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Seismicity of the Pahute Mesa Area, Nevada Test Site

8 October 1975 to 30 June 1976

by

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ABSTRACT

A total of 1,075 earthquakes occurred in the Pahute Mesa area with $2.5 \le M_L \le 4.9$ during the period October 28, 1975, to June 28, 1976. The majority of these earthquakes are aftershocks of the nuclear events, Kasseri, Inlet, Muenster, Fontina, Cheshire, Estuary, Colby, and Pool ($5.8 \le M_L \le 6.3$). Smaller nuclear events ($M_L \le 5.5$) on Rainier Mesa and Yucca Flat detonated in the same time period did not trigger aftershock sequences. The aftershock series were displaced laterally from ground zero and occurred deeper (at 4-6 km) than the nuclear event depth of burial (~1 km). The aftershocks appear to occur on vertical faults with approximately north-south strike.

The number of aftershocks following each nuclear event generally declined as the testing program progressed (for instance, Kasseri triggered twice as many events as Colby). Comparison of this series with the 1968-70 nuclear test series shows that Benham triggered about nine times the number of aftershocks associated with Kasseri. Aftershock b-values were lower during this series than the 1968-70 series. The range of b-values in the earlier period was $1.7 \le b \le 2.0$ while during this period b ranged between $0.9 \le b \le 1.4$.

INTRODUCTION

The principal goal of this program was to locate aftershocks related to high-yield nuclear tests conducted by the Department of Energy (formerly Energy Research and Development Administration) at the Nevada Test Site (NTS) and to document the temporal variation in seismicity. The intent of this data report is to make available the basic seismological observations concerning the nuclear event induced seismicity at NTS during the 1975-76 testing program (Accelerated High Yield Testing Program). Subsequent reports will present detailed analyses of these data in relation to the geologic structure, nuclear event induced faulting, and tectonics of the region.

Earthquake activity has been previously observed to follow large nuclear explosions on the Pahute Mesa (Boucher and others, 1969; Ryall and Savage, 1969). In an earlier study by the U.S. Geological Survey (Hamilton and Healy, 1969; Hamilton and others, 1971; Hamilton and others, 1972), a dense network of seismic stations was used to monitor aftershocks from the 1,100-kt Benham test on December 19, 1968, and five other tests. Two of the tests, Jorum in 1969 and Handley in 1970, were also in the 1,000-kt yield range. The Almendro event in 1973 was also monitored for aftershocks (Bayer, 1974) using the USGS Southern Nevada network with two supplemental stations.

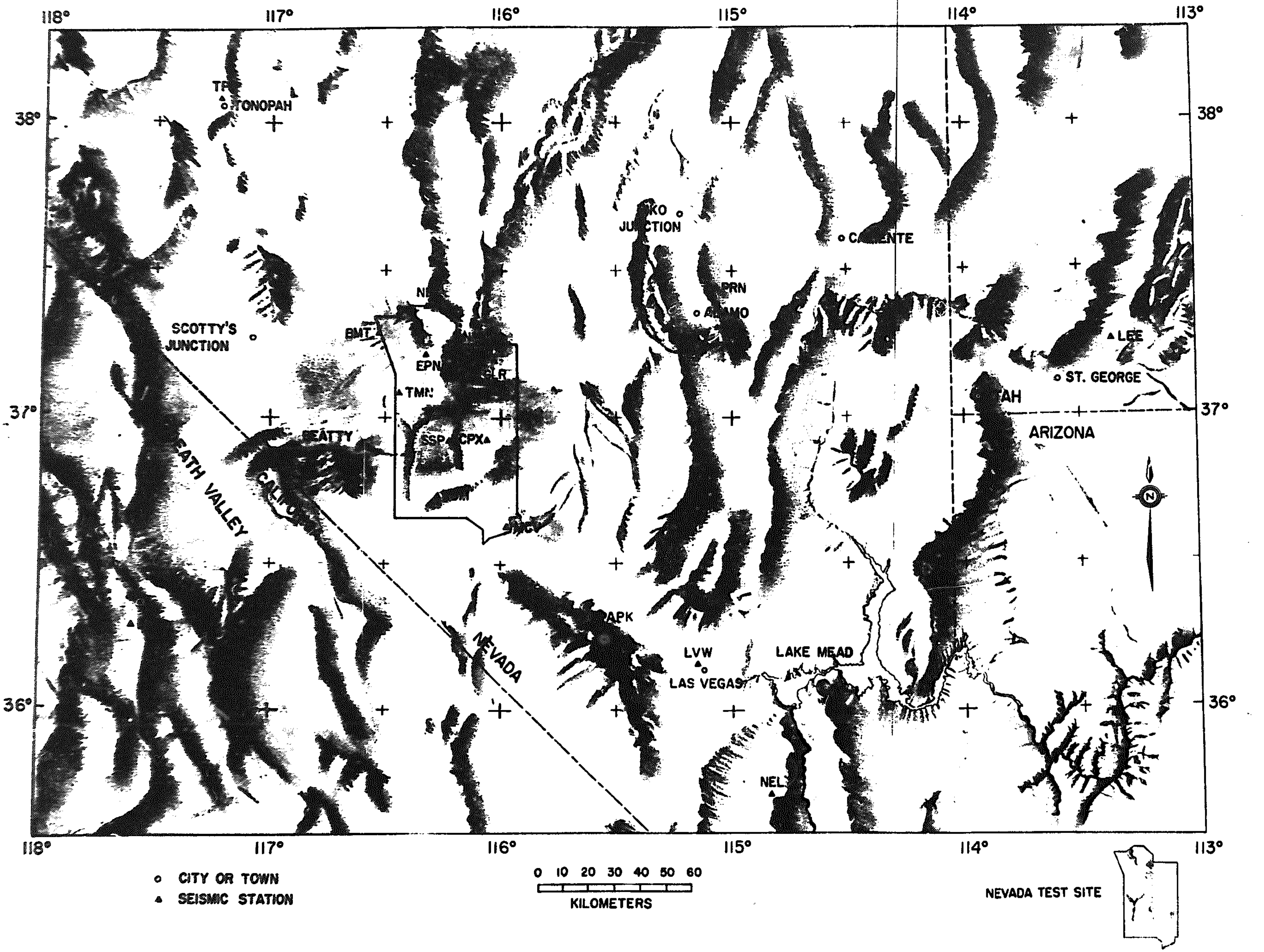

Figure 1.--Map showing the location of the Nevada Test Site and the Southern Nevada Seismic Net.

The current seismic monitoring program was initiated October 8, 1975, prior to event Kasseri, the second of six large tests in an accelerated nuclear testing program in 1975 and early 1976. New seismic stations were installed in the northern and central part of the NTS (BMT, NPM, NRM, EPN, TMN, GLR, and SSP). These stations and the ten stations which were already recording are shown in figure 1. The older stations include LSM, CPX, and MCV on NTS, Angels Peak (APK), Las Vegas (LVW), South Pahroc Range (PRN), and four which belong to Sandia Laboratories including Darwin, Calif. (DAC), Nelson, Nev. (NEL), Tonopah, Nev. (TPH), and Leeds, Utah (LEE). All the stations operated to the end of June 1976 except for a few temporary outages due to power or telephone line difficulties.

During this report period, there were five nuclear events in the yield range 200-1,000 kt (kilotons), three events in the 200-500-kt range, and two events with yields less than 20 kt in the Pahute Mesa and Rainier Mesa regions of the Nevada Test Site. The location of these events is shown in figure 2.

During the same period, there were five announced nuclear events on Yucca Flat (east-central NTS). The yield ranges for these events are: one in the 200-500-kt range, three in the 20-200-kt range, and one less than 20 kt. These events are listed in the appendix, but are not shown in figure 2 or succeeding maps, because they are not believed to be associated with seismic activity.

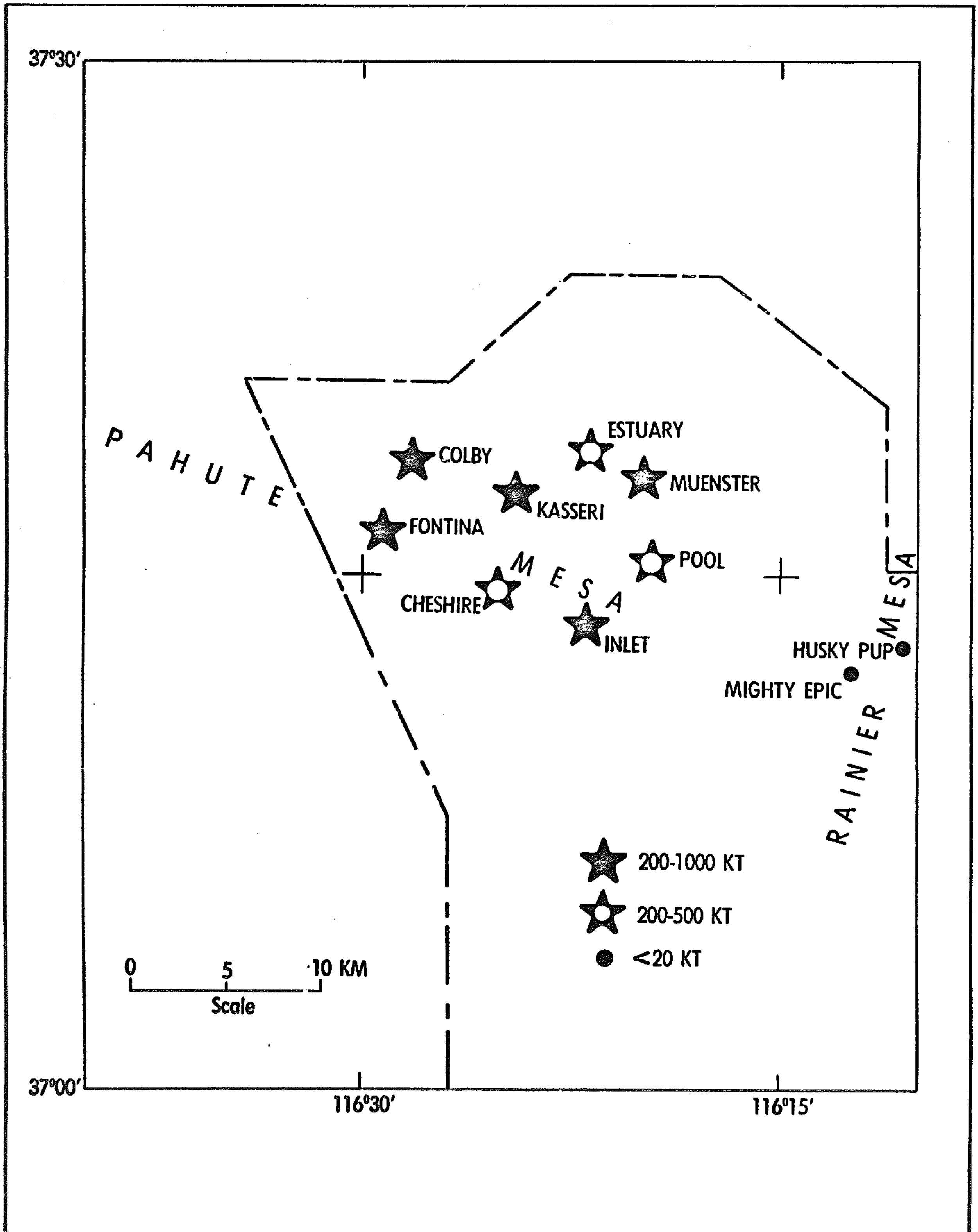

Figure 2.--Map showing the locations of announced nuclear tests in the Pahute Mesa and Rainier Mesa areas.

SEISMIC INSTRUMENTATION

Station locations, travel time delays, magnitude corrections, magnification, and equipment types are shown in table 1. Equipment at the USGS stations is powered by commercial power whenever possible, but where commercial power is not available, batteries or gas-driven thermal electric generator is used. A frequency-modulated tone is carried by wire or radio to a central point where it is combined with tones from other stations, and the multiplexed signal is then transmitted by telephone circuits to the USGS office in Las Vegas. There, the signal is demodulated by discriminators and recorded on 16-mm film.

Table 1.--Seismograph station data and corrections

Station	Latitude N.	Longitude W.	Travel time delay no. 1[1]	Magnitude correction[2]	Seismometer	VCO/amp	Magnification @ 1 Hz
BMT	37°17.01'	116°32.02'	.05 sec.	.19	L-4C	6242	209 K
NRM	37°16.73'	116°12.25'	.18 sec	.33	L-4C	6242	122 K
EPN	37°12.83'	116°19.42'	.01 sec	-.18	S-13	6202	90 K
NPM	37°23.04'	116°19.38'	-.06 sec	.35	L-4C	6242	122 K
SSP	36°55.52'	116°13.11'	.02 sec	.15	NGC-21	6242	188 K
TMN	37° 5.02'	116°26.63'	.01 sec	.46	NGC-21	6242	55 K
GLR	37°11.97'	116° 1.05'	-.13 sec	.02	NGC-21	6242	218 K
CPX	36°55.89'	116° 3.40'	-.16 sec	.20	NGC-21	6207/L-5	112 K
LSM	36°44.32'	116°16.68'	.02 sec	-.08	S-13	6202	257 K
MCV	36°38.01'	115°59.99'	.03 sec	.34	NGC-21	6207/L-5	217 K
PRN	37°26.50'	115° 4.00'	.57 sec	-.40	NGC-21	6202	111 K
DAC	36°16.61'	117°35.62'	.39 sec	--	Benioff	--	--
TPH	38° 4.49'	117°13.35'	.24 sec	--	Benioff	--	--
NEL	35°42.74'	114°50.61'	--	--	Benioff	--	--

Table 1.--Seismograph station data and corrections--Continued

Station	Latitude N.	Longitude W.	Travel time delay no. 1[1]	Magnitude correction[2]	Seismometer	VCO/amp	Magnification @ 1 Hz
LEE	37°14.59'	113°22.60'	.72 sec	--	Benioff	--	--
LVW	36°10.20'	115°11.25'	--	.60	NGC-21	6207/L-5	22 K
APK	36°19.14'	115°34.44'	.25 sec	.68	S-13	6242	60 K

[1] Subtracted from seismic wave arrival times for events in Pahute Mesa and Yucca Flat areas.

[2] Added to magnitude calculation.

The various manufacturers[1/] of the seismic equipment used in this investigation are:

Seismometers:

Mark Products (L-4C)

National Geophysical Company (NGC-21)

Geotech Division, Teledyne Industries (S-13)

Develco (L-7D)

Voltage control oscillators:

Develco (Models 6202, 6207, and 6242)

Amplifier:

National Geophysical Company (L-5)

Discriminators:

Develco (Model 6203)

EMTEL (Model 6243)

Film recorder:

Geotech Division, Teledyne Industries

Film viewer:

Geotech Division, Teledyne Industries

[1/] The use of brand names in this report is for descriptive purposes only and in no way constitutes endorsement by U.S. Geological Survey.

HYPOCENTER DETERMINATION

Hypocenters are computed from arrival times of P waves using the program HYPO71 (Lee and Lahr, 1975). The model of seismic velocities used in the earthquake location program is the same one used by Hamilton and others (1971) and is shown in table 2.

Earthquake locations were first attempted using only the stations on NTS. The quality of the final solution of many of the aftershocks was improved by using selected arrival-time data from stations, PRN, DAC, TPH, LEE, or APK, if the event was not within the close-in network; if missing data created a large azimuthal gap between adjacent stations; and if impulsive first arrivals were recorded at those stations.

Travel-time station corrections were used in the final location of all the events. These corrections are intended to be mean compensations for differences in the structure beneath each station. The corrections were derived using the following procedure. All the events were located using data from the NTS stations. Pahute Mesa was divided into a grid about 4 km on a side and an attempt was made to select an equal number of the best locations from each square. Fifty-one such events were chosen, and the mean station residual was calculated for each station using these events. The earthquakes were relocated using the mean station residuals as station corrections, and the mean residuals from this run were added to the previous station corrections to obtain the final corrections. Corrections for the distant stations were obtained during this procedure even though they were not used in the location procedure at this point. All the earthquakes were relocated using the derived station corrections and all the stations. At several points poor individual station readings were culled from the data. The final locations are listed in the appendix.

Table 2.--Velocity model used in locating seismic events

Depth to layer km	Layer velocity km/sec
0.0	2.7
0.96	3.4
1.33	3.8
2.14	4.4
2.50	5.1
5.00	6.1
25.00	7.0
35.00	8.0

Only earthquakes greater than or equal to magnitude 2.5 were located in this study. The appendix also includes events of this magnitude or greater which were not locatable because of station difficulties or overlap of events. Whenever possible, an attempt was made to determine the approximate duration magnitude of these events. Events in the appendix with no location or magnitude are believed to be greater than magnitude 2.5, and the time listed is the P-wave arrival time at the nearest station. The list of events undoubtedly contains a combination of naturally occurring earthquakes, triggered events, and events related to cavity collapse. Some events, probably related to the cavity collapse, demonstrated emergent P-wave onsets, and good quality locations for these events were often difficult to obtain.

Another location scheme was also tried and rejected. Station corrections were derived using the nuclear tests themselves by running HYPO71 with the known origin times and locations. These station residuals were then used to locate the aftershocks. Comparing these locations (B) with the locations found using the previous scheme (A), we find that scheme A yields 80-percent A- and B-quality solutions, while scheme B yields 35-percent A- and B-quality solutions. Comparison of the standard errors in the hypocenters shows that scheme A has consistently smaller standard errors than scheme B. On the other hand, scheme B locates the nuclear explosions closer to their actual location than does scheme A. This paradox can apparently be explained by examining the A- and B-ray paths. The scheme-A first-arrival ray paths (aftershocks) are predominantly direct arrivals because the depth of the aftershocks is typically greater than 2 km. For the location model used, it was found that direct arrivals were first arrivals for events greater than 2-5 km deep and stations less than 17 km from the epicenter, or for events greater than 5 km deep and stations less than 130 km distant. These conditions include the preponderance of first arrivals for scheme-A determined residuals. For the case of a direct arrival, the ray leaves the source at an angle (take-off angle, i_t) greater than 90°. For scheme A, i_t is predominantly greater than 90° and always greater than 40°. For scheme B, the nuclear explosion depth of burial (all less than 1.5 km) and station distances are such to always produce refracted first-arrival paths resulting in $i_t \leq 50°$. Thus, nuclear-event ray paths traverse the upper layers twice, while the earthquake ray paths traverse once. The point is that station corrections derived from nuclear events are not likely to be optimal for locating earthquakes and vice-versa.

Another aspect of scheme B is that it produced all negative station residuals. That is

$$\text{Residual} = T_p^{\circ} - T_p^{t} < 0,$$

where T_p°=observed travel time, and

T_p^{t}=theoretical travel time.

This observation indicates that the crustal model near-surface layers have velocities which are too low. Plotting of the average residual versus the average epicentral distance for each station shows that the residual is increasing negative out to epicentral distances of about 60 km after which it becomes approximately constant and small negative. This behavior indicates that the shallow refracted paths are too slow while the deeper refracted paths are approximately correct. If it were possible to correct the crustal model, the effect on scheme-A locations would probably be to reduce the focal depths of the aftershocks somewhat.

EARTHQUAKE MAGNITUDES

Magnitudes were determined using the duration of the seismic signal. A formula for calculating duration magnitude (FMAG)(Lee and others, 1972) is incorporated in the HYPO71 program.

> FMAG=-0.87+2 log(T)+0.0035D, where FMAG is the local magnitude, approximating M_L.
>
> T is the time in seconds from the initial P-wave motion until the signal amplitude decreases to 1 cm and remains less than 1 cm on a 20X Geotech film viewer, and D is the epicentral distance in km.

Magnitude station corrections were determined for this array by comparing FMAG determinations to amplitude magnitudes (M_L) determined using a L-7D velocity seismograph at station CPX. Five earthquakes in the magnitude range 2.4-3.6 were recorded on the L-7D, and equivalent local Richter magnitudes were determined. A graph of FMAG and M_L versus the logarithm of coda length was constructed for each station. The magnitude increment observed between two straight lines with a slope of 2 fit to these two data sets was accepted as the magnitude correction. These corrections are shown in table 1.

