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ABSTRACT

This report is a seismicity study of the Pacific Northwest region of the United States; it covers the period between November 1961 and August 1965. During the study, 326 epicenters (SDL events) were located by visual analysis of film records of short-period seismic data. Magnitudes for these events ranged from 1.5 to 4.2 and were computed with a method that utilized vertical component L_g motion. This method was shown to be compatible with body-wave magnitudes.

These SDL events were in addition to the 302 events in the area of interest, ranging in body-wave magnitude from 3.0 to 6.5, compiled from the National Earthquake Information Service (NEIS) epicenter list. A plot of the 326 events generally shows the same geographic distribution as the plot of the NEIS events, except in Oregon where most of the SDL events were located in the historically quiet SE quadrant of the state. Considerably more events were located in Washington and Oregon than appeared on the NEIS plot, suggesting that the area of interest is far more active than traditionally thought.

Geotech recommends that the Corps of Engineers refine locations, develop single-station location techniques, develop travel-time tables for the region, and investigate depth determinations.

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I. INTRODUCTION

1.1 Subject

This report presents results from the analysis and interpretation of microseismicity data recorded within the North Pacific Division (NPD) between November 1961 and August 1965. The area of interest (AI) within the NPD is bordered by the 110° and 125° West Longitudes and 42° and 49° North Latitudes.

The seismic data examined were recorded on film at Long Range Seismic Measurements (LRSM) stations located in the Western United States (WUS) and at two seismological observatories - Blue Mountain Seismological Observatory (BMSO) located in eastern Oregon and Uinta Basin Seismological Observatory (UBSO) located in northeastern Utah. Also presented is a list of epicenters which were located within the AI by the National Earthquake Information Service (NEIS), United States Geological Survey (USGS), Department of the Interior.

1.2 Recording Sites and Instrumentation

The LRSM stations and seismological observatories were operated under sponsorship of the Advanced Research Projects Agency, Project VELA-UNIFORM, of the Department of Defense. The operational parameters at these stations were closely monitored, ensuring high quality, uniform records. Careful seismometer installation enhanced the quality resulting in recording magnifications that were generally quite high - seldom under 200,000. The LRSM stations used short-period Benioff instruments, and the observatories used short-period Johnson-Matheson instruments. All recording systems had peak response at about 3 hertz. Table I gives the locations of the recording sites used in this study and Figure 1 is a plot of these sites. Not all of these stations were operational at the same time; some were temporary installations and operated for only a few weeks. In general, only from three to six of these stations were recording at any one time, but never less than three stations recorded the located events.

TABLE I

Stations Used in Seismicity Study.

Station Coordinates

Station	Latitude (Deg)	Longitude (Deg)	Elevation (Meters)
MUWA	48.928N	121.910W	732
CEWA	48.522N	121.687W	274
TKWA	48.794N	119.587W	549
GCWA	48.162N	121.282W	671
ELWA	46.924N	120.730W	975
YAWA	46.511N	119.920W	610
PTOR	45.611N	118.884W	411
PKOR	45.317N	118.909W	1036
SROR	44.940N	117.427W	1341
BMO	44.849N	117.305W	1189
VTOR	43.114N	118.414W	1341
GIMA	47.193N	104.219W	732
FRMA	46.111N	106.440W	823
HYMA	45.973N	107.081W	975
HLID	43.647N	114.250W	1890
HKWY	41.696N	104.357W	1494
PMWY	41.207N	105.361W	2469
PIWY	42.453N	109.548W	2170
DRCO	37.465N	107.794W	2225
VNUT	40.509N	109.579W	1768
UBO	40.322N	109.568W	1596
FMUT	39.218N	111.207W	1890
WWUT	38.514N	113.589W	1829
MNNV	38.436N	118.148W	1524
SZNV	39.204N	113.380W	1606
ATNV	39.481N	11[illegible].074W	1981
EKNV	39.209N	11[illegible].710W	1951
WINV	41.351N	117.458W	1524
MVCL	39.213N	121.203W	183

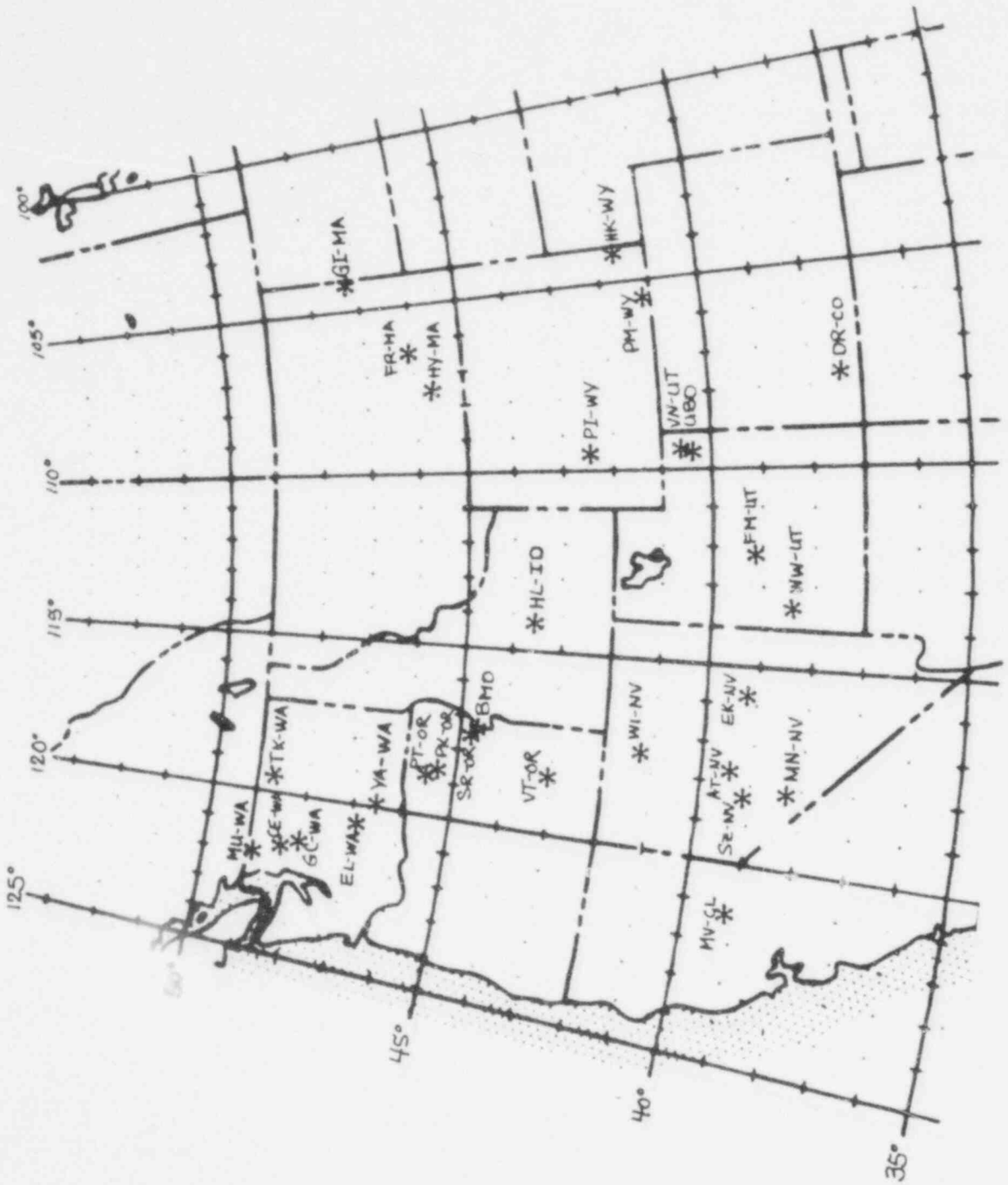

Figure 1. Recording stations.

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II. PROCEDURES

2.1 Analysis

All short-period vertical data available from the stations listed in Table I were reviewed for each day in the study period. In cases where the vertical trace was unavailable, we used one of the horizontal traces. A preliminary epicenter and origin time was determined by triangulation, using appropriate body-wave to surface-wave (L_g) intervals, for events with at least three correlated arrival times. Phase arrival times, periods, and amplitudes were measured for first P arrival, significant subsequent P phases, discernible S phases, and the L_g train (period and amplitude of maximum ground motion cycle).

Events recorded at only one or two stations were noted by date and time and their frequency of occurrence (tabulated in Table II). Note that the intensive activity recorded for the months of September and October 1963, resulted from the nearly 2000 events recorded at HLID, associated with an epicenter located approximately 53 km NW of the station. These events comprise the only "swarm" of events associated with a known epicenter encountered throughout this study. The NEIS located more than seventy-five larger events in the same area. Another 350 single-station events, recorded at HLID, were associated with epicenters located approximately two degrees east of the station in eastern Idaho, and they occurred consistently throughout the study period - not in swarms. Again, the NEIS also reported several events in that area.

2.2 Locations

The preliminary epicenter parameters and phase data were input to LOCATION, a modified version (A. Chang) of a location program called LOK originally written by B. Julian (Lincoln Laboratory, 1973). The program calculates an event hypocenter by the iterative least squares of residuals method and gives reliability estimates of the hypocenter parameters. A variety of body phases can be used and four inputs are necessary to locate.

Julian, B. R., 1973, Extension of standard event location procedures; Seismic Discrimination, Seimannual Technical Summary, 30 Jun 1973, MIT Lincoln Laboratory, 409.

TABLE II

One and Two Station Events

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
						One Station Events							Totals
1961	-	-	-	-	-	-	-	-	-	-	248	336	584
1962	361	246	575	330	296	180	803	344	376	393	348	358	4610
1963	587	237	328	288	211	239	259	424	2252*	1119**	553	641	7138
1964	581	517	354	470	547	210	140	95	574	688	272	321	4769
1965	662	363	23	24	41	136	140	0	-	-	-	-	1389
													18,490
						Two Station Events							Totals
1961	-	-	-	-	-	-	-	-	-	-	2	8	10
1962	11	9	5	4	1	11	22	13	18	1	0	5	100
1963	7	8	3	2	2	0	5	8	10	13	6	4	68
1964	10	9	0	17	17	9	1	1	12	18	16	33	143
1965	11	18	1	3	2	8	40	0	-	-	-	-	83
													404

* 1419 of 2252 events were 53 km from HLID.

** 521 of 1119 events were 53 km from HLID.

If only three stations have arrival times, then two phases will be necessary from at least one station. J-B travel-time tables are used in the program and the earth model can be adjusted.

2.3 Earth Model

For this study, the earth model used in LOCATION is a synthesis of various local models determined by several investigators. The area covered by this study encompasses several geologic provinces including: the Pacific Border, Basin and Range, Cascade Mountains, Columbia Plateaus, Snake River Plain, Rocky Mountains, and part of the Great Plains province (Figure 2). The variety of the provinces complicates the crustal structure of the AI, an observation confirmed by several investigations of different regions of the AI (Herrin and Taggart, 1962; Herrin, 1969; Pakiser, 1963, 1964;

Herrin, E. and J. Taggart, 1962, Regional variations in P_n velocity and their effect on the location of epicenters; Bull. Seism. Soc. Am., 52(5), 1037-1046.

Herrin, E., 1969, Regional variations of P-wave velocity in the upper mantle beneath North America; The Earth's Crust and Upper Mantle, American Geophysical Union, Geophysical Monograph No. 13, 242-246.

Pakiser, L. C., 1963, Structure of the crust and upper mantle in the Western U.S.; Technical Letter No. 8, U. S. Department of the Interior, Geological Survey.

Pakiser, L. C., 1964, Continental crust; Technical Letter No. 20, U. S. Department of the Interior, Geological Survey.

Hill and Pakiser, 1966; Hill, 1972; Stuart et al., 1964; Dehlinger, Chiburis Collver, 1965; Healy and Warren, 1969; Asada and Aldrich, 1966; James and Steinhart, 1966; Smithson, 1978).

Hill, D. P. and L. C. Pakiser, 1966, Crustal structure between the NTS and Boise, Idaho from seismic-refraction measurements; The Earth Beneath the Continents, American Geophysical Union, 391-419.

Hill, D. P., 1972, Crustal and upper mantle structure of the Columbia Plateau from long range seismic-refraction measurements; Geological Society of America Bulletin, 83, 1639-1648.

Stuart, D., J. Roller, W. Jackson and G. Mangan, 1964, Seismic propagation paths, regional travel-times and crustal structure in the Western United States; Geophysics, 29(2), 178-187.

Dehlinger, P., E. Chiburis and M. Collver, 1965, Local travel-time curves and their geologic implications for the Pacific Northwest states; Bull. Seism. Soc. Am., 55(3), 587-607.

Healy, J. and D. Warren, 1969, Explosion seismic studies in North America; The Earth's Crust and Upper Mantle, American Geophysical Union, Geophysical Monograph# 13, 208-220.

Asada, T. and L. Aldrich, 1966, Seismic observations of explosions in Montana; The Earth Beneath the Continents, American Geophysical Union, Geophysical Monograph # 10, 382-390.

James, D and J. Steinhart, 1966, Structure beneath continents: A critical review of explosion studies 1960 - 1965; The Earth Beneath the Continents, American Geophysical Union, 2930333.

Smithson, S., 1978, Modeling continental crust: Structural and chemical constraints; Geophysical Research Letter, 5(9).

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Figure 2. Geological provinces in AI.

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TABLE III

Earth Model

Layer	Thickness (km)	P-velocity (km/sec)
1	15	6.00
2	25	6.75
Moho	-	7.95

However, most of these studies seem to support the contention that a two layer crustal model best fits available data. Table III lists our compromise model of a 40 km thick crust.

2.4 Magnitude Estimation

Because of the low levels of P wave energy recorded for many events and the resulting variance of observed first arrivals (P_n, P*, P_g), magnitudes were determined using R. G. Baker's (Baker, 1970) method. Baker developed his method using L_g phases -- maximum amplitude regardless of component -- from underground nuclear explosions conducted by the then Atomic Energy Commission at the Nevada Test Site (NTS), and recorded at LRSM stations located throughout most of the U.S.. He determined a sixth-degree polynomial to calculate amplitude-distance correction factors (Q) for surface waves. Magnitudes (M) were calculated using the L_g data and the magnitudes were found to have less scatter than body-wave magnitudes reported for the same events and stations.

To make certain that Baker's method was relevant to the study, we had to determine if: a) the method held true for a different geographical area, specifically the Pacific Northwest; and b) it applied to earthquakes, as well as explosions. To test the method, ten earthquakes with epicenters in the AI were found where the NEIS had reported a body-wave magnitude (m_b) and where the quakes were not so large that they were unreadable at the recording stations. The m_b range of these events was from 3.2 to 4.7. For the appropriate distance, Q factors were calculated using Baker's polynomial, and M was determined for each station. The maximum amplitude L_g phase was used, as measured on the short-period vertical instrument. Baker's equation is $M = \log A/T + Q + S$, where S is a station correction (residual). Station corrections were not used in this study because they were not available for all stations. The event was assigned the average of the individual station magnitudes. These L_g magnitudes were then plotted against the NEIS body-wave magnitudes (Figure 3). This plot shows a virtual 1-1 relationship between M and m_b, and it indicates that Baker's method is applicable to the Pacific Northwest area and to earthquakes as well as explosions, at least in this area and as measured on the vertical component.

Baker, R., 1970, Determining magnitude from L_g; Bull. Seism. Soc. Am., 60(6), 1907-1919.

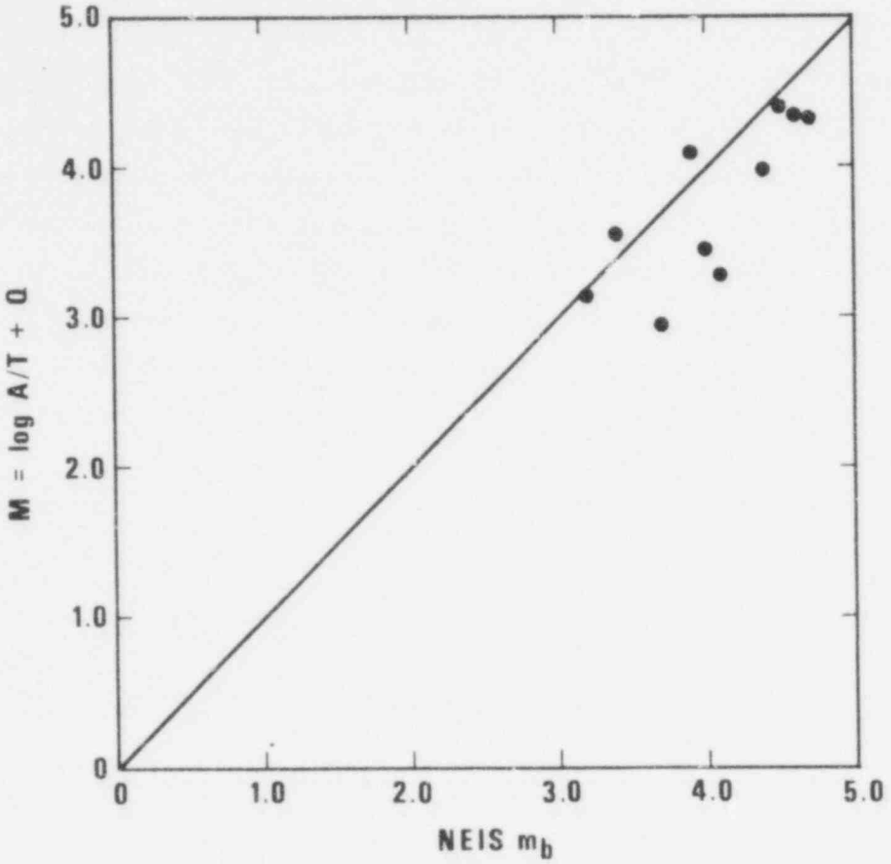

Figure 3. m_b versus M for the AI.

2.5 Reliability Estimates

The program LOCATION computes several hypocenter reliability estimates. Those listed in the event file (Appendix A) include: standard error of latitude, standard error of longitude, and standard error of depth, if depth is determined. These standard errors are all 0.95 confidence estimates. Note that these reliability estimates are based on the earth model and, consequently, their accuracy is dependent on how closely this model reflects actual conditions. Epicenter locations could be refined by regionalizing crustal and P_n velocities. LOCATION is presently being modified with an option to call the appropriate local crustal model for each station used (Chang, personal communication).

