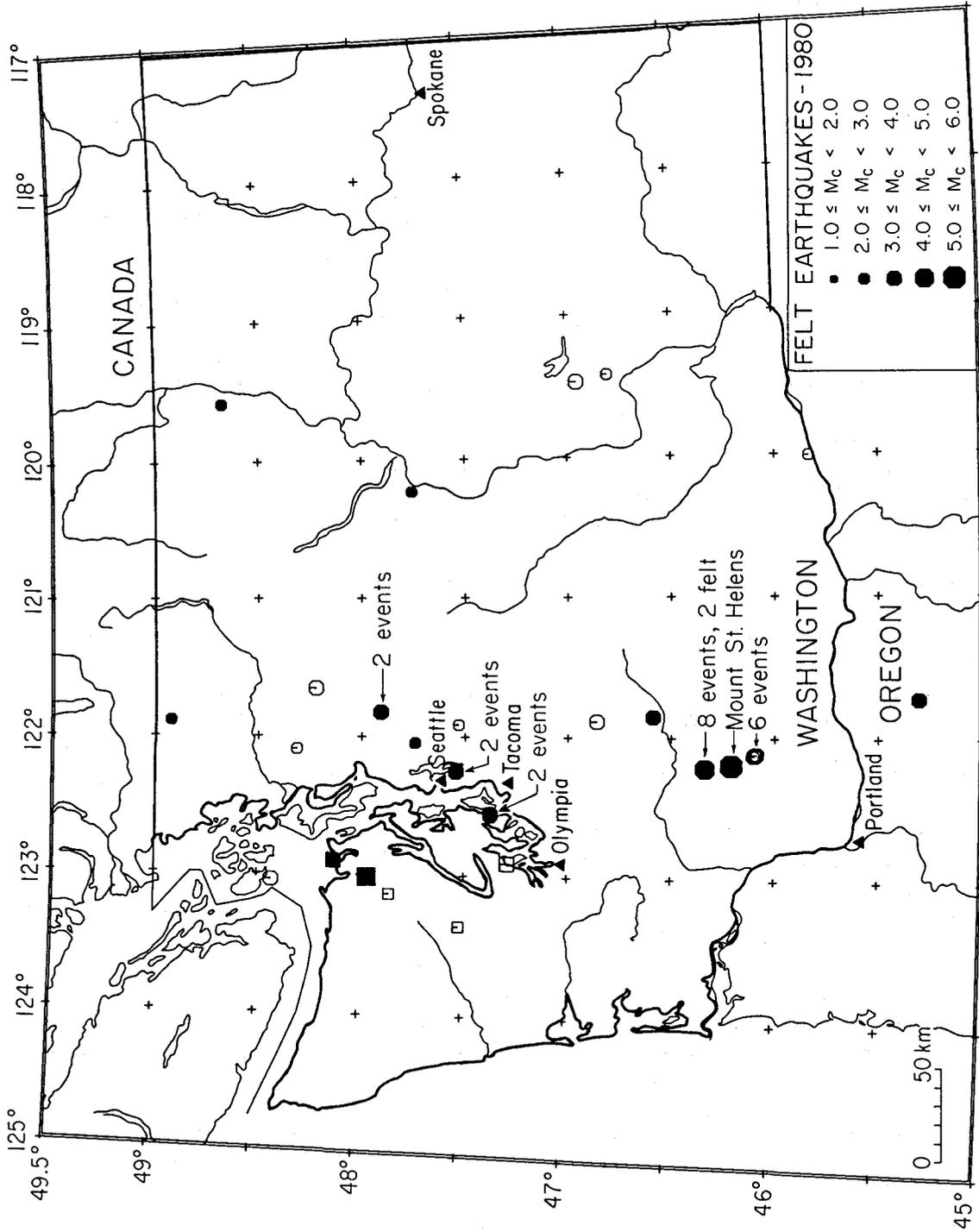


Figure 7. Felt and other important earthquakes in Washington and northern Oregon in 1980. All earthquakes in 1980 of  $M_c \geq 2.7$  are shown. Earthquakes deeper than 30 km are shown as squares. (See caption, Fig. 1.) Earthquakes not felt are shown as open symbols, and felt earthquakes are shown as solid symbols.

B.C., in the San Juan Islands, and as far east as Mount Vernon (intensity IV). Two shallow earthquakes ( $M_C$  3.7 and 3.3) were felt strongly (intensity V) in Seattle on June 23.

In September three earthquakes were felt northeast of Seattle. The first two occurred on September 19 ( $M_C$  3.8) and September 21 ( $M_C$  3.5) and were felt near Monroe. A small earthquake on September 30 ( $M_C$  2.8) was felt in Duvall. In October small earthquakes were felt in Whatcom County near the Canadian border (October 16,  $M_C$  2.4) and in Packwood, 25 km south of Mount Rainier (October 19,  $M_C$  3.0).

### MOUNT ST. HELENS REGION

During 1980 the Mount St. Helens region was the most active earthquake zone in Washington and northern Oregon (Fig. 4). This was due principally to the eruption of Mount St. Helens, which not only caused thousands of volcanic earthquakes but apparently also triggered tectonic earthquakes to the north at Elk Lake and to the south at Marble Mountain. In 1979 we recorded three earthquakes that were located at Mount St. Helens--on October 13 ( $M_C$  1.4), November 14 ( $M_C$  2.0), and December 2 ( $M_C$  1.0). On February 9, 1980, a moderately large ( $M_C$  3.2) low-frequency earthquake occurred which may have signaled the first movement of magma in the mountain. However, the number of minor earthquakes at Mount St. Helens did not increase significantly until March 13. By March 17, there were at least 30 small events per day, and these led to a  $M_C$  4.2 earthquake on March 20. This earthquake was followed by 2 months of intense seismic energy release reported by Endo and others (1981).

Within 28 hours of the March 20 earthquake, four new seismographs were installed around Mount St. Helens to supplement the station SHW, which had operated on the mountain's west flank since 1972. By March 30 eleven stations were operating, and five more were later added. Many of the volcanic earthquakes that we located prior to the deployment of the new seismic stations are not as precisely located as later earthquakes, and they have been assigned the lowest, or "D", quality in Appendix II. Figure 4 does not show these D quality epicenters. Because of the overwhelming number of volcanic earthquakes between March 20 and the cataclysmic eruption of May 18, we have not processed all the seismic data, and the catalog of hypocenters in Appendix II is incomplete for volcanic earthquakes that may have  $M_{NEW} < 4.0$  during that period.

Many of the earthquake locations for the period May 18 at 18:54 UT until May 19 at 00:42 UT are of poor quality because of the intense earthquake activity following the eruption at 15:32 UT on May 18, which obscured seismic signals. Many large earthquakes (some of them deep) occurred during the several hours following the eruption, and they are the subject of papers by Weaver and others (1981), Scandone and Malone (1985), Shemeta and Weaver (in press), and C. S. Weaver and J. E. Shemeta (written commun., 1986).

The 1980 Mount St. Helens earthquake patterns and volcanic eruptions were complex and are documented in more detail by Malone and others (1981), Weaver and others (1981), and Endo and others (1981), Qamar and others (1983), Shemeta and Weaver (in press), and C. S. Weaver and J. E. Shemeta (written commun., 1986). An important lesson learned was that the main eruption on May

18 and the later eruptions of May 25, June 12, July 22, August 17, and October 16 were all preceded by some sort of seismic activity (Malone and others, 1983). This knowledge allowed us to consistently predict the later eruptions of Mount St. Helens with an uncertainty of a few hours or days (Swanson and others 1983). The devastating eruption of May 18 was preceded by 2 months of intense earthquake activity (magnitudes as much as 5) and periods of volcanic tremor, whereas later eruptions were preceded by increased seismic activity lasting from a few hours to a few days. Other than the thousands of earthquakes between March 20 and May 18, no distinctive earthquake activity seemed to signal the ultimate eruption at 15:32 UT and the  $M_C$  5.7 earthquake that accompanied it. Although of unusually long duration, the 15:32 UT earthquake had signal amplitudes comparable to those of other earthquakes in the preceding 2 months. However, on May 18 the earthquake triggered a massive landslide of the north flank of Mount St. Helens, which had been steadily bulging during April and May (Voight and others, 1981). The protracted landslide not only increased the duration of the earthquake (Kanamori and Given, 1982; Kanamori and others, 1984; Burger and Langston, 1985) but also depressurized the mountain, causing it to erupt a few seconds later.

The seismic precursors of later eruptions varied in pattern. When the central vent was relatively clear (no dome capping the vent), eruptions were preceded mostly by volcanic tremor (May 25, June 12, and August 17), although a short period of tremor on June 3 produced no eruption. When the vent was plugged by a lava dome, eruptions were preceded by low-frequency earthquakes (May 18, July 22, October 16; Malone and others, 1981). Several eruptions, including the one on May 18, were followed by small, high-frequency, deep earthquakes occurring as much as 20 km below the mountain, evidence that some eruptions were accompanied by magma movements deep under the volcano (Weaver and others, 1981; Scandone and Malone, 1985; C. S. Weaver and J. E. Shemeta, written commun., 1986).

Within a few hours of the May 18 eruption of Mount St. Helens, a series of tectonic earthquakes began near Elk Lake, 17 km north of the volcano (Grant and others, 1984). Although not responsible for the tectonic stress that produced these earthquakes, the eruption may have triggered the Elk Lake sequence that produced several earthquakes of  $M_C \leq 3.3$  in the next 4 days and three  $M_C \geq 4.0$  events on May 24 and 28. The sequence continued with approximately two earthquakes per week until July 25. Only three more small earthquakes occurred between that time and February 1981, when the mainshock of the series occurred on February 14, 1981 ( $M_C$  5.5). The five largest 1980 Elk Lake earthquakes had fault-plane solutions consistent with the mechanism and the aftershock pattern of the 1981 main shock, indicating a north-south-trending right-lateral, strike-slip fault.

On July 7, 1980, another swarm of tectonic earthquakes began near Marble Mountain immediately north of Swift Reservoir and 12 km southeast of Mount St. Helens. The largest of these reached magnitude 3.5 on July 20, and they exhibited strike-slip fault plane solutions with a preferred strike direction of N 25° W. (Weaver and others, 1981).

### MAGNITUDES OF MOUNT ST. HELENS EARTHQUAKES

We have examined several methods of determining magnitude for the shallow low-frequency volcanic earthquakes that preceded the major eruption of Mount St.

Helens on May 18, 1980. Unless otherwise noted, all magnitudes appearing in Appendices I and II are coda magnitudes  $M_C$ , computed from the following equation:

$$M_C = -2.46 + 2.82 \log_{10}(\tau) \quad (1) \quad \text{Coda Mag. vs Duration (Crosson, 1972)}$$

derived for tectonic earthquakes in western Washington by Crosson (1972).  $\tau$  is the duration of the recorded signal in seconds, which we determine by subtracting the P-wave arrival time from the time at which the signal decays to twice the amplitude of background noise. Crosson (1972) developed equation (1) to determine earthquake magnitudes from coda durations ( $M_C$ ) that would agree closely with Richter-like magnitudes (Richter, 1958) determined from signal amplitudes recorded on the Seattle Wood-Anderson seismograph ( $M_{SEA}$ ).

Equation (1) was never intended to be applied to the shallow volcanic earthquakes that preceded the May 18 eruption of Mount St. Helens. We have compared several magnitude scales for Mount St. Helens earthquakes, including scales based on amplitude and coda length. As described below, we conclude that the use of equation (1) for shallow volcanic earthquakes yields coda magnitudes that overestimate the measured  $M_{SEA}$  at Seattle by 0.1 to 0.3 units for earthquakes having  $3 \leq M_C \leq 5$ . As part of a discussion below, we present two new equations, (6) and (7), either of which predict Seattle Wood-Anderson magnitudes from the coda durations of shallow Mount St. Helens earthquakes.

Endo and others (1981) first reported that equation (1) yields  $M_C$  magnitudes that are significantly larger than Wood-Anderson magnitudes determined at Newport, Washington ( $M_{NEW}$ ), as shown in Figure 8a. They also note that Wood-Anderson magnitudes determined from the Newport instrument differ consistently from magnitudes determined from the Seattle Wood-Anderson instrument. Figure 8b and equation (5) show that  $M_{NEW}$  is as much as 0.3 units less than  $M_{SEA}$ . From their unpublished data and unpublished data used by Qamar and others (1983), we obtain the following relationships:

$$M_{NEW} = -3.852 + 3.175 \log_{10}(\tau_{CPW}) \quad (2) \quad \text{Newport Mag. vs Coda Duration, station CPW}$$

$$M_{NEW} = -0.287 + 0.962 M_C \quad (3) \quad \text{Newport Mag. vs Coda Mag.}$$

$$M_{NEW} = 2.762 - 0.656 M_C + 0.211 M_C^2 \quad (4) \quad \text{Quadratic alternative to equation (3)}$$

$$M_{NEW} = -0.557 + 1.080 M_{SEA} \quad (5) \quad \text{Newport Mag. vs Seattle Mag.}$$

In the equations,  $\tau_{CPW}$  is signal duration, in seconds, measured at station CPW;  $M_C$  is coda magnitude determined from equation (1) using average coda duration at several stations;  $M_{NEW}$  and  $M_{SEA}$  are Wood-Anderson magnitudes determined from instruments at Newport and Seattle respectively. The equations are least-squares fits to measurements from earthquakes exceeding magnitude 3 only. The intercept standard error and slope standard error for equations (2), (3), and (5) are (0.067, 0.031), (0.044, 0.012), and (0.063, 0.017) respectively.

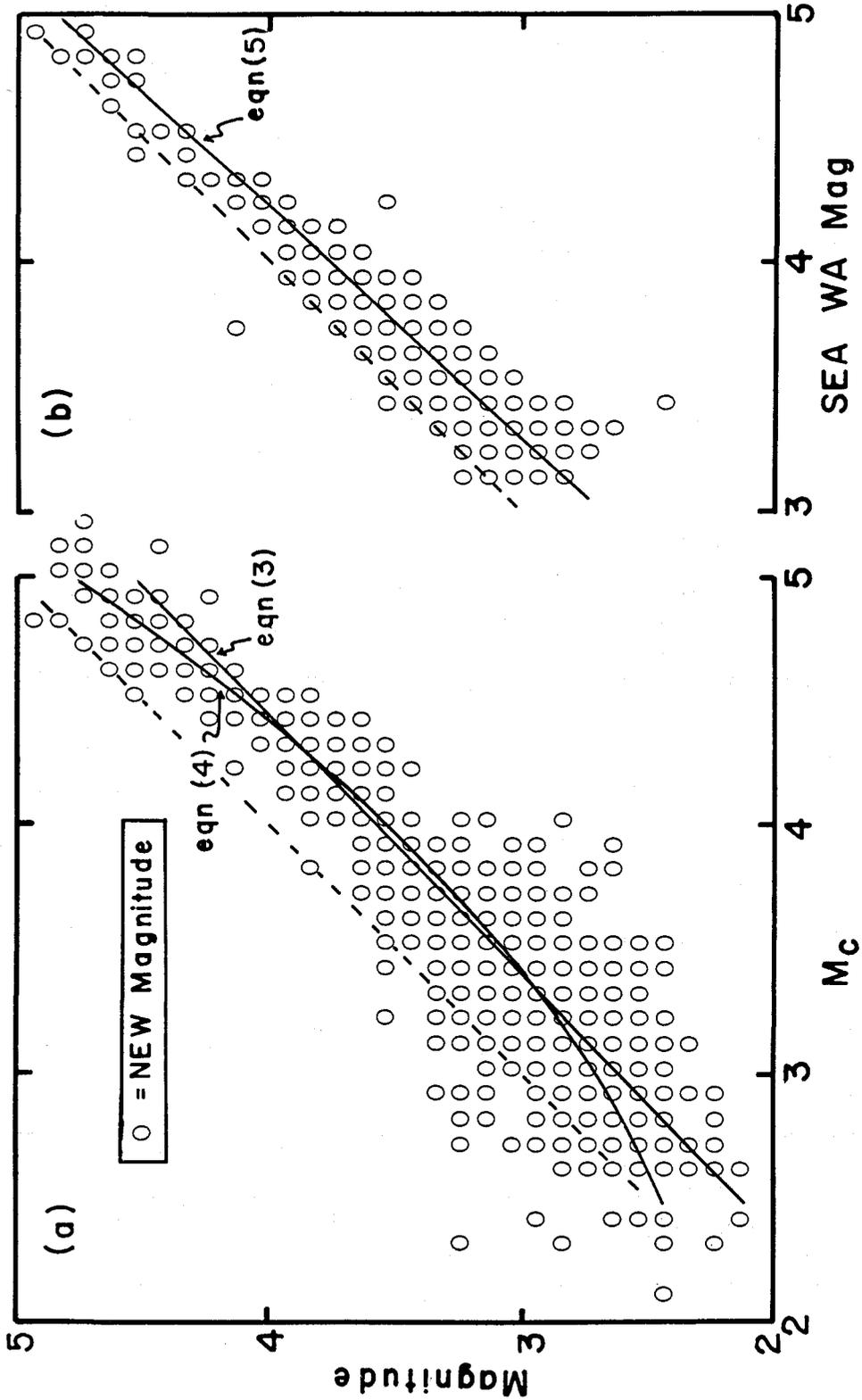


Figure 8. Magnitudes of Mount St. Helens earthquakes, March 20 to May 18, 1980. Wood-Anderson magnitudes  $M_{NEW}$  (NEW in figure) are compared with coda magnitude  $M_C$  in (a) and Wood-Anderson magnitude  $M_{SEA}$  (SEA in figure) in (b). Best fit relations given by equations (3), (4), and (5) are shown by solid lines. Dashed lines, given for reference, indicate  $M_C$  in (a) and  $M_{SEA}$  in (b). As seen in (a) and (b),  $M_{NEW}$  is consistently less than  $M_C$  and  $M_{SEA}$ . Many of these data points have identical values. There are 1,836 points in (a) and 442 points in (b).

The linear equation (3) can be combined with equations (1) and (5) to yield:

$$M_{SEA} = -1.94 + 2.51 \log_{10} \tau \quad (6) \quad \text{Seattle Wood-Anderson Mag. vs Duration}$$

or, alternatively, the quadratic equation (4), which fits the data somewhat better than equation (3) (Fig. 8a), can be combined with equations (1) and (5) to give:

$$M_{SEA} = 5.75 - 4.42 \log_{10} \tau + 1.554 (\log_{10} \tau)^2 \quad (7) \quad \text{Quadratic alternate to equation (6)}$$

Given a duration,  $\tau$ , equations (6) or (7) yield magnitudes of shallow volcanic earthquakes that agree closely with observed  $M_{SEA}$  for  $3 \leq M_C \leq 5$  (Fig. 9a). The use of the traditional equation (1) gives a coda magnitude of  $M_C$  that overestimates  $M_{SEA}$  by 0.1 to 0.3 magnitude units when  $3 \leq M_C \leq 5$ . Figure 9b compares magnitude scales applied to shallow volcanic earthquakes at Mount St. Helens.

Another available magnitude measurement,  $M_{MSO}$ , is based on the maximum amplitude measured on the short-period, vertical component of the WWSSN station MSO at Missoula, Montana (Qamar and others, 1983.) This has been correlated with  $M_{NEW}$ :

$$M_{NEW} = 0.313 + 0.901 M_{MSO} \quad (8) \quad \text{Newport Mag. vs Missoula Mag.}$$

This is also a least-squares fit to measurements from earthquakes exceeding magnitude 3 only. The intercept standard error and slope standard error for equation (8) are (0.038, 0.011). Values of  $M_{MSO}$  are listed in Appendix III, together with  $M_{NEW}$  and  $M_C$ , for all earthquakes above magnitude 3 from March 20 to May 21, 1980.

Endo and others (1981) classified Mount St. Helens earthquakes prior to May 18, 1980, as "high frequency" and "low frequency" based on their characteristics at seismograph CPW, 110 km away. Using this classification, we find:

$$M_{NEW} = -3.810 + 3.180 \log_{10}(\tau_{CPW}) \quad (2a) \quad \text{High frequency}$$

$$M_{NEW} = -3.402 + 2.962 \log_{10}(\tau_{CPW}) \quad (2b) \quad \text{Low frequency}$$

instead of the combined relationship given by equation (2). However, it is difficult to distinguish the two types of earthquakes on the basis of coda magnitude. In fact, equation (2) adequately predicts  $M_{NEW}$  to within 0.1 magnitude units of the values given by equations (2a) or (2b).

In summary, we find that although the traditional equation (1) predicts magnitudes that agree well with Wood-Anderson-based  $M_{SEA}$  when applied to tectonic earthquakes, this equation does not predict  $M_{SEA}$  well when applied to shallow volcanic Mount St. Helens earthquakes in the range  $3 \leq M_C \leq 5$ . For volcanic earthquakes, equation (6) or (7) predicts  $M_{SEA}$  better. Finally, Wood-Anderson magnitudes calculated at different stations can vary significantly, as illustrated by equation (5) and Figure 8b.

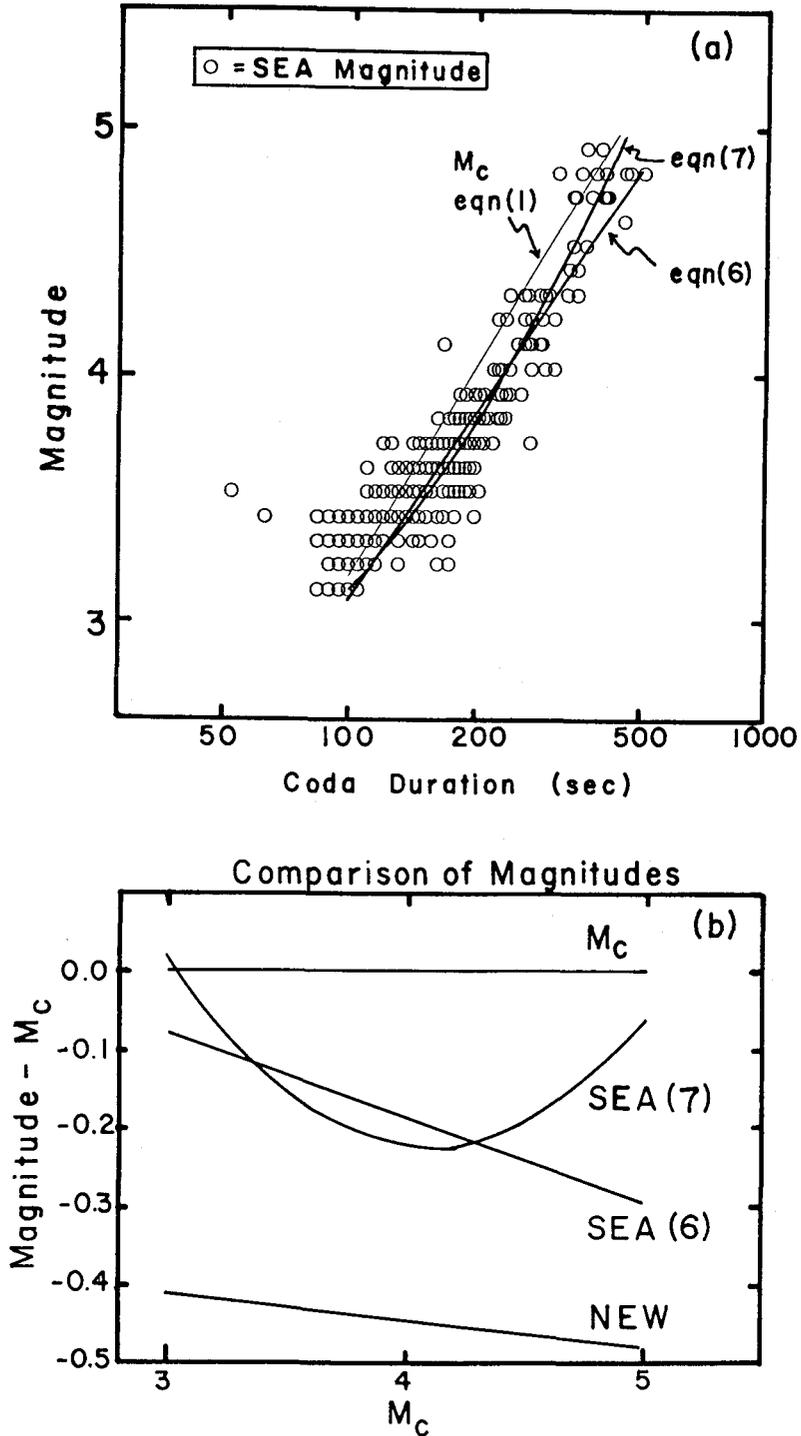


Figure 9. Magnitudes of Mount St. Helens earthquakes, March 20 to May 18, 1980. (a) Circles show  $M_{SEA}$  plotted against  $\log_{10}\tau$  ( $\tau$  = coda duration in seconds) for 426 points. Heavy lines show best fit linear equation (6) and quadratic equation (7). The light line shows predicted coda magnitude given by equation (1). (b) A comparison of  $M_C$ ,  $M_{NEW}$ , and  $M_{SEA}$  for shallow Mount St. Helens earthquakes is shown as a function of magnitude. Two predictions for  $M_{SEA}$  are given based on equations (6) and (7). Note that, for  $3 \leq M_C \leq 5$ ,  $M_C$  usually exceeds  $M_{SEA}$  by 0.1 to 0.3 magnitude units and exceeds  $M_{NEW}$  by 0.4 to 0.5 magnitude units.

## ACKNOWLEDGMENTS

In addition to the authors mentioned in the text, many students and other staff members have contributed to this document. Most worked long hours in the field or the seismology laboratory from March 25 to December 31, 1980, because of the eruptions of Mount St. Helens. The laboratory was usually operating 24 hours a day during this time.

Caryl Michaelson drew attention to peculiar low-frequency events at Mount St. Helens before March 1980 while scanning Develocorder films. Apparently, the events had higher amplitude, longer duration, and more phases than icequakes which occurred periodically on the mountain (Craig Weaver, personal communication, 1986). These observations have not yet been systematically investigated.

During the early activity of Mount St. Helens, Craig Weaver, A. B. Adams, and Bob Norris played back and analyzed analog magnetic-tape data from the portable seismographs. Processing of the digital data ("pinging") was done by Weaver, Wendy Grant, Linda Noson, Steve Malone, and, later, by Susan Carlson. Those who served as analysts, "captains" or "night captains", include Adams, Norris, Christina Boyko, Steve Bryant, Sue Ferguson, Judy Terreberry, and Steve Walter. Several individuals assisted our technicians, Jim Ramey, Laurens Engel, Ed Wildermuth, and Jim Hudspeth; they include Bruce Furukawa, John Coakley, and Ed Criley of the U.S. Geological Survey, as well as graduate students Don Leaver and John Taber and systems programmer Alex Bittenbinder. Bittenbinder and Leaver contributed much of the computer software used in the data processing.

Elliot Endo, of the U.S. Geological Survey, contributed valuable studies of the magnitudes of Mount St. Helens earthquakes. Several people reprocessed 1980 data: Rick Benson, Dawn Mullen, Anne Rathbun, Jim Zollweg, Julie Shemeta, Chris Trisler, and others. William Dunlap did the regression analyses for equations (2) through (5) and (8).

## DESCRIPTION OF APPENDICES

Earthquake locations for 1980 have been divided into two catalogs (Appendices I and II). A key to interpreting Appendices I and II, as well as the catalog in Appendix III, follows. Earthquakes within the Mount St. Helens region (Figs. 3 and 4) are listed separately from those in the rest of Washington and northern Oregon. Although we located 3,231 earthquakes in 1980 in the region of Figure 3, we list only earthquakes exceeding magnitude 1.0 in the catalogs. Epicenters of smaller earthquakes are plotted in Figure 5. There are 1,349 earthquakes listed in the Mount St. Helens catalog (Appendix I) and 740 earthquakes for the rest of Washington and northern Oregon (Appendix II).

Not all earthquakes at Mount St. Helens that had  $M_c \geq 1.0$  were located for the period March 20 to May 21. In fact, the list of earthquake locations at the volcano in Appendix II is only complete for  $M_{NEW} \geq 4.0$  during that period. A more complete list of volcanic earthquakes from March 20 to May 21 is given, without locations, in Appendix III. The list is derived from previously unpublished compilations by Endo, Qamar, and Shemeta (Endo and others, 1981; Qamar and others, 1983; Shemeta and Weaver, in press) and is nearly complete above magnitude 3.

In Appendices I and II the following information is given:

- TIME** Origin time is calculated for each earthquake on the basis of multistation arrival times. Time is given in **Coordinated Universal Time (UTC)** in hours:minutes:seconds. To convert to Pacific Standard Time (PST), subtract 8 hours, or to Pacific daylight time, subtract 7 hours.
- LAT** North latitude, in degrees and minutes, of the epicenter.
- LONG** West longitude, in degrees and minutes, of the epicenter.
- DEPTH** The depth, given in kilometers, is usually freely calculated from the arrival-time data. In some instances, the depth must be fixed arbitrarily to obtain a convergent solution. Such depths are noted by an asterisk (\*) in the column immediately following the depth. A \$ or a # following the depth mean that the maximum number of iterations has been exceeded without meeting convergence tests and both the location and depth have been arbitrarily fixed.
- MAC** Coda magnitude,  $M_C$  from equation (1) except magnitudes in parentheses, which are  $M_{SEA}$ . For tectonic earthquakes in Washington,  $M_C$  is an estimate of local Richter magnitude,  $M_{SEA}$ . Where blank, data were insufficient for a reliable magnitude determination. Normally, the only earthquakes with undetermined magnitudes are very small ones. Magnitude values may be revised as we improve our analysis procedure.
- NS/SP** NS is the number of station observations, and NP the number of P and S phases used to calculate the earthquake location. A minimum of three stations and four phases is required. Generally, more observations improve the quality of the solution.
- GAP** Azimuthal gap. The largest angle (relative to the epicenter) containing no stations.
- RMS** The root mean square residual taken about the mean of the station first-arrival residuals. It is only useful as a measure of the quality of the solution when five or more well distributed stations are used in the solution. Good solutions are normally characterized by RMS values less than about 0.3 sec.
- Q** Two **Quality factors** indicate the general reliability of the solution (A is best, D is worst). Similar quality factors are used by the USGS for events located with the computer program HYPO71. The first letter is a measure of the hypocenter reliability based on travel time residuals. For example: A quality requires a RMS less than 0.15 sec, while a RMS of 0.5 sec or more is D quality. (Estimates of the uncertainty in hypocenter location also affect this quality parameter.) The second letter of the quality code depends on the spatial distribution of stations around the epicenter, that is, number of stations, their azimuthal distribution, and the minimum distance (DMIN) from the epicenter to a station. Quality A requires a solution with eight or more phases,  $GAP < 90^\circ$  and  $DMIN < (5 \text{ km or calculated depth of earthquake, whichever is greater})$ . If the number of phases, NP, is five or less, or  $GAP > 180^\circ$ , or  $DMIN > 50 \text{ km}$ , the solution is assigned quality D.

**MOD** The crustal velocity model used in location calculations (refer to Fig. 1).

P3 - Puget Sound model

C3 - Cascade model

S3 - Mount St. Helens model including Elk Lake

N3 - northeastern model

E3 - southeastern model

**TYP** Earthquake classification

F - earthquakes reported to have been felt

P - probable explosion

L - low-frequency earthquakes

H - handpicked from helicorder records

X - known explosion

In Appendix III the following information is given:

**Dat** Month and day of earthquake

**Time** UTC time earthquake was recorded, in hours and minutes. Usually within one minute of the origin time.

**ty** Earthquake classification by E. Endo based on characteristics of seismic waves recorded at station CPW, 110 km northwest of Mount St. Helens. "h" is high frequency, "l" is low frequency. Blank means no classification attempted. Note that Endo's type "h" is roughly equivalent to "medium" in the more recent classification scheme of Malone and others (1983).

**NEW**  $M_{NEW}$  (Newport Wood-Anderson magnitude)

**MSO**  $M_{MSO}$ . A magnitude scale based on vertical ground motion amplitudes recorded at WWSSN station MSO at Missoula, Montana, described in Qamar and others (1983).

**DUR** Coda magnitude ( $M_C$ ) calculated from signal duration using equation (1). Values in parentheses are  $M_{SEA}$  given for some Mount St. Helens earthquakes on May 18, 1980, whose coda magnitudes could not be estimated (Shemeta and Weaver, in press).

**s** Source of information. w, University of Washington; M, University of Montana; and 2, both universities.

For example, the first entry in Appendix III, 320 2348 h 4.1 4.1 4.2 2, describes a "higher frequency" earthquake recorded on March 20, 1980, at approximately 23:48:00 UTC. It was assigned magnitudes  $M_{NEW}$  4.1,  $M_{MSO}$  4.1, and  $M_C$  4.2. Sources of information are both University of Washington and University of Montana.

## REFERENCES CITED

- Burger, R. R.; Langston, C. A., 1985, Source mechanism of the May 18, 1980 Mount St. Helens eruption from regional surface waves: *Journal of Geophysical Research*, v. 90, no. B9, p. 7653-7664.
- Crosson, R. S., 1972, Small earthquakes, structure, and tectonics of the Puget Sound region: *Seismological Society of America Bulletin*, v. 62, no. 5, p. 1133-1171.
- Crosson, R. S., 1974, Compilation of earthquake hypocenters in western Washington, July 1970-Dec. 1972: *Washington Division of Geology and Earth Resources Information Circular 53*, 25 p.
- Crosson, R. S., 1975, Compilation of earthquake hypocenters for western Washington--1973: *Washington Division of Geology and Earth Resources Information Circular 55*, 14 p.
- Crosson, R. S.; Millard, R. C., 1975, Compilation of earthquake hypocenters in western Washington--1974: *Washington Division of Geology and Earth Resources Information Circular 56*, 14 p.
- Crosson, R. S.; Noson, L. L., 1978a, Compilation of earthquake hypocenters in western Washington--1975: *Washington Division of Geology and Earth Resources Information Circular 64*, 12 p.
- Crosson, R. S.; Noson, L. L., 1978b, Compilation of earthquake hypocenters in western Washington--1976: *Washington Division of Geology and Earth Resources Information Circular 65*, 13 p.
- Crosson, R. S.; Noson, L. L., 1979, Compilation of earthquake hypocenters in western Washington--1977: *Washington Division of Geology and Earth Resources Information Circular 66*, 12 p.
- Endo, E. T.; Malone, S. D.; Noson, L. L.; Weaver, C. S., 1981, locations, magnitudes, and statistics of the March 20-May 18 earthquake sequence. In Lipman, P. W.; Mullineaux, D. R., editors, 1981, *The 1980 eruptions of Mount St. Helens, Washington*: U.S. Geological Survey Professional Paper 1250, p. 93-107.
- Fairfield, Clara, 1980, OMSI sound project--The acoustic effects of the Mount St. Helens eruption on May 18, 1980: *Oregon Geology*, v. 42, no. 12, p. 200-202.
- Geiger, L., 1912, Probability method for the determination of earthquake epicenters from arrival times only: *St. Louis University Bulletin*, v. 8, p. 56-71.
- Grant, W. C.; Weaver, C. S.; Zollweg, J. E., 1984, The 14 February 1981 Elk Lake, Washington, earthquake sequence: *Seismological Society of America Bulletin*, v. 74, no. 4, p. 1289-1309.
- Johnson, C. E., 1979, I, CEDAR--An approach to the computer automation of short-period local seismic networks; II. Seismotectonics of the Imperial Valley of southern California: *California Institute of Technology Doctor of Philosophy thesis*, 343 p.
- Kanamori, Hiroo; Given, J. W., 1982, Analysis of long-period seismic waves excited by the May 18, 1980, eruption of Mount St. Helens--A terrestrial monopole?: *Journal of Geophysical Research*, v. 87, no. B7, p. 5422-5432.
- Kanamori, Hiroo; Given, J. W.; Lay, Thorne, 1984, Analysis of seismic body waves excited by the Mount St. Helens eruption of May 18, 1980: *Journal of Geophysical Research*, v. 89, no. B3, p. 1856-1866.
- Malone, S. D., 1975, 1976, 1977, 1987, 1979, Earthquake monitoring of the Hanford region, eastern Washington; Annual technical report: *University of Washington Geophysics Program*, 1 v., annual.

- Malone, S. D.; Endo, E. T.; Weaver, C. S.; Ramey, J. W., 1981, Seismic monitoring for eruption prediction. In Lipman, P. W.; Mullineaux, D. R., editors, 1981, The 1980 eruptions of Mount St. Helens, Washington: U.S. Geological Survey Professional Paper 1250, p. 803-813.
- Malone, S. D.; Boyko, C.; Weaver, C. S., 1983, Seismic precursors to the Mount St. Helens eruptions in 1981 and 1982: *Science*, v. 221, p. 1376-1378.
- Noson, L. L.; Crosson, R. S., 1980, Compilation of earthquake hypocenters in western Washington--1978: Washington Division of Geology and Earth Resources Information Circular 72, 17 p.
- Noson, L. L.; Ludwin, R. S.; Crosson, R. S., 1985, Compilation of earthquake hypocenters in western Washington--1979: Washington Division of Geology and Earth Resources Information Circular 79, 19 p.
- Qamar, Anthony; St. Lawrence, W. F.; Moore, J. N.; Kendrick, George, 1983, Seismic signals preceding the explosive eruption of Mount St. Helens, Washington, on 18 May 1980: *Seismological Society of America Bulletin*, v. 73, no. 6, p. 1797-1813.
- Rasmussen, N. H., 1967, Washington State earthquakes 1840 through 1965: *Seismological Society of America Bulletin*, v. 57, no. 3, p. 463-467.
- Richter, C. F., 1958, *Elementary Seismology*: W. H. Freeman and Co., 768 p.
- Rosenbaum, J. G.; Waitt, R. B., Jr., 1981, Summary of eyewitness accounts of the May 18 eruption. In Lipman, P. W.; Mullineaux, D. R., editors, 1981, The 1980 eruptions of Mount St. Helens, Washington: U.S. Geological Survey Professional Paper 1250, p. 53-67.
- Scandone, Roberto; Malone, S. D., 1985, Magma supply, magma discharge, and readjustment of the feeding system of Mount St. Helens during 1980: *Journal of Volcanology and Geothermal Research*, v. 23, no. 3-4, p. 239-262.
- Swanson, D. A.; Casadevall, T. J.; Dzurisin, Daniel; Malone, S. D.; Newhall, C. G.; Weaver, C. S., 1983, Predicting eruptions at Mount St. Helens, June 1980 through December 1982: *Science*, v. 221, no. 4618, p. 1369-1376.
- Shemeta, J. E.; Weaver, C. S., (in press), Seismicity accompanying the May 18, 1980, eruption of Mount St. Helens, Washington. In Keller, S. A. C., editor, *Mount St. Helens five years later*: Eastern Washington University Press.
- Taber, J. J., Jr.; Smith, S. W., 1985, Seismicity and focal mechanisms associated with the subduction of the Juan de Fuca plate beneath the Olympic Peninsula, Washington: *Seismological Society of America Bulletin*, v. 75, no. 1, p. 237-249.
- Stover, C. W.; Von Hake, C. A., editors, 1982, *United States earthquakes, 1980*: U.S. Geological Survey, National Oceanic and Atmospheric Administration, 182 p.
- Voight, Barry; Glicken, Harry; Janda, R. J.; Douglass, P. M., 1981, Catastrophic rockslide avalanche of May 18. In Lipman, P. R.; Mullineaux, D. R., editors, 1981, The 1980 eruptions of Mount St. Helens, Washington: U.S. Geological Survey Professional Paper 1250, p. 347-377.
- Weaver, C. S.; Grant, W. C.; Malone, S. D.; Endo, E. T., 1981, Post-May 18 seismicity--Volcanic and tectonic implications. In Lipman, P. W.; Mullineaux, D. R., editors, 1981, The 1980 eruptions of Mount St. Helens, Washington: U.S. Geological Survey Professional Paper 1250, p. 109-121.
- Weaver, C. S.; Smith, S. W., 1983, Regional tectonic and earthquake hazard implications of a crustal fault zone in southwestern Washington: *Journal of Geophysical Research*, v. 88, no. B12, p. 10371-10383.