For 13 events, it was possible to compare Berkeley or Pasadena magnitudes with those in this study. The mean difference between the magnitudes was -0.09, and the standard deviation of the differences was 0.34. The largest difference observed was 0.5 magnitude units. Thus, the magnitudes listed in the appendix are believed to be equivalent to the Richter magnitude.

TEMPORAL AND SPATIAL VARIATION IN SEISMICITY

The number of events occurring per day versus time is plotted in figure 3. These data show a pattern of aftershock activity that peaks in association with the largest nuclear tests. Eight episodes of increased activity can be noted in association with the events Kasseri, Inlet, Muenster, Fontina, Cheshire, Estuary, Colby, and Pool. All of these nuclear events are magnitude $M_L \geq 5.8$ and occur on Pahute Mesa. It should be noted that between October 8, and October 28, 1975, prior to event Kasseri, only one earthquake occurred on Pahute Mesa. This event, on October 25, was in the vicinity of nuclear event Tybo (not shown) detonated May 14, 1975. On November 8, 1975, an earthquake occurred on Yucca Flat, apparently unrelated to the nuclear testing program. No other earthquakes were noted on Yucca Flat or Rainier Mesa during the monitoring period. However, the magnitude of nuclear tests in these areas were lower ($M_L \leq 5.6$) than the Pahute Mesa nuclear events. Other earthquake activity that took place in the area included: an event a few kilometers southwest of station LSM on January 29, 1976; an event a few kilometers northeast of station MCV on January 30, 1976; an event 15 km west of NTS on April 24, 1976; and 18 earthquakes ($4.2 \geq M_L \geq 2.5$) a few kilometers south of NTS in June 1976.

The increase in activity at the time of events Keelson and Esrom (fig. 3) represents earthquakes occurring near event Muenster and is probably not related to these two Yucca Flat events. Note that a similar increase in activity occurs in the interval between Muenster and the Yucca Flat events.

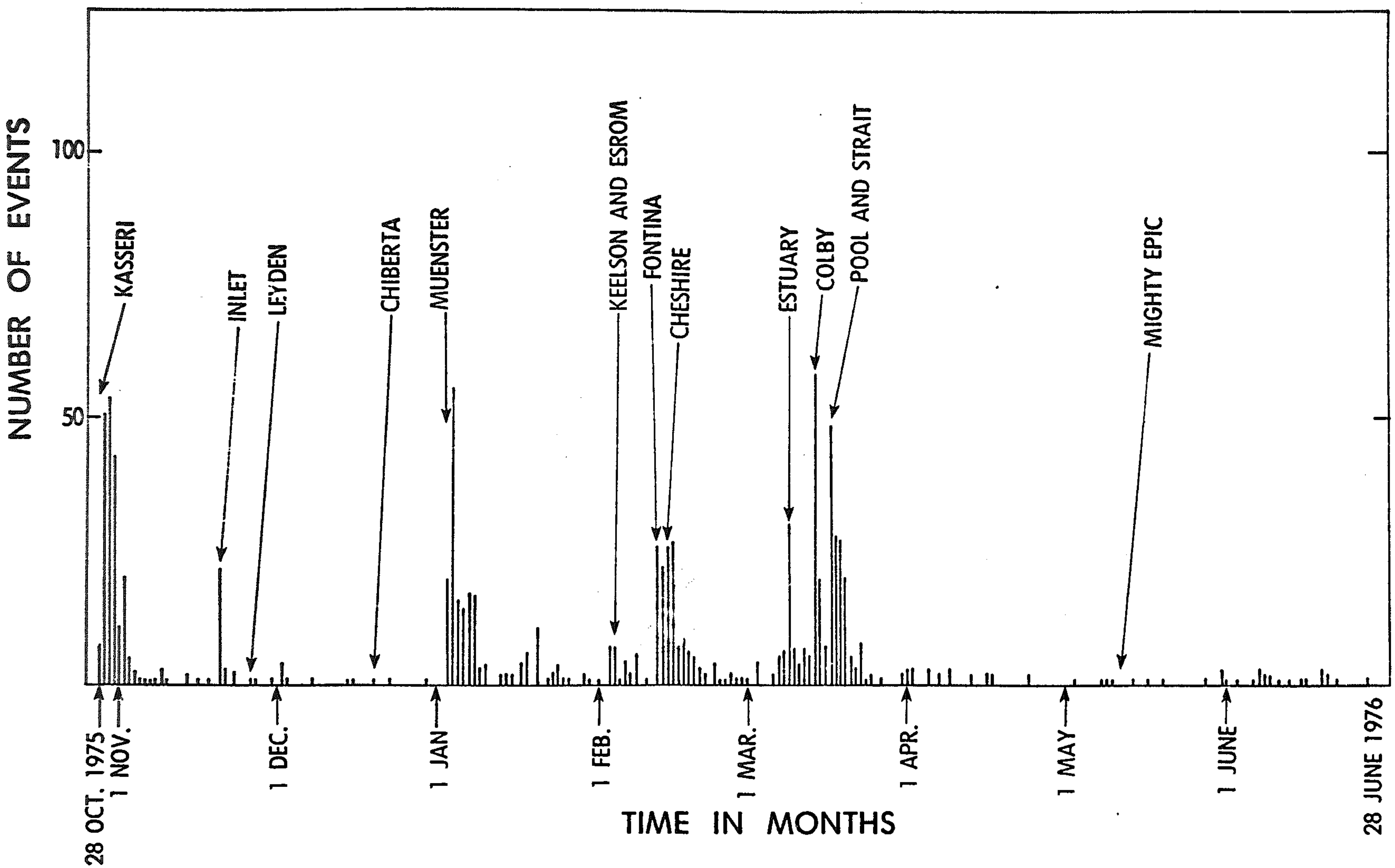

Figure 3.--Graph showing number of events per log versus time and the time of occurrence of each of the announced nuclear events.

Table 3 compares the estimated number of aftershocks associated with each event for two different time intervals, 23 days and 10 days. For intervals that overlap one or more nuclear events, the count is based primarily on earthquake location, but the percentage of unlocated earthquakes assigned to an event is equal to the percentage of located earthquakes related to the event. Table 3 shows that the amount of aftershock activity generally decreased with subsequent shots, although the magnitude of the nuclear events did not decrease with time. For instance, Kasseri (M=6.2) triggered about twice as many events as Colby (M=6.2). Comparing events Kasseri, Muenster, and Colby in figure 3, it appears that aftershock activity falls off more rapidly following the last two events than after Kasseri.

In the period from April 1, to June 28, 1976, following completion of the Accelerated High Yield Testing Program, a mean of 2.7 events/week was observed in the Pahute Mesa region. This rate can be compared with 0.8 events/week that occurred between January 1971, and March 1973, in the same region. The magnitude of the events detected during the earlier interval was comparable with that in this study (Bayer, 1972a, b, 1973a, b, c, d; Bayer and King, 1972a, b; Bayer and others, 1972); although it is unknown if events above $M_L \geq 2.5$ were completely reported. During the earlier period, there were 19 announced nuclear events at NTS. All events were less than magnitude 5.4 and occurred off Pahute Mesa. Based on these data, an upper-bound estimate of about three is obtained for the ratio of activity at the end of the current monitoring period compared with the earlier period.

Table 3.--Event name, number of after hocks, days counted, and event magnitude

Event	Number of events	Number of days	Events/day	Nuclear event magnitude
Kasseri	206	23	9.0	6.2
Inlet	36	23	1.6	5.9
Muenster	179	23	7.8	6.3
Fontina	108	23	4.7	6.3
Cheshire	41	23	1.8	5.8
Estuary	65	23	2.8	5.9
Colby	96	23	4.2	6.3
Pool	87	23	3.8	5.9
Kasseri	197	10	19.7	6.2
Inlet	27	10	2.7	5.9
Muenster	144	10	14.4	6.3
Fontina	80	10	8.0	6.3
Cheshire	59	10	5.9	5.8
Estuary	46	10	4.6	5.9
Colby	98	10	9.8	6.3
Pool	102	10	10.2	5.9

The frequency of occurrence data and maximum likelihood least squares (Page, 1968) fits to the data are shown in figure 4a for five different time intervals. The equations and corresponding intervals are:

		χ^2	df
Total	$Log_{10}N_I=5.47-1.08M$	12.8	7
Kasseri	$Log_{10}N_I=5.93-1.42M$	5.0	3
Muenster	$Log_{10}N_I=4.48-0.95M$	6.8	4
Fontina	$Log_{10}N_I=4.75-1.09M$	6.5	3
Colby	$Log_{10}N_I=4.98-1.15M$	1.5	3

where N_I=interval frequency

M=magnitude midpoint≥2.8

M_{max}=maximum magnitude 5.0

χ^2=chi-squared values

df=degrees of freedom.

Examination of these data indicates they are complete for magnitude ≥2.7.

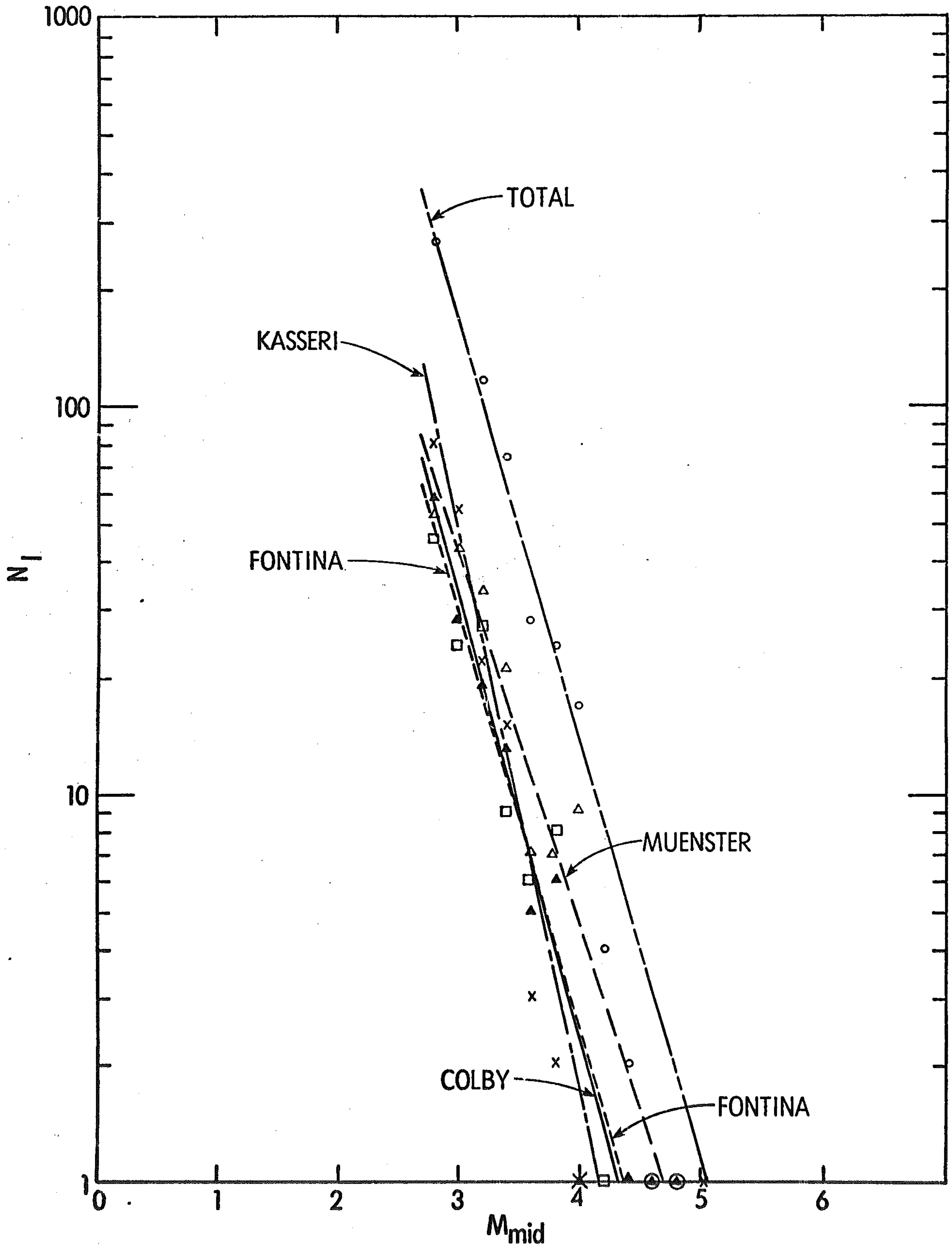

Figure 4a.--Graph showing frequency of occurrence for all data (o)(253 days), 13 days following event Kasseri (x), 39 days following event Muenster (△), 24 days following event Fontina (□), and 14 days following event Colby (▲). The lines are maximum likelihood least squares fits to the data.

Figure 4b shows the recurrence data for the 1968-70 testing period for comparison. These data have been corrected for the difference in duration magnitude formulas used by adding DM to magnitudes determined by Hamilton and others (1971) where

$$DM=0.096M+0.266$$

The maximum likelihood least squares fit to these data is given by:

		χ^2	d.f.
Total	$Log_{10}N_I=8.03-1.74M$	14.3	8
Benham	$Log_{10}N_I=7.91-1.74M$	8.8	7
Jorum	$Log_{10}N_I=8.20-2.01M$	8.0	4
Handley	$Log_{10}N_I=7.89-2.03M$	2.2	2

where $M\geq3.39$ for total and Benham

$M\geq3.28$ for Jorum and Handley

$$M_{max}=5.0$$

Below magnitude 3.39, the data appear to be incomplete for the first two data sets. While this problem may affect the second two data sets, incompleteness is not apparent from examination of the data. Tests of χ^2 goodness of fit (Walpole and Myers, 1972) for all nine of these recurrence relations indicate that the hypothesis that the earthquakes occur according to these relations cannot be rejected at the 5-percent significance level.

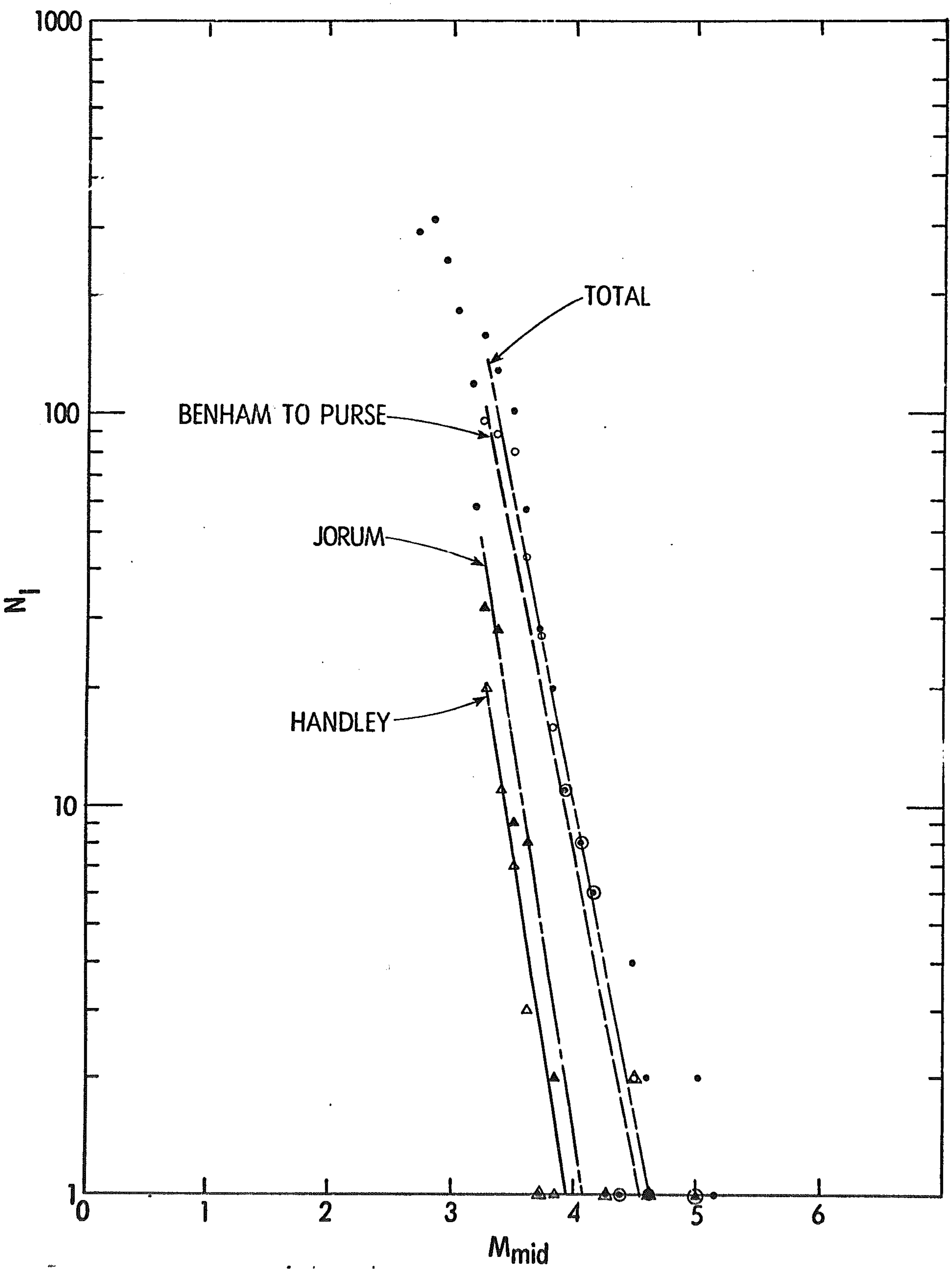

Figure 4b.--Graph showing the frequency of occurrence during the 1968-70 nuclear testing program (◉); for the Benham-to-Purse period (o)(439 days); for t' Jorum-to-Handley period (▲)(191 days); and for Handley to the end oi . ie recording period (△)(280 days).

Comparison of these data shows that the 1968-70 series of nuclear tests triggered a larger total number of aftershocks than during the more recent testing series, in spite of the fact that the 1968-70 series included only three magnitude-6 or greater nuclear events. On the basis of the fitted frequency curves for magnitude ≥3, Benham (M_L=6.3) triggered about nine times as many earthquakes as Kasseri (M_L=6.2). It also appears that b-value has declined with time. During the 1968-70 period, b-values varied between 1.7 and 2.0, while during the 1975-76 period values ranged between 0.9 and 1.4.

Figures 5-13 show the aftershock locations as a function of time. The majority of seismicity associated with event Kasseri occurs west of a north-south line through gz (ground zero). An event of magnitude M_L=4.0 was the largest located aftershock which occurred northwest of gz. An unlocated magnitude-4.9 aftershock occurred about 5 days after Kasseri.

Inlet aftershock series is shown in figure 6. These events are predominantly east of gz. Three magnitude 4.0 or larger unlocated aftershocks occurred during this period.

The majority of aftershock epicenters shown in figure 7 following Muenster are north of the shot point. A north-northeast-striking epicenter lineament north of gz is apparent in this aftershock series and includes a magnitude-4.0 event. Two other magnitude-4 aftershocks were triggered by this event. One of these was locatable and occurred about 3 km northeast of gz.