II. RESULTS

3.1 NEIS Events

The NEIS epicenter list was searched for epicenters in the AI during the time covered by this study. We found 302 epicenters; eighty of them had reported body-wave magnitudes ranging from 3.0 to 6.5. These events are included chronologically in the epicenter listing in Appendix A and they are designated as NEIS source epicenters. Figure 4 is a plot of NEIS events. The base map for this plot shows the latest USGS efforts to determine possibly active young faults in the AI (Howard et al. 1978). Figure 5 is a Marsden squares grid of the AI. The area itself (42° to 49° lat. and 110° to 125° long.) is completely enclosed by Marsden 10° square numbers 156 and 157; the Marsden 1° sub-square numbers are indicated on the grid.

Fifty percent (50%) of these epicenters are located in Idaho, twenty-five percent (25%) in Montana and fifteen percent (15%) in Wyoming. Only three events are located in Oregon; five in Washington, four along the Washington-Oregon border and one along the Oregon-Idaho border. Some of the events are located slightly outside the AI, but they are included because they might possibly be mislocated; that is, a small shift in location could place them in the AI. This is also true of the SDL events.

The NEIS events are generally of greater magnitude than events analyzed for this study. Indeed, because of the high magnification levels of the recording stations, many of the NEIS events have amplitudes sufficient to render them unreadable on the film records.

3.2 SDL Events

The record analysis performed for this study produced: 326 located events (SDL events); 404 two-station events; and 18,490 one-station events. A complete listing of located events is given in Appendix A and Figure 6 is a plot of these events on the same base map as the NEIS events.

3.2.1 Magnitudes

Events located ranged in magnitude (M) from 1.5 to 4.2. Generally, events larger than 4.0 were reported by the NEIS and were not analyzed.

Howard et al., 1978, Preliminary map of young faults, U.S., a guide to possible fault activity, Department of the Interior, U.S. Geological Survey.

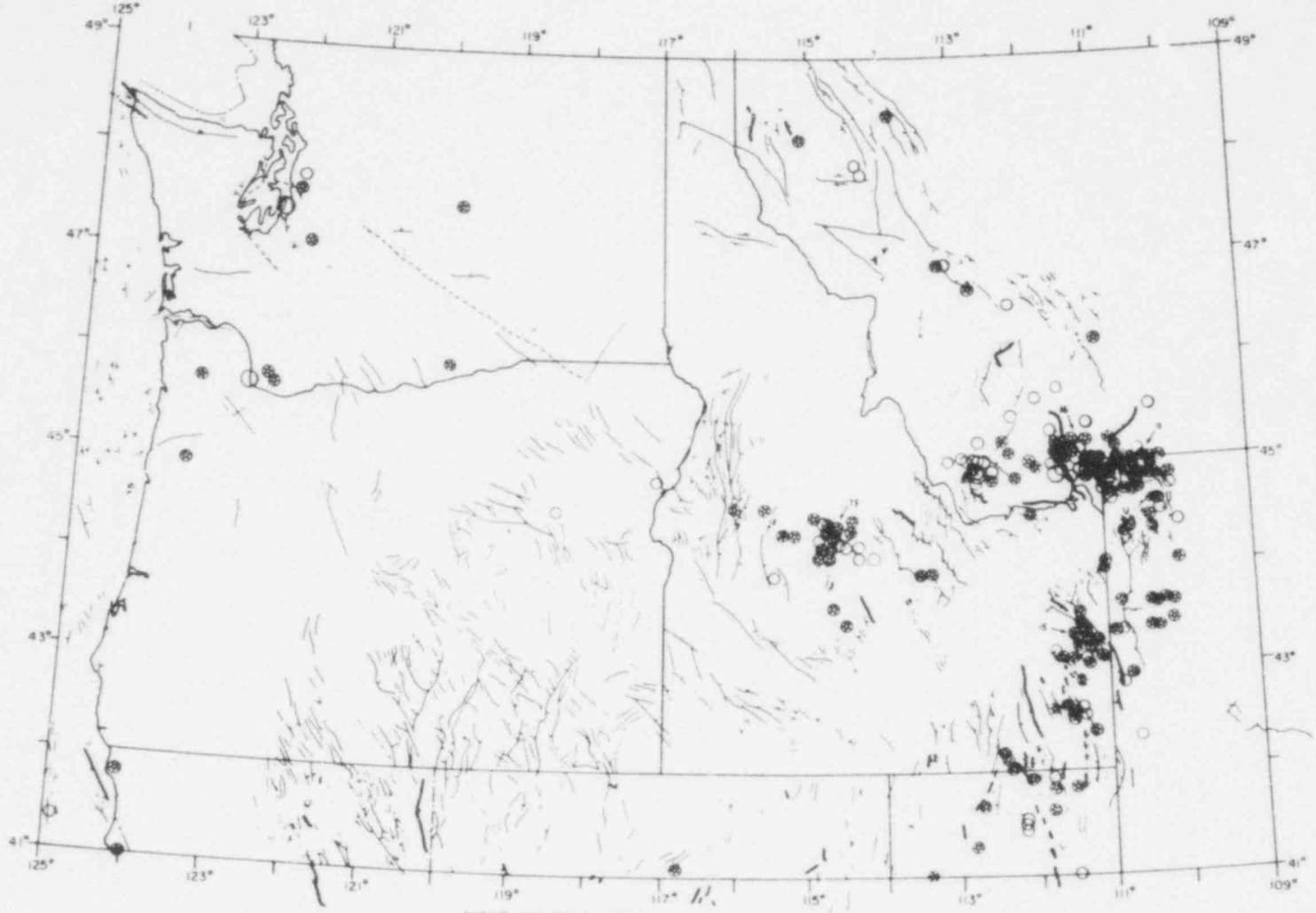

Figure 4. NEIS epicenters Nov 1961 - Aug 1965.

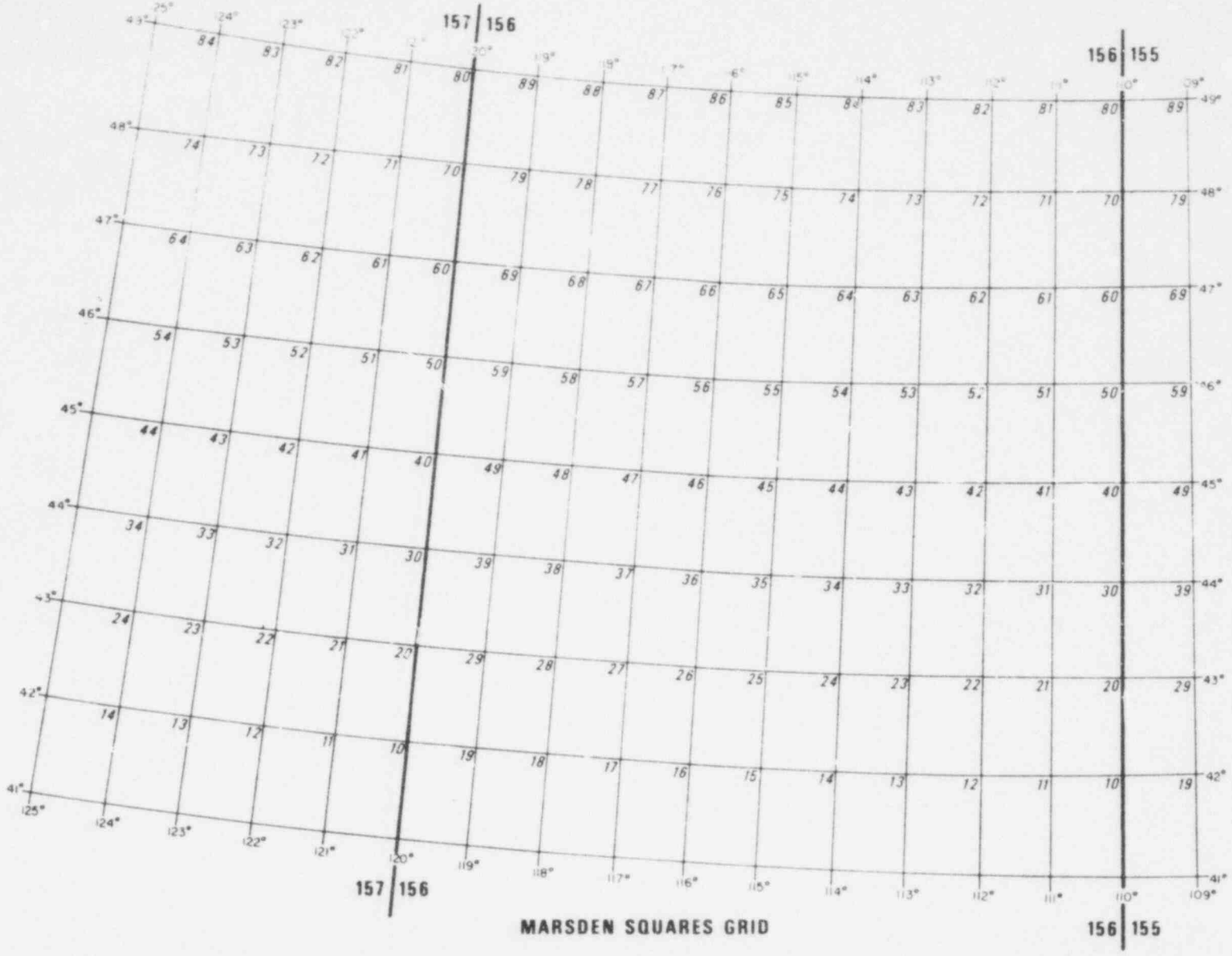

Figure 5. Marsden Squares grid.

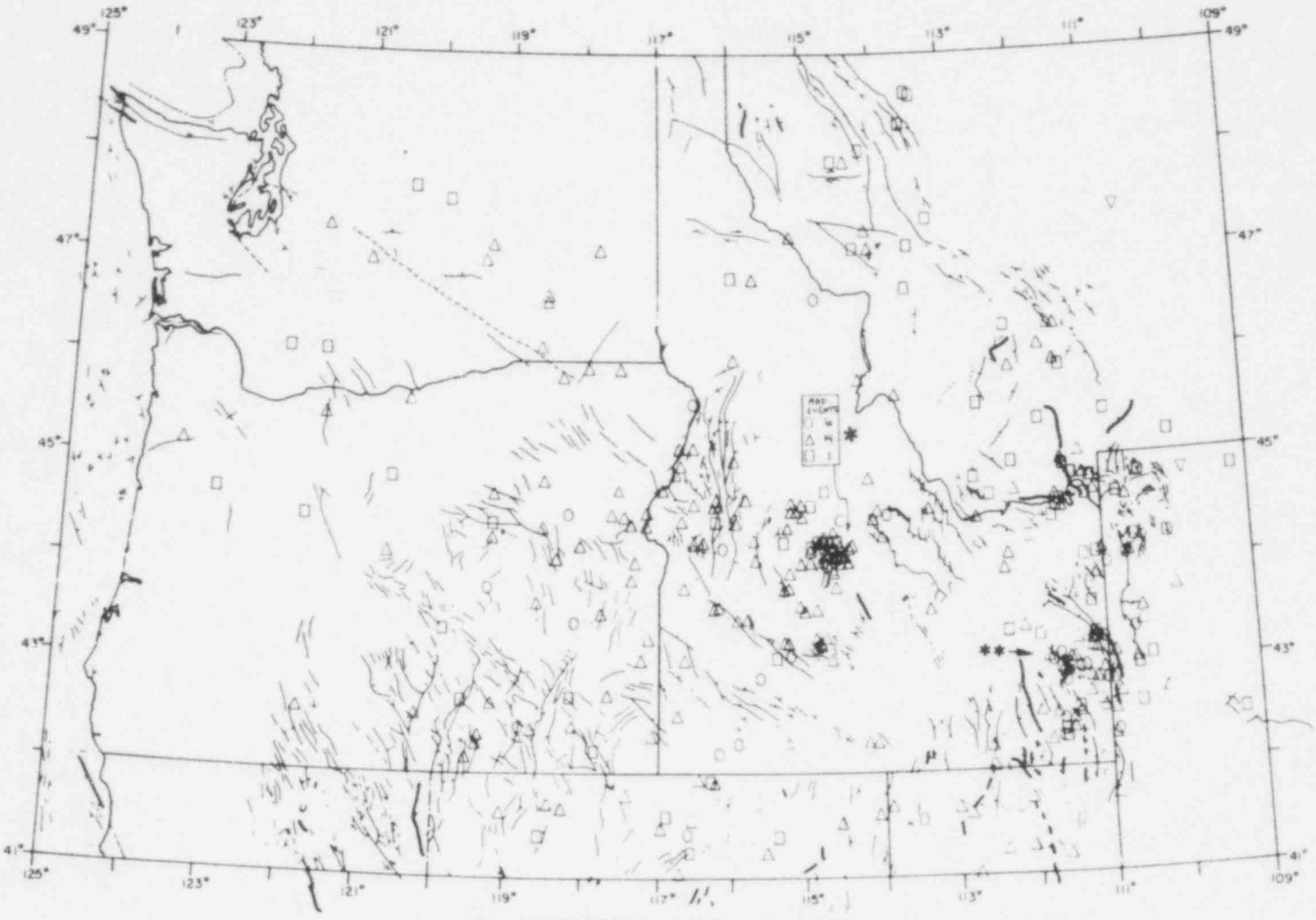

Figure 6. SDL epicenters Nov 1961 - Aug 1965.

Events of magnitude less than 1.5 were too small to be recorded at three stations and were not located. Presumably, all the two-station and one-station events are of magnitude less than 1.5. The Q factors used in computing M are tabulated in Table IV.

Note that many of the one and two-station events could be located by means other than three-station computer locations. Single-station locations can be determined by three component first motion relationships and phase intervals, but these determinations are more time consuming, especially with low magnitude events, and less accurate than computer program locations.

3.2.2 Man-Made Events

To resolve the problem posed by man-made events, letters requesting blasting information were sent to nearly one hundred of the largest mines and quarries in the AI known to have been operating during the early 1960's (Figure 7). (No letters were sent to Oregon mines because no information about Oregon mines could be found.) Generally, all who responded indicated that blasting activity was light, occurred mostly during day-shift hours Monday through Saturday, and that the blasts were small. We searched for specific blasts reported to us but with no success. (Another motivation in requesting this information was finding large blasts that were recorded at all stations and thus could be used as "calibration" shots for crustal modeling. All shots reported were far too small for this.) Because of the responses we decided to tabulate events by day and hour for three different times of year to determine if any patterns of activity emerged. The fall of 1962 and the winter and summer of 1963, were chosen as time frames. The years were arbitrarily chosen, but the times of the year were deliberately chosen as those most likely to show seasonal variations in activity. Tables V, VI and VII are tabulations of SDL located events found during the different time periods. The responses to our letter suggested that man-made events should cluster during daylight hours, except on Sundays. These tables give no indication of any such clustering. Table VIII is a similar tabulation of all SDL events located during this study. This table also gives no indication of any temporal grouping. Tables IX through XVII are tabulated for all events -- located and unlocated -- for the same three time periods recorded at HLID, WINV and PTOR. These tables should reflect any significant man-caused activity in the vicinity of the stations. The HLID fall and summer data (Tables IX

TABLE IV

Q (L_g) Amplitude-Distance Correction Factors

km	Q	km	Q	km	Q
50	.189	360	1.636	670	2.380
60	.251	370	1.669	680	2.396
70	.311	380	1.701	690	2.412
80	.371	390	1.733	700	2.428
90	.430	400	1.763	710	2.443
100	.488	410	1.794	720	2.458
110	.544	420	1.823	730	2.472
120	.599	430	1.852	740	2.487
130	.653	440	1.880	750	2.500
140	.706	450	1.908	760	2.514
150	.758	460	1.935	770	2.527
160	.809	470	1.961	780	2.540
170	.859	480	1.987	790	2.552
180	.908	490	2.012	800	2.565
190	.956	500	2.037	810	2.577
200	1.003	510	2.061	820	2.588
210	1.049	520	2.084	850	2.622
220	1.094	530	2.107	900	2.673
230	1.138	540	2.130	950	2.718
240	1.187	550	2.152	1000	2.758
250	1.224	560	2.174	1050	2.794
260	1.266	570	2.195	1100	2.827
270	1.306	580	2.215	1150	2.856
280	1.346	590	2.235	1200	2.882
290	1.385	600	2.255	1250	2.906
300	1.423	610	2.274	1300	2.929
310	1.461	620	2.293	1350	2.949
320	1.497	630	2.311	1400	2.969
330	1.533	640	2.329	1450	2.987
340	1.568	650	2.346	1500	3.005
350	1.603	660	2.363		

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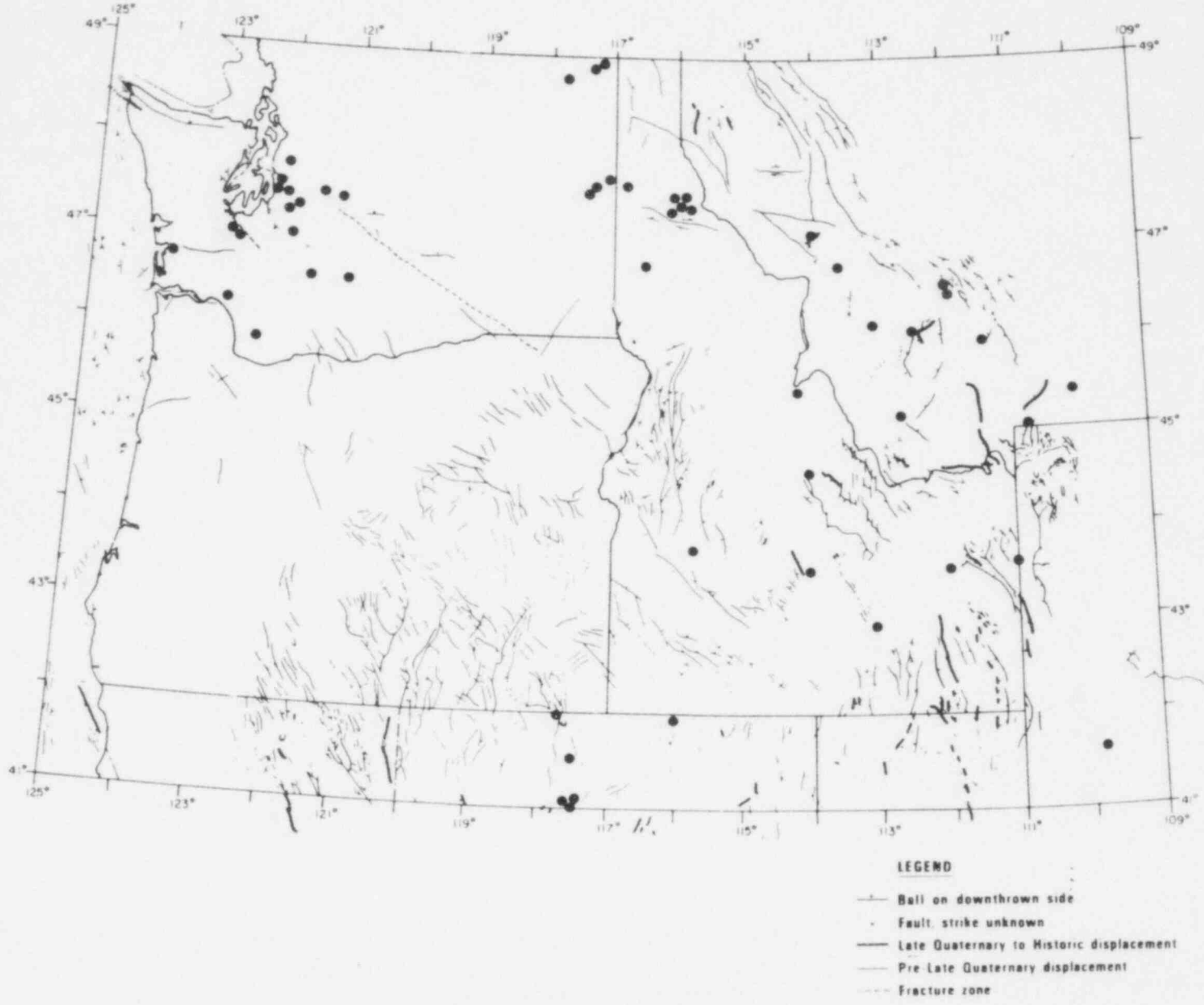

Figure 7. Some mine/quarry sites active during Nov 1961 - Aug 1965.