## APPENDIX I

## EARTHQUAKE CATALOG 1980

Excluding Mount St. Helens region 46°-46.4° N, 122°-122.4° W

DAY	TIME	LAT	LON	Jan 1980		NS/NP	GAP	RMS	Q	MOD	TYP
				DEPTH	M						
1	00:00:15.83	47 49.34	121 57.80	0.38	1.3	5/08	94	0.18	BD	P3	H
1	13:45:56.14	46 54.84	119 33.15	0.44	1.0	5/06	266	0.26	CD	E3	H
1	19:31:41.00	46 56.23	119 35.83	0.03#	1.1	6/06	288	0.36	CD	E3	H
2	08:48:06.90	46 36.92	121 49.79	2.27	1.3	5/06	285	0.07	BD	C3	H
2	09:15:52.79	48 13.48	122 46.20	25.77	1.0	6/08	155	0.10	AC	P3	H
2	11:09:20.32	48 15.49	122 24.53	28.97	1.3	6/12	153	0.17	BC	P3	H
3	00:20:49.62	47 50.80	122 02.85	0.04*	1.7	3/06	215	0.10	AD	P3	P
3	08:11:39.48	46 47.16	124 02.34	34.18	1.7	7/11	252	0.13	BD	P3	H
3	22:26:35.90	47 53.18	118 09.21	6.50	3.2	11/11	140	0.10	AC	N3	P
4	23:25:16.68	47 47.59	119 41.81	0.62	2.3	10/12	107	0.08	AC	N3	P
5	16:02:08.04	46 48.04	119 25.28	0.03*	2.9	17/17	65	0.18	BA	E3	H
6	18:23:01.99	47 31.94	122 30.23	15.35	1.0	4/08	137	0.16	BD	P3	H
7	09:31:13.36	46 29.80	119 32.73	0.54	1.1	4/05	198	0.22	BD	E3	H
7	17:52:25.17	46 27.29	122 24.89	13.25	1.0	5/10	161	0.31	CD	S3	H
7	19:14:37.16	48 18.26	119 33.99	10.50	1.3	8/10	133	0.46	CB	N3	H
8	05:41:16.16	47 17.98	123 17.30	41.16\$	1.1	10/18	122	0.42	CB	P3	H
8	10:19:41.38	47 47.08	122 03.94	19.85	1.1	4/07	219	0.16	CD	P3	H
8	12:29:56.42	46 40.50	122 17.88	16.11	1.4	10/13	87	0.20	BA	C3	H
8	19:22:53.02	46 38.55	122 16.28	16.29	1.5	6/10	122	0.19	BC	C3	H
8	19:26:53.06	46 39.00	122 16.86	16.96	1.5	7/09	136	0.26	BC	C3	H
8	22:38:47.51	48 17.77	122 03.13	11.90	1.4	4/08	247	0.08	AD	P3	H
9	10:39:59.89	47 28.93	120 43.40	1.48\$	1.5	15/17	60	0.39	CC	C3	H
9	12:47:10.29	47 17.45	122 54.31	45.22	3.3	20/22	69	0.26	BA	P3	H
10	11:58:48.57	47 46.44	120 01.98	5.36	1.4	12/15	67	0.25	BA	N3	H
11	09:44:49.94	45 39.58	122 39.99	0.02*	1.8	5/07	305	0.14	AD	C3	H
11	10:58:14.22	48 15.45	123 28.11	28.64	1.1	7/11	130	0.10	AB	P3	H
11	20:17:26.45	47 50.58	119 59.40	0.52	1.4	10/14	82	0.21	BB	N3	H
11	21:40:23.65	47 33.59	122 45.20	15.08	1.5	10/16	60	0.06	AA	P3	
11	22:50:12.38	46 15.91	118 54.16	0.02*	1.1	9/10	179	0.36	CC	E3	X
12	21:51:26.76	47 42.21	122 16.52	22.35	1.3	6/06	82	0.05	AC	P3	
14	23:35:15.05	47 32.37	121 43.63	0.02*	1.3	6/08	182	0.23	BD	P3	H
16	18:00:03.16	46 15.62	118 54.09	0.02*	1.3	8/09	165	0.13	AC	E3	X
16	19:26:48.08	47 53.26	118 06.29	9.20	2.4	12/14	256	0.10	AD	N3	P
17	02:01:54.57	46 16.45	118 52.34	0.03*	1.4	7/08	153	0.18	BC	E3	X
17	02:02:48.82	46 35.31	118 58.21	4.27	1.4	12/13	138	0.25	BC	E3	P
17	05:39:21.37	47 23.08	122 20.07	3.96	1.4	12/21	86	0.22	BC	P3	
18	00:59:29.24	47 56.94	122 10.27	21.94	1.5	10/16	84	0.10	AA	P3	H
18	18:21:00.00	46 15.50	118 53.55	0.03*	1.3	12/12	130	0.24	BC	E3	X
19	17:28:42.59	46 14.76	118 54.87	5.32	1.0	8/08	157	0.38	DC	E3	X
19	20:01:06.50	46 15.18	118 53.52	1.18	1.5	12/12	166	0.18	BC	E3	X
21	18:29:37.37	47 13.69	121 50.38	6.81#	1.6	4/07	197	0.46	CD	C3	P
21	22:29:25.97	46 14.43	118 53.04	3.22	1.1	12/12	130	0.24	BC	E3	X
21	22:43:21.17	46 41.55	122 45.14	0.03*	2.1	5/07	104	0.42	CD	P3	P
22	22:24:11.99	46 15.28	118 53.34	2.71	1.1	10/11	130	0.20	BC	E3	X
22	23:24:54.53	48 26.50	124 43.73	6.65\$	2.2	4/05	317	0.72	DD	P3	P
24	21:35:17.96	46 13.40	118 51.17	0.03*	1.3	9/10	268	0.12	AD	E3	X
25	00:07:09.47	46 21.90	123 22.27	0.02*	1.4	4/06	297	0.21	BD	P3	P
25	00:50:03.43	46 49.13	122 23.29	0.02*	1.4	10/14	116	0.10	AC	P3	H
25	16:23:07.64	46 51.44	120 30.90	12.86\$	1.7	10/14	165	0.51	DD	E3	
25	19:32:57.75	47 50.63	122 02.67	0.03*	1.6	4/06	158	0.11	AD	P3	P
26	20:00:40.48	49 12.84	120 06.73	6.44	2.5	11/11	281	0.94	DD	N3	
27	05:20:19.46	46 16.96	122 29.20	10.57\$	1.6	6/07	174	0.23	DC	S3	H
27	06:12:33.22	47 40.65	120 19.24	3.58	1.1	6/08	134	0.11	AC	N3	
27	22:25:16.74	48 12.57	121 43.89	0.02*	1.3	8/12	275	0.28	BD	P3	H
27	23:41:44.76	48 21.34	122 10.85	13.40	1.5	6/09	231	0.09	BD	P3	
28	07:16:39.62	46 17.34	120 27.10	4.63	2.6	20/21	211	0.61	DD	E3	
28	19:27:28.34	46 51.53	119 29.17	4.49	1.5	9/10	221	0.46	CD	E3	H
29	00:39:12.21	47 53.72	118 06.57	8.23	1.5	8/09	276	0.08	BD	N3	X
29	00:41:56.32	46 51.64	121 53.06	8.85	3.5	21/22	89	0.24	BC	C3	
29	06:07:32.84	47 50.46	122 34.42	22.48	1.6	15/19	62	0.12	AB	P3	

## 26 EARTHQUAKE HYPOCENTERS - 1980

Jan 1980, cont'd												
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP	
29	06:41:01.05	46 32.30	121 30.38	4.02*	1.3	4/04	243	0.03	AD	C3	H	
30	00:29:41.46	47 53.70	118 07.18	7.51	2.0	12/13	275	0.14	BD	N3	P	
30	04:50:28.21	46 40.76	122 20.26	8.72\$	1.2	5/10	198	0.39	DD	C3	H	
30	16:45:18.33	47 38.01	122 11.60	24.84	1.6	13/17	72	0.08	AA	P3		
30	22:14:11.55	46 14.61	118 54.69	3.93	1.0	12/15	164	0.35	CC	E3	X	
31	01:23:15.54	46 14.88	118 53.84	2.17	1.8	7/07	181	0.20	BD	E3	X	
31	01:41:01.51	48 45.50	122 03.98	1.82\$	1.6	6/08	201	0.42	DD	P3	H	
Feb 1980												
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP	
1	00:39:51.10	47 52.57	118 07.44	7.51\$	1.9	17/19	282	0.42	CD	N3	P	
1	04:51:58.38	48 18.86	122 17.63	9.04	1.4	5/07	258	0.30	CD	P3	H	
1	21:57:00.50	49 18.50	120 26.51	8.72\$	1.9	11/15	283	0.66	DD	C3		
2	00:30:24.34	47 54.94	118 03.54	7.98	1.9	14/21	287	0.14	BD	N3	P	
2	19:50:27.41	47 42.65	121 23.17	0.04*	2.1	8/09	289	0.21	BD	C3	H	
2	20:06:51.19	46 48.24	119 25.36	0.03*	1.2	17/22	65	0.18	BC	E3	X	
4	08:25:47.70	46 48.23	119 25.52	3.15	1.3	10/12	105	0.23	BC	E3	H	
4	16:11:45.55	44 59.71	121 49.80	0.02*	2.6	6/06	307	0.24	BD	C3	H	
4	16:27:33.68	45 04.43	121 48.64	0.02*	2.3	6/06	303	0.19	BD	C3	H	
4	19:38:33.26	47 23.09	121 33.98	96.35	2.4	28/33	74	0.26	BA	C3		
4	20:40:21.97	47 50.12	122 34.35	19.24	1.4	8/11	95	0.11	AB	P3		
5	19:28:06.86	46 24.50	119 16.68	0.02*	1.5	6/10	119	0.14	AC	E3		
5	21:17:07.46	46 15.16	118 52.91	3.28	1.0	9/10	150	0.18	BC	E3	X	
6	15:50:16.29	46 15.22	118 52.77	2.90	1.6	8/09	204	0.28	BD	E3	X	
6	16:16:45.58	46 14.69	118 53.50	2.94	1.1	10/13	129	0.22	BC	E3	X	
6	23:47:14.29	47 48.68	121 58.03	0.71	1.4	4/05	139	0.02	AD	P3	P	
7	20:09:03.81	45 06.55	121 48.80	0.05*	2.2	6/06	299	0.33	CD	C3	H	
9	00:38:46.03	47 21.48	118 48.20	13.63	1.5	6/06	161	0.57	DC	N3		
9	01:17:35.14	46 14.91	118 52.08	3.98	1.1	11/14	132	0.27	BC	E3	X	
9	04:46:34.82	47 43.12	121 27.07	8.11	1.4	10/12	107	0.16	BC	C3		
9	18:04:45.27	46 14.29	118 57.21	3.06	1.1	13/17	123	0.22	BC	E3	X	
9	18:12:00.61	46 14.89	118 51.68	2.98	1.1	11/15	133	0.25	BC	E3	X	
9	20:29:14.21	47 52.45	118 09.84	7.98	1.4	10/11	281	0.27	BD	N3	P	
9	21:55:36.70	46 15.13	118 52.32	3.00	1.2	12/13	132	0.19	BC	E3	X	
9	22:18:13.31	46 14.29	118 57.03	2.51	1.2	13/15	123	0.20	BC	E3	X	
10	16:18:16.71	46 56.13	119 35.54	3.32	1.1	12/17	89	0.13	AC	E3		
11	18:07:55.83	46 14.72	118 52.09	3.02	1.1	8/10	151	0.23	BC	E3	X	
11	21:09:02.45	46 14.49	118 57.05	2.79	1.0	13/16	124	0.20	BC	E3	X	
12	19:53:39.07	47 24.40	121 54.73	22.46	1.8	11/15	104	0.90	DB	P3	H	
12	20:30:50.72	47 45.28	120 36.09	0.02*	1.2	7/09	172	0.10	AC	C3	H	
12	20:47:50.99	47 45.22	120 37.43	1.64\$	1.4	7/10	197	0.50	DD	C3	H	
12	21:34:02.55	47 30.21	122 01.86	0.04*	1.1	7/07	118	0.03	AC	P3	P	
12	21:41:20.28	46 14.81	118 52.30	0.03*	2.0	7/11	217	0.23	BD	E3	X	
13	03:02:54.86	48 48.41	122 54.32	17.42*	1.3	8/09	167	0.14	AC	P3	H	
13	14:31:49.40	45 59.82	122 45.45	5.34	1.1	3/04	265	0.	AD	C3	H	
13	19:22:26.48	47 53.00	118 08.90	8.37	1.6	13/15	142	0.15	AD	N3	P	
13	21:56:33.18	46 44.73	123 49.06	18.14	1.4	7/07	267	0.24	DD	P3	H	
13	23:54:24.76	46 36.01	118 56.06	3.27	1.8	9/13	266	0.14	AD	E3	H	
14	23:39:39.10	46 12.11	118 47.34	0.39#	1.5	5/07	167	0.25	BD	E3	X	
16	13:32:10.14	47 39.49	120 22.65	3.30	1.2	8/13	156	0.09	AC	N3		
17	14:17:36.04	47 00.30	120 38.23	5.96	2.1	19/22	58	0.28	BC	N3		
18	19:21:37.36	46 15.08	118 50.93	5.22	1.2	8/10	134	0.23	BC	E3	X	
18	20:41:09.87	47 34.62	119 43.91	7.35	1.7	11/15	103	0.24	BC	N3	H	
18	20:58:09.78	47 34.92	119 42.18	13.72*	2.0	13/18	90	0.23	BB	N3		
18	22:09:14.42	49 19.16	120 11.28	33.85\$	2.5	7/09	299	0.57	DD	C3		
19	00:33:40.65	47 53.39	118 08.27	7.88	1.5	13/18	142	0.23	BD	N3	P	
19	00:49:28.40	47 09.33	121 54.22	0.54	1.7	8/11	100	0.18	BB	P3	P	
19	05:12:04.64	45 59.24	118 32.66	8.95	1.5	6/09	153	0.10	AC	E3		
19	22:28:36.60	46 15.16	118 52.12	2.80	1.1	12/14	132	0.38	CC	E3	X	
20	00:36:49.22	47 52.87	118 07.86	9.41	1.7	17/19	143	0.31	CD	N3	P	
20	14:50:03.00	47 32.64	122 30.40	19.88	1.0	6/11	111	0.17	BC	P3		
22	00:14:27.18	46 42.30	122 21.31	0.03*	1.3	7/11	85	0.28	BB	C3	P	
22	19:14:40.25	47 47.25	121 55.26	21.77	1.2	6/07	132	0.08	AC	P3	H	
22	20:16:23.38	45 52.26	119 20.20	0.88	1.9	11/13	185	0.23	BD	E3		
22	22:05:33.72	47 14.72	121 03.71	1.19#	1.0	5/06	203	0.65	DD	C3	P	
23	18:53:17.01	46 14.95	118 53.82	1.86	1.0	6/07	162	0.14	BC	E3	X	
24	00:34:28.94	46 15.52	118 51.40	2.48	1.4	10/11	154	0.33	CC	E3	X	
25	23:12:37.27	46 15.52	118 44.07	6.88\$	1.3	6/08	194	0.28	CD	E3	X	

Feb 1980, cont'd											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
26	01:26:45.71	46 14.85	118 47.98	15.39	1.2	5/08	244	0.32	CD	E3	X
26	09:32:22.37	47 25.14	121 46.48	15.50	1.0	6/08	149	0.09	AC	P3	
26	17:10:47.14	46 15.01	118 42.54	14.99	1.1	5/07	265	0.35	DD	E3	X
27	00:36:24.52	46 23.40	121 42.16	7.25*	1.3	4/06	239	0.20	BD	C3	H
27	01:25:41.14	47 30.19	122 01.96	0.02*	1.1	7/08	118	0.07	AC	P3	H
27	01:58:45.41	47 34.65	122 29.48	23.05	2.2	13/15	45	0.06	AA	P3	
27	16:47:44.90	48 24.04	122 16.57	13.89*	1.3	6/07	246	0.08	AD	P3	
28	22:05:11.19	46 45.36	122 23.44	0.02*	1.5	8/09	75	0.12	AC	P3	P
28	22:11:52.13	46 13.47	118 53.03	0.49	1.7	7/08	160	0.14	AC	E3	P
28	22:52:46.63	46 19.24	119 45.87	4.29	2.0	7/07	234	0.34	CD	E3	P
29	14:48:50.62	47 25.36	122 43.02	22.00	2.3	15/16	58	0.09	AA	P3	H
29	16:05:26.19	47 45.32	120 02.64	5.35	2.3	16/22	61	0.16	BB	N3	
29	19:14:42.67	45 46.82	119 23.54	0.03*	2.0	8/09	254	0.27	BD	E3	X
29	19:35:59.15	46 07.74	119 01.75	0.05*	1.4	5/07	156	0.16	BD	E3	X
29	21:34:02.24	46 15.05	118 54.87	3.09	1.1	6/07	124	0.18	BC	E3	X

Mar 1980											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
1	16:34:49.49	46 14.83	118 54.62	2.02	1.0	7/07	125	0.13	AC	E3	X
1	22:04:16.07	46 15.00	118 55.02	2.34	1.2	8/08	103	0.13	AC	E3	X
2	19:50:26.94	47 42.39	121 28.97	10.02	2.7	20/24	104	0.15	BC	C3	
3	14:15:28.71	46 52.50	119 19.17	0.51	2.0	9/10	104	0.11	AB	E3	
4	00:42:17.02	45 56.40	119 39.84	0.02*	2.6	11/11	275	0.25	BD	E3	
4	16:14:30.74	47 41.00	120 09.74	3.31	1.1	4/07	164	0.25	CD	N3	
4	20:41:41.74	46 46.83	121 53.77	9.94	2.0	10/12	156	0.23	BC	C3	H
5	02:05:00.04	46 13.67	122 35.26	5.48	1.4	6/08	202	0.02	AD	C3	H
5	05:00:52.55	46 44.35	121 42.70	6.36	1.3	6/09	205	0.06	AD	C3	H
6	07:00:47.93	47 47.84	121 56.95	24.20	2.1	15/19	85	0.13	AA	P3	H
6	14:19:15.81	47 48.05	121 57.21	25.22	1.0	4/06	141	0.02	AD	P3	H
6	22:47:38.13	46 08.92	122 42.65	3.43§	1.9	9/10	231	0.33	DD	C3	H
7	00:28:44.01	47 09.10	121 55.99	0.04*	1.1	5/07	228	0.18	BD	P3	P
7	02:58:32.02	47 44.00	120 05.14	2.03*	2.5	14/16	80	0.16	BB	N3	
7	05:42:10.93	46 48.15	121 32.17	5.83	1.2	4/08	333	0.04	BD	C3	H
7	12:44:58.53	47 45.74	122 17.94	17.77	1.2	7/09	132	0.05	AB	P3	
7	17:15:28.42	46 15.12	118 53.63	0.99	1.4	14/16	78	0.41	CC	E3	X
7	18:03:25.27	46 06.94	119 02.79	0.02*	1.1	10/12	143	0.20	BC	E3	
7	20:35:44.83	47 14.33	121 45.54	3.61	1.3	7/08	97	0.16	BB	C3	P
7	21:26:46.03	47 50.61	122 03.21	0.03*	1.1	4/05	217	0.11	AD	P3	P
7	23:44:32.53	49 22.41	120 34.15	20.19	1.8	9/12	302	0.40	CD	C3	
11	02:29:53.54	46 54.87	121 56.51	8.09	2.1	14/15	111	0.17	BC	C3	H
12	17:02:05.03	46 07.48	119 01.54	3.19	2.6	10/11	121	0.15	BC	E3	
13	04:15:32.56	48 41.79	123 26.37	18.95	1.8	9/12	106	0.23	BB	P3	H
14	13:53:19.43	47 43.54	120 16.72	1.90	1.6	13/16	86	0.13	BB	N3	
14	17:32:11.22	46 14.82	118 54.86	0.79	1.3	9/10	111	0.08	AC	E3	X
15	17:34:43.17	46 14.80	118 55.12	0.40*	1.5	8/08	111	0.10	AC	E3	X
17	17:48:26.11	48 37.27	123 06.66	19.94§	2.2	12/15	103	0.33	CB	P3	
17	18:00:28.18	46 14.70	118 55.41	0.24	1.1	8/08	122	0.09	BC	E3	X
18	16:45:43.72	46 14.87	118 55.41	0.03*	1.3	10/10	175	0.11	AC	E3	X
18	19:22:57.64	47 53.38	118 08.70	7.82§	1.8	13/14	151	0.20	BD	N3	
18	19:55:14.50	46 54.71	123 27.51	12.96	1.4	4/06	212	0.42	CD	P3	
19	19:22:03.94	47 53.20	118 08.35	10.14	2.2	16/18	147	0.31	CD	N3	
20	00:14:46.60	46 36.49	118 56.64	2.83	1.5	8/11	229	0.21	BD	E3	
20	16:40:22.40	46 15.43	118 54.32	0.02*	1.3	13/14	80	0.24	BC	E3	X
20	21:51:58.74	47 18.28	121 59.11	0.04*	1.5	5/07	174	0.38	CD	P3	
21	00:30:53.94	46 14.88	118 54.03	2.49	1.1	14/14	80	0.20	BC	E3	X
21	15:25:21.33	45 45.27	122 30.81	3.55	1.8	4/05	299	0.14	CD	C3	H
21	16:45:56.42	45 54.27	119 18.51	0.03*	1.5	8/09	192	0.15	BD	E3	X
22	00:32:46.37	47 53.54	118 08.66	8.65	1.9	11/13	142	0.27	BD	N3	
22	17:18:26.53	46 14.57	118 53.86	0.03*	1.4	13/13	81	0.32	CC	E3	X
22	20:41:00.63	46 14.34	118 57.51	0.03*	1.4	12/13	107	0.21	BC	E3	X
22	20:45:24.56	46 50.16	122 22.87	0.03*	2.3	14/18	67	0.22	BC	P3	P
23	07:01:56.52	48 42.13	123 26.70	20.16*	1.8	7/10	106	0.18	BB	P3	H
24	09:37:59.79	47 32.10	122 27.34	17.38	1.0	7/09	150	0.09	AC	P3	H
24	13:41:38.09	48 28.16	122 49.12	54.69	1.2	9/15	121	0.14	AB	P3	H
25	10:57:56.28	47 58.65	123 08.38	44.76	1.8	12/14	104	0.18	BB	P3	
25	19:19:09.03	47 52.82	118 09.02	7.71	1.5	13/13	130	0.11	AC	N3	P
25	23:07:56.66	46 31.90	119 24.74	2.66	1.3	6/06	112	0.05	AC	E3	
25	23:40:29.56	46 08.91	119 11.44	1.41	2.0	11/12	160	0.33	CC	E3	

## 28 EARTHQUAKE HYPOCENTERS - 1980

Mar 1980, cont'd											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
26	23:00:53.00	46 31.49	119 25.20	1.37	1.3	7/07	115	0.08	AB	E3	
27	17:14:06.96	46 32.67	119 24.16	6.53	1.4	7/07	106	0.13	AB	E3	P
28	00:09:26.61	45 54.09	119 41.33	0.03*	2.4	14/14	202	0.14	AD	E3	P
28	14:07:06.46	47 41.49	120 20.30	4.66	1.4	4/06	236	0.07	AD	N3	
29	22:10:49.91	46 31.86	119 25.27	3.22	1.2	8/09	117	0.18	BB	E3	
31	21:10:36.21	47 48.24	122 19.15	22.01	2.1	15/15	142	0.12	AC	P3	
Apr 1980											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
2	22:25:33.82	47 07.26	118 45.96	7.81*	2.1	14/14	192	0.23	BD	N3	P
4	07:38:17.68	47 53.14	121 48.26	16.04*	1.2	5/08	157	0.40	CD	P3	H
6	23:56:25.87	46 14.54	119 33.39	10.16	1.4	9/09	159	0.12	BC	E3	
7	14:17:20.56	46 15.08	119 33.43	7.40	1.1	6/06	150	0.24	BC	E3	
7	18:19:45.95	46 14.92	119 32.50	7.33	1.3	8/08	155	0.08	AC	E3	
7	23:01:12.36	48 11.33	123 41.70	23.37	1.4	4/06	305	0.11	BD	P3	P
8	01:30:20.11	47 24.75	118 22.91	7.27	2.0	12/13	167	0.34	CC	N3	P
8	19:11:45.60	47 52.85	118 08.59	9.06	1.6	13/13	142	0.27	BD	N3	P
8	21:04:09.81	47 00.98	122 10.01	0.02*	1.0	8/08	122	0.05	AB	P3	P
9	11:26:47.67	46 17.90	119 30.83	6.55	1.0	6/07	172	0.14	BC	E3	H
10	03:22:04.81	47 51.22	120 01.03	0.04*	1.8	10/13	88	0.18	BB	N3	
11	06:29:29.70	46 48.21	119 31.07	0.40	1.3	5/05	203	0.08	AD	E3	
14	21:16:01.96	45 58.73	118 17.72	0.03*	2.4	9/09	245	0.21	BD	E3	P
15	19:23:48.12	47 52.69	118 08.92	9.31	1.5	10/10	261	0.11	BD	N3	P
16	14:47:06.79	48 07.75	122 54.01	50.10	3.8	14/15	70	0.12	AA	P3	F
16	18:34:58.50	46 32.61	119 24.58	7.56	1.1	6/07	134	0.19	BC	E3	
17	00:31:42.81	47 52.72	118 08.93	7.72	1.4	11/11	138	0.16	BC	N3	P
17	23:05:39.23	47 28.42	118 28.64	8.33	2.0	14/14	152	0.18	BC	N3	P
17	23:20:08.90	46 35.53	118 56.74	4.50	1.8	9/10	179	0.21	BC	E3	P
18	11:05:49.13	46 09.41	122 31.15	16.92	2.3	20/20	165	0.15	BC	C3	
19	21:03:04.41	46 34.19	119 25.76	2.80	1.7	6/06	111	0.15	AC	E3	P
20	17:59:54.78	47 08.54	122 37.16	25.46	1.0	15/15	56	0.09	AB	P3	
22	10:03:06.96	46 45.10	121 56.58	6.28	1.9	18/22	67	0.18	BC	C3	
24	20:59:39.57	47 45.28	120 28.02	6.83	2.3	17/18	114	0.19	BB	N3	
24	22:36:32.70	47 18.53	121 55.12	1.29	2.0	8/08	115	0.13	BC	P3	P
25	02:37:19.81	47 38.67	122 33.64	25.30	1.5	10/11	110	0.07	AB	P3	
27	06:00:27.61	47 22.47	122 33.42	20.18	3.7	22/24	48	0.13	AB	P3	F
28	19:54:30.67	48 08.52	119 09.75	2.01*	1.1	4/04	292	0.43	CD	N3	
28	22:26:54.07	46 34.31	123 11.77	28.62*	1.6	5/05	177	0.10	BD	P3	P
29	19:01:39.20	47 31.14	122 27.00	22.94	1.2	6/08	175	0.06	AC	P3	
30	19:43:08.42	46 36.05	118 55.78	2.14\$	2.2	12/14	118	0.20	BC	E3	
30	23:37:39.59	47 53.07	118 08.68	8.43	2.0	11/12	131	0.14	AC	N3	P
May 1980											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
2	22:05:45.86	46 50.02	121 59.42	0.02*	1.2	8/09	85	0.20	BC	C3	P
2	22:08:21.05	47 41.02	120 18.98	22.54	1.2	4/04	265	0.	AD	N3	H
3	13:00:11.01	47 16.75	122 00.11	13.70	2.0	14/15	101	0.14	AB	P3	
4	01:44:15.13	46 00.31	118 24.03	4.24	2.2	12/12	198	0.28	BD	E3	
4	13:01:08.75	47 39.01	121 54.68	25.44	2.0	19/20	62	0.18	BA	P3	
5	17:12:37.89	45 49.26	119 00.61	0.04*	1.9	10/10	230	0.15	AD	E3	P
5	22:26:37.38	47 27.02	121 53.14	16.34\$	1.0	4/05	206	0.26	DD	P3	
6	08:28:49.47	47 22.50	122 33.08	19.46*	3.0	22/24	57	0.12	AB	P3	F
6	23:14:58.03	46 27.03	123 23.95	3.10*	1.5	5/06	270	0.07	AD	P3	P
7	01:24:34.26	46 07.24	122 50.52	7.11	1.9	8/08	222	0.12	BD	C3	P
8	03:01:07.34	45 27.17	122 51.76	17.24	2.2	16/16	271	0.21	DD	C3	
8	09:58:30.64	48 47.62	118 46.58	0.02*	2.3	7/07	300	0.33	CD	N3	
8	23:20:01.26	46 52.56	122 15.73	3.85	1.4	9/09	78	0.34	CC	P3	P
8	23:34:05.61	47 52.32	118 10.19	7.61*	2.1	9/09	246	0.10	AD	N3	X
9	22:00:35.97	46 42.34	122 23.80	0.03*	1.1	7/07	179	0.14	AC	P3	P
11	09:10:37.80	48 39.98	122 39.90	12.26	1.1	4/06	228	0.17	CD	P3	H
13	04:08:18.41	46 39.00	121 00.10	2.53	1.8	15/17	77	0.28	BC	C3	
13	19:47:04.45	49 06.14	122 56.19	14.10\$	1.9	5/07	326	0.17	CD	P3	H
15	00:01:49.62	45 48.29	119 00.87	0.42*	1.9	12/12	166	0.17	BC	E3	P
15	21:50:46.44	48 40.50	122 55.07	19.41	1.2	4/05	301	0.28	DD	P3	H
15	22:22:42.49	47 27.79	121 49.06	0.04*	1.2	5/08	177	0.20	BD	P3	H
15	23:35:26.66	47 53.56	118 07.04	8.74	1.9	10/11	254	0.20	BD	N3	X
16	00:16:11.78	46 18.72	117 51.55	0.02*	2.1	11/11	254	0.29	BD	E3	P

May 1980, cont'd												
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP	
16	22:54:08.13	47 54.64	121 32.65	21.28	1.7	4/05	243	0.11	CD	C3	H	
17	18:36:16.67	46 32.47	119 19.96	2.32	1.1	5/06	119	0.10	BD	E3	P	
17	19:48:30.38	46 32.30	119 20.67	0.53	1.2	6/06	144	0.08	AC	E3	P	
17	20:34:43.17	47 24.29	120 21.58	8.33\$	1.8	21/21	93	0.36	CC	N3		
17	22:01:34.33	46 32.21	119 21.72	6.84\$	1.0	6/07	112	0.24	BC	E3	P	
17	22:46:58.40	46 32.43	119 20.13	2.92	1.4	6/06	118	0.10	BC	E3	P	
17	22:55:09.98	46 32.21	119 21.35	3.82	1.4	6/07	113	0.15	BC	E3	P	
20	06:01:24.81	46 57.11	120 55.64	0.97\$	1.2	8/09	105	0.52	DC	C3		
20	10:31:55.63	47 45.90	120 04.17	11.74	1.3	9/11	113	0.29	BD	N3		
22	12:06:55.80	46 02.52	122 43.06	17.60*	1.9	10/12	229	0.15	BD	C3		
22	17:10:00.64	46 38.05	122 27.75	5.23	1.2	5/07	180	0.17	BD	C3	H	
23	16:27:06.65	46 26.30	122 20.93	15.80	1.9	15/19	81	0.15	AA	S3		
24	11:26:30.32	47 41.84	121 07.41	4.79	1.4	5/07	253	0.15	BD	C3	H	
24	21:09:56.00	47 09.25	123 40.08	38.05	1.4	11/15	267	0.26	BD	P3		
27	21:36:22.49	46 40.85	122 52.97	0.02*	1.9	11/14	189	0.52	DD	P3	P	
28	05:53:50.01	47 55.54	122 24.11	21.98	1.2	6/11	183	0.14	BD	P3	H	
28	08:29:04.50	46 07.93	118 46.99	7.93	1.0	6/07	100	0.31	CC	E3		
29	01:45:39.44	47 32.62	119 40.03	0.27	1.7	6/07	150	0.26	BC	N3	P	
29	21:08:54.48	47 18.02	121 55.73	0.02*	2.1	9/10	116	0.14	AC	P3	P	
31	12:52:11.54	48 01.71	119 35.78	0.50	2.2	8/11	123	0.18	BC	N3		

June 1980												
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP	
2	07:17:05.75	47 56.51	120 25.44	8.36	1.8	4/06	259	0.36	CD	C3	H	
2	09:47:30.03	48 08.31	122 30.12	27.57	1.2	4/06	236	0.11	BD	P3	H	
2	14:02:16.35	46 30.00	122 14.17	4.45	1.5	8/12	84	0.12	AC	S3		
3	21:21:35.89	47 36.37	122 58.08	14.35	2.3	12/14	84	0.14	AA	P3		
4	02:49:54.94	45 57.62	120 15.52	12.26	1.6	8/08	182	0.07	BD	E3		
4	13:36:10.30	46 58.29	120 24.77	16.66	1.7	12/13	94	0.22	BB	E3		
6	18:52:49.72	47 27.65	121 51.48	0.04*	1.2	5/07	118	0.70	DD	P3		
6	19:35:36.83	46 24.66	123 16.31	0.03*	1.4	4/04	292	0.05	AD	P3	P	
6	22:46:05.61	47 57.08	118 04.99	8.52	1.0	7/08	258	0.19	CD	N3		
8	22:40:10.65	47 58.08	123 00.99	48.54	4.2	22/22	70	0.17	BA	P3	F	
8	23:02:09.27	47 58.31	122 59.76	48.75	1.5	8/10	181	0.13	BD	P3		
9	06:35:14.58	48 24.97	122 35.03	23.04	1.2	10/11	115	0.18	BB	P3		
11	02:24:27.55	47 51.48	121 57.89	26.09	1.5	7/08	140	0.07	AC	P3		
13	22:47:18.07	46 47.81	122 00.65	0.02*	1.6	12/18	63	0.23	BC	C3	P	
14	00:03:22.65	47 30.04	122 12.08	6.04*	1.3	7/09	109	0.17	BB	P3	H	
14	00:20:59.61	47 32.49	123 33.50	37.67	1.1	7/09	247	0.19	CD	P3	H	
17	12:24:36.00	48 54.02	121 52.92	2.00	1.5	8/11	227	0.50	DD	P3		
17	19:18:30.28	47 18.14	121 55.99	1.03	2.1	5/05	165	0.04	AD	P3	P	
18	01:10:21.14	46 19.64	117 59.10	0.02*	2.3	13/13	253	0.30	BD	E3		
18	02:03:07.36	47 25.31	122 42.93	23.61	1.3	7/07	107	0.08	AB	P3		
18	04:30:26.87	48 35.61	119 37.65	0.65	2.0	3/04	306	0.04	AD	N3	H	
18	11:41:27.90	48 40.21	119 34.69	11.18#	2.9	6/06	325	0.09	AD	N3	F	
18	18:13:44.85	47 48.97	118 25.52	8.83	2.2	6/06	210	0.50	DD	N3	X	
19	16:33:36.16	48 34.70	119 34.09	7.25	1.9	5/10	297	0.23	BD	N3	H	
19	16:59:10.95	47 18.34	121 56.46	0.03*	1.5	7/07	116	0.11	AC	P3	P	
19	18:59:08.25	48 30.55	122 10.55	5.74	1.2	4/04	234	0.02	AD	P3		
19	21:01:05.80	48 32.19	122 11.73	0.02*	1.2	4/06	239	0.36	CD	P3	P	
20	22:17:05.58	47 17.14	121 54.16	0.05*	1.0	5/07	202	0.10	AD	C3	P	
20	23:20:01.53	47 32.27	121 54.52	0.02*	1.2	5/06	191	0.26	BD	P3	P	
21	14:51:46.39	47 49.08	122 26.47	18.73	1.2	8/10	90	0.15	BC	P3	H	
21	16:22:26.57	47 46.94	121 58.46	10.32	1.1	4/06	196	0.09	AD	P3	H	
22	02:40:37.39	46 26.54	122 23.78	15.05	1.3	14/16	91	0.13	AB	S3		
23	16:04:51.99	47 32.99	122 14.90	0.03#	1.7	10/11	105	0.30	BB	P3	H	
23	16:05:16.43	47 32.56	122 15.05	0.05*	3.7	18/18	54	0.16	BA	P3	F	
23	16:09:55.04	47 32.43	122 14.86	0.02*	3.3	22/22	54	0.24	BA	P3	F	
23	16:29:50.95	47 31.94	122 14.93	0.03*	1.6	8/10	107	0.26	BB	P3	H	
23	20:35:36.27	47 41.52	121 52.81	8.06	1.7	6/06	176	0.07	BC	P3		
24	02:30:33.16	47 32.55	122 14.72	0.02*	1.7	13/13	71	0.27	BA	P3	H	
24	11:19:27.55	48 20.41	122 48.04	15.99	1.2	6/08	157	0.13	AC	P3	H	
25	00:33:22.12	46 39.20	122 28.44	0.03*	1.3	5/05	168	0.11	AD	P3	H	
26	04:00:23.11	48 37.39	123 07.16	7.74	1.1	5/05	262	0.12	CD	P3	H	
27	00:28:49.66	48 20.03	122 42.63	52.17	1.3	9/09	94	0.15	BB	P3		
28	08:25:15.97	48 13.42	121 46.33	19.03\$	1.1	5/05	188	0.17	CD	P3		
29	17:15:27.07	48 18.01	122 09.81	6.85*	1.1	5/05	205	0.14	AD	P3		
30	20:11:00.91	46 37.56	123 10.03	6.24	2.8	12/12	140	0.09	AC	P3	P	

## 30 EARTHQUAKE HYPOCENTERS - 1980

June 1980, cont'd											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
30	22:55:25.12	45 42.45	118 53.34	14.70\$	1.9	8/08	252	0.25	CD	E3	P
July 1980											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
1	12:39:32.38	48 18.46	122 07.27	11.04	1.5	6/08	114	0.21	BC	P3	
2	03:52:03.87	46 47.74	118 14.39	23.49	1.8	7/08	221	0.10	AD	E3	
2	18:19:00.57	47 53.71	118 07.43	8.30	2.3	11/11	274	0.12	CD	N3	X
2	20:58:40.33	47 02.99	122 12.08	0.53	1.7	11/11	80	0.10	AB	P3	P
3	08:21:42.55	46 39.47	118 52.08	6.30	2.1	9/11	133	0.40	CC	E3	
3	20:15:16.13	45 07.99	122 53.13	33.53\$	1.7	7/10	340	0.31	DD	C3	
3	20:47:07.87	47 18.88	121 49.63	19.51	1.7	4/06	195	0.17	DD	P3	
3	23:29:06.73	47 42.16	121 53.86	18.86	1.0	4/06	188	0.05	BD	P3	H
3	23:42:28.12	46 34.50	123 02.52	7.94	2.6	6/06	122	0.06	AC	P3	P
4	04:14:35.87	48 20.28	122 30.34	9.04	1.7	5/05	175	0.27	BD	P3	
4	08:52:37.71	47 22.27	121 50.39	1.65	1.8	13/14	150	0.21	BC	P3	
4	19:37:24.17	47 32.27	121 54.05	19.04	1.6	7/11	121	0.22	CB	P3	
5	15:58:01.38	46 46.24	121 55.01	8.49	2.1	17/17	68	0.11	AC	C3	
6	07:47:21.97	47 12.30	122 22.56	7.70*	1.5	14/14	62	0.11	AC	P3	
7	00:30:01.46	46 48.86	119 26.91	0.33	1.2	8/12	120	0.08	AB	E3	
7	01:17:08.60	45 18.21	121 43.23	8.76\$	3.2	21/22	261	0.29	DD	C3	F
8	04:22:57.76	47 49.72	122 24.83	22.92	1.2	7/10	144	0.13	BC	P3	H
8	06:22:42.52	46 39.20	118 51.57	7.18	1.2	8/09	134	0.32	CC	E3	
8	06:29:21.32	46 39.00	118 50.39	5.76	1.3	10/11	137	0.22	BC	E3	P
8	20:52:43.30	47 00.72	122 53.58	0.05*	1.2	4/06	127	0.38	CD	P3	P
9	00:17:47.31	47 06.46	123 11.65	0.02*	1.2	9/11	153	0.17	BC	P3	P
10	03:26:06.18	45 34.52	121 43.51	3.53*	2.1	11/15	243	0.18	BD	C3	
10	18:13:21.08	47 54.35	118 05.76	9.67	1.7	7/07	279	0.20	DD	N3	X
10	20:55:48.79	46 24.69	123 14.92	0.02*	1.2	4/05	291	0.26	BD	P3	P
10	22:45:47.22	46 36.05	123 01.14	0.03*	2.1	4/05	159	0.41	CD	P3	P
11	18:45:59.57	48 18.39	122 05.13	12.19	2.2	13/22	122	0.17	BB	P3	
11	18:47:04.63	48 18.73	122 05.57	10.72	1.5	7/10	122	0.14	AB	P3	
11	18:49:04.57	46 34.48	119 30.60	0.47	1.2	4/04	152	0.73	DD	E3	X
11	19:14:23.23	48 18.62	122 05.50	12.07	1.8	6/08	122	0.09	AC	P3	
11	19:30:24.53	46 33.24	119 24.53	0.48	1.2	6/07	107	0.16	BC	E3	X
11	21:14:59.23	46 32.99	119 22.58	7.35\$	1.2	6/08	112	0.43	CC	E3	X
11	23:14:42.60	48 18.76	122 05.58	13.32	2.8	19/24	90	0.19	BB	P3	
12	00:56:23.49	46 27.86	122 14.62	3.01	2.6	18/20	57	0.14	BC	S3	
12	21:27:10.17	46 31.64	119 26.11	3.68	1.5	7/07	121	0.07	AB	E3	X
13	07:46:21.41	47 49.15	121 47.12	14.48	1.2	5/06	162	0.04	BD	P3	H
13	15:16:44.98	48 38.21	123 03.02	14.87\$	1.1	4/05	299	0.43	DD	P3	H
13	20:32:59.38	48 25.37	121 49.59	2.97	1.7	7/11	184	0.37	CD	P3	
14	10:29:22.59	48 17.77	122 10.09	4.07	1.3	4/05	219	0.14	BD	P3	
14	13:00:10.15	46 51.85	120 38.41	14.05	1.5	10/11	57	0.33	CA	E3	
14	14:33:13.21	48 17.56	122 09.83	4.26	1.3	4/06	218	0.15	BD	P3	
14	17:07:42.66	48 20.10	122 55.33	49.61	1.3	12/17	63	0.20	BA	P3	
14	20:02:24.08	46 32.79	119 24.31	1.28	1.2	6/06	106	0.05	AC	E3	X
15	03:06:40.18	47 44.36	121 22.35	10.08	1.2	5/07	212	0.06	AD	C3	H
15	15:37:11.96	46 33.59	119 26.52	0.41	1.2	4/04	158	0.03	AD	E3	X
15	16:45:10.63	46 32.70	119 27.75	0.34	1.1	6/06	103	0.17	BC	E3	X
15	18:40:15.81	46 32.68	119 28.34	2.23	1.2	5/05	136	0.08	BD	E3	X
15	21:11:58.23	46 32.80	123 14.03	14.49\$	2.2	4/06	267	0.13	CD	P3	P
15	21:33:06.13	48 58.48	121 59.80	0.03*	1.5	4/06	332	0.59	DD	P3	H
15	22:08:43.30	45 50.18	120 35.36	10.31	2.2	11/12	210	0.16	BD	E3	
16	16:38:16.75	46 33.41	119 27.05	0.95	1.7	4/04	146	0.	AD	E3	X
16	23:37:26.22	47 53.50	118 08.01	8.58	2.3	12/12	252	0.13	BD	N3	X
17	15:50:28.93	46 27.53	122 16.14	1.52	1.5	9/12	157	0.13	AC	S3	
17	22:56:33.12	48 06.47	117 44.52	2.78	1.5	5/05	324	0.03	BD	N3	X
18	11:27:18.11	48 17.58	121 18.59	8.60\$	1.7	6/08	171	0.30	DC	C3	
18	12:51:10.37	47 48.43	122 46.53	47.37	1.2	7/07	96	0.10	BB	P3	H
18	16:08:47.43	48 12.38	121 51.68	19.79	1.2	4/06	173	0.08	BD	P3	
18	16:38:41.93	46 32.51	119 26.34	6.63*	1.2	7/07	123	0.34	CB	E3	X
19	00:16:40.27	46 32.34	119 25.34	4.56	1.7	5/05	130	0.10	BD	E3	X
19	00:25:30.85	48 12.51	121 48.20	17.49	1.5	4/06	183	0.17	DD	P3	
19	04:34:22.66	47 28.28	120 09.97	12.75	1.5	6/08	227	0.11	AD	N3	
19	07:36:29.57	47 24.20	121 47.00	27.35	1.7	11/12	169	0.16	BC	P3	
20	02:54:06.45	46 51.90	121 43.37	5.19	1.7	8/10	143	0.24	BC	C3	
20	23:19:19.66	48 12.80	121 37.64	6.71	1.5	8/11	139	0.31	CC	P3	
21	11:03:40.97	48 31.83	122 32.44	19.13	1.7	12/19	91	0.13	AB	P3	