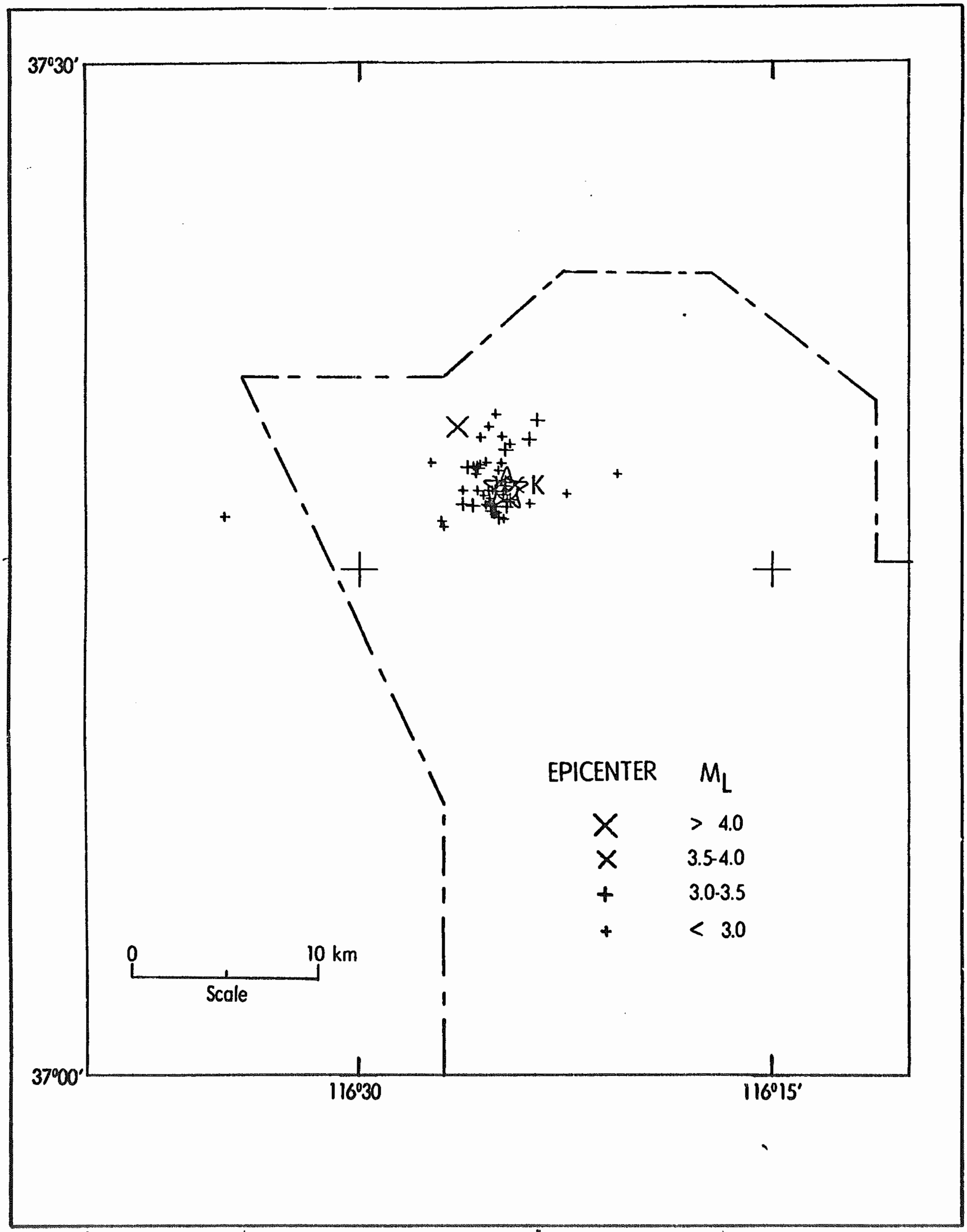

Figure 5.--Map showing the locations of earthquake aftershocks during the 23 days after event Kasseri (K). Star symbol indicates the location of event Kasseri.

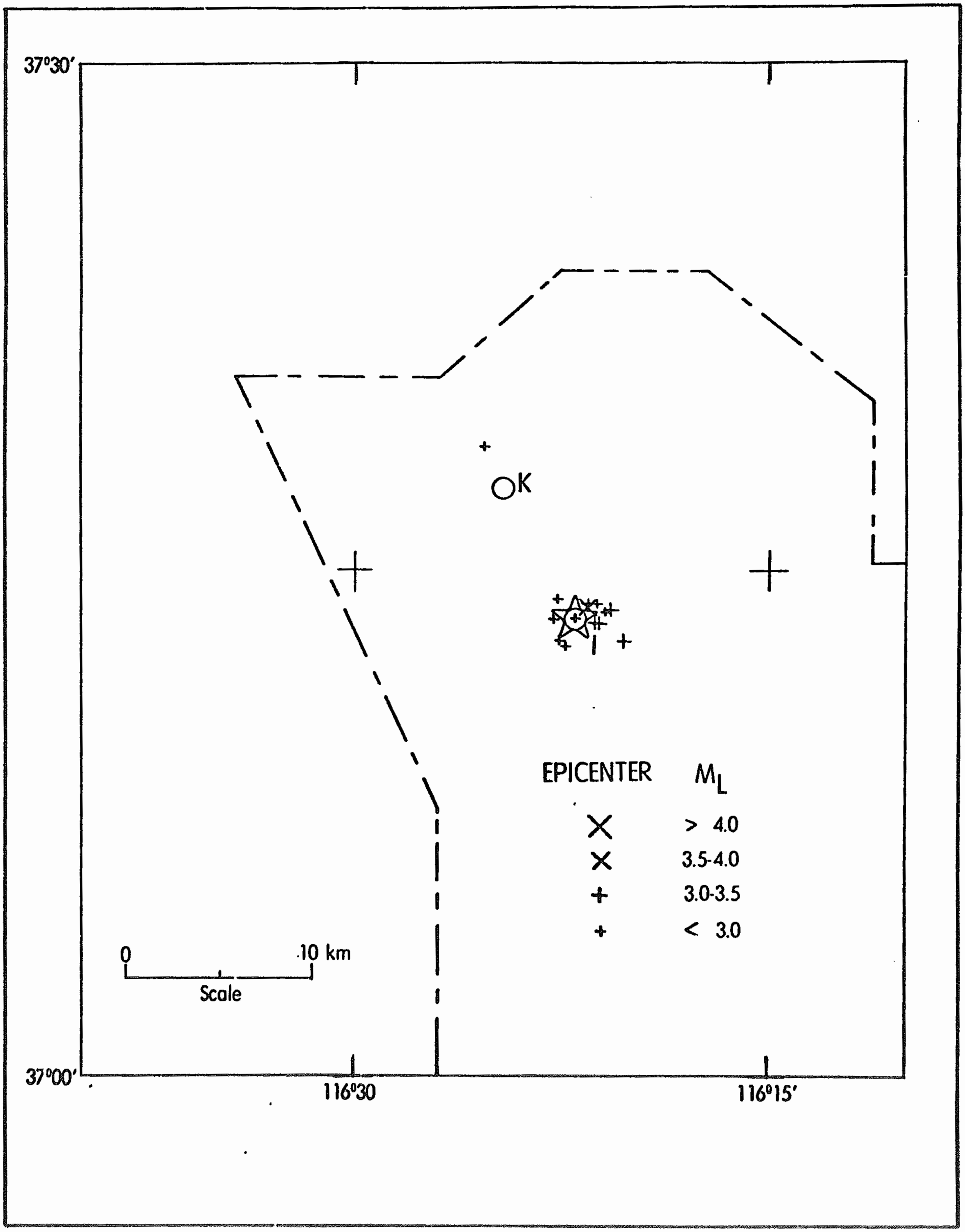

Figure 6.--Map showing the location of earthquake aftershocks during the 44 days after event Inlet (I). Star symbol indicates the location of event Inlet. Circle indicates the location of Kasseri (K).

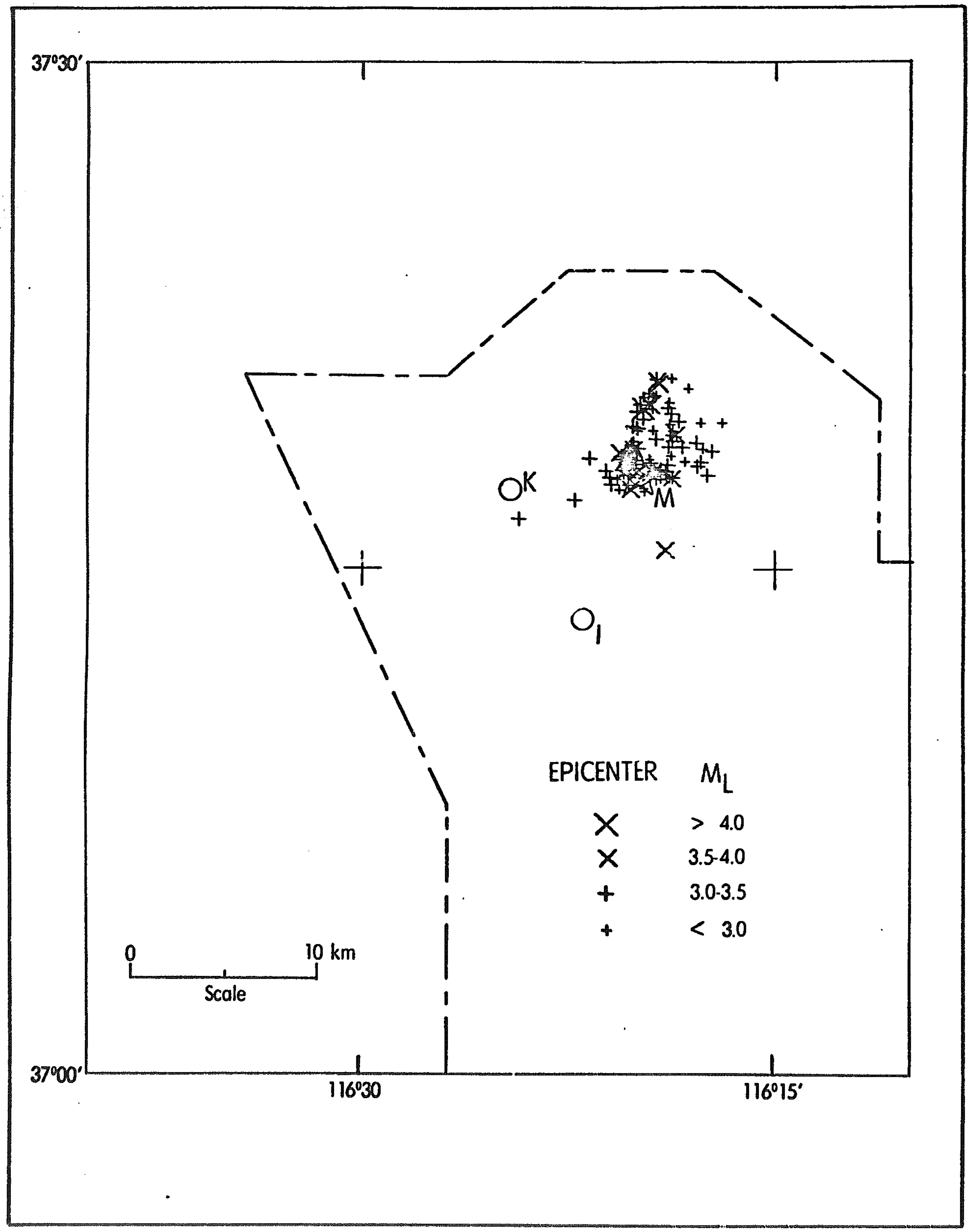

Figure 7.--Map showing the location of earthquake aftershocks during the 40 days after event Muenster (M). Star symbol indicates the location of event Muenster. Circles indicate the locations of Kasseri (K) and Inlet (I).

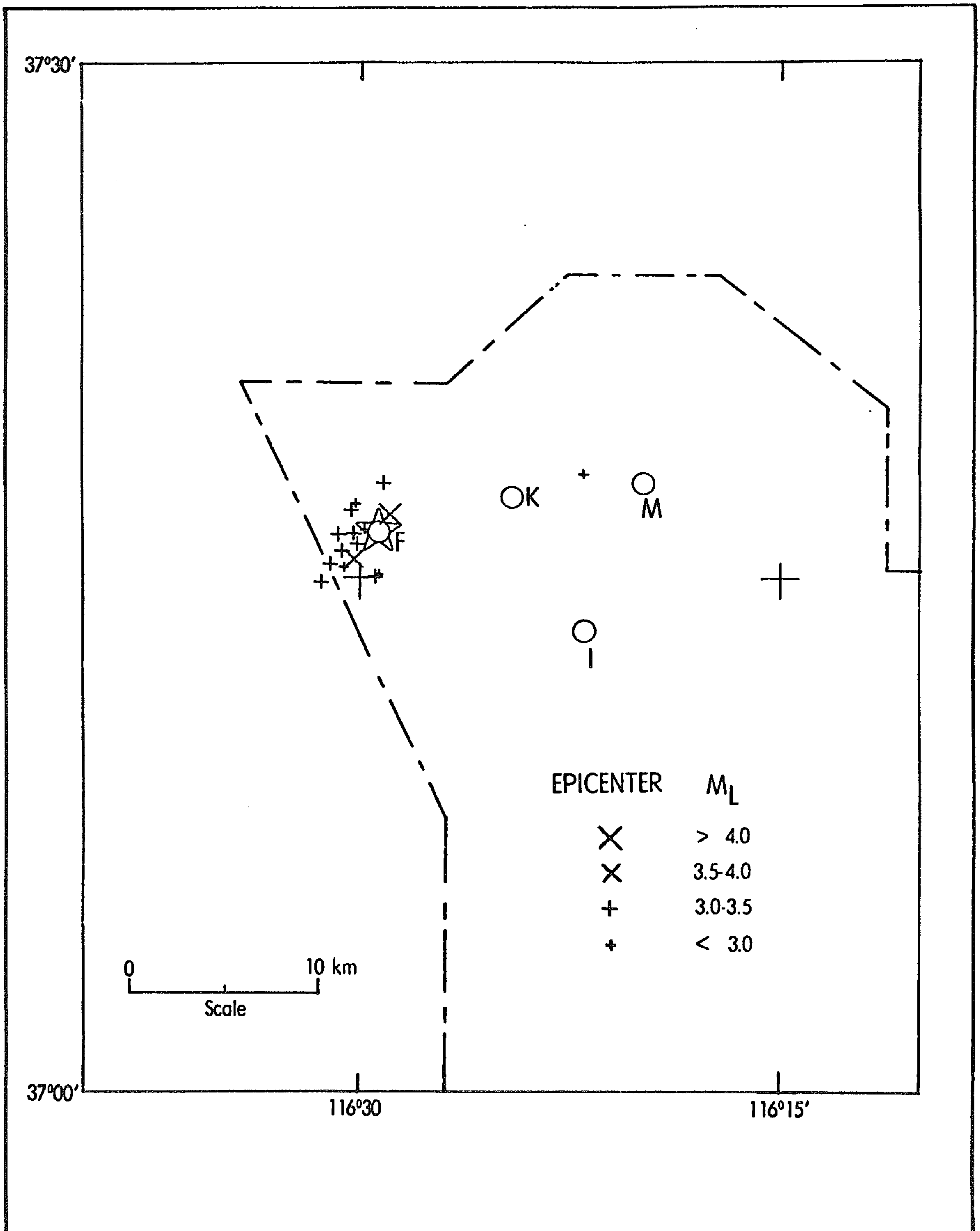

Figure 8.--Map showing the location of earthquake aftershocks during the 2 days after event Fontina (F). Star symbol indicates the location of event Fontina. Circles indicate the locations of Kasseri (K), Inlet (I), and Muenster (M).

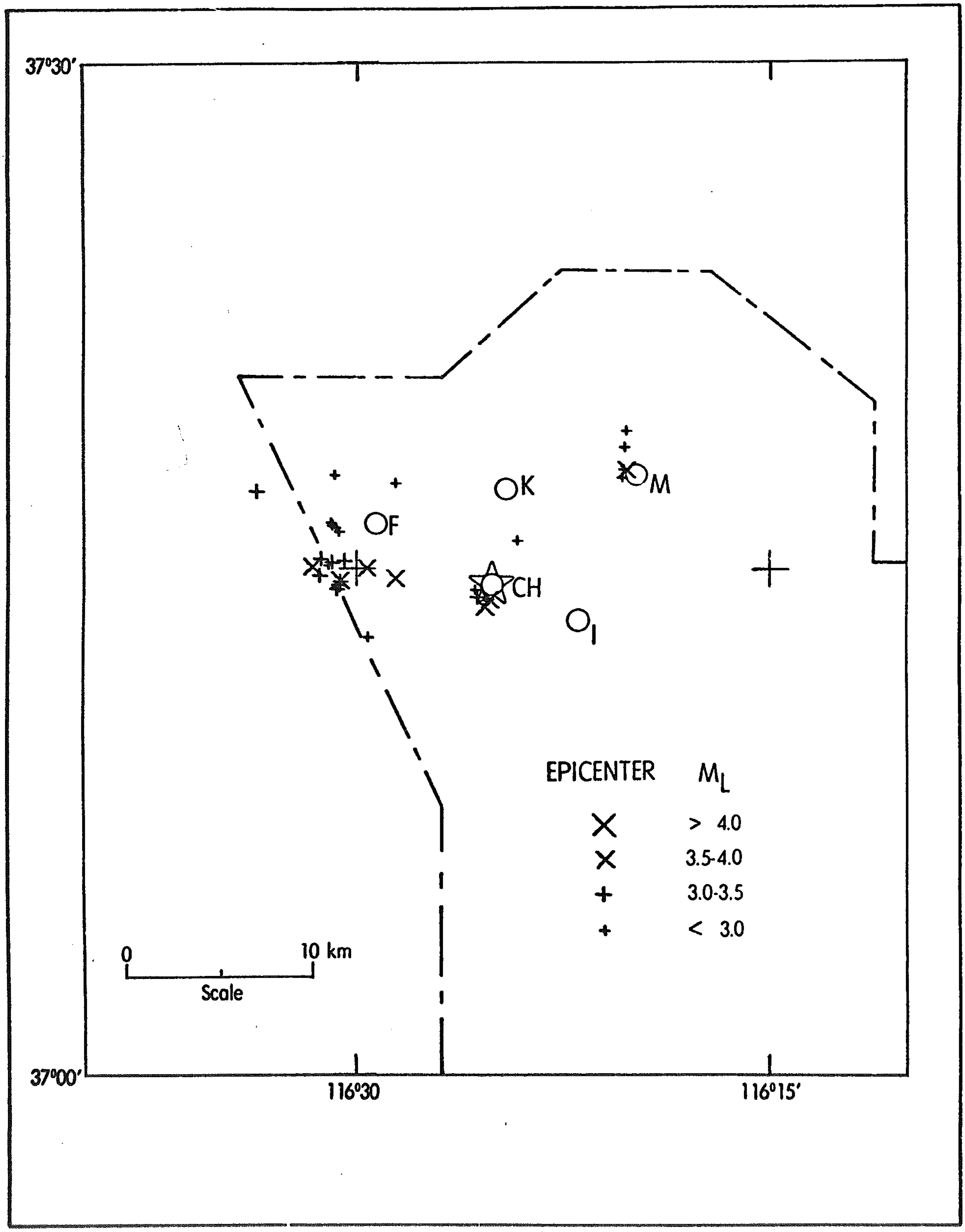

Figure 9.--Map showing the location of earthquake aftershocks during the 24 days after event Cheshire (CH). Star symbol indicates the location of event Cheshire. Circles indicate the locations of Kasseri (K), Inlet (I), Muenster (M), and Fontina (F).