TABLE V

Located SDL Events

30 Sep - 31 Dec 1962

Time GMT	Time Local	Number of Events Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total
00	04/05*								
01	PM				1				1
02							1		1
03									
04						1			1
05									
06				1	2			2	5
07				1					1
08				1					1
09									
10									
11			1	1	1				3
12							1		1
13						1	1		2
14			1		1		1		3
15	07/08*							1	1
16	AM		1	2					3
17			1						1
18					1				1
19									
20					1		1		2
21				2	1				3
22			1		1		1	1	4
23			1		1				2
Total			6	8	10	2	6	4	36

* Two Time Zones

TABLE VI

Located SDL Events

26 Jan - 10 Mar 1963

Time GMT	Time Local	Number of Events Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total
00	04/05*							1	1
01	PM			2			1	2	5
02									
03									
04		1							1
05									
06									
07									
08									
09									
10				1	1			1	3
11									
12									
13								1	1
14									
15	07/08*								
16	AM								
17								2	2
18									
19									
20					1				1
21									
22									
23								2	2
Total		1		3	2		1	9	16

* Two Time Zones

TABLE VII

Located SDL Events

01 Jun - 24 Aug 1963

Time GMT	Time Local	Number of Events Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total
00	04/05*								
01	PM							1	1
02							1	2	3
03									
04									
05								1	1
06									
07				1					1
08						1			1
09									
10									
11								1	1
12									
13		1		1			1		3
14							1	1	2
15	07/08*				1		1		2
16	AM	1							1
17									
18									
19									
20									
21							1		1
22									
23					1		1		2
Total		2		2	2	1	6	6	19

* Two Time Zones

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TABLE VIII

Located SDL Events

01 Nov 1961 - 31 Aug 1965

Time GMT	Time Local	Number of Events Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total
00	04/05*			2	2			2	6
01	PM	1		2	1		1	3	8
02			1	1	1	3	3	3	12
03		2	5	2	4	2		1	16
04		4	3			3	4	3	17
05		6	2	6			2	4	20
06		1	2	2	3		2	6	16
07		9	1	3		4	3		20
08		4	1	3	4	2	1	3	18
09		1	1	2				1	5
10				1	5	1	1	2	10
11		3	4	6	2	3	3	4	25
12		1		2	1		3	2	9
13		2		2	3	4	2	3	16
14		2	1	1	2	1	2	1	10
15	07/08*		1	2	2	1	1	7	14
16	AM	3	1	3		3		1	11
17		1	3	1	2		2	3	12
18			3	2	2	1	2		10
19		1		1	1		2	2	7
20			1	5	3	1	2	1	13
21			2	4	3	3	3	4	19
22		1	2	1	3		3	2	12
23			3	3	3	3	3	5	20
Total		42	37	57	47	35	45	63	326

* Two Time Zones

TABLE IX

All SDL Events at HLID

30 Sep - 31 Dec 1962

Time GMT	Time Local	Number of Events Mon	Tue	Wed	Tnu	Fri	Sat	Sun	Total
00	05	5	1	3	1	5	1	2	18
01	PM	3	2	3	1	2	3	6	20
02		4	1	2	1		7	9	24
03		2	1	5	8		3	6	25
04		7	5	7	5	2	2	2	30
05		4		5	6	1	4	6	26
06		2	3	6	3	3	5	11	33
07		2	4	3	2	5	3	3	22
08		6	3	3	2	2	2	6	24
09		4	8	2	5	1	8	7	35
10		3	2	1	1	4	5	4	20
11		4	2	4	4	1	4	6	25
12		4	3	3	1	1	2	6	20
13		1	3	1	2	2	4	4	17
14	07	4	2	4	2	1	5	3	21
15	AM	5	2	1	3	1	1	8	21
16		4	6	7	3		1	1	22
17		2	7	6	3	6	2	5	31
18		3	2	3	13	6	2	5	34
19		20	13	15	21	15	18	2	104
20		5	4	3	9	3	4	7	35
21		3	11	14	10	14	12	3	67
22		15	18	14	8	9	10	3	77
23		6	5	3	8	10	5	1	38
Total		118	108	118	122	94	113	116	789

TABLE X

All SDL Events at HLID

26 Jan - 10 Mar 1963

Time GMT	Local	Number of Events Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total
00	05	1	3	3	1	1	4	3	16
01	PM		6	3	2		1	4	16
02		4	1	2	2			2	11
03		4	1		1	2	2	1	11
04		2	1		1	1	1	3	9
05		5	1	2	2		3	2	15
06		3	6		2	3	2	1	17
07		2	7	1					10
08		2	3	2	6	2	2	1	18
09		1	5		1	1	1	2	11
10		3	2	5	1	2		4	17
11		3	3		1		3	1	11
12		2	3			2	2	3	12
13		1	2	3	5	2		3	16
14	07	1	2	4		3	2		12
15	AM	1	3		1	2	1	8	16
16		2	3			4	2	3	14
17		3	4	1	1	5	2	11	27
18		3		2		5	4	1	15
19		2	3	1	5	2		3	16
20			3	1	1		3	1	9
21		1	3	4	2	1	3	1	15
22		1	1	2		1	5	3	13
23		2	2	1	2	2	1		10
Total		49	68	37	37	41	44	61	337

TABLE XI

All SDL Events at HLID

01 Jun - 24 Aug 1963

Time GMT	Time Local	Number of Events Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total
00	05	1	3	6	2	4	4	4	24
01	PM	2	2	2	4	2	3	3	18
02		2	1	1	1	2	4	5	16
03		3	1	4	2	2	4	1	17
04		1	5	3				1	10
05		2	3	2	3	3		2	15
06		6	1	2	5	1	2	1	18
07		5	2	1	2	3	7	4	24
08		5		1		2		3	11
09		4	1	5	2	3	2	1	18
10		1	2	8	1	2	2	3	19
11		3	3	4	1	1	3	8	23
12		3	1	3	1	2	1	10	21
13		3		4	2	3	2	1	15
14	07	2		4	3	3	5	3	20
15	AM		3	4	5	8	8	1	29
16		3	1	1	4	4	1	1	15
17		8		8	4	3	5	3	31
18		10	7	14	9	8	4	1	53
19		4	5	8	5	6	5	2	35
20		10	5	8	10	8	11	1	53
21		12	14	14	13	7	21	2	83
22		3	3	10	9	3	6	3	37
23		6		2	4	5	6	3	26
Total		99	63	119	92	85	106	67	631

TABLE XII

All SDL Events at WINV

30 Sep - 31 Dec 1962

Time GMT	Time Local	Number of Events Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total
00	04	5	2		1	3			11
01	PM	2	3			1	1	1	8
02		1		1			1	1	5
03		1	1	3		2	1	5	13
04		1		3				2	6
05			1	1	2			1	5
06		1	2	2	2			2	9
07		2	2	3	5	1	1	2	16
08		3	1	3	4	1	3	1	16
09		1	2			1	2	2	8
10				1	1	2		2	6
11		2	2	1	2	1	2	2	12
12		3	2		2	1	1		9
13		1	2	1			1	2	7
14		3	2	1	1	2		1	10
15	07	3	1	1	2		2	1	10
16	AM	2	2	3	3	1	2		13
17		2	2	2	3	1	2		12
18		2	1	1	5	1	3		13
19		2			4	2	3	1	12
20				6	2	3	3	1	15
21			1	2	1	1	2	2	9
22		3	2	4	4	1	10	3	27
23		2	1	4	1	1	3	4	16
Total		42	32	43	45	26	44	36	268

774141

TABLE XIII

All SDL Events at WINV

26 Jan - 10 Mar 1963

Time GMT	Time Local	Number of Events Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total
00	04						1	2	3
01	PM		2			3	1	2	8
02						1		1	2
03		1		1					2
04		2					1		3
05				1			1	1	3
06		2	1			1	1		5
07		1	1						2
08		2			1	1			4
09		1			1		2		4
10			1	1	1		1		4
11		1	1	1				2	5
12		1				1	3		5
13						1		2	3
14		2					1		3
15	07		1		1	1	1	2	6
16	AM		1			1	1	1	4
17					1			4	5
18		1	1		1	1	1		5
19					2	2			4
20		1	2		1	1		1	6
21		2	1	1	3	3	1		11
22			1		2		4		7
23				1	1	2		2	6
Total		17	13	6	15	19	20	20	110

TABLE XIV

All SDL Events at WINV

01 Jun - 24 Aug 1963

Time GMT	Time Local	Number of Events Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total
00	04	2	1	2	2	3		1	11
01	PM	2	1	2	1		2	5	13
02		2	1		1	1	1	1	7
03		2		1	1	4	2	1	11
04		1		1	4	1		1	8
05			2		2		1	2	7
06					2		1	1	4
07			2	1	3			2	8
08			3	2	4		6		15
09						1	1	1	3
10					2	2	5		9
11		1	1		4		2	1	9
12		2	1	2	2		1		8
13		1	1	2		1	2		7
14			2	1	2	1	3	1	10
15	07		2	2	4	7	2	1	18
16	AM	1	1	3	3	4	3		15
17			1	2		1	1		5
18		2		5		2	5	1	15
19		2	1	2	3	2	1	2	13
20		3	1		1				5
21		1		2	2		3		8
22		3	2	2	2	5	3	2	19
23		1	3	4	3	8	4		23
Total		26	26	36	48	43	49	23	251

774143

TABLE XV

All SDL Events at PTOR

30 Sep - 31 Dec 1962

Time GMT	Time Local	Number of Events Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total
00	04	1	1	4	2	2			10
01	PM				1			2	3
02		1		1			1	1	4
03			1						1
04				2		1			3
05		1							1
06				1					1
07						1			1
08				1				1	2
09			1	1			1	1	4
10						2		1	3
11				1					1
12							1		1
13			1			1			2
14			1			1	1	1	4
15	07				1			1	2
16	AM				2				2
17			2				3		5
18				1	3				4
19				1	1	1			3
20			1	1	1				3
21				4		1		1	6
22		1	2	2			1	2	8
23			3	2	2		1	1	9
Total		4	13	22	13	10	9	12	83

TABLE XVI

All SDL Events at PTOR

26 Jan - 10 Mar 1963

Time GMT	Time Local	Number of Events Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total
00	04	1	6	2	1	1	1		12
01	PM		2	5		2	2	1	12
02					1				1
03		1							1
04							1		1
05				1					1
06		1	1						2
07			1						1
08						1			1
09									
10									
11									
12				1					1
13								1	1
14					1				1
15	07					2		3	5
16	AM					2			2
17			1			1	1	1	4
18				1	1		1	1	4
19						3	1		4
20			1	1	1	1	1		5
21		1	1						2
22			1		1		1		3
23		1			1	2		1	5
Total		5	14	11	7	15	9	8	69

TABLE XVII

All SDL Events at PTOR

01 Jun - 24 Aug 1963

Time GMT	Time Local	Number of Events Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total
00	04		1	2	1		2		6
01	PM								
02									
03									
04					1				1
05									
06									
07		1		1					2
08				1		2			3
09									
10									
11								1	1
12						1			1
13									
14					1				1
15	07			1		1	1		3
16	AM								
17									
18				2		1	1		4
19									
20			2	2		1			5
21		1			1	3			5
22			3	4	2	2			11
23		4	3	3	3	1	1		15
Total		6	9	16	9	12	5	1	58

and XI) clearly show a majority of events occurring during day-shift hours (1400 GMT is 7 AM local time), but no significant daily variation. The HLID winter data (Table X) show no hourly or daily pattern either. Thus, the HLID data definitely fit the blasting pattern expected, which indicates localized mine or quarry activity. Indeed, much of the single-station activity at HLID is typical of mining activity, showing identical phase characteristics, narrow magnitude range, and consistent station to epicenter azimuths and distances. The WINV data, roughly one-third the events at HLID for comparable time periods, are less conclusive than the HLID data. All three time period tables (Tables XII, XIII, and XIV) give some tentative indication of more activity during the day-shift hours (1500 GMT is 7 AM local time), but again no daily variation. The data clearly show that mining activity in the vicinity of WINV is probably considerably less than around HLID. The PTOR data, while fewer than the WINV data, reveal a more positive indication of greater daylight and weekday activity. This is true for all three seasons considered (Tables XV, XVI and XVII). The data indicate significant mining and quarry activity in the vicinity of the station.

Because the activity patterns of the individual stations show some fit to the blasting model, while the located events pattern shows no fit, very few, if any, located events seem man-made. The considerable distance between recording stations provides further evidence for this observation. For example, the distance from HLID to PTOR was 3.8 degrees, HLID to WINV was 3.3 degrees and PTOR to WINV 4.4 degrees. A sizeable blast would be required before it would be recorded by these three widely separated stations. The largest blast reported in reply to the blasting information request was a shot of 4400 lbs. in western Washington. All film records were examined for this shot with no results. All other reported blasts were an order of magnitude smaller than this one. Therefore, the probability is extremely low that any of the SDL events were man-made.

IV. CONCLUSIONS

Figures 4 and 6 show that the SDL events reproduce the pattern of the NEIS events; that is, a parabolic arc with the apex of the curve at Yellowstone Park and the arms extending west into central Idaho and south into southern Idaho. This effectively doubles the magnitude range of events located on this arc as many of these SDL events have magnitudes less than 2.0.

Many more SDL events were located in Oregon and Washington than were located there by the NEIS. While the Oregon events reflect no pattern, all are located on or near indicated faults (Figure 6). Historically, (Berg and Baker, 1963; Lawrence, 1976) Oregon earthquakes tend to cluster in the NE, NW, and SW quadrants of the state. Most SDL Oregon epicenters occur in the SE quadrant of the state and they are of lower magnitude than the historical quakes (the lowest magnitude historical quake reported is a 4.2). The Washington, Idaho, Montana and Wyoming events follow historical patterns. Six of the Washington events are located on a line parallel to but displaced about 100 kilometers north of a large fracture zone running NW-SE through the center of the state (Figure 6). The western Montana events seem to follow the faulting indicated on the map (Figure 6) and the Wyoming events are associated with the Yellowstone Park area.

Although it is difficult to be site-specific in a study such as this, two areas were specifically checked as requested by the Portland District. The first area surrounded the Libby and Rereg Dams in NW Montana; no SDL events were located in their vicinity. The second site of interest was an area of the Flathead Reservation, again in NW Montana, and the closest SDL events to it are approximately 0.5 degrees to the north and to the south of the area.

Berg, J. and C. Baker, 1963, Oregon earthquakes, 1841 through 1958, Bull. Seism. Soc. Am., 53(1), 95-108.

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V. RECOMMENDATIONS

5.1 Refined Locations

Refined epicenters for located events could be achieved by the regionalization of crustal and P_n velocity models. As previously mentioned, modifications are underway on program LOCATION to permit the use of individual models, one for each station input to the program.

5.2 Single-Station Locations

Large events can be located with a single station using the first motions determined from three-component instruments to determine azimuth, and phase intervals to determine distance. The number of the double and single-station events that can be located with this method and the limits of the method's magnitude range could be determined. In many instances L_g surface waves are also suitable to determine azimuth.

5.3 Regional Travel-Time Tables

Using available phase data regional travel-time tables could be developed for the AI. This development could be carried on in conjunction with 5.1, epicenter refinement.

5.4 Depth Estimates

A rigorous investigation of the phase data could be made to develop techniques for determining depths for regional events recorded at only a few stations.

5.5 Phase Attenuation

We recommend an investigation of phase attenuation rates for body and surface waves. During the analysis evidence emerged of considerable attenuation of P_n recorded at WINV, especially from events occurring NE of the station. For large NEIS events, the observed P_n phases were very small relative to the following P phases (P^*, P_g). For small events the P_n phase could not be seen at all. There were indications that this attenuation was also occurring at some of the other stations, but not as extensively.

SUMMARY

This report presents the results of work done under contract DACW-57-78-C-0091, which required the contractor to review and to compile available seismicity records for the period from 1961 to 1965 for the area bounded by 42° and 49° North Latitudes and 110° and 125° West Longitudes. The seismic data was analyzed by visually scanning film recordings of the short-period instruments that operated at various sites located in and around the area of interest. The records were made at Long Range Seismic Measurements (LRSM) stations and at two seismological observatories, all operated under sponsorship of the Advanced Research Projects Agency, Project VELA-UNIFORM, Department of Defense. All operating aspects of these stations were closely monitored so that the records were uniform and of high quality.

Within the time period covered by the investigation, the National Earthquake Information Center reported 302 events with magnitudes 3.0 to 6.5. As a result of our analysis, 326 previously unreported events were found to have occurred within this area. These "SDL" events were recorded at three or more stations and none were thought to be man-made.

During the data analysis, signals for 404 two-station events and 18,490 one-station events were detected, but not located. One swarm of events occurred during the period analyzed. Approximately 2000 small events recorded at HLID, a station near Hailey, Idaho, during the months of September and October 1963 were associated with a cluster of epicenters located in central Idaho. Another 350 of the small events recorded at HLID throughout the study period were associated with a cluster of located events in eastern Idaho.