July 1980, cont'd												
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP	
21	11:14:10.07	48 32.40	122 31.24	17.30	1.2	5/07	146	0.14	BD	P3	H	
21	15:53:16.74	46 34.49	119 22.25	7.28	1.5	6/07	119	0.12	BC	E3	X	
21	17:10:57.50	46 32.53	119 24.62	0.46	1.5	4/04	139	0.08	AD	E3	X	
22	18:49:30.91	46 32.59	119 25.23	0.36	1.7	5/05	132	0.06	AD	E3	X	
22	21:20:27.98	46 33.16	119 24.62	7.49	1.2	4/04	172	0.	AD	E3	X	
22	22:59:18.94	47 22.65	121 37.47	3.28	1.2	4/04	197	0.09	BD	P3	X	
23	05:53:46.32	46 27.22	122 13.98	3.45*	1.7	11/20	112	0.07	AC	S3		
23	15:55:46.80	46 32.67	119 25.43	1.29	1.7	4/04	164	0.	AD	E3	X	
24	17:14:16.18	46 16.96	119 32.80	0.02*	2.3	10/10	114	0.12	AC	E3	X	
25	15:47:30.01	46 26.95	122 13.90	3.01	1.7	15/18	65	0.17	BC	S3		
25	17:19:14.84	47 54.81	124 00.00	26.10	1.2	6/08	166	0.25	CC	P3		
26	15:11:59.01	46 22.06	122 33.76	5.90	2.2	21/21	124	0.17	BC	C3		
26	15:56:28.26	46 31.38	119 23.94	6.05	1.5	8/09	105	0.28	BB	E3	X	
26	18:38:04.32	46 31.77	119 23.96	5.25	1.5	8/09	103	0.21	BB	E3	X	
26	20:40:27.93	46 32.67	119 24.87	2.13	1.2	5/05	138	0.10	BD	E3	X	
27	05:35:40.69	46 51.75	121 44.30	3.54*	1.5	6/07	173	0.10	AC	C3		
27	15:08:28.17	46 32.05	119 24.66	4.75	1.5	6/07	111	0.17	BC	E3	X	
27	16:10:24.68	46 33.74	119 26.46	6.53	1.5	5/06	129	0.15	AD	E3	X	
27	19:54:58.84	47 25.59	121 49.06	18.80	1.2	6/08	178	0.08	BC	P3		
28	07:16:21.00	48 27.08	120 20.45	9.53	2.4	9/09	176	0.14	BC	N3		
28	12:58:55.04	48 05.47	121 54.66	0.02*	1.9	12/16	95	0.22	BC	P3		
28	22:50:25.38	49 01.98	122 00.94	2.27\$	1.7	4/05	286	0.59	DD	P3	H	
29	14:35:53.38	46 25.41	119 01.96	3.41	1.1	12/12	148	0.15	AC	E3	P	
29	20:41:59.95	45 54.06	122 49.06	21.80	2.2	13/15	212	0.37	CD	C3		
30	20:57:18.82	47 18.56	121 55.89	0.24	2.1	9/09	68	0.11	AC	P3	P	
31	12:52:19.80	48 32.45	121 59.24	3.55	1.9	11/12	155	0.32	CC	P3		

Aug 1980												
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP	
1	00:05:48.55	46 23.07	122 35.36	0.02*	1.5	9/09	124	0.17	BB	C3	P	
1	20:55:42.08	48 18.89	121 53.93	0.02*	1.7	11/14	121	0.31	CC	P3		
1	22:53:35.14	48 08.17	117 33.01	0.03*	1.5	7/07	307	0.41	CD	N3	X	
4	19:32:19.57	48 21.52	121 38.56	2.30\$	1.2	5/06	210	0.79	DD	P3	H	
5	13:54:34.70	47 39.96	120 02.71	3.13\$	1.9	21/25	52	0.22	CC	N3		
6	20:17:26.55	47 52.58	118 43.00	10.51#	2.0	11/11	189	0.19	BD	N3	P	
6	20:22:54.75	46 31.49	121 52.84	0.49	1.0	6/06	154	0.27	BC	C3		
6	21:40:23.97	46 40.16	122 27.26	5.14\$	1.2	10/14	114	0.24	BC	C3		
7	20:51:35.54	45 50.32	120 34.45	16.44	1.9	10/13	290	0.26	BD	E3		
8	14:12:38.37	47 18.27	122 25.63	13.47*	1.7	16/18	73	0.12	AC	P3		
8	19:12:34.75	46 40.43	122 03.66	15.16	1.2	4/04	244	0.	AD	C3		
9	13:24:27.21	46 51.93	121 44.75	5.55	1.6	9/10	165	0.13	BC	C3		
10	21:18:58.01	46 18.59	119 42.40	0.21*	1.4	5/06	194	0.42	CD	E3	P	
11	10:22:30.60	48 36.92	123 04.22	17.89	2.0	15/20	86	0.28	BB	P3		
11	10:24:27.76	48 36.94	123 04.50	13.79	1.5	11/15	64	0.24	BB	P3		
11	16:59:37.10	45 39.87	122 47.05	22.49	1.9	9/13	230	0.10	BD	C3		
11	18:40:52.94	48 32.09	122 42.77	52.14	1.5	8/11	133	0.05	AB	P3		
11	18:55:19.83	46 51.81	121 43.93	9.50\$	1.7	5/08	278	0.24	CD	C3	H	
11	19:06:43.71	45 39.84	122 46.80	24.79	2.1	11/16	230	0.13	BD	C3		
11	22:35:58.20	47 31.33	121 40.94	0.02*	1.2	4/04	143	0.15	AD	P3	P	
12	13:59:57.66	48 28.19	124 14.07	0.05*	3.3	17/17	200	0.35	CD	P3	X	
12	22:25:31.29	46 31.62	119 24.75	4.18	1.2	4/05	128	0.24	CD	E3	X	
14	13:59:51.94	48 27.44	124 12.35	0.03*	3.2	17/17	195	0.33	CD	P3	X	
15	03:36:47.95	47 41.42	122 38.91	16.36	1.2	7/13	101	0.14	AB	P3		
15	05:11:42.66	45 39.73	122 46.35	24.13	2.2	11/16	230	0.12	BD	C3		
15	08:52:56.12	46 27.57	122 16.53	2.53	1.1	5/08	178	0.08	AD	S3		
15	20:08:56.83	46 31.77	119 28.88	0.03*	1.2	6/07	105	0.40	CC	E3	X	
15	21:10:55.96	47 44.90	122 21.47	19.70	1.4	13/17	65	0.11	AB	P3		
16	16:46:12.34	47 19.76	123 14.31	43.11	2.3	19/21	60	0.22	BA	P3		
16	18:04:12.77	48 08.71	121 41.24	0.05*	1.2	5/06	199	0.14	AD	P3		
16	23:27:33.38	47 58.21	121 32.02	0.03*	1.1	5/05	127	0.02	AD	C3		
20	00:14:48.39	46 18.84	122 36.43	11.77	1.7	8/09	141	0.23	CC	C3	P	
20	02:28:30.47	47 35.38	122 01.30	10.19	2.4	21/27	48	0.18	BB	P3		
20	03:38:31.56	48 46.21	118 47.43	4.15	2.4	7/09	281	0.44	CD	N3		
21	13:12:51.90	48 27.95	123 24.40	30.54	1.7	6/08	256	0.15	BD	P3	H	
21	22:54:48.99	47 17.31	121 34.99	7.99	1.5	6/07	120	0.23	BC	C3		
22	03:13:03.56	46 24.80	121 16.52	6.44	2.3	18/25	59	0.27	BC	C3		
22	06:49:14.09	48 25.23	121 51.29	10.92	1.3	5/06	179	0.09	BD	P3		
22	16:01:25.97	47 22.37	122 41.76	21.40	1.5	12/17	55	0.08	AA	P3		

Aug 1980, cont'd											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
22	18:19:52.21	48 13.28	121 39.14	1.44\$	3.0	23/23	120	0.32	CC	P3	
22	18:59:13.98	47 54.08	122 36.17	16.25	1.6	16/18	62	0.22	BB	P3	
22	23:33:50.67	46 19.43	122 27.05	5.42#	1.2	5/07	167	0.12	AD	S3	P
23	00:28:07.07	46 37.20	122 13.75	0.66	2.1	6/06	138	0.11	AC	C3	
23	06:38:01.55	46 54.71	119 17.80	3.49	1.1	7/11	138	0.15	AC	E3	
23	14:02:58.31	48 46.04	122 52.60	11.11	1.7	12/15	101	0.42	CB	P3	
24	01:40:50.57	48 18.99	122 05.22	7.98	1.2	5/06	124	0.23	BD	P3	H
24	16:32:30.04	47 45.23	122 23.41	19.82	1.6	11/12	78	0.08	AB	P3	
24	18:02:48.36	46 39.69	122 17.28	15.83	1.7	16/18	98	0.10	AB	C3	
25	08:42:26.22	46 46.61	121 55.20	3.83	1.2	7/08	235	0.16	CD	C3	H
27	00:46:36.83	47 25.45	121 43.59	17.59	1.1	4/06	196	0.06	CD	P3	
27	05:55:55.50	47 06.19	121 52.65	17.15	2.0	18/21	77	0.10	AA	C3	
27	22:40:29.83	46 21.77	122 37.33	4.08	1.6	14/15	133	0.14	AC	C3	P
27	23:47:21.39	46 18.87	122 27.73	6.38	1.3	4/06	227	0.13	BD	S3	P
28	23:23:24.56	47 20.86	117 16.99	3.81	2.4	10/10	227	0.30	CD	N3	P
29	18:00:53.32	45 55.29	122 24.83	5.09	1.3	6/07	225	0.23	CD	C3	
30	00:45:05.11	46 19.74	122 26.74	1.96*	1.4	11/13	112	0.18	BB	S3	P
31	05:28:09.18	47 42.23	122 35.79	15.33	1.2	6/09	104	0.11	BC	P3	H
31	18:01:29.06	47 51.47	121 41.22	9.33*	1.2	4/05	213	0.13	AD	P3	
31	19:04:05.20	48 23.50	122 31.11	18.67	1.1	5/07	105	0.16	BD	P3	
31	21:10:12.28	47 44.19	122 23.42	20.41	1.8	12/14	82	0.07	AB	P3	

Sept 1980											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
1	09:56:28.24	47 25.58	121 56.31	23.05	1.1	8/10	141	0.19	BC	P3	
1	23:02:13.01	45 51.21	122 59.29	27.55\$	1.6	9/12	255	0.25	BD	C3	
2	01:54:37.84	48 11.57	122 22.73	29.70	2.1	20/27	61	0.17	BA	P3	
2	06:11:28.32	46 40.66	122 16.08	17.35	1.3	11/12	78	0.11	AA	C3	
2	19:09:58.14	47 06.53	122 02.93	15.12\$	1.1	6/06	129	0.08	AC	P3	
3	01:17:46.21	46 29.00	122 12.05	0.02*	1.3	6/08	86	0.43	CC	S3	P
3	23:36:11.40	46 51.71	119 22.32	0.45	1.2	6/08	145	0.06	AC	E3	
4	15:36:06.67	47 42.28	122 58.16	46.93	1.2	13/16	134	0.14	AB	P3	
4	23:34:28.32	46 18.76	122 28.37	0.03*	1.6	10/12	140	0.15	AC	S3	P
5	23:47:43.12	47 11.73	121 46.05	0.04*	1.3	5/07	166	0.24	BD	P3	X
6	11:18:33.18	47 31.21	123 21.72	46.16	2.8	22/24	74	0.19	BA	P3	
8	18:36:26.43	47 07.72	118 49.86	11.36	1.9	9/13	165	0.13	AC	N3	P
8	21:33:37.22	47 11.55	121 49.99	0.66	1.3	4/04	206	0.07	AD	P3	X
8	22:07:42.32	47 37.13	121 45.19	14.82	1.2	8/10	178	0.11	AC	P3	
8	22:53:07.89	46 59.42	122 01.99	17.06	1.2	4/04	259	0.	AD	C3	P
9	00:30:23.98	48 00.40	122 14.29	8.61	1.1	4/04	217	0.	AD	P3	
9	02:26:10.32	48 00.72	122 14.51	16.51\$	1.2	4/05	172	0.03	CD	P3	
9	21:40:39.75	47 11.85	121 46.71	0.02*	1.0	4/04	164	0.15	BD	C3	P
10	08:55:16.94	47 37.05	121 44.77	14.39	1.2	8/10	180	0.10	BC	P3	
10	09:31:35.82	47 36.98	121 46.28	13.90	1.4	16/19	70	0.12	AB	P3	
10	19:31:06.94	46 28.72	122 12.42	0.03*	1.1	4/04	140	0.02	AD	S3	P
10	23:32:36.42	46 18.94	122 27.88	0.08	1.4	10/10	117	0.19	BB	S3	X
11	04:54:35.24	47 39.64	122 12.89	21.68	1.2	12/15	96	0.11	AB	P3	
11	20:39:43.15	47 39.84	120 06.56	7.94	1.2	6/11	135	0.10	AC	N3	
11	22:14:09.29	47 04.78	121 49.14	3.06	1.8	4/05	215	0.07	BD	C3	P
12	03:52:03.53	48 13.51	123 01.10	26.82	1.1	6/07	143	0.03	AC	P3	
12	03:53:42.23	46 44.25	122 26.29	0.05*	1.0	6/08	171	0.36	CC	P3	
12	12:15:18.21	47 20.00	123 14.30	41.36	1.0	12/14	112	0.19	BB	P3	
12	20:27:12.23	46 20.17	122 38.03	8.62\$	2.3	9/14	140	0.36	CC	C3	P
12	23:35:29.48	46 19.28	122 27.51	0.89	1.5	8/09	137	0.19	BC	S3	P
13	02:03:39.62	48 07.09	121 49.32	0.02*	1.4	4/04	197	0.12	AD	P3	
14	05:49:31.35	47 12.39	121 54.99	7.64	1.2	4/07	227	0.08	AD	P3	
14	21:55:44.01	47 55.34	121 39.74	0.87	1.0	4/05	220	0.23	CD	P3	P
15	22:37:50.08	47 08.69	118 52.42	0.88	2.0	8/09	162	0.11	AC	N3	P
16	19:30:03.34	46 39.15	122 23.04	0.80	1.4	5/05	195	0.48	DD	C3	P
16	23:35:29.24	46 19.58	122 27.42	1.14	1.6	18/18	114	0.24	BB	S3	P
17	18:41:21.18	46 44.50	122 10.74	17.11	1.1	7/07	195	0.17	BD	C3	
17	19:03:43.76	47 31.80	121 42.46	0.13	1.1	4/05	198	0.40	DD	P3	P
17	23:33:25.85	46 28.15	123 15.64	0.02*	1.5	4/05	251	0.19	BD	P3	P
18	22:14:04.48	46 44.19	121 44.50	19.85*	1.8	6/08	95	0.23	BC	C3	P
18	23:19:10.70	48 25.32	121 52.47	0.03*	1.2	6/06	176	0.40	CC	P3	P
19	05:45:37.54	47 23.41	121 46.40	17.88	2.2	21/24	111	0.12	AB	P3	
19	22:53:16.28	47 54.45	121 49.38	4.40	3.8	28/30	90	0.24	BC	P3	F
19	23:28:55.71	46 19.64	122 27.02	3.20	1.7	14/16	154	0.21	BC	S3	P

Sept 1980, cont'd											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
21	17:45:12.97	47 54.51	121 49.46	3.15	3.5	27/27	90	0.24	BC	P3	F
21	17:51:23.28	47 54.64	121 50.45	1.99	1.7	14/16	92	0.21	BC	P3	
21	20:32:54.33	47 43.52	122 12.69	0.02*	1.4	5/06	184	0.42	CD	P3	P
22	01:28:16.70	47 11.33	123 14.69	0.02*	1.2	6/08	87	0.20	BC	P3	P
22	17:18:39.08	48 15.84	122 14.96	0.04*	1.7	10/12	84	0.32	CC	P3	
22	22:55:50.16	47 06.40	121 16.36	0.02*	1.7	10/11	96	0.32	CC	C3	P
22	23:59:39.08	46 17.41	122 26.62	6.65\$	1.5	15/16	116	1.39	DB	S3	X
25	00:53:29.50	48 22.93	121 42.37	4.28\$	1.6	8/09	200	0.68	DD	P3	
25	09:39:36.37	47 51.47	123 08.65	42.67	1.6	13/14	115	0.19	BB	P3	H
25	17:34:00.21	48 14.25	121 38.33	5.67	1.7	8/10	198	0.33	CD	P3	H
25	23:12:29.97	48 03.06	118 44.17	5.95	1.8	8/08	175	0.09	BC	N3	P
25	23:30:01.41	46 19.78	122 26.73	1.91	1.8	16/19	112	0.20	BB	S3	X
26	09:26:06.18	48 44.10	121 46.17	23.70	1.5	4/07	240	0.41	DD	P3	H
26	20:15:00.08	47 34.41	121 42.75	1.93	1.0	4/06	197	0.15	CD	P3	
26	20:55:10.17	46 52.17	121 08.96	0.59	1.6	7/07	97	0.15	BC	C3	P
26	22:20:09.32	47 24.55	122 00.67	23.62	1.1	6/08	158	0.24	CC	P3	
27	22:26:56.62	47 12.09	121 46.45	3.52\$	1.0	5/05	165	0.30	DD	C3	P
28	06:09:11.64	47 37.11	121 46.12	15.18	1.3	12/15	91	0.11	AB	P3	
28	18:01:33.29	46 24.15	122 13.05	3.42\$	1.2	10/16	116	0.16	BC	S3	
28	22:35:35.41	47 45.45	120 14.21	1.96	1.4	7/12	88	0.12	BC	N3	
29	03:53:52.99	47 45.40	120 14.15	0.66	2.6	24/28	73	0.18	BC	N3	F
29	23:55:51.93	46 19.76	122 27.26	1.52	1.9	15/16	113	0.16	BB	S3	X
30	04:38:09.74	48 23.66	122 16.27	15.56	2.7	18/19	92	0.20	BB	P3	
30	04:38:49.51	48 23.64	122 16.36	15.41*	2.3	16/19	92	0.14	AB	P3	
30	05:39:40.41	48 23.16	122 15.29	8.65	1.4	7/08	139	0.11	AC	P3	
30	16:32:14.27	47 44.52	122 02.72	8.82*	2.8	28/28	61	0.16	BC	P3	F
30	17:23:13.32	47 42.31	121 15.43	6.43	1.3	7/10	120	0.04	AC	C3	
30	22:21:36.89	46 53.89	123 24.60	0.03*	1.5	7/07	204	0.14	AD	P3	P

Oct 1980											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
1	12:47:47.44	47 44.60	122 03.44	0.04*	1.3	6/06	131	0.08	AC	P3	
1	19:15:34.22	47 08.75	121 36.49	1.24	1.0	4/04	120	0.02	AD	C3	
1	22:15:08.55	46 31.49	119 18.80	0.45	1.2	5/05	118	0.03	AD	E3	
1	23:34:26.99	46 13.67	122 27.71	17.70*	1.7	6/06	193	0.12	AD	S3	P
2	18:33:50.53	47 53.20	118 07.13	9.79	1.9	10/12	139	0.22	BC	N3	X
2	23:00:31.22	47 25.70	121 47.64	17.86	1.3	6/08	167	0.15	BC	P3	
3	00:50:51.75	46 11.56	122 55.47	12.34\$	1.7	9/10	192	0.42	CD	C3	P
3	15:04:37.83	48 38.27	121 36.38	15.02\$	1.3	4/05	191	0.06	BD	C3	
3	20:19:42.82	46 42.11	122 10.93	3.21	2.1	10/10	60	0.39	CB	C3	P
3	22:09:28.93	47 45.63	122 28.57	15.99\$	1.1	4/05	276	0.15	CD	P3	
3	23:53:18.69	46 19.82	122 26.88	1.92	1.2	12/12	112	0.19	BB	S3	X
4	00:40:04.84	46 13.03	122 49.29	6.36	1.8	8/08	197	0.08	AD	C3	P
4	02:08:07.36	46 41.79	121 22.00	0.02*	1.4	5/07	281	0.22	BD	C3	H
4	02:36:35.85	48 24.04	122 16.73	15.95	2.7	20/24	77	0.20	BB	P3	
4	05:00:35.30	48 24.20	122 16.87	15.81*	1.1	8/12	102	0.15	AB	P3	
5	08:31:01.18	48 06.03	122 47.16	49.32	1.1	7/08	88	0.13	AB	P3	
5	09:48:42.56	46 02.28	122 27.23	18.05*	1.4	10/13	169	0.26	BC	S3	
5	17:42:34.92	46 36.40	122 30.36	17.20*	1.2	13/13	130	0.15	AB	C3	
6	07:40:42.03	47 53.94	121 55.41	7.44	1.0	4/04	133	0.	AD	P3	
6	19:20:42.50	46 19.15	122 34.72	13.34*	1.5	6/06	136	0.13	AC	S3	X
6	23:47:16.78	46 19.81	122 26.98	1.11	1.2	13/13	112	0.17	BB	S3	X
7	00:22:52.75	47 54.21	122 35.20	0.92	1.1	9/10	68	0.23	BC	P3	
7	08:15:23.34	48 43.46	122 08.43	0.02#	1.4	5/05	257	0.76	DD	P3	
7	15:15:08.91	47 25.81	122 30.94	45.20	1.8	16/17	55	0.21	BA	P3	
7	22:36:32.17	47 18.77	119 50.18	3.97	2.2	23/23	53	0.17	BC	N3	P
8	00:49:53.01	46 12.82	122 55.73	9.52	1.8	11/11	212	0.24	BD	C3	P
8	09:32:01.96	47 26.52	121 14.44	8.30	1.3	10/12	97	0.18	BC	C3	
8	10:55:50.81	48 25.79	123 02.76	24.92	3.0	20/22	46	0.37	CB	P3	
8	22:56:58.45	46 18.95	123 51.91	7.24	1.8	11/13	255	0.36	CD	P3	
13	11:09:04.49	47 54.44	121 51.22	2.58	1.2	4/04	161	0.	AD	P3	
13	16:21:32.24	47 54.45	121 51.39	2.23	1.4	4/04	160	0.	AD	P3	
13	18:45:32.14	47 50.83	122 02.72	0.05*	1.7	4/04	128	0.07	AD	P3	P
13	19:28:01.21	47 18.66	119 50.03	0.66	1.4	9/09	77	0.55	DC	N3	P
13	23:24:47.01	46 19.45	122 27.57	0.06	1.2	16/16	115	0.21	BB	S3	X
14	13:13:31.98	46 35.97	121 50.71	5.65	1.0	11/14	142	0.15	AC	C3	
14	20:24:59.90	47 50.49	121 52.73	0.04*	1.5	4/04	122	0.03	AD	P3	X
14	20:48:04.22	47 23.84	122 39.41	15.74*	1.0	8/09	95	0.57	DB	P3	

Oct 1980, cont'd											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
14	21:58:19.82	46 07.51	122 52.13	8.10	1.9	5/05	245	0.08	BD	C3	H
14	22:15:10.10	47 48.76	121 58.24	0.04*	1.7	6/07	135	0.19	BC	P3	P
15	00:45:22.90	47 22.40	122 41.68	21.84	1.2	10/13	79	0.09	AA	P3	
15	01:12:53.05	47 22.13	122 41.97	22.08	1.0	13/13	63	0.13	AA	P3	H
15	11:48:26.80	47 19.71	122 18.76	8.43*	1.7	25/25	33	0.14	AC	P3	
15	17:14:23.32	47 24.16	120 37.93	1.01\$	1.7	5/07	211	0.44	DD	C3	H
15	23:25:36.79	46 20.42	122 27.89	0.03*	1.2	14/14	113	0.26	BC	S3	X
16	19:50:24.27	46 27.52	121 38.95	0.03*	1.1	6/07	308	0.54	DD	C3	H
16	20:57:20.29	48 55.34	121 53.13	0.02*	2.4	11/14	228	0.53	DD	P3	F
16	23:36:49.24	46 37.12	123 03.66	0.03*	2.2	6/07	134	0.42	CC	P3	X
17	11:41:37.26	47 35.13	121 50.11	16.96	1.0	5/09	159	0.09	BD	P3	
17	22:06:10.96	47 10.97	119 00.62	0.76	1.9	14/14	138	0.15	BC	N3	P
17	22:39:23.06	48 05.61	121 55.10	0.26	1.7	6/07	165	0.28	CC	P3	P
18	21:44:15.23	48 26.24	123 03.47	26.39	1.2	16/20	70	0.36	CB	P3	
18	23:40:06.61	47 40.24	120 06.12	4.42\$	1.8	14/16	67	0.19	CC	N3	
19	06:23:42.83	46 35.30	121 51.07	6.59	3.0	30/30	41	0.25	BC	C3	F
19	17:31:24.78	48 00.37	122 14.37	18.70	1.2	13/16	76	0.13	AB	P3	
20	02:23:33.96	47 22.53	122 41.75	22.47	1.3	13/16	62	0.08	AA	P3	
20	03:11:35.99	46 48.62	120 43.08	0.95\$	1.3	13/14	61	0.27	CC	C3	
20	03:12:12.03	46 48.62	120 43.38	0.04*	1.2	15/15	67	0.30	CC	C3	
20	05:14:36.81	47 22.60	122 41.35	22.71	1.4	14/20	55	0.11	AA	P3	
20	14:19:25.17	47 21.57	122 21.73	14.73	1.3	7/07	112	0.04	AB	P3	
20	23:30:33.52	47 21.66	122 21.86	14.62	1.3	12/13	97	0.10	AB	P3	
20	23:46:13.89	46 35.44	121 50.53	7.37	1.8	17/20	134	0.15	BC	C3	
22	00:31:43.10	46 26.25	121 50.85	0.82	1.8	11/11	164	0.13	BC	S3	
22	00:41:22.02	46 12.56	122 55.52	7.31	1.2	7/07	212	0.31	CD	C3	P
22	01:00:12.72	47 12.38	121 46.23	0.03*	1.7	9/09	85	0.28	BA	C3	
22	17:14:16.51	48 48.21	122 08.60	4.99\$	2.4	10/11	185	0.39	CD	P3	
22	22:04:14.26	48 15.15	122 14.30	13.46	1.0	5/06	215	0.07	BD	P3	
23	04:50:02.25	48 48.59	122 08.00	1.19\$	2.0	13/13	188	0.35	DD	P3	
23	23:47:43.54	46 19.22	122 27.59	1.30	1.1	8/08	115	0.15	CC	S3	P
24	06:35:16.93	48 14.23	122 50.06	22.04	1.1	12/17	67	0.14	AB	P3	
25	00:03:31.64	46 19.84	122 26.82	1.86*	1.2	13/13	112	0.22	BB	S3	P
25	00:14:44.69	46 35.23	121 50.23	6.15	1.8	21/24	136	0.17	BC	C3	
26	03:10:34.36	46 19.69	119 20.00	15.84	1.1	8/12	118	0.17	BB	E3	
27	19:58:49.35	48 06.83	121 55.51	2.41\$	1.1	4/05	163	0.31	DD	P3	P
27	22:48:00.12	46 27.24	121 37.56	0.03*	1.4	9/10	124	0.24	BC	C3	
28	00:33:57.67	46 33.09	117 48.46	0.03*	1.8	10/12	277	0.18	BD	E3	X
28	20:16:47.61	48 04.97	121 48.08	0.03*	1.3	5/05	199	0.18	BD	P3	P
28	22:49:02.32	47 30.19	122 04.42	0.04*	1.1	9/10	120	0.31	CC	P3	
28	23:24:41.62	47 17.50	121 58.13	0.02*	2.1	9/10	140	0.26	BC	P3	P
29	21:30:26.82	47 11.91	121 46.68	1.36	1.5	7/07	127	0.16	BB	C3	P
29	22:25:24.55	47 11.25	119 01.87	0.41	2.0	13/13	122	0.23	BC	N3	P
30	06:45:22.60	47 38.25	122 18.16	20.28	1.0	12/13	65	0.10	AA	P3	
30	16:44:59.31	46 26.30	121 36.27	0.02*	1.2	8/10	214	0.31	CD	C3	
31	00:20:06.04	46 39.17	121 56.36	10.62	1.2	9/14	107	0.14	BB	C3	P
31	02:54:38.82	47 35.53	122 46.38	17.07	1.0	8/11	84	0.04	AA	P3	
31	11:01:00.14	47 18.67	122 23.85	13.68	1.8	23/24	70	0.14	AC	P3	
31	23:13:46.62	47 18.60	122 23.08	14.15*	1.3	12/14	74	0.12	AC	P3	

Nov 1980											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
1	08:34:41.39	48 16.28	121 14.74	0.02*	1.7	4/04	233	0.13	AD	C3	
1	12:37:07.48	46 27.74	119 43.32	19.99	1.5	19/20	101	0.18	BB	E3	
3	17:24:28.50	47 05.37	121 39.34	14.09	1.1	6/09	175	0.22	DC	C3	
3	23:47:15.57	48 03.41	118 43.66	7.94	1.8	16/18	131	0.16	BC	N3	P
4	08:26:34.09	47 43.00	121 59.77	4.68	1.0	10/14	92	0.26	CC	P3	
4	23:54:08.90	48 05.41	121 55.45	0.02*	1.0	4/04	159	0.06	AD	P3	P
5	07:45:59.76	45 36.63	122 42.82	38.21	1.0	4/06	329	0.12	CD	C3	
5	20:19:13.87	46 58.65	119 27.15	0.51	1.1	4/05	299	0.09	AD	E3	H
6	13:37:52.55	47 51.61	123 08.34	45.56	2.9	28/29	36	0.15	BA	P3	
7	00:04:36.06	46 56.97	119 28.23	1.20	2.6	13/14	96	0.11	AC	E3	P
7	21:16:36.65	46 46.51	119 32.65	15.79	1.5	4/07	149	0.11	AD	E3	H
8	11:40:39.97	47 47.93	122 21.21	19.64	1.3	12/19	65	0.13	AB	P3	
9	02:36:16.98	47 40.70	120 04.57	8.16	2.7	25/27	52	0.14	AB	N3	
10	15:53:57.39	48 14.56	121 41.84	14.00	1.1	5/08	154	0.13	AD	P3	
11	05:31:53.80	48 06.96	122 58.46	47.76	1.1	9/10	84	0.08	AA	P3	
11	06:26:34.77	47 59.08	121 51.56	8.61	1.3	6/07	134	0.09	AC	P3	

Nov 1980, cont'd												
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP	
12	07:55:13.30	46 29.36	122 16.39	16.95	1.1	15/23	104	0.09	AB	S3		
12	19:55:04.76	47 03.09	123 55.42	4.21	1.1	5/05	219	0.68	DD	P3	P	
12	20:26:28.58	46 18.66	122 38.71	8.14	1.4	12/13	248	0.25	BD	C3	P	
13	01:21:45.30	47 31.41	122 04.88	0.03*	1.0	8/11	118	0.44	CC	P3	P	
14	00:00:52.63	48 36.83	123 06.23	11.27*	1.3	12/14	62	0.17	BB	P3		
17	02:02:30.31	48 15.95	121 45.42	3.22	1.4	11/12	93	0.27	BC	P3		
17	06:58:33.80	46 26.24	122 22.90	10.49	2.1	20/25	85	0.17	BA	S3		
17	07:25:46.90	46 37.07	120 32.30	12.80	1.5	16/19	82	0.16	BA	E3		
18	15:54:28.69	47 37.79	120 15.62	3.06	1.7	11/13	123	0.13	AB	N3		
19	21:35:24.07	46 56.98	119 28.17	0.86	3.3	26/27	55	0.10	AC	E3		
20	08:00:50.22	45 53.77	122 30.88	18.46	1.1	6/09	317	0.14	BD	C3		
21	08:01:12.91	47 35.04	123 17.96	40.28	1.0	10/13	128	0.20	BB	P3		
22	00:03:27.24	46 54.41	121 53.02	9.88	2.1	25/29	67	0.08	AB	C3		
22	00:04:25.09	46 54.42	121 53.15	9.64	1.4	18/20	96	0.09	AB	C3		
23	04:10:54.20	46 54.77	119 34.71	1.49	2.5	17/19	117	0.14	AB	E3		
23	04:31:39.15	46 55.98	119 34.56	2.16	1.3	5/07	285	0.17	CD	E3	H	
23	14:12:06.02	47 31.87	121 54.76	7.35	2.8	33/33	49	0.11	AB	P3		
24	05:33:32.54	47 56.52	119 28.73	12.86	1.2	5/09	226	0.20	BD	N3		
27	00:38:16.17	45 57.94	122 57.61	24.55	1.6	16/18	245	0.14	BD	C3		
28	05:59:20.38	46 54.42	121 53.20	7.80	1.6	17/22	135	0.13	AC	C3		
29	19:36:38.21	46 55.69	122 27.79	20.14*	1.1	14/20	73	0.15	AA	P3		
30	01:07:09.91	47 18.46	123 15.87	43.81	2.6	22/24	85	0.29	BA	P3		
30	03:14:30.86	45 43.65	119 55.28	5.67	1.4	9/09	240	0.21	CD	E3	P	
30	14:40:31.61	47 50.86	122 06.34	28.48	1.1	9/11	108	0.10	AB	P3		

Dec 1980												
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP	
2	22:28:39.23	47 24.37	123 39.05	0.04*	1.0	5/06	182	0.53	DD	P3		
3	06:58:46.86	46 55.21	119 21.66	1.22	2.6	26/27	79	0.25	BC	E3		
3	07:01:36.90	46 54.62	119 21.66	2.11	1.0	10/11	81	0.20	BB	E3		
3	20:02:38.06	46 51.36	119 23.84	1.19	1.8	5/06	220	0.15	BD	E3	H	
3	23:46:22.94	47 41.05	120 08.19	2.24	2.2	24/26	41	0.12	BC	N3		
4	01:30:27.99	46 18.54	119 03.49	0.67	1.2	5/05	171	0.36	CD	E3	X	
4	12:59:39.83	46 54.58	119 21.28	0.03*	1.0	6/08	172	0.10	AC	E3		
5	20:04:50.23	46 14.43	118 54.83	0.96	1.2	7/08	207	0.15	BD	E3	X	
5	21:44:54.59	47 41.53	118 07.12	10.82*	1.5	6/06	313	0.32	CD	N3	P	
6	19:19:23.89	46 14.61	118 56.36	0.38	2.1	8/09	199	0.77	DD	E3	X	
6	22:16:56.82	46 15.57	118 47.44	8.67	2.1	4/04	246	0.15	CD	E3	X	
7	00:15:32.59	46 14.18	118 57.98	1.76*	1.5	7/07	188	0.24	BD	E3	X	
7	00:39:31.06	46 09.36	123 14.92	9.67	1.4	5/05	321	0.03	BD	P3		
8	20:25:50.89	46 47.91	124 09.36	29.94\$	1.8	8/09	242	0.32	DD	P3		
8	21:33:43.95	46 14.81	118 55.48	3.03	1.1	9/09	203	0.24	BD	E3	X	
9	00:48:09.07	46 14.86	118 55.27	1.26	1.1	7/07	194	0.18	BD	E3	X	
9	20:55:43.16	47 39.11	118 11.46	0.37#	1.4	5/06	311	0.44	CD	N3	P	
9	21:52:58.15	46 29.87	123 13.90	1.53	1.1	6/06	158	0.03	AC	P3	P	
9	22:02:01.33	46 47.44	122 22.74	3.94	1.1	12/12	182	0.18	BD	P3	P	
10	01:06:41.84	46 14.41	118 56.35	0.02*	1.5	9/09	171	0.16	BC	E3	X	
10	14:17:11.15	46 14.98	118 55.49	2.19	1.2	9/09	193	0.15	BD	E3	X	
11	00:51:42.46	46 13.10	122 56.33	33.34\$	2.1	6/07	209	0.23	CD	C3	P	
11	06:29:48.74	46 14.18	118 54.96	11.64	1.2	6/06	195	0.25	BD	E3	X	
11	14:06:49.08	46 51.80	121 42.34	7.69	1.1	7/08	143	0.17	BC	C3		
12	03:50:40.61	46 12.74	118 52.13	0.26*	1.5	7/08	288	0.20	BD	E3	X	
12	18:41:37.72	46 56.08	119 54.13	2.50	1.9	28/30	43	0.18	BB	E3		
13	01:08:35.53	46 14.41	118 53.12	5.69	1.0	7/09	203	0.27	BD	E3	X	
13	01:26:49.05	47 30.04	122 04.71	0.04*	1.2	7/08	141	0.21	BC	P3	P	
16	21:44:37.17	46 13.44	119 35.43	7.84\$	2.2	10/11	158	1.99	DC	E3	P	
17	04:25:35.72	46 14.86	118 49.32	20.69	1.1	5/06	237	0.25	CD	E3	X	
17	09:11:36.72	46 15.11	118 50.95	5.96	1.2	6/06	229	0.28	DD	E3	X	
17	09:25:48.42	46 12.04	118 46.40	5.98	1.3	5/06	311	0.31	DD	E3	P	
17	11:33:12.89	47 43.21	122 06.63	20.09*	1.5	10/14	118	0.20	BB	P3		
17	15:55:42.02	46 15.75	118 40.38	15.96	1.1	4/05	272	0.24	CD	E3	X	
17	18:39:28.53	46 12.36	118 43.99	0.03*	1.4	5/06	315	0.15	AD	E3	P	
17	21:05:25.76	46 14.85	118 54.93	0.51	1.1	6/06	207	0.01	AD	E3	X	
18	17:03:04.90	46 14.74	118 55.28	1.44	1.1	5/05	205	0.01	AD	E3		
18	19:49:37.68	48 37.96	123 22.72	52.00	1.9	14/18	69	0.16	BA	P3		
18	20:13:57.94	46 14.46	118 52.99	6.78	1.5	6/06	214	0.11	BD	E3	X	
18	22:44:27.93	45 49.98	120 00.44	0.03*	2.8	16/16	196	0.28	BD	E3		
19	06:08:00.79	46 13.18	118 50.64	0.02*	1.0	5/07	303	0.13	AD	E3	X	

DAY	TIME	LAT	LON	Dec 1980, cont'd			GAP	RMS	Q	MOD	TYP
				DEPTH	M	NS/NP					
19	17:46:13.73	46 48.17	119 40.63	14.03	1.1	8/09	109	0.09	AB	E3	
19	20:02:02.82	46 14.50	118 50.52	8.51	1.1	5/06	231	0.20	BD	E3	X
19	21:31:30.15	46 15.89	118 56.94	3.26	1.0	6/07	197	0.32	CD	E3	X
19	23:35:00.10	46 50.62	122 17.48	0.04*	1.4	16/18	44	0.11	AC	P3	P
20	01:00:32.09	46 13.90	118 54.37	21.54	1.3	4/05	210	0.15	BD	E3	X
20	08:33:52.53	47 41.96	120 05.13	3.28	1.7	15/20	79	0.18	BB	N3	
20	17:32:05.98	47 50.54	122 04.40	20.12	1.1	9/10	104	0.07	AB	P3	
20	19:54:39.60	46 14.42	118 52.06	9.94*	1.0	6/07	223	0.15	BD	E3	X
20	23:20:38.35	46 15.05	118 51.26	6.03	1.0	5/05	228	0.13	CD	E3	X
21	02:56:44.15	46 28.19	118 48.33	27.18	1.0	4/05	283	0.18	CD	E3	X
21	08:07:02.61	46 14.70	118 55.03	0.03*	1.0	5/05	207	0.03	AD	E3	X
21	09:14:10.86	47 33.52	121 45.08	10.56	2.0	23/26	58	0.18	BB	P3	
21	21:54:18.51	46 49.20	121 56.76	9.54	1.9	21/24	52	0.11	AC	C3	
23	17:44:21.02	46 15.55	118 53.02	1.27	1.1	5/05	219	0.04	AD	E3	X
24	05:56:03.30	46 19.30	119 03.60	0.52	1.0	5/05	161	0.29	BD	E3	X
25	23:33:36.89	47 13.38	122 06.74	12.75	1.5	14/16	131	0.08	AB	P3	
27	00:47:40.12	47 53.62	122 19.20	7.96	1.9	9/10	116	0.12	AC	P3	
28	14:09:51.97	46 48.24	119 24.72	0.03*	1.2	9/13	105	0.12	AB	E3	
28	14:10:59.37	46 48.37	119 25.08	0.04*	1.2	10/14	69	0.09	AA	E3	
29	11:53:44.58	47 47.37	120 46.83	13.67	1.8	15/17	127	0.22	BB	C3	
29	12:37:51.74	47 02.64	121 54.07	17.43	1.9	19/23	57	0.11	AB	C3	
30	01:53:14.30	47 44.42	122 12.81	15.40	1.2	10/13	149	0.12	AC	P3	
30	02:57:44.09	47 33.82	121 43.62	9.43	1.6	8/12	123	0.09	AB	P3	
30	03:01:34.23	46 33.60	121 45.76	10.10*	1.3	11/16	156	0.12	AC	C3	
30	08:51:17.16	48 39.67	122 59.38	19.59	1.3	9/13	134	0.13	AB	P3	
30	17:07:51.47	46 14.31	118 56.42	1.47	1.0	5/08	198	0.11	AD	E3	X
30	22:13:15.81	46 15.47	118 51.57	6.62	1.0	8/10	208	0.23	BD	E3	X
31	02:05:42.98	46 14.45	118 53.94	5.48	1.0	10/12	199	0.21	BD	E3	X
31	02:54:18.98	46 15.41	118 50.46	3.68	1.0	7/08	212	0.10	AD	E3	X
31	05:05:25.99	46 16.00	118 44.07	14.99	1.0	5/07	260	0.12	BD	E3	X
31	05:09:01.39	48 27.12	121 39.62	8.64	1.9	9/10	117	0.14	AB	P3	
31	06:25:42.99	46 14.27	118 55.66	2.03	1.1	9/11	192	0.21	BD	E3	X
31	06:50:15.41	46 13.53	118 52.62	0.03*	1.1	5/05	219	0.16	BD	E3	X
31	08:35:20.05	46 15.27	118 50.42	6.75	1.0	7/07	213	0.21	CD	E3	X
31	11:28:28.23	47 32.08	122 29.94	24.31	1.1	16/18	56	0.09	AA	P3	
31	15:05:15.33	46 15.51	118 46.01	8.64	1.3	5/05	252	0.08	BD	E3	X
31	16:30:50.89	46 59.47	123 16.61	38.47	1.2	7/09	133	0.23	BB	P3	
31	20:58:30.85	48 27.09	121 38.66	10.71	1.2	6/08	119	0.07	AC	P3	
31	22:52:11.46	46 14.31	118 54.99	6.24	1.0	5/07	206	0.13	BD	E3	X