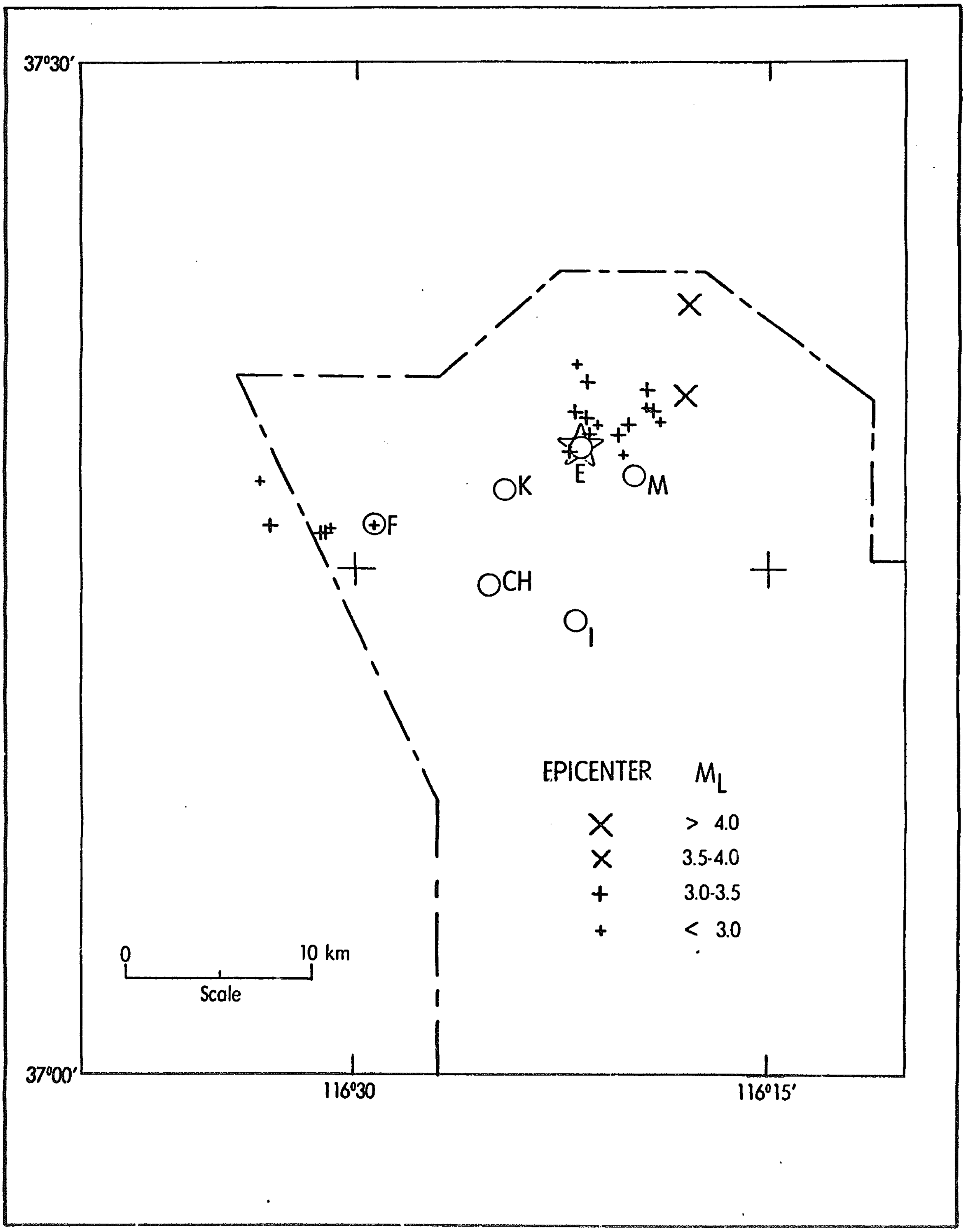

Figure 10.--Map showing the location of earthquake aftershocks during the 5 days after event Estuary (E). Star symbol indicates the location of event Estuary. Circles indicate the locations of Kasseri (K), Inlet (I), Muenster (M), Fontina (F), and Cheshire (CH).

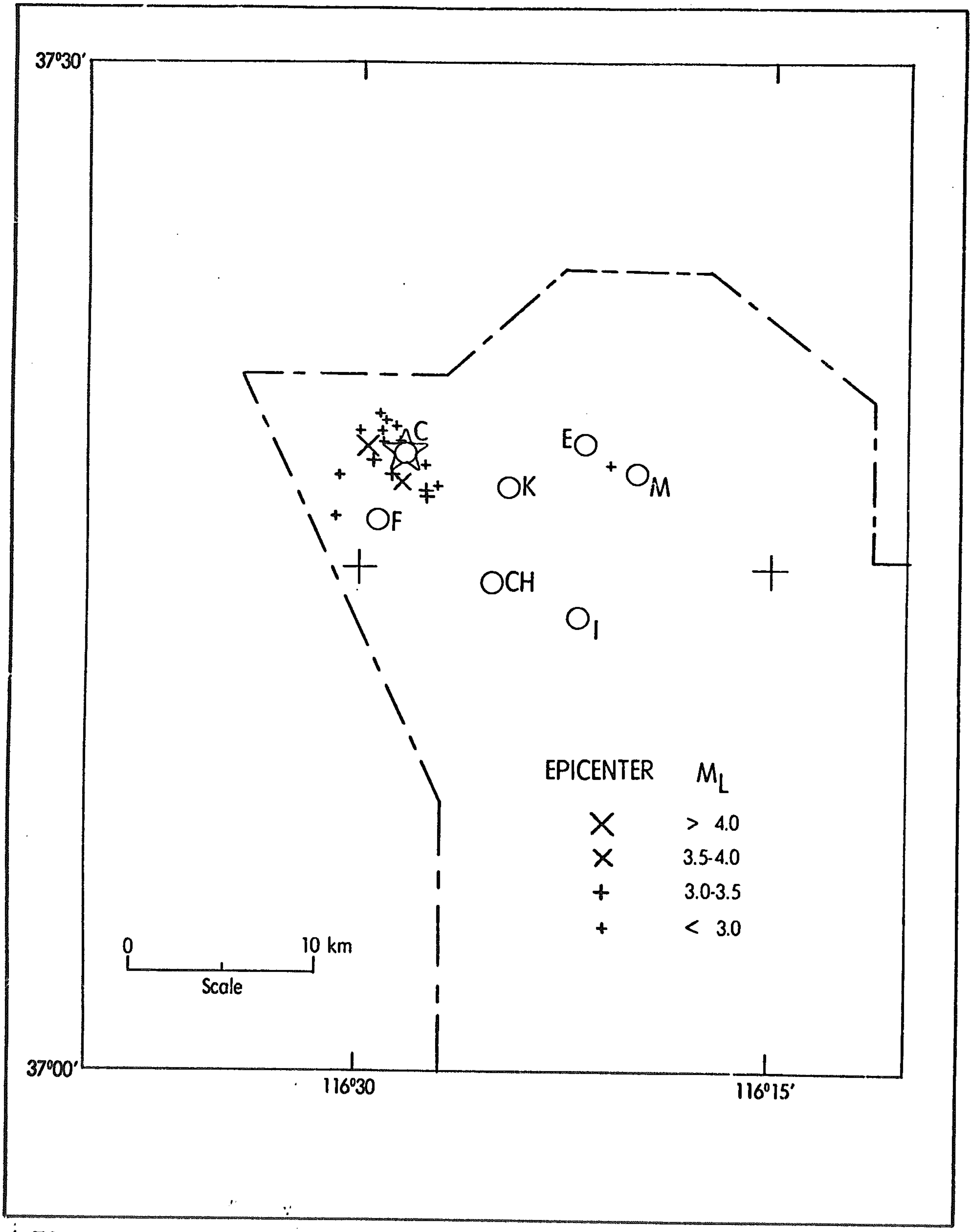

Figure 11.--Map showing the location of earthquake aftershocks during the 3 days after event Colby (C). Star symbol indicates the location of event Colby. Circles indicate the locations of Kasseri (K), Inlet (I), Muenster (M), Fontina (F), Cheshire (CH), and Estuary (E).

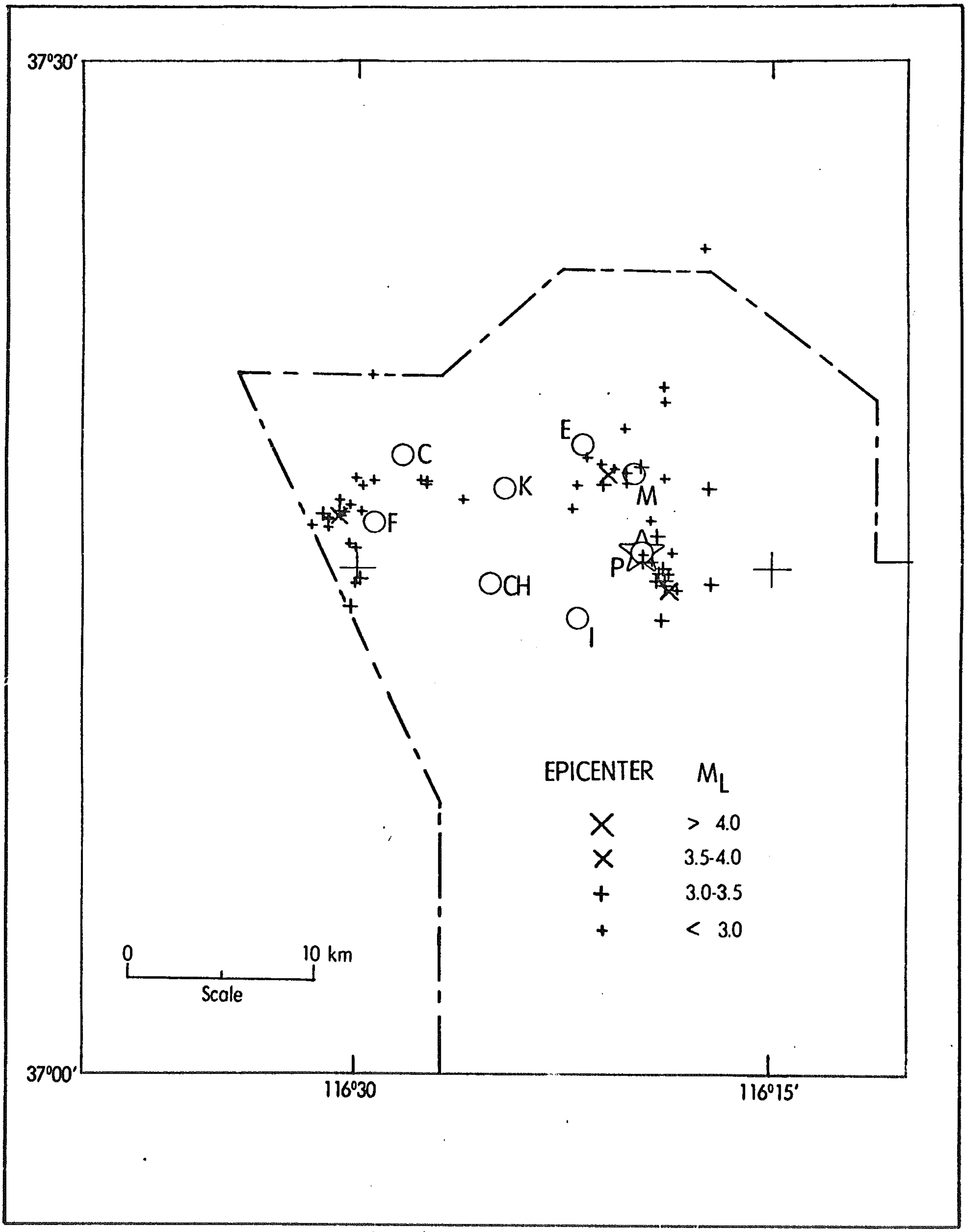

Figure 12.--Map showing the location of earthquake aftershocks during the 105 days after event Pool (P). Star symbol indicates the location of event Pool. Circles indicate the locations of Kasseri (K), Inlet (I), Muenster (M), Fontina (F), Cheshire (CH), Estuary (E), and Colby (C).

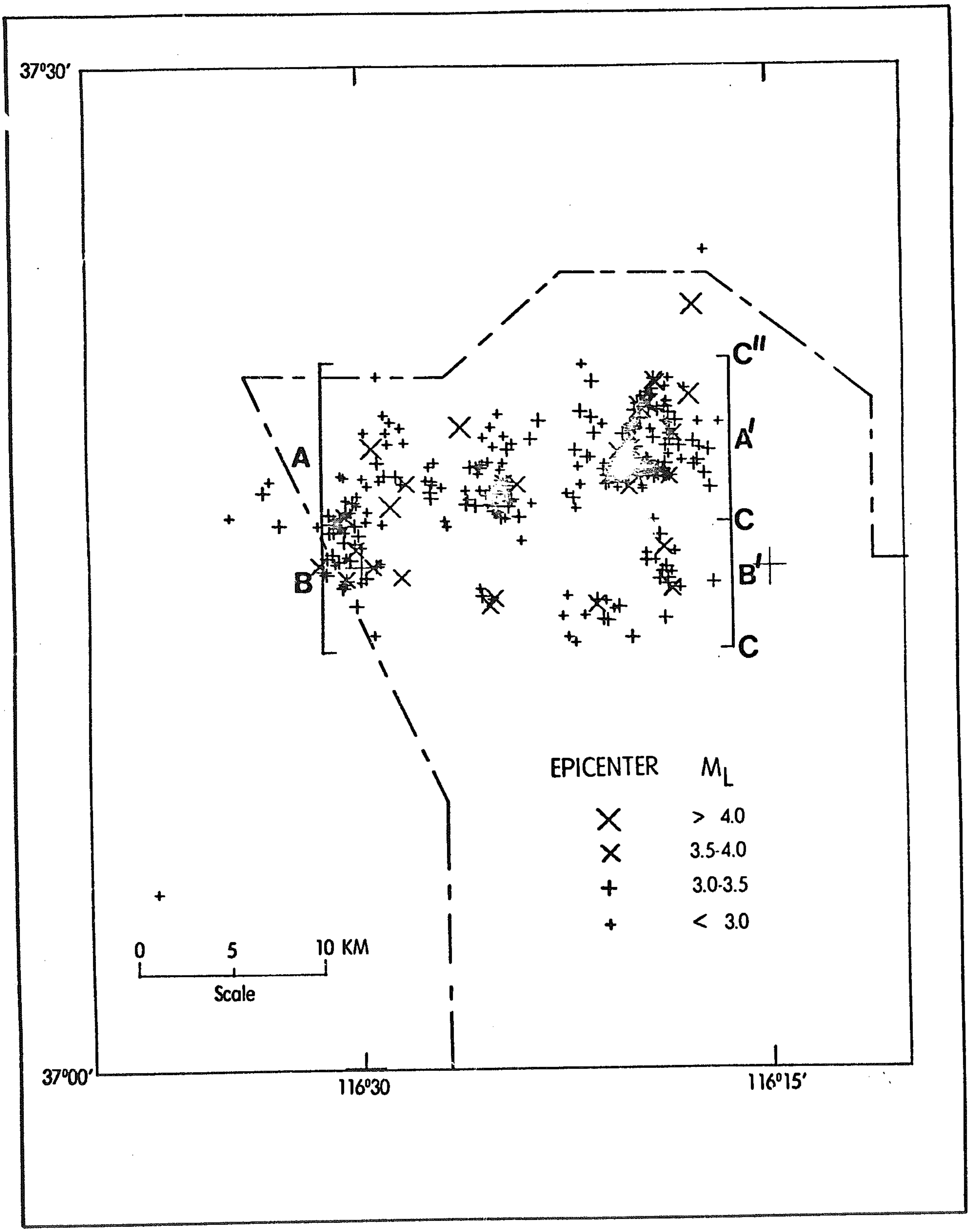

Figure 13.--Map showing the epicenters of all earthquakes located during the monitoring period. Brackets indicate the areas used for the vertical sections shown in figure 16.

Events associated with Fontina appear in figures 8, 9, 10, 11, 12, and 13. The activity associated with Fontina is largely west and south of gz although the largest aftershock (M_L=4.2) occurred about 2 km northeast of the shot point.

The Cheshire aftershocks are shown in figure 9 and occur south-southwest of gz. Ten days after Cheshire, activity was renewed in the Muenster vicinity on what appears to be a north-striking lineament 1 km west of gz. The activity south of Fontina gz begins 2 days after Cheshire as a diffuse group of events farther from gz than during the previous period.

Aftershocks associated with event Estuary are shown in figure 10. These earthquakes form a particularly diffuse pattern. The largest aftershock (M_L=4.3) near the northern border of NTS is not well located because of emergent first motions. This event may be a poorly located collapse. The magnitude-4.1 event south of the first is a better located aftershock and is probably a tectonic event that occured 7 hrs after Estuary.

Figure 11 shows the Colby aftershock series which is also relatively diffuse. The largest located aftershock (M_L=4.9) is poorly located and likely to be a collapse event. An unlocated magnitude-4.6 aftershock was also observed.

The Pool aftershock series is shown in figure 12. The events form an apparent sublineation striking north-northwest on the southeast side of gz.

Figure 13 shows epicenters of all earthquakes located during the monitoring period. The brackets indicate the areas used for the vertical sections shown in figure 16.

Figure 14 shows the epicentral distribution of aftershocks for each of the nuclear events. All epicenters ≥20 km from the nuclear event are shown at 20 km. Each bar graph covers the time period from the detonation of the current event up to the time of detonation of the next event. Aftershocks associated with a previous event are included in the plot for the current event in those cases where there is overlap in the aftershock series. Examination of the epicenter plots together with these graphs permits some separation of earthquakes into groups associated with particular nuclear events. In each case, the aftershocks which can be clearly related to a given nuclear event appear to be concentrated within 6 km of gz. The percentage of aftershocks within 6 km of gz for Kasseri, Inlet, Muenster, Fontina, Cheshire (neglecting those aftershocks near Fontina and Muenster), and Colby varies from 93-100 percent. The number for Estuary is 88 percent assuming earthquakes out to 10 km are related to this event. The Pool percentage varies from 52--100 percent depending on the assumed outer radius for Pool-induced events. Comparing these percentages with those of Hamilton and others (1971)(95 percent of aftershocks within 14 km) indicate that these events occur in tighter clusters about gz. The epicentral distance mode value is in the 1-3 km range except for events Pool and Estuary. In every case, the aftershock activity is displaced away from gz.

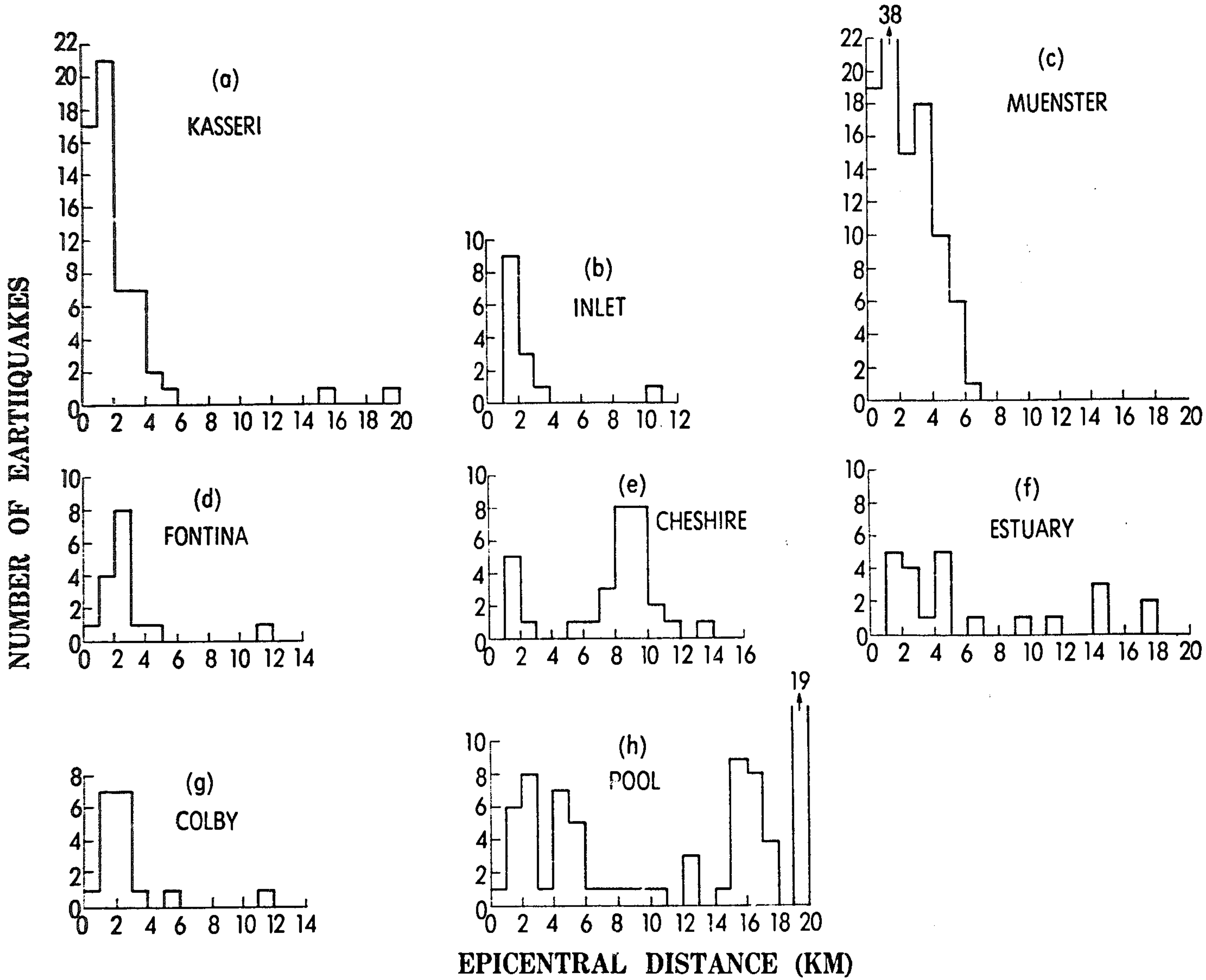

Figure 14.--Graphs showing the distribution of epicentral distance for sets of aftershocks following events (a) Kasseri, (b) Inlet, (c) Muenster, (d) Fontina, (e) Cheshire, (f) Estuary, (g) Colby, (h) Pool. Events beyond 20 km are grouped at that distance.