The SDL events were located using a computer program that calculates hypocenters with the iterative least-squares of residuals methods, which gives 0.95 confidence of reliability estimates for hypocenter parameters. The earth model used in the program is a synthesis of various local models determined by several investigators throughout the area. It is a three-layer model: 1) the top crustal layer 15 kilometers thick with a P-velocity of 6.0 km/sec; 2) the second crustal layer 25 kilometers thick with a P-velocity of 6.75 km/sec; and 3) the upper mantle with a P-velocity of 7.95 km/sec. Magnitudes were estimated using a surface-wave (L_g) scheme shown to be compatible with body-wave magnitudes, at least in the area of interest. While the SDL events range in

magnitude from 1.5 to 4.2, the NEIS events range from 3.0 to 6.5. The two sets of events are plotted; the SDL events show the same geographic distribution as the NEIS events, except that most of the SDL events located in Oregon occur in the historically quiet SE quadrant of the state. Considerably more events were located in Washington and Oregon than shown on the NEIS plot. The results of the study show that the area of interest is much more active than traditionally thought.

Recommendations are made: to refine locations; to develop single-station location techniques; to develop travel-time tables for the region; and to investigate methods of depth determination.

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APPENDIX A

Epicenter List

Nov 1961 - Aug 1965

This Appendix presents a list of all events (NEIS and SDL) located as a result of this seismicity study. Epicenters and other event parameters are presented and defined as follows:

DATE	- Day Month Year of event
O. T.	- Computed Origin Time, G.M.T.
GEO AREA	- General Geographic Location of Epicenter
MAR SQ	- Marsden Squares Numbers. First number is 10° square. Second number is 1° sub-square.
LAT (DEG) +/-	- Latitude and 0.95 estimated error in degrees.
LONG (DEG) +/-	- Longitude and 0.95 estimated error in degrees.
DEPTH (KM) +/-	- Computed depth and 0.95 estimated error in kilometers.
MB	- Body-wave magnitude (NEIS events only)
M	- Surface-wave (L_g) magnitude (SDL events only)
SOURCE	- Source of epicenter (NEIS or SDL)

NOTE: A value of zero for NEIS events indicates data not available. A value of zero for SDL events indicates insufficient data to determine.

DATE	O.T.	GEO AREA	MAP SQ	LAT(DEG)	+/-	LONG(DEG)	+/-	DEPTH(KM)	+/-	MB	M	SOURCE
05NOV61	95308.2	MONTANA	156-50	45.00N	0.0	111.00W	0.0	25.0	0.0	0.0	0.0	NEIS
07NOV61	12908.4	WA-OR BORD	157-52	45.70N	0.0	122.40W	0.0	33.0	0.0	0.0	0.0	NEIS
25NOV61	110820.6	E IDAHO	156-32	43.32N	0.03	112.10W	0.02	0.0	0.0	0.0	2.8	SDL
01DEC61	215630.7	SE IDAHO	156-32	43.37N	0.02	112.36W	0.02	0.0	0.0	0.0	3.5	SDL
10DEC61	42005.8	W WYOMING	156-20	42.95N	0.02	110.93W	0.02	0.0	0.0	0.0	2.6	SDL
23DEC61	65336.5	HEBGEN LK	156-41	44.90N	0.0	111.20W	0.0	23.0	0.0	0.0	0.0	NEIS
19JAN62	23139.8	ID-MA BORD	156-42	44.49N	0.04	111.60W	0.04	0.0	0.0	0.0	3.1	SDL
28JAN62	114058.0	E IDAHO	156-42	44.80N	0.0	112.50W	0.0	39.0	0.0	0.0	0.0	NEIS
28JAN62	151440.0	E IDAHO	156-43	44.34N	0.07	113.99W	0.12	0.0	0.0	0.0	2.3	SDL
31JAN62	155647.0	SE OREGON	156-28	42.73N	0.01	118.15W	0.03	4.3	2.2	0.0	3.7	SDL
24FEB62	72902.5	E IDAHO	156-42	44.41N	0.03	112.73W	0.06	0.0	0.0	0.0	2.7	SDL
25FEB62	171738.9	MONTANA	156-51	45.20N	0.0	111.20W	0.0	25.0	0.0	0.0	0.0	NEIS
10MAR62	201235.7	W IDAHO	156-46	44.74N	0.01	116.21W	0.01	0.0	0.0	0.0	2.6	SDL
11MAR62	192514.1	W IDAHO	156-46	44.69N	0.01	116.11W	0.01	0.0	0.0	0.0	2.7	SDL
12MAR62	82725.9	W IDAHO	156-46	44.62N	0.01	116.20W	0.02	9.9	2.6	0.0	2.0	SDL
15MAR62	225351.9	S WASH	156-61	47.00N	0.03	121.00W	0.04	0.0	0.0	0.0	2.8	SDL
16MAR62	30833.6	SW MONTANA	156-42	44.96N	0.02	112.15W	0.02	0.0	0.0	0.0	3.0	SDL
20MAR62	112336.6	N NEVADA	156-16	41.68N	0.01	116.92W	0.01	0.0	0.0	0.0	3.0	SDL
24MAR62	42249.2	NE NEVADA	156-13	41.52N	0.02	113.55W	0.04	0.0	0.0	0.0	1.8	SDL
28MAR62	205937.7	CENT IDAHO	156-29	42.72N	0.01	119.74W	0.03	0.0	0.0	0.0	3.3	SDL
01APR62	82023.1	W IDAHO	156-46	44.79N	0.01	116.92W	0.01	0.0	0.0	0.0	2.3	SDL
01APR62	121907.9	N NEVADA	156-18	41.75N	0.01	118.48W	0.02	0.0	0.0	0.0	2.1	SDL
02APR62	163042.2	CENT IDAHO	156-45	44.60N	0.01	115.01W	0.02	0.0	0.0	0.0	2.8	SDL
03APR62	31510.7	N NEVADA	156-13	41.40N	0.01	116.67W	0.02	0.0	0.0	0.0	1.8	SDL
05APR62	102951.7	CENT WASH	157-71	47.32N	0.05	121.70W	0.08	0.0	0.0	0.0	2.7	SDL
06APR62	75329.1	CENT WASH	156-69	47.00N	0.05	119.43W	0.05	0.0	0.0	0.0	2.9	SDL
10APR62	113634.2	CENT IDAHO	156-44	44.19N	0.03	114.55W	0.02	0.0	0.0	0.0	2.7	SDL
11APR62	115335.5	CENT IDAHO	156-44	44.06N	0.02	114.63W	0.02	0.0	0.0	0.0	1.6	SDL
11APR62	153224.2	SW IDAHO	156-25	42.69N	0.01	115.92W	0.02	0.0	0.0	0.0	1.6	SDL
15APR62	62727.1	CENT IDAHO	156-34	43.14N	0.01	114.79W	0.02	0.0	0.0	0.0	2.0	SDL
15APR62	122827.0	S IDAHO	156-24	42.39N	0.01	114.11W	0.02	0.0	0.0	0.0	2.9	SDL
17APR62	172115.2	SW IDAHO	156-21	42.59N	0.02	111.94W	0.02	0.0	0.0	0.0	2.9	SDL
18APR62	173218.0	SW IDAHO	156-21	42.55N	0.02	113.95W	0.05	0.0	0.0	0.0	3.3	SDL
19APR62	134339.9	NW NEVADA	156-19	41.65N	0.02	119.08W	0.04	0.0	0.0	0.0	2.9	SDL
20APR62	160637.2	CENT OREG	156-39	43.36N	0.01	119.95W	0.03	0.0	0.0	0.0	3.0	SDL
21APR62	184724.4	E IDAHO	156-42	44.29N	0.01	112.00W	0.08	0.0	0.0	0.0	3.1	SDL
29APR62	61024.5	E OREGON	156-47	44.47N	0.01	117.18W	0.01	0.0	0.0	0.0	2.8	SDL
03MAY62	85944.7	CENT IDAHO	156-44	44.17N	0.01	114.89W	0.01	7.1	1.2	0.0	2.8	SDL
03MAY62	175523.6	SE OREGON	156-27	42.15N	0.01	117.91W	0.03	11.0	2.4	0.0	3.2	SDL
05MAY62	54159.2	CENT IDAHO	156-44	44.19N	0.01	114.95W	0.02	0.0	0.0	0.0	2.9	SDL
09MAY62	232143.1	SW IDAHO	156-36	43.61N	0.02	116.13W	0.01	0.0	0.0	0.0	2.3	SDL
29MAY62	210631.9	E OREGON	157-53	45.23N	0.01	123.58W	0.07	0.0	0.0	0.0	2.9	SDL
31MAY62	12146.7	HEBGEN LK	156-41	44.84N	0.02	111.41W	0.01	0.0	0.0	0.0	3.6	SDL
06JUN62	230902.1	E OREGON	156-47	44.54N	0.01	117.18W	0.02	0.0	0.0	0.0	2.5	SDL
05JUL62	150000.5	NE NEVADA	156-16	41.93N	0.02	116.16W	0.03	0.0	0.0	0.0	2.3	SDL
05JUL62	155951.6	N NEVADA	156-15	41.38N	0.01	115.57W	0.02	0.0	0.0	0.0	2.2	SDL
08JUL62	174811.2	CENT IDAHO	156-34	43.98N	0.01	114.76W	0.02	0.0	0.0	0.0	3.4	SDL
09JUL62	70213.9	E IDAHO	156-31	43.62N	0.02	111.22W	0.01	5.9	1.4	0.0	3.6	SDL
10JUL62	213000.7	SW IDAHO	156-35	43.53N	0.01	115.92W	0.02	13.6	4.7	0.0	2.5	SDL
11JUL62	165958.9	SW IDAHO	156-35	43.53N	0.01	115.87W	0.01	0.0	0.0	0.0	2.7	SDL
11JUL62	231041.2	W OREGON	156-47	44.49N	0.01	117.40W	0.01	0.0	0.0	0.0	2.4	SDL
15JUL62	33045.4	N NEVADA	156-17	41.81N	0.05	117.45W	0.12	7.5	2.1	0.0	2.2	SDL
15JUL62	43452.8	NW WYOMING	155-49	44.84N	0.02	109.19W	0.07	0.0	0.0	0.0	3.6	SDL
15JUL62	54344.5	YELLOWSTON	156-40	44.66N	0.02	110.87W	0.01	0.0	0.0	0.0	3.4	SDL
15JUL62	115921.9	MONTANA	156-50	45.00N	0.0	110.20W	0.0	0.0	0.0	0.0	0.0	NEIS
15JUL62	221024.7	NE NEVADA	156-16	41.45N	0.01	117.00W	0.01	0.0	0.0	0.0	2.1	SDL
15JUL62	234730.4	N NEVADA	156-16	41.63N	0.02	116.53W	0.02	0.0	0.0	0.0	3.0	SDL
17JUL62	53224.7	N NEVADA	156-16	41.06N	0.05	116.76W	0.01	0.0	0.0	0.0	2.1	SDL
17JUL62	55510.2	SW IDAHO	156-21	42.29N	0.02	111.62W	0.01	13.4	2.4	0.0	3.0	SDL

DATE	O.T.	GEO AREA	MAP SQ	LAT(DEG)	+/-	LONG(DEG)	+/-	DEPTH(KM)	+/-	MB	M	SOURCE
17JUL62	235720.4	N NEVADA	156-16	41.19N	0.01	116.63W	0.01	0.0	0.0	0.0	3.4	SDL
23JUL62	111243.2	NW WYOMING	156-40	44.20N	0.02	110.60W	0.01	0.0	0.0	0.0	3.2	SDL
01AUG62	181325.1	SE IDAHO	156-21	42.38N	0.01	111.61W	0.01	4.1	1.9	0.0	3.4	SDL
09AUG62	81110.5	E IDAHO	156-31	43.36N	0.02	111.94W	0.01	0.0	0.0	0.0	3.5	SDL
12AUG62	192308.2	W WYOMING	156-20	42.91N	0.02	110.65W	0.08	0.0	0.0	0.0	3.5	SDL
18AUG62	41806.8	W IDAHO	156-46	44.99N	0.01	116.82W	0.01	0.0	0.0	0.0	2.7	SDL
23AUG62	192916.0	NW CALIF	157-14	41.80N	0.0	124.10W	0.0	0.0	0.0	0.0	0.0	NEIS
24AUG62	234210.2	E OREGON	156-47	44.01N	0.09	117.36W	0.04	0.0	0.0	0.0	2.5	SDL
26AUG62	115337.0	ID-MA BORD	156-41	44.52N	0.07	111.53W	0.01	0.0	0.0	0.0	2.3	SDL
26AUG62	132157.2	E IDAHO	156-31	43.81N	0.05	111.07W	0.01	0.0	0.0	0.0	2.8	SDL
29AUG62	202519.7	ID-OR BORD	156-56	45.16N	0.01	116.70W	0.01	0.0	0.0	0.0	2.2	SDL
20AUG62	133528.7	UTAH	156-11	41.80N	0.0	111.80W	0.0	0.0	0.0	0.0	0.0	NEIS
01SEP62	105306.0	CENT IDAHO	156-35	43.13N	0.01	115.26W	0.01	0.0	0.0	0.0	1.8	SDL
04SEP62	171727.6	N CA COAST	157-13	41.00N	0.0	124.00W	0.0	0.0	0.0	0.0	0.0	NEIS
06SEP62	185938.2	CENT IDAHO	156-45	44.56N	0.02	115.14W	0.02	0.0	0.0	0.0	2.7	SDL
07SEP62	233913.7	NEVADA	156-16	41.10N	0.0	116.80W	0.0	0.0	0.0	0.0	0.0	NEIS
08SEP62	62953.8	E IDAHO	156-42	44.09N	0.01	112.30W	0.05	0.0	0.0	0.0	2.8	SDL
09SEP62	61239.4	E OREGON	156-48	44.01N	0.01	118.33W	0.02	0.0	0.0	0.0	2.1	SDL
09SEP62	143813.0	UTAH	156-11	41.60N	0.0	111.80W	0.0	0.0	0.0	0.0	0.0	NEIS
14SEP62	131702.9	UTAH	156-11	41.80N	0.0	111.50W	0.0	0.0	0.0	0.0	0.0	NEIS
14SEP62	143650.0	CENT IDAHO	156-43	44.60N	0.03	113.34W	0.11	0.0	0.0	0.0	2.6	SDL
14SEP62	204816.6	SW MONTANA	156-51	45.37N	0.01	111.88W	0.01	10.5	1.9	0.0	3.1	SDL
14SEP62	215131.9	CENT IDAHO	156-44	44.15N	0.02	114.82W	0.02	0.0	0.0	0.0	1.7	SDL
15SEP62	122642.5	CENT IDAHO	156-44	44.74N	0.02	114.82W	0.03	0.0	0.0	0.0	3.6	SDL
15SEP62	124328.9	CENT IDAHO	156-45	44.42N	0.01	115.24W	0.01	0.0	0.0	0.0	2.5	SDL
16SEP62	115408.0	S IDAHO	156-24	42.26N	0.02	114.14W	0.04	0.0	0.0	0.0	2.6	SDL
16SEP62	213713.9	CENT OREG	157-40	44.12N	0.01	120.71W	0.06	0.0	0.0	0.0	2.2	SDL
20SEP62	170848.9	S OREGON	156-29	42.38N	0.01	119.49W	0.01	0.0	0.0	0.0	2.7	SDL
20SEP62	203028.0	SE OREGON	156-29	42.14N	0.01	119.59W	0.02	0.0	0.0	0.0	2.5	SDL
20SEP62	210051.6	SE OREGON	156-29	42.37N	0.01	119.44W	0.02	5.4	3.5	0.0	2.6	SDL
24SEP62	160904.2	N IDAHO	156-65	46.84N	0.03	115.99W	0.02	0.0	0.0	0.0	3.4	SDL
25SEP62	201438.4	E OREGON	156-47	44.74N	0.04	117.55W	0.03	11.3	4.4	0.0	2.2	SDL
26SEP62	50715.2	E IDAHO	156-42	44.90N	0.0	112.60W	0.0	0.0	0.0	0.0	0.0	NEIS
26SEP62	114417.7	CENT WASH	157-79	47.67N	0.03	119.96W	0.05	0.0	0.0	0.0	3.0	SDL
26SEP62	212828.5	E OREGON	156-47	44.50N	0.01	117.49W	0.01	0.0	0.0	0.0	2.2	SDL
26SEP62	213235.0	N IDAHO	156-65	46.82N	0.03	115.80W	0.02	0.0	0.0	0.0	2.9	SDL
02OCT62	141954.2	SW MONTANA	156-50	45.43N	0.02	110.93W	0.06	0.0	0.0	0.0	3.2	SDL
03OCT62	163154.1	SE IDAHO	156-21	42.39N	0.02	111.50W	0.01	0.0	0.0	0.0	2.9	SDL
03OCT62	211424.0	E OREGON	156-37	43.87N	0.01	117.40W	0.02	0.0	0.0	0.0	2.3	SDL
06OCT62	92817.4	WYOMING	156-25	43.60N	0.0	110.80W	0.0	0.0	0.0	0.0	0.0	NEIS
06OCT62	204112.0	S IDAHO	156-25	42.30N	0.03	115.98W	0.05	0.0	0.0	0.0	1.6	SDL
09OCT62	162712.4	SW MONTANA	156-52	45.88N	0.02	112.14W	0.02	0.0	0.0	0.0	2.7	SDL
13OCT62	125612.6	ID-MA BORD	156-41	44.54N	0.02	111.58W	0.04	0.0	0.0	0.0	3.5	SDL
17OCT62	60315.4	CENT WASH	156-79	47.15N	0.02	119.32W	0.04	6.0	2.8	0.0	2.5	SDL
17OCT62	83434.7	NW OREGON	157-43	44.80N	0.04	123.01W	0.06	0.0	0.0	0.0	3.4	SDL
18OCT62	180318.5	W IDAHO	156-45	44.30N	0.0	115.30W	0.0	0.0	0.0	0.0	0.0	NEIS
18OCT62	181356.9	CENT IDAHO	156-35	43.81N	0.01	115.25W	0.01	0.0	0.0	0.0	2.0	SDL
18OCT62	185632.2	W IDAHO	156-45	44.60N	0.0	116.00W	0.0	0.0	0.0	0.0	0.0	NEIS
18OCT62	200136.0	CENT IDAHO	156-44	44.33N	0.02	114.73W	0.03	0.0	0.0	0.0	2.2	SDL
18OCT62	203107.1	W IDAHO	156-45	44.30N	0.0	115.20W	0.0	0.0	0.0	0.0	0.0	NEIS
18OCT62	213016.4	CENT IDAHO	156-44	44.29N	0.02	114.83W	0.02	0.0	0.0	0.0	2.5	SDL
18OCT62	221332.9	CENT IDAHO	156-44	44.28N	0.02	114.87W	0.02	0.0	0.0	0.0	2.1	SDL
19OCT62	104325.0	W IDAHO	156-45	44.60N	0.0	115.60W	0.0	0.0	0.0	0.0	0.0	NEIS
20OCT62	22225.1	CENT IDAHO	156-35	43.81N	0.01	115.22W	0.01	0.0	0.0	0.0	2.7	SDL
21OCT62	151021.9	CENT IDAHO	156-44	44.40N	0.02	114.57W	0.03	0.0	0.0	0.0	1.9	SDL
22OCT62	50303.9	MONTANA	156-51	44.20N	0.0	118.40W	0.0	0.0	0.0	0.0	0.0	NEIS
24OCT62	212952.6	E OREGON	156-48	44.91N	0.02	118.56W	0.02	0.0	0.0	0.0	2.3	SDL
25OCT62	61601.8	CENT IDAHO	156-34	43.41N	0.01	114.87W	0.01	0.0	0.0	0.0	2.2	SDL
25OCT62	61958.7	CENT IDAHO	156-34	43.40N	0.01	114.88W	0.01	0.0	0.0	0.0	2.1	SDL
25OCT62	141213.5	CENT IDAHO	156-46	44.23N	0.01	116.40W	0.01	0.0	0.0	0.0	2.4	SDL
27OCT62	220705.0	W IDAHO	156-46	44.16N	0.01	116.47W	0.02	0.0	0.0	0.0	3.0	SDL
04NOV62	61246.5	NW WYOMING	156-40	44.05N	0.02	110.69W	0.01	0.0	0.0	0.0	2.9	SDL
04NOV62	61831.5	YELLOWSTON	156-40	44.30N	0.0	110.30W	0.0	0.0	0.0	0.0	0.0	NEIS
06NOV62	33646.9	WA-OR BORD	157-52	45.80N	0.0	122.50W	0.0	0.0	0.0	0.0	0.0	NEIS