## APPENDIX II

## EARTHQUAKE CATALOG 1980

Mount St. Helens region only 46°-46.4° N, 122°-122.4° W

DAY	TIME	LAT	LON	Feb 1980		NS/NP	GAP	RMS	Q	MOD	TYP
				DEPTH	M						
9	00:28:56.83	46 10.72	122 10.46	0.03#	3.2	5/06	262	0.17	BD	S3	
Mar 1980											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
17	12:58:17.69	46 11.39	122 12.70	0.05*	2.5	5/05	251	0.05	AD	S3	
18	02:00:58.81	46 08.91	122 11.05	0.04*	2.1	4/06	271	0.18	BD	S3	
18	10:31:31.15	46 12.78	122 11.51	0.82\$	2.0	4/05	210	0.17	DD	S3	H
19	03:39:14.95	46 10.44	122 11.07	0.04*	2.2	5/07	268	0.19	BD	S3	H
20	23:47:43.46	46 11.52	122 12.23	1.54	4.2	7/07	210	0.18	DD	S3	L
21	00:04:03.19	46 11.70	122 11.99	0.84	2.7	6/07	237	0.12	BD	S3	
21	00:34:52.49	46 11.17	122 11.94	1.90\$	2.4	5/06	257	0.12	DD	S3	
22	22:22:42.54	46 12.22	122 13.25	0.62	4.2	6/06	162	0.29	DC	S3	L
23	15:22:42.80	46 12.06	122 11.73	0.04*	3.5	7/07	243	0.22	BD	S3	
24	03:27:35.90	46 08.74	122 09.04	0.02#	3.0	4/04	259	0.11	AD	S3	
24	13:14:42.16	46 11.75	122 12.61	0.03*	3.8	8/08	107	0.16	BB	S3	
24	13:20:53.82	46 11.31	122 12.66	0.93	2.9	4/04	217	0.	AD	S3	
24	20:41:18.42	46 11.96	122 11.23	1.16	2.8	4/04	228	0.	AD	S3	
24	21:56:49.49	46 11.96	122 10.38	0.03*	4.4	10/10	133	0.35	CB	S3	
25	00:21:09.64	46 11.78	122 12.26	0.03*	2.8	6/06	154	0.07	AC	S3	
25	00:28:03.28	46 12.07	122 11.76	0.05*	2.9	7/07	158	0.09	AC	S3	
25	04:07:09.59	46 12.14	122 11.14	0.04*	3.8	13/13	89	0.16	BA	S3	
25	07:08:46.10	46 11.80	122 11.00	0.02*	4.1	10/10	143	0.20	BC	S3	
25	13:42:14.04	46 12.04	122 11.39	0.05*	3.8	7/07	160	0.06	AC	S3	
25	16:16:15.19	46 12.17	122 11.31	0.04*	3.5	12/12	89	0.18	BA	S3	
25	17:18:47.74	46 09.19	122 10.02	19.11	3.8	7/07	270	0.03	BD	S3	
25	19:16:48.47	46 12.61	122 12.71	17.16	3.3	7/07	264	0.23	DD	S3	
25	20:01:00.75	46 06.12	122 08.64	16.55	2.9	6/06	275	0.14	DD	S3	
25	21:03:49.00	46 10.52	122 11.62	18.66	3.3	7/07	268	0.12	CD	S3	
25	21:30:25.99	46 12.41	122 12.41	0.02*	3.4	6/06	208	0.03	AD	S3	
25	21:50:51.25	46 12.10	122 12.32	0.02*	4.1	11/11	111	0.19	BC	S3	
25	22:14:49.39	46 09.64	122 11.75	10.74	3.5	7/07	269	0.31	DD	S3	
25	22:22:14.57	46 11.94	122 10.21	0.02*	3.8	9/09	149	0.25	BC	S3	
25	22:36:24.29	46 09.47	122 07.63	2.70	2.9	5/05	271	0.18	DD	S3	
25	22:49:28.87	46 12.71	122 13.17	0.03*	2.7	5/05	264	0.03	AD	S3	
25	22:53:01.65	46 11.97	122 10.82	0.04*	4.3	11/11	90	0.23	BA	S3	
25	23:03:03.07	46 09.59	122 10.41	17.89	3.5	6/06	270	0.13	CD	S3	
25	23:26:33.50	46 12.22	122 11.15	0.03*	3.6	11/11	89	0.19	BA	S3	
25	23:41:50.58	46 09.65	122 11.17	0.02*	2.6	7/07	151	0.16	BC	S3	
25	23:43:02.51	46 11.50	122 11.16	0.02*	3.8	6/06	246	0.14	AD	S3	
26	00:02:16.00	46 10.63	122 09.95	21.14	2.7	7/07	268	0.15	CD	S3	
26	00:07:55.27	46 09.34	122 07.96	16.15\$	3.1	7/07	271	0.29	DD	S3	
26	00:12:07.79	46 12.70	122 11.37	0.03*	3.8	9/09	104	0.20	BC	S3	
26	00:16:28.82	46 10.94	122 11.65	0.04*	3.2	6/06	267	0.22	BD	S3	
26	00:29:36.78	46 11.12	122 11.49	19.13	3.3	8/08	267	0.12	CD	S3	
26	00:42:23.56	46 03.73	122 07.52	18.26	3.4	7/07	279	0.28	DD	S3	
26	00:58:46.18	46 10.97	122 11.85	19.18	3.3	7/07	267	0.13	CD	S3	
26	01:00:43.49	46 10.46	122 11.53	17.32	3.5	6/06	268	0.09	BD	S3	
26	01:06:29.91	46 12.11	122 11.34	0.04*	4.0	13/13	89	0.35	CA	S3	
26	01:15:42.82	46 13.85	122 13.50	2.05	3.8	6/06	261	0.06	BD	S3	
26	01:37:51.96	46 07.08	122 08.38	15.97\$	3.7	8/08	215	0.25	CD	S3	
26	01:53:00.02	46 09.68	122 10.27	18.23	3.7	7/07	270	0.17	DD	S3	
26	02:03:18.33	46 12.37	122 12.34	0.04*	4.4	9/09	111	0.09	AB	S3	
26	02:18:32.92	46 12.12	122 11.57	0.03*	3.7	8/08	159	0.11	AC	S3	
26	02:25:32.65	46 12.45	122 11.51	0.02*	3.7	8/08	107	0.17	BB	S3	
26	02:35:59.94	46 12.10	122 11.24	0.05*	4.1	14/14	89	0.17	BA	S3	
26	02:44:38.55	46 11.89	122 12.00	0.03*	3.4	5/05	230	0.03	AD	S3	
26	03:01:03.04	46 11.73	122 12.25	0.02*	3.9	11/11	95	0.21	BB	S3	
26	03:05:57.73	46 12.28	122 11.58	0.04*	3.5	14/14	88	0.15	AA	S3	
26	03:13:20.16	46 12.07	122 11.85	0.04*	2.3	8/08	157	0.12	AC	S3	

Mar 1980, cont'd											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
26	03:16:40.64	46 02.49	122 08.99	17.60	2.8	5/05	303	0.07	CD	S3	
26	03:33:00.22	46 12.23	122 11.38	0.74	3.5	10/10	108	0.14	AB	S3	
26	03:36:24.06	46 12.41	122 10.75	0.11	3.7	15/15	90	0.17	BA	S3	
26	04:10:43.29	46 12.10	122 11.77	0.02*	3.5	13/13	103	0.20	BB	S3	
26	04:14:28.90	46 12.38	122 11.31	0.05*	3.7	15/16	89	0.14	AA	S3	
26	04:42:10.52	46 12.50	122 10.95	0.02*	3.8	13/13	109	0.25	BB	S3	
26	04:47:27.19	46 12.49	122 11.39	0.02*	3.6	9/09	108	0.21	BB	S3	
26	05:00:04.31	46 12.15	122 11.02	0.02*	4.3	14/14	102	0.26	BB	S3	
26	05:13:40.42	46 12.28	122 11.75	0.04*	4.1	11/11	107	0.15	BB	S3	
26	05:30:09.88	46 11.97	122 11.67	0.22	4.2	12/12	90	0.19	BA	S3	
26	06:00:13.33	46 10.83	122 09.52	6.00	3.5	7/07	131	0.13	BB	S3	
26	06:14:25.20	46 11.95	122 11.01	0.02*	3.6	9/09	111	0.25	BB	S3	
26	06:29:34.67	46 07.28	122 06.63	9.75	3.6	6/06	264	0.20	CD	S3	
26	06:45:40.99	46 11.01	122 09.78	5.45	3.9	7/07	126	0.07	AB	S3	
26	07:17:21.80	46 12.31	122 10.98	0.03*	4.1	11/11	112	0.11	AB	S3	
26	09:10:07.87	46 12.38	122 10.55	0.03*	4.1	15/15	90	0.13	AA	S3	
26	09:44:02.56	46 12.07	122 10.14	0.02*	4.4	12/12	121	0.16	BB	S3	
26	14:17:41.47	46 12.05	122 10.63	0.02*	3.9	11/11	116	0.17	BB	S3	
26	14:33:18.07	46 06.85	122 09.32	0.02*	3.6	8/08	262	0.19	BD	S3	H
26	14:47:26.14	46 15.34	122 10.64	0.07	4.1	8/08	158	0.33	CC	S3	H
26	15:01:20.11	46 08.47	122 08.61	0.03#	3.4	6/06	272	0.75	DD	S3	H
26	15:09:29.06	46 21.94	122 05.50	0.02*	3.1	7/07	135	0.63	DC	S3	H
26	15:17:47.99	46 08.01	122 11.17	0.02*	3.4	5/05	282	0.13	AD	S3	H
26	15:53:45.74	46 07.81	122 08.31	24.71	3.5	6/06	261	0.27	DD	S3	H
26	16:00:44.11	46 12.43	122 09.76	6.03*	3.7	7/07	208	0.22	BD	S3	H
26	16:09:19.20	46 09.83	122 10.70	0.54	2.8	7/07	252	0.09	BD	S3	H
26	16:12:12.65	46 11.59	122 10.48	0.03*	3.8	8/08	223	0.18	BD	S3	H
26	17:04:55.04	46 09.16	122 12.97	0.02#	2.7	6/06	270	0.44	CD	S3	H
26	17:07:10.82	46 11.54	122 12.36	2.61*	4.4	12/12	93	0.16	BB	S3	
26	17:13:55.78	46 09.32	122 10.65	0.02*	3.2	6/06	254	0.12	AD	S3	H
26	18:03:25.49	46 10.69	122 13.54	0.90	3.1	6/06	172	0.18	BC	S3	H
26	18:15:17.24	46 11.08	122 12.52	1.56	3.2	7/07	157	0.14	BC	S3	H
26	20:37:49.04	46 12.55	122 11.24	0.29	4.0	8/08	132	0.15	AB	S3	
27	03:40:05.62	46 13.08	122 10.78	0.09	4.2	10/10	101	0.17	BB	S3	
27	03:48:58.46	46 12.54	122 11.26	0.04*	4.1	11/11	104	0.13	AB	S3	
27	04:26:10.35	46 11.62	122 10.93	4.53	4.0	9/09	101	0.14	BB	S3	
27	05:30:43.41	46 12.27	122 11.10	0.02*	3.9	10/10	103	0.19	BB	S3	
27	06:33:23.85	46 11.82	122 13.07	0.03*	4.3	11/11	74	0.30	BA	S3	
27	07:39:15.52	46 12.42	122 10.68	0.04*	4.0	11/11	60	0.14	AA	S3	
27	10:40:16.89	46 12.33	122 11.55	0.03*	3.9	11/11	106	0.15	AB	S3	
27	12:32:54.55	46 12.40	122 11.38	0.03*	3.9	10/10	104	0.17	BB	S3	
27	14:55:54.58	46 12.27	122 11.46	0.03*	4.3	10/10	105	0.15	AB	S3	
27	15:55:03.73	46 12.51	122 12.08	1.05	4.0	8/08	109	0.21	BB	S3	
27	18:55:44.83	46 12.31	122 11.49	0.80	4.0	12/12	61	0.11	AA	S3	
27	20:16:43.01	46 12.22	122 11.17	0.14	4.3	11/11	103	0.13	AB	S3	
27	22:00:05.43	46 12.89	122 11.64	0.08	4.7	15/15	58	0.30	BA	S3	
28	01:51:12.64	46 12.37	122 11.23	2.06	4.3	11/11	103	0.17	BB	S3	
28	03:35:50.85	46 12.18	122 11.39	0.05*	4.0	12/12	105	0.28	BB	S3	
28	08:28:25.61	46 12.85	122 10.68	0.02*	4.9	15/15	53	0.42	CB	S3	
28	12:51:19.35	46 12.54	122 10.80	1.94	4.4	11/11	101	0.21	BB	S3	
28	13:59:38.45	46 12.42	122 11.36	0.79	4.1	11/11	104	0.17	BB	S3	
28	15:18:43.26	46 12.29	122 12.23	0.02*	4.0	11/11	110	0.31	CB	S3	
28	22:50:28.48	46 12.60	122 12.05	2.32\$	4.1	11/11	109	0.34	CB	S3	
29	05:48:47.36	46 12.31	122 11.57	2.57	4.4	11/11	106	0.27	BB	S3	
29	08:36:56.72	46 12.15	122 10.53	1.26	4.4	11/11	99	0.17	BB	S3	
29	10:34:40.31	46 12.86	122 11.12	0.05*	4.3	9/09	103	0.24	BB	S3	
29	11:51:48.16	46 12.19	122 11.76	2.28	4.4	11/11	107	0.11	AB	S3	
29	13:01:50.70	46 11.92	122 12.24	0.05*	4.3	11/11	110	0.49	CB	S3	
29	15:05:24.78	46 12.14	122 11.19	0.33	4.5	10/10	103	0.20	BB	S3	
29	15:35:39.62	46 12.85	122 10.58	1.21	4.4	12/12	100	0.23	BB	S3	
29	19:01:01.78	46 12.87	122 10.66	0.45	4.0	11/11	75	0.22	BB	S3	
29	20:55:51.88	46 12.42	122 11.39	0.04*	4.4	11/11	105	0.16	BB	S3	
29	23:20:40.56	46 12.22	122 11.33	0.02*	4.3	10/10	104	0.16	BB	S3	
30	02:56:19.62	46 12.66	122 11.49	0.02*	4.3	12/12	84	0.22	BB	S3	
30	03:53:55.06	46 11.51	122 10.15	0.02*	4.4	9/09	96	0.17	BB	S3	
30	07:42:17.10	46 12.38	122 10.97	0.03*	4.1	12/12	83	0.29	BB	S3	
30	09:16:53.15	46 12.21	122 11.59	2.04*	4.5	12/12	64	0.16	BA	S3	
30	12:39:57.68	46 12.57	122 10.59	0.04*	4.1	13/13	61	0.19	BB	S3	
30	13:32:25.33	46 12.62	122 11.59	0.02*	4.6	14/14	54	0.21	BA	S3	

DAY	TIME	LAT	LON	Mar 1980, cont'd							
				DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
30	17:55:10.05	46 12.50	122 10.98	0.14	4.6	14/14	58	0.25	BA	S3	
30	22:47:11.76	46 12.63	122 11.70	0.03*	4.7	16/16	53	0.24	BA	S3	
31	02:44:06.13	46 12.46	122 11.61	0.98	4.5	13/13	57	0.20	BA	S3	
31	07:49:42.02	46 12.58	122 11.30	0.04*	4.7	12/12	81	0.11	AA	S3	
31	08:12:51.92	46 12.76	122 11.94	0.02*	4.2	12/12	77	0.14	AA	S3	
31	11:34:09.84	46 12.61	122 11.62	0.03*	4.6	18/18	85	0.33	CA	S3	
31	14:49:01.21	46 12.91	122 11.44	0.03*	4.5	19/19	60	0.29	BA	S3	
31	14:49:01.20	46 12.73	122 11.60	0.05*	4.5	14/14	84	0.15	AB	S3	
31	19:29:11.33	46 13.43	122 10.23	0.03*	4.2	9/09	123	0.32	CB	S3	
31	19:37:09.98	46 11.77	122 11.44	0.72	3.3	10/10	90	0.23	BB	S3	

DAY	TIME	LAT	LON	Apr 1980							
				DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
1	04:24:30.57	46 12.92	122 10.79	0.02*	4.9	12/12	63	0.27	BB	S3	
1	08:54:25.42	46 12.78	122 11.23	0.03*	4.9	17/17	82	0.21	BB	S3	
1	12:30:46.67	46 12.49	122 10.91	1.29	4.9	18/18	60	0.19	BA	S3	
1	15:42:51.67	46 12.37	122 10.78	1.12	2.8	8/08	90	0.15	BA	S3	
1	23:14:38.56	46 12.51	122 11.60	0.25	4.9	18/18	86	0.29	BB	S3	
2	09:37:12.96	46 12.57	122 11.47	0.04*	4.9	18/18	58	0.31	CA	S3	
2	18:48:20.66	46 12.47	122 10.96	0.02*	4.6	16/16	59	0.23	BA	S3	
3	02:43:19.37	46 12.50	122 11.34	0.03*	4.8	18/18	57	0.29	BA	S3	
3	09:34:25.77	46 12.51	122 10.84	1.42	3.7	9/09	114	0.28	BB	S3	
3	09:35:26.88	46 13.61	122 10.31	0.02*	5.1	16/16	69	0.35	CA	S3	
3	15:30:20.14	46 12.18	122 11.13	0.65	4.3	15/15	65	0.16	BA	S3	
3	21:03:53.40	46 12.38	122 10.57	0.95	2.1	9/09	117	0.18	BB	S3	
3	21:51:58.54	46 12.70	122 10.87	0.03*	4.0	13/13	61	0.21	BA	S3	
3	23:57:51.93	46 12.74	122 11.19	0.02*	5.0	17/17	60	0.36	CA	S3	
4	09:42:35.35	46 12.72	122 12.38	1.24*	4.3	14/14	88	0.18	BB	S3	
4	09:49:56.13	46 13.23	122 11.55	0.93	4.0	15/15	62	0.15	AA	S3	
4	13:45:05.69	46 12.52	122 10.86	0.90	4.9	14/14	60	0.18	BA	S3	
4	17:32:49.35	46 12.27	122 11.60	1.94	3.3	11/11	93	0.40	CB	S3	L
4	21:40:44.70	46 13.30	122 11.13	0.51*	4.9	16/16	64	0.18	BB	S3	
5	02:09:28.75	46 12.23	122 11.14	0.38	3.9	15/15	63	0.15	BA	S3	
5	06:39:03.15	46 12.26	122 10.99	0.02*	4.3	14/14	63	0.17	BA	S3	
5	08:49:17.36	46 12.59	122 10.64	1.17	4.4	17/17	61	0.29	BA	S3	
5	10:58:49.28	46 12.18	122 11.44	0.05*	4.1	15/15	65	0.21	BA	S3	
5	13:46:55.91	46 12.37	122 11.99	1.81	4.5	13/13	81	0.22	BA	S3	
5	16:42:05.53	46 12.94	122 11.99	2.04*	4.7	17/17	48	0.48	CA	S3	
5	23:56:53.36	46 12.64	122 10.52	0.02*	3.9	13/13	79	0.16	BC	S3	
6	06:41:38.40	46 12.50	122 11.02	0.03*	3.9	15/15	59	0.29	BA	S3	
6	06:58:04.31	46 12.63	122 11.23	0.03*	5.1	16/16	59	0.29	BA	S3	
6	11:08:27.37	46 12.12	122 11.38	1.93	3.2	16/16	66	0.34	CA	S3	
6	15:00:38.30	46 12.26	122 11.12	0.16	3.9	15/15	57	0.17	BC	S3	
6	17:18:46.67	46 12.77	122 10.42	0.03*	4.0	9/09	63	0.19	BC	S3	
6	20:26:12.26	46 12.03	122 11.65	0.03*	4.1	16/16	54	0.18	BB	S3	
6	22:41:03.12	46 12.30	122 10.91	0.03*	3.7	14/14	58	0.23	BC	S3	
6	23:22:56.01	46 12.29	122 10.44	0.05*	4.0	15/15	60	0.23	BB	S3	
6	23:26:00.80	46 12.35	122 11.51	0.03*	4.4	13/13	57	0.18	BC	S3	
7	01:54:13.53	46 12.74	122 10.73	0.04*	3.9	16/16	62	0.20	BB	S3	
7	01:57:44.81	46 12.42	122 11.78	0.03*	4.1	14/14	56	0.23	BC	S3	
7	03:52:03.23	46 12.09	122 11.15	0.03*	3.8	13/13	86	0.16	BC	S3	
7	04:52:53.94	46 11.12	122 10.06	2.58	4.0	11/11	83	0.30	BB	S3	
7	06:45:18.91	46 12.78	122 10.94	0.04*	4.8	17/17	61	0.29	BA	S3	
7	09:42:01.54	46 12.76	122 10.54	0.04*	4.0	12/12	78	0.28	BC	S3	
7	10:29:03.47	46 12.33	122 10.74	0.78	3.7	10/10	87	0.13	AC	S3	
7	11:32:31.68	46 12.58	122 10.61	0.05*	4.0	12/12	61	0.12	AC	S3	
7	11:51:43.57	46 12.29	122 10.70	0.05*	4.0	14/14	59	0.15	BC	S3	
7	15:05:32.70	46 13.03	122 10.90	3.39\$	5.1	13/13	72	0.24	CC	S3	
7	21:14:57.92	46 12.88	122 11.33	0.50	3.6	17/17	60	0.16	BA	S3	
7	22:50:46.20	46 12.25	122 11.17	0.03*	3.8	15/15	57	0.20	BB	S3	
8	01:30:22.96	46 12.20	122 10.07	2.66	2.9	8/08	123	0.20	BB	S3	
8	02:18:46.89	46 12.13	122 11.33	0.04*	4.0	16/16	56	0.15	AB	S3	
8	04:46:58.27	46 12.64	122 10.68	0.03*	4.1	14/14	61	0.27	BB	S3	
8	06:07:04.52	46 12.35	122 10.81	0.10	4.8	14/14	59	0.14	AB	S3	
8	12:29:15.05	46 12.16	122 11.66	1.16\$	3.7	13/13	80	0.39	CB	S3	
8	13:40:56.16	46 12.55	122 10.76	0.04*	3.7	15/15	60	0.24	BB	S3	
8	13:42:26.94	46 12.08	122 10.95	0.05*	4.1	15/15	78	0.23	BA	S3	
8	14:37:32.28	46 12.05	122 10.66	0.29	3.7	16/16	57	0.20	BA	S3	

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Apr 1980, cont'd											TYP
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	
8	15:47:29.48	46 12.07	122 11.11	0.02*	3.7	17/17	56	0.21	BA	S3	
8	17:07:58.47	46 12.73	122 11.64	0.02*	3.7	16/16	71	0.20	BA	S3	
8	19:29:02.91	46 12.59	122 11.75	0.44	5.1	17/17	63	0.39	CA	S3	
8	22:10:15.20	46 13.48	122 11.26	0.03*	4.2	13/13	71	0.29	BB	S3	
8	22:13:49.87	46 12.21	122 11.59	0.29	4.4	17/17	58	0.26	BB	S3	
8	23:59:16.21	46 11.95	122 11.30	0.02*	3.7	14/14	83	0.28	BA	S3	
9	03:25:20.51	46 11.87	122 11.58	0.02*	3.8	13/13	55	0.14	AA	S3	
9	03:28:51.26	46 12.15	122 11.09	0.28	3.8	17/17	57	0.16	BA	S3	
9	07:04:47.19	46 12.13	122 10.98	0.03*	3.8	16/16	57	0.25	BA	S3	
9	09:01:44.22	46 12.12	122 11.02	2.06	4.5	16/16	57	0.23	BA	S3	
9	10:13:19.82	46 11.53	122 11.07	0.04*	4.7	13/13	84	0.34	CA	S3	
9	11:55:26.08	46 12.22	122 10.86	1.13	3.8	18/18	58	0.23	BB	S3	
9	18:19:26.90	46 12.84	122 10.35	0.04*	4.7	9/09	102	0.17	BC	S3	
9	22:29:03.38	46 12.39	122 11.00	0.03*	4.1	17/17	67	0.15	AA	S3	
10	00:25:47.89	46 12.88	122 10.08	0.04*	4.8	15/17	65	0.22	BB	S3	
10	00:44:15.51	46 13.30	122 11.07	0.02*	4.9	21/21	61	0.25	BB	S3	
10	05:03:47.72	46 12.22	122 10.86	0.03*	3.4	16/16	58	0.24	BA	S3	
10	08:51:25.12	46 12.71	122 10.47	0.03*	3.8	17/17	63	0.22	BB	S3	
10	09:56:47.53	46 12.20	122 11.00	0.05*	3.8	17/17	57	0.17	BA	S3	
10	14:13:44.46	46 12.56	122 10.92	0.05*	3.8	17/17	65	0.36	CB	S3	
10	14:16:15.12	46 12.52	122 10.99	0.04*	4.7	21/21	47	0.40	CA	S3	
10	15:22:21.14	46 12.23	122 11.21	0.03*	3.7	19/19	57	0.36	CA	S3	
10	18:57:02.36	46 11.94	122 11.02	0.03*	3.9	19/19	56	0.22	BA	S3	
10	21:08:26.09	46 12.33	122 10.79	0.45	4.2	16/16	59	0.15	AA	S3	
10	21:35:34.06	46 12.26	122 10.45	0.04*	3.6	16/16	60	0.35	CA	S3	
10	22:38:05.70	46 12.04	122 10.68	0.04*	3.7	17/17	57	0.29	BA	S3	
11	00:51:48.17	46 12.25	122 11.01	0.02*	3.8	20/20	58	0.19	BA	S3	
11	03:36:04.13	46 12.40	122 11.16	0.03*	3.7	18/18	64	0.19	BA	S3	
11	04:45:22.02	46 13.10	122 10.67	1.99	4.7	17/17	64	0.21	BB	S3	
11	04:50:38.08	46 12.43	122 10.76	0.02*	3.8	13/13	60	0.21	BB	S3	
11	06:01:53.23	46 12.61	122 10.64	0.04*	3.6	15/15	61	0.31	CA	S3	
11	06:29:37.37	46 11.88	122 11.29	2.14	3.1	12/12	107	0.19	BB	S3	
11	07:42:01.64	46 12.40	122 11.69	0.03*	4.1	19/19	56	0.22	BA	S3	
11	08:34:59.05	46 12.60	122 11.03	0.02*	3.8	17/17	60	0.28	BA	S3	
11	08:55:07.57	46 11.91	122 11.76	0.04*	3.8	18/18	53	0.48	CA	S3	
11	11:14:16.40	46 12.93	122 10.29	0.02*	3.8	18/18	65	0.19	BB	S3	
11	13:32:51.60	46 12.52	122 11.27	0.03*	3.9	13/13	73	0.31	CA	S3	
11	14:44:10.63	46 12.68	122 10.81	0.16	3.8	17/17	61	0.17	BA	S3	
11	14:52:25.05	46 12.52	122 11.27	0.02*	4.1	16/16	59	0.22	BA	S3	
11	16:19:28.09	46 12.33	122 10.53	1.05	2.7	12/12	62	0.11	AA	S3	
11	16:20:20.52	46 10.61	122 12.38	8.06§	3.7	9/09	120	0.54	DB	S3	
11	18:01:10.32	46 12.31	122 10.97	0.04*	4.3	13/13	67	0.28	BA	S3	
11	19:11:08.51	46 12.89	122 11.26	0.04*	1.6	5/05	147	0.20	BD	S3	
11	19:15:08.35	46 12.00	122 09.10	0.02*	4.1	13/13	63	0.27	BB	S3	
11	20:04:27.75	46 12.05	122 11.11	0.85	3.6	18/18	56	0.14	AA	S3	
11	21:56:30.99	46 12.49	122 10.80	0.04*	4.0	12/12	90	0.27	BB	S3	
11	22:06:17.13	46 12.55	122 11.03	0.95	3.6	18/18	60	0.15	AA	S3	
11	22:28:17.88	46 12.64	122 10.63	0.02*	2.0	9/09	117	0.31	CB	S3	
11	23:51:59.86	46 12.49	122 10.08	0.02*	5.0	18/18	63	0.24	BB	S3	
12	00:47:51.47	46 12.00	122 10.63	1.24	2.3	13/13	57	0.12	AA	S3	
12	02:25:23.61	46 13.61	122 09.82	1.06	3.8	15/15	71	0.28	BA	S3	
12	03:55:42.58	46 12.44	122 11.93	0.08	3.7	11/11	91	0.17	BB	S3	
12	05:16:22.21	46 12.99	122 10.47	0.05*	4.7	21/21	63	0.28	BB	S3	
12	15:08:11.70	46 12.25	122 11.16	0.03*	4.3	18/18	64	0.26	BA	S3	
12	20:45:33.95	46 12.50	122 11.47	0.04*	4.0	17/17	58	0.28	BA	S3	
12	20:47:42.09	46 12.80	122 10.80	0.03*	4.0	17/17	62	0.20	BA	S3	
12	21:25:19.52	46 12.45	122 11.47	0.05*	3.9	18/18	57	0.23	BB	S3	
12	22:03:55.40	46 12.38	122 11.06	1.43	3.6	13/13	61	0.13	AA	S3	
12	22:29:12.02	46 13.11	122 11.87	1.97*	4.6	19/19	60	0.23	BA	S3	
13	00:15:38.20	46 12.29	122 11.58	2.46	3.8	19/19	56	0.22	BA	S3	
13	01:25:55.91	46 12.20	122 11.34	0.05*	4.2	20/20	56	0.26	BA	S3	
13	03:03:22.73	46 14.67	122 11.29	0.02*	4.0	11/11	130	0.37	CB	S3	
13	04:45:26.90	46 12.47	122 11.13	0.02*	4.0	14/14	62	0.26	BA	S3	
13	06:13:18.42	46 12.22	122 11.26	0.59	4.2	20/20	57	0.18	BA	S3	
13	07:39:31.97	46 12.49	122 11.36	0.05*	3.6	18/18	58	0.18	BA	S3	
13	08:36:18.75	46 12.69	122 10.82	1.93	4.8	18/18	61	0.15	AA	S3	
13	09:40:46.32	46 12.80	122 11.12	0.02*	4.0	13/13	64	0.23	BB	S3	
13	12:05:09.93	46 12.60	122 10.70	0.49	2.8	11/11	73	0.16	BA	S3	
13	12:06:20.57	46 12.44	122 11.72	0.04*	4.1	15/15	57	0.29	BA	S3	

Apr 1980, cont'd											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
13	13:18:34.30	46 12.60	122 11.13	0.03*	3.8	17/17	60	0.30	CA	S3	
13	14:30:31.26	46 12.33	122 11.12	0.73	3.8	17/17	58	0.16	BB	S3	
13	17:35:41.65	46 12.22	122 11.59	0.16	4.5	20/20	56	0.20	BA	S3	
13	18:58:21.63	46 12.59	122 11.00	0.03*	4.9	18/18	60	0.15	BB	S3	
13	21:04:24.80	46 12.58	122 11.49	0.73	3.8	19/19	58	0.12	AA	S3	
13	22:02:51.94	46 13.30	122 11.62	0.02*	1.4	9/09	70	0.23	BA	S3	
13	23:57:32.03	46 12.78	122 10.98	0.54	3.9	17/17	61	0.13	AA	S3	
14	00:49:45.17	46 12.36	122 11.34	0.02*	3.8	20/20	57	0.20	BA	S3	
14	03:01:02.49	46 12.16	122 11.26	0.95	4.1	18/18	56	0.14	AA	S3	
14	03:44:28.34	46 12.39	122 11.27	0.62	3.8	11/11	69	0.17	BB	S3	
14	06:53:38.80	46 12.87	122 10.69	0.42	4.3	18/18	63	0.16	BB	S3	
14	06:59:22.38	46 12.57	122 11.53	2.01	4.9	20/20	58	0.26	BA	S3	
14	08:37:35.77	46 13.06	122 10.83	0.13	3.6	16/16	63	0.20	BB	S3	
14	08:42:11.63	46 12.19	122 10.85	2.12*	3.9	18/18	58	0.22	BA	S3	
14	09:49:09.38	46 12.10	122 11.26	0.92	3.7	16/16	56	0.14	AA	S3	
14	11:06:53.82	46 12.68	122 11.57	0.04*	3.9	12/12	75	0.19	BB	S3	
14	11:08:54.69	46 12.07	122 12.20	0.02*	3.8	17/17	70	0.33	CA	S3	
14	12:28:43.52	46 12.69	122 11.24	1.18	4.4	20/20	60	0.20	BA	S3	
14	13:49:03.76	46 12.21	122 11.84	1.46*	5.2	18/18	55	0.19	BA	S3	
14	15:30:30.61	46 12.44	122 11.35	0.04*	4.0	19/19	58	0.22	BA	S3	
14	22:28:53.16	46 12.86	122 12.02	0.02*	4.0	18/18	58	0.33	CA	S3	
15	00:37:05.37	46 12.52	122 11.03	2.31#	4.5	16/16	59	0.22	BA	S3	
15	02:26:17.98	46 11.80	122 11.77	0.02*	4.3	10/10	92	0.28	BB	S3	
15	03:25:19.50	46 12.25	122 13.68	2.17*	3.9	14/14	67	0.35	CA	S3	
15	06:58:22.28	46 12.64	122 12.05	1.60	4.7	20/20	57	0.36	CB	S3	
15	07:15:31.87	46 12.06	122 11.40	1.44	4.0	16/16	55	0.15	BA	S3	
15	07:35:25.71	46 12.37	122 11.61	0.75	3.9	18/18	57	0.14	AB	S3	
15	08:51:20.08	46 12.55	122 11.47	0.73	3.9	14/14	85	0.28	BB	S3	
15	11:53:53.93	46 12.41	122 11.27	1.09	4.1	17/17	58	0.16	BA	S3	
15	13:56:24.56	46 12.55	122 11.85	0.05*	3.9	18/18	63	0.19	BA	S3	
15	15:27:51.28	46 12.56	122 11.53	1.03	3.8	17/17	64	0.15	BA	S3	
15	16:12:04.66	46 12.42	122 11.23	0.02*	4.1	14/14	65	0.28	BA	S3	
15	17:54:54.16	46 12.77	122 10.86	0.41	5.0	20/20	62	0.27	BA	S3	
16	01:54:09.08	46 12.63	122 11.05	0.02*	2.7	16/16	86	0.27	BA	S3	
16	04:58:57.41	46 12.30	122 11.05	1.93	4.0	16/16	58	0.22	BA	S3	
16	06:25:52.51	46 12.86	122 11.62	1.04	3.8	19/19	59	0.14	AA	S3	
16	11:47:28.63	46 12.15	122 11.31	1.73	4.1	20/20	56	0.24	BA	S3	
16	15:22:05.54	46 12.71	122 11.16	0.03*	4.8	21/21	60	0.20	BA	S3	
16	15:40:23.54	46 12.82	122 10.57	3.29*	4.6	19/19	63	0.22	BB	S3	
16	21:29:42.56	46 13.03	122 11.88	2.80*	3.5	16/16	59	0.11	AA	S3	
16	22:46:24.77	46 12.40	122 11.28	0.05*	4.2	15/15	62	0.22	BA	S3	
17	04:26:15.94	46 12.46	122 10.90	0.65	4.7	19/19	59	0.20	BA	S3	
17	07:06:47.32	46 11.58	122 12.12	2.13	4.0	14/14	56	0.21	BA	S3	
17	08:58:44.80	46 11.93	122 11.35	1.28	3.8	15/15	57	0.17	BA	S3	
17	10:33:00.33	46 12.42	122 11.29	0.70	3.6	16/16	58	0.18	BA	S3	
17	14:43:24.56	46 12.24	122 11.41	0.26	3.9	16/16	61	0.23	BA	S3	
17	16:41:32.59	46 12.07	122 10.54	0.02*	3.7	16/16	58	0.21	BA	S3	
17	17:43:22.58	46 12.79	122 11.16	0.57	5.0	18/18	62	0.16	BA	S3	
17	23:20:26.22	46 12.58	122 11.03	0.02*	3.1	9/09	94	0.23	BB	S3	
18	00:51:05.77	46 12.45	122 11.22	0.02*	4.0	18/18	58	0.24	BA	S3	
18	00:53:40.44	46 12.79	122 11.01	0.03*	4.7	19/19	61	0.21	BA	S3	
18	02:24:31.11	46 12.02	122 11.32	0.39	3.9	17/17	55	0.13	AA	S3	
18	04:19:48.40	46 12.59	122 11.39	1.00	2.6	17/17	59	0.18	BA	S3	
18	08:28:08.99	46 12.36	122 11.23	0.02*	3.8	17/17	58	0.24	BA	S3	
18	09:23:38.99	46 12.04	122 11.28	0.63	4.0	17/17	55	0.21	BA	S3	
18	10:45:22.28	46 12.05	122 11.03	1.49	4.0	15/15	56	0.18	BA	S3	
18	12:15:43.78	46 13.23	122 11.19	0.03*	3.5	17/17	63	0.16	BA	S3	
18	13:03:55.21	46 12.69	122 10.66	0.74	4.2	19/19	62	0.18	BB	S3	
18	13:08:29.38	46 12.22	122 11.14	0.74	4.0	18/18	57	0.14	AA	S3	
18	15:53:13.71	46 12.02	122 11.34	0.03*	3.9	17/17	69	0.18	BA	S3	
18	19:16:25.35	46 12.28	122 11.06	2.00	4.0	15/15	85	0.21	BA	S3	
18	20:27:11.70	46 12.43	122 11.09	0.03*	3.8	16/16	85	0.23	BA	S3	
18	21:16:02.12	46 12.48	122 10.95	0.61	5.0	19/19	59	0.19	BA	S3	
18	22:27:14.48	46 12.49	122 10.67	1.90	4.6	17/17	60	0.16	BA	S3	
19	02:37:26.16	46 12.21	122 11.10	0.91*	4.1	16/16	59	0.20	BA	S3	
19	06:03:12.49	46 12.25	122 11.56	0.49	4.1	14/14	82	0.25	BA	S3	
19	08:07:17.99	46 12.34	122 11.35	0.97	4.3	17/17	57	0.16	BA	S3	
19	14:53:14.24	46 12.41	122 10.92	0.02*	4.0	15/15	86	0.32	CA	S3	
19	16:06:47.29	46 12.56	122 10.91	0.77	3.2	17/17	60	0.18	BA	S3	

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DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
19	17:02:21.53	46 12.94	122 11.03	2.19	3.8	8/08	200	0.18	BD	S3	
19	17:48:35.55	46 12.97	122 10.43	0.03*	4.4	18/18	64	0.23	BB	S3	
19	19:07:10.64	46 12.49	122 11.39	0.71	3.0	14/14	58	0.11	AA	S3	
19	19:17:58.32	46 12.09	122 11.44	0.03*	3.9	16/16	59	0.13	AA	S3	
19	20:41:38.62	46 12.26	122 11.21	0.61	3.8	16/16	60	0.18	BA	S3	
19	22:28:28.20	46 12.59	122 10.87	1.63	4.8	17/17	60	0.18	BA	S3	
20	00:13:41.09	46 12.12	122 11.13	0.47	3.7	18/18	56	0.15	AA	S3	
20	02:24:37.43	46 12.41	122 10.89	0.11	3.8	18/18	59	0.16	BA	S3	
20	04:53:02.42	46 12.34	122 11.08	0.03*	4.1	18/18	58	0.23	BA	S3	
20	05:04:50.29	46 12.56	122 11.54	1.31	4.0	17/17	58	0.13	AA	S3	
20	07:18:09.84	46 12.35	122 11.15	0.80	2.9	10/10	72	0.19	BA	S3	
20	08:08:08.59	46 13.06	122 11.53	0.02*	4.0	16/16	61	0.32	CA	S3	
20	10:25:25.07	46 12.56	122 10.88	1.35	4.3	17/17	60	0.20	BA	S3	
20	11:59:30.99	46 12.18	122 11.28	0.81	3.9	17/17	56	0.17	BA	S3	
20	13:29:24.24	46 12.21	122 11.30	0.70	3.8	18/18	57	0.18	BA	S3	
20	15:47:09.51	46 12.25	122 11.36	0.35	3.8	18/18	57	0.14	AA	S3	
20	16:15:33.46	46 12.58	122 11.04	0.05*	3.0	16/16	61	0.22	BA	S3	
20	16:43:01.65	46 12.49	122 12.05	1.81	2.7	9/09	70	0.06	AA	S3	
20	16:55:56.09	46 12.23	122 11.29	0.04*	3.6	18/18	57	0.23	BA	S3	
20	17:53:34.00	46 12.13	122 11.48	0.70	4.0	19/19	55	0.27	BA	S3	
20	19:19:32.87	46 12.64	122 10.71	1.47	5.1	19/19	61	0.21	BA	S3	
20	20:12:19.28	46 12.07	122 11.47	0.04*	3.9	18/18	55	0.18	BA	S3	
20	22:03:48.71	46 12.67	122 10.58	0.32	4.4	20/20	66	0.20	BB	S3	
20	22:10:57.00	46 12.37	122 11.97	0.04*	3.8	17/17	62	0.29	BA	S3	
21	03:23:33.67	46 12.16	122 11.33	0.58	4.1	17/17	56	0.23	BA	S3	
21	05:17:52.14	46 12.54	122 10.88	0.04*	4.3	16/16	60	0.23	BA	S3	
21	05:57:24.62	46 12.32	122 11.33	0.40	3.9	17/17	72	0.25	BA	S3	
21	07:54:39.16	46 12.49	122 11.28	0.04*	3.9	17/17	58	0.18	BA	S3	
21	13:31:20.73	46 12.25	122 11.12	0.03*	3.8	17/17	57	0.21	BA	S3	
21	14:10:26.07	46 12.53	122 11.74	0.02*	2.7	16/16	63	0.21	BA	S3	
21	15:13:54.63	46 12.50	122 10.43	0.02*	4.8	14/14	61	0.10	AB	S3	
21	17:27:31.88	46 12.06	122 11.87	0.03*	3.8	18/18	54	0.18	BA	S3	
21	19:49:02.85	46 12.17	122 11.13	0.71	3.8	18/18	57	0.16	BA	S3	
21	19:52:08.57	46 12.66	122 10.01	0.02*	4.4	15/15	74	0.19	BB	S3	
21	20:33:59.42	46 12.67	122 11.27	0.04*	3.9	16/16	82	0.24	BA	S3	
22	03:10:35.69	46 12.67	122 12.04	1.24	3.0	8/08	83	0.15	AA	S3	
22	03:11:33.07	46 12.16	122 11.04	0.47	4.0	14/14	106	0.24	BB	S3	
22	06:11:55.81	46 12.64	122 10.88	1.33	4.4	18/18	61	0.17	BA	S3	
22	06:46:20.05	46 13.23	122 11.64	0.54	4.0	17/17	61	0.48	CA	S3	
22	10:25:05.48	46 12.55	122 11.36	0.78	4.4	17/17	58	0.18	BA	S3	
22	11:54:49.51	46 12.50	122 11.41	0.58	2.7	18/18	58	0.13	AA	S3	
22	12:55:48.90	46 12.11	122 11.01	1.05	3.8	17/17	57	0.31	CA	S3	
22	16:36:17.95	46 12.26	122 11.17	0.04*	4.0	19/19	57	0.24	BA	S3	
22	18:02:00.84	46 12.21	122 11.23	0.04*	3.7	17/17	57	0.22	BA	S3	
22	18:37:51.24	46 12.37	122 11.33	0.02*	3.1	18/18	57	0.27	BA	S3	
22	19:28:18.71	46 12.16	122 10.92	0.31	5.0	19/19	57	0.18	BA	S3	
22	19:32:35.15	46 12.71	122 10.62	0.21	2.8	10/10	88	0.12	AB	S3	
22	20:43:10.16	46 11.87	122 11.48	0.35	3.6	18/18	54	0.13	AA	S3	
22	22:04:11.02	46 12.37	122 10.20	2.73	4.4	17/17	61	0.25	BB	S3	
23	03:01:04.95	46 12.02	122 11.40	1.72	3.5	17/17	55	0.25	BA	S3	
23	03:03:04.65	46 11.48	122 10.51	3.39*	3.5	11/11	116	0.15	AB	S3	
23	03:29:31.92	46 11.96	122 11.58	0.47	3.6	17/17	58	0.17	BA	S3	
23	06:04:16.83	46 12.37	122 11.06	1.19	1.7	7/07	112	0.14	AB	S3	
23	06:33:10.52	46 12.57	122 11.67	1.04	3.7	19/19	58	0.18	BA	S3	
23	06:44:41.56	46 12.09	122 11.08	0.04*	3.8	18/18	56	0.21	BA	S3	
23	06:46:51.77	46 11.94	122 11.97	0.35	3.6	19/19	53	0.18	BA	S3	
23	08:42:42.79	46 12.16	122 11.06	0.93	3.9	17/17	57	0.23	BA	S3	
23	09:19:56.29	46 12.26	122 11.25	1.22	3.5	18/18	57	0.16	BA	S3	
23	12:28:39.21	46 12.26	122 11.23	0.44	3.8	16/16	63	0.24	BA	S3	
23	12:30:28.26	46 12.49	122 11.40	2.20*	3.8	15/15	58	0.26	BA	S3	
23	13:08:15.32	46 12.39	122 12.11	1.11	4.0	16/16	55	0.20	BA	S3	
23	14:32:43.39	46 12.51	122 10.97	0.05*	3.7	17/17	59	0.24	BA	S3	
23	15:18:01.01	46 12.47	122 10.82	0.04*	4.5	17/17	60	0.20	BB	S3	
23	15:31:02.94	46 11.52	122 11.24	1.71	3.8	17/17	52	0.19	BA	S3	
23	20:15:38.10	46 12.08	122 11.38	1.15	3.8	17/17	55	0.20	BA	S3	
23	21:20:02.22	46 12.29	122 11.18	0.12	3.7	19/19	57	0.18	BA	S3	
23	23:06:50.54	46 11.40	122 12.22	1.94	3.9	13/13	70	0.25	BA	S3	
24	00:29:34.50	46 12.85	122 10.93	0.88	3.7	17/17	72	0.19	BA	S3	
24	01:41:05.11	46 12.06	122 12.13	0.03*	3.9	18/18	53	0.28	BA	S3	

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DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
24	02:28:23.42	46 12.41	122 11.15	0.04*	3.8	16/16	58	0.24	BA	S3	
24	04:21:41.14	46 12.15	122 11.30	0.57	3.9	17/17	56	0.18	BA	S3	
24	05:05:03.08	46 12.26	122 11.51	1.73	3.8	14/14	83	0.15	AA	S3	
24	06:01:03.84	46 11.77	122 10.76	0.03*	3.8	13/13	60	0.19	BA	S3	
24	06:37:21.23	46 12.45	122 11.45	1.71	3.6	15/15	63	0.12	AA	S3	
24	07:31:46.55	46 12.24	122 11.71	1.31	2.6	14/14	62	0.17	BA	S3	
24	08:26:59.23	46 12.39	122 11.27	0.67	3.8	14/14	63	0.14	AA	S3	
24	09:50:09.42	46 12.55	122 10.76	0.34	4.4	17/17	61	0.15	BA	S3	
24	10:50:42.62	46 12.74	122 11.45	0.03*	4.0	18/18	59	0.18	BA	S3	
24	13:32:07.78	46 11.73	122 10.79	2.79	4.1	17/17	55	0.17	BA	S3	
24	15:31:37.76	46 12.30	122 11.16	0.93	3.9	15/15	63	0.14	AA	S3	
24	17:34:10.30	46 12.76	122 10.95	0.99	4.8	18/18	61	0.17	BA	S3	
24	17:59:50.16	46 12.75	122 10.96	0.05*	3.9	15/15	61	0.24	BB	S3	
24	19:00:42.07	46 12.34	122 11.24	0.03*	3.9	18/18	58	0.20	BA	S3	
24	19:54:24.57	46 12.15	122 11.06	0.28	3.7	17/17	57	0.24	BA	S3	
24	23:07:53.59	46 12.66	122 10.93	0.56	4.2	18/18	61	0.17	BA	S3	
25	00:27:57.56	46 12.10	122 12.29	0.03*	4.0	12/12	70	0.19	BB	S3	
25	04:55:31.86	46 12.17	122 11.39	1.12	3.9	17/17	56	0.16	BA	S3	
25	06:26:42.30	46 12.33	122 11.58	1.82	3.7	15/15	62	0.17	BA	S3	
25	07:03:42.56	46 12.42	122 10.96	0.46	3.8	13/13	65	0.15	AA	S3	
25	11:00:21.74	46 12.18	122 11.27	0.67	4.1	16/16	56	0.21	BA	S3	
25	11:03:43.57	46 12.66	122 10.68	0.77	3.9	17/17	62	0.17	BA	S3	
26	12:16:55.66	46 12.22	122 11.20	0.03*	4.0	16/16	62	0.28	BA	S3	
26	14:26:00.24	46 12.73	122 10.76	0.71	4.0	16/16	62	0.16	BA	S3	
26	15:53:59.74	46 12.44	122 10.95	0.04*	4.1	17/17	59	0.30	CA	S3	
26	17:33:04.42	46 12.89	122 11.49	1.31	2.8	15/15	60	0.09	AA	S3	
26	17:48:37.19	46 12.23	122 11.21	0.91	3.9	17/17	57	0.18	BA	S3	
26	20:14:33.13	46 12.28	122 10.81	0.02*	3.7	16/16	59	0.24	BA	S3	
26	22:10:32.49	46 11.91	122 11.74	2.05	3.8	17/17	53	0.24	BA	S3	
27	01:15:41.64	46 12.41	122 11.33	1.99	4.3	17/17	71	0.17	BA	S3	
27	01:59:56.07	46 12.27	122 11.21	0.04*	4.2	16/16	72	0.22	BA	S3	
27	02:46:03.07	46 12.46	122 11.06	0.51	3.8	14/14	59	0.20	BA	S3	
27	05:46:37.27	46 12.27	122 10.94	0.03*	3.8	15/15	58	0.25	BA	S3	
27	07:15:17.40	46 12.16	122 11.16	3.33\$	4.0	14/14	57	0.21	BA	S3	
27	07:26:21.08	46 12.63	122 10.72	0.03*	4.9	15/15	61	0.15	BA	S3	
27	07:38:29.35	46 12.28	122 11.46	1.33	3.8	13/13	96	0.21	BB	S3	
27	08:31:07.27	46 12.11	122 11.10	0.30	3.9	15/15	56	0.33	CA	S3	
27	12:34:37.39	46 12.47	122 11.27	0.03*	4.0	15/15	58	0.30	BA	S3	
27	14:48:20.20	46 12.59	122 10.68	0.88*	4.2	14/14	61	0.24	BA	S3	
27	17:04:39.13	46 11.99	122 11.59	0.03*	3.9	15/15	54	0.21	BA	S3	
27	20:54:19.59	46 12.18	122 11.04	0.02*	3.9	15/15	57	0.21	BA	S3	
27	21:28:26.77	46 12.20	122 10.98	0.29	3.9	12/12	72	0.22	BA	S3	
27	23:40:47.53	46 12.37	122 11.11	0.09	3.9	15/15	58	0.16	BA	S3	
28	03:49:33.55	46 12.50	122 11.35	1.89	4.9	15/15	71	0.16	BA	S3	
28	04:09:24.37	46 12.17	122 11.41	0.31	3.6	15/15	71	0.16	BA	S3	
28	05:15:53.90	46 12.88	122 10.85	0.02*	4.4	15/15	72	0.26	BA	S3	
28	06:23:39.81	46 12.25	122 11.31	0.04*	3.8	13/13	84	0.21	BA	S3	
28	11:10:36.82	46 12.27	122 10.96	1.13	2.7	10/10	139	0.26	BC	S3	
28	12:30:54.65	46 11.95	122 11.30	0.15	4.0	14/14	83	0.28	BA	S3	
28	12:38:41.73	46 12.81	122 10.68	0.04*	3.8	13/13	88	0.34	CB	S3	
28	12:39:38.54	46 12.56	122 11.39	0.04*	4.1	11/11	84	0.10	AC	S3	
28	15:09:07.57	46 12.11	122 10.89	0.75	4.1	14/14	85	0.24	BA	S3	
28	17:07:11.68	46 12.68	122 10.80	0.02*	3.8	11/11	87	0.32	CA	S3	
28	17:52:52.91	46 12.64	122 11.26	1.84	3.2	14/14	71	0.21	BA	S3	
28	19:10:34.65	46 12.28	122 11.16	0.04*	3.9	11/11	118	0.30	CB	S3	
28	22:12:19.18	46 12.03	122 10.67	0.02*	3.4	9/09	212	0.38	CD	S3	
28	23:52:35.49	46 12.34	122 10.84	0.38	4.1	8/08	108	0.20	BB	S3	
29	03:37:36.38	46 12.41	122 11.14	1.63	3.8	12/12	85	0.14	AA	S3	
29	04:24:30.04	46 12.86	122 10.78	1.13	4.8	12/12	88	0.10	AB	S3	
29	06:20:50.27	46 12.95	122 10.78	0.02*	3.7	11/11	69	0.19	BB	S3	
29	06:22:38.51	46 12.98	122 11.00	0.03*	4.6	13/13	73	0.25	BA	S3	
29	06:29:24.52	46 13.28	122 09.41	0.04*	3.4	10/10	71	0.37	CB	S3	
29	06:51:05.10	46 12.10	122 11.32	0.11	3.9	12/12	61	0.10	AA	S3	
29	08:59:23.71	46 11.70	122 13.22	3.55	3.8	12/12	54	0.24	BA	S3	
29	11:13:35.19	46 12.31	122 11.03	0.03*	3.6	13/13	63	0.21	BA	S3	
29	12:41:36.33	46 12.59	122 10.79	0.63	4.2	13/13	63	0.10	AA	S3	
29	12:46:07.96	46 12.60	122 10.72	0.63	3.9	9/09	63	0.20	BC	S3	
29	15:21:27.55	46 13.12	122 08.92	1.14*	3.7	10/10	73	0.22	BB	S3	
29	17:46:05.73	46 12.91	122 10.57	0.02*	3.8	9/09	89	0.09	AB	S3	

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DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
29	19:37:52.50	46 12.44	122 11.83	0.05*	3.4	11/11	77	0.20	BA	S3	
29	21:34:09.82	46 12.43	122 10.93	0.66	3.5	9/09	86	0.12	AA	S3	
30	00:34:10.35	46 11.56	122 09.60	0.02*	4.2	12/12	59	0.29	BB	S3	
30	02:23:13.04	46 12.35	122 11.98	1.49	3.6	12/12	60	0.25	BA	S3	
30	02:34:29.87	46 12.38	122 11.50	1.11	3.5	12/12	83	0.16	BA	S3	
30	04:12:13.68	46 12.12	122 11.30	0.02*	3.7	11/11	81	0.16	BA	S3	
30	05:09:02.50	46 12.61	122 10.32	0.96	4.9	12/12	63	0.16	AB	S3	
30	05:09:02.52	46 12.64	122 10.16	0.37	4.9	13/13	63	0.11	AB	S3	
30	05:38:07.55	46 12.41	122 11.43	0.03*	3.9	13/13	63	0.17	BA	S3	
30	07:17:11.18	46 10.25	122 09.34	0.03*	3.8	12/12	68	0.46	CB	S3	
30	07:42:09.22	46 12.70	122 11.31	1.65	4.5	11/11	73	0.20	BA	S3	
30	07:42:09.19	46 12.65	122 11.05	1.36	4.5	10/10	137	0.13	AC	S3	
30	07:54:58.91	46 12.23	122 10.26	0.09	4.0	10/10	114	0.28	BB	S3	
30	09:20:51.98	46 12.21	122 11.14	0.88	3.9	11/11	84	0.10	AA	S3	
30	12:24:21.72	46 12.40	122 10.59	0.04*	3.7	11/11	93	0.21	BB	S3	
30	20:45:59.42	46 12.26	122 10.84	0.04*	2.7	10/10	86	0.10	AA	S3	
30	20:50:38.47	46 12.12	122 11.13	0.58	4.0	13/13	84	0.13	AA	S3	
30	22:41:12.83	46 12.12	122 10.31	0.05*	3.7	14/14	88	0.28	BB	S3	

May 1980											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
1	01:07:29.89	46 12.33	122 11.18	0.03*	3.8	15/15	72	0.25	BA	S3	
1	04:46:15.46	46 12.53	122 10.93	0.04*	4.6	12/12	92	0.29	BB	S3	
1	04:46:15.45	46 12.39	122 10.92	0.04*	4.6	14/14	86	0.23	BA	S3	
1	04:48:18.11	46 12.77	122 11.42	0.33	3.2	14/14	85	0.20	BA	S3	
1	04:53:05.08	46 12.34	122 11.05	0.03*	3.8	12/12	85	0.20	BC	S3	
1	06:18:32.19	46 12.18	122 11.34	0.57	4.1	14/14	83	0.16	BA	S3	
1	10:59:03.55	46 11.52	122 11.78	1.88\$	4.0	14/14	79	0.21	BA	S3	
1	12:46:12.19	46 12.53	122 10.62	0.46	3.7	12/12	88	0.17	BA	S3	
1	15:36:42.68	46 11.96	122 10.62	0.04*	3.7	12/12	141	0.27	BC	S3	
1	19:27:15.65	46 11.32	122 11.95	0.04*	4.6	12/12	71	0.17	BA	S3	
1	19:40:08.04	46 12.70	122 11.81	1.20\$	3.6	11/11	70	0.36	CC	S3	
1	21:31:09.45	46 12.59	122 10.49	0.04*	4.1	15/15	73	0.42	CB	S3	
1	22:00:17.06	46 12.34	122 11.77	0.02*	3.6	15/15	71	0.30	BA	S3	
1	23:01:10.72	46 12.52	122 11.20	0.67	3.8	12/12	72	0.32	CA	S3	
2	00:57:09.32	46 12.76	122 12.06	0.05*	3.8	14/14	70	0.36	CA	S3	
2	03:09:15.16	46 09.71	122 12.80	0.05*	3.7	12/12	118	0.61	DB	S3	
2	05:11:14.88	46 12.76	122 11.27	0.02*	2.7	12/12	71	0.27	BA	S3	
2	05:12:18.99	46 12.51	122 10.95	2.16	4.4	15/15	72	0.18	BA	S3	
2	08:36:31.46	46 12.14	122 11.78	0.03*	4.1	12/12	135	0.17	BB	S3	
2	09:52:25.15	46 12.08	122 10.83	0.03*	3.9	12/12	140	0.28	BC	S3	
2	11:26:24.27	46 12.09	122 10.40	0.03*	3.9	9/09	184	0.27	BD	S3	
2	12:52:17.75	46 12.37	122 10.56	6.66	4.3	10/10	140	0.28	BC	S3	
2	12:58:58.63	46 12.11	122 10.42	1.55	3.5	9/09	142	0.19	BC	S3	
2	13:02:29.44	46 12.91	122 11.40	0.03*	4.8	15/15	72	0.27	BA	S3	
2	13:27:24.48	46 12.59	122 10.78	0.02*	3.5	11/11	139	0.30	CC	S3	
2	14:00:22.91	46 12.25	122 11.36	0.48	3.5	11/11	137	0.21	BC	S3	
2	15:07:08.71	46 12.15	122 11.14	0.06	3.8	12/12	138	0.19	BC	S3	
2	16:42:35.36	46 12.48	122 11.13	0.05*	3.2	12/12	137	0.23	BC	S3	
2	18:59:47.20	46 12.04	122 11.01	0.02*	3.8	13/13	139	0.16	BC	S3	
2	21:00:24.09	46 12.09	122 11.85	0.03*	3.8	13/13	134	0.27	BB	S3	
2	23:12:07.79	46 12.26	122 11.32	0.02*	3.7	14/14	137	0.30	CC	S3	
3	03:04:28.86	46 12.63	122 11.24	0.02*	3.9	13/13	136	0.18	BC	S3	
3	05:00:46.42	46 12.23	122 10.75	0.05*	4.5	13/13	140	0.26	BC	S3	
3	05:05:30.26	46 12.62	122 11.41	0.02*	4.4	13/13	135	0.20	BB	S3	
3	05:10:09.49	46 13.76	122 12.69	2.06*	3.7	12/12	126	0.19	BB	S3	
3	05:18:57.17	46 12.55	122 11.40	1.27	3.6	12/12	136	0.15	AC	S3	
3	05:35:06.56	46 12.73	122 11.94	0.02*	2.9	12/12	132	0.21	BB	S3	
3	06:47:50.59	46 11.97	122 11.24	0.45	4.1	11/11	138	0.20	BC	S3	
3	08:54:52.21	46 12.36	122 11.59	0.58	3.6	14/14	135	0.19	BB	S3	
3	10:47:38.95	46 12.83	122 11.25	0.04*	3.8	11/11	135	0.26	BB	S3	
3	13:37:02.01	46 12.31	122 11.74	0.05*	3.4	12/12	134	0.28	BB	S3	
3	13:42:58.27	46 11.53	122 10.68	0.04*	3.5	12/12	142	0.12	AC	S3	
3	15:40:57.02	46 12.42	122 12.00	0.46	4.2	14/14	133	0.18	BB	S3	
3	20:45:37.86	46 11.91	122 10.37	0.03*	4.2	14/14	87	0.31	CA	S3	
4	00:46:44.68	46 12.01	122 11.53	0.51	3.7	17/17	54	0.15	BA	S3	
4	05:23:09.05	46 12.14	122 11.36	0.37	3.9	18/18	53	0.25	BA	S3	
4	06:01:13.02	46 12.40	122 11.44	1.79	2.9	18/18	52	0.18	BA	S3	

May 1980, cont'd											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
4	07:47:28.71	46 12.61	122 11.44	0.02*	3.8	16/16	59	0.20	BA	S3	
4	09:07:49.16	46 12.10	122 10.46	0.03*	3.7	18/18	58	0.18	BA	S3	
4	11:58:27.43	46 13.00	122 11.18	1.52	4.9	20/20	50	0.30	BA	S3	
4	13:18:12.75	46 11.79	122 11.13	1.05	3.6	18/18	56	0.21	BA	S3	
4	16:12:14.59	46 11.99	122 11.47	0.11	3.5	17/17	58	0.25	BA	S3	
4	17:34:30.59	46 12.49	122 11.41	0.03*	3.8	16/16	55	0.28	BA	S3	
4	19:34:52.15	46 11.77	122 11.27	0.04*	3.8	17/17	56	0.14	AA	S3	
4	21:39:22.06	46 12.03	122 11.35	0.97	4.0	18/18	54	0.22	BA	S3	
5	01:53:30.39	46 12.40	122 11.62	0.02*	4.0	19/19	54	0.25	BA	S3	
5	04:44:32.20	46 12.15	122 11.38	0.53	3.7	20/20	53	0.19	BA	S3	
5	05:24:33.37	46 12.69	122 11.81	2.05	3.5	18/18	58	0.18	BA	S3	
5	05:43:04.08	46 12.57	122 10.71	1.29	4.7	19/19	61	0.17	BA	S3	
5	06:30:11.69	46 11.90	122 11.39	1.08	3.3	10/10	72	0.11	AA	S3	
5	07:27:30.39	46 11.75	122 10.91	0.04*	4.0	16/16	56	0.33	CA	S3	
5	09:12:54.43	46 12.65	122 10.78	1.65	4.3	20/20	61	0.25	BA	S3	
5	09:22:15.44	46 12.25	122 11.05	0.02*	3.7	17/17	58	0.19	BA	S3	
5	10:44:57.78	46 12.29	122 10.61	0.74	3.7	18/18	59	0.23	BA	S3	
5	13:19:08.42	46 12.63	122 11.41	4.40	4.0	15/15	64	0.16	BA	S3	
5	16:13:51.93	46 12.76	122 10.56	0.34	4.0	12/12	63	0.27	BA	S3	
5	21:24:45.23	46 12.98	122 11.38	3.17	3.7	17/17	61	0.26	BA	S3	
5	23:47:01.02	46 11.88	122 11.08	0.04*	3.4	7/07	84	0.64	DB	S3	
6	00:03:31.50	46 12.52	122 10.81	0.04*	4.3	14/14	82	0.10	AA	S3	
6	00:56:04.64	46 12.12	122 11.44	1.03	3.7	17/17	55	0.13	AA	S3	
6	03:28:20.81	46 12.60	122 12.04	1.53*	3.5	12/12	62	0.10	AA	S3	
6	05:08:26.51	46 12.36	122 11.45	0.46	3.7	16/16	62	0.27	BA	S3	
6	08:15:01.61	46 12.37	122 11.86	0.03*	4.0	18/18	52	0.26	BA	S3	
6	10:27:51.24	46 12.20	122 11.27	0.03*	3.7	14/14	60	0.17	BA	S3	
6	11:48:10.96	46 12.55	122 11.21	2.40	3.8	17/17	59	0.22	BA	S3	
6	16:50:18.85	46 12.60	122 10.55	0.53	3.7	15/15	62	0.26	BA	S3	
6	17:04:49.19	46 12.62	122 10.44	1.87	4.6	18/18	62	0.21	BA	S3	
6	17:53:13.23	46 13.24	122 14.84	0.09#	4.0	11/11	90	0.55	DA	S3	
6	19:22:28.38	46 12.64	122 10.66	1.53	4.4	17/17	61	0.18	BA	S3	
6	20:09:52.36	46 12.19	122 11.22	1.14	3.8	16/16	60	0.17	BA	S3	
6	23:28:52.24	46 12.31	122 11.56	0.03*	3.9	16/16	54	0.19	BA	S3	
7	03:44:42.66	46 12.23	122 11.25	0.57	4.2	17/17	63	0.19	BA	S3	
7	08:52:32.95	46 12.32	122 11.19	0.04*	4.0	17/17	55	0.25	BA	S3	
7	11:09:17.90	46 12.99	122 11.69	1.69	4.7	20/21	60	0.21	BA	S3	
7	12:16:52.89	46 12.35	122 11.51	1.61	3.4	18/18	54	0.18	BA	S3	
7	12:33:20.87	46 12.26	122 10.85	0.81	4.0	19/19	39	0.19	BA	S3	
7	16:50:27.60	46 12.04	122 11.08	1.48	3.9	12/12	68	0.18	BA	S3	
7	19:08:47.79	46 12.30	122 11.27	0.52	3.8	19/19	51	0.20	BA	S3	
8	01:19:58.87	46 12.01	122 11.24	0.33	4.2	19/19	55	0.25	BA	S3	
8	03:16:48.52	46 11.98	122 11.13	0.05*	3.8	18/18	69	0.22	BA	S3	
8	06:16:32.38	46 11.78	122 10.02	2.07*	3.4	14/14	89	0.30	BB	S3	
8	07:46:50.09	46 12.43	122 11.46	1.99	4.4	17/17	63	0.19	BA	S3	
8	07:48:46.20	46 12.58	122 10.60	0.97	4.7	20/20	61	0.22	BA	S3	
8	08:47:55.40	46 12.16	122 11.45	0.12	4.0	15/15	65	0.19	BA	S3	
8	09:03:39.93	46 12.85	122 10.75	1.21	4.6	20/20	62	0.20	BA	S3	
8	10:05:38.07	46 12.36	122 11.58	0.03*	4.3	13/13	62	0.16	BB	S3	
8	12:38:04.94	46 12.37	122 11.48	0.32	3.9	19/19	54	0.21	BA	S3	
8	15:31:48.80	46 12.43	122 11.39	0.36	3.9	14/14	70	0.31	CA	S3	
8	19:27:30.11	46 12.27	122 10.88	1.96	3.9	17/17	44	0.26	BA	S3	
8	22:13:05.82	46 12.60	122 11.71	0.95	3.9	17/17	56	0.31	CA	S3	
9	00:55:02.36	46 12.03	122 11.23	1.23	4.0	19/19	53	0.24	BA	S3	
9	04:31:58.01	46 12.21	122 10.76	0.81	4.0	19/19	54	0.20	BA	S3	
9	06:59:08.86	46 12.79	122 11.58	1.65	3.6	15/15	61	0.26	BB	S3	
9	07:01:01.11	46 12.95	122 10.42	0.02*	4.7	23/23	63	0.20	BA	S3	
9	08:19:38.89	46 12.43	122 11.32	2.03	3.8	20/20	47	0.20	BA	S3	
9	08:32:30.40	46 12.29	122 11.63	0.42	3.8	16/16	61	0.21	BA	S3	
9	14:10:37.27	46 12.40	122 10.90	1.66	4.0	17/17	50	0.21	BA	S3	
9	16:38:09.02	46 12.73	122 11.43	2.31	3.6	16/16	64	0.27	BA	S3	
9	18:06:26.54	46 12.84	122 10.47	1.31*	4.6	20/20	63	0.19	BA	S3	
9	18:26:20.91	46 12.35	122 10.42	0.66	3.7	16/16	88	0.27	BB	S3	
9	19:04:21.08	46 12.04	122 11.19	0.03*	3.7	15/15	58	0.16	BA	S3	
9	21:29:35.60	46 12.05	122 10.85	0.02*	4.0	18/18	57	0.31	CA	S3	
10	01:14:10.58	46 12.24	122 11.22	1.02	4.0	17/17	40	0.12	AA	S3	
10	05:50:03.94	46 12.33	122 11.40	1.15	4.1	20/20	41	0.24	BA	S3	
10	09:25:55.32	46 10.82	122 07.15	0.02*	4.1	16/16	104	0.53	DB	S3	
10	11:15:54.85	46 12.39	122 10.96	0.69	4.0	20/20	46	0.22	BA	S3	

DAY	TIME	LAT	LON	May 1980, cont'd			GAP	RMS	Q	MOD	TYP
				DEPTH	M	NS/NP					
10	12:31:47.59	46 12.80	122 10.69	1.65	4.5	12/12	114	0.20	BB	S3	
10	13:03:09.58	46 13.07	122 11.12	0.02*	1.7	5/05	112	0.07	AD	S3	
10	13:21:43.07	46 13.03	122 11.19	1.40	3.9	14/14	62	0.28	BA	S3	
10	15:13:00.30	46 12.69	122 11.59	3.11*	3.6	20/20	57	0.27	BA	S3	
10	16:17:07.95	46 12.16	122 11.22	0.62	3.6	19/19	41	0.21	BA	S3	
10	17:35:20.56	46 12.41	122 11.48	2.40	4.3	16/16	59	0.16	BA	S3	
10	20:25:52.01	46 12.25	122 11.23	0.60	3.8	17/17	40	0.17	BA	S3	
11	00:45:59.43	46 12.58	122 11.54	2.39	3.1	18/18	57	0.24	BA	S3	
11	01:19:29.43	46 12.14	122 11.33	2.97	4.1	19/19	41	0.31	CA	S3	
11	03:03:12.94	46 12.34	122 10.86	1.85	3.5	18/18	40	0.22	BA	S3	
11	04:00:17.96	46 12.67	122 10.75	2.00	4.6	19/19	61	0.19	BA	S3	
11	05:11:15.14	46 12.50	122 11.48	2.12	3.1	17/17	52	0.18	BA	S3	
11	05:45:52.30	46 12.76	122 11.28	1.07	3.9	17/17	60	0.34	CA	S3	
11	08:09:48.32	46 12.21	122 11.08	1.82	4.1	19/19	40	0.23	BA	S3	
11	08:15:42.04	46 11.43	122 10.87	8.63	3.9	16/16	52	0.57	DA	S3	
11	10:18:47.19	46 12.36	122 10.78	0.07	3.9	16/16	59	0.15	AA	S3	
11	13:29:53.96	46 12.63	122 10.82	1.93	4.4	18/18	61	0.16	BA	S3	
11	15:00:52.18	46 11.96	122 09.94	1.26	4.0	18/18	59	0.25	BA	S3	
11	17:12:00.30	46 11.74	122 11.23	5.20	1.7	15/15	76	0.30	BA	S3	
11	19:39:33.63	46 12.04	122 10.91	0.77	3.9	18/18	57	0.26	BA	S3	
11	20:42:06.31	46 12.93	122 10.53	0.03*	3.9	18/18	64	0.26	BA	S3	
11	22:46:24.41	46 12.40	122 11.48	1.13	4.3	20/20	44	0.18	BA	S3	
12	00:05:29.41	46 12.35	122 11.50	0.03*	3.7	19/19	41	0.18	BA	S3	
12	02:45:47.74	46 11.87	122 11.21	0.04*	3.5	16/16	74	0.24	BA	S3	
12	02:49:24.08	46 12.51	122 11.51	1.85	3.5	17/17	52	0.18	BA	S3	
12	05:24:36.04	46 12.11	122 11.38	0.08	3.9	19/19	41	0.24	BA	S3	
12	08:08:45.63	46 11.69	122 11.82	1.04	3.8	15/15	49	0.22	BA	S3	
12	10:18:05.14	46 12.35	122 11.19	0.03*	3.6	18/18	40	0.31	CA	S3	
12	12:11:25.27	46 12.43	122 11.66	0.04*	4.2	18/18	45	0.16	BA	S3	
12	15:41:36.40	46 12.20	122 11.12	1.04	3.8	19/19	40	0.16	BA	S3	
12	16:25:23.91	46 12.67	122 11.03	0.03*	3.3	9/09	113	0.17	BB	S3	
12	16:26:29.67	46 12.55	122 10.64	1.60	4.3	20/20	61	0.18	BA	S3	
12	16:34:02.58	46 12.93	122 10.40	2.83	3.9	13/13	64	0.33	CA	S3	
12	16:46:50.28	46 12.17	122 10.89	1.85	4.3	17/17	62	0.22	BA	S3	
12	17:24:11.70	46 12.38	122 11.43	0.03*	4.1	17/17	55	0.33	CA	S3	
12	18:42:09.93	46 12.65	122 10.21	0.04*	4.0	18/18	63	0.22	BA	S3	
12	19:33:08.71	46 12.43	122 11.17	1.29	3.7	10/10	112	0.22	BB	S3	
12	20:33:39.61	46 12.70	122 10.53	0.95	4.8	19/19	62	0.14	AA	S3	
12	21:48:31.32	46 12.35	122 11.04	0.02*	3.5	19/19	40	0.26	BA	S3	
13	01:29:13.55	46 12.34	122 11.41	1.59	3.1	18/18	41	0.21	BA	S3	
13	01:30:50.18	46 12.99	122 10.40	0.03*	4.4	18/18	65	0.18	BA	S3	
13	02:01:00.47	46 12.15	122 11.62	0.02*	3.6	18/18	42	0.44	CA	S3	
13	08:59:55.65	46 12.30	122 10.93	1.41	3.9	17/17	44	0.32	CA	S3	
13	11:12:12.89	46 11.01	122 11.64	5.16	4.1	18/18	51	0.24	BA	S3	
13	18:51:48.41	46 11.92	122 10.09	0.02*	3.9	19/19	58	0.24	BA	S3	
13	22:38:27.07	46 12.32	122 11.32	1.67	2.3	9/09	71	0.08	AA	S3	
14	02:18:57.71	46 12.77	122 10.59	1.48	4.6	18/18	63	0.22	BA	S3	
14	02:34:11.80	46 12.57	122 11.29	1.60	3.5	15/15	59	0.26	BB	S3	
14	03:25:56.62	46 13.25	122 11.07	0.04*	3.5	15/15	64	0.24	BA	S3	
14	05:00:49.16	46 12.14	122 11.60	0.59	3.9	17/17	55	0.28	BA	S3	
14	07:07:36.10	46 12.34	122 11.38	2.38	3.6	18/18	41	0.15	AA	S3	
14	07:11:10.89	46 12.19	122 10.88	0.43	3.4	17/17	55	0.23	BA	S3	
14	09:43:51.73	46 12.18	122 11.17	1.97	4.2	16/16	55	0.31	CA	S3	
14	10:45:00.79	46 12.29	122 11.02	2.89	3.6	16/16	55	0.20	BA	S3	
14	14:08:16.38	46 12.60	122 10.26	1.53	4.1	18/18	63	0.21	BA	S3	
14	14:11:22.54	46 12.43	122 11.23	2.52	3.4	16/16	49	0.17	BA	S3	
14	14:41:59.63	46 12.25	122 11.20	0.87	3.7	17/17	40	0.18	BA	S3	
14	16:44:07.76	46 13.43	122 10.51	0.04*	3.2	18/18	63	0.30	CA	S3	
14	18:48:01.84	46 11.77	122 10.67	0.03*	4.1	18/18	55	0.38	CA	S3	
14	20:17:17.19	46 12.18	122 11.41	0.53	3.5	14/14	65	0.22	BA	S3	
14	23:45:58.43	46 12.17	122 10.88	0.54	4.0	15/15	51	0.23	BA	S3	
15	00:50:54.79	46 12.26	122 11.46	1.79	3.1	16/16	63	0.18	BA	S3	
15	06:48:24.69	46 11.96	122 10.99	1.44	4.1	15/15	56	0.22	BA	S3	
15	09:13:00.11	46 12.57	122 10.25	1.32	3.8	15/15	63	0.21	BA	S3	
15	09:20:23.00	46 12.14	122 11.34	1.46	3.7	16/16	41	0.21	BA	S3	
15	10:35:58.97	46 12.28	122 11.78	1.97	3.6	8/08	70	0.15	AA	S3	
15	11:41:34.65	46 12.06	122 11.47	1.75	3.7	15/15	42	0.14	AA	S3	
15	11:50:59.89	46 12.55	122 10.32	0.02*	3.8	12/12	62	0.17	BB	S3	
15	12:01:29.72	46 12.14	122 11.07	1.78	3.4	14/14	55	0.13	AA	S3	

May 1980, cont'd											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
15	13:20:38.38	46 12.49	122 11.20	1.23	3.9	15/15	56	0.26	BA	S3	
15	16:30:40.92	46 12.34	122 11.09	1.96	3.6	15/15	41	0.23	BA	S3	
15	17:29:16.79	46 12.41	122 10.03	1.26	4.0	14/14	62	0.30	BA	S3	
15	18:32:30.15	46 12.48	122 10.25	1.53	3.6	15/15	62	0.23	BA	S3	
15	20:18:32.86	46 12.49	122 11.57	0.02*	3.5	12/12	64	0.22	BA	S3	
16	00:10:56.21	46 12.12	122 10.70	0.66	3.5	17/17	58	0.24	BA	S3	
16	03:31:04.60	46 11.94	122 10.94	0.99	4.3	13/13	84	0.29	BA	S3	
16	05:21:46.81	46 12.37	122 11.36	2.01	3.3	16/16	42	0.23	BA	S3	
16	06:44:44.33	46 12.76	122 10.74	0.03*	3.5	14/14	84	0.26	BA	S3	
16	07:30:25.89	46 12.94	122 11.67	1.18	3.9	12/12	83	0.19	BA	S3	
16	11:15:13.77	46 12.19	122 10.40	0.59	3.9	16/16	59	0.30	BA	S3	
16	12:34:54.12	46 12.76	122 11.80	1.30\$	4.7	18/18	58	0.29	BA	S3	
16	12:39:43.49	46 10.06	122 14.65	0.03*	3.8	8/08	142	0.29	BC	S3	
16	12:42:17.67	46 12.21	122 10.80	2.12*	3.9	15/15	52	0.22	BA	S3	
16	12:47:29.92	46 11.83	122 12.04	1.95	3.6	13/13	81	0.37	CA	S3	
16	13:27:13.53	46 12.01	122 11.03	1.44	4.1	16/16	56	0.18	BA	S3	
16	14:22:00.22	46 12.42	122 10.71	1.44	4.3	17/17	60	0.28	BA	S3	
16	16:17:44.46	46 11.85	122 11.76	0.79	4.1	14/14	68	0.23	BA	S3	
16	20:37:10.07	46 12.29	122 10.16	1.62	3.8	15/15	61	0.41	CA	S3	
16	20:49:45.93	46 12.15	122 10.83	2.84	3.3	16/16	57	0.26	BA	S3	
16	23:59:46.84	46 12.20	122 11.14	2.75	3.7	10/10	87	0.10	AA	S3	
17	00:02:16.95	46 12.49	122 10.43	1.49	3.6	15/15	61	0.23	BA	S3	
17	01:20:18.17	46 12.64	122 10.88	0.24	3.5	12/12	63	0.15	BA	S3	
17	01:42:41.57	46 12.01	122 11.56	0.03*	3.5	15/15	54	0.24	BA	S3	
17	02:36:15.56	46 12.35	122 11.37	2.38	3.7	12/12	67	0.11	AA	S3	
17	05:03:31.76	46 12.29	122 11.22	0.05*	3.5	15/15	55	0.24	BA	S3	
17	05:32:39.95	46 12.66	122 11.70	0.87	3.7	11/11	70	0.20	BA	S3	
17	08:05:52.55	46 12.37	122 11.47	1.78	3.9	15/15	58	0.21	BA	S3	
17	08:31:53.01	46 11.80	122 12.32	3.45*	4.2	13/13	65	0.25	BA	S3	
17	10:00:58.19	46 09.63	122 09.22	3.57	3.4	12/12	56	0.19	BA	S3	
17	11:57:29.60	46 11.92	122 11.22	2.51	3.7	15/15	62	0.17	BA	S3	
17	15:55:59.69	46 12.15	122 10.84	2.01	3.9	16/16	65	0.20	BA	S3	
17	15:59:12.17	46 12.61	122 10.40	2.29	3.5	15/15	62	0.18	BA	S3	
17	16:22:37.09	46 19.23	122 20.96	0.04*	2.1	8/09	127	0.49	CC	S3	
17	16:52:35.17	46 14.05	122 14.11	0.04*	2.9	7/07	98	0.62	DB	S3	
17	19:27:53.52	46 11.82	122 10.90	2.99	3.9	16/16	55	0.22	BA	S3	
17	19:29:28.73	46 12.13	122 11.52	2.51	3.9	17/17	42	0.21	BA	S3	
17	21:36:04.37	46 12.35	122 11.77	1.18	3.6	15/15	56	0.23	BA	S3	
17	21:42:07.48	46 12.55	122 10.63	2.97	4.3	17/17	61	0.27	BA	S3	
17	22:43:23.57	46 11.64	122 12.12	1.32	3.5	17/17	55	0.33	CA	S3	
17	23:07:46.95	46 12.42	122 11.55	3.09	3.5	16/16	55	0.24	BA	S3	
17	23:35:04.33	46 12.34	122 12.23	2.12	3.6	15/15	55	0.34	CA	S3	
18	01:50:52.09	46 11.88	122 11.02	2.75	4.1	18/18	55	0.22	BA	S3	
18	02:51:29.69	46 12.67	122 10.64	3.58	3.8	17/17	69	0.23	BA	S3	
18	06:20:06.94	46 12.24	122 11.25	1.16	3.0	13/13	69	0.17	BA	S3	
18	07:22:53.09	46 09.52	122 10.31	0.69	3.3	6/06	270	0.11	CD	S3	
18	08:32:16.33	46 11.22	122 11.10	2.19*	3.5	10/10	88	0.23	BA	S3	
18	08:44:52.30	46 11.19	122 11.13	0.02*	3.5	9/09	92	0.26	BB	S3	
18	11:31:18.96	46 10.68	122 11.30	2.81\$	3.8	10/10	96	0.20	BB	S3	
18	13:29:43.64	46 12.41	122 10.63	1.51	2.7	5/05	131	0.12	BD	S3	
18	14:03:46.98	46 12.35	122 11.09	0.44	1.7	13/13	91	0.27	BB	S3	
18	14:36:10.70	46 12.30	122 10.94	2.84	4.1	18/18	39	0.24	BA	S3	
18	14:44:50.19	46 12.15	122 11.80	1.69	3.8	8/08	74	0.10	AA	S3	
18	15:17:47.49	46 13.98	122 12.80	1.84	1.0	7/07	168	0.21	BC	S3	
18	15:32:11.43	46 12.44	122 11.28	2.82	5.7	17/17	62	0.22	BA	S3	
18	16:16:13.86	46 12.18	122 12.43	7.72	1.3	4/08	169	0.06	AD	S3	F
18	16:18:12.45	46 08.73	122 14.97	0.04*	1.8	4/08	164	0.47	CD	S3	
18	16:20:58.56	46 12.59	122 11.36	5.97*	2.1	4/08	177	0.04	AD	S3	
18	16:26:49.66	46 12.80	122 12.32	4.88	1.5	4/07	174	0.09	AD	S3	
18	16:32:18.13	46 12.10	122 12.42	7.59	1.9	4/08	169	0.05	AD	S3	
18	16:33:52.93	46 12.89	122 11.21	3.55	1.5	4/07	180	0.06	AD	S3	
18	16:34:54.55	46 19.26	122 08.23	3.65	1.4	4/08	228	0.46	CD	S3	
18	16:35:22.29	46 12.35	122 10.95	6.97	1.5	4/08	178	0.05	AD	S3	
18	16:36:43.61	46 12.28	122 11.10	6.58	1.7	4/08	176	0.05	AD	S3	
18	16:38:21.35	46 12.30	122 11.14	6.41\$	1.9	4/08	176	0.06	AD	S3	
18	16:41:04.98	46 11.69	122 13.34	9.82	1.9	4/08	162	0.12	BD	S3	
18	16:45:17.13	46 09.45	122 12.86	9.93#	2.2	4/06	145	0.09	AD	S3	
18	16:45:38.95	46 13.01	122 11.26	5.85	1.9	4/07	181	0.05	AD	S3	
18	16:47:59.15	46 11.98	122 12.47	8.18	1.1	4/08	168	0.05	AD	S3	