Figure 15 shows the distribution of focal depth for each aftershock series using only A- and B-quality solutions. For clarity in these graphs, an attempt has been made to show only those earthquakes associated with a given nuclear event. Figure 15d, the Fontina series, includes earthquakes in that vicinity through event Pool. Figure 15e, the Cheshire series, does not include aftershocks near Fontina or Muenster. The mode of aftershock focal depths varies between 4 and 6 km, and the average depth varies from 4 to 9 km depending on the aftershock series. Few aftershocks occur at depths characteristic of the nuclear events depth of burial (0.8-1.4 km). This result was also observed during the 1968-70 series (Hamilton and others, 1971). The smaller nuclear events, magnitude 5.8-5.9, produce shallower events and a smaller range of focal depth distribution than do the larger events. With the exception of Inlet, which is the shallowest of all the aftershock series, there is also a trend to shallower depths with time. The greater focal depths associated with this series compared to the 1969-70 series is probably completely attributable to the location scheme. Using location scheme B (referred to above) with these data yields a mean focal depth of 3.3 km (standard deviation of 2.40 km). Hamilton and others (1971) found a 3-4 km mean focal depth with 95 percent of the events in the upper 5 km. The greater dispersion in depths for the 1975-76 series may be attributable to lower station density in the epicentral region.

Two sets of orthogonal cross sections are shown in figure 16. Comparing these plots with figure 13 shows that the earthquake hypocenters form nearly vertical bands striking approximately north-south. In most cases, these bands are displaced laterally and 1-2 km below gz indicating that the earthquakes are occurring on vertical faults that do not intersect gz.

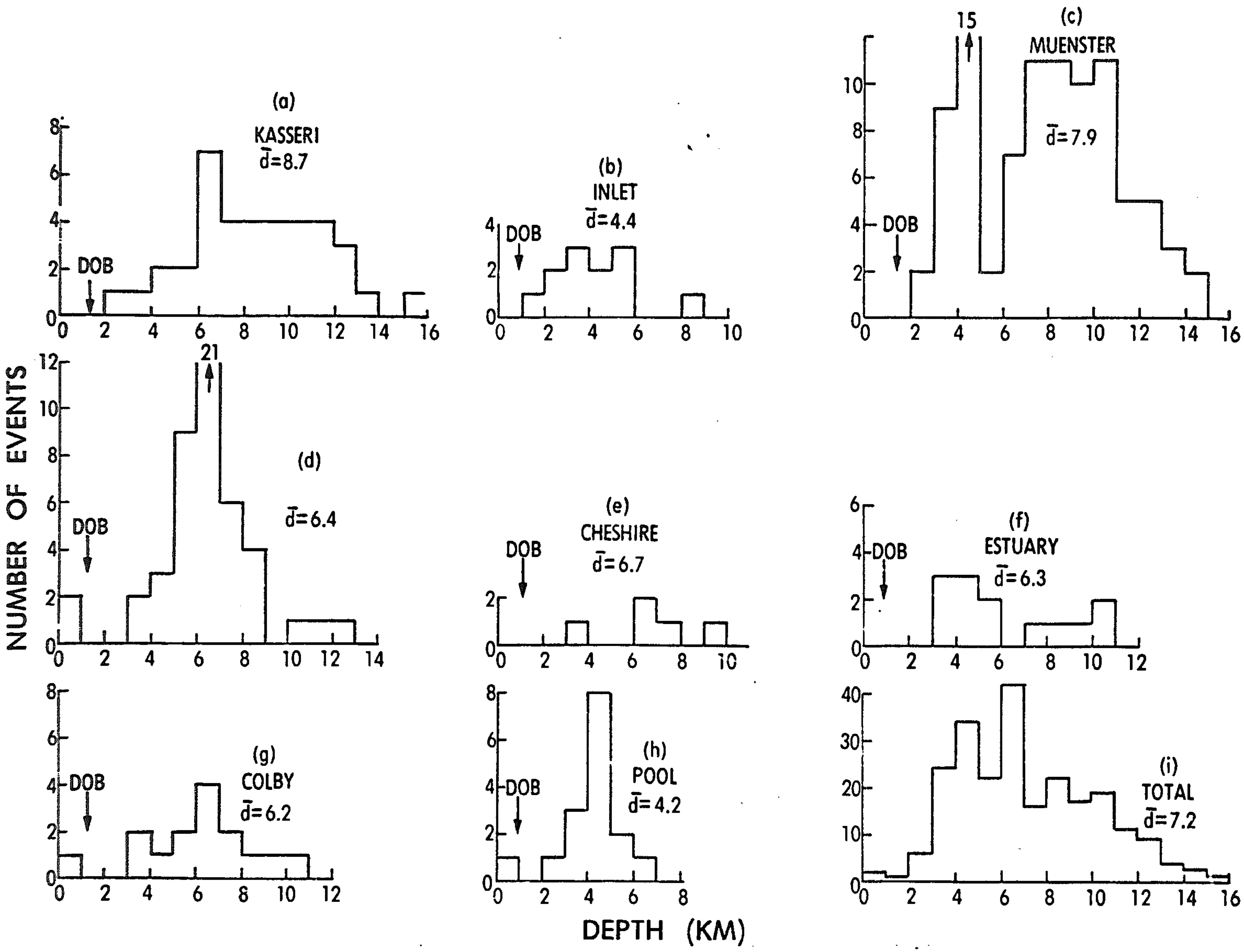

Figure 15.--Graphs showing the distribution of focal depth for sets of aftershocks following events (a) Kasseri, (b) Inlet, (c) Muenster, (d) Fontina, (e) Cheshire, (f) Estuary, (g) Colby, (h) Pool, (i) all aftershocks. $\bar{d}$ is the mean focal depth for each set. DOB is depth of burial. Events deeper than 15 km are grouped at 15-16 km. Only A and B quality locations are included.

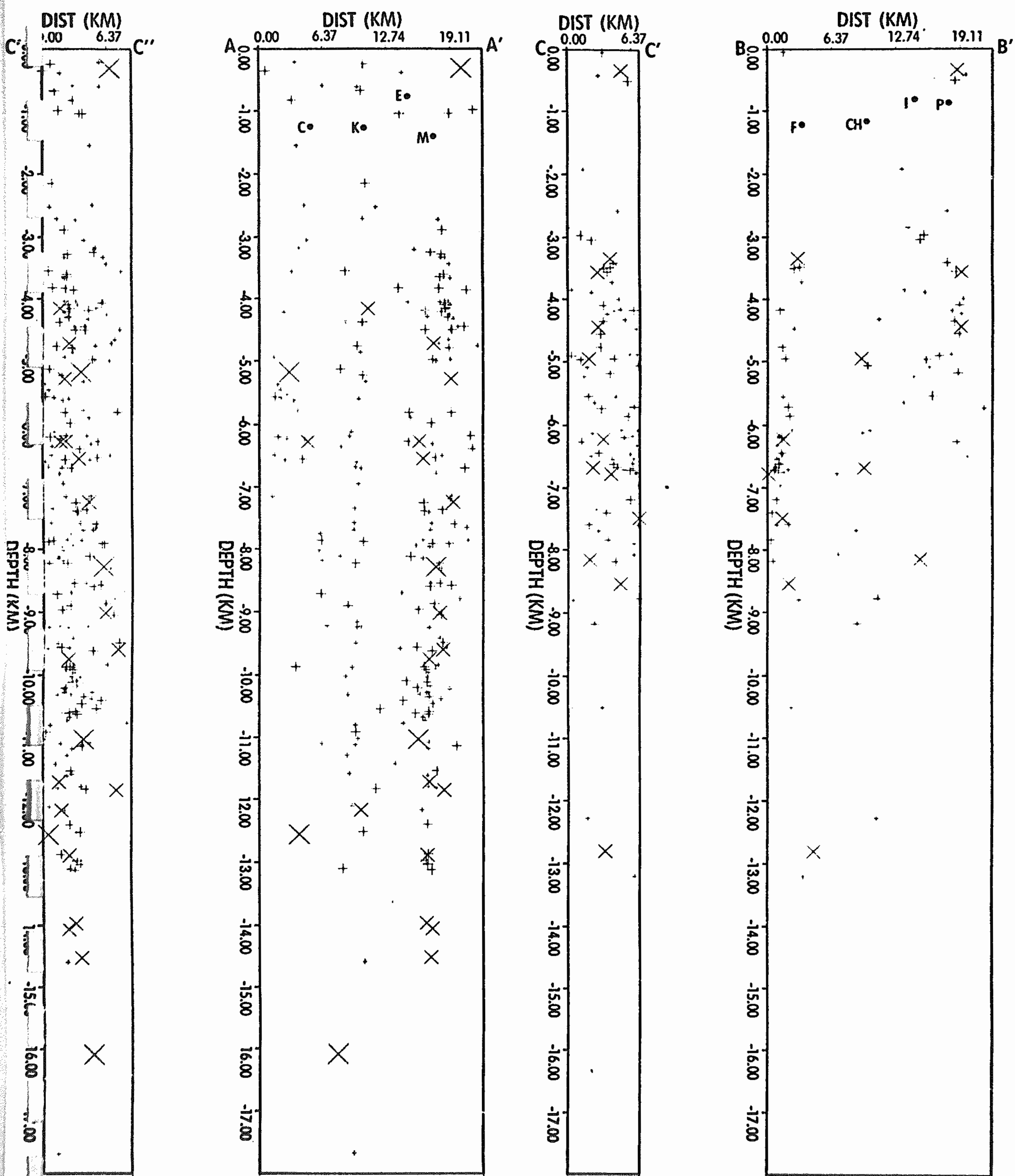

Figure 16.--Vertical orthogonal cross sections through the epicentral region covering the areas shown in figure 13. AA' and C'C" include events Kasseri, Muenster, Estuary, and Colby, BB' and CC' include Pool, Inlet, Cheshire and Fontina.

SUMMARY

1. A total of 1,075 aftershocks ($M_L \geq 2.5$) were detected during the monitoring period. The rate of earthquake occurrence during this period is 3.8 events/day compared with 1 event in the 20 days prior to Kasseri. The magnitude of nuclear events triggering aftershock sequences was $M_L \geq 5.8$.
2. Nuclear events with magnitudes $M_L \leq 5.5$ did not trigger aftershock sequences during the Accelerated High Yield Testing Program, although smaller nuclear events in the past may have triggered aftershocks. These events, however, were on Rainier Mesa or Yucca Flat.
3. The number of aftershocks triggered generally increases with the magnitude of the nuclear event.
4. The number of aftershocks triggered appears to decrease with time from event to event for a fixed nuclear event magnitude.
5. During the last 3 months of the monitoring period, the rate of aftershock occurrence was about three times as high as background level determined during the 1971-73 monitoring period.
6. Comparison of the aftershocks during the 1968-70 testing program with this program shows that the earlier series produced a larger proportion of small-to-large earthquakes and a larger number of aftershocks.
7. Aftershock epicenters were not concentrated at gz, but were displaced laterally 1-2 km. The direction of displacement varies with each nuclear event.

8. The focal depth of the majority of aftershocks is in the range 4-6 km. A few events also occur shallower than the shot point, but very few occur at depths characteristic of the depth of burial.

9. Many aftershocks appear to be occurring on vertical faults with approximately north-south orientation.

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APPENDIX

A chronological listing of the seismic events is contained in this appendix. For each event the following data are given:

DATE	Date of earthquake: Year, month, and day.
ORIGIN	Origin time: hour, minute, and second (Greenwich civil time).
LAT	Latitude of epicenter in degrees and minutes.
LONG	Longitude of epicenter in degrees and minutes.
DEPTH	Focal depth in km.
MAG	Magnitude of the earthquake M_L.
NO	Number of station readings used in locating the earthquake.
GAP	Largest azimuthal separation in degrees between stations.
DM	Epicentral distance in km to the nearest station.
RMS	Root mean square error of time residuals in sec. $RMS=\sqrt{\Sigma R_i^2/NO}$, where R_i is the time residual for the i^{th} station.
ERH	Standard error of the epicenter in km.[1] $ERH=\sqrt{SDX^2+SDY^2}$, where SDX and SDY are the standard errors in latitude and longitude, respectively of the epicenter.
ERZ	Standard error of the focal depth in km.[1]

[1]Statistical interpretation of standard errors involves assumptions which may not be met in earthquake locations. Therefore, the standard errors may not represent actual error limits.

Q Solution quality of the hypocenter. This measure is intended to indicate the general reliability of the solution:

Q	Epicenter	Focal depth
A	excellent	good
B	good	fair
C	fair	poor
D	poor	poor

Q is taken as the average of QS and QD (defined below). For example, an A and a C yield a B, and two B's yield a B. When QS and QD are only one level apart, the lower one is used, i.e., an A and a B yield a B.

QS and QD rating. QS is rated by the statistical measure of the solution as follows:

QS	RMS(sec)	ERH(km)	ERZ(km)
A	<0.15	≤1.0	≤2.0
B	<0.30	≤2.5	≤5.0
C	<0.50	≤5.0	
D	Others		

QD is rated according to the station distribution as follows:

QD	NO	GAP	DMN
A	≥6	≤90°	≤Depth or 5 km
B	≥6	≤135°	≤2x depth or 10 km
C	≥6	≤180°	≤50 km
D	Others		

1975	HR MN	SEC	LAT N	LONG W	DEPTH	MAG	NO	GAP	DMIN	RMS	ERH	ERZ	Q
OCT "KASSERI"			PAHUTE MESA	YIELD: 200-1000 KT									
28	14 30	0.16	37-17.40	116-24.69	1.27	6.30							
28	14 50												
28	14 51												
28	14 59												
28	15 01												
28	15 03												
28	15 04												
28	15 12												
28	15 14												
28	15 16	58.02	37-17.49	116-24.84	12.17	3.60	10	134	13.1	.09	.7	.8	B
28	15 24					2.5							
28	15 28												
28	15 29					2.5							
28	15 32												
28	15 34												
28	15 35												
28	15 36												
28	15 37												
28	15 38												
28	15 40												
28	15 41	35.37	37-19.17	116-26.41	16.09	4.05	9	171	9.2	.07	1.1	1.6	C
28	15 43												
28	15 46												
28	15 48												
28	15 52												
28	15 53												
28	15 53												
28	15 58												
28	15 58												
28	16 4	54.42	37-17.25	116-25.08	4.76	3.06	8	131	10.3	.07	.5	92.5	C
28	16 9	11.21	37-16.68	116-24.50	5.33	2.78	12	83	11.1	.13	.7	2.0	C
28	16 00												
28	16 01												
28	16 02												
28	16 03												
28	16 10	10.02	37-16.78	116-24.68	7.88	3.30	10	122	10.7	.13	.8	1.4	B
28	16 21												
28	16 37												
28	16 38												
28	16 41					2.7							
28	16 42												
28	16 49					2.9							
28	16 55					3.1							
28	16 57					3.3							
28	16 57	50.48	37-16.94	116-24.63	.24	3.18	10	97	10.8	.29	2.1	17.1	C
28	17 02					2.6							
28	17 03					3.4							
28	17 10												
28	17 15					2.5							
28	17 26					2.6							
28	17 30												
28	17 41	55.43	37-19.37	116-23.52	10.53	3.10	8	96	9.1	.24	2.2	2.3	B
28	17 47												
28	17 55					2.6							
28	18 06					2.6							
28	18 09												
28	18 15					2.8							
28	18 23					2.8							
28	18 27	24.74	37-16.46	116-24.96	5.07	3.08	11	119	10.5	.14	.8	2.4	C
28	18 28												
28	18 36												
28	18 38					2.7							
28	18 44					2.6							
28	18 49												
28	18 52					2.7							
28	18 58					2.8							
29	19 01					2.9							
28	19 11												
28	19 16												
28	19 21					2.6							
28	19 30					3.4							
28	19 32					2.7							
28	19 36	35.24	37-16.86	116-26.22	5.13	3.16	11	80	8.6	.07	.4	1.2	B
28	19 38					2.5							
28	19 52					2.6							
28	20 03					3.0							
28	20 11	43.01	37-16.79	116-25.10	9.24	2.94	12	86	10.2	.09	.5	1.1	B
28	20 19					2.8							
28	20 25												
28	20 39					2.6							

1975	HR MN	SEC	LAT N	LONG W	DEPTH	MAG	NO	GAP	DMIN	RMS	ERH	ERZ	Q
CT 28	20 40												
28	20 48	12.48	37-16.65	116-25.18	10.91	3.09	11	88	10.1	.18	1.1	2.1	B
28	20 54					2.8							
28	20 58					3.1							
28	21 10												
28	21 22					3.3							
28	21 47												
28	21 53												
28	21 55	26.17	37-16.82	116-25.87	3.54	3.30	8	120	43.7	.08	.8	3.8	C
28	22 06												
28	22 09					3.0							
28	22 17												
28	22 20					2.7							
28	22 28					2.8							
28	22 46					3.0							
28	22 48	51.76	37-17.42	116-24.73	4.38	3.14	12	77	10.8	.09	.5	.8	B
28	22 50	33.25	37-17.15	116-24.79	.67	3.32	12	75	10.7	.27	1.2	10.2	C
28	22 54												
28	22 55												
28	23 09					3.1							
28	23 10												
28	23 10	55.50	37-17.18	116-22.50	11.43	2.96	11	95	11.8	.32	2.1	3.0	C
28	23 37					2.9							
28	23 45					2.8							
28	23 56					2.6							
29	1					3.0							
29	12					2.8							
29	48					2.7							
29	52					2.6							
29	1 08					2.6							
29	1 53					2.8							
29	2 30												
29	2 31					2.9							
29	2 34												
29	2 38					2.7							
29	2 54					2.3							
29	4 40												
29	4 41					2.9							
29	4 45					3.0							
29	4 49	44.35	37-17.04	116-25.25	7.34	2.71	13	77	10.0	.17	.8	1.7	B
29	4 52					2.7							
29	4 54					2.6							
29	4 56												
29	4 56					3.0							
29	4 57					2.7							
29	4 59												
29	5 02												
29	5 02					3.0							
29	5 11					2.9							
29	5 22					2.6							
29	5 23												
29	5 33												
29	5 33					3.0							
29	5 36												
29	5 37					3.1							
29	5 41					2.5							
29	5 44					2.5							
29	5 46												
29	5 52												
29	5 54												
29	6 02												
29	6 02												
29	6 03												
29	6 03					3.4							
29	6 07					2.8							
29	6 12												
29	6 23	5.90	37-17.53	116-24.70	5.23	3.07	12	77	10.9	.15	.7	2.3	C
29	6 28												
29	6 36					2.7							
29	6 45					2.6							
29	6 53					2.5							
29	6 58												
29	7 04												
29	7 06												
29	7 06												
29	7 13												
29	7 14					2.6							
29	7 16					2.6							
29	7 22												
29	7 24	19.07	37-17.27	116-25.69	10.31	2.73	12	84	9.4	.18	1.0	2.0	B
29	7 31					3.0							
29	7 31	30.47	37-16.63	116-25.11	6.59	2.91	12	98	11.0	.15	1.0	2.1	B
29	7 32					2.6							
29	7 35												