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07NOV62	164418.7	CENT IDAHO	156-44	44.37N	0.02	114.58W	0.03	0.0	0.0	0.0	2.4	SDL
09NOV62	135218.1	S WASH	157-61	46.14N	0.04	121.64W	0.10	0.0	0.0	0.0	3.2	SDL
11NOV62	221043.2	SE WASH	156-68	46.69N	0.01	118.59W	0.02	0.0	0.0	0.0	2.6	SDL
13NOV62	222750.1	N OREGON	157-51	45.55N	0.08	121.64W	0.13	0.0	0.0	0.0	2.5	SDL
13NOV62	234948.1	N OREGON	157-50	45.74N	0.07	120.44W	0.10	0.0	0.0	0.0	2.9	SDL
14NOV62	111238.2	N IDAHO	156-46	44.99N	0.01	116.82W	0.01	0.0	0.0	0.0	2.5	SDL
15NOV62	232552.0	NW MONTANA	156-83	48.33N	0.02	113.62W	0.04	0.0	0.0	0.0	3.7	SDL
24NOV62	131349.0	SE IDAHO	156-21	42.99N	0.02	111.69W	0.02	0.0	0.0	0.0	3.0	SDL
25NOV62	60239.1	CENT IDAHO	156-45	44.56N	0.02	115.09	0.02	0.0	0.0	0.0	2.3	SDL
28NOV62	71951.2	CENT IDAHO	156-34	43.64N	0.01	114.99W	0.01	0.0	0.0	0.0	2.2	SDL
04DEC62	112910.7	N NEVADA	156-16	41.97N	0.01	116.21W	0.02	0.0	0.0	0.0	3.3	SDL
11DEC62	171521.2	CENT IDAHO	156-44	44.67N	0.02	114.98W	0.02	0.0	0.0	0.0	3.5	SDL
15DEC62	143616.2	NW MONTANA	156-63	47.71N	0.04	113.61W	0.04	0.0	0.0	0.0	3.3	SDL
20DEC62	3948.0	NW MONTANA	156-74	47.90N	0.17	114.65W	0.10	0.0	0.0	0.0	3.9	SDL
21DEC62	44141.9	NW MONTANA	156-83	48.67N	0.03	113.43W	0.03	0.0	0.0	0.0	3.5	SDL
27DEC62	105947.2	SW IDAHO	156-26	42.26N	0.02	116.13W	0.02	0.0	0.0	0.0	1.7	SDL
28DEC62	100123.6	MONTANA	156-83	48.40N	0.0	113.90W	0.0	0.0	0.0	0.0	0.0	NEIS
31DEC62	204935.2	WASHINGTON	157-72	47.10N	0.0	122.00W	0.0	0.0	0.0	0.0	0.0	NEIS
01JAN63	35428.8	NW MONTANA	156-83	48.69N	0.07	113.50W	0.04	0.0	0.0	0.0	3.5	SDL
06JAN63	180746.2	E IDAHO	156-42	44.80N	0.0	112.20W	0.0	33.0	0.0	0.0	0.0	NEIS
07JAN63	15637.7	W WYOMING	155-29	42.47N	0.03	109.23W	0.10	0.0	0.0	0.0	3.6	SDL
07JAN63	64838.7	CENT IDAHO	156-44	44.31N	0.02	114.79W	0.02	0.0	0.0	0.0	2.4	SDL
07JAN63	70719.1	CENT IDAHO	156-35	43.16N	0.04	115.42W	0.01	0.0	0.0	0.0	3.0	SDL
07JAN63	72638.5	CENT IDAHO	156-44	44.28N	0.01	114.80W	0.02	0.0	0.0	0.0	2.6	SDL
07JAN63	73030.4	CENT IDAHO	156-43	44.48N	0.03	113.90W	0.07	0.0	0.0	0.0	1.9	SDL
07JAN63	75616.7	CENT IDAHO	156-45	44.06N	0.01	115.09W	0.01	0.0	0.0	0.0	2.7	SDL
07JAN63	222437.7	CENT OREG	156-39	43.81N	0.01	119.33W	0.04	0.0	0.0	0.0	1.9	SDL
09JAN63	194602.7	HEBGEN LK	156-41	44.96N	0.02	111.53W	0.04	3.7	1.6	0.0	3.5	SDL
12JAN63	40409.6	SE OREGON	156-28	42.44N	0.01	118.14W	0.02	10.7	2.0	0.0	2.3	SDL
13JAN63	83752.2	E IDAHO	156-41	44.78N	0.02	111.64W	0.10	0.0	0.0	0.0	2.6	SDL
17JAN63	225404.6	CENT OREG	157-40	44.95N	0.03	120.80W	0.03	11.9	1.8	0.0	3.0	SDL
20JAN63	82921.7	CENT IDAHO	156-44	44.12N	0.03	114.68W	0.01	0.0	0.0	0.0	1.8	SDL
20JAN63	92439.7	YELLOWSTON	156-40	44.90N	0.0	110.90W	0.0	28.0	0.0	0.0	0.0	NEIS
20JAN63	211623.7	HEBGEN LK	156-41	44.95N	0.03	111.50W	0.08	0.0	0.0	0.0	2.6	SDL
21JAN63	54950.8	YELLOWSTON	156-40	44.86N	0.02	111.19W	0.05	0.0	0.0	0.0	3.0	SDL
21JAN63	85538.2	E OREGON	156-28	42.43N	0.01	118.71W	0.05	7.8	1.6	0.0	2.0	SDL
21JAN63	120431.6	CENT IDAHO	156-44	44.23N	0.02	114.37W	0.04	0.0	0.0	0.0	2.0	SDL
23JAN63	200201.2	YELLOWSTON	156-40	44.22N	0.03	110.16W	0.06	0.0	0.0	0.0	3.2	SDL
24JAN63	214311.7	WASHINGTON	157-72	47.60N	0.0	122.10W	0.0	17.0	0.0	0.0	0.0	NEIS
25JAN63	35532.3	N NEVADA	156-15	41.46N	0.01	115.37W	0.01	0.0	0.0	0.0	3.0	SDL
27JAN63	152447.2	W IDAHO	156-44	44.40N	0.0	114.60W	0.0	32.0	0.0	0.0	0.0	NEIS
28JAN63	44604.4	CENT IDAHO	156-44	44.20N	0.02	114.52W	0.03	2.3	2.1	0.0	2.2	SDL
30JAN63	10911.0	W MONTANA	156-61	46.36N	0.22	111.51W	0.0	0.0	0.0	0.0	2.9	SDL
30JAN63	55059.5	MONTANA	156-50	45.00N	0.0	110.80W	0.0	33.0	0.0	0.0	0.0	NEIS
31JAN63	104945.0	CENT IDAHO	156-45	44.70N	0.02	115.15W	0.02	0.0	0.0	0.0	2.9	SDL
01FEB63	163859.5	W IDAHO	156-44	44.30N	0.0	114.50W	0.0	33.0	0.0	0.0	0.0	NEIS
03FEB63	14419.0	CENT IDAHO	156-33	43.69N	0.02	113.33W	0.13	0.0	0.0	0.0	2.9	SDL
03FEB63	171751.7	CENT IDAHO	156-44	44.13N	0.01	114.75W	0.01	0.0	0.0	0.0	2.1	SDL
03FEB63	231013.5	CENT IDAHO	156-44	44.15N	0.02	114.51W	0.03	0.0	0.0	0.0	2.4	SDL
03FEB63	231708.6	CENT IDAHO	156-34	43.67N	0.01	115.00W	0.01	0.0	0.0	0.0	2.0	SDL
05FEB63	72859.4	W IDAHO	156-44	44.30N	0.0	114.60W	0.0	33.0	0.0	0.0	0.0	NEIS
10FEB63	12420.5	CENT IDAHO	156-44	44.21N	0.02	114.47W	0.03	0.0	0.0	0.0	2.8	SDL
16FEB63	30141.0	MONTANA	156-60	46.10N	0.0	111.00W	0.0	33.0	0.0	0.0	0.0	NEIS
17FEB63	101215.7	NE NEVADA	156-14	41.55N	0.02	114.62W	0.03	6.5	1.8	0.0	2.3	SDL
17FEB63	130644.2	SE OREGON	156-28	42.47N	0.01	118.94W	0.04	0.0	0.0	0.0	1.9	SDL
24FEB63	152457.7	MONTANA	156-52	45.00N	0.0	112.00W	0.0	33.0	0.0	0.0	0.0	NEIS
24FEB63	172647.1	E IDAHO	156-53	45.72N	0.02	113.89W	0.04	0.0	0.0	0.0	2.8	SDL
02MAR63	10427.3	E WASH	156-68	46.76N	0.01	118.54W	0.02	0.0	0.0	0.0	2.0	SDL
03MAR63	4017.1	S IDAHO	156-22	42.26N	0.03	112.66W	0.11	0.0	0.0	0.0	2.9	SDL
05MAR63	13038.7	E IDAHO	156-21	42.60N	0.0	111.30W	0.0	33.0	0.0	0.0	0.0	NEIS
06MAR63	11807.7	SW MONTANA	156-62	46.34N	0.03	112.25W	0.05	0.0	0.0	0.0	3.2	SDL
06MAR63	104642.2	W IDAHO	156-45	44.08N	0.01	115.79W	0.01	0.0	0.0	0.0	2.5	SDL
07MAR63	202046.1	NE OREGON	156-58	45.86N	0.01	118.40W	0.01	0.0	0.0	0.0	2.1	SDL
07MAR63	235325.0	OREGON	156-43	44.90N	0.0	123.50W	0.0	33.0	0.0	0.0	0.0	NEIS

DATE	O.T.	GEO AREA	MAP SQ	LAT (DEG)	+/-	LONG (DEG)	+/-	DEPTH (KM)	+/-	MB	M	SOURCE
08MAR63	83548.9	YELLOWSTON	156-40	44.80N	0.0	110.20W	0.0	33.0	0.0	0.0	0.0	NEIS
10MAR63	112606.4	YELLOWSTON	156-40	44.90N	0.0	110.90W	0.0	33.0	0.0	0.0	0.0	NEIS
10MAR63	131657.5	YELLOWSTON	156-40	44.80N	0.0	110.50W	0.0	33.0	0.0	0.0	0.0	NEIS
12MAR63	34124.4	YELLOWSTON	156-40	44.90N	0.0	110.70W	0.0	21.0	0.0	0.0	0.0	NEIS
17MAR63	221035.4	YELLOWSTON	156-40	44.80N	0.0	110.10W	0.0	20.0	0.0	0.0	0.0	NEIS
19MAR63	183551.7	NW WYOMING	156-49	44.87N	0.02	109.93W	0.14	0.0	0.0	0.0	4.1	SDL
20MAR63	113831.2	YELLOWSTON	156-40	44.80N	0.0	110.70W	0.0	33.0	0.0	0.0	0.0	NEIS
20MAR63	123224.5	YELLOWSTON	156-40	44.70N	0.0	110.60W	0.0	33.0	0.0	0.0	0.0	NEIS
21MAR63	30024.2	YELLOWSTON	156-40	44.80N	0.0	110.60W	0.0	33.0	0.0	0.0	0.0	NEIS
21MAR63	160947.0	MONTANA	156-50	45.00N	0.0	110.30W	0.0	33.0	0.0	0.0	0.0	NEIS
22MAR63	43402.9	YELLOWSTON	156-40	44.80N	0.0	110.50W	0.0	34.0	0.0	0.0	0.0	NEIS
23MAR63	122139.0	YELLOWSTON	156-40	44.70N	0.0	110.60W	0.0	33.0	0.0	0.0	0.0	NEIS
27MAR63	72209.4	YELLOWSTON	156-40	44.30N	0.0	110.70W	0.0	33.0	0.0	0.0	0.0	NEIS
27MAR63	151546.2	YELLOWSTON	156-40	44.90N	0.0	110.90W	0.0	33.0	0.0	0.0	0.0	NEIS
01APR63	43827.7	NE OREGON	156-49	44.74N	0.01	119.21W	0.03	0.0	0.0	0.0	2.9	SDL
02APR63	134013.4	YELLOWSTON	156-40	44.80N	0.0	110.70W	0.0	33.0	0.0	0.0	0.0	NEIS
02APR63	152942.6	YELLOWSTON	156-40	44.70N	0.0	110.50W	0.0	33.0	0.0	0.0	0.0	NEIS
03APR63	93508.7	MONTANA	156-50	45.00N	0.0	110.70W	0.0	33.0	0.0	0.0	0.0	NEIS
04APR63	153626.2	E IDAHO	156-21	42.30N	0.0	111.20W	0.0	33.0	0.0	0.0	0.0	NEIS
06APR63	71410.5	N IDAHO	156-56	45.64N	0.02	116.74W	0.02	0.0	0.0	0.0	1.9	SDL
06APR63	112417.0	NE OREGON	156-49	44.43N	0.01	119.63W	0.03	0.0	0.0	0.0	3.3	SDL
07APR63	151947.7	W IDAHO	156-36	43.64N	0.01	116.25W	0.01	0.0	0.0	0.0	2.3	SDL
07APR63	153338.0	CENT OREG	156-41	44.47N	0.07	121.80W	0.17	0.0	0.0	0.0	3.3	SDL
08APR63	144820.7	E OREGON	156-38	43.80N	0.01	118.77W	0.03	0.0	0.0	0.0	2.2	SDL
09APR63	41340.2	CENT IDAHO	156-34	43.81N	0.01	114.61W	0.01	0.0	0.0	0.0	2.6	SDL
09APR63	70904.2	SW MONTANA	156-61	46.11N	0.03	111.86W	0.10	0.0	0.0	0.0	2.9	SDL
10APR63	80827.7	NW OREGON	156-56	45.22N	0.01	116.59W	0.02	0.0	0.0	0.0	2.0	SDL
12APR63	134501.5	W IDAHO	156-36	43.86N	0.01	116.72W	0.01	12.5	1.3	0.0	2.0	SDL
14APR63	153851.1	CENT IDAHO	156-44	44.65N	0.02	114.10W	0.04	0.0	0.0	0.0	2.7	SDL
15APR63	55210.7	SW IDAHO	156-26	42.60N	0.01	116.84W	0.02	13.3	2.7	0.0	2.2	SDL
15APR63	73744.2	E OREGON	156-48	44.56N	0.01	118.27W	0.01	0.0	0.0	0.0	1.9	SDL
16APR63	53434.6	YELLOWSTON	156-40	44.80N	0.0	110.40W	0.0	33.0	0.0	0.0	0.0	NEIS
17APR63	2051.4	N NEVADA	156-16	41.91N	0.01	116.49W	0.02	0.0	0.0	0.0	2.1	SDL
17APR63	33449.1	SE OREGON	156-27	42.73N	0.01	117.72W	0.02	0.0	0.0	0.0	2.0	SDL
18APR63	104316.9	YELLOWSTON	156-40	44.80N	0.0	110.30W	0.0	33.0	0.0	0.0	0.0	NEIS
18APR63	121154.2	E OREGON	156-38	43.48N	0.01	118.17W	0.02	0.0	0.0	0.0	1.5	SDL
18APR63	145912.6	MONTANA	156-50	45.00N	0.0	111.00W	0.0	33.0	0.0	0.0	0.0	NEIS
18APR63	173211.6	W WYOMING	156-30	43.07N	0.03	110.43W	0.45	0.0	0.0	0.0	3.4	SDL
22APR63	73801.4	E OREGON	156-37	43.58N	0.01	117.83W	0.02	10.5	2.6	0.0	2.0	SDL
25APR63	82941.6	SE OREGON	156-27	42.38N	0.01	117.18W	0.03	5.6	2.4	0.0	2.1	SDL
25APR63	113030.9	E OREGON	156-47	44.57N	0.01	117.73W	0.02	0.0	0.0	0.0	2.2	SDL
26APR63	165512.0	S OREGON	156-29	42.71N	0.05	119.26W	0.15	0.0	0.0	0.0	2.5	SDL
27APR63	45350.9	YELLOWSTON	156-40	44.80N	0.0	110.30W	0.0	33.0	0.0	0.0	0.0	NEIS
27APR63	111448.0	W IDAHO	156-36	43.14N	0.32	116.77W	0.0	0.0	0.0	0.0	2.4	SDL
27APR63	133933.9	MONTANA	156-51	45.00N	0.0	111.40W	0.0	33.0	0.0	0.0	0.0	NEIS
30APR63	33319.0	CENT IDAHO	156-45	44.77N	0.01	115.84W	0.02	0.0	0.0	0.0	2.2	SDL
01MAY63	1137.8	S OREGON	156-21	42.67N	0.01	121.84W	0.03	0.0	0.0	0.0	2.8	SDL
03MAY63	110554.0	E OREGON	156-37	43.21N	0.04	117.19W	0.0	0.0	0.0	0.0	2.3	SDL
03MAY63	163255.9	MONTANA	156-51	45.00N	0.0	111.20W	0.0	33.0	0.0	0.0	0.6	NEIS
04MAY63	60243.8	CENT OREG	156-49	44.38N	0.01	119.21W	0.03	0.0	0.0	0.0	2.5	SDL
11MAY63	25559.0	MONTANA	156-50	45.00N	0.0	110.40W	0.0	33.0	0.0	0.0	0.0	NEIS
11MAY63	30058.7	E IDAHO	156-50	45.10N	0.0	110.80W	0.0	15.0	0.0	0.0	0.0	NEIS
12MAY63	204529.0	W IDAHO	156-55	45.07N	0.02	116.98W	0.02	0.0	0.0	0.0	2.5	SDL
19MAY63	81018.5	E IDAHO	156-42	44.40N	0.0	112.00W	0.0	15.0	0.0	0.0	0.0	NEIS
19MAY63	234204.0	E OREGON	156-48	44.40N	0.48	118.55W	1.36	0.0	0.0	0.0	2.2	SDL
22MAY63	123136.6	W IDAHO	156-65	46.01N	0.04	116.99W	0.03	12.8	2.5	0.0	2.1	SDL
25MAY63	41730.9	CENT IDAHO	156-35	43.39N	0.01	115.39W	0.01	0.0	0.0	0.0	2.5	SDL
25MAY63	85123.5	E OREGON	156-48	44.24N	0.01	118.06W	0.02	0.0	0.0	0.0	2.2	SDL
26MAY63	112559.0	NE OREGON	156-57	45.90N	0.03	117.97W	0.01	5.9	1.6	0.0	2.7	SDL
27MAY63	35544.1	CENT IDAHO	156-35	43.31N	0.01	115.26W	0.01	0.0	0.0	0.0	2.2	SDL
27MAY63	50451.7	CENT IDAHO	156-35	43.68N	0.01	115.04W	0.01	6.4	2.4	0.0	2.4	SDL
28MAY63	84503.1	W IDAHO	156-45	44.46N	0.01	115.92W	0.01	0.0	0.0	0.0	2.7	SDL
28MAY63	162911.9	W IDAHO	156-44	44.30N	0.0	114.80W	0.0	33.0	0.0	0.0	0.0	NEIS
30MAY63	4513.0	SW MONTANA	156-52	45.57N	0.03	112.80W	0.10	0.0	0.0	0.0	3.3	SDL