May 1980, cont'd												
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP	
18	16:52:27.41	46 12.47	122 10.93	5.07\$	2.2	4/08	178	0.04	CD	S3		
18	16:53:40.00	46 11.67	122 12.90	10.58	1.3	4/08	163	0.12	BD	S3		
18	17:04:51.47	46 12.29	122 12.27	1.30	1.8	11/12	61	0.27	BC	S3	L	
18	17:07:47.23	46 12.27	122 11.42	2.20*	1.9	16/19	62	0.10	AC	S3		
18	17:08:50.65	46 12.35	122 11.21	2.93	1.6	16/20	63	0.13	AC	S3		
18	17:10:25.78	46 12.21	122 11.17	2.20*	1.5	15/18	63	0.15	BC	S3		
18	17:26:27.93	46 12.30	122 11.40	2.33	(3.5)	16/20	62	0.13	AC	S3		
18	17:56:49.52	46 12.45	122 11.39	2.73*	1.3	11/14	84	0.16	BC	S3		
18	17:57:31.92	46 12.25	122 12.21	6.60	1.2	9/13	79	0.10	AB	S3		
18	17:58:35.99	46 12.52	122 11.61	2.71	1.8	15/19	62	0.16	BC	S3		
18	18:10:19.55	46 12.41	122 11.12	2.15	3.4	16/19	63	0.15	AC	S3		
18	18:19:23.07	46 12.21	122 11.41	1.35\$	1.8	14/18	83	0.29	CC	S3		
18	18:20:34.42	46 12.90	122 11.16	1.62\$	1.9	15/18	86	0.21	CC	S3		
18	18:25:55.96	46 12.27	122 12.37	6.99\$	1.4	11/15	79	0.19	BB	S3		
18	18:28:34.90	46 12.81	122 12.77	6.79	1.3	11/13	126	0.09	AB	S3		
18	18:52:22.79	46 12.18	122 12.49	11.37	(3.8)	17/19	61	0.19	BB	S3		
18	18:54:04.82	46 12.20	122 11.27	2.75	2.2	16/19	63	0.12	AC	S3		
18	19:01:51.49	46 12.28	122 11.41	2.13	2.4	14/17	83	0.15	AC	S3		
18	19:06:40.20	46 12.26	122 11.35	1.91	1.9	14/17	83	0.16	BC	S3		
18	19:11:27.54	46 12.22	122 09.68	0.03*	3.3	7/07	231	0.20	BD	S3	L	
18	19:16:03.97	46 12.66	122 11.26	3.14\$	1.6	11/14	85	0.12	AC	S3		
18	19:17:18.72	46 11.65	122 12.57	0.02*	1.6	10/11	130	0.28	BC	S3		
18	19:21:15.58	46 12.48	122 11.18	3.29	2.0	13/15	85	0.10	AC	S3		
18	19:22:23.57	46 12.19	122 11.28	5.28	1.6	13/17	84	0.17	BC	S3		
18	19:23:25.82	46 09.45	122 13.99	19.53	1.4	11/13	65	0.46	CA	S3		
18	19:25:48.88	46 14.91	122 12.81	0.02*	1.6	9/10	103	0.16	BC	S3		
18	19:27:11.59	46 11.42	122 10.03	11.18	1.5	14/18	87	0.21	BA	S3		
18	19:27:57.01	46 12.22	122 11.55	1.83\$	1.1	15/18	82	0.23	CC	S3		
18	19:29:04.79	46 11.96	122 11.38	5.88\$	1.0	11/13	137	0.26	CC	S3		
18	19:31:09.44	46 11.92	122 11.42	6.15	1.7	8/12	114	0.07	AB	S3		
18	19:39:12.82	46 12.30	122 11.55	2.62\$	1.2	14/16	83	0.17	BC	S3		
18	19:39:35.37	46 12.22	122 11.68	2.88	1.1	12/16	82	0.17	BC	S3		
18	19:40:01.43	46 11.25	122 12.09	11.31	1.6	10/13	77	0.29	BA	S3		
18	19:45:40.50	46 12.98	122 11.25	2.22*	1.3	12/14	86	0.12	AC	S3		
18	19:46:26.47	46 12.11	122 11.33	3.01	1.8	16/20	83	0.18	BC	S3		
18	19:56:21.41	46 12.49	122 10.97	2.72\$	3.3	14/17	74	0.36	CC	S3		
18	20:05:08.60	46 12.21	122 11.34	3.29	(3.7)	18/22	53	0.25	BC	S3		
18	20:10:10.27	46 12.29	122 10.97	2.19#	(3.8)	16/18	63	0.16	BC	S3		
18	20:11:33.67	46 12.37	122 11.33	3.58\$	(3.6)	14/16	84	0.16	CC	S3		
18	20:22:38.55	46 11.82	122 11.11	2.07	1.3	11/15	104	0.23	BC	S3		
18	20:24:05.31	46 09.86	122 09.77	0.42\$	(4.1)	14/15	80	0.25	BB	S3		
18	20:29:04.91	46 12.49	122 11.23	5.54*	1.6	13/16	85	0.18	BC	S3		
18	20:33:24.50	46 12.46	122 11.40	2.37	1.5	11/15	84	0.15	BC	S3		
18	20:34:04.30	46 12.14	122 11.51	2.16	1.7	16/20	82	0.21	BC	S3		
18	20:35:42.06	46 12.52	122 11.05	1.82	1.6	14/17	86	0.13	AC	S3		
18	20:37:25.71	46 12.39	122 11.37	3.51\$	2.9	14/17	62	0.16	CC	S3		
18	20:38:18.63	46 12.52	122 11.13	1.27*	(3.9)	15/18	63	0.17	BC	S3		
18	20:39:46.58	46 12.44	122 11.47	2.93	2.7	15/20	83	0.25	BC	S3		
18	20:44:00.50	46 11.94	122 11.60	1.99	(3.7)	15/17	81	0.20	BC	S3		
18	20:47:34.89	46 11.87	122 11.18	2.67\$	(3.5)	15/18	83	0.19	BC	S3		
18	20:48:56.55	46 11.09	122 10.08	16.20	1.6	14/16	86	0.36	CA	S3		
18	20:50:08.42	46 12.06	122 11.39	2.77	1.5	16/20	83	0.24	BC	S3		
18	21:02:33.13	46 12.24	122 11.42	8.78	(3.7)	13/17	62	0.51	DB	S3		
18	21:07:11.55	46 12.18	122 12.67	6.43	(4.3)	15/15	66	0.13	AB	S3		
18	21:10:06.99	46 12.14	122 11.65	3.13	(4.0)	15/19	62	0.25	BC	S3		
18	21:14:22.35	46 12.40	122 11.13	3.30\$	(3.6)	11/13	85	0.19	BC	S3		
18	21:23:32.29	46 12.06	122 11.44	2.82	(3.7)	13/16	82	0.17	BC	S3		
18	21:24:29.40	46 12.37	122 11.14	2.43	1.9	13/16	85	0.19	BC	S3		
18	21:25:45.16	46 12.32	122 11.05	3.20	(3.6)	16/19	63	0.18	BC	S3		
18	21:28:36.02	46 12.01	122 11.41	3.71\$	(3.7)	16/19	63	0.16	CC	S3		
18	21:46:03.83	46 11.92	122 12.19	2.81\$	(3.6)	15/18	79	0.25	BC	S3		
18	21:52:14.15	46 12.30	122 11.25	3.31*	(4.1)	13/16	87	0.15	AC	S3		
18	21:54:40.96	46 12.15	122 10.58	2.26	(4.0)	16/17	64	0.13	BC	S3		
18	21:56:49.41	46 08.28	122 12.16	0.02*	(3.5)	11/13	143	0.58	DC	S3		
18	21:57:48.77	46 11.91	122 11.09	0.03*	(3.7)	15/16	84	0.21	BC	S3		
18	21:59:00.80	46 12.19	122 11.37	2.50	(4.0)	14/17	83	0.15	AC	S3		
18	22:00:43.10	46 12.27	122 10.88	1.52	(3.6)	13/14	86	0.17	BC	S3		
18	22:01:59.46	46 12.17	122 10.71	1.17*	1.9	13/16	86	0.20	BC	S3		
18	22:05:06.44	46 11.80	122 13.15	5.09\$	2.5	7/07	125	0.25	CC	S3		

DAY	TIME	LAT	LON	May 1980, cont'd		NS/NP	GAP	RMS	Q	MOD	TYP
				DEPTH	M						
18	22:05:57.43	46 12.47	122 11.00	1.97#	(3.8)	9/10	91	0.13	AC	S3	
18	22:11:58.25	46 12.34	122 10.36	0.95\$	(3.8)	13/14	89	0.39	CC	S3	
18	22:13:06.57	46 11.95	122 10.43	0.31	(3.9)	15/19	65	0.26	BC	S3	
18	22:14:20.56	46 08.46	122 12.74	12.34	1.7	13/14	134	0.43	CB	S3	
18	22:16:51.36	46 12.58	122 10.94	1.80*	(3.5)	11/13	86	0.12	AC	S3	
18	22:18:08.66	46 10.65	122 08.96	2.39\$	(4.1)	9/11	90	0.39	CB	S3	
18	22:18:57.61	46 12.31	122 11.52	1.66#	1.6	13/14	83	0.23	BC	S3	
18	22:23:50.11	46 12.29	122 11.01	2.98	1.1	14/18	85	0.13	AC	S3	
18	22:24:38.84	46 11.87	122 11.64	2.94\$	1.6	15/18	81	0.22	BC	S3	
18	22:25:36.13	46 12.26	122 11.99	3.12	1.1	13/16	80	0.19	BC	S3	
18	22:27:12.62	46 11.83	122 11.71	2.44*	(4.1)	16/18	80	0.19	BC	S3	
18	22:28:37.13	46 12.20	122 12.54	5.84\$	(3.7)	11/14	78	0.18	BB	S3	
18	22:35:50.08	46 12.79	122 12.02	7.64	(4.2)	16/17	61	0.25	BB	S3	
18	22:37:07.82	46 12.38	122 11.58	1.13\$	(4.0)	14/15	83	0.31	CC	S3	
18	22:38:34.21	46 11.74	122 11.32	1.97	(4.1)	14/15	82	0.11	AC	S3	
18	22:48:09.16	46 12.40	122 11.47	3.41\$	(4.2)	13/13	88	0.47	CC	S3	
18	22:49:04.27	46 11.86	122 10.99	1.57\$	(4.2)	16/17	64	0.30	CC	S3	
18	22:50:54.96	46 10.90	122 12.76	5.54	(4.3)	14/15	72	0.19	BB	S3	
18	22:54:01.48	46 13.14	122 11.82	1.25\$	(4.5)	7/07	122	0.64	DC	S3	
18	22:55:11.80	46 12.88	122 11.92	2.94	2.2	16/17	61	0.20	BC	S3	
18	22:56:29.61	46 12.19	122 11.40	1.57\$	3.3	17/17	70	0.42	CC	S3	
18	22:57:27.56	46 11.75	122 11.69	1.85	1.6	13/15	80	0.17	BC	S3	
18	22:59:04.34	46 12.05	122 11.45	3.16	(4.2)	14/16	82	0.11	AC	S3	
18	23:00:49.92	46 12.46	122 11.58	6.71*	(4.0)	14/15	62	0.29	BB	S3	
18	23:01:20.23	46 13.11	122 10.40	2.88	1.6	13/15	90	0.25	BC	S3	
18	23:03:17.58	46 12.27	122 10.63	1.65\$	(4.0)	13/13	87	0.15	BC	S3	
18	23:06:19.93	46 12.26	122 11.24	2.92	(3.9)	14/16	124	0.28	BC	S3	
18	23:07:21.53	46 07.59	122 09.02	0.02*	(4.3)	9/10	197	0.28	BD	S3	
18	23:09:41.36	46 08.96	122 10.24	27.02	(4.1)	8/08	153	0.30	DC	S3	
18	23:12:58.22	46 12.65	122 12.00	0.03*	1.6	15/15	61	0.21	BC	S3	
18	23:14:19.49	46 12.64	122 10.92	3.28\$	(4.1)	15/16	63	0.13	BC	S3	
18	23:16:39.92	46 12.82	122 12.47	13.19*	(3.6)	17/21	49	0.20	BA	S3	
18	23:21:16.17	46 12.29	122 11.29	1.76	1.6	13/16	84	0.20	BC	S3	
18	23:23:24.02	46 12.30	122 12.49	11.87*	(3.8)	16/18	52	0.36	CA	S3	
18	23:26:06.27	46 12.15	122 11.06	1.74	1.2	11/13	85	0.15	BC	S3	
18	23:26:57.89	46 12.99	122 12.13	7.52	(3.6)	13/16	82	0.17	BB	S3	
18	23:39:16.42	46 11.91	122 11.07	1.32#	1.4	12/13	84	0.14	AC	S3	
18	23:40:57.33	46 12.20	122 11.39	1.97\$	1.3	14/15	83	0.35	CC	S3	
18	23:46:02.03	46 12.45	122 11.10	3.02	1.2	11/15	78	0.13	AC	S3	
18	23:47:08.06	46 12.90	122 11.77	13.75	1.7	15/17	72	0.30	CA	S3	
18	23:47:49.35	46 12.08	122 11.25	3.23	1.6	13/16	83	0.16	BC	S3	
18	23:50:46.96	46 12.27	122 12.56	6.57	1.3	11/13	78	0.21	BB	S3	
18	23:51:47.54	46 12.08	122 12.29	3.73*	1.8	15/18	79	0.18	BC	S3	
18	23:53:33.07	46 12.14	122 10.65	2.21*	1.7	11/13	162	0.24	BC	S3	
18	23:54:59.34	46 12.58	122 12.39	12.62	3.2	16/19	60	0.21	BA	S3	
18	23:55:40.60	46 12.01	122 11.24	3.52*	2.5	13/15	104	0.15	BC	S3	
18	23:57:01.99	46 11.85	122 12.57	12.89	2.1	13/16	83	0.22	BA	S3	
18	23:59:28.49	46 12.53	122 12.32	1.44\$	1.2	14/14	50	0.37	CC	S3	
19	00:00:03.71	46 12.57	122 11.19	2.04	1.1	15/19	62	0.19	BC	S3	
19	00:00:40.43	46 11.84	122 11.21	1.13*	1.4	11/13	83	0.12	AC	S3	
19	00:01:38.75	46 12.07	122 11.34	3.05	1.5	14/17	83	0.22	BC	S3	
19	00:02:15.43	46 12.31	122 12.11	3.08	1.1	12/14	61	0.15	BC	S3	
19	00:03:30.15	46 12.51	122 10.73	7.14	2.9	15/17	63	0.28	BB	S3	
19	00:04:00.58	46 12.25	122 11.13	1.74\$	2.0	15/19	63	0.18	BC	S3	
19	00:04:55.29	46 12.22	122 11.50	2.41#	1.8	15/19	62	0.16	BC	S3	
19	00:07:33.26	46 12.24	122 11.17	2.25	1.7	14/16	84	0.13	AC	S3	
19	00:09:56.43	46 12.46	122 12.33	2.69	2.2	17/20	61	0.20	BC	S3	
19	00:10:56.04	46 12.17	122 11.08	2.48	2.5	15/17	63	0.17	BC	S3	
19	00:15:29.22	46 11.76	122 11.69	3.08	2.8	15/17	63	0.20	BC	S3	
19	00:17:45.17	46 12.10	122 10.95	3.46*	3.0	16/18	63	0.16	BC	S3	
19	00:18:02.79	46 12.23	122 11.26	1.62	(4.0)	14/16	84	0.22	BC	S3	
19	00:19:14.73	46 11.86	122 11.43	3.39	1.5	15/18	63	0.26	BC	S3	
19	00:19:55.00	46 12.27	122 11.05	1.92	2.4	14/17	85	0.15	BC	S3	
19	00:22:03.19	46 13.46	122 11.51	17.45	2.1	14/16	86	0.08	AA	S3	
19	00:22:24.45	46 12.25	122 12.19	7.68*	1.4	8/11	80	0.06	AB	S3	
19	00:22:47.92	46 12.43	122 10.59	6.72\$	1.3	9/12	88	0.12	AB	S3	
19	00:23:36.08	46 10.40	122 13.17	1.83\$	2.4	14/20	62	1.34	DB	S3	
19	00:25:19.11	46 12.46	122 13.09	12.09	1.6	8/10	76	0.05	AA	S3	
19	00:27:48.73	46 12.95	122 11.81	3.07	2.1	14/18	83	0.14	AC	S3	

May 1980, cont'd											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
19	00:32:59.50	46 11.86	122 12.16	7.19\$	2.0	13/17	95	0.25	BB	S3	
19	00:34:10.63	46 13.88	122 10.98	14.58	1.8	15/17	89	0.18	BA	S3	
19	00:36:32.98	46 12.78	122 11.00	9.07	1.7	14/18	87	0.24	BB	S3	
19	00:39:41.09	46 05.58	122 14.48	10.16	1.6	11/13	94	0.40	CB	S3	
19	00:42:52.08	46 12.28	122 10.65	4.03	2.6	14/20	87	0.16	BA	S3	
19	00:46:09.32	46 12.24	122 11.48	4.95	2.2	12/14	69	0.12	AA	S3	
19	00:47:29.02	46 11.63	122 10.93	5.91\$	2.3	13/19	83	0.15	BA	S3	
19	00:49:37.29	46 12.15	122 12.25	10.75	1.2	9/11	132	0.39	CB	S3	
19	00:51:33.27	46 12.95	122 13.00	7.34\$	3.3	17/17	69	0.28	BB	S3	
19	00:53:03.11	46 12.75	122 12.09	15.66	3.3	15/15	60	0.20	BA	S3	
19	00:55:58.33	46 13.56	122 11.58	16.76	2.8	16/20	66	0.09	AA	S3	
19	00:56:50.67	46 12.17	122 10.60	3.75\$	1.9	12/16	117	0.18	BB	S3	
19	00:57:59.61	46 12.66	122 11.72	13.93	3.6	15/15	54	0.18	BA	S3	
19	01:01:01.76	46 12.32	122 09.98	13.22	1.7	8/10	143	0.17	BC	S3	
19	01:05:27.33	46 12.11	122 07.44	1.90	1.5	9/13	157	0.27	BC	S3	
19	01:06:33.56	46 11.78	122 11.90	18.03*	2.2	13/17	72	0.25	BB	S3	
19	01:07:44.39	46 13.20	122 12.42	3.51	1.2	9/14	69	0.16	BA	S3	
19	01:09:16.44	46 12.73	122 10.15	6.18*	1.7	16/18	64	0.12	AA	S3	
19	01:11:41.94	46 13.32	122 11.59	18.01*	2.8	15/17	64	0.07	AA	S3	
19	01:14:03.96	46 12.52	122 10.93	2.58\$	1.9	13/18	75	0.23	CA	S3	
19	01:17:07.74	46 13.12	122 11.28	3.51\$	1.5	6/08	198	0.21	CD	S3	
19	01:21:15.95	46 12.26	122 11.08	2.64	1.2	13/16	96	0.23	BB	S3	
19	01:21:41.29	46 13.26	122 11.41	15.40	2.6	13/16	86	0.13	AA	S3	
19	01:26:40.09	46 11.90	122 11.58	3.84\$	1.7	7/10	181	0.14	CD	S3	
19	01:29:30.21	46 13.29	122 11.36	18.53	2.6	13/16	86	0.10	AA	S3	
19	01:31:58.70	46 13.06	122 12.75	7.95	3.5	17/20	68	0.16	BA	S3	
19	01:36:09.74	46 12.39	122 10.12	7.05	2.6	16/18	65	0.14	AA	S3	
19	01:48:00.33	46 12.81	122 12.37	4.39*	1.5	7/09	173	0.15	AC	S3	
19	02:00:10.14	46 12.83	122 11.80	13.49	1.7	10/15	175	0.16	BC	S3	
19	02:07:02.95	46 13.60	122 11.77	16.65\$	1.4	9/13	195	0.19	BD	S3	
19	02:09:33.23	46 13.06	122 11.34	19.60	2.3	15/18	61	0.17	BA	S3	
19	02:12:15.54	46 13.13	122 11.89	12.72	2.4	13/13	65	0.27	BA	S3	
19	02:17:38.60	46 13.34	122 11.22	16.45	1.7	10/13	113	0.08	AB	S3	
19	02:32:49.52	46 13.05	122 12.37	7.11\$	1.2	11/15	108	0.15	AB	S3	
19	02:36:49.21	46 11.66	122 11.82	12.22	2.2	15/15	63	0.15	BA	S3	
19	02:40:42.32	46 14.08	122 12.06	2.70#	1.2	6/08	155	0.24	BC	S3	
19	02:58:35.27	46 13.42	122 11.54	17.12	1.9	13/18	85	0.06	AA	S3	
19	03:09:54.85	46 12.64	122 12.18	19.73	2.1	5/06	101	0.05	AD	S3	
19	03:11:16.95	46 13.28	122 11.74	17.80	1.9	15/17	66	0.19	BA	S3	
19	03:34:39.82	46 12.46	122 10.72	0.05*	2.4	11/11	69	0.34	CA	S3	
19	03:38:04.24	46 12.75	122 10.78	6.80	1.2	10/14	63	0.21	BB	S3	
19	03:50:03.19	46 13.53	122 11.81	16.18	1.2	8/14	171	0.10	AC	S3	
19	03:51:28.97	46 12.27	122 10.34	7.15\$	2.3	15/19	89	0.19	BA	S3	
19	03:55:51.07	46 11.77	122 10.73	5.66	2.5	16/22	64	0.22	BA	S3	
19	04:05:10.22	46 13.69	122 10.91	2.98	2.1	8/11	115	0.17	BB	S3	
19	04:13:27.65	46 13.34	122 12.71	4.94\$	1.8	8/09	169	0.16	CC	S3	
19	04:36:19.69	46 12.47	122 12.59	13.01	2.5	17/19	61	0.10	AA	S3	
19	04:43:55.28	46 11.88	122 09.65	11.27	1.8	11/14	66	0.24	BA	S3	
19	05:05:54.16	46 11.93	122 11.59	5.41	1.2	11/15	63	0.22	BA	S3	
19	05:06:23.47	46 13.21	122 10.10	3.08	1.2	4/06	142	0.01	AD	S3	
19	05:23:52.89	46 12.10	122 09.97	12.20	1.2	6/08	125	0.20	CC	S3	
19	05:26:56.49	46 12.28	122 12.89	7.00	1.7	9/10	93	0.11	AB	S3	
19	05:28:48.91	46 11.87	122 09.70	11.15	2.0	10/13	128	0.17	BB	S3	
19	05:38:00.36	46 11.94	122 11.34	3.77\$	2.4	14/16	63	0.14	BA	S3	
19	05:43:30.22	46 12.51	122 11.91	6.81	1.2	5/08	145	0.08	AD	S3	
19	05:46:06.73	46 13.06	122 12.31	13.69	2.1	17/20	67	0.13	AA	S3	
19	05:46:43.00	46 11.83	122 09.67	11.43	1.7	8/10	129	0.20	BB	S3	
19	06:24:31.55	46 13.40	122 10.86	3.52*	1.5	14/17	64	0.14	AB	S3	
19	06:30:50.23	46 12.20	122 10.70	2.86\$	1.7	16/19	64	0.16	BA	S3	
19	06:36:53.76	46 12.64	122 11.27	6.43	1.5	11/15	62	0.27	BA	S3	
19	06:45:41.34	46 12.94	122 10.46	7.28	1.9	11/13	63	0.17	BA	S3	
19	07:18:50.75	46 12.63	122 12.10	15.44	3.6	23/23	58	0.17	BA	S3	
19	07:22:05.09	46 13.61	122 10.06	9.23	1.5	10/12	63	0.18	BA	S3	
19	07:39:32.10	46 12.44	122 12.79	12.10	3.3	16/16	64	0.14	AA	S3	
19	08:00:51.45	46 12.25	122 09.01	1.48	1.2	6/08	145	0.10	AC	S3	
19	08:43:16.18	46 13.00	122 10.97	7.35	2.1	14/15	62	0.26	BA	S3	
19	08:53:10.33	46 11.26	122 11.85	12.02	1.2	6/06	103	0.12	BC	S3	
19	08:58:46.02	46 11.86	122 12.55	10.34	1.9	14/16	77	0.12	AA	S3	
19	09:01:52.67	46 12.70	122 10.09	9.93	1.0	9/11	91	0.07	AB	S3	

May 1980, cont'd											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
19	09:10:38.25	46 12.02	122 10.44	10.45	1.9	13/13	87	0.20	BA	S3	
19	09:13:31.61	46 12.46	122 11.86	5.28	1.5	10/12	103	0.22	BB	S3	
19	09:15:35.68	46 11.73	122 10.94	5.90	2.9	15/17	64	0.17	BA	S3	
19	09:32:11.37	46 12.86	122 10.35	7.83	1.5	10/11	63	0.11	AA	S3	
19	10:03:28.14	46 13.12	122 10.83	5.27\$	1.0	11/11	88	0.12	AB	S3	
19	11:13:39.67	46 12.58	122 12.72	6.76	1.0	9/10	96	0.15	BB	S3	
19	11:20:57.40	46 13.15	122 11.42	3.86*	1.2	7/10	110	0.16	BB	S3	
19	11:51:29.79	46 12.13	122 10.10	10.65	1.8	9/12	90	0.08	AA	S3	
19	12:02:11.66	46 12.07	122 12.71	9.24	1.0	8/09	93	0.05	AB	S3	
19	14:21:57.21	46 12.97	122 12.33	14.69*	3.6	11/11	92	0.09	AB	S3	
19	16:17:33.71	46 12.42	122 12.11	7.00	1.0	6/08	130	0.11	AC	S3	
19	18:21:05.44	46 12.84	122 12.28	15.40	2.1	8/10	132	0.07	AB	S3	
19	20:04:29.45	46 12.39	122 10.28	6.06*	1.1	5/09	151	0.13	AD	S3	
19	20:59:49.53	46 12.13	122 11.61	5.06	1.5	11/13	82	0.17	BA	S3	
19	21:59:40.05	46 13.41	122 10.80	2.89*	1.4	9/15	143	0.10	AC	S3	
19	22:14:13.77	46 08.00	122 09.34	4.63	1.5	8/12	163	0.15	BC	S3	
19	23:23:31.54	46 19.96	122 13.04	3.54#	1.0	8/13	109	0.16	BC	S3	
20	00:42:14.51	46 12.51	122 12.85	6.94	1.7	12/16	94	0.17	BB	S3	
20	01:45:55.40	46 12.87	122 10.46	9.48	1.5	10/14	90	0.09	AA	S3	
20	09:14:12.82	46 11.92	122 12.68	10.19	2.3	15/18	76	0.19	BA	S3	
20	09:38:31.52	46 12.39	122 12.05	14.89	2.1	11/13	61	0.15	BA	S3	
20	09:47:16.52	46 12.00	122 10.66	6.68	1.1	10/11	115	0.22	BB	S3	
20	10:02:19.99	46 12.33	122 12.62	7.33	1.0	10/12	95	0.17	BB	S3	
20	11:06:29.52	46 12.44	122 10.26	8.11	1.2	13/16	90	0.17	BA	S3	
20	12:34:31.76	46 12.38	122 12.46	12.50	3.4	17/19	61	0.12	AA	S3	
20	13:54:18.33	46 12.41	122 11.29	3.12\$	1.2	8/10	109	0.12	AB	S3	
20	14:33:06.10	46 11.93	122 12.54	10.44	1.2	9/13	94	0.15	AB	S3	
20	15:52:33.17	46 11.97	122 10.46	8.57	1.2	9/12	118	0.20	BB	S3	
20	19:09:00.53	46 12.22	122 12.99	8.80	2.2	13/14	92	0.18	BB	S3	
20	22:23:17.92	46 12.07	122 11.46	5.25*	1.2	6/07	130	0.16	BC	S3	
20	23:07:08.51	46 12.19	122 12.71	7.86	2.4	10/11	94	0.17	BB	S3	
21	02:36:32.81	46 12.59	122 13.37	7.59	1.9	8/10	114	0.26	BB	S3	
21	04:23:06.07	46 12.14	122 11.63	1.20	1.7	6/06	126	0.27	BC	S3	
21	04:23:14.78	46 19.33	122 11.82	2.98	1.6	7/10	172	0.23	BC	S3	
21	08:21:33.83	46 11.73	122 12.28	9.65	2.7	15/17	62	0.16	BA	S3	
21	12:07:07.33	46 11.78	122 10.63	6.56	1.0	9/10	115	0.18	BB	S3	
21	12:32:24.01	46 12.37	122 09.86	10.31	1.2	6/11	149	0.21	BC	S3	
21	13:25:50.92	46 12.29	122 10.92	3.26*	1.2	11/12	113	0.21	BB	S3	
21	13:45:53.78	46 10.14	122 07.95	12.45	2.6	12/14	91	0.13	AB	S3	
21	14:00:59.68	46 12.22	122 10.72	3.25#	1.2	7/08	115	0.07	AB	S3	
21	14:59:01.76	46 12.03	122 12.93	10.45	2.5	9/10	113	0.21	BB	S3	
21	16:02:31.88	46 11.73	122 12.29	14.30	4.3	15/15	62	0.12	AA	S3	
21	20:34:53.95	46 19.55	122 12.34	1.97	3.3	14/16	74	0.21	BC	S3	
21	21:45:34.05	46 12.13	122 11.20	3.24\$	1.9	12/14	131	0.20	BB	S3	
21	22:24:55.35	46 12.56	122 10.74	0.88	3.1	12/14	85	0.26	BA	S3	
21	23:42:07.47	46 19.87	122 12.37	1.92	2.1	10/12	128	0.13	AC	S3	L
22	01:01:14.24	46 11.50	122 12.86	8.45	2.1	10/14	83	0.08	AA	S3	
22	09:40:24.32	46 11.30	122 11.72	3.29	1.2	5/06	118	0.06	AD	S3	
22	10:46:11.88	46 12.32	122 13.11	6.93	1.7	11/15	83	0.13	AA	S3	
22	12:01:45.50	46 11.37	122 09.94	10.58	1.2	6/09	124	0.06	AC	S3	
22	12:51:11.16	46 04.48	122 05.82	6.08*	1.2	8/11	212	0.16	BD	S3	
22	14:41:22.87	46 19.45	122 11.51	2.31	2.0	8/11	134	0.19	BC	S3	
22	14:46:20.87	46 19.84	122 13.44	2.12\$	2.6	13/18	76	0.40	DC	S3	
22	14:50:41.72	46 12.04	122 10.91	3.65\$	1.2	9/10	133	0.21	BB	S3	
22	15:40:30.50	46 20.34	122 13.11	2.78\$	2.8	15/18	76	0.32	CC	S3	
22	16:36:03.05	46 20.44	122 13.58	2.84\$	1.4	11/16	77	0.22	CC	S3	
22	17:33:56.48	46 15.76	122 15.87	11.70	1.1	10/12	83	0.14	AA	S3	
22	17:42:25.14	46 12.41	122 12.51	3.76\$	1.2	6/11	150	0.14	BC	S3	
22	17:56:12.19	46 19.71	122 12.20	3.97*	1.5	9/12	106	0.12	AC	S3	
22	21:50:01.91	46 16.14	122 12.48	6.11*	2.2	13/15	72	0.10	AB	S3	
22	21:51:38.28	46 12.18	122 12.82	10.38	1.2	5/07	149	0.09	AD	S3	
22	22:39:00.20	46 19.70	122 12.02	3.36*	2.9	13/14	98	0.17	BC	S3	
23	00:51:03.69	46 11.73	122 09.53	11.00	1.0	7/08	131	0.13	AB	S3	
23	04:39:45.55	46 11.86	122 12.52	9.99	1.2	9/12	94	0.12	AB	S3	
23	04:57:23.82	46 05.92	122 06.13	6.06*	1.1	8/10	198	0.20	BD	S3	
23	05:19:10.05	46 12.37	122 11.20	4.28	1.2	6/07	134	0.09	AC	S3	
23	06:43:43.12	46 12.22	122 12.61	7.84	1.2	11/12	95	0.20	BB	S3	
23	08:17:39.29	46 12.00	122 11.41	3.40	1.5	12/15	106	0.21	BB	S3	
23	11:00:04.35	46 19.67	122 13.43	3.21	1.2	6/08	118	0.07	AC	S3	

May 1980, cont'd											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
23	11:40:57.27	46 12.79	122 10.51	7.23	1.2	11/14	63	0.19	BB	S3	
23	13:50:49.37	46 20.30	122 12.90	3.77	3.3	17/19	75	0.21	BC	S3	
23	13:51:46.00	46 20.14	122 12.41	3.29	1.8	12/16	107	0.21	BC	S3	
23	14:13:05.68	46 20.30	122 12.71	4.35*	1.8	12/15	94	0.13	AC	S3	
23	14:17:21.00	46 20.58	122 12.69	2.89	1.3	9/11	108	0.08	AC	S3	
23	14:19:31.76	46 20.61	122 13.12	3.45\$	1.4	9/13	109	0.15	CC	S3	
23	14:25:37.42	46 20.72	122 13.00	4.38\$	1.0	8/11	91	0.16	BC	S3	
23	16:14:38.68	46 12.27	122 12.80	7.96	1.7	11/14	94	0.17	BB	S3	
24	04:18:33.57	46 12.55	122 10.52	7.04\$	1.7	12/16	118	0.18	BB	S3	
24	04:50:28.26	46 12.52	122 11.10	3.41*	1.5	6/07	137	0.06	AC	S3	
24	21:49:52.05	46 12.28	122 12.46	7.58	1.2	10/16	83	0.20	BB	S3	
24	23:01:23.69	46 19.97	122 12.78	2.45	4.1	18/18	50	0.19	BC	S3	
25	00:03:19.84	46 20.06	122 12.30	1.19	1.1	9/16	109	0.14	AC	S3	
25	00:41:24.67	46 19.83	122 12.61	2.20	2.5	14/20	95	0.13	AC	S3	
25	03:36:47.02	46 04.81	122 05.96	3.72	1.8	12/15	129	0.16	BC	S3	
25	07:27:56.62	46 19.64	122 13.83	2.99\$	2.3	13/17	73	0.20	BB	S3	
25	09:10:42.08	46 12.42	122 12.45	8.16	1.2	10/15	85	0.14	AA	S3	
25	09:49:06.70	46 12.27	122 12.54	7.30	1.8	13/16	83	0.18	BA	S3	
25	09:49:33.91	46 12.07	122 12.79	7.68	1.3	12/14	115	0.26	BB	S3	
25	10:23:52.13	46 11.70	122 12.53	7.72	1.1	10/13	114	0.21	BB	S3	
25	10:24:30.34	46 12.26	122 11.85	3.44\$	1.0	13/15	84	0.15	BA	S3	
25	10:33:41.59	46 12.06	122 12.21	6.74	1.0	13/15	83	0.33	CA	S3	
25	10:46:58.80	46 12.10	122 12.04	2.83	1.2	12/15	84	0.16	BA	S3	
25	10:57:26.39	46 12.06	122 12.22	5.92*	1.2	12/13	120	0.16	BB	S3	
25	11:15:29.20	46 12.22	122 11.67	4.45\$	1.0	9/11	126	0.20	CB	S3	
25	11:22:09.86	46 12.22	122 12.19	5.92	1.5	10/12	121	0.20	BB	S3	
25	11:24:12.67	46 12.17	122 12.44	6.40	1.4	13/16	83	0.17	BA	S3	
25	11:51:12.99	46 12.70	122 12.87	7.18*	1.1	7/09	120	0.07	AB	S3	
25	12:01:34.46	46 12.46	122 11.98	4.77	1.5	14/16	84	0.24	BA	S3	
25	12:24:36.35	46 17.92	122 14.66	0.04*	1.1	8/10	223	0.26	BD	S3	
25	12:32:08.98	46 12.11	122 10.87	6.50	1.2	12/15	134	0.24	BB	S3	
25	12:42:01.33	46 12.81	122 12.28	7.52	1.0	13/17	84	0.24	BA	S3	
25	12:56:23.94	46 12.25	122 12.19	7.75	1.2	10/13	85	0.17	BA	S3	
25	13:00:41.35	46 11.89	122 11.40	5.94	1.7	14/19	84	0.16	BA	S3	
25	13:06:37.59	46 12.29	122 09.99	7.58	1.6	13/17	145	0.18	BC	S3	
25	13:08:37.37	46 12.37	122 12.03	5.89*	1.7	14/17	84	0.22	BA	S3	
25	13:20:24.10	46 12.36	122 12.36	7.17	1.0	10/13	121	0.15	BB	S3	
25	13:20:24.15	46 12.27	122 12.16	7.10	1.1	11/15	122	0.20	BB	S3	
25	13:23:07.92	46 11.67	122 10.55	0.02*	1.3	11/12	136	0.18	BC	S3	
25	13:32:34.83	46 11.95	122 12.43	6.62	1.4	11/13	117	0.15	AB	S3	
25	13:36:59.68	46 12.31	122 12.60	6.65	1.0	8/11	118	0.13	AB	S3	
25	13:42:49.55	46 11.97	122 12.51	7.78	1.1	11/13	117	0.19	BB	S3	
25	14:03:27.36	46 12.14	122 10.96	5.95*	1.4	14/18	85	0.24	BA	S3	
25	14:07:45.55	46 12.12	122 12.26	6.55	1.4	11/18	120	0.14	AB	S3	
25	14:09:13.06	46 11.78	122 11.21	5.83	2.1	13/16	84	0.19	BA	S3	
25	14:31:01.13	46 12.04	122 10.72	9.70	1.1	10/13	136	0.35	CC	S3	
25	14:53:54.91	46 12.37	122 11.84	5.29	1.3	9/11	126	0.20	BB	S3	
25	14:59:31.88	46 12.07	122 12.63	6.75	1.0	12/14	83	0.22	BA	S3	
25	15:16:21.98	46 12.16	122 12.88	10.48	2.5	14/18	83	0.16	BA	S3	
25	15:22:36.86	46 12.80	122 11.72	4.52	1.0	11/13	84	0.27	BA	S3	
25	15:25:45.96	46 12.06	122 12.76	5.29	1.0	13/16	83	0.16	BA	S3	
25	16:28:23.10	46 11.91	122 10.83	6.06	1.2	13/16	85	0.16	BA	S3	
25	17:45:17.94	46 12.29	122 10.63	6.56	1.2	13/18	64	0.22	BA	S3	
25	17:58:01.40	46 12.20	122 12.61	7.26	1.2	10/13	83	0.15	BA	S3	
25	19:03:44.10	46 12.02	122 12.64	7.38	1.5	14/17	61	0.16	BA	S3	
25	19:32:28.37	46 12.31	122 09.93	7.15	1.3	13/16	65	0.20	BA	S3	
25	20:37:55.02	46 12.23	122 12.46	6.90	1.0	11/14	96	0.18	BB	S3	
25	21:04:12.27	46 12.07	122 12.46	6.01*	1.0	12/16	96	0.15	AB	S3	
25	22:06:41.12	46 12.03	122 12.54	8.08	1.0	7/10	95	0.05	AB	S3	
25	23:10:30.15	46 12.33	122 10.61	8.20	1.0	6/09	129	0.08	AC	S3	
26	06:53:58.69	46 05.34	122 06.33	7.44	1.4	6/09	220	0.06	AD	S3	
26	10:13:20.48	46 13.38	122 10.80	0.02*	1.1	8/08	139	0.43	CC	S3	L
26	14:02:10.23	46 20.51	122 12.41	3.91	2.3	10/14	75	0.18	BC	S3	
26	18:30:43.80	46 12.38	122 09.95	8.41	2.2	13/17	65	0.17	BA	S3	
26	21:24:27.02	46 11.44	122 08.75	10.72	1.2	6/08	144	0.17	BC	S3	
26	21:47:26.66	46 11.37	122 10.49	6.02\$	1.4	8/11	117	0.21	BB	S3	
27	03:40:31.55	46 12.27	122 12.48	6.82*	1.2	7/11	127	0.19	BB	S3	
27	05:44:34.68	46 06.12	122 07.28	5.80\$	1.7	8/10	114	0.25	CB	S3	
27	22:44:54.49	46 12.68	122 10.96	7.01	1.2	6/10	113	0.11	AC	S3	

May 1980, cont'd											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
27	23:30:41.22	46 15.61	122 15.81	7.44	2.6	11/13	149	0.11	AC	S3	
27	23:50:00.29	46 19.90	122 11.51	3.06\$	2.7	12/16	131	0.31	CC	S3	
28	13:38:32.82	46 11.90	122 11.03	6.54*	1.5	13/15	64	0.22	BA	S3	
28	14:15:31.67	46 20.18	122 12.77	1.87	4.1	18/18	75	0.23	CC	S3	F
28	14:18:30.23	46 20.12	122 12.34	3.99	4.0	17/17	74	0.24	BC	S3	F
28	14:21:49.64	46 20.45	122 12.81	2.44	2.6	14/17	75	0.20	BC	S3	
28	14:24:55.37	46 20.61	122 12.78	3.31\$	1.6	11/14	93	0.17	BC	S3	
28	14:29:59.47	46 20.46	122 12.70	3.42*	1.1	7/11	120	0.07	AC	S3	
28	14:43:34.60	46 20.52	122 12.67	2.92	1.7	8/09	97	0.10	AC	S3	
28	14:44:36.66	46 20.54	122 12.41	3.11	1.4	7/10	110	0.12	AC	S3	
28	14:59:15.35	46 20.35	122 12.70	3.20	2.3	13/18	94	0.13	AC	S3	
28	16:03:12.72	46 20.39	122 12.34	3.23\$	1.1	7/10	95	0.20	CC	S3	
29	10:07:30.34	46 20.35	122 12.60	3.59\$	2.1	5/10	120	0.11	BD	S3	
29	10:17:08.15	46 12.19	122 09.83	10.08	1.2	4/07	189	0.08	BD	S3	
29	13:51:46.78	46 12.04	122 12.63	10.80	1.2	5/09	159	0.07	AD	S3	
30	16:53:42.17	46 16.36	122 12.95	2.54\$	1.2	11/13	99	0.13	CB	S3	
31	05:45:47.85	46 20.78	122 11.75	5.38	1.0	5/10	130	0.06	AD	S3	
31	07:40:18.74	46 21.00	122 12.77	3.39	2.5	16/19	73	0.11	AA	S3	
31	10:05:48.73	46 20.87	122 11.66	3.22\$	1.8	10/12	130	0.14	CC	S3	
31	12:22:08.75	46 11.61	122 11.33	11.43	1.2	7/11	105	0.06	AB	S3	
31	21:39:50.84	46 19.40	122 13.93	1.22	2.5	16/17	73	0.18	BB	S3	

June 1980											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
1	22:27:57.87	46 17.15	122 12.08	3.16	1.2	8/10	133	0.10	AC	S3	
2	03:15:21.52	46 22.77	122 13.22	2.74	1.9	15/19	69	0.23	BA	S3	
2	09:56:34.15	46 22.75	122 12.95	2.80	1.8	12/14	82	0.15	BA	S3	
5	21:48:23.57	46 06.36	122 07.80	6.85	1.1	6/08	183	0.05	AD	S3	
6	20:12:16.86	46 21.47	122 09.69	1.81	1.5	8/10	140	0.10	AC	S3	
9	08:01:06.67	46 06.33	122 08.63	6.75	1.5	7/10	177	0.09	AC	S3	
9	12:40:55.05	46 20.37	122 14.30	3.86\$	1.3	7/10	189	0.15	CD	S3	
11	04:07:55.02	46 09.44	122 07.80	12.31	2.0	11/14	166	0.16	BC	S3	
11	07:31:28.71	46 04.53	122 04.70	12.86	1.4	6/08	217	0.07	AD	S3	
13	07:50:45.27	46 11.97	122 12.14	7.92	1.0	7/07	122	0.04	AB	S3	
13	07:51:24.68	46 12.11	122 12.44	8.21	1.0	8/10	96	0.07	AB	S3	
13	09:36:56.58	46 11.95	122 12.11	8.44	1.1	10/10	65	0.06	AA	S3	
13	10:00:16.47	46 11.83	122 12.28	8.35	1.0	15/15	46	0.19	BA	S3	
13	10:05:15.50	46 14.47	122 08.60	0.88\$	1.0	6/07	163	0.92	DC	S3	
13	10:11:17.73	46 11.97	122 10.73	6.87	1.2	12/16	114	0.24	BB	S3	
13	10:30:38.84	46 12.44	122 12.06	8.36	1.3	8/09	101	0.08	AB	S3	
13	10:31:07.44	46 12.41	122 12.10	6.72	1.4	9/10	101	0.11	AB	S3	
13	11:29:54.67	46 11.94	122 12.25	8.10	1.4	10/10	66	0.06	AA	S3	
13	12:02:17.73	46 12.08	122 12.23	6.94*	1.4	14/15	64	0.10	AA	S3	
13	12:26:23.63	46 12.17	122 12.50	7.51	1.0	8/10	96	0.06	AB	S3	
13	13:38:37.22	46 12.18	122 12.44	8.17	1.6	18/21	45	0.20	BA	S3	
13	18:25:27.84	46 11.95	122 12.31	7.33	1.2	14/14	45	0.24	BA	S3	
13	22:26:08.36	46 21.30	122 14.89	4.44*	1.6	13/18	73	0.10	AC	S3	
15	08:25:48.78	46 16.42	122 12.42	2.29	1.1	9/13	93	0.07	AB	S3	
16	13:53:47.91	46 17.47	122 13.60	11.84	1.1	14/17	73	0.10	AA	S3	
16	22:53:28.75	46 20.15	122 12.84	3.95\$	2.3	15/20	77	0.27	CC	S3	
18	19:48:21.83	46 07.30	122 07.45	2.08*	2.0	10/13	152	0.12	AC	S3	
19	18:04:56.11	46 20.09	122 13.37	3.79*	2.7	21/23	65	0.12	AC	S3	
22	05:02:49.38	46 22.49	122 13.28	5.24\$	1.0	8/10	107	0.09	AC	S3	
22	07:08:58.87	46 21.40	122 14.80	6.65	1.0	9/12	100	0.16	BB	S3	
22	12:46:38.17	46 23.96	122 13.04	2.46\$	1.4	18/24	57	0.15	CC	S3	
25	06:50:43.52	46 20.30	122 13.17	2.34\$	1.0	13/15	55	0.30	CC	S3	
25	11:30:29.94	46 19.33	122 12.47	3.59\$	1.0	14/19	59	0.17	CC	S3	
25	17:55:03.24	46 06.32	122 07.13	4.96	2.3	19/26	112	0.21	BB	S3	
25	17:59:37.87	46 06.17	122 07.34	6.19	1.8	13/18	142	0.08	AC	S3	
27	14:40:32.14	46 22.16	122 16.31	14.72	1.6	14/19	63	0.10	AA	S3	
27	21:59:19.07	46 17.31	122 21.87	16.05	1.2	14/17	100	0.14	AB	S3	
30	05:42:26.11	46 17.19	122 12.50	1.19	2.7	21/23	69	0.16	BC	S3	