1975	HR MN	SEC	LAT N	LONG W	DEPTH	MAG	NO	GAP	DMIN	RMS	ERH	ERZ	Q
OCT 29	7 36												
29	7 40					3.3							
29	7 41					2.9							
29	7 50	46.85	37-18.01	116-25.84	10.02	2.96	12	85	9.3	.11	.6	1.2	A
29	8 18					3.0							
29	8 23					2.5							
29	8 28					2.5							
29	9 22					3.0							
29	9 23					2.5							
29	9 34					2.6							
29	9 40	35.03	37-16.19	116-26.93	8.08	2.68	13	79	7.7	.15	.7	1.3	A
29	9 41					2.7							
29	9 57					2.6							
29	10 12	56.96	37-17.89	116-24.96	5.60	2.83	12	80	10.6	.20	1.0	2.9	B
29	10 15					2.6							
29	10 56	30.47	37-16.36	116-27.00	6.77	2.98	13	80	7.5	.11	.5	1.1	B
29	11 18					2.6							
29	11 23					2.7							
29	11 38												
29	12 13												
29	12 16	55.82	37-17.78	116-25.76	11.29	2.59	12	83	9.4	.16	.9	1.2	B
29	12 33					2.5							
29	13 19					2.5							
29	15 10												
29	15 10					2.5							
29	15 10	45.96	37-17.28	116-25.32	17.67	2.57	6	132	9.9	.05	.8	1.8	B
29	15 24					2.6							
29	15 25					2.7							
29	16 47					2.7							
29	17 01					2.5							
29	17 09					3.0							
29	17 18					2.8							
29	17 31					2.9							
29	17 33					2.7							
29	18 06												
29	18 30					2.6							
29	18 40					2.6							
29	19 05					2.9							
29	19 14					2.8							
29	21 07					2.6							
29	21 14												
29	21 19	37.50	37-17.13	116-25.48	6.11	2.74	13	78	9.7	.17	.8	2.1	B
29	21 31					2.8							
29	22 20					2.5							
29	22 28					2.7							
29	23 02					2.7							
29	23 23					2.7							
29	23 24					3.1							
29	23 28					2.9							
29	23 40					2.7							
29	23 49					2.5							
29	23 50					2.7							
30	4					2.5							
30	45					2.9							
30	48					2.9							
30	2 16					2.5							
30	2 18					2.6							
30	3 56	8.72	37-16.42	116-24.77	6.08	2.57	13	72	10.3	.15	.7	1.9	B
30	3 56					2.6							
30	4 03					2.9							
30	4 10					2.6							
30	4 13					2.6							
30	4 29					2.6							
30	4 30					2.8							
30	4 34	12.07	37-16.80	116-25.18	6.67	2.81	8	136	14.4	.12	.9	6.1	C
30	5 3	20.21	37-16.61	116-25.03	11.02	2.79	10	88	10.4	.27	1.6	3.1	B
30	5 13					2.9							
30	5 15					2.6							
30	5 17					3.1							
30	5 21					2.6							
30	5 39					2.8							
30	5 48					2.5							
30	7 00					2.8							
30	7 07					2.5							
30	7 11					2.6							
30	7 15	59.86	37-17.96	116-25.70	8.90	3.18	10	84	9.5	.16	1.0	2.3	B
30	7 20					2.5							
30	7 42	11.48	37-16.55	116-25.10	9.16	2.99	11	89	10.3	.09	.5	1.2	B
30	7 54					2.7							
30	8 02					2.9							
30	8 51					2.5							
30	9 06					2.8							
30	9 08					2.5							
30	10 05					2.5							

1975		HR	MN	SEC	LAT N	LONG W	DEPTH	MAG	NO	GAP	DMIN	RMS	ERH	ERZ	Q
OCT	30	11	44					2.7							
	30	11	55					2.5							
	30	11	58					2.6							
	30	12	04					2.8							
	30	13	04					2.6							
	30	14	44					2.6							
	30	15	39					3.3							
	30	15	49					2.8							
	30	16	13					2.5							
	30	16	29					2.8							
	30	16	52					2.7							
	30	17	24					2.9							
	30	17	37	8.69	37-19.55	116-25.03	.61	2.52	8	93	10.5	.32	1.9	18.2	C
	30	17	43	7.91	37-18.50	116-24.68	12.52	3.43	9	83	11.2	.21	1.4	2.4	B
	30	17	47					2.6							
	30	18	10					3.2							
	30	18	10	59.74	37-18.87	116-25.58	6.17	2.81	9	90	10.1	.07	.4	2.5	B
	30	18	50					2.8							
	30	19	00					2.9							
	30	20	23					2.8							
	30	20	30					2.5							
	30	20	45					2.9							
	31		31					2.8							
	31		52	18.42	37-18.11	116-27.37	.59	2.81	6	159	7.2	.31	4.5	19.0	C
	31		58					2.7							
	31	1	02					2.9							
	31	1	27					2.7							
	31	2	48					2.6							
	31	3	05					2.8							
	31	4	11					2.8							
	31	4	48					2.7							
	31	5	13					3.0							
	31	5	32					2.8							
	31	6	00					2.8							
	31	6	09					2.5							
	31	6	16					2.5							
	31	6	21					2.8							
	31	6	22					3.0							
	31	6	24												
	31	6	49												
	31	7	15												
	31	8	08					2.9							
	31	8	13					2.7							
	31	8	20					3.5							
	31	8	48					3.0							
	31	9	36					2.7							
	31	11	04					2.5							
	31	11	14					2.5							
	31	11	18					2.6							
	31	11	46					2.5							
	31	12	56					2.5							
	31	13	06					2.6							
	31	14	42					2.7							
	31	14	47					2.7							
	31	15	04					2.7							
	31	16	07					2.5							
	31	18	09					3.2							
	31	18	34					2.6							
	31	19	51					2.6							
	31	19	52					3.1							
	31	20	52					3.1							
	31	20	56					3.2							
	31	23	29	52.93	37-16.93	116-25.29	7.57	2.19	7	127	9.9	.12	1.0	1.6	B
	31	23	35	4.50	37-17.53	116-24.82	6.69	2.81	10	133	10.7	.14	.9	1.8	B
NOV	1		38					2.7							
	1	2	18					2.6							
	1	2	52	34.37	37-16.80	116-25.23	8.23	3.18	11	87	10.0	.18	1.0	2.8	B
	1	3	42	14.50	37-16.89	116-25.20	10.80	2.92	6	126	10.1	.10	1.3	2.8	B
	1	4	08					2.8							
	1	4	39					3.1							
	1	6	44					3.0							
	1	10	24					2.9							
	1	11	05					2.5							
	1	14	37	13.48	37-18.81	116-23.83	11.83	3.15	9	81	10.2	.34	2.3	4.3	B
	1	15	58					2.7							
	2	9	38	44.07	37-16.88	116-23.81	2.53	2.89	7	119	9.9	.13	1.0	1.7	B
	2	9	41					2.7							
	2	12	41					3.2							
	2	14	16					3.1							
	2	14	51					3.3							
	2	16	37	48.21	37-17.58	116-25.00	6.94	2.88	9	121	10.4	.13	.9	1.5	B
	2	16	56					3.0							
	2	17	17	22.38	37-17.27	116-24.68	2.71	2.57	9	121	10.9	.25	1.6	2.1	C
	2	18	51					3.7							

1975		HR	MN	SEC	LAT N	LONG W	DEPTH	MAG	NO	GAP	DMIN	RMS	ERH	ERZ	Q
NOV	2	20	02					3.3							
	2	20	33					3.0							
	2	21	1	36.69	37-17.00	116-24.52	2.15	3.21	10	121	18.1	.40	2.9	12.7	C
	2	21	28					3.3							
	2	21	37					2.5							
	2	21	41					3.3							
	2	23	21					3.5							
	2	23	24					3.0							
	2	23	34	47.09	37-17.44	116-24.34	4.16	3.76	12	122	11.2	.13	.7	.8	B
	3	2	13												
	3	2	19												
	3	2	20					4.9							
	3	6	39	46.77	37-17.79	116-20.66	7.85	2.53	10	141	9.3	.13	.9	1.4	B
	3	17	20	35.20	37-18.89	116-24.82	9.23	2.96	10	142	11.2	.17	1.3	2.6	C
	4	9	36	30.19	37-16.84	116-25.42	12.11	2.78	10	129	9.8	.09	.7	.7	B
	4	11	34	18.97	37-17.28	116-25.17	9.50	2.78	10	132	10.1	.10	.7	.9	B
	4	18	12					3.0							
	5	23	26					2.9							
	6	12	53	49.71	37-16.47	116-34.88	1.60	2.53	9	172	4.3	.11	1.1	1.1	C
	7	12	52					2.6							
	8	3	45	57.33	37- 5.26	116- 2.05	.34	2.77	8	212	17.4	.16	2.1	1.3	C
	9	4	52	11.11	37-18.05	116-25.60	11.59	2.72	8	136	9.7	.08	.7	1.1	B
	9	7	24	9.93	37-18.12	116-25.39	9.68	2.40	8	137	10.0	.10	.8	1.5	B
	9	7	54					2.5							
	9	8	40					2.5							
	10	7	31	40.97	37-18.10	116-24.85	4.86	2.52	6	137	10.8	.08	.9	133.3	C
	14	18	49	51.31	37-17.97	116-26.05	13.10	3.18	8	135	9.0	.09	.8	1.1	B
	14	18	57	35.33	37-19.18	116-25.30	7.69	2.52	7	143	10.7	.12	1.3	3.7	C
	16	12	38					3.0							
	18	16	23					3.9							
	20	10	59	19.90	37-17.27	116-26.24	8.12	2.54	9	85	8.5	.11	.7	2.1	B
	"INLET"				PAHUTE MESA	YIELD: 200-1000 KT									
	20	15	0	0.09	37-13.50	116-22.05	0.82	6.00							
	20	16	22					3.4							
	20	16	47					2.9							
	20	17	07					2.8							
	20	17	19					2.9							
	20	17	47	52.94	37-13.97	116-21.44	3.04	3.06	10	85	3.7	.24	1.3	1.6	B
	20	17	49					3.5							
	20	18	42					3.3							
	20	19	43	3.05	37-13.40	116-21.20	2.97	3.39	11	85	2.8	.14	.8	1.0	A
	20	20	17					3.4							
	20	20	38	38.46	37-13.85	116-21.46	8.16	3.75	11	64	14.6	.22	1.2	2.7	B
	20	21	03					3.1							
	20	21	16					3.4							
	20	21	31												
	20	21	33					3.3							
	20	21	37												
	20	21	43					3.5							
	20	22	10					3.6							
	20	22	18					4.2							
	20	23	11	1.38	37-14.11	116-22.54	5.65		9	111	15.0	.26	1.7	4.3	C
	20	23	14					4.3							
	21	4	1	8.86	37-12.88	116-22.49	3.85	2.86	11	72	4.5	.23	1.2	1.6	B
	21	15	7	16.33	37-13.38	116-21.05	4.97	3.48	11	66	2.6	.10	.5	.5	A
	21	15	22	29.14	37-13.78	116-20.63	5.55	3.50	12	63	2.5	.17	.8	1.2	B
	23	7	28	1.07	37-18.59	116-25.20	11.12	2.94	12	86	10.5	.12	.7	.9	A
	23	23	21	15.23	37-13.51	116-22.69	1.93	2.57	9	95	5.0	.17	.9	3.5	B
	23	23	49	27.20	37-13.72	116-20.83	5.09	2.65	11	82	2.7	.11	.6	1.1	A
	"LEYDEN"				YUCCA FLAT	YIELD: < 20 KT									
	26	15	30	0.16	37- 7.04	116- 1.13	0.65	4.40							
	26	16	35					4.0							
	27	18	18					2.5							
	30	20	30					2.6							
DEC	2	2	15	47.03	37-12.86	116-20.17	4.91	3.07	8	107	1.1	.09	.6	.4	B
	2	4	32					2.5							
	2	8	6	13.92	37-13.96	116-21.12	3.89	2.81	9	83	3.3	.11	.7	.7	A
	2	13	17					2.6							
	3	2	00					2.6							
	8	3	26					2.8							
	15	21	49					3.0							
	16	14	18	19.80	37-13.53	116-21.90	5.24	2.98	11	89	3.9	.19	.9	2.5	B
	20	5	09					2.7							
	"CHIBERTA"				YUCCA FLAT	YIELD: 20-200 KT									
	20	20	0	0.16	37- 8.66	116- 3.69	0.72	5.30							
	23	10	31	18.74	37-12.72	116-22.26	2.85	2.63	9	94	4.2	.14	.8	1.1	B
	30		26					2.5							
JAN	"MUENSTER"				PAHUTE MESA	YIELD: 200-1000 KT									
	3	19	15	0.16	37-17.76	116-19.99	1.45	6.20							

976		HR	MN	SEC	LAT N	LONG W	DEPTH	MAG	NO	GAP	DMIN	RMS	ERH	ERZ	Q
JAN	3	20	17	6.38	37-18.63	116-18.86	1.05	3.30	7	126	19.7	.12	1.0	6.2	C
	3	20	39					2.8							
	3	20	40	31.29	37-17.50	116-20.96	8.96	3.34	8	118	10.5	.06	.4	1.1	B
	3	20	43					2.5							
	3	21	0	38.39	37-19.17	116-19.99	4.98	3.48	9	93	7.2	.15	.9	6.3	C
	3	21	08					2.8							
	3	22	03					3.0							
	3	22	10					3.4							
	3	22	20	25.10	37-20.53	116-19.29	9.60	3.90	9	122	4.6	.11	1.3	2.3	B
	3	22	25					2.6							
	3	23	08					3.0							
	3	23	21					3.0							
	3	23	24	54.24	37-18.09	116-18.89	4.79	3.18	6	109	9.2	.12	1.1	211.0	C
	3	23	31	16.11	37-18.50	116-17.31	6.38	3.03	8	134	8.2	.10	.8	1.6	B
	3	23	39	45.85	37-18.57	116-17.63	7.86	2.73	5	135	8.7	.01	.1	.3	C
	3	23	41	40.80	37-19.11	116-19.43	10.37	2.35	7	214	11.5	.07	1.0	1.4	C
	3	23	53					3.1							
	3	23	55	7.06	37-17.79	116-19.58	8.23	3.16	7	98	9.2	.05	.4	1.1	B
	3	23	59					2.6							
	4		1					2.7							
	4		5	19.88	37-20.46	116-19.23	11.85	3.95	10	123	4.8	.15	1.8	2.8	B
	4		9	42.63	37-17.78	116-17.46	6.17	3.21	8	98	7.9	.15	1.1	2.3	B
	4		19	2.26	37-18.85	116-19.33	7.36	3.02	6	83	7.7	.16	1.5	3.8	B
	4		22					3.0							
	4		37					2.8							
	4	1	15	39.53	37-17.90	116-18.96	4.30	3.23	8	106	9.4	.07	.5	.5	B
	4	1	18	18.78	37-19.73	116-19.79	8.29	4.01	12	78	6.2	.14	.8	1.7	A
	4	1	22	24.83	37-20.12	116-19.35	6.49	2.73	6	120	5.4	.04	1.0	2.7	B
	4	1	23					2.7							
	4	1	27					2.8							
	4	2	0	4.25	37-20.09	116-19.42	8.31	2.86	9	118	5.4	.10	.8	1.4	B
	4	2	14					2.7							
	4	2	29	1.87	37-17.69	116-18.60	3.66	2.79	8	87	9.0	.13	.8	1.0	B
	4	2	33	23.69	37-18.79	116-18.71	4.50	3.13	7	119	7.9	.16	1.7	2.2	B
	4	3	16	51.84	37-18.36	116-18.79	4.10	2.86	6	112	8.7	.10	1.0	1.2	B
	4	3	23	25.53	37-17.37	116-20.24	11.72	3.90	10	75	8.5	.16	.9	1.6	B
	4	4	28					2.5							
	4	6	48	43.51	37-17.81	116-19.22	3.60	3.14	11	83	9.2	.12	.6	.8	B
	4	6	58	50.43	37-19.60	116-18.77	8.58	3.48	9	126	6.4	.11	.8	1.1	B
	4	7	16					2.7							
	4	7	31					2.5							
	4	7	39					2.9							
	4	8	5	4.57	37-19.09	116-18.71	7.14	2.95	9	91	7.4	.14	.8	2.3	B
	4	8	46					2.6							
	4	8	48	44.70	37-17.67	116-19.33	2.89	3.20	8	82	9.0	.04	.2	.3	B
	4	9	22	23.39	37-18.26	116-20.59	7.25	3.18	9	71	9.0	.26	1.6	5.0	C
	4	10	12					2.6							
	4	10	33					2.7							
	4	10	47					3.0							
	4	11	13					2.8							
	4	11	14	37.90	37-18.53	116-20.34	13.03	3.08	6	117	8.5	.04	.5	.7	B
	4	11	29	40.27	37-18.15	116-19.51	8.55	3.13	8	179	9.8	.12	1.1	2.1	C
	4	11	44					2.6							
	4	11	51					2.7							
	4	12	40					2.7							
	4	12	44	3.94	37-17.71	116-21.01	10.20	3.47	11	68	9.3	.14	.8	1.5	A
	4	12	45					2.8							
	4	12	47	24.32	37-18.18	116-17.71	3.86	3.45	7	130	9.1	.09	.8	.9	B
	4	14	12	34.95	37-18.05	116-17.83	6.69	3.27	10	96	8.6	.15	.8	2.6	B
	4	14	51	59.61	37-18.75	116-17.88	4.45	3.43	9	98	8.2	.12	.8	.9	B
	4	15	01					2.8							
	4	15	29					3.0							
	4	16	16	10.03	37-18.98	116-18.61	7.24	4.00	11	91	7.6	.12	.6	1.8	B
	4	16	27	6.71	37-18.26	116-19.57	2.73	2.98	11	80	8.9	.18	.9	1.4	B
	4	16	28					2.9							
	4	16	56	30.51	37-19.84	116-19.53	9.02	3.69	11	81	5.9	.12	.7	1.3	A
	4	17	39	28.17	37-18.07	116-20.44	9.91	3.14	6	117	9.3	.02	.2	.4	B
	4	18	22					3.2							
	4	18	48	4.91	37-19.37	116-18.52	7.59	3.41	6	128	6.9	.08	1.0	2.0	B
	4	19	13	50.63	37-19.96	116-19.61	9.84	2.70	9	80	5.7	.05	.3	.6	A
	4	19	24					2.6							
	4	19	47					2.7							
	4	20	19					2.7							
	4	20	33	24.88	37-17.95	116-19.13	4.16	3.13	9	105	9.4	.06	.4	.4	B
	5		2					2.9							
	5		33					2.5							
	5		35	33.83	37-19.29	116-18.81	4.98	3.00	7	90	7.0	.13	1.0	204.8	C
	5	1	40					2.9							
	5	2	24					2.5							
	5	3	39	3.21	37-18.97	116-18.81	7.19	2.93	11	89	7.6	.14	.8	2.2	B
	5	6	58					2.6							
	5	11	28					2.5							
	5	12	18	17.07	37-17.31	116-19.75	11.81	2.98	9	93	8.3	.11	.7	1.3	B
	5	12	44	55.83	37-18.94	116-18.58	4.33	2.86	10	92	7.7	.12	.6	.7	B