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31MAY63	113753.6	MONTANA	156-51	45.00N	0.0	111.20W	0.0	15.0	0.0	0.0	0.0	NEIS
02JUN63	20927.0	W IDAHO	156-46	44.23N	0.11	116.14W	0.08	0.0	0.0	0.0	1.5	SDL
06JUN63	154448.5	CENT IDAHO	156-34	43.37N	0.01	114.80W	0.02	12.0	2.2	0.0	2.4	SDL
08JUN63	20302.3	CENT IDAHO	156-34	43.38N	0.01	114.83W	0.04	9.2	6.2	0.0	2.0	SDL
09JUN63	140417.9	CENT IDAHO	156-44	44.16N	0.02	114.60W	0.02	0.0	0.0	0.0	2.2	SDL
12JUN63	94801.6	NW OREGON	156-57	45.94N	0.03	117.48W	0.02	13.0	2.7	0.0	2.8	SDL
15JUN63	131550.6	MONTANA	156-50	45.00N	0.0	110.60W	0.0	33.0	0.0	0.0	0.0	NEIS
16JUN63	14258.5	NW UTAH	156-12	41.61N	0.02	112.89W	0.01	0.0	0.0	0.0	2.4	SDL
20JUN63	234717.2	NW UTAH	156-12	41.35N	0.01	112.10W	0.01	4.4	1.9	0.0	2.7	SDL
25JUN63	155149.6	YELLOWSTON	156-40	44.00N	0.0	110.00W	0.0	33.0	0.0	0.0	0.0	NEIS
29JUN63	210455.0	CENT IDAHO	156-34	43.38N	0.01	114.86W	0.01	0.0	0.0	0.0	2.0	SDL
01JUL63	131850.6	CENT IDAHO	156-44	43.14N	0.02	114.66W	0.02	0.0	0.0	0.0	2.1	SDL
03JUL63	70303.4	W IDAHO	156-46	44.33N	0.01	116.52W	0.01	0.0	0.0	0.0	2.2	SDL
06JUL63	150419.5	CENT IDAHO	156-44	44.22N	0.02	114.50W	0.03	0.0	0.0	0.0	2.0	SDL
17JUL63	134505.0	CENT IDAHO	156-44	44.18N	0.01	114.56W	0.03	0.0	0.0	0.0	2.3	SDL
19JUL63	192633.1	YELLOWSTON	156-40	44.90N	0.0	110.60W	0.0	33.0	0.0	0.0	0.0	NEIS
19JUL63	205645.4	YELLOWSTON	156-40	44.80N	0.0	110.60W	0.0	33.0	0.0	0.0	0.0	NEIS
20JUL63	104102.5	MONTANA	156-51	45.10N	0.0	111.30W	0.0	33.0	0.0	4.0	0.0	NEIS
21JUL63	50020.3	SE IDAHO	156-21	42.81N	0.03	111.26W	0.02	0.0	0.0	0.0	2.6	SDL
24JUL63	105746.9	HEBGEN LK	156-99	44.90N	0.0	111.00W	0.0	33.0	0.0	0.0	0.0	NEIS
26JUL63	84507.2	SE WASH	156-68	46.22N	0.06	118.66W	0.04	0.0	0.0	0.0	2.6	SDL
27JUL63	232808.1	S OREGON	157-20	42.69N	0.06	120.38W	0.07	2.7	3.7	0.0	2.7	SDL
02AUG63	94541.9	W IDAHO	156-34	43.40N	0.0	114.50W	0.0	50.0	0.0	0.0	0.0	NEIS
03AUG63	12316.7	W IDAHO	156-45	44.90N	0.0	115.40W	0.0	33.0	0.0	4.0	0.0	NEIS
04AUG63	113736.6	E IDAHO	156-51	45.00N	0.03	111.35W	0.13	0.0	0.0	0.0	2.8	SDL
06AUG63	52032.0	MONTANA	156-51	45.10N	0.0	111.40W	0.0	33.0	0.0	3.7	0.0	NEIS
08AUG63	95442.7	MONTANA	156-51	45.20N	0.0	111.50W	0.0	33.0	0.0	0.0	0.0	NEIS
08AUG63	235320.7	YELLOWSTON	156-40	44.90N	0.0	110.90W	0.0	33.0	0.0	4.0	0.0	NEIS
12AUG63	163356.6	CENT IDAHO	156-45	44.34N	0.02	115.33W	0.02	7.8	3.0	0.0	3.4	SDL
14AUG63	123006.0	UTAH	156-12	41.50N	0.0	112.20W	0.0	33.0	0.0	3.7	0.0	NEIS
16AUG63	70103.7	UTAH	156-12	41.50N	0.0	112.20W	0.0	33.0	0.0	3.6	0.0	NEIS
17AUG63	50911.1	UTAH	156-12	41.50N	0.0	112.20W	0.0	33.0	0.0	3.5	0.0	NEIS
17AUG63	133922.7	CENT IDAHO	156-34	43.68N	0.01	114.85W	0.02	12.6	2.1	0.0	2.0	SDL
18AUG63	24945.4	CENT IDAHO	156-44	44.14N	0.02	114.54W	0.03	0.0	0.0	0.0	2.2	SDL
24AUG63	100152.2	CENT IDAHO	156-44	44.49N	0.01	114.12W	0.04	0.0	0.0	0.0	2.0	SDL
24AUG63	144708.4	CENT IDAHO	156-44	44.13N	0.02	114.49W	0.03	0.0	0.0	0.0	2.3	SDL
25AUG63	62840.9	CENT IDAHO	156-44	44.10N	0.02	114.97W	0.01	0.0	0.0	0.0	2.4	SDL
03SEP63	222502.5	CENT IDAHO	156-34	43.96N	0.02	114.77W	0.02	12.5	2.9	0.0	2.6	SDL
06SEP63	192355.7	OREGON	156-47	44.80N	0.0	117.10W	0.0	33.0	0.0	0.0	0.0	NEIS
06SEP63	221935.2	W IDAHO	156-44	44.30N	0.0	114.70W	0.0	33.0	0.0	4.1	0.0	NEIS
07SEP63	233344.2	SW MONTANA	156-70	47.46N	0.05	110.61W	0.18	0.0	0.0	0.0	4.2	SDL
09SEP63	82453.7	CENT IDAHO	156-44	44.89N	0.03	114.27W	0.05	11.0	1.9	0.0	2.3	SDL
09SEP63	104517.4	W IDAHO	156-44	44.40N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
09SEP63	185046.9	E IDAHO	156-33	43.90N	0.0	113.30W	0.0	33.0	0.0	0.0	0.0	NEIS
09SEP63	190716.2	W IDAHO	156-44	44.30N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
09SEP63	191035.2	W IDAHO	156-44	44.30N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
09SEP63	194328.6	CENT IDAHO	156-44	44.27N	0.02	114.63W	0.03	0.0	0.0	0.0	2.7	SDL
10SEP63	21709.3	W IDAHO	156-44	44.30N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
10SEP63	33323.2	W IDAHO	156-44	44.30N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
11SEP63	1227.2	W IDAHO	156-44	44.30N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
11SEP63	20844.8	W IDAHO	156-44	44.30N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
11SEP63	22504.7	W IDAHO	156-44	44.30N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
11SEP63	23139.9	W IDAHO	156-44	44.30N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
11SEP63	34533.6	W IDAHO	156-44	44.40N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
11SEP63	35537.8	W IDAHO	156-44	44.40N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
11SEP63	94204.7	W IDAHO	156-44	44.30N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
11SEP63	122929.2	W IDAHO	156-44	44.30N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
11SEP63	182152.2	W IDAHO	156-44	44.20N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
11SEP63	182428.6	W IDAHO	156-44	44.30N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
11SEP63	203453.9	W IDAHO	156-44	44.30N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
12SEP63	62350.6	W IDAHO	156-44	44.30N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
12SEP63	65300.9	W IDAHO	156-44	44.20N	0.0	114.50W	0.0	33.0	0.0	4.1	0.0	NEIS
12SEP63	80121.6	W IDAHO	156-44	44.40N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
12SEP63	90109.0	W IDAHO	156-44	44.40N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS

DATE	O.T.	GEO AREA	MAP SQ	LAT(DEG)	+/-	LONG(DEG)	+/-	DEPTH(KM)	+/-	MB	M	SOURCE
12SEP63	91904.7	W IDAHO	156-44	44.30N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
12SEP63	111647.2	W IDAHO	156-44	44.40N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
12SEP63	122822.6	W IDAHO	156-44	44.30N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
12SEP63	201506.2	W IDAHO	156-44	44.40N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
13SEP63	134313.6	MONTANA	156-51	45.00N	0.0	111.60W	0.0	33.0	0.0	0.0	0.0	NEIS
14SEP63	50409.3	W IDAHO	156-44	44.30N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
14SEP63	50714.3	W IDAHO	156-44	44.40N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
14SEP63	155802.1	W IDAHO	156-44	44.30N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
14SEP63	160649.2	W IDAHO	156-44	44.30N	0.0	114.70W	0.0	33.0	0.0	3.9	0.0	NEIS
14SEP63	162511.2	W IDAHO	156-44	44.30N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
14SEP63	163941.7	W IDAHO	156-44	44.40N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
14SEP63	165540.6	W IDAHO	156-44	44.30N	0.0	114.60W	0.0	15.0	0.0	0.0	0.0	NEIS
14SEP63	171634.7	W IDAHO	156-44	44.30N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
14SEP63	175006.9	W IDAHO	156-44	44.40N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
14SEP63	184856.4	W IDAHO	156-44	44.30N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
15SEP63	53457.9	W IDAHO	156-44	44.30N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
15SEP63	165101.7	W IDAHO	156-44	44.30N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
15SEP63	191409.5	W IDAHO	156-44	44.20N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
16SEP63	120614.0	W IDAHO	156-44	44.30N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
17SEP63	53615.4	W IDAHO	156-44	44.30N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
17SEP63	122254.9	W IDAHO	156-44	44.40N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
18SEP63	1605.9	W IDAHO	156-44	44.30N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
18SEP63	44507.5	MONTANA	156-51	45.00N	0.0	111.30W	0.0	33.0	0.0	0.0	0.0	NEIS
18SEP63	210350.7	W IDAHO	156-44	44.40N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
19SEP63	30205.9	W IDAHO	156-44	44.50N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
19SEP63	105957.0	W IDAHO	156-44	44.40N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
20SEP63	110937.0	W IDAHO	156-44	44.30N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
20SEP63	114120.1	W IDAHO	156-44	44.40N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
20SEP63	231321.2	SE IDAHO	156-31	43.28N	0.03	111.50W	0.03	0.0	0.0	0.0	2.9	SDL
21SEP63	95857.5	W IDAHO	156-44	44.30N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
21SEP63	122925.7	W IDAHO	156-34	43.70N	0.0	114.70W	0.0	33.0	0.0	3.5	0.0	NEIS
22SEP63	5036.1	W IDAHO	156-44	44.30N	0.0	114.70W	0.0	15.0	0.0	0.0	0.0	NEIS
22SEP63	5610.5	W IDAHO	156-44	44.30N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
22SEP63	43715.1	E IDAHO	156-31	43.30N	0.0	111.40W	0.0	33.0	0.0	0.0	0.0	NEIS
22SEP63	63001.7	W IDAHO	156-44	44.30N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
22SEP63	85810.5	E IDAHO	156-31	43.30N	0.0	111.50W	0.0	33.0	0.0	0.0	0.0	NEIS
22SEP63	95644.0	E IDAHO	156-31	43.30N	0.0	111.60W	0.0	33.0	0.0	0.0	0.0	NEIS
22SEP63	145501.2	W IDAHO	156-44	44.40N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
22SEP63	154119.0	W IDAHO	156-44	44.40N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
22SEP63	170607.1	E IDAHO	156-31	43.20N	0.0	111.20W	0.0	33.0	0.0	0.0	0.0	NEIS
22SEP63	211332.6	W IDAHO	156-44	44.30N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
22SEP63	213055.7	E IDAHO	156-31	43.20N	0.0	111.50W	0.0	33.0	0.0	0.0	0.0	NEIS
22SEP63	213217.0	E IDAHO	156-31	43.20N	0.0	111.40W	0.0	33.0	0.0	0.0	0.0	NEIS
23SEP63	13032.7	E IDAHO	156-31	43.20N	0.0	111.30W	0.0	33.0	0.0	0.0	0.0	NEIS
23SEP63	41821.1	SE IDAHO	156-41	44.13N	0.05	111.19W	0.03	0.0	0.0	0.0	3.4	SDL
23SEP63	102103.6	W IDAHO	156-44	44.40N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
23SEP63	121708.6	W IDAHO	156-44	44.40N	0.0	114.80W	0.0	15.0	0.0	0.0	0.0	NEIS
23SEP63	232710.5	E IDAHO	156-31	43.30N	0.0	111.50W	0.0	33.0	0.0	0.0	0.0	NEIS
24SEP63	63150.5	HEBGEN LK	156-40	44.80N	0.0	111.00W	0.0	33.0	0.0	0.0	0.0	NEIS
24SEP63	63552.1	HEBGEN LK	156-40	44.90N	0.0	111.00W	0.0	33.0	0.0	4.7	0.0	NEIS
24SEP63	170527.9	E IDAHO	156-31	43.20N	0.0	111.20W	0.0	33.0	0.0	0.0	0.0	NEIS
28SEP63	190802.7	E IDAHO	156-31	43.30N	0.0	111.30W	0.0	33.0	0.0	0.0	0.0	NEIS
29SEP63	55823.7	E IDAHO	156-31	43.40N	0.0	111.40W	0.0	33.0	0.0	0.0	0.0	NEIS
29SEP63	60532.5	E IDAHO	156-31	43.30N	0.0	111.40W	0.0	33.0	0.0	0.0	0.0	NEIS
020CT63	21312.8	CENT IDAHO	156-44	44.21N	0.02	114.59W	0.03	0.0	0.0	0.0	2.2	SDL
020CT63	54433.2	CENT IDAHO	156-44	44.22N	0.02	114.67W	0.02	0.0	0.0	0.0	2.2	SDL
020CT63	55[illegible]	CENT IDAHO	156-44	44.24N	0.02	114.63W	0.03	0.0	0.0	0.0	2.2	SDL
020CT63	6[illegible]	CENT IDAHO	156-44	44.24N	0.02	114.55W	0.06	12.0	6.6	0.0	1.9	SDL
020CT63	20[illegible]	W MONTANA	156-74	47.35N	0.02	114.19W	0.06	8.7	2.7	0.0	2.8	SDL
030CT63	10[illegible]	CENT IDAHO	156-44	44.07N	0.02	114.86W	0.01	0.0	0.0	0.0	1.9	SDL
040CT63	44[illegible]	CENT IDAHO	156-44	44.22N	0.02	114.63W	0.03	0.0	0.0	0.0	2.4	SDL
050CT63	2[illegible]	CENT IDAHO	156-44	44.15N	0.02	114.65W	0.02	0.0	0.0	0.0	2.1	SDL
050CT63	181[illegible]	CENT IDAHO	156-44	44.14N	0.02	114.76W	0.02	0.0	0.0	0.0	2.1	SDL
060CT63	50[illegible]	CENT IDAHO	156-44	44.23N	0.02	114.63W	0.03	0.0	0.0	0.0	2.3	SDL