July 1980											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
1	08:14:08.40	46 23.82	122 14.60	3.42	1.2	9/14	137	0.08	AC	S3	
1	14:48:54.78	46 21.45	122 12.31	2.27\$	1.0	10/17	71	0.26	CC	S3	

DAY	TIME	LAT	LON	July 1980, cont'd			GAP	RMS	Q	MOD	TYP
				DEPTH	M	NS/NP					
6	04:27:32.43	46 21.63	122 12.32	3.73\$	1.5	11/16	66	0.20	CC	S3	
6	09:26:23.55	46 21.65	122 12.37	3.49	1.1	8/12	116	0.09	AC	S3	
7	00:20:09.85	46 21.29	122 12.18	2.84	2.8	17/23	54	0.15	AC	S3	
7	00:45:13.07	46 21.38	122 12.22	2.09\$	2.5	16/21	53	0.27	CC	S3	
7	01:35:02.84	46 05.23	122 06.81	4.72	3.1	15/16	122	0.19	BB	S3	
7	01:36:34.31	46 05.33	122 06.94	4.24	2.8	16/17	120	0.19	BB	S3	
7	01:38:59.90	46 04.89	122 06.57	6.24\$	2.4	12/14	180	0.19	BC	S3	
7	01:45:34.88	46 05.40	122 06.82	4.15	3.2	17/18	120	0.17	BB	S3	
7	03:12:04.05	46 05.02	122 06.98	6.72	1.9	10/13	172	0.07	AC	S3	
7	11:30:59.02	46 17.87	122 13.30	7.73	1.7	14/18	82	0.12	AB	S3	
7	15:32:51.14	46 04.94	122 06.86	7.74	2.0	9/13	175	0.09	AC	S3	
7	23:34:11.62	46 21.39	122 11.52	3.48*	1.5	14/19	72	0.11	AC	S3	
13	04:40:25.37	46 16.92	122 13.83	11.19	1.5	4/04	171	0.06	AD	S3	H
15	11:07:04.81	46 18.58	122 12.17	1.23	1.0	10/14	86	0.15	BC	S3	
15	15:10:58.97	46 18.84	122 12.58	3.20	2.4	13/18	86	0.12	AC	S3	
15	20:41:18.92	46 18.83	122 12.55	2.32	2.4	14/18	86	0.12	AC	S3	
17	03:51:37.13	46 04.79	122 06.94	8.36	1.9	7/08	202	0.03	AD	S3	
17	03:53:07.66	46 04.64	122 06.03	8.31	2.0	8/11	209	0.07	AD	S3	
19	04:36:49.65	46 05.81	122 06.92	7.20	1.0	6/11	210	0.18	BD	S3	
20	02:03:24.66	46 05.90	122 07.29	4.99	3.5	17/17	86	0.19	BB	S3	
20	03:55:17.27	46 05.90	122 07.22	7.58	1.3	10/16	150	0.06	AC	S3	
20	04:23:25.34	46 06.08	122 07.19	5.79\$	1.8	13/17	123	0.22	BB	S3	
20	04:47:15.53	46 06.06	122 07.16	6.26	2.0	12/16	127	0.20	BB	S3	
20	13:30:25.41	46 06.10	122 07.34	6.15	2.8	14/18	123	0.25	BB	S3	
20	14:22:32.90	46 10.33	122 07.38	8.69	3.7	19/19	99	0.15	BB	S3	
20	17:36:44.93	46 06.20	122 07.28	6.01\$	2.6	16/19	61	0.27	BA	S3	
20	17:42:09.84	46 06.06	122 07.17	4.48	3.1	17/20	62	0.17	BB	S3	
20	20:12:04.91	46 05.89	122 06.64	7.18	1.3	10/14	156	0.12	AC	S3	
21	01:42:53.07	46 05.80	122 06.29	7.56	1.0	8/10	162	0.05	AC	S3	
21	19:54:00.22	46 05.80	122 07.09	7.39	1.0	7/10	153	0.06	AC	S3	
22	08:25:29.85	46 05.97	122 06.89	6.96	1.0	10/14	151	0.07	AC	S3	
22	08:57:49.32	46 05.88	122 07.17	5.96\$	2.1	14/16	151	0.19	BC	S3	
22	13:27:52.34	46 02.33	122 18.73	19.94	1.1	6/07	288	0.50	DD	S3	
22	14:53:27.15	46 12.52	122 11.31	1.32	2.3	7/07	89	0.08	AB	S3	L
22	19:49:18.92	46 12.17	122 11.10	1.05	2.3	6/06	149	0.05	AC	S3	L
22	21:04:04.28	46 12.03	122 12.03	1.96	2.3	6/06	138	0.01	AC	S3	L
22	21:58:05.84	46 14.27	122 11.01	0.03*	1.7	8/08	97	0.03	AB	S3	
22	22:46:42.71	46 12.65	122 11.67	1.69	2.1	7/07	89	0.07	AB	S3	L
22	22:56:30.67	46 12.67	122 11.17	0.51	1.3	4/04	167	0.	AD	S3	L
22	23:01:13.20	46 12.15	122 11.20	1.04	2.1	7/07	75	0.18	BB	S3	L
22	23:09:54.92	46 12.12	122 11.31	0.74	2.1	11/11	71	0.22	BA	S3	L
22	23:20:27.72	46 12.61	122 11.67	0.04*	2.1	7/07	88	0.04	AB	S3	L
22	23:21:35.25	46 12.18	122 11.81	1.09	1.7	6/06	144	0.17	BC	S3	L
22	23:40:13.14	46 12.29	122 11.29	0.60	2.1	13/13	63	0.23	BA	S3	L
22	23:43:17.13	46 12.38	122 11.51	2.04	2.3	6/06	153	0.10	AC	S3	L
22	23:48:07.90	46 12.87	122 11.04	0.74	2.1	6/06	176	0.09	AC	S3	L
22	23:53:12.31	46 12.79	122 11.06	1.26	2.1	7/07	100	0.04	AB	S3	L
22	23:56:33.05	46 12.50	122 11.93	1.40	2.3	9/09	76	0.08	AA	S3	L
22	23:59:15.99	46 13.45	122 11.33	0.52	2.1	7/07	110	0.20	BB	S3	L
23	00:03:28.67	46 11.79	122 11.71	2.02	1.4	4/04	186	0.	AD	S3	
23	00:03:59.22	46 12.16	122 12.51	2.21	1.5	7/07	100	0.17	BB	S3	
23	00:06:00.69	46 12.40	122 12.60	3.41\$	1.7	6/06	145	0.10	AC	S3	L
23	01:17:27.80	46 12.35	122 10.21	0.05*	2.1	6/06	171	0.10	AC	S3	L
23	03:58:12.43	46 12.85	122 08.82	1.09\$	1.2	5/07	120	0.59	DD	S3	
23	07:06:47.62	46 11.90	122 10.49	7.42	1.3	10/15	68	0.09	AA	S3	
23	10:38:15.63	46 05.64	122 07.08	6.17\$	2.7	12/16	91	0.26	BB	S3	
23	11:53:17.08	46 05.71	122 06.87	6.88	1.7	10/13	158	0.10	AC	S3	
24	01:39:06.32	46 05.70	122 07.10	6.91	1.0	6/08	156	0.06	AC	S3	
24	08:31:16.34	46 14.46	122 06.55	10.52	1.2	10/15	152	0.12	AC	S3	
25	05:42:58.39	46 18.91	122 12.94	3.45\$	2.5	16/20	80	0.13	BB	S3	
28	02:45:10.30	46 05.91	122 07.06	6.18	2.1	13/18	87	0.19	BA	S3	
28	04:51:36.36	46 05.38	122 06.40	6.72	1.1	7/12	171	0.08	AC	S3	
28	05:32:15.37	46 05.66	122 07.40	7.53	1.3	7/10	154	0.07	AC	S3	
28	20:30:22.87	46 06.44	122 07.46	5.03	2.3	13/15	59	0.23	BA	S3	
28	20:30:52.51	46 05.97	122 06.42	6.01	2.1	10/12	156	0.16	BC	S3	
29	02:34:28.40	46 05.98	122 06.55	6.93	1.2	7/11	154	0.06	AC	S3	
29	10:58:03.87	46 05.77	122 07.19	6.05#	2.2	13/16	127	0.28	BB	S3	
29	13:09:20.36	46 06.43	122 07.43	7.30	1.1	7/11	202	0.05	AD	S3	
29	13:46:38.61	46 05.71	122 06.67	6.41	1.1	6/07	213	0.05	AD	S3	

July 1980, cont'd											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
29	18:06:39.32	46 06.23	122 07.17	7.18*	2.2	10/13	143	0.09	AC	S3	
30	05:01:39.08	46 16.68	122 10.11	3.42	1.1	8/11	112	0.08	AB	S3	
31	06:57:35.45	46 05.14	122 06.42	7.47	1.1	9/12	202	0.16	BD	S3	
31	12:29:35.53	46 06.19	122 07.32	6.39	2.3	12/14	188	0.21	BD	S3	
31	18:41:35.29	46 05.24	122 05.97	6.99	1.2	6/09	180	0.04	AC	S3	

Aug 1980											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
4	19:45:54.78	46 05.69	122 07.23	7.31	1.7	10/15	155	0.07	AC	S3	
4	20:43:56.07	46 05.66	122 07.14	7.21	1.1	10/16	156	0.07	AC	S3	
5	00:36:11.36	46 05.76	122 07.08	5.13	2.5	16/20	155	0.16	BC	S3	
5	11:49:13.89	46 06.18	122 07.76	6.01	1.7	10/14	139	0.09	AC	S3	
5	12:17:39.37	46 05.83	122 07.30	7.75	2.3	9/12	151	0.06	AC	S3	
7	00:26:34.93	46 04.58	122 08.11	4.21	1.1	7/11	160	0.10	AC	S3	
7	19:38:28.43	46 05.63	122 06.61	6.92	2.4	12/16	163	0.13	AC	S3	
7	21:52:06.63	46 06.32	122 07.16	6.65	2.1	10/16	140	0.08	AC	S3	
7	22:29:26.09	46 12.73	122 10.65	0.43*	1.4	9/09	105	0.19	BB	S3	L
7	23:42:26.41	46 11.97	122 10.95	6.29	1.0	8/16	96	0.07	AB	S3	
8	21:04:47.99	46 06.45	122 05.61	11.82	2.0	14/16	83	0.16	BA	S3	
9	14:00:59.75	46 05.93	122 07.37	7.17	1.0	10/16	189	0.10	AD	S3	
9	20:04:39.17	46 10.43	122 07.36	9.52	1.4	15/16	100	0.24	BB	S3	
12	11:01:46.04	46 06.41	122 07.16	6.89	1.2	7/14	187	0.05	AD	S3	
13	23:10:08.69	46 06.29	122 06.87	6.61	1.1	5/06	144	0.05	AD	S3	
15	00:29:54.92	46 10.36	122 07.44	9.62	1.9	13/15	121	0.16	BB	S3	
16	02:45:47.57	46 18.56	122 13.08	3.57*	1.2	11/17	95	0.07	AB	S3	
16	07:56:15.77	46 05.41	122 06.29	7.91	1.2	10/17	201	0.13	AD	S3	
19	20:42:47.80	46 17.66	122 12.88	3.18	1.0	12/16	90	0.06	AB	S3	
24	15:41:44.26	46 19.71	122 15.32	2.97	1.1	10/17	104	0.14	AB	S3	
27	07:21:33.00	46 06.15	122 07.09	7.45	1.7	10/15	190	0.07	AD	S3	

Sept 1980											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
2	10:55:27.51	46 20.53	122 12.62	2.98\$	1.4	14/20	72	0.17	CC	S3	
4	22:59:33.33	46 18.66	122 13.12	3.58\$	1.1	13/20	80	0.12	BB	S3	
5	03:46:08.44	46 18.28	122 13.12	3.44#	2.7	21/25	61	0.15	BB	S3	
5	03:47:08.06	46 18.60	122 13.07	3.66\$	1.2	12/16	81	0.14	CB	S3	
5	03:51:48.96	46 18.54	122 13.09	5.70	1.0	10/14	95	0.07	AB	S3	
5	03:55:19.98	46 18.49	122 13.01	3.29*	1.7	12/15	88	0.07	AB	S3	
5	07:05:57.46	46 18.56	122 13.10	2.50\$	1.3	13/17	81	0.15	CB	S3	
8	17:35:11.18	46 22.89	122 13.83	7.18	1.2	10/14	128	0.09	AB	S3	
11	06:45:38.69	46 04.91	122 06.43	7.12	1.4	6/11	221	0.09	AD	S3	
11	23:32:22.54	46 22.44	122 21.54	8.52	1.6	4/05	199	0.11	CD	S3	P
12	07:50:05.60	46 09.98	122 09.33	7.73	1.3	10/14	135	0.07	AB	S3	
28	14:32:09.14	46 10.01	122 08.67	9.11	1.1	9/10	88	0.04	AA	S3	
28	21:26:17.22	46 12.06	122 11.39	1.44	1.9	9/09	71	0.18	BA	S3	L
29	19:30:18.53	46 10.14	122 08.70	8.31	1.3	12/16	88	0.10	AA	S3	

Oct 1980											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
4	13:37:41.23	46 12.04	122 11.56	1.37	1.8	9/09	70	0.16	BA	S3	
7	23:13:09.34	46 22.95	122 19.87	1.59	1.2	10/11	103	0.17	BB	S3	X
8	22:35:53.45	46 12.03	122 11.56	1.38	1.7	7/07	140	0.01	AC	S3	
8	22:37:23.02	46 12.49	122 11.20	1.23	1.7	10/10	75	0.06	AA	S3	
9	16:10:57.28	46 11.80	122 11.12	0.61	1.9	6/06	185	0.02	AD	S3	
15	00:28:47.44	46 14.63	122 18.46	3.12	1.7	7/07	161	0.48	CC	S3	L
16	12:44:02.30	46 12.69	122 11.17	1.04	1.4	5/05	237	0.18	CD	S3	
16	12:46:34.39	46 11.40	122 11.15	2.56\$	1.4	5/05	160	0.26	DD	S3	
17	02:01:37.24	46 11.96	122 11.27	1.27	2.4	17/17	52	0.21	BA	S3	
17	03:16:16.31	46 11.80	122 12.05	2.19	1.4	7/07	130	0.04	AB	S3	
17	03:27:44.83	46 13.55	122 06.07	1.28\$	1.4	7/07	140	0.44	CC	S3	
17	04:04:31.91	46 10.55	122 10.01	2.01	1.1	4/04	127	0.	AD	S3	
17	04:08:45.61	46 12.29	122 11.01	1.27	2.3	15/15	66	0.21	BA	S3	
17	04:36:40.03	46 12.53	122 11.91	2.18*	1.4	6/06	154	0.27	BC	S3	
17	04:38:21.82	46 12.59	122 11.08	1.25	1.8	9/09	82	0.08	AA	S3	
17	04:41:59.33	46 11.76	122 12.47	2.67	2.0	9/09	86	0.35	CA	S3	
17	04:44:22.05	46 15.09	122 10.87	9.26*	1.1	6/06	284	0.34	CD	S3	

Oct 1980, cont'd											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
17	04:57:59.22	46 12.52	122 10.43	1.45	2.8	8/08	94	0.12	AB	S3	
17	06:12:51.35	46 12.49	122 12.38	7.56	1.0	8/09	83	0.10	AA	S3	
17	12:49:16.76	46 19.33	122 13.31	1.69	1.1	13/16	100	0.12	AB	S3	
18	19:34:38.14	46 13.98	122 13.29	3.55	1.7	7/07	93	0.16	BB	S3	
19	01:16:45.51	46 12.51	122 10.00	1.53	1.0	7/07	185	0.32	CD	S3	
19	04:32:09.59	46 13.39	122 10.20	0.03*	1.7	7/07	196	0.25	BD	S3	
21	13:30:25.02	46 10.46	122 12.38	2.46	1.8	7/07	84	0.35	CB	S3	
24	23:18:13.73	46 23.11	122 19.56	1.81	1.3	15/15	89	0.22	BB	S3	

Nov 1980											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
3	10:52:54.71	46 19.88	122 15.64	2.75	2.1	18/23	58	0.17	BB	S3	
9	10:57:46.79	46 20.07	122 15.69	2.61	1.3	12/18	93	0.13	AB	S3	
14	19:07:19.80	46 10.22	122 06.81	8.43	1.1	12/18	103	0.10	AB	S3	
23	10:31:47.35	46 12.46	122 11.54	1.47	1.4	6/06	87	0.03	AC	S3	
28	11:45:49.16	46 03.76	122 18.66	15.65	1.2	12/17	156	0.12	AC	S3	

Dec 1980											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
1	23:23:47.29	46 20.77	122 13.92	0.02*	1.6	5/07	112	0.42	CD	S3	
9	04:55:49.86	46 22.92	122 14.83	9.42	1.0	11/16	70	0.07	AB	S3	
18	16:07:19.19	46 11.91	122 11.12	2.00	1.5	8/08	78	0.23	BA	S3	
24	11:47:52.27	46 13.50	122 10.60	2.85	1.4	4/04	268	0.	AD	S3	
25	01:28:12.73	46 13.09	122 10.69	0.03*	1.5	6/06	188	0.11	AD	S3	
25	19:57:36.71	46 12.07	122 11.64	2.66	1.6	7/07	141	0.22	BC	S3	
25	22:27:28.32	46 12.19	122 10.59	0.02*	1.4	6/06	156	0.23	BC	S3	
26	12:03:37.39	46 12.65	122 11.26	0.73	1.4	5/05	142	0.	AD	S3	
26	13:48:41.27	46 11.31	122 11.45	4.02*	2.0	6/06	170	0.11	AC	S3	
27	01:42:35.20	46 11.37	122 11.52	1.44	1.1	4/04	159	0.	AD	S3	
27	04:32:44.15	46 14.58	122 03.17	2.50	1.2	4/04	289	0.	AD	S3	
27	12:41:05.42	46 12.65	122 12.41	0.89	1.1	4/04	240	0.	AD	S3	
27	12:58:39.39	46 13.05	122 12.51	2.77	1.7	4/04	258	0.	AD	S3	
27	13:22:49.54	46 11.99	122 11.57	1.80	1.1	4/04	198	0.	AD	S3	
27	13:59:14.19	46 11.66	122 10.70	0.03*	1.1	4/04	174	0.02	AD	S3	
27	14:22:17.89	46 12.57	122 11.14	2.22	1.1	4/04	232	0.	AD	S3	
27	15:04:26.18	46 13.10	122 11.51	1.23	1.1	5/05	170	0.11	AD	S3	
27	15:43:47.11	46 12.69	122 11.33	0.95	1.1	4/05	237	0.06	AD	S3	
27	16:02:56.10	46 11.63	122 11.65	2.91	1.1	5/05	126	0.10	AD	S3	
27	16:31:24.15	46 12.70	122 11.30	0.69	1.1	6/06	87	0.02	AC	S3	
27	16:50:49.47	46 11.70	122 11.54	1.23	1.0	4/04	180	0.	AD	S3	
27	18:06:24.84	46 12.38	122 10.48	3.08	1.1	5/05	167	0.09	AD	S3	
27	18:41:28.26	46 20.45	122 15.28	3.51	1.1	4/05	332	0.13	CD	S3	
27	19:43:54.34	46 12.87	122 12.37	1.87	1.2	5/05	159	0.02	AD	S3	
27	20:30:38.25	46 13.29	122 11.17	1.00	1.9	5/05	185	0.42	CD	S3	
27	20:51:29.69	46 11.54	122 12.13	2.09	1.1	5/05	126	0.03	AD	S3	
27	21:55:13.23	46 12.59	122 11.24	1.08	1.3	10/10	77	0.12	AA	S3	
27	22:10:52.05	46 12.02	122 11.63	1.76	1.1	5/05	139	0.08	AD	S3	
27	23:01:27.73	46 11.14	122 10.84	0.04*	1.3	4/04	141	0.01	AD	S3	
27	23:21:55.34	46 12.60	122 10.72	2.14	1.1	4/04	236	0.	AD	S3	
28	00:17:24.51	46 12.39	122 11.76	1.79	1.1	4/04	222	0.	AD	S3	
28	00:41:49.48	46 13.12	122 11.90	3.58	1.1	5/05	171	0.17	BD	S3	
28	01:01:20.08	46 12.60	122 11.49	1.39	1.1	4/04	232	0.	AD	S3	
28	01:21:22.21	46 12.46	122 11.31	1.35	1.2	6/06	87	0.14	AC	S3	
28	02:12:37.12	46 20.95	122 14.82	2.43\$	1.1	4/05	331	1.05	DD	S3	
28	03:20:16.81	46 11.87	122 11.73	2.38	1.2	5/05	134	0.09	AD	S3	
28	03:30:18.54	46 12.39	122 11.25	1.30	1.4	9/09	81	0.06	AA	S3	
28	03:43:04.31	46 14.44	122 10.20	1.81\$	1.1	5/06	207	0.37	CD	S3	
28	04:05:51.94	46 12.75	122 11.28	0.70	1.3	5/05	168	0.04	AD	S3	
28	06:09:44.39	46 14.70	122 10.45	1.42	1.3	5/06	208	0.44	CD	S3	
28	06:53:31.88	46 12.65	122 11.23	0.60	1.2	5/05	166	0.01	AD	S3	
28	07:19:52.28	46 12.65	122 12.78	3.11	1.1	6/06	95	0.24	BC	S3	
28	07:36:53.74	46 12.07	122 11.68	1.58	1.3	5/05	141	0.01	AD	S3	
28	07:51:18.12	46 14.60	122 11.90	0.85\$	1.1	5/05	198	0.60	DD	S3	
28	08:17:59.02	46 14.56	122 11.55	0.79	1.2	4/04	290	0.	AD	S3	
28	08:32:08.08	46 14.11	122 10.65	1.50\$	1.2	5/06	201	0.48	CD	S3	
28	08:51:00.50	46 12.93	122 11.88	0.49	1.4	5/05	166	0.01	AD	S3	

Dec 1980, cont'd											
DAY	TIME	LAT	LON	DEPTH	M	NS/NP	GAP	RMS	Q	MOD	TYP
28	09:46:55.78	46 12.31	122 11.60	1.56	1.3	5/05	150	0.03	AD	S3	
28	10:03:39.39	46 11.93	122 11.64	2.20	2.7	12/12	99	0.29	BB	S3	
28	11:42:42.58	46 14.78	122 11.78	0.10	1.1	4/04	294	0.	AD	S3	
28	14:22:49.09	46 13.63	122 11.62	1.03	1.1	5/05	187	0.09	AD	S3	
28	15:58:49.87	46 14.92	122 09.97	1.07§	1.1	5/06	212	0.40	CD	S3	
28	17:04:03.22	46 12.37	122 11.16	2.89	1.3	4/04	221	0.	AD	S3	
28	17:25:21.66	46 11.02	122 11.25	0.03*	1.1	5/05	137	0.17	BD	S3	
28	17:45:01.83	46 11.83	122 08.68	3.20	1.1	5/05	191	0.16	BD	S3	
28	18:55:57.13	46 12.44	122 11.34	1.81	1.8	11/11	67	0.14	AA	S3	
28	19:33:21.35	46 13.18	122 12.09	6.14	1.1	4/04	260	0.	AD	S3	
29	00:52:24.23	46 12.60	122 11.57	1.36	1.1	4/04	232	0.	AD	S3	
29	03:05:23.34	46 12.18	122 11.76	0.76	1.4	7/07	144	0.08	AC	S3	
29	03:22:02.99	46 09.82	122 12.89	0.51	2.3	7/07	97	0.24	BB	S3	L
29	07:43:35.16	46 12.21	122 11.08	1.37	1.4	10/10	72	0.27	BA	S3	
29	13:35:53.55	46 14.07	122 11.66	0.99*	1.7	9/09	92	0.23	BB	S3	
29	15:19:50.70	46 12.50	122 11.11	2.01	1.2	9/09	76	0.08	AA	S3	
31	13:11:57.37	46 11.19	122 11.42	2.46	1.2	4/04	148	0.	AD	S3	
31	16:19:46.64	46 11.59	122 12.62	3.09*	1.2	5/05	128	0.25	BD	S3	

## APPENDIX III

**Catalog of Mount St. Helens Earthquakes,  $M \geq 3$**   
with comparison of magnitudes - March 20 to May 21, 1980

Dat	Time	ty	NEW	MSO	DUR	s	Dat	Time	ty	NEW	MSO	DUR	s	Dat	Time	ty	NEW	MSO	DUR	s
320	2348	h	4.1	4.1	4.2	2	326	1554	h	3.2	3.0	3.6	2	329	1014	l	3.0		3.2	w
322	2223	h	3.5	3.5	4.0	2	326	1601	h	3.2	3.0	3.7	2	329	1035	h	3.5	3.5	4.3	2
323	1524			3.1		M	326	1610	h	3.4	3.3	3.9	2	329	1044	l	3.3	3.0	3.8	2
324	2157	h	4.2	4.2	4.4	2	326	1613	l	3.4		3.8	w	329	1059	l	3.2		2.9	w
325	0408	h	3.4	3.3	3.8	2	326	1708	h	4.0	3.6	4.4	2	329	1146	h	3.5	3.4	3.5	2
325	0709	h	3.4	3.4	4.0	2	326	1903	l	3.3	3.1	3.9	2	329	1153	h	4.0	3.9	4.4	2
325	1343	h	3.3	3.4	3.8	2	326	1946	l	3.0			w	329	1254	l	3.0		3.2	w
325	1617	h	3.0	2.6	3.5	2	326	2028	h	3.3	3.1	3.7	2	329	1302	h	3.7	3.7	4.3	2
325	1719	h	3.5	3.5	3.8	2	326	2037	h	3.7	3.3	4.0	2	329	1313	l	3.2	3.0	3.2	2
325	1917		3.1		3.3	w	326	2110	l	3.0		3.4	w	329	1412	l	3.1		3.4	w
325	1956		3.1	3.0	3.4	2	326	2211	l	3.1		3.2	w	329	1446		3.1		3.3	w
325	2151		3.4	3.5	4.1	2	326	2221	h	3.3		3.5	w	329	1456	h	3.2	2.6		2
325	2215		3.0	2.9	3.5	2	326	2358	h	3.1	3.1	3.2	2	329	1506	l	3.8	3.4	4.5	2
325	2222		3.4	3.2	3.8	2	327	0336	l	3.0		3.2	w	329	1536	h	4.2	4.2	4.4	2
325	2254		3.7	3.6	4.3	2	327	0341	h	3.9	3.8	4.2	2	329	1652		3.0	2.9	4.0	2
325	2304		3.0	3.1	3.5	2	327	0349	h		3.7		2	329	1841	l	3.0		3.2	w
325	2327		3.2	3.0	3.6	2	327	0427	l	3.4	3.5	4.0	2	329	1857	l	3.1		3.3	w
325	2344		3.1	2.9	3.8	2	327	0531	h	3.4	3.3	3.9	2	329	1902	h	3.4	3.5	4.0	2
326	0003		2.9	3.1		2	327	0634	h	3.8	3.7	4.3	2	329	2020	l	3.0		3.2	w
326	0013		3.2	3.0	3.8	2	327	0740	h	3.4	3.1	4.0	2	329	2056	h	4.0	4.0	4.4	2
326	0107		3.5	3.6	4.0	2	327	0959	l	3.0		3.1	w	329	2321	h	3.9	4.0	4.3	2
326	0116		3.2	3.2	3.8	2	327	1041	l	3.3	3.3	3.9	2	330	0257	h	3.8	4.0	4.3	2
326	0138		3.0	3.1	3.7	2	327	1147	l	3.0	2.9	3.6	2	330	0355	h	3.9	4.0	4.4	2
326	0154		3.0	2.9	3.7	2	327	1234	l	3.4	3.3	3.9	2	330	0537	l	3.1		3.5	w
326	0204		3.8	4.0	4.4	2	327	1456	h	3.9	4.1	4.3	2	330	0743	h	3.8	3.9	4.1	2
326	0226		3.0	2.9	3.7	2	327	1556	h	3.6		4.0	w	330	0917	h	4.2	4.3	4.5	2
326	0237		3.5	3.4	4.1	2	327	1656			3.5		M	330	1036	h	3.0	3.0	3.6	2
326	0302		3.0	2.9	3.9	2	327	1747	h	3.0		3.1	w	330	1128	l	3.0		3.5	w
326	0307		3.3	3.0	3.5	2	327	1856	h	3.6	3.6	4.0	2	330	1241	h	3.7	3.7	4.2	2
326	0314		3.0	2.9	3.5	2	327	1934	h	3.0		3.2	w	330	1333	h	4.2	4.2	4.6	2
326	0330		3.0		2.9	w	327	2017	l	3.8	3.8	4.3	2	330	1556	l	3.3	3.1	3.9	2
326	0334		3.1		3.5	w	327	2106	h	3.3	3.3	3.9	2	330	1727	l	3.0		3.5	w
326	0337		3.5	3.5	3.7	2	327	2201	h	4.5	4.7	4.7	2	330	1756	h	4.4	4.5	4.6	2
326	0351		3.0		2.9	w	327	2341	l	3.2	3.3	4.0	2	330	2104		3.0		3.4	w
326	0411		3.1	3.2	3.5	2	328	0035	h	3.1		3.8	w	330	2207	l	3.1		3.6	w
326	0415		3.7	3.7	3.7	2	328	0053	h	3.3	3.0	3.2	2	330	2244	l	3.1		3.3	w
326	0443		3.2	3.0	3.8	2	328	0152	l	3.7	3.7	4.3	2	330	2248	h	4.2	4.4	4.7	2
326	0447		3.0		3.6	w	328	0336	h	3.1	3.5	4.0	2	331	0151	l	3.0		3.4	w
326	0501		3.6	3.8	4.3	2	328	0521	h	3.1	3.3		2	331	0245	h	4.1	4.0	4.5	2
326	0514		3.2		4.1	w	328	0524	h	3.4	3.4	3.7	2	331	0251	l	3.1		3.4	w
326	0531		3.3		4.2	w	328	0555	l	3.0		3.1	w	331	0433	l	3.0		3.3	w
326	0557		3.1	2.9	3.7	2	328	0648	l	3.2	3.0	2.8	2	331	0514	l	3.3		4.1	w
326	0615		3.0	3.0	3.6	2	328	0808	l	3.1	3.0	3.2	2	331	0551			3.3		M
326	0630		3.1		3.6	w	328	0818	l	3.0		2.7	w	331	0601	l	3.1		3.2	w
326	0639		3.0	3.0	3.6	2	328	0829	h	4.2	4.5	4.9	2	331	0721	h	3.3		3.3	w
326	0646		3.3	3.2	4.0	2	328	0917	l	3.0		3.1	w	331	0750	h	4.4	4.6	4.7	2
326	0706		3.2		3.8	w	328	1001	l	3.1		3.6	w	331	0814	h	4.1	4.1	4.2	2
326	0718		3.5	3.5	4.1	2	328	1005	l	3.0		3.9	w	331	1054	l	3.2	3.4	3.5	2
326	0757		3.2	3.1	3.8	2	328	1037	l	3.4	3.4	3.6	2	331	1135	h	4.4	4.3	4.6	2
326	0810		3.1	3.0	3.8	2	328	1047	l	3.0		3.1	w	331	1223	l	3.0		3.4	w
326	0837		3.1		3.5	w	328	1204	h	3.0	2.9	3.2	2	331	1346		3.0		3.7	w
326	0911		3.5	3.6	4.1	2	328	1252	h	3.6	3.7	4.4	2	331	1450	h	4.3	4.1	4.5	2
326	0941		3.4	3.5	4.1	2	328	1400	h	3.7	3.8	4.1	2	331	1826	l	3.1		3.4	w
326	0945		3.8	4.1	4.4	2	328	1427	l	3.0		3.4	w	331	1912	l	3.0		3.9	w
326	1024		3.1	3.0	3.8	2	328	1508	h	3.3	3.0	3.1	2	331	1930	h	3.8	3.9	4.2	2
326	1056		3.2	3.1	3.9	2	328	1519	h	3.6	3.4	4.0	2	331	1938	h	3.9	4.0	4.1	2
326	1123		3.4	3.4	4.0	2	328	1823	l	3.1	3.0	3.6	2	331	2151	l	3.1		3.3	w
326	1156		3.0		3.6	w	328	2246	l	3.0	3.0	3.2	2	331	2215	l	3.0		3.2	w
326	1213		3.1		3.0	w	328	2252	h	3.7	4.0	4.3	2	331	2301	l	3.1		3.3	w
326	1240		3.1	2.9	3.8	2	328	2351	h	3.6	3.5	4.1	2	331	2332	l	3.1		3.7	w
326	1309		3.4	3.3	3.7	2	329	0154	l	3.4	3.4	3.6	2	331	2347	h	2.4	3.1	3.2	2
326	1343		3.2	3.1	3.6	2	329	0349	l	3.2		3.2	w	401	0227	l	3.3	3.5	2.9	2
326	1418		3.1	3.1	3.9	2	329	0549	h	3.8	4.0	4.4	2	401	0425	h	4.7	4.7	4.9	2
326	1434		3.3	3.0	3.7	2	329	0836	h	3.8	3.9	4.4	2	401	0559	l	3.1		3.4	w
326	1448		3.3	3.0	4.1	2	329	0946	l	3.2	3.2	3.2	2	401	0855	h	4.5	4.5	4.9	2

Dat	Time	ty	NEW	MSO	DUR	s	Dat	Time	ty	NEW	MSO	DUR	s	Dat	Time	ty	NEW	MSO	DUR	s
401	1227		3.0	3.0	3.5	2	405	1348	l	3.8	3.9	4.5	2	407	0538	l	3.1		3.5	w
401	1231	h	4.6	4.6	4.9	2	405	1445	l	3.1		3.7	w	407	0606	l	3.2	3.4	3.5	2
401	1256	l	2.9	3.0	3.2	2	405	1542	l	3.0		3.6	w	407	0643	l	3.2		3.5	w
401	1851	l	3.0		3.6	w	405	1643	h	4.5	4.6	4.7	2	407	0646	h	4.5	4.5	4.8	2
401	2039	h	3.2	3.4	3.6	2	405	1735	l	3.0	3.0	3.5	2	407	0701	h	3.1			w
401	2101	l	3.0		3.5	w	405	1805	l	3.0			w	407	0806	l	3.2	3.1	3.6	2
401	2311	l	3.1		3.5	w	405	1914	l	3.1	3.0	3.5	2	407	0835	l	3.1		3.4	w
401	2315	h	4.6	4.7	4.9	2	405	2022	l	3.1	3.0	3.6	2	407	0907		3.1	3.1	3.5	2
402	0513	l	3.1	3.3	4.0	2	405	2037	l	3.1		3.5	w	407	0932	l	3.1		3.5	w
402	0649	l	3.1		3.6	w	405	2057	h	3.0		3.5	w	407	0943	l	3.2	3.3	3.9	2
402	0938	h	4.7	4.7	4.9	2	405	2235	l	3.0		3.4	w	407	1013	l	3.2		3.5	w
402	1355	l	3.4	3.4	3.5	2	405	2241	l	3.4	3.1	3.6	2	407	1030	l	3.2	3.3	3.5	2
402	1546	l	3.1		3.7	w	405	2357	l	3.6	3.4	3.9	2	407	1133	l	3.3	3.4	3.8	2
402	1604	h	3.5	3.5	4.1	2	406	0004	l	3.2		3.5	w	407	1152	l	3.3	3.1	3.7	2
402	1849	h	4.1	4.2	4.6	2	406	0128		3.0		3.6	w	407	1218	l	3.3	3.3	3.5	2
402	1850	h	4.1			w	406	0206	l	3.2	3.0	3.5	2	407	1310	l	3.2	3.3	3.6	2
402	1907	l	3.0		3.6	w	406	0232	l	3.1	2.9	3.5	2	407	1344	l	3.1		3.3	w
402	2156		3.2		4.0	w	406	0301	l	3.1	2.9	2.8	2	407	1435	l	3.2		3.4	w
403	0112	h	3.1			w	406	0347	l	3.1		3.2	w	407	1506	h	4.7	5.0	5.1	2
403	0244	h	4.4	4.5	4.8	2	406	0432	h	3.2		3.6	w	407	1518	l	3.1	3.1	3.4	2
403	0724	l	3.1		3.4	w	406	0519	l	3.1		3.5	w	407	1533	l	3.1		3.5	w
403	0827	l	3.2		3.6	w	406	0558	l	3.1	3.0		2	407	1625	l	3.2	3.4	3.6	2
403	0936	h	4.8	4.9	5.1	2	406	0642	l	3.1		3.5	w	407	1722	l	3.1	3.0	3.5	2
403	1216	l	3.0		3.7	w	406	0659	h	4.7	4.7	5.1	2	407	1751	l	3.1		3.3	w
403	1531	h	3.7	3.9	4.3	2	406	0721	l	3.2	3.1	3.3	2	407	1827	l	3.1		3.4	w
403	2153	h	3.6		4.0	w	406	0737	h	3.0		3.2	w	407	1940		3.1	3.2	3.7	2
403	2228		3.0		3.7	w	406	0804	l	3.1		3.3	w	407	1941	l	3.6	3.6	3.8	2
403	2358	h	4.5	4.8		2	406	0940	l	3.2	3.1	3.5	2	407	2033	l	3.1	3.2	3.6	2
404	0515	l	3.2		3.8	w	406	0947	l	3.2		3.3	w	407	2116	h	3.2	3.2	3.6	2
404	0913	l	3.0		3.8	w	406	1004	l	3.1		3.4	w	407	2148	l	3.2	3.2	3.7	2
404	0943	l	3.8	4.0	4.3	2	406	1040	l	3.5		3.4	w	407	2251	l	3.4	3.4	3.8	2
404	0950	h	3.6	3.5	4.0	2	406	1109	l	3.2		3.2	w	407	2311	l	3.3	3.4	3.7	2
404	1202	h	3.3		3.8	w	406	1154	l	3.1		3.3	w	407	2349	l	2.9	3.0	3.5	2
404	1232	l	3.0		3.5	w	406	1222	l	3.1		3.4	w	408	0036		3.0	3.4	3.6	2
404	1238	h	3.0		3.4	w	406	1351	l	3.1		3.2	w	408	0141	l	3.2	3.1	3.5	2
404	1346	h	4.5	4.5	4.9	2	406	1428	l	3.2	3.1	3.5	2	408	0219	l	3.5		4.0	w
404	1625		3.0		3.9	w	406	1501	l	3.4	3.3	3.9	2	408	0307	l	3.2	3.2	3.5	2
404	1631		3.0		3.5	w	406	1554	l	3.0		3.3	w	408	0352	l	3.1	3.2	3.6	2
404	1733		3.0		3.5	w	406	1717		3.2	3.3	3.8	2	408	0435	l	3.1		3.5	w
404	1850	l	3.0		3.9	w	406	1719	l	3.6	3.3	4.0	2	408	0448	h	3.8	3.7	4.1	2
404	1855	l	3.0		3.5	w	406	1750	l	3.2		3.3	w	408	0608	h	4.5	4.5	4.8	2
404	2137	l	3.1		3.5	w	406	1753		3.1			w	408	0726	l	3.5	3.3	3.2	2
404	2141	h	4.4	4.3	4.9	2	406	1809	l	3.1		3.1	w	408	0749	l	3.1	3.2	3.6	2
404	2207		3.0			w	406	1847	l	3.1		3.2	w	408	0913	l	3.1		3.4	w
405	0048	l	2.9	3.1	3.6	2	406	1909	l	3.1		3.3	w	408	1042	l	3.2	3.3	3.7	2
405	0110	l	3.0	3.0	3.6	2	406	1939	l	3.1		3.1	w	408	1230	l	3.2	3.2	3.7	2
405	0210	h	3.4	3.4	3.9	2	406	2020	l	3.2	3.1	3.2	2	408	1342	l	3.2		3.7	w
405	0221	l	2.9	3.0	3.7	2	406	2027	l	3.6	3.5	4.1	2	408	1343	l	3.5		4.1	w
405	0241		3.0			w	406	2045	l	3.1		3.4	w	408	1439			3.4		M
405	0242	h	3.2		3.6	w	406	2115	l	3.0		3.1	w	408	1548	l	3.5	3.4	3.9	2
405	0327	l	3.0		3.1	w	406	2242	l	3.2	3.1	3.7	2	408	1630		2.9	3.2	3.3	2
405	0640	l	3.7	3.5	4.3	2	406	2318	l	3.1		3.4	w	408	1709		3.2	3.2	3.7	2
405	0718	l	3.0		3.6	w	406	2324	l	3.4	3.5	4.0	2	408	1745	l	3.1	3.2	3.4	2
405	0744	l	3.0		3.5	w	406	2327	l	3.7	3.9	4.4	2	408	1838	l	3.1	3.4	3.5	2
405	0816	l	3.0		3.6	w	406	2353		3.1		3.5	w	408	1930	h	4.4	4.4	5.1	2
405	0850	l	3.9	4.0	4.4	2	407	0024	l	3.1		3.4	w	408	1958	l	3.1	3.5	3.7	2
405	0901	l	3.0		3.4	w	407	0135	h	3.3	3.2	3.6	2	408	2039	l	3.1		3.2	w
405	0937	l	3.3		3.8	w	407	0155	l	3.5	3.4	3.9	2	408	2122	l	3.1		3.3	w
405	1027	h	3.4		3.7	w	407	0158	l	3.5	3.5	4.1	2	408	2211	l	3.4	3.5	4.2	2
405	1049	l	3.0		3.6	w	407	0218	l	3.2		3.3	w	408	2214	h	4.2	4.0	4.4	2
405	1059	l	3.6	3.4	4.1	2	407	0308	l	3.2	3.4	3.5	2	408	2233	l	3.0		3.8	w
405	1158		3.2	3.4	4.0	2	407	0353	l	3.4	3.3	3.8	2	409	0000	l	3.2	3.5	3.8	2
405	1223	l	3.0		3.5	w	407	0402	h	3.2		3.5	w	409	0053	l	3.2	3.5	3.5	2
405	1249	l	3.0		3.5	w	407	0451	l	3.4	3.4	3.8	2	409	0125	l	3.0		3.3	w
405	1311		3.0			w	407	0453	l	3.5		4.0	w	409	0227	l	3.2	3.2	3.5	2