1976	HR MN	SEC	LAT N	LONG W	DEPTH	MAG	NO	GAP	DMIN	RMS	ERH	ERZ	Q
JAN 5	13 19	44.12	37-19.33	116-17.70	7.65	2.99	10	103	7.3	.23	1.3	3.2	B
5	14 57	43.61	37-17.68	116-18.76	5.29	3.51	10	87	9.0	.13	.7	9.8	C
5	18 21	2.08	37-17.88	116-19.19	4.10	3.40	10	83	9.4	.16	.8	.9	B
5	18 57					2.8							
5	18 58					2.8							
5	21 02					3.6							
6	2 53	12.13	37-19.92	116-18.85	3.43	2.93	8	91	5.8	.10	.6	.7	B
6	3 9	20.36	37-18.06	116-20.36	10.11	3.48	9	73	9.3	.13	.8	1.7	A
6	3 14					3.1							
6	5 15	14.94	37-19.77	116-18.91	7.91	3.16	6	125	6.1	.06	.8	1.9	B
6	8 43					2.8							
6	8 47					2.6							
6	12 40	42.71	37-16.48	116-24.28	8.78	3.49	10	86	9.9	.10	.6	1.4	B
6	14 31					2.7							
6	14 38					2.8							
6	16 55					3.5							
6	21 36					2.5							
6	22 15					2.6							
7	30	41.66	37-17.90	116-19.39	4.21	3.50	8	95	9.4	.09	.5	.6	B
7	1 02					3.2							
7	2 33	5.49	37-17.72	116-18.74	5.81	3.44	11	87	9.1	.12	.6	3.6	B
7	6 35					2.8							
7	6 52	47.19	37-17.66	116-19.15	3.32	3.00	8	84	8.9	.14	.8	1.1	B
7	10 36					2.7							
7	10 47					2.6							
7	11 25					2.8							
7	11 43	40.98	37-17.68	116-18.94	4.04	2.95	9	90	9.0	.11	.6	.7	B
7	12 28					2.5							
7	14 5	13.25	37-18.19	116-18.29	4.45	2.95	9	92	9.1	.13	.8	.8	B
7	17 51	11.05	37-17.85	116-19.39	3.27	3.04	6	95	9.3	.09	.8	1.0	B
7	18 04					3.5							
7	18 47					2.6							
7	22 41	6.94	37-17.99	116-20.07	5.97	3.46	5	144	11.8	.02	.3	.6	C
7	22 50					2.5							
7	23 24	24.88	37-17.75	116-19.54	3.83	3.01	7	157	9.1	.12	.9	1.0	B
8	3 14	12.80	37-17.92	116-19.91	4.72	3.52	7	162	9.4	.10	.9	154.7	C
8	4 26					2.8							
8	8 56					3.0							
8	9 05					3.0							
8	9 46					2.6							
8	10 16					2.6							
8	11 23					2.6							
8	11 29	34.28	37-18.62	116-18.38	11.14	3.37	6	121	8.3	.15	2.6	5.2	C
8	12 51					3.7							
8	12 58					3.4							
8	13 00					3.2							
8	13 10	28.95	37-17.80	116-19.48	3.64	3.24	7	95	9.2	.12	.8	1.0	B
8	14 35					3.8							
8	15 41					3.3							
8	16 01					3.1							
8	16 13					3.8							
8	20 18	17.19	37-17.39	116-19.76	6.78	2.90	6	95	8.5	.04	.4	1.5	B
9	11 35	13.08	37-18.23	116-20.05	13.12	3.36	7	104	9.0	.10	1.3	2.2	B
9	11 36	51.68	37-18.25	116-20.50	4.50	3.23	7	108	9.0	.05	.4	.4	B
9	17 34					2.7							
9	20 05					2.8							
10	4 40	49.35	37-17.49	116-20.30	12.87	3.05	9	89	8.7	.11	.8	1.3	A
10	4 47					2.3							
10	10 53					2.7							
10	22 15					2.8							
13	6 47	36.21	37-20.19	116-19.56	4.72	2.69	8	81	5.3	.08	.7	.8	B
13	21 33					2.9							
14	42	48.24	37-18.29	116-20.16	10.17	2.64	8	105	8.9	.04	.4	.8	B
14	6 48	12.32	37-18.07	116-19.50	9.42	2.79	8	102	9.2	.08	.8	1.6	B
15	3 17	10.57	37-17.69	116-19.80	9.90	2.87	7	95	9.0	.07	.6	1.2	B
15	12 53					2.6							
17	9 51	47.97	37-17.04	116-22.27	3.82	3.11	7	74	8.9	.12	.8	1.0	B
17	21 39	33.05	37-15.55	116-18.98	.34	3.97	9	227	5.1	.27	1.8	2.9	C
17	21 47					2.6							
17	22 36	31.38	37-17.79	116-20.50	10.72	2.94	11	117	9.3	.08	.6	.9	B
18	8					2.7							
18	2 04					2.5							
18	7 20	17.13	37-17.86	116-20.03	14.06	3.97	12	94	9.3	.14	.9	.9	B
18	7 52					3.1							
18	8 11	51.05	37-18.34	116-20.55	7.38	3.27	10	92	8.9	.22	1.3	4.1	B
18	16 45					2.5							
20	2 43	58.94	37-19.18	116-20.02	9.62	3.42	9	104	7.2	.11	.8	1.4	B
20	2 50					2.6							
20	2 50	25.20	37-19.10	116-19.98	6.30	2.82	10	104	7.3	.15	1.0	3.7	B
20	3 18	15.94	37-19.43	116-19.79	6.52	3.05	9	109	6.7	.06	.4	1.3	B
20	3 29	56.04	37-19.22	116-20.17	8.60	3.03	10	102	7.2	.11	.7	1.6	B
20	3 30					2.6							
20	3 37	18.71	37-19.86	116-19.88	8.87	3.17	10	110	5.9	.15	1.0	1.9	B
20	3 43	32.73	37-19.66	116-20.02	7.91	3.37	7	114	6.3	.07	.8	2.0	B

76	HR	MN	SEC	LAT N	LONG W	DEPTH	MAG	NO	GAP	DMIN	RMS	ERH	ERZ	Q
JAN 20	5	35	11.32	37-17.96	116-20.36	12.40	3.02	11	92	9.5	.08	.5	.6	B
20	10	37	28.26	37-17.80	116-20.34	11.62		10	91	9.3	.10	.7	1.2	B
20	10	38					3.2							
22	15	08					2.7							
23	23	30					3.1							
23	23	30	37.69	37-17.93	116-20.56	9.87	3.02	10	90	9.6	.19	1.2	2.3	B
24	6	54					3.1							
24	6	54	42.59	37-20.59	116-19.30	9.49	3.03	10	122	4.5	.15	1.1	1.7	B
24	7	2	15.84	37-19.73	116-19.48	4.05	2.71	10	116	6.1	.09	.5	.6	B
24	7	02					3.0							
25	6	42					2.8							
26	3	26	11.00	37-18.50	116-20.07	7.58	2.46	8	106	8.5	.09	.7	2.2	B
29	3	58	8.62	37-20.08	116-19.76	5.00	3.00	8	116	5.5	.08	.7	.8	B
29	9	22	54.38	36-42.91	116-21.29	3.76	2.24	7	124	7.3	.09	.8	1.0	B
30	12	54	42.11	36-49.72	115-46.50	6.35	2.43	12	103	27.6	.43	2.3	4.2	C
.B 1	15	17	5.31	37-20.33	116-18.18	8.79	2.93	12	104	5.3	.17	1.0	1.7	B
3		14	27.27	37-18.44	116-20.63	6.54	3.73	13	92	8.7	.22	1.1	1.1	B
3		31	11.15	37-18.19	116-20.29	9.96	2.74	12	94	9.1	.09	.5	1.0	B
3	5	46	30.75	37-18.05	115-20.27	11.18	2.96	12	94	9.3	.11	.6	1.1	B
3	11	13	2.30	37-18.25	116-20.25	10.58	3.43	10	95	9.0	.08	.5	.9	B
3	12	29	47.31	37-18.28	116-21.74	10.09	3.12	11	80	9.5	.22	1.3	2.6	B
3	12	42	27.02	37-18.49	116-20.33	10.03	2.71	11	96	8.5	.09	.6	1.0	B
3	20	53	41.62	37-18.68	116-20.21	10.34	3.01	11	98	8.2	.12	.8	1.4	B
4	6	51	46.82	37-18.25	116-20.41	13.97	3.91	13	73	9.0	.17	.9	1.0	B
4	7	33					3.0							
4	13	39												
4	13	39					2.7							
"KEELSON"				YUCCA FLAT	YIELD:	20-200 KT								
4	14	20	0.11	37- 4.16	116- 1.81	0.64	5.70							
"ESROM"				YUCCA FLAT	YIELD:	20-200 KT								
4	14	40	0.16	37- 6.40	116- 2.25	0.66	5.60							
4	19	43					3.8							
4	20	09					4.3							
4	21	20					2.7							
5	22	43	14.29	37-18.58	116-19.97	10.45	3.12	11	77	8.3	.14	.8	1.4	A
6	1	14	23.89	37-17.93	116-20.36	12.89	3.93	11	92	9.5	.11	.7	.8	B
6	1	20					3.1							
6	1	27					2.6							
6	1	41					3.8							
7	7	36	55.31	37-18.54	115-20.12	14.52	3.77	10	107	8.4	.14	1.2	1.2	B
7	15	3	20.85	37-19.33	116-16.95	4.76	2.86	12	120	7.7	.21	1.5	1.5	B
8	2	35	36.93	37-18.79	116-20.15	8.55	2.66	9	109	7.9	.17	1.5	3.6	B
8	2	43					2.7							
8	2	50	48.09	37-17.35	115-20.67	8.15	2.52	10	102	8.6	.13	.9	2.2	B
8	4	17	53.33	37-18.65	116-20.15	7.69	2.76	10	108	8.2	.16	1.2	3.3	B
8	8	51	49.10	37-18.32	116-20.25	10.62	3.02	9	106	8.8	.10	.9	1.7	B
8	14	34	28.70	37-17.67	116-20.73	12.17	2.88	9	106	9.2	.06	.6	1.0	B
10	1	7	12.55	37-20.62	116-18.77	4.50	2.83	9	96	4.6	.13	1.0	1.1	B
11	1	29	25.10	37-18.34	116-20.45	12.97	3.21	10	93	8.8	.11	.8	.8	B
11	1	32	38.29	37-17.91	116-21.15	10.60	3.29	9	144	9.7	.10	.9	1.3	B
"FONTINA"				PAHUTE MESA	YIELD:	200-1000 KT								
12	14	45	0.16	37-16.28	116-29.31	1.22	6.30							
12	16	23					3.7							
12	16	33					3.6							
12	16	52	24.64	37-16.78	116-28.98	12.56	4.18	9	102	18.3	.13	1.2	1.4	B
12	17	06					3.1							
12	17	14					3.6							
12	17	19	36.30	37-17.72	116-29.21	9.87	3.41	9	102	17.5	.32	2.7	3.7	C
12	17	24												
12	17	26												
12	17	32												
12	17	35												
12	17	37												
12	17	44					3.6							
12	17	47					3.1							
12	17	49					2.9							
12	17	52					3.2							
12	18	18	42.12	37-15.06	116-29.38	3.72	2.59	12	90	5.3	.22	1.2	1.9	B
12	18	23	18.04	37-14.82	116-31.45	7.84	3.10	12	105	4.1	.19	1.1	1.5	B
12	19	1	16.01	37-16.19	116-30.84	4.18	3.16	12	90	2.3	.19	1.1	1.0	B
12	19	07					2.6							
12	19	26	2.27	37-15.33	116-31.14	6.67	3.43	7	166	3.4	.07	.7	.9	B
12	20	57					2.8							
12	21	50					3.3							
12	22	35					2.8							
12	22	55					2.7							
12	22	56					3.1							
13		13					2.8							

1976	HR MN	SEC	LAT N	LONG W	DEPTH	MAG	NO	GAP	DMIN	RMS	ERH	ERZ	Q
FEB 13	1 27					3.3							
13	2 4	57.25	37-15.92	116-30.16	5.86	3.19	11	86	3.4	.22	1.3	1.9	B
13	2 09					2.7							
13	2 16					2.7							
13	3 29					2.7							
13	5 14					3.1							
13	5 24	2.72	37-16.34	116-29.88	4.48	2.64	11	87	3.4	.14	.9	.9	A
13	5 55					2.9							
13	5 56					3.1							
13	7 46					2.8							
13	7 52	19.33	37-15.48	116-30.26	8.55	3.88	11	96	3.8	.17	1.1	1.3	B
13	10 37					2.6							
13	11 40	5.47	37-14.98	116-29.50	3.48	3.25	6	154	5.3	.06	1.3	2.2	C
13	12 53					2.7							
13	14 54					3.0							
13	16 37	35.71	37-16.91	116-30.39	6.19	3.36	11	91	2.4	.16	.9	1.1	B
13	17 11					3.2							
13	20 5	23.93	37-16.22	116-30.28	5.72	3.10	9	87	3.0	.16	1.1	1.4	B
13	20 13					2.7							
13	20 34					2.5							
13	23 22	31.97	37-15.71	116-30.71	6.19	3.29	11	100	3.1	.13	.8	1.1	B
14	29					2.7							
14	1 53					2.8							
14	2 23					3.1							
14	2 31					2.7							
14	3 7	59.03	37-17.98	116-22.08	8.70	2.59	11	90	10.2	.17	.9	2.1	B
14	3 54					3.1							
14	4 19	53.36	37-17.10	116-30.20	5.58	2.70	11	105	2.7	.17	1.2	2.1	B
14	7 14					2.9							
14	7 18	5.47	37-15.25	116-30.64	5.56	2.76	12	104	3.8	.11	.6	1.5	B
"CHESHIRE"			PAHUTE MESA	YIELD: 200-500 KT									
14	11 30	9.16	37-14.56	116-25.21	1.17	5.70							
14	13 15					2.8							
14	13 51					2.7							
14	14 29					2.7							
14	14 37	33.04	37-14.02	116-25.20	6.66	3.52	10	74	8.8	.05	.3	.6	B
14	14 45					2.7							
14	14 49					3.0							
14	15 23					3.1							
14	15 23	49.82	37-14.31	116-25.73	7.69	2.84	12	74	9.7	.10	.5	1.0	B
14	15 56					3.1							
14	21 16					3.1							
14	21 42					3.5							
14	22 26					3.0							
14	23 0	28.56	37-14.96	116-29.63	3.34	3.88	11	95	5.2	.13	.6	.8	B
14	23 15					3.0							
14	23 44					3.0							
15	17					2.6							
15	56					2.8							
15	1 04												
15	2 14												
15	2 48	1.75	37-13.81	116-25.38	4.96	3.78	11	98	9.0	.09	.5	109.6	C
15	2 50					2.7							
15	2 55					2.8							
15	3 09					2.8							
15	3 10					3.3							
15	3 13					2.9							
15	3 25												
15	3 26												
15	3 28					3.1							
15	3 35												
15	3 41												
15	3 43												
15	3 44												
15	3 46					3.1							
15	3 48												
15	3 49												
15	3 50												
15	3 52												
15	3 53					3.7							
15	5 9	55.97	37-17.64	116-20.40	10.27	2.69	10	91	9.0	.13	.9	1.5	B
15	5 09					2.8							
15	6 24					3.1							
15	6 56												
15	14 26					2.8							
16	4 42					3.2							
16	6 20												
16	6 21												
16	6 58					3.0							
16	6 58	28.95	37-14.00	116-25.30	6.12	2.69	10	75	9.0	.17	1.0	2.3	B
16	8 17					2.8							
16	9 19	13.56	37-14.09	116-25.66	9.18	3.15	9	134	9.5	.12	.8	1.8	B

76	HR	MN	SEC	LAT N	LONG W	DEPTH	MAG	NO	GAP	DMIN	RMS	ERH	ERZ	Q
FEB 17	7	51	14.79	37-17.47	116-28.59	6.24	2.86	9	90	5.1	.20	1.4	2.1	B
17	9	26					2.9							
17	13	1	53.27	37-16.02	116-30.66	6.46	2.87	11	91	2.7	.14	.8	1.1	B
17	13	02												
17	20	39												
17	21	57	45.69	37-14.59	116-30.60	6.22	3.84	10	104	4.9	.15	1.0	2.4	B
17	23	18	17.02	37-14.99	116-31.61	6.78	3.82	8	167	3.8	.09	.8	1.2	B
17	23	44	14.20	37-15.22	116-31.31	8.19	3.39	9	167	3.5	.14	1.2	1.6	C
18	3	23					3.1							
18	10	38					3.0							
18	10	48					3.0							
18	12	41	3.88	37-14.33	116-30.73	6.44	3.13	9	104	5.3	.12	.9	2.0	B
18	15	38					2.5							
18	17	54					3.0							
19	2	56					2.7							
19	4	23					2.9							
19	8	4	31.23	37-14.55	116-30.60	.04	3.07	9	104	5.0	.18	1.1	1.2	B
19	9	59					2.7							
19	16	44	4.61	37-15.13	116-30.90	6.62	3.34	8	104	3.8	.15	1.1	1.4	B
20	13	21					2.7							
20	14	54	51.21	37-15.17	116-30.46	4.96	3.18	9	104	4.1	.12	.9	.9	B
20	22	43					2.5							
21	12	03					2.8							
21	16	34	5.90	37-16.14	116-30.79	6.61	2.99	10	90	2.4	.17	1.1	1.3	B
23	1	54					2.8							
23	4	51	34.25	37-15.04	116-31.05	6.54	2.98	11	104	3.9	.21	1.3	1.8	B
23	7	6	13.96	37-14.65	116-28.59	12.81	3.65	9	178	14.0	.11	1.2	1.0	C
23	14	44	33.19	37-14.73	116-31.36	7.40	3.36	8	167	4.3	.13	1.2	1.9	C
24	1	57					2.9							
25	18	14	7.53	37-17.89	116-20.34	4.29	2.81	10	104	9.5	.10	.6	.6	B
26		14					2.7							
26	22	52	53.78	37-15.75	116-24.21	4.33	2.64	10	106	8.9	.36	2.1	2.9	C
27	18	29					2.6							
28	23	26	13.43	37-17.72	116-30.80	7.15	2.71	10	96	2.2	.29	1.9	2.1	B
MAR 1	6	10					2.5							
3	2	3	59.55	37-18.55	116-20.31	11.79	2.90	9	96	8.4	.12	.9	1.3	B
3	13	14	18.16	37-17.86	116-20.22	9.75	3.70	10	93	9.4	.17	1.1	2.0	B
3	13	47	24.59	37-19.04	116-20.23	11.08	2.48	6	100	7.5	.07	.8	1.4	B
3	23	01					2.8							
6	20	44					2.8							
6	23	35					2.8							
7	9	33					2.9							
7	9	34					2.7							
7	18	18	7.49	37-16.28	116-30.95	6.75	2.74	10	89	2.1	.14	.9	1.0	A
7	19	20	42.45	37-16.20	116-30.90	6.53		10	91	2.2	.12	.8	1.0	B
7	21	23					2.9							
8		40	13.96	37-17.21	116-33.65	5.85	3.07	9	107	2.4	.09	.6	12.7	C
8	2	31	11.38	37-11.44	116-30.66	4.77	3.27	11	104	5.2	.13	.8	.9	B
8	2	47					2.9							
8	9	13	18.91	37-12.93	116-29.59	8.80	2.87	11	103	9.4	.14	.9	1.5	B
8	15	01					2.8							
8	16	12					2.8							
8	19	34					2.5							
9	6	02												