DATE	O.T.	GEO AREA	MAP SQ	LAT(DEG)+/-		LONG(DEG)+/-		DEPTH(KM)+/-		MB	M	SOURCE
060CT63	52654.6	CENT IDAHO	156-44	44.21N	0.02	114.62W	0.03	0.0	0.0	0.0	1.9	SDL
070CT63	34120.7	CENT IDAHO	156-44	44.16N	0.02	114.65W	0.02	0.0	0.0	0.0	2.3	SDL
070CT63	44451.6	CENT IDAHO	156-44	44.19N	0.02	114.61W	0.03	0.0	0.0	0.0	2.2	SDL
070CT63	52346.0	CENT IDAHO	156-44	44.16N	0.02	114.61W	0.03	0.0	0.0	0.0	2.1	SDL
070CT63	70618.0	CENT IDAHO	156-44	44.23N	0.02	114.58W	0.03	0.0	0.0	0.0	2.0	SDL
070CT63	213030.0	W IDAHO	156-44	44.80N	0.0	114.40W	0.0	33.0	0.0	0.0	0.0	NEIS
080CT63	42442.6	CENT IDAHO	156-44	44.16N	0.02	114.67W	0.02	0.0	0.0	0.0	1.9	SDL
110CT63	74850.7	CENT IDAHO	156-44	44.17N	0.02	114.50W	0.03	0.0	0.0	0.0	1.8	SDL
110CT63	230953.1	E IDAHO	156-31	43.40N	0.0	111.10W	0.0	30.0	0.0	0.0	0.0	NEIS
120CT63	65825.7	WYOMING	156-30	43.30N	0.0	110.90W	0.0	30.0	0.0	0.0	0.0	NEIS
120CT63	211008.1	SE IDAHO	156-21	42.99N	0.03	111.07W	0.03	0.0	0.0	0.0	2.7	SDL
120CT63	211227.4	SE IDAHO	156-30	43.40N	0.03	110.58W	0.04	0.0	0.0	0.0	2.7	SDL
120CT63	215901.9	E IDAHO	156-31	43.10N	0.0	111.10W	0.0	33.0	0.0	0.0	0.0	NEIS
120CT63	220159.2	SE IDAHO	156-21	42.69N	0.02	111.50W	0.02	0.0	0.0	0.0	3.0	SDL
120CT63	223401.6	E IDAHO	156-31	43.10N	0.0	111.30W	0.0	33.0	0.0	0.0	0.0	NEIS
130CT63	175547.1	E IDAHO	156-31	43.20N	0.0	111.20W	0.0	30.0	0.0	0.0	0.0	NEIS
140CT63	50231.6	SE IDAHO	156-30	43.17N	0.03	110.94W	0.03	11.4	2.1	0.0	2.7	SDL
140CT63	174029.0	SE IDAHO	156-30	43.52N	0.04	110.55W	0.04	0.0	0.0	0.0	2.9	SDL
150CT63	151520.6	W IDAHO	156-44	44.30N	0.0	114.80W	0.0	33.0	0.0	0.0	0.0	NEIS
160CT63	153632.1	W IDAHO	156-44	44.30N	0.0	114.80W	0.0	30.0	0.0	0.0	0.0	NEIS
170CT63	12207.7	W IDAHO	156-44	44.40N	0.0	114.70W	0.0	30.0	0.0	0.0	0.0	NEIS
190CT63	152934.4	ID-MA BORD	156-64	46.69N	0.01	114.82W	0.02	0.0	0.0	0.0	1.9	SDL
200CT63	130844.1	SE IDAHO	156-31	43.05N	0.02	111.55W	0.02	0.0	0.0	0.0	2.3	SDL
200CT63	214059.0	N IDAHO	156-75	47.23N	0.01	115.27W	0.03	0.0	0.0	0.0	2.3	SDL
240CT63	33149.6	W IDAHO	156-45	44.38N	0.01	115.73W	0.01	0.0	0.0	0.0	2.1	SDL
240CT63	95237.4	W IDAHO	156-44	44.40N	0.0	114.80W	0.0	33.0	0.0	3.8	0.0	NEIS
240CT63	134216.4	N IDAHO	156-54	45.80N	0.05	114.32W	0.04	0.0	0.0	0.0	2.9	SDL
240CT63	213512.6	W IDAHO	156-46	44.65N	0.02	116.57W	0.01	0.0	0.0	0.0	2.1	SDL
260CT63	202014.5	E IDAHO	156-31	43.10N	0.0	111.20W	0.0	37.0	0.0	0.0	0.0	NEIS
270CT63	155849.9	W IDAHO	156-44	44.20N	0.0	114.80W	0.0	30.0	0.0	0.0	0.0	NEIS
290CT63	53933.0	E IDAHO	156-31	43.10N	0.0	111.60W	0.0	33.0	0.0	4.0	0.0	NEIS
290CT63	74211.7	E IDAHO	156-31	43.20N	0.0	111.30W	0.0	30.0	0.0	0.0	0.0	NEIS
310CT63	80852.0	E IDAHO	156-31	43.00N	0.0	111.30W	0.0	33.0	0.0	3.0	0.0	NEIS
01NOV63	104120.7	CENT IDAHO	156-44	44.24N	0.02	114.63W	0.03	0.0	0.0	0.0	2.1	SDL
03NOV63	182602.0	E IDAHO	156-31	43.10N	0.0	111.30W	0.0	33.0	0.0	0.0	0.0	NEIS
04NOV63	80304.5	W IDAHO	156-45	44.65N	0.02	115.29W	0.02	0.0	0.0	0.0	2.4	SDL
05NOV63	33831.6	W WYOMING	156-20	42.38N	0.02	110.92W	0.06	0.0	0.0	0.0	2.8	SDL
05NOV63	34439.7	E IDAHO	156-31	43.10N	0.0	111.20W	0.0	33.0	0.0	0.0	0.0	NEIS
06NOV63	113533.6	W IDAHO	156-35	43.93N	0.01	115.24W	0.01	0.0	0.0	0.0	2.1	SDL
10NOV63	155052.6	W WYOMING	156-20	42.59N	0.02	110.61W	0.07	0.0	0.0	0.0	3.0	SDL
12NOV63	45712.1	YELLOWSTON	156-40	44.80N	0.0	110.60W	0.0	33.0	0.0	0.0	0.0	NEIS
12NOV63	234637.2	CENT IDAHO	156-44	44.29N	0.01	114.55W	0.03	0.0	0.0	0.0	3.4	SDL
24NOV63	2900.0	W WYOMING	156-30	43.73N	0.06	110.02W	0.07	0.0	0.0	0.0	2.8	SDL
28NOV63	31402.4	W IDAHO	156-44	44.30N	0.0	114.80W	0.0	33.0	0.0	3.5	0.0	NEIS
28NOV63	111418.6	CENT WASH	157-70	47.72N	0.01	120.50W	0.06	0.0	0.0	0.0	3.2	SDL
09DEC63	14518.2	WYOMING	156-30	43.60N	0.0	110.10W	0.0	33.0	0.0	0.0	0.0	NEIS
09DEC63	53925.7	YELLOWSTON	156-40	44.90N	0.0	110.30W	0.0	33.0	0.0	0.0	0.0	NEIS
14DEC63	125507.9	WYOMING	156-30	43.60N	0.0	110.30W	0.0	33.0	0.0	0.0	0.0	NEIS
14DEC63	184637.7	W IDAHO	156-44	44.50N	0.0	114.90W	0.0	33.0	0.0	0.0	0.0	NEIS
19DEC63	131006.9	E IDAHO	156-31	43.23N	0.02	111.27W	0.07	0.0	0.0	0.0	2.8	SDL
20DEC63	130050.2	HEBGEN LK	156-41	44.90N	0.0	111.70W	0.0	33.0	0.0	0.0	0.0	NEIS
22DEC63	25029.8	W IDAHO	156-44	44.80N	0.0	114.60W	0.0	33.0	0.0	4.4	0.0	NEIS
22DEC63	25408.2	WASHINGTON	156-89	48.50N	0.0	119.90W	0.0	33.0	0.0	0.0	0.0	NEIS
22DEC63	54439.2	W IDAHO	156-44	44.40N	0.0	114.50W	0.0	33.0	0.0	0.0	0.0	NEIS
23DEC63	1502.0	W IDAHO	156-44	44.30N	0.0	114.70W	0.0	33.0	0.0	0.0	0.0	NEIS
23DEC63	2859.1	W IDAHO	156-44	44.20N	0.0	114.40W	0.0	33.0	0.0	0.0	0.0	NEIS
24DEC63	15058.1	HEBGEN LK	156-41	44.80N	0.0	111.50W	0.0	20.0	0.0	0.0	0.0	NEIS
24DEC63	175419.7	HEBGEN LK	156-41	44.80N	0.0	111.10W	0.0	33.0	0.0	0.0	0.0	NEIS
25DEC63	200410.2	W IDAHO	156-44	44.20N	0.0	114.50W	0.0	33.0	0.0	0.0	0.0	NEIS
27DEC63	23621.6	WA-OR BORD	157-53	45.70N	0.0	123.40W	0.0	33.0	0.0	0.0	0.0	NEIS
28DEC63	72308.5	YELLOWSTON	156-40	44.90N	0.01	110.53W	0.09	10.0	3.0	0.0	3.5	SDL
28DEC63	82221.1	HEBGEN LK	156-41	44.90N	0.0	111.00W	0.0	33.0	0.0	0.0	0.0	NEIS
30DEC63	32853.5	YELLOWSTON	156-40	44.80N	0.0	110.30W	0.0	33.0	0.0	0.0	0.0	NEIS
06JAN64	193508.5	W IDAHO	156-44	44.30N	0.0	114.60W	0.0	0.0	0.0	0.0	0.0	NEIS

DATE	O.T.	GEO AREA	MAP SQ	LAT(DEG)	+/-	LONG(DEG)	+/-	DEPTH(KM)	+/-	MB	M	SOURCE
09JAN64	31056.2	W IDAHO	156-44	44.30N	0.0	114.60W	0.0	0.0	0.0	0.0	0.0	NEIS
09JAN64	111154.2	W IDAHO	156-44	44.30N	0.0	114.80W	0.0	0.0	0.0	0.0	0.0	NEIS
15JAN64	230636.2	WA-OR BORD	157-50	45.90N	0.0	120.00W	0.0	0.0	0.0	0.0	0.0	NEIS
18JAN64	221619.7	W IDAHO	156-46	44.48N	0.04	116.73W	0.04	0.0	0.0	0.0	2.5	SDL
22JAN64	54513.0	SE IDAHO	156-31	43.06N	0.01	111.82W	0.01	0.0	0.0	0.0	2.3	SDL
22JAN64	115352.2	SE IDAHO	156-21	42.32N	0.01	111.85W	0.01	0.0	0.0	0.0	1.8	SDL
22JAN64	211058.7	W IDAHO	156-44	44.30N	0.0	114.80W	0.0	0.0	0.0	0.0	0.0	NEIS
23JAN64	30449.7	W IDAHO	156-44	44.40N	0.0	114.50W	0.0	41.0	0.0	0.0	0.0	NEIS
25JAN64	232508.2	SE IDAHO	156-21	42.90N	0.01	111.60W	0.01	0.0	0.0	0.0	2.0	SDL
26JAN64	105723.2	SE IDAHO	156-21	42.57N	0.03	111.78W	0.02	0.0	0.0	0.0	2.1	SDL
26JAN64	162440.4	SE IDAHO	156-21	42.46N	0.02	111.64W	0.02	0.0	0.0	0.0	1.9	SDL
26JAN64	214054.6	NW OREGON	157-62	46.17N	0.02	122.18W	0.07	0.0	0.0	0.0	3.4	SDL
27JAN64	144106.9	SE IDAHO	156-31	43.17N	0.02	111.20W	0.02	0.0	0.0	0.0	2.3	SDL
28JAN64	24146.9	YELLOWSTON	156-40	44.65N	0.01	110.76W	0.01	0.0	0.0	0.0	2.7	SDL
28JAN64	125707.9	E IDAHO	156-31	43.20N	0.0	111.40W	0.0	0.0	0.0	4.2	0.0	NEIS
29JAN64	31653.3	W MONTANA	156-61	46.31N	0.02	111.64W	0.01	0.0	0.0	0.0	2.6	SDL
29JAN64	115104.9	SE IDAHO	156-31	43.11N	0.06	111.73W	0.02	0.0	0.0	0.0	1.8	SDL
30JAN64	195221.2	E IDAHO	156-31	43.09N	0.03	111.81W	0.02	0.0	0.0	0.0	1.9	SDL
30JAN64	213317.0	SE IDAHO	156-31	43.26N	0.03	111.20W	0.03	9.9	2.2	0.0	2.5	SDL
30JAN64	222310.4	E IDAHO	156-31	43.30N	0.0	111.40W	0.0	0.0	0.0	0.0	0.0	NEIS
31JAN64	82842.6	YELLOWSTON	156-40	44.04N	0.05	110.75W	0.05	0.0	0.0	0.0	1.9	SDL
31JAN64	165026.7	CENT IDAHO	156-44	44.02N	0.01	114.97W	0.01	0.0	0.0	0.0	2.5	SDL
02FEB64	121511.0	E IDAHO	156-31	43.30N	0.0	111.40W	0.0	0.0	0.0	0.0	0.0	NEIS
03FEB64	55544.3	E IDAHO	156-31	43.20N	0.0	111.10W	0.0	0.0	0.0	0.0	0.0	NEIS
05FEB64	223817.7	SW WYOMING	156-10	41.77N	0.01	110.91W	0.01	11.7	2.3	0.0	1.8	SDL
06FEB64	80228.2	E IDAHO	156-22	42.00N	0.0	112.30W	0.0	0.0	0.0	0.0	0.0	NEIS
06FEB64	111334.7	E IDAHO	156-22	42.10N	0.0	112.40W	0.0	0.0	0.0	0.0	0.0	NEIS
07FEB64	132008.1	E IDAHO	156-22	42.30N	0.0	112.40W	0.0	0.0	0.0	0.0	0.0	NEIS
08FEB64	62209.1	W IDAHO	156-44	44.40N	0.0	114.50W	0.0	0.0	0.0	0.0	0.0	NEIS
11FEB64	65606.6	W MONTANA	156-74	47.15N	0.02	114.16W	0.05	13.4	3.3	0.0	2.5	SDL
11FEB64	65851.6	W MONTANA	156-73	47.12N	0.02	113.54W	0.06	0.0	0.0	0.0	3.0	SDL
14FEB64	22222.7	ID-MA BORD	156-41	44.42N	0.01	111.77W	0.01	0.0	0.0	0.0	3.3	SDL
16FEB64	41047.0	W WYOMING	156-21	42.61N	0.03	111.17W	0.05	10.9	9.9	0.0	2.6	SDL
19FEB64	142304.4	CENT IDAHO	156-44	44.16N	0.02	114.59W	0.03	0.0	0.0	0.0	2.4	SDL
20FEB64	32936.1	W IDAHO	156-44	44.40N	0.0	114.70W	0.0	0.0	0.0	0.0	0.0	NEIS
21FEB64	234518.1	ID-WY BORD	156-20	42.73N	0.01	110.89W	0.01	0.0	0.0	0.0	2.2	SDL
22FEB64	193344.0	SE IDAHO	156-21	42.59N	0.02	111.43W	0.02	6.7	3.2	0.0	2.1	SDL
24FEB64	94729.7	ID-WY BORD	156-20	42.39N	0.01	110.97W	0.01	0.0	0.0	0.0	1.7	SDL
24FEB64	114728.5	SE IDAHO	156-21	42.85N	0.22	111.07W	0.03	0.0	0.0	0.0	1.6	SDL
25FEB64	45728.2	SE IDAHO	156-32	43.95N	0.02	112.38W	0.01	0.0	0.0	0.0	2.0	SDL
27FEB64	230946.2	SE IDAHO	156-21	42.80N	0.02	111.32W	0.02	0.0	0.0	0.0	2.5	SDL
28FEB64	10943.1	WYOMING	156-30	43.60N	0.0	110.20W	0.0	0.0	0.0	0.0	0.0	NEIS
04MAR64	92354.6	W WYOMING	156-30	43.00N	0.02	110.65W	0.02	0.0	0.0	0.0	2.3	SDL
01APR64	50647.6	N UTAH	156-11	41.25N	0.02	111.62W	0.02	0.0	0.0	0.0	2.0	SDL
01APR64	73924.2	ID-WY BORD	156-31	43.27N	0.03	111.01W	0.02	0.0	0.0	0.0	1.8	SDL
01APR64	122134.6	S IDAHO	156-22	42.06N	0.02	112.58W	0.02	8.9	2.2	0.0	2.0	SDL
02APR64	33016.8	SE IDAHO	156-21	42.46N	0.02	111.54W	0.02	5.7	2.5	0.0	2.1	SDL
02APR64	60210.4	SE IDAHO	156-21	42.35N	0.01	111.76W	0.01	0.0	0.0	0.0	1.8	SDL
02APR64	84437.2	SE IDAHO	156-31	43.07N	0.02	111.47W	0.02	5.3	1.7	0.0	2.2	SDL
03APR64	42924.5	N UTAH	156-13	41.60N	0.01	113.08W	0.01	0.0	0.0	0.0	2.0	SDL
03APR64	75535.7	SE IDAHO	156-21	42.96N	0.03	111.40W	0.02	6.9	2.3	0.0	1.8	SDL
03APR64	114839.0	SE IDAHO	156-21	42.58N	0.02	111.14W	0.01	0.0	0.0	0.0	2.0	SDL
03APR64	182801.5	ID-WY BORD	156-20	42.52N	0.01	110.94W	0.01	11.2	1.8	0.0	2.1	SDL
04APR64	174513.2	NW UTAH	156-12	41.32N	0.02	112.48W	0.02	0.0	0.0	0.0	2.5	SDL
04APR64	190109.5	NW UTAH	156-12	41.08N	0.02	112.89W	0.03	0.0	0.0	0.0	2.2	SDL
05APR64	90752.5	W MONTANA	156-74	47.10N	0.01	114.34W	0.03	0.0	0.0	0.0	3.0	SDL
07APR64	153132.5	MONTANA	156-51	45.00N	0.0	111.60W	0.0	33.0	0.0	0.0	0.0	NEIS
07APR64	154948.1	W MONTANA	156-74	47.93N	0.03	114.40W	0.06	0.0	0.0	0.0	2.9	SDL
08APR64	34827.0	SE IDAHO	156-21	42.86N	0.03	111.63W	0.02	0.0	0.0	0.0	1.6	SDL
08APR64	53500.0	CENT WASH	156-77	47.14N	0.02	117.85W	0.04	0.0	0.0	0.0	2.8	SDL
09APR64	33905.4	ID-WY BORD	156-20	42.89N	0.02	110.95W	0.01	0.0	0.0	0.0	2.1	SDL
10APR64	24458.5	W WYOMING	156-30	43.32N	0.04	110.69W	0.03	0.0	0.0	0.0	1.8	SDL
10APR64	132624.7	SE IDAHO	156-21	42.90N	0.02	111.40W	0.01	0.0	0.0	0.0	1.6	SDL
12APR64	153749.6	E IDAHO	156-31	43.20N	0.0	111.40W	0.0	0.0	0.0	0.0	0.0	NEIS