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Dat	Time	ty	NEW	MSO	DUR	s	Dat	Time	ty	NEW	MSO	DUR	s	Dat	Time	ty	NEW	MSO	DUR	s
409	0326	l	3.2	3.4	3.8	2	411	0446	h	4.4	4.6	4.7	2	413	1742		3.5			M
409	0330	l	3.4	3.4	3.8	2	411	0452	l	3.0		3.8	w	413	1912		3.3			M
409	0416	l	3.2	3.3	3.5	2	411	0527	l	3.5	3.5	3.7	2	413	1951	l	3.4	3.6	3.5	2
409	0454	l	3.1	3.2	3.4	2	411	0603	l	3.1	3.2	3.6	2	413	2049	l	3.3	3.6	3.6	2
409	0532	l	3.1		3.4	w	411	0743	l	3.6	3.8	4.1	2	413	2105	h	3.3	3.4	3.8	2
409	0541	l	3.2	3.5	3.8	2	411	0835	l	3.1		3.8	w	413	2211	l	3.2	3.5	3.2	2
409	0620	l	3.2	3.1	3.3	2	411	0856	h	3.3	3.2	3.8	2	413	2358	h	3.6	3.7	3.9	2
409	0701	l	3.1	3.1	3.5	2	411	1007	l	3.5	3.7	4.2	2	414	0001	l	3.5		3.9	w
409	0705	l	3.3	3.2	3.8	2	411	1107	l	3.1		3.6	w	414	0050	l	3.3	3.4	3.8	2
409	0741		3.1			w	411	1115	h	3.3	3.5	3.8	2	414	0302	h	3.7	3.8	4.1	2
409	0902	h	4.2	4.0	4.5	2	411	1156	l	3.2	3.4	3.8	2	414	0345	l	3.3	3.3	3.8	2
409	0929	l	3.1	3.2	3.5	2	411	1334	l	3.2	3.3	3.9	2	414	0654	h	3.7	3.8	4.3	2
409	1014	l	4.5	4.5	4.7	2	411	1445	l	3.3	3.6	3.8	2	414	0700	l	4.5	4.6	4.9	2
409	1156	l	3.4	3.5	3.8	2	411	1453	l	3.6	3.5	4.1	2	414	0712	l	3.0		3.6	w
409	1305	l	3.3	3.3	3.6	2	411	1519	l	3.0		3.7	w	414	0839	h	3.1	3.0	3.6	2
409	1352	l	3.1	3.1	3.4	2	411	1621	l	3.0		3.7	w	414	0843	l	3.4	3.5	3.9	2
409	1356	l	3.3	3.1	3.5	2	411	1700	l	3.0	3.1	3.7	2	414	0950	l	3.1		3.7	w
409	1457	l	3.2	3.1	3.6	2	411	1802	l	3.7	3.7	4.3	2	414	1032	l	3.0		3.6	w
409	1531	l	3.1		3.2	w	411	1828	l	3.0		3.6	w	414	1108	h	3.3	3.3	3.9	2
409	1709	l	3.2	3.4	3.7	2	411	1916	l	3.2	3.2	3.6	2	414	1157	l	2.9	3.2	3.2	2
409	1752	l	3.1		3.4	w	411	2005	l	3.1		3.6	w	414	1229	h	3.9	4.0	4.4	2
409	1820	h	4.5		4.7	w	411	2032	l	3.1		3.7	w	414	1324	l	3.0	3.3	3.5	2
409	1829	l	3.0		3.3	w	411	2157	l	3.5	3.4	4.0	2	414	1350	h	4.7	4.8	5.2	2
409	1847	l	3.1		3.3	w	411	2207	l	3.1		3.6	w	414	1531	h	3.4	3.6	4.0	2
409	2018	l	3.2		3.4	w	411	2232	h	3.0		3.4	w	414	1738	l	3.5	3.6	3.8	2
409	2055	l	3.2	3.1	3.3	2	411	2353	h	4.8	4.9	5.0	2	414	1910		3.3			M
409	2230	h	3.7	3.8	4.1	2	412	0049	l	3.2	3.4	3.8	2	414	1918	l	3.1		3.7	w
409	2317	l	3.2		3.5	w	412	0226	l	3.3	3.5	3.8	2	414	2230	l	3.4	3.6	4.0	2
410	0025	l	3.1		3.3	w	412	0356	l	3.2	3.4	3.7	2	414	2324	l	3.0	3.3	3.5	2
410	0026	h	4.3	4.3	4.8	2	412	0517	l	4.2	4.4	4.7	2	415	0034	l	3.4	3.4	3.8	2
410	0045	h	4.6	4.7	4.9	2	412	0546	l	3.1		3.7	w	415	0038	l	4.0	4.1	4.5	2
410	0117	l	3.0		3.3	w	412	0703	l	3.1		3.8	w	415	0227	l	3.7	3.6	4.3	2
410	0224	l	3.2	3.1	3.5	2	412	0838	l	3.1		3.6	w	415	0326	l	3.4		3.9	w
410	0405	l	3.3	3.4	3.7	2	412	0845	l	3.0		3.6	w	415	0440	l	3.0		3.4	w
410	0504	l	3.2	3.3	3.4	2	412	1043	l	3.1		3.8	w	415	0659	h	4.3	4.4	4.7	2
410	0620	l	3.3	3.3	3.6	2	412	1205			3.4		M	415	0716	l	3.2	3.4	3.9	2
410	0734	l	3.1	3.4	3.7	2	412	1234	l	3.2		3.8	w	415	0736	h	3.4	3.5	3.9	2
410	0813		3.1			M	412	1509	h	3.6	3.7	4.3	2	415	0819	h	3.0		3.0	w
410	0828	l	3.1		3.6	w	412	1610	l	3.1	3.4	3.6	2	415	0852	l	3.3	3.4	3.9	2
410	0850	l	3.2		3.6	w	412	1745	l	3.4	3.4	3.9	2	415	0938	l	3.0		3.2	w
410	0852	l	3.5		3.8	w	412	1831			3.0		M	415	1139	h	3.1	3.1	3.0	2
410	0957	l	3.2	3.6	3.8	2	412	2047	h	3.6	3.5	4.0	2	415	1155	l	3.7	3.6	4.1	2
410	1052	l	3.2		3.5	w	412	2126	l	3.4	3.2	3.9	2	415	1357	l	3.4	3.5	3.9	2
410	1110			3.7		M	412	2230	h	4.3	4.3	4.6	2	415	1521	l	3.2	3.4	3.5	2
410	1248	l	3.1	3.2	3.6	2	412	2238	l	3.3	2.9	3.3	2	415	1528	h	3.3	3.3	3.8	2
410	1250	l	3.4		3.8	w	412	2319	l	3.1	3.0	3.4	2	415	1613	h	3.5	3.4	4.1	2
410	1414	l	3.2	3.4	3.8	2	413	0009	l	3.1		3.1	w	415	1706	l	3.1	3.2	3.1	2
410	1417	h	4.5	4.5	4.7	2	413	0016	l	3.3	3.3	3.8	2	415	1755	h	4.7		5.0	w
410	1427	l	3.2	3.1	3.5	2	413	0127	l	3.6	3.7	4.2	2	415	1846	l	3.3	3.3		2
410	1523	l	3.2	3.5	3.7	2	413	0304	l	3.5	3.5	4.0	2	415	2007	l	3.3	3.5	3.8	2
410	1612	l	3.2	3.4	3.4	2	413	0348	l	3.1	3.3	3.2	2	415	2156	h	4.0	4.3	4.3	2
410	1654	l	3.1	3.2		2	413	0446	l	3.4	3.2	4.0	2	415	2221	l	3.3	3.4	3.5	2
410	1858	l	3.3	3.5	3.9	2	413	0614	l	3.6	3.8	4.2	2	415	2348	l	3.3	3.3	3.8	2
410	2009	l	3.2	3.2	3.3	2	413	0740	l	3.1	3.3	3.6	2	416	0155	l	3.5	3.4	4.0	2
410	2104	l	3.1		3.4	w	413	0837	l	4.5	4.5	4.8	2	416	0300	h	3.2	3.2		2
410	2109	l	3.7	3.7	4.2	2	413	0849	l	3.1	3.4	3.2	2	416	0302	l	3.3		3.5	w
410	2136	l	3.2		3.6	w	413	0941	l	3.5	3.6	4.0	2	416	0500	l	3.4	3.6	4.0	2
410	2239	l	3.2	3.6	3.7	2	413	1051	l	3.1		3.4	w	416	0620	l	3.1	3.4	3.2	2
411	0012	l	3.2	3.5	3.7	2	413	1207	l	3.5		4.1	w	416	0626	h	3.2	3.4	3.8	2
411	0052	l	3.5	3.4	3.8	2	413	1319	l	3.2		3.8	w	416	0833	l	3.4	3.5	3.7	2
411	0132	l	3.0		3.3	w	413	1431	l	3.3	3.3	3.8	2	416	1148	l	3.5	3.7	4.1	2
411	0232	l	3.2		3.5	w	413	1502	l	3.2		3.5	w	416	1259	l	3.2		3.8	w
411	0337	l	3.2	3.4	3.7	2	413	1544	l	3.0	3.1		2	416	1523	h	4.9	5.0	4.8	2
411	0410		3.4		3.7	w	413	1702			3.1		M	416	1541	h	4.5		4.6	w
411	0422	h	3.2	3.2	3.2	2	413	1737			4.1		M	416	1612		3.1	3.2	3.4	2

Dat	Time	ty	NEW	MSO	DUR	s	Dat	Time	ty	NEW	MSO	DUR	s	Dat	Time	ty	NEW	MSO	DUR	s
416	1706	l	3.0	3.3	3.6	2	419	0708	l	3.0	2.9	3.1	2	421	1332	l	3.3	3.5	3.8	2
416	1751	l	3.1			w	419	0808	h	3.8	3.8	4.3	2	421	1514	h	4.5	4.7	4.8	2
416	1917	l	3.1	3.3	3.6	2	419	0837	l	3.2	2.9	3.4	2	421	1533	l	3.3		3.7	w
416	2130	h	2.9	3.0	3.5	2	419	1030	l	3.5	3.6	3.8	2	421	1554	l	3.1	3.2	4.0	2
416	2247	l	3.5	3.7	4.2	2	419	1133	l	3.0		3.1	w	421	1623	l	3.0	3.1	3.2	2
417	0010	l	3.2	3.2	3.4	2	419	1152	l	3.2	3.1	3.2	2	421	1728	l	3.3	3.2	3.8	2
417	0215	l	3.1	3.2	3.3	2	419	1312	l	3.1	3.0	2.9	2	421	1949	l	3.4	3.4	3.8	2
417	0340	l	3.3	3.4	3.8	2	419	1454	l	3.6	3.4	4.0	2	421	1952	h	4.0	4.1	4.4	2
417	0427	h	4.3	4.2	4.7	2	419	1536	l	3.1			w	421	2035	l	3.5	3.5	3.9	2
417	0437	l	3.3	3.5	3.5	2	419	1646	l	3.3	3.5	3.5	2	421	2121	l	3.2	3.2	3.5	2
417	0508	l	3.2	3.5	3.7	2	419	1703	l	3.4	3.2	3.8	2	421	2217	l	3.3	3.5	3.6	2
417	0539	l	2.6	3.0	3.1	2	419	1749	h	3.9	3.9	4.4	2	421	2347	l	3.3	3.3	3.6	2
417	0707	l	3.5	3.5	4.0	2	419	1807	l	3.3	3.4	3.9	2	422	0109	l	3.1	3.0	3.5	2
417	0859	l	3.3	3.4	3.8	2	419	1845	l	3.0	3.0	3.2	2	422	0312	l	3.4	3.4	4.0	2
417	1011	l	3.0	3.0	3.3	2	419	1908	h	3.8	3.9	4.3	2	422	0413	l	3.0	3.3	3.6	2
417	1034	h	3.0		3.6	w	419	1919	l	3.5	3.7	3.9	2	422	0609	l	3.3		3.8	w
417	1219	l	3.6	3.7	4.0	2	419	1938	l	3.1	3.0	3.3	2	422	0613	h	3.8	4.0	4.4	2
417	1402	l	3.2	3.3	3.7	2	419	2042	l	3.4	3.5	3.8	2	422	0647	l	3.5	3.5	4.0	2
417	1444	l	3.3	3.3	3.9	2	419	2157	l	3.2	3.2	3.6	2	422	0728	l	3.2	3.1	4.0	2
417	1642	l	3.3	3.5	3.7	2	419	2226	l	3.0	3.2	3.2	2	422	0806	l	3.0	3.0	3.5	2
417	1712	l	3.0		3.1	w	419	2229	h	4.6	4.9	4.8	2	422	0922	l	3.3	3.4	3.8	2
417	1744	h	4.6	4.7	5.0	2	419	2250	l	3.4	3.4	3.5	2	422	1026	h	3.9	4.0	4.4	2
417	1801	l	3.0		3.2	w	419	2314	l	3.3	3.2	3.2	2	422	1102	l	3.5	3.4	3.9	2
417	1815	l	2.9	3.0	3.1	2	420	0014	l	3.4	3.1	3.7	2	422	1256	l	3.4	3.2	3.8	2
417	1910	l	3.3	3.4	3.5	2	420	0047	l	3.2	3.0	3.3	2	422	1410	l	3.3	3.2	3.5	2
417	2005	l	3.2	3.2	3.4	2	420	0206	l	3.3	3.2	3.3	2	422	1637	l	3.7	3.6		2
417	2138	l	3.3	3.2	3.2	2	420	0225	h	3.6	3.6	3.8	2	422	1803	l		3.3		M
417	2220	l	3.0	3.0	3.2	2	420	0250	l	3.1	3.0	3.1	2	422	1928	h	4.6	4.6		2
418	0052	l	3.4	3.5	4.0	2	420	0256	l		3.4		M	422	2008	l		3.0		2
418	0054	h	4.4	4.5	4.7	2	420	0349	l	3.2	3.1	3.2	2	422	2043	l		3.0		2
418	0104	l	3.3	3.4	3.3	2	420	0454	l	3.7	3.7	4.1	2	422	2204	h		4.0		2
418	0225	l	3.4	3.4	3.9	2	420	0505	h	3.8	3.4	4.0	2	422	2206	h		3.5		2
418	0318	l	3.0	3.1	3.1	2	420	0602	l	3.2	3.3	3.4	2	422	2306	l		3.4		2
418	0404	l	3.1	3.2	3.2	2	420	0655	l	3.2	3.2	3.8	2	423	0102	l		3.4		2
418	0458	h	3.3	3.3	3.2	2	420	0809	l	3.6	3.5	4.0	2	423	0301	l		3.5		2
418	0509	l	3.5	3.4	3.8	2	420	0840	l	3.1		3.2	w	423	0329	l		3.1		2
418	0543	l	3.0		3.2	w	420	0937	l	3.2		3.7	w	423	0401	l		3.2		M
418	0612	h	3.0		3.1	w	420	1014	l	3.2	3.1	3.1	2	423	0605	l		3.2		2
418	0657	l	3.0		3.2	w	420	1014	h	4.0	3.9	4.3	2	423	0633	h		3.2		2
418	0829	l	3.4	3.5	3.8	2	420	1026	h	3.5	3.3	3.6	2	423	0646	l		3.1		2
418	0924	l	3.7	3.6	4.0	2	420	1036	l	3.6	3.5	3.9	2	423	0843	l		3.5		2
418	1046	l	3.4	3.4	4.0	2	420	1200	l	3.5	3.2	3.8	2	423	0920	l		3.0		2
418	1057	h	3.2		3.2	w	420	1330	l	3.5	3.2	3.8	2	423	1029	l		3.0		2
418	1158	l	3.3	2.7	3.8	2	420	1416	l	3.5	3.5	3.7	2	423	1230	l		3.4		M
418	1216	h	3.4	3.0	3.5	2	420	1548	l	3.4	3.5	3.8	2	423	1232	h		4.6		2
418	1304	h	3.9	3.9	4.2	2	420	1645	l	3.0	2.9	3.7	2	423	1244	l		3.0		M
418	1309	l	3.6	3.4	4.0	2	420	1754	l	3.4		4.0	w	423	1309	l	3.4	3.4	4.0	2
418	1327	l	3.1		3.0	w	420	1920	h	4.8	4.8	5.1	2	423	1335	l	3.2	3.0	3.6	2
418	1434	l	3.4	3.3	3.7	2	420	1930	l	2.8	3.1	3.2	2	423	1433	l	3.3	3.1	3.7	2
418	1554	l	3.3	3.4	3.9	2	420	1937	l	3.2		3.2	w	423	1516	l	3.2	3.0	3.5	2
418	1734	l	3.3	3.4	3.4	2	420	2013	l	3.5	3.1	3.9	2	423	1519	h	4.2	4.2	4.5	2
418	1835	l	3.0		3.2	w	420	2204	h	4.0	4.1	4.4	2	423	1532	l	3.5	3.5	3.8	2
418	1917	l	3.5	3.4	4.0	2	420	2212	l	3.3	3.0	3.8	2	423	1615	l	3.0	3.0	3.5	2
418	2028	l	3.4	3.3	3.8	2	420	2244	l	3.3		3.7	w	423	1835	l	3.4	3.4	3.8	2
418	2040	l	2.8	3.0	3.1	2	420	2331	l	2.7	3.0	3.1	2	423	2016	l	3.3	3.1	3.8	2
418	2117	h	4.7	4.6	5.0	2	421	0045	l	3.3	3.2	3.1	2	423	2121	l	3.3	3.1	3.7	2
418	2128	l	3.2		3.4	w	421	0324	l	3.5	3.6	4.1	2	423	2307	l	3.4	3.4	3.9	2
418	2151	l	3.2		3.2	w	421	0356	l	3.0		3.8	w	424	0025	l	3.2		3.5	w
418	2228	h	4.1	4.4		2	421	0509	l	3.0	3.0	3.3	2	424	0031	h	3.3	3.5	3.7	2
418	2311	l	3.2	3.1	3.1	2	421	0518	h	3.7	3.8	4.3	2	424	0025	l		3.0		M
418	2337	l	3.0		3.3	w	421	0558	l	3.3	3.4	3.9	2	424	0142	h	3.5	3.5	3.9	2
419	0020	l	2.9	3.0	3.0	2	421	0725	l	2.9	3.2	3.6	2	424	0229	h	3.4	3.3	3.8	2
419	0238	l	3.6	3.4	4.1	2	421	0755	l	3.4	3.2	3.9	2	424	0422	l	3.4	3.5	3.9	2
419	0325	l	2.9	3.0	3.1	2	421	0836	l	3.3		3.6	w	424	0506	l	3.3	3.3	3.8	2
419	0604	l	3.6	3.7	4.1	2	421	1040	l	3.3	3.4	3.7	2	424	0602	l	3.2	3.0	3.8	2
							421	1236	l	3.2	3.1	3.5	2	424	0638	h	3.0	3.0	3.6	2

Dat	Time	ty	NEW	MSO	DUR	s	Dat	Time	ty	NEW	MSO	DUR	s	Dat	Time	ty	NEW	MSO	DUR	s
424	0733	l	3.2	3.0	3.5	2	427	0916	l	3.1	2.9	3.3	2	430	0539	h	3.4	3.5	3.9	2
424	0828	l	3.4	3.6	3.8	2	427	0936	h	3.1	3.0	3.1	2	430	0604	l	3.3	3.3	3.5	2
424	0951	h	3.9	4.0	4.4	2	427	0959	l	3.1	3.0	3.6	2	430	0718	l	3.1	3.3	3.8	2
424	1051	h	3.4	3.5	4.0	2	427	1111	l	3.2	3.0	3.3	2	430	0743	h	4.2	4.4	4.5	2
424	1204	l	3.2	3.3	3.8	2	427	1235	l	3.6	3.8	4.0	2	430	0756	l	3.6	3.6	4.0	2
424	1333	l	3.5	3.4	4.1	2	427	1412	l	3.3	3.3	3.6	2	430	0922	l	3.4	3.6	3.9	2
424	1532	l	3.5	3.7	3.9	2	427	1449	h	3.9	3.9	4.2	2	430	1225	l	3.4	3.5	3.7	2
424	1734	h	4.8	4.8	4.8	2	427	1523	l	3.0	2.9	3.4	2	430	1509	l	3.6	3.6	3.7	2
424	1745	l	3.1	3.0	3.4	2	427	1705	l	3.5	3.5	3.9	2	430	1728	l	3.0	3.2	3.4	2
424	1800	l	3.3	3.3	3.9	2	427	1822	l	3.1	3.1	3.4	2	430	1753	l	3.2	3.2	3.4	2
424	1901	l	3.4	3.6	3.9	2	427	2055	l	3.5	3.7	3.9	2	430	2051	l	3.6	3.7	4.0	2
424	1955	l	3.3	3.4	3.7	2	427	2129	l	3.4	3.5	3.9	2	430	2242	l	3.3	3.4	3.7	2
424	2103	l	3.2	3.4	3.5	2	427	2341	l	3.4		3.9	w	501	0108	l	3.2	3.3	3.8	2
424	2200	l	2.9	3.0	3.2	2	427	2357	l	2.6	3.5	2.9	2	501	0333	h	3.0	3.0	3.5	2
424	2309	h	3.7	3.8	4.2	2	428	0102	l	3.2	3.2	3.5	2	501	0446	h	4.2	4.3	4.6	2
425	0029	l	3.6	3.7	4.0	2	428	0213	l	3.1	3.0	3.3	2	501	0454	l	3.4	3.4	3.8	2
425	0133	l	3.1	3.1	3.4	2	428	0312	l	3.0	3.0	3.4	2	501	0619	l	3.7	3.7	4.1	2
425	0309	l	3.2	3.2	3.6	2	428	0350	h	4.6	4.5	4.9	2	501	0717	l	3.1	3.2	3.6	2
425	0456	l	3.3	3.4	3.9	2	428	0357	l	3.2	3.1	3.4	2	501	1100	l	3.6	3.7	4.0	2
425	0558	l	3.4	3.5	3.6	2	428	0410	l	3.3	3.2	3.6	2	501	1247	l	3.2	3.3	3.7	2
425	0627	h	3.2	3.1	3.7	2	428	0429	l	3.1	3.0	3.4	2	501	1537	l	3.3	3.4	3.7	2
425	0704	l	3.3	3.4	3.8	2	428	0516	h	3.9	4.1	4.4	2	501	1650	l	3.1	3.3	3.6	2
425	0845	l	3.0	3.1	3.3	2	428	0624	l	3.3	3.4	3.8	2	501	1928	h	4.3	4.6	4.6	2
425	1101	l	3.6	3.7	4.1	2	428	0734	l	3.2	3.2	3.5	2	501	1941	l	3.3	3.2	3.6	2
425	1104	h	3.5	3.8	3.9	2	428	0933	l	3.4	3.2	3.5	2	501	2000	l	3.0	3.0	3.4	2
425	1123	l	3.0	3.0	3.3	2	428	1054	l	3.2	3.2	3.8	2	501	2132	l	3.7	3.7	4.1	2
425	1351	l	3.4	3.7	3.8	2	428	1232	l	3.6	3.6	4.0	2	501	2201	l	3.2	3.2	3.6	2
425	1528	l	3.3	3.2	3.6	2	428	1239	h	3.8	3.7	4.1	2	501	2302	l	3.3	3.4	3.8	2
425	1707	l	3.0	3.2	3.6	2	428	1303	l	2.7	3.0	3.2	2	501	2350	l	3.0		3.4	w
425	1817	l	3.5	3.5	3.9	2	428	1510	l	3.5	3.7	4.1	2	502	0058	l	3.3	3.4	3.8	2
425	1921	l	3.3	3.0	3.9	2	428	1708	l	3.3	3.7	3.8	2	502	0310	l	3.3	3.5	3.7	2
425	2026	l	3.0	3.1	3.5	2	428	1754	h	3.1	3.0	3.2	2	502	0513	h	4.0	4.1	4.4	2
425	2152	l	3.4	3.6	3.9	2	428	1911	l	3.4	3.6	3.9	2	502	0543	l	3.0	3.2	3.6	2
425	2250	l	2.9	3.0	3.6	2	428	2213	l	3.3	3.4	3.4	2	502	0647	l	3.1	3.0	3.5	2
425	2321	h		4.6		2	428	2353	l	3.6	3.7	4.1	2	502	0745	l	3.2	2.9	3.2	2
425	2348	l	3.2	3.4	3.4	2	429	0053	l	3.2	3.2	3.4	2	502	0837	l	3.6	3.7	4.1	2
426	0009	l	3.0	3.2	3.5	2	429	0153	l	3.3	3.4	3.5	2	502	0953	l	3.4	3.1	3.9	2
426	0225	l	3.6	3.8	3.9	2	429	0338	l	3.4	3.2	3.8	2	502	1127	l	3.3	3.3	3.9	2
426	0333	l	3.2	3.2	3.5	2	429	0425	h	4.6	4.5	4.8	2	502	1253	h	3.8	3.9	4.3	2
426	0412	h	3.8	3.8	3.8	2	429	0437	l	3.0		3.4	w	502	1300	l	3.2	3.2	3.5	2
426	0556	l	3.3		3.6	w	429	0534	l	3.4	3.1	3.7	2	502	1303	h	4.5	4.7	4.8	2
426	0612	l	3.1	3.4	3.4	2	429	0542	h	3.3	3.2	3.6	2	502	1312	l	3.0		3.2	w
426	0629		3.1		M		429	0622	l	3.6	3.6	3.7	2	502	1328	l	3.2	3.3	2.3	2
426	0722	l	3.2	3.2	3.3	2	429	0623	h	4.5	4.7	4.6	2	502	1401	l	3.1	3.2	3.5	2
426	0857	l	3.0	2.9	3.1	2	429	0630	l	3.3	3.3	3.4	2	502	1508	l	3.4	3.2		2
426	1045	l	3.4	3.4	4.0	2	429	0652	l	3.3	3.5	3.9	2	502	1643	l	3.0	3.0	3.2	2
426	1218	l	3.5	3.6	4.0	2	429	0722	l	2.9	3.2	3.4	2	502	1900	l	3.4	3.5	3.8	2
426	1316	l	3.3	3.3	3.5	2	429	0756	l	3.0	2.9	3.5	2	502	2101	l	3.5	3.4	3.8	2
426	1427	h	3.6	3.7	4.0	2	429	0900	l	3.4	3.4	3.8	2	502	2313	l	3.5	3.2	3.7	2
426	1555	l	3.7	3.6	4.1	2	429	1114	l	3.3		3.6	w	503	0305	l	3.5	3.5	3.9	2
426	1749		3.4	3.4	3.9	2	429	1239	l	3.4	3.4	3.6	2	503	0501	h	4.5	4.6	4.5	2
426	1848	l	2.9	3.0	3.1	2	429	1242	h	4.1	4.2	4.2	2	503	0506	h	4.1	4.1	4.4	2
426	2015	l	3.4	3.3	3.7	2	429	1247	l	3.6	3.7	3.9	2	503	0511	l	3.2	3.3	3.7	2
426	2211	l	3.4	3.2	3.8	2	429	1522	l	3.4	3.5	3.7	2	503	0514	l	3.0	2.9	3.1	2
426	2251	l	3.1	3.1	3.1	2	429	1747	l	3.6	3.5	3.8	2	503	0520	l	3.2	3.2	3.6	2
427	0116	h	3.8	3.7	4.3	2	429	1911	l	3.3	3.1	3.6	2	503	0536	l	3.0	3.3	3.6	2
427	0201	l	3.8	3.7	4.2	2	429	1939	h	3.0	3.0	3.4	2	503	0647	l	3.6	3.7	4.1	2
427	0247	l	3.3	3.5	3.8	2	429	2135	l	3.2	3.0	3.5	2	503	0720	l	2.7	3.0	3.2	2
427	0419	l	3.1	3.2	3.5	2	429	2332	l	3.0	3.1	3.2	2	503	0856	l	3.3	3.2	3.5	2
427	0547	h	3.4	3.2	3.8	2	430	0035	l	3.7	3.8	4.2	2	503	1047	l	3.3	3.5	3.8	2
427	0716	l	3.5	3.7	4.0	2	430	0224	l	3.4	3.2	3.6	2	503	1242	l	2.7	3.1	2.6	2
427	0727	h	4.6	4.8	4.9	2	430	0235	l	3.0	3.2	3.5	2	503	1313	h	3.9	3.9	4.5	2
427	0739	l	3.3	3.5	3.8	2	430	0413	l	3.4	3.4	3.7	2	503	1338	l	3.1	3.1	3.4	2
427	0813	l	2.8	3.0	3.0	2	430	0510	h	4.7	4.9	4.9	2	503	1344	l	3.0	3.1	3.5	2
427	0832	l	3.4	3.6	3.9	2	430	0518	l	3.4	3.3	3.6	2	503	1542	l	3.8	3.7	4.2	2

Dat	Time	ty	NEW	MSO	DUR	s	Dat	Time	ty	NEW	MSO	DUR	s	Dat	Time	ty	NEW	MSO	DUR	s
503	1815	l	2.7	3.0		2	507	0941	l	2.9	3.0	3.2	2	511	1713	l	3.3		3.8	w
503	2046	l	3.7	3.7	4.2	2	507	1110	h	4.6	4.5	4.7	2	511	1940	l	3.3	3.4	3.9	2
503	2222	l	2.9	3.0	3.2	2	507	1234	l	3.4	3.5	4.0	2	511	2043	h	3.5	3.6	3.9	2
503	2352	l	3.0	3.0	3.4	2	507	1408	l	3.4	3.4	3.6	2	511	2247	h	4.0	4.2	4.3	2
504	0047	l	3.4	3.5	3.7	2	507	1651	l	3.4	3.6	3.9	2	512	0006	l	3.4	3.4	3.7	2
504	0307	l	3.2	3.3	3.7	2	507	1909	l	3.3	3.2	3.8	2	512	0246	l	3.4	3.5	3.7	2
504	0524	l	3.8	3.7	3.9	2	507	2205	l	3.4	3.4	3.8	2	512	0248	h	3.2	3.0	3.5	2
504	0533	l	3.0	3.0	3.8	2	508	0121	l	3.6	3.6	4.2	2	512	0525	l	3.5	3.3	3.9	2
504	0748	l	3.6	3.5	3.8	2	508	0318	l	3.3	3.3	3.8	2	512	0809	l	3.4	3.4	3.8	2
504	0909	l	3.2	3.4	3.7	2	508	0617	l	3.3	3.3	3.9	2	512	1019	l	3.0	3.0	3.6	2
504	1159	h	4.6	4.7	4.9	2	508	0747	l	3.8	4.0	4.4	2	512	1212	l	3.5	3.8	4.2	2
504	1214	l	3.0	3.0	3.1	2	508	0749	h	4.7	4.8	4.7	2	512	1541	l		3.5		2
504	1239	l	3.1	3.4	3.6	2	508	0808	l	3.0	3.0	3.5	2	512	1626	h	4.9	4.8		2
504	1319	l	3.3	3.0	3.6	2	508	0849	l	3.6	3.5	4.0	2	512	1647	l		3.7		2
504	1416	l	3.3	3.4	3.9	2	508	0904	h	4.3	4.2	4.6	2	512	1724	l		3.6		2
504	1613	l	3.2	3.0	3.5	2	508	0945	l	3.0	3.0	3.8	2	512	1842	l		3.7		2
504	1735	l	3.4	3.4	3.8	2	508	1006	l	3.7	3.8		2	512	1933	l		3.3		2
504	1936	l	3.3	3.6	3.8	2	508	1239	l	3.3	3.2	3.9	2	512	2033	h	4.6	4.8		2
504	2140	l	3.5	3.7	4.0	2	508	1532	l	3.6	3.5	3.9	2	512	2045	l		3.1		2
504	2338	l	3.0	3.0	3.2	2	508	1928	l	3.6	3.4	3.9	2	512	2151	l		3.0		M
505	0049	l	2.9	3.0	3.3	2	508	1949	h	3.0		3.1	w	512	2300	l		3.3		2
505	0154	l	3.7	3.7	4.0	2	508	2214	l	3.5	3.5	3.9	2	513	0100	h		3.0		2
505	0445	l	3.4	3.6	3.7	2	509	0056	l	3.5	3.3	4.0	2	513	0131	h		4.0		2
505	0525	h	3.3	3.1	3.5	2	509	0433	l	3.5	3.5	4.0	2	513	0201	l		3.2		2
505	0544	h	4.6	4.6	4.7	2	509	0700	h	4.6	4.7	4.7	2	513	0449	l		3.2		2
505	0550	l	3.1		3.2	w	509	0717	l	3.2	3.1	3.5	2	513	0900	l		3.5		2
505	0605	l	3.1	3.0	2.9	2	509	0731	l	3.3	2.9	3.9	2	513	1112	l		3.7		2
505	0631	l	3.0	3.1	3.3	2	509	0820	h	3.2	3.1	3.8	2	513	1852	l		3.7		2
505	0728	l	3.6	3.8	4.0	2	509	0833	l	3.3	3.4	3.8	2	513	2239	l		3.4		2
505	0907	l	3.3	3.3	3.4	2	509	1008	l	3.2	3.3	3.8	2	514	0219	h	4.5	4.5		2
505	0914	h	4.0	4.2	4.3	2	509	1411	l	3.7	3.7		2	514	0234	l		3.2		2
505	0923	l	3.4	3.5	3.7	2	509	1525	l	3.0	3.0	3.4	2	514	0326	l		3.1		2
505	1046	l	3.3	3.4	3.7	2	509	1639	l	3.2		3.6	w	514	0501	l		3.7		2
505	1200	l	3.0	3.0	3.4	2	509	1807	h	4.6	4.5	4.6	2	514	0707	h		3.2		2
505	1320	l	3.6	3.7	4.0	2	509	1827	l	3.3	3.4	3.7	2	514	0711	l		3.2		2
505	1405	l	3.0	3.0	3.2	2	509	1905	l	3.4	3.3	3.7	2	514	0944	h		3.7		2
505	1615	l	3.5		4.0	w	509	2130	l	3.6	3.8	4.0	2	514	1045	l		3.1		2
505	1820	l	3.1	3.0		2	509	2204	h	3.1	3.0	3.4	2	514	1320	l		3.0		2
505	2125	l	3.5	3.5	3.7	2	510	0115	l	3.6	3.6	4.0	2	514	1408	h		3.8		2
505	2348	l	3.2	3.0	3.4	2	510	0323	l	3.3	3.1	3.7	2	514	1442	l		3.3		2
506	0004	h	4.0	4.3	4.3	2	510	0551	l	3.7	3.8	4.1	2	514	1504	l	3.1	3.1	3.2	2
506	0057	l	3.4	3.6	3.7	2	510	0927	l	3.8	3.7	4.1	2	514	1645	h	3.0	2.9	3.2	2
506	0148	l	3.1	3.0	3.2	2	510	1117	l	3.5	3.6	4.0	2	514	1849	l	3.6	3.7	4.1	2
506	0329	l	3.2	3.4	3.5	2	510	1232	h	4.0	4.3	4.5	2	514	2018	l	3.3	3.1	3.5	2
506	0509	l	3.1	3.2	3.7	2	510	1307		3.9			w	514	2347	l	3.5	3.6	4.0	2
506	0816	l	3.8	3.8	4.0	2	510	1322	l	3.4	3.5	3.9	2	515	0049	l	3.1	3.0		2
506	1029	l	3.4	3.5	3.7	2	510	1401	l	3.2			w	515	0052	h	3.0		3.1	w
506	1149	h	3.5	3.4	3.8	2	510	1514	l	3.2	3.3	3.6	2	515	0436	l	3.1		3.2	w
506	1209	l	3.3	3.5	3.5	2	510	1618	l	3.3	3.2	3.6	2	515	0649	l	3.6	3.6	4.1	2
506	1530	h		3.8		2	510	1736	l	4.0	3.9	4.3	2	515	0803	l	3.3	3.3	3.6	2
506	1704	h		4.6	4.6	2	510	1817	l	3.1	3.0	3.1	2	515	0914	h	3.8	3.8		2
506	1714	l	2.8	3.0	3.5	2	510	2027	l	3.3	3.5	3.8	2	515	0921	h	3.3	3.4	3.7	2
506	1723	l	3.2	3.2	3.6	2	510	2120	l	3.2	3.0	3.1	2	515	1037	l	3.4	3.3	3.6	2
506	1754	l	3.4	3.7	4.0	2	511	0047	h	3.1		3.1	w	515	1142	h	4.6	4.6	4.8	2
506	1820	l	3.2	3.4	3.8	2	511	0120	l	3.7	3.7	4.1	2	515	1152	l	3.3	3.4	3.8	2
506	1923	h	4.2		4.4	w	511	0304	l	3.1	3.1	3.5	2	515	1202	l	3.2		3.4	w
506	2011	l	3.4	3.5	3.8	2	511	0401	h	4.5	4.3	4.6	2	515	1231	l	3.1	3.1	3.2	2
506	2133	l	3.2	3.3	3.5	2	511	0420	l	3.4		3.7	w	515	1321	l	3.4	3.5	3.9	2
506	2330	l	3.5	3.5	3.9	2	511	0547	l	3.5	3.6	3.9	2	515	1441	l	3.2	3.1	3.5	2
507	0237	l	2.8	3.0	3.1	2	511	0810	h	3.6	3.7	4.1	2	515	1631	h	3.3	3.3	3.6	2
507	0345	l	3.7	3.6	4.2	2	511	0816	l	3.5	3.5	3.9	2	515	1730	l	3.6	3.6	4.0	2
507	0505	l	3.0	2.9		2	511	1020	l	3.4	3.4	3.9	2	515	1833	h	3.4	3.4	3.6	2
507	0637			3.2		2	511	1330	h	4.1	4.2	4.4	2	515	2019	l	3.3	3.5	3.5	2
507	0638	l	3.2		3.1	w	511	1406	h	3.1			w	515	2304	l	3.0		3.1	w
507	0853	l	3.6	3.4	4.0	2	511	1502	l	3.6	3.7	4.0	2	516	0012	l	3.1	3.1	3.5	2

Dat	Time	ty	NEW	MSO	DUR	s	Dat	Time	ty	NEW	MSO	DUR	s
516	0332	l	3.7	3.7	4.3	2	518	2125		(3.6)			w
516	0500	l	3.1	3.0	3.7	2	518	2128		(3.7)			w
516	0522	h	2.9	3.1	3.3	2	518	2146		(3.6)	3.5		2
516	0645	l	3.1	3.1	3.5	2	518	2152		(4.1)	3.5		2
516	0731	l	3.4	3.5	3.9	2	518	2154		(4.0)			w
516	1116	l	3.5	3.5	3.9	2	518	2156		(3.5)			w
516	1234	h	4.7	4.6	4.7	2	518	2157		(3.7)			w
516	1240	l	3.2	3.5	2.7	2	518	2159		(4.0)	3.1		2
516	1243	h	3.5	3.4	3.9	2	518	2200		(3.6)			w
516	1248	l	3.2	3.0	3.6	2	518	2205		(3.5)			w
516	1256	l	2.9	3.0	3.6	2	518	2205		(3.8)	3.4		2
516	1328	h	3.9	3.8	4.1	2	518	2211		(3.8)	3.1		2
516	1406	l	3.0	2.9	3.5	2	518	2213		(3.9)	3.2		2
516	1423	h	4.0	4.1	4.3	2	518	2216		(3.5)			w
516	1521	l	3.0	2.9	3.5	2	518	2218		(4.1)	3.5		2
516	1604	l	3.0		3.4	w	518	2227		(4.1)	3.4		2
516	1618	l	3.8	3.7	4.1	2	518	2228		(3.7)			w
516	2038	h	3.4	3.7	3.8	2	518	2235		(4.2)	3.7		2
517	0000	l	3.2	3.3	3.7	2	518	2237		(4.0)	3.8		2
517	0003	h	3.5	3.3	3.6	2	518	2238		(4.1)	3.9		2
517	0121	l	3.2	3.0	3.5	2	518	2248		(4.2)	3.9		2
517	0143	l	3.2	3.0	3.5	2	518	2249		(4.2)	3.9		2
517	0237	l	3.2	3.3	3.7	2	518	2250		(4.3)	3.8		2
517	0504	l	3.2	3.5	3.5	2	518	2254		(4.5)	4.1		2
517	0533	l	3.3	3.4	3.7	2	518	2256				3.3	w
517	0806	h	3.6	3.5	3.9	2	518	2259		(4.2)	3.8		2
517	0832	l	3.9	4.1	4.2	2	518	2300		(4.0)	3.4		2
517	1158	l	3.4	3.3	3.7	2	518	2303		(4.0)	3.4		2
517	1340		3.1	2.8	3.0	2	518	2306		(3.9)			w
517	1402		3.1	3.0	3.3	2	518	2307		(4.3)	3.6		2
517	1557		3.5	3.4	3.9	2	518	2309		(4.1)	3.4		2
517	1600		3.3	3.1	3.5	2	518	2314		(4.1)	3.4		2
517	1929		3.6	3.7	3.9	2	518	2316		(3.6)	3.1		2
517	1930		3.6	3.5	3.9	2	518	2323		(3.8)	3.1		2
517	2137		3.2	3.2	3.6	2	518	2326		(3.6)			w
517	2143		3.9	4.0	4.3	2	518	2354			3.7	3.2	2
517	2244		3.2	3.2	3.5	2	519	0017				3.0	w
517	2308		3.1	3.0	3.5	2	519	0018		(4.0)	3.3		2
517	2336		3.2	3.0	3.6	2	519	0052		3.4		3.2	w
518	0152		3.7	3.8	4.1	2	519	0054		3.0	3.1	3.3	2
518	0252		3.2	3.0	3.8	2	519	0055			3.0		M
518	0621		3.7	3.8	3.0	2	519	0059		3.6	3.5	3.5	2
518	0833		3.3		3.5	w	519	0133		3.5	3.3	3.4	2
518	0846		3.5	3.6	3.9	2	519	0719		3.8	3.7	3.7	2
518	1132		3.4		3.8	w	519	0740		3.0	3.0	3.1	2
518	1404		3.2	3.0	3.5	2	519	1422		3.7	3.7	3.4	2
518	1437		3.6	3.7	4.1	2	521	1603		3.3		3.6	w
518	1533		5.0	5.0	5.7	2	521	2226		3.1	2.9	3.2	2