"ESTUARY" PAHUTE MESA YIELD: 200-500 KT

76	HR	MN	SEC	LAT N	LONG W	DEPTH	MAG	NO	GAP	DMIN	RMS	ERH	ERZ	Q
9	14	0	0.09	37-18.60	116-21.85	0.87	5.90							
9	14	20												
9	14	33					3.6							
9	14	39					3.5							
9	14	42												
9	14	51	.81	37-19.47	116-21.61	6.26	3.14	9	152	14.7	.16	1.3	2.5	C
9	14	54												
9	14	55												
9	14	56					3.4							
9	14	56					3.0							
9	14	59	38.74	37-20.51	116-21.56	5.81	3.39	9	82	5.7	.19	1.2	2.5	B
9	15	09					3.2							
9	15	12					3.2							
9	15	17	12.00	37-18.99	116-21.47	5.89		10	85	8.1	.09	.6	1.4	B
9	15	20												
9	15	22												
9	15	46					2.8							
9	16	33					3.4							
9	16	41	49.02	37-18.47	116-22.19	1.05	3.12	9	76	9.4	.20	1.1	6.2	C
9	16	55	1.65	37-22.79	116-17.88	12.03	4.27	6	198	23.5	.12	2.0	1.5	C
9	17	31	5.14	37-18.96	116-20.47	4.19	3.16	12	71	7.7	.24	1.2	1.4	B
9	17	43					2.7							
9	18	39	33.38	37-19.25	116-21.19	3.20	2.79	12	63	7.5	.11	.5	.7	B
9	20	54	5.43	37-20.11	116-18.02	.31	4.06	9	141	5.8	.25	1.8	6.3	C
9	20	57					2.8							
9	21	3	47.86	37-19.67	116-19.17	4.07	3.17	12	86	6.2	.10	.5	.5	B
9	21	41	18.61	37-19.76	116-19.43	3.32	2.78	10	83	6.1	.15	.8	1.0	B

1976	HR	MN	SEC	LAT N	LONG W	DEPTH	MAG	NO	GAP	DMIN	RMS	ERH	ERZ	Q
MAR 9	23	54					2.7							
9	23	59					2.9							
10	1	37	58.67	37-18.37	116-20.26	7.40	2.78	8	74	8.7	.12	.9	1.7	B
10	4	28	32.35	37-20.28	116-19.40	9.05	3.18	9	84	5.1	.18	1.3	1.7	B
10	4	34					2.6							
10	12	41	5.63	37-19.26	116-20.08	3.24	3.44	7	112	7.1	.19	1.3	2.7	B
10	16	51					3.0							
10	17	39					2.5							
10	22	45	20.59	37-19.63	116-22.00	10.40	3.16	8	83	7.4	.19	1.6	2.0	B
11	1	24	21.32	37-18.98	116-21.49	8.12	3.06	9	126	8.1	.10	.8	1.2	B
11	1	43	42.84	37-16.16	116-30.85	6.17	2.93	11	91	2.3	.12	.8	.9	B
11	15	15	9.28	37-21.01	116-21.94	10.77	2.76	8	88	5.3	.29	2.3	3.3	B
11	19	26					3.4							
12		40					2.6							
12	4	52					2.5							
12	4	52	18.14	37-17.54	116-33.42	10.12	2.57	7	168	2.3	.14	1.5	1.6	C
12	5	39	6.82	37-16.02	116-31.05	7.19	3.04	8	101	2.3	.15	1.2	1.3	B
12	5	39												
12	5	43					2.9							
12	22	35	43.09	37-16.00	116-31.21	6.72	3.24	10	104	2.2	.12	.8	.9	B
13	4	46	57.46	37-19.35	116-18.93	4.15	2.90	10	69	6.9	.15	.8	.9	B
13	13	16	35.35	37-16.23	116-33.06	11.71	3.14	9	249	2.1	.14	1.8	1.0	C
13	14	39					2.6							
13	14	48					2.5							
13	16	24					2.4							
13	20	32	59.37	37-16.25	116-29.28	13.20	2.59	7	162	15.9	.18	2.5	5.1	C
14	11	22					2.7							
"COLBY"				PAIUTE MESA	YIELD: 500-1000 KT									
14	12	30	0.16	37-18.36	116-28.29	1.27	6.20							
14	12	42												
14	12	45												
14	12	49												
14	12	55					2.7							
14	13	06					3.0							
14	13	10					3.4							
14	13	22												
14	13	28												
14	13	35												
14	13	38												
14	13	43					3.2							
14	13	48												
14	13	49												
14	13	52												
14	13	59												
14	14	02												
14	14	10												
14	14	18												
14	14	36												
14	14	51												
14	14	59	21.89	37-18.54	116-29.66	5.18	4.89	12	98	4.5	.20	1.1	1.9	B
14	15	06					3.7							
14	15	08					3.9							
14	15	13												
14	15	15												
14	15	17												
14	15	19												
14	15	21												
14	15	23												
14	15	24					4.6							
14	15	30					3.0							
14	16	14					2.7							
14	16	15					2.7							
14	16	17					2.7							
14	16	20					2.8							
14	16	22	34.01	37-17.70	116-28.76	6.55	3.33	12	92	5.0	.18	1.0	1.5	B
14	16	31					2.7							
14	17	01					2.7							
14	17	07					2.7							
14	18	18	13.46	37-19.01	116-29.14	1.56	2.59	10	100	5.6	.30	1.8	2.3	C
14	18	41					2.7							
14	18	45					2.8							
14	19	17	23.80	37-19.54	116-29.23	.21	2.76	12	104	6.2	.34	1.8	6.6	C
14	19	27	52.40	37-17.47	116-28.39	6.27	3.76	13	90	5.4	.13	.7	1.1	A
14	19	38	35.43	37-16.46	116-30.83	6.96	2.93	11	89	2.0	.13	.8	1.0	A
14	19	50					2.6							
14	20	15					2.6							
14	20	16					2.7							
14	20	36					2.7							
14	21	07					2.6							
14	21	28					2.6							
14	21	34					2.5							
14	22	18	42.02	37-19.33	116-28.97	3.17	2.53	8	102	6.2	.26	1.8	2.1	B

1976	HR	MN	SEC	LAT N	LONG W	DEPTH	MAG	NO	GAP	DMIN	RMS	ERH	ERZ	Q
14	22	57					2.7							
14	22	58					2.6							
14	23	40					2.7							
15		16	12.45	37-17.04	116-27.49	7.86	3.42	12	85	6.7	.13	.7	1.1	A
15		25					2.8							
15		38					2.8							
15		48					3.0							
15	1	29					2.7							
15	2	14					2.5							
15	3	14					3.0							
15	3	39					2.8							
15	4	55	59.77	37-17.22	116-27.53	8.72	3.01	11	86	6.6	.14	.8	1.2	A
15	7	3	34.79	37-19.02	116-29.94	6.56	2.66	8	103	4.8	.08	.6	.8	B
15	7	03					2.7							
15	8	11					2.5							
15	11	36					2.8							
15	12	20	36.37	37-17.98	116-20.83	10.30	2.68	10	69	9.6	.18	1.1	2.0	B
15	12	51					2.8							
15	13	27	26.51	37-19.15	116-28.62	2.50	2.69	10	100	6.4	.33	1.8	5.8	C
15	16	52					2.7							
15	22	50	59.15	37-17.35	116-27.10	9.22	2.74	13	85	7.3	.16	.8	1.2	B
15	22	57	13.09	37-18.71	116-28.47	3.05	2.80	8	97	6.1	.13	.8	1.1	B
15	23	3	5.77	37-18.11	116-29.45	.83	3.24	12	95	4.3	.23	1.0	2.8	B
16	2	23					2.7							
16	7	34					2.8							
16	8	30					2.6							
16	15	30					2.7							
16	18	5	53.53	37-17.67	116-30.70	4.94	2.54	11	95	2.3	.16	1.1	.9	B
16	21	51	57.87	37-18.68	116-29.07	5.78	2.76	8	98	5.4	.14	1.0	1.7	B
16	22	57	30.55	37-17.98	116-27.56	7.75	2.60	12	90	6.8	.13	.7	1.1	B
17	4	26												
"POOL"				PAHUTE MESA	YIELD: 200-500 KT									
17	14	15	0.09	37-15.35	116-19.71	0.88	5.80							
17	14	25												
17	14	27												
17	14	45												
"STRAIT"				YUCCA FLAT	YIELD: 200-500 KT									
17	14	45	0.09	37- 6.44	116- 3.15	0.78	5.60							
17	14	56												
17	14	58												
17	15	00												
17	15	01												
17	15	03												
17	15	12												
17	15	17												
17	15	23												
17	15	24												
17	15	26												
17	15	28												
17	15	59					3.7							
17	16	03					2.7							
17	16	06					3.2							
17	16	10												
17	16	14					3.0							
17	16	16												
17	16	16					3.2							
17	16	18					2.7							
17	16	29												
17	16	40					3.6							
17	16	36					3.2							
17	16	37												
17	16	39					3.5							
17	16	46												
17	16	49												
17	16	51					3.4							
17	16	55												
17	17	8	47.57	37-14.82	116-19.05	3.55	3.12	9	75	3.7	.15	.9	1.0	B
17	17	12												
17	17	16					3.4							
17	17	19					2.9							
17	17	35					3.0							
17	18	00					3.8							
17	18	05					3.6							
17	18	12					2.7							
17	18	40					3.3							
17	20	10	4.75	37-15.43	116-18.58	4.00	2.79	12	80	5.0	.15	.7	.8	A
17	20	23	7.08	37-15.55	116-30.03	6.07	2.91	12	91	4.0	.29	1.6	2.6	B
17	20	41					2.6							
17	22	56					2.9							
17	23	16	4.80	37-14.31	116-18.71	4.45	3.51	6	101	2.9	.10	1.0	.8	B

1976	HR MN	SEC	LAT N	LONG W	DEPTH	MAG	NO	GAP	DMIN	RMS	ERH	ERZ	Q
MAR 17	23 26	39.17	37-15.15	116-19.63	3.41	3.32	12	74	4.3	.23	1.0	1.2	B
17	23 31					2.7							
18	18					2.7							
18	23					2.9							
18	1 12	26.75	37-14.33	116-18.39	.42	2.63	6	109	3.2	.32	2.7	2.4	C
18	3 4	37.00	37-14.61	116-18.83	4.10	3.10	12	71	3.4	.12	.5	.5	A
18	5 26					3.2							
18	5 30	54.71	37-17.36	116-17.27	.99	3.15	9	98	7.5	.33	1.7	12.6	C
18	8 44					2.7							
18	9 37					3.0							
18	12 49					2.6							
18	16 38												
18	16 41	47.38	37-14.49	116-17.18	5.74	3.29	8	72	4.5	.23	1.5	3.6	B
18	17 07					3.0							
18	17 18	59.04	37-14.96	116-18.91	5.19	3.22	12	74	4.0	.08	.4	.7	A
18	17 20					2.8							
18	17 47					3.0							
18	17 52					3.0							
18	18 21												
18	18 24					2.6							
18	19 09					2.7							
18	20 13					2.8							
18	21 8	4.87	37-14.80	116-18.70	4.24	2.86	9	88	3.8	.13	.7	.7	A
18	21 32					2.8							
18	21 33	51.92	37-15.38	116-19.63	2.59	2.95	7	97	4.7	.27	1.9	3.3	B
18	22 06					2.9							
18	22 19					2.6							
18	23 03					3.1							
18	23 18					2.6							
18	23 26					2.6							
19	28					2.8							
19	32					2.8							
19	1 20	53.90	37-15.93	116-19.12	.51	3.29	9	95	5.7	.28	1.2	4.9	B
19	2 49					2.6							
19	3 12					2.8							
19	4 04					2.9							
19	4 37					2.8							
19	4 54					3.4							
19	5 31					3.3							
19	5 47					3.4							
19	5 50					3.1							
19	5 51					3.2							
19	5 59					2.8							
19	6 8	34.56	37-14.59	116-19.15	4.36	3.42	9	80	3.3	.22	1.3	1.2	B
19	6 00					3.1							
19	6 14					3.0							
19	6 15												
19	6 21	51.74	37-14.30	116-18.68	3.56	3.77	9	82	2.9	.11	.6	.6	A
19	6 25					2.6							
19	7 09					3.1							
19	7 27					2.9							
19	7 32					3.1							
19	7 41												
19	7 47					3.4							
19	7 52												
19	10 22					2.6							
19	10 33	11.49	37-15.16	116-19.31	4.19	2.80	11	80	4.3	.19	1.0	1.1	B
20	1 56	39.82	37-20.68	116-29.45	3.55	2.66	9	112	7.8	.38	2.6	3.7	C
20	6 23	3.34	37-16.48	116-30.66	7.49	3.88	13	89	2.2	.20	1.1	1.4	B
20	6 35	11.16	37-16.39	116-31.03	6.32	2.91	9	145	1.9	.24	2.0	2.6	C
20	6 36	16.12	37-16.63	116-30.62	5.57	3.03	11	90	2.2	.20	1.2	1.5	B
20	7 36	39.45	37-19.93	116-18.65	4.26	2.95	11	91	5.8	.19	1.2	1.7	B
20	7 46					2.6							
20	7 48	48.56	37-16.54	116-31.24	.35	3.11	11	90	1.4	.23	1.4	1.3	B
20	8 46	27.64	37-16.20	116-31.65	7.90	2.77	10	165	1.6	.12	.9	1.2	B
20	14 30	32.72	37-16.62	116-30.45	5.37	2.95	12	89	2.4	.16	1.0	1.7	B
20	20 31	51.62	37-16.98	116-30.63	6.48	2.53	10	106	2.1	.14	1.0	1.5	B
21	3 59	44.37	37-16.49	116-30.58	6.75	2.97	11	89	2.3	.15	.9	1.1	B
21	4 1	5.67	37-16.83	116-30.24	5.46	2.74	6	137	2.6	.12	3.1	5.5	C
21	4 54	.76	37-17.45	116-27.46	11.10	2.57	10	87	6.8	.12	.8	1.3	A
21	5 22	31.00	37-16.64	116-29.83	5.53	2.80	11	88	3.3	.24	1.4	2.1	B
21	5 44					2.6							
21	16 15	42.87	37-16.08	116-21.13	7.94	2.69	12	66	9.5	.21	1.1	1.9	B
22	13 20					2.6							
22	16 21					2.8							
22	22 40					2.7							
23	2 48	4.90	37-17.75	116-20.89	6.26	3.58	12	69	9.4	.23	1.2	2.8	B
23	3 51					2.9							
23	4 24					2.8							
23	4 25	30.63	37-19.13	116-20.28	10.27	2.78	12	73	7.4	.19	1.0	1.4	B
23	5 02					2.6							
23	5 56	56.38	37-17.50	116-20.21	7.96	2.89	12	75	8.7	.15	.8	1.4	B
23	10 29												
23	12 08					2.7							

976		HR	MN	SEC	LAT N	LONG W	DEPTH	MAG	NO	GAP	DMIN	RMS	ERH	ERZ	Q
MAR	24	20	23	43.97	37-16.39	116-19.36	4.89	2.77	11	81	6.6	.16	.8	1.1	B
	25	13	30	18.48	37-13.44	116-18.96	6.26	3.46	12	62	1.3	.41	1.9	2.7	B
	25	13	36					3.0							
	27	19	42					2.7							
	31	11	52	26.56	37-14.63	116-29.87	3.50	3.01	14	102	5.4	.24	1.3	2.3	B
	31	17	41	34.29	37-17.01	116-26.15	6.34	2.69	14	80	8.7	.14	.7	1.6	B
APR	1	8	9	26.98	37-15.66	116-30.28	6.71	2.70	11	150	3.6	.16	1.1	2.0	C
	1	8	40					2.7							
	1	12	52					2.8							
	2	3	07					2.7							
	2	8	37					2.6							
	2	15	36					2.6							
	5	1	2	39.46	37-18.00	116-19.71	11.54	3.21	13	79	9.3	.23	1.2	1.6	B
	5	1	03					2.8							
	5	23	37	38.82	37-17.93	116-20.66	10.67	2.76	12	71	9.6	.14	.8	1.4	A
	7	12	48	41.12	37-14.49	116-30.07	10.50	2.49	11	103	18.2	.11	.7	1.3	B
	7	14	16	53.97	37-13.81	116-30.25	7.59	3.09	11	103	17.1	.29	2.0	4.3	C
	9	13	36	42.82	37-18.28	116-21.64	4.05	2.46	9	124	14.2	.24	1.5	9.3	C
	9	13	43	31.47	37-17.44	116-22.02	.38	2.61	9	123	14.5	.28	2.1	20.9	C
	9	19	2	40.70	37-17.63	116-30.02	4.22	2.84	9	130	23.9	.16	1.2	220.3	C
	13	13	26	43.33	37-17.65	116-13.86	10.22	2.58	10	124	19.5	.33	2.4	4.4	C
	16	20	20					2.5							
	17	17	51					2.9							
	24	3	21	21.97	37- 5.28	116-37.54	15.53	2.73	13	110	16.2	.23	1.7	1.4	B
AY	3	3	35	5.65	37-17.57	116-29.37	5.62	2.46	10	160	4.1	.13	.9	1.3	B
	8	13	16	37.48	37-17.46	116-21.06	9.56	3.48	13	68	8.9	.16	.8	1.6	B
	9	12	0	25.44	37-17.82	116-20.22	9.25	2.79	12	75	9.3	.11	.6	1.2	B
	10	13	7	3.07	37-16.73	116-22.18	9.58	2.64	12	62	8.3	.18	.9	1.4	B
	"MIGHTY EPIC"				RAINIER MESA	YIELD: < 20 KT									
	12	19	50	0.17	37-12.54	116-12.75	0.42	4.60							
	14	12	48	24.75	37-14.45	116-18.82	4.56	3.33	11	69	3.1	.12	.6	.6	A
	17	12	23					2.6							
	20	14	7	38.91	37-24.45	116-17.43	8.94	2.56	11	211	3.9	.12	1.2	1.4	C
	28	1	57	13.71	37-20.36	116-18.91	4.66	2.87	12	92	5.0	.19	1.1	1.3	B
	31	3	25	35.38	37-17.57	116-27.67	8.02	2.78	10	88	6.5	.13	.8	1.1	A
	31	7	47	31.76	37-17.55	116-27.45	8.19	2.99	11	87	6.8	.11	.6	1.0	A
JUN	1	10	24	42.71	36-38.10	116-19.32	7.00	3.50	16	123	12.2	.09	.5	.8	B
	3	4	59	35.65	37-17.41	116-29.81	6.22	2.80	12	92	3.4	.30	1.7	2.3	B
	6	12	45	2.74	36-37.86	116-19.71	6.11	3.98	15	124	12.8	.09	.5	.9	B
	7		32	38.68	36-37.81	116-19.80	6.34	4.09	15	124	12.9	.09	.5	.9	B
	7		37	12.95	36-37.71	116-19.95	7.62	4.16	15	124	13.2	.18	.9	1.3	B
	7	2	28	6.67	36-37.72	116-20.24	.17	3.10	14	124	13.3	.14	.7	6.2	C
	8	5	56	5.36	36-38.84	116-19.71	.92	2.35	9	122	11.1	.32	2.2	16.8	C
	8	6	45	48.41	36-38.48	116-19.52	.61	2.42	10	123	11.6	.26	1.4	10.4	C
	9	9	43	6.74	36-37.71	116-19.02	7.12	2.51	10	124	12.7	.17	1.2	1.8	B
	9	22	12	58.54	36-37.20	116-19.76	9.32	3.08	12	124	13.9	.38	2.3	3.5	C
	11	11	1	2.22	37-16.43	116-31.04	7.60	2.83	8	146	1.8	.11	1.0	1.2	B
	13		26	.84	36-38.70	116-18.39	3.38	2.40	12	122	10.7	.22	1.3	2.0	C
	15	1	50	26.73	37-16.16	116-31.08	6.69	2.71	8	123	2.1	.18	1.6	1.5	B
	16	15	35	24.72	36-38.20	116-20.07	4.93	2.86	11	123	12.4	.15	.9	4.4	C
	19	6	49	57.96	36-37.78	116-19.35	.45	2.44	11	124	12.7	.18	1.1	8.6	C
	19	10	26	55.80	36-38.82	116-19.33	4.65	3.92	12	122	10.9	.08	.5	2.0	C
	19	10	48	48.24	36-37.92	116-19.14	.51	2.48	9	123	12.4	.14	1.0	7.4	C
	20	18	30	58.26	36-37.53	116-19.26	.20	3.44	9	124	13.1	.14	.9	7.4	C
	20	20	28	21.30	36-38.38	116-19.58	5.89	3.42	11	123	11.8	.19	1.2	2.2	C
	22	23	39	2.97	36-37.66	116-19.46	5.97	2.93	10	124	13.0	.13	1.0	2.4	C
	28	1	58	43.55	36-37.81	116-19.03	.61	2.37	13	124	12.5	.15	.8	6.5	C