DATE	O.T.	GEO AREA	MAP SQ	LAT(DEG) +/-		LONG(DEG) +/-		DEPTH(KM) +/-		MB	M	SOURCE
13APR64	113630.4	WYOMING	156-30	43.30N	0.0	110.80W	0.0	37.0	0.0	0.0	0.0	NEIS
13APR64	113905.1	E IDAHO	156-31	43.31N	0.02	111.21W	0.02	12.0	1.8	0.0	2.7	SDL
15APR64	52620.6	SE IDAHO	156-31	43.36N	0.04	111.23W	0.02	0.0	0.0	0.0	2.4	SDL
15APR64	133702.7	E IDAHO	156-31	43.10N	0.0	111.50W	0.0	33.0	0.0	0.0	0.0	NEIS
17APR64	65343.6	W IDAHO	156-44	44.10N	0.0	114.30W	0.0	33.0	0.0	0.0	0.0	NEIS
18APR64	54353.4	SW MONTANA	156-42	44.70N	0.02	112.22W	0.02	0.0	0.0	0.0	2.5	SDL
21APR64	35157.1	ID-WY BORD	156-30	43.95N	0.07	110.98W	0.05	0.0	0.0	0.0	1.9	SDL
21APR64	121132.9	W IDAHO	156-44	44.20N	0.0	114.30W	0.0	33.0	0.0	3.6	0.0	NEIS
26APR64	14218.4	N WASH	157-81	50.00N	0.05	121.50W	0.06	0.0	0.0	0.0	3.8	SDL
02MAY64	32424.1	WYOMING	156-30	43.60N	0.0	110.40W	0.0	33.0	0.0	0.0	0.0	NEIS
03MAY64	223145.2	HEBGEN LK	156-41	44.90N	0.0	111.90W	0.0	33.0	0.0	0.0	0.0	NEIS
07MAY64	114230.4	WYOMING	156-30	43.30N	0.0	110.40W	0.0	33.0	0.0	0.0	0.0	NEIS
08MAY64	13508.2	E IDAHO	156-31	43.30N	0.0	111.30W	0.0	33.0	0.0	0.0	0.0	NEIS
09MAY64	141839.0	MONTANA	156-51	45.00N	0.0	111.10W	0.0	33.0	0.0	0.0	0.0	NEIS
11MAY64	50116.6	ID-WY BORD	156-41	44.10N	0.01	111.17W	0.01	0.0	0.0	0.0	2.6	SDL
13MAY64	134606.5	NW MONTANA	156-84	48.08N	0.01	114.20W	0.01	0.0	0.0	0.0	3.4	SDL
19MAY64	62338.7	MONTANA	156-52	45.00N	0.0	112.70W	0.0	33.0	0.0	3.8	0.0	NEIS
19MAY64	214656.5	E IDAHO	156-42	44.90N	0.0	112.70W	0.0	33.0	0.0	4.3	0.0	NEIS
19MAY64	223231.1	MONTANA	156-52	45.20N	0.0	112.30W	0.0	33.0	0.0	0.0	0.0	NEIS
20MAY64	22126.4	MONTANA	156-52	45.00N	0.0	112.80W	0.0	33.0	0.0	4.0	0.0	NEIS
22MAY64	121149.2	UTAH	156-12	41.90N	0.0	112.10W	0.0	33.0	0.0	0.0	0.0	NEIS
25MAY64	134315.9	W MONTANA	156-73	47.41N	0.04	113.39W	0.02	0.0	0.0	0.0	3.2	SDL
26MAY64	93200.9	W MONTANA	156-51	45.86N	0.02	111.50W	0.02	12.1	2.5	0.0	3.1	SDL
30MAY64	25343.2	W MONTANA	156-51	45.98N	0.04	111.64W	0.02	8.3	3.2	0.0	2.6	SDL
05JUN64	45204.3	E IDAHO	156-31	43.20N	0.0	111.30W	0.0	33.0	0.0	3.7	0.0	NEIS
12JUN64	33335.9	W IDAHO	156-44	44.10N	0.0	114.70W	0.0	0.0	0.0	0.0	0.0	NEIS
26JUN64	122428.5	MONTANA	156-85	48.20N	0.0	115.10W	0.0	33.0	0.0	0.0	0.0	NEIS
27JUN64	231041.9	UTAH	156-13	41.00N	0.0	113.40W	0.0	33.0	0.0	0.0	0.0	NEIS
01JUL64	34115.0	E IDAHO	156-30	42.60N	0.0	111.80W	0.0	33.0	0.0	0.0	0.0	NEIS
03JUL64	72826.7	NW UTAH	156-13	41.73N	0.03	113.94W	0.59	0.0	0.0	0.0	2.3	SDL
07JUL64	111755.7	SW IDAHO	156-37	43.19N	0.02	117.31W	0.04	0.0	0.0	0.0	2.8	SDL
11JUL64	24725.3	WYOMING	156-20	42.90N	0.0	110.70W	0.0	33.0	0.0	0.0	0.0	NEIS
13AUG64	20826.4	NE NEVADA	156-14	41.69N	0.01	114.19W	0.01	0.0	0.0	0.0	2.8	SDL
13AUG64	215101.7	MONTANA	156-62	46.50N	0.0	112.20W	0.0	15.0	0.0	4.1	0.0	NEIS
15AUG64	173805.1	YELLOWSTON	156-40	44.30N	0.0	110.70W	0.0	33.0	0.0	0.0	0.0	NEIS
18AUG64	84718.2	MONTANA	156-50	45.10N	0.0	110.50W	0.0	33.0	0.0	4.2	0.0	NEIS
24AUG64	101858.5	MONTANA	156-51	45.00N	0.0	111.40W	0.0	33.0	0.0	4.3	0.0	NEIS
08SEP64	2755.5	W IDAHO	156-44	44.30N	0.0	114.80W	0.0	33.0	0.0	3.9	0.0	NEIS
12SEP64	84505.5	W IDAHO	156-44	44.20N	0.0	114.60W	0.0	33.0	0.0	0.0	0.0	NEIS
17SEP64	221720.0	WYOMING	156-20	42.80N	0.0	110.80W	0.0	33.0	0.0	4.0	0.0	NEIS
18SEP64	220128.2	HEBGEN LK	156-41	44.90N	0.0	111.20W	0.0	41.0	0.0	0.0	0.0	NEIS
20SEP64	74227.7	N CALIF	157-14	41.30N	0.0	124.90W	0.0	33.0	0.0	4.3	0.0	NEIS
22SEP64	65210.0	W IDAHO	156-44	44.40N	0.0	114.80W	0.0	15.0	0.0	4.3	0.0	NEIS
22SEP64	80351.0	W IDAHO	156-44	44.30N	0.0	114.70W	0.0	33.0	0.0	0.0	0.0	NEIS
01OCT64	123124.6	WA-OR BORD	157-52	45.70N	0.0	122.80W	0.0	33.0	0.0	5.3	0.0	NEIS
02OCT64	103933.2	HEBGEN LK	156-41	44.80N	0.0	111.40W	0.0	33.0	0.0	3.8	0.0	NEIS
09OCT64	22602.4	MONTANA	156-74	47.80N	0.0	114.20W	0.0	33.0	0.0	4.6	0.0	NEIS
14OCT64	160353.6	MONTANA	156-74	47.90N	0.0	114.30W	0.0	33.0	0.0	4.6	0.0	NEIS
15OCT64	3730.0	E IDAHO	156-33	43.90N	0.0	113.50W	0.0	33.0	0.0	0.0	0.0	NEIS
15OCT64	143237.5	WASHINGTON	157-72	47.70N	0.0	122.10W	0.0	33.0	0.0	4.1	0.0	NEIS
18OCT64	183329.9	UTAH	156-11	41.90N	0.0	111.80W	0.0	10.0	0.0	4.3	0.0	NEIS
21OCT64	73831.0	HEBGEN LK	156-41	44.80N	0.0	111.60W	0.0	33.0	0.0	5.8	0.0	NEIS
21OCT64	200220.5	HEBGEN LK	156-41	44.80N	0.0	111.60W	0.0	33.0	0.0	3.9	0.0	NEIS
25OCT64	231613.0	ID-MA BORD	156-41	44.86N	0.03	111.39W	0.03	0.0	0.0	0.0	2.8	SDL
13NOV64	230953.7	HEBGEN LK	156-41	44.80N	0.0	111.00W	0.0	10.0	0.0	4.1	0.0	NEIS
17NOV64	101100.1	YELLOWSTON	156-40	44.60N	0.0	110.90W	0.0	33.0	0.0	3.9	0.0	NEIS
18NOV64	102650.0	W IDAHO	156-44	44.10N	0.0	114.10W	0.0	33.0	0.0	3.6	0.0	NEIS
24NOV64	30107.7	MONTANA	156-51	45.30N	0.0	111.70W	0.0	10.0	0.0	3.9	0.0	NEIS
09DEC64	184440.2	N NEVADA	156-18	41.68N	0.01	118.34W	0.04	0.0	0.0	0.0	2.7	SDL
10DEC64	105211.2	N NEVADA	156-18	41.47N	0.01	118.61W	0.03	0.0	0.0	0.0	3.5	SDL
12DEC64	2218.5	MONTANA	156-62	46.70N	0.0	112.80W	0.0	33.0	0.0	0.0	0.0	NEIS
15DEC64	171634.7	W MONTANA	156-50	45.23N	0.05	110.08W	0.06	0.0	0.0	0.0	3.0	SDL
15DEC64	185340.5	E IDAHO	156-41	44.08N	0.05	111.32W	0.05	0.0	0.0	0.0	3.0	SDL
17DEC64	30116.6	SW MONTANA	156-41	44.72N	0.02	111.17W	0.01	7.3	1.8	0.0	2.8	SDL

DATE	O.T.	GEO AREA	MAP SQ	LAT(DEG)	+/-	LONG(DEG)	+/-	DEPTH(KM)	+/-	MB	M	SOURCE
21DEC64	213847.2	MONTANA	156-52	45.20N	0.0	112.70W	0.0	33.0	0.0	3.5	0.0	NEIS
21DEC64	215458.0	MONTANA	156-42	44.90N	0.0	112.70W	0.0	44.0	0.0	3.9	0.0	NEIS
21DEC64	225508.7	MONTANA	156-52	45.00N	0.0	112.00W	0.0	33.0	0.0	0.0	0.0	NEIS
22DEC64	102846.7	MONTANA	156-42	44.90N	0.0	112.50W	0.0	33.0	0.0	4.3	0.0	NEIS
22DEC64	154528.2	MONTANA	156-52	45.40N	0.0	112.20W	0.0	33.0	0.0	4.0	0.0	NEIS
23DEC64	200541.2	SW MONTANA	156-42	44.77N	0.02	112.54W	0.01	0.0	0.0	0.0	3.3	SDL
24DEC64	225134.7	YELLOWSTON	156-40	44.70N	0.0	110.80W	0.0	33.0	0.0	4.0	0.0	NEIS
06JAN65	20122.2	MONTANA	156-42	44.90N	0.0	112.70W	0.0	7.0	0.0	5.1	0.0	NEIS
06JAN65	33358.5	SW MONTANA	156-42	44.83N	0.04	112.72W	0.04	3.2	2.0	0.0	3.4	SDL
13JAN65	34054.5	MONTANA	156-52	45.00N	0.0	112.60W	0.0	33.0	0.0	3.8	0.0	NEIS
13JAN65	34423.3	MONTANA	156-42	44.90N	0.0	112.70W	0.0	33.0	0.0	3.8	0.0	NEIS
13JAN65	232354.7	YELLOWSTON	156-40	44.50N	0.0	110.20W	0.0	33.0	0.0	0.0	0.0	NEIS
25JAN65	72318.2	SE IDAHO	156-21	42.89N	0.08	111.40W	0.09	0.0	0.0	0.0	2.6	SDL
25JAN65	122419.2	MONTANA	156-50	45.50N	0.0	110.30W	0.0	33.0	0.0	4.0	0.0	NEIS
19FEB65	173521.0	YELLOWSTON	156-40	44.70N	0.0	110.10W	0.0	22.0	0.0	4.0	0.0	NEIS
20FEB65	44534.7	SW MONTANA	156-41	44.69N	0.03	111.28W	0.03	0.0	0.0	0.0	3.0	SDL
27MAR65	231738.5	E IDAHO	156-30	42.60N	0.0	111.50W	0.0	33.0	0.0	0.0	0.0	NEIS
02APR65	30651.1	E IDAHO	156-30	42.60N	0.0	111.50W	0.0	33.0	0.0	0.0	0.0	NEIS
02APR65	51925.5	E IDAHO	156-30	42.50N	0.0	111.50W	0.0	33.0	0.0	4.5	0.0	NEIS
02APR65	52520.0	E IDAHO	156-30	42.50N	0.0	111.50W	0.0	33.0	0.0	0.0	0.0	NEIS
06APR65	144601.2	MONTANA	156-51	45.60N	0.0	111.90W	0.0	33.0	0.0	3.7	0.0	NEIS
07APR65	210643.0	W IDAHO	156-44	44.40N	0.0	114.80W	0.0	33.0	0.0	3.8	0.0	NEIS
13APR65	75901.0	MONTANA	156-63	46.90N	0.0	113.10W	0.0	33.0	0.0	4.0	0.0	NEIS
15APR65	82247.5	YELLOWSTON	156-40	44.90N	0.0	110.30W	0.0	33.0	0.0	3.1	0.0	NEIS
16APR65	154712.0	W WYOMING	156-20	42.75N	0.05	110.30W	0.19	0.0	0.0	0.0	2.6	SDL
18APR65	190534.1	W IDAHO	156-44	44.30N	0.0	114.50W	0.0	33.0	0.0	3.5	0.0	NEIS
27APR65	185136.6	UTAH	156-12	41.30N	0.0	112.80W	0.0	33.0	0.0	0.0	0.0	NEIS
29APR65	152843.2	WASHINGTON	157-72	47.40N	0.0	122.40W	0.0	57.0	0.0	6.5	0.0	NEIS
11MAY65	15025.3	UTAH	156-11	41.00N	0.0	111.50W	0.0	15.0	0.0	4.1	0.0	NEIS
11MAY65	181724.0	HEBGEN LK	156-40	44.70N	0.0	111.00W	0.0	33.0	0.0	4.2	0.0	NEIS
11MAY65	183243.7	YELLOWSTON	156-40	44.80N	0.0	110.50W	0.0	33.0	0.0	0.0	0.0	NEIS
11MAY65	202943.6	MONTANA	156-50	45.00N	0.0	110.70W	0.0	33.0	0.0	0.0	0.0	NEIS
11MAY65	214034.1	HEBGEN LK	156-41	44.90N	0.0	111.20W	0.0	35.0	0.0	0.0	0.0	NEIS
12MAY65	101606.9	MONTANA	156-51	45.30N	0.0	111.20W	0.0	15.0	0.0	3.6	0.0	NEIS
13MAY65	64738.5	HEBGEN LK	156-41	44.80N	0.0	111.20W	0.0	33.0	0.0	0.0	0.0	NEIS
15MAY65	104108.2	HEBGEN LK	156-40	44.90N	0.0	111.00W	0.0	33.0	0.0	0.0	0.0	NEIS
15MAY65	130411.2	YELLOWSTON	155-49	44.30N	0.0	110.00W	0.0	33.0	0.0	3.6	0.0	NEIS
16MAY65	173614.7	HEBGEN LK	156-41	44.80N	0.0	111.40W	0.0	15.0	0.0	4.2	0.0	NEIS
23MAY65	191507.2	MONTANA	156-53	45.00N	0.0	113.10W	0.0	33.0	0.0	3.9	0.0	NEIS
24MAY65	120517.6	E IDAHO	156-30	42.80N	0.0	111.40W	0.0	33.0	0.0	0.0	0.0	NEIS
28MAY65	110453.7	N UTAH	156-12	41.72N	0.01	112.18W	0.02	0.0	0.0	0.0	2.7	SDL
01JUN65	94203.5	YELLOWSTON	156-40	44.70N	0.0	110.90W	0.0	33.0	0.0	3.9	0.0	NEIS
03JUN65	210651.0	MONTANA	156-50	45.20N	0.0	110.90W	0.0	33.0	0.0	0.0	0.0	NEIS
07JUN65	175915.7	MONTANA	156-63	46.90N	0.0	113.20W	0.0	33.0	0.0	0.0	0.0	NEIS
09JUN65	121905.7	MONTANA	156-51	45.20N	0.0	111.60W	0.0	33.0	0.0	0.0	0.0	NEIS
09JUL65	210116.5	MONTANA	156-51	45.00N	0.0	111.50W	0.0	33.0	0.0	0.0	0.0	NEIS
10JUL65	65212.6	MONTANA	156-51	45.10N	0.0	111.50W	0.0	33.0	0.0	0.0	0.0	NEIS
10JUL65	71817.0	MONTANA	156-51	45.10N	0.0	111.40W	0.0	33.0	0.0	0.0	0.0	NEIS
15JUL65	70141.6	HEBGEN LK	156-41	44.90N	0.0	111.70W	0.0	33.0	0.0	4.2	0.0	NEIS
24JUL65	122158.2	MONTANA	156-52	45.10N	0.0	112.90W	0.0	33.0	0.0	4.1	0.0	NEIS
29JUL65	40242.2	W IDAHO	156-44	44.30N	0.0	114.70W	0.0	33.0	0.0	4.4	0.0	NEIS
29JUL65	82552.7	E IDAHO	156-31	43.20N	0.0	111.80W	0.0	33.0	0.0	4.0	0.0	NEIS
03AUG65	83130.6	MONTANA	156-51	45.00N	0.0	112.00W	0.0	19.0	0.0	0.0	0.0	NEIS
07AUG65	83036.2	MONTANA	156-52	45.10N	0.0	112.30W	0.0	33.0	0.0	0.0	0.0	NEIS
12AUG65	134543.7	MONTANA	156-52	45.00N	0.0	112.80W	0.0	33.0	0.0	3.4	0.0	NEIS
17AUG65	70934.4	UTAH	156-12	41.70N	0.0	112.70W	0.0	33.0	0.0	0.0	0.0	NEIS
19AUG65	210215.7	OREGON	156-48	44.60N	0.0	118.40W	0.0	33.0	0.0	4.4	0.0	NEIS
22AUG65	175433.2	WYOMING	156-20	42.30N	0.0	110.60W	0.0	33.0	0.0	3.3	0.0	NEIS
23AUG65	10305.8	E IDAHO	156-30	42.50N	0.0	111.30W	0.0	33.0	0.0	3.6	0.0	NEIS
29AUG65	30019.7	MONTANA	156-51	45.70N	0.0	111.60W	0.0	17.0	0.0	3.7	0.0	NEIS

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16. ABSTRACT (200 words or less)

This report is a seismicity study of the Pacific Northwest region of the United States; it covers the period between November 1961 and August 1965. During the study, 326 epicenters (SDL events) were located by visual analysis of film records of short-period seismic data.

These SDL events were in addition to the 302 events in the area of interest, ranging in body-wave magnitude from 3.0 to 6.5, compiled from the National Earthquake Information Service (NEIS) epicenter list. A plot of the 326 events generally shows the same geographic distribution as the plot of the NEIS events, except in Oregon where most of the SDL events were located in the historically quiet SE quadrant of the state. Considerably more events were located in Washington and Oregon than appeared on the NEIS plot, suggesting that the area of interest is far more active than traditionally thought.

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