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SEISMICITY AND FOCAL MECHANISMS FOR THE SOUTHERN GREAT BASIN OF NEVADA AND CALIFORNIA IN 1991

by

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Seismicity and Focal Mechanisms for the Southern Great Basin of Nevada and California in 1991

ABSTRACT

For calendar year 1991, the southern Great Basin seismic network (SGBSN) recorded 980 earthquakes in the SGB, as compared to 1050 in 1990. Local magnitudes, M_L, ranged from 0.0 for several earthquakes in the southern Nevada Test Site to 4.1 for a strike-slip earthquake in the Lower Pahranagat Lake SW quadrangle on March 10, 1991. No felt reports or damage reports were filed with the National Earthquake Information Center (NEIC) for Southern Great Basin (SGB) earthquakes of 1991, although public agencies were canvassed following three of the largest of them. Within a 10-km radius of the site of a potential national, high-level nuclear-waste repository near the center of Yucca Mountain, Nevada, no earthquakes were detected, although three earthquakes, with duration magnitudes between 0.8 and 1.1, were recorded in the Claim Canyon Cauldron segment south of Timber Mountain and 10+ km north of the potential repository site. The estimated focal depths of these earthquakes are 3.6 km to 4.9 km below sealevel. Other, smaller events also may have occurred in the immediate vicinity of Yucca Mountain, but would have been below the network's detection threshold ($M_L \approx 0.0$ at Yucca Mountain). Twelve earthquakes were located in 1991 at Bare Mountain, Nevada, six of them on or near a fault along the northwestern flank of Bare Mountain.

Focal mechanisms for 16 SGB earthquakes of 1991 with magnitudes in the range $0.8 \leq M_L \leq 4.1$ are predominantly strike slip. Normal slip occurred for an earthquake at Gold Mountain, Nevada, and oblique dip slip strike slip is determined for earthquakes at Sarcobatus Flat, Nevada; Pahranagat Shear Zone, Nevada; and Frenchman Flat, Nevada Test Site (NTS). One small (M_L 1.3) earthquake in the Amargosa Desert, California, displays subhorizontal nodal planes for its focal mechanism solutions, indicating the possibility of a seismically active detachment fault. The azimuth of the average tension axis for preferred focal mechanism solutions of 14 earthquakes of 1991 having $M_L \geq 1.4$ is North 57° West (data from smaller earthquakes were not included in this statistic).

INTRODUCTION

The SGBSN has operated continuously since August 1978, with 54 vertical-component stations deployed since mid-1981. Horizontal-component seismographs were added at selected sites in 1984, and a vertical-component seismograph south of Boulder City, Nev., was added in August 1988. Figure 1 shows seismograph station locations and some of the major physiographic features of the southern Great Basin of Nevada and California. Appendix E tabulates seismograph station information and station-site geology.

The primary purpose of the network is to monitor seismicity in the vicinity of Yucca Mountain, Nevada, the potential site of a high-level, national nuclear-waste repository. The network also provides information on seismotectonics within a ≈160-km radial distance of Yucca Mountain. Seismic signals from the network are continuously telemetered to the U.S. Geological Survey (USGS) data processing center in Golden, Col., where preliminary hypocenters are determined, along with research on focal mechanisms and faulting, on fluid-induced seismicity, on seismic-wave attenuation, on velocity structure, and on other topics of importance to the Yucca Mountain Project.

Operation of the seismic network is funded by an interagency agreement with the Department of Energy, which provides quality-assurance guidelines for the collection, analysis, interpretation, and reporting of Yucca Mountain Project data. The seismic network data are collected as permanent records to support site characterization. Because seismicity data in the SGB come from sources and crustal paths that are, at best, approximately known, the

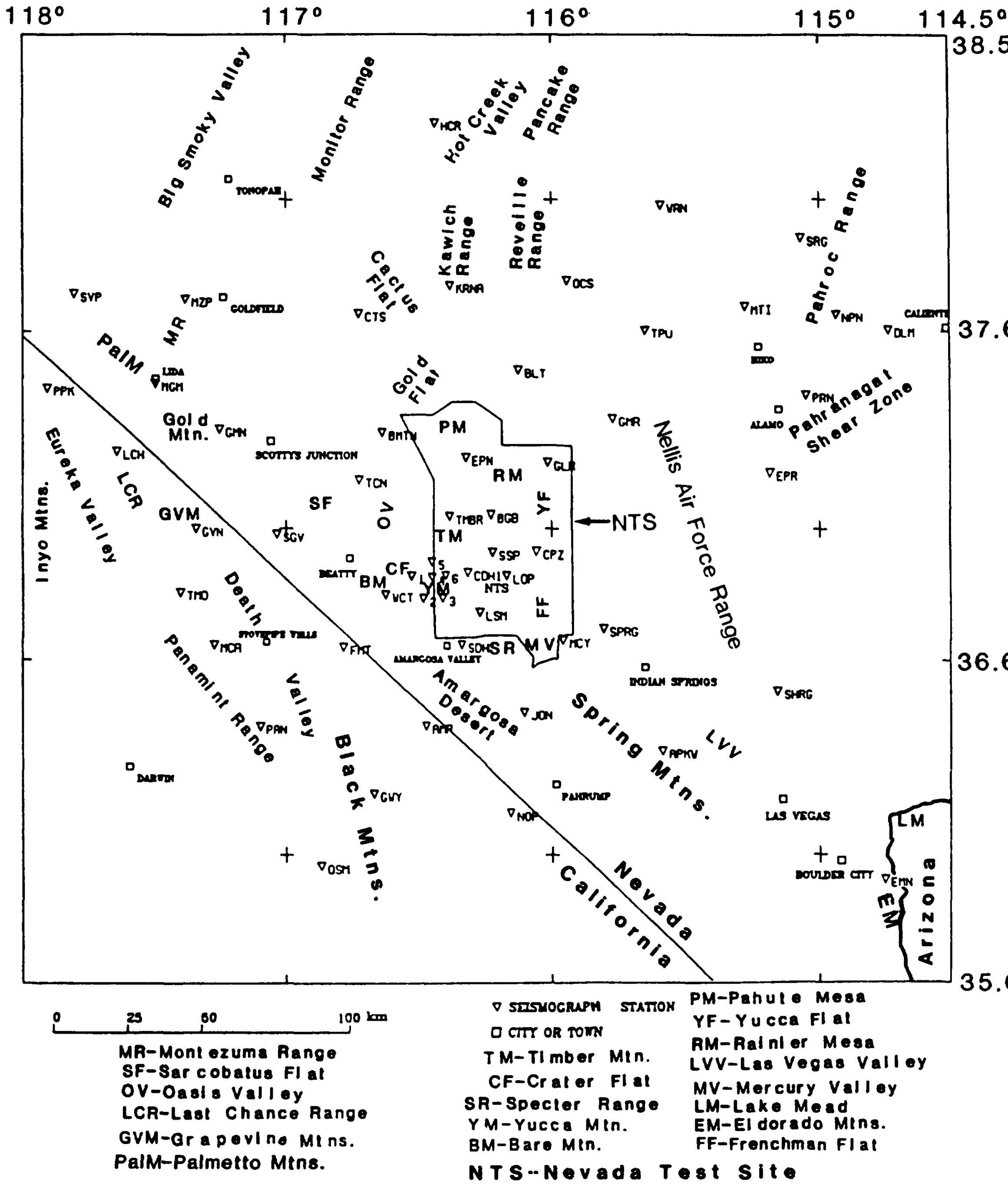

Figure 1.– SGBSN seismograph station locations, cities and towns, and some major physiographic features of the southern Great Basin.

hypocenters and analyses that are presented in open-file format are necessarily preliminary. Any "final" report of seismicity in the SGB should integrate information from all relevant sources, whereas the open-file reports (OFR's) of SGB seismicity periodically published by the USGS, such as this one, are less comprehensive. OFR's for previous years are listed in the References Cited section. **All hypocenters and focal mechanisms appearing in this and previous SGB seismicity reports are preliminary.**

Seismic station density will be increased, first in the vicinity of Yucca Mountain, Nevada, and then in the surrounding region, during implementation of the seismic network upgrade, a cooperative project among the USGS, the University of Nevada at Reno Seismology Lab, and the U.S. Department of Energy. The upgrade will consist of three-component broadband seismometers and digital satellite telemetry to a downlink center, probably at Golden, Col. and various computer systems for data analysis, redistribution, and archiving. During fiscal year 1991, progress was made on seismic station site selection and permitting, equipment purchasing and installation, software development, and all other aspects of that project. Instrument deployment and data acquisition from the upgrade network are scheduled to begin in fiscal year 1992.

Acknowledgments

Maintenance and periodic calibration of seismograph stations and related field equipment are performed by D. E. Overturf and W. T. Bice of the USGS, and by contract technicians. Most preliminary seismic event catagorizations, phase arrival time determinations, and initial hypocenter determinations for SGB seismicity of 1991 were performed by J. B. Duggar of the USGS.

Helpful technical reviews of this report were provided by J. S. Gomberg and H. M. Benz of the USGS, Branches of Geologic Risk Assessment and Seismology, respectively. Corrections to the original draft and observations by W. J. Carr on the geology of the southern Great Basin have been incorporated into the text and figures and are gratefully acknowledged. It is emphasized here, however, that this report is a catalog of seismicity, not of geology. All fault traces shown in the figures of this report are from Rogers and others (1983, pl. 1).

CALIBRATION OF INSTRUMENTS

All seismographic systems in the SGBSN are periodically calibrated as specified in the quality-assurance document, YMP-USGS Seismic Procedure 11. Seismometers and related equipment are inspected and calibrated annually, or as needed. Calibration results are deemed acceptable when the amplitude response of a seismographic system lies within a ±30% range of a nominal (expected) response, in the frequency band $2 \leq f \leq 10$ Hz. In actual field calibrations, systems are tested in the frequency band $0.1 \leq f \leq 20$ Hz. In these calibrations, Teledyne-Geotech[1] S13 systems (see Appendix E) generally display an amplitude response within 10% of the nominal level at all measured frequencies, and Mark Products[1] L4C systems display responses within 25% of their nominal levels for frequencies $1 \leq f \leq 10$ Hz. For $f < 2$ Hz, the true system magnifications are rarely required, because wavelet periods corresponding to peak-amplitude S-waves observed on seismograms of local SGB earthquakes, which are scaled to obtain M_L estimates, are almost always less than 0.5 seconds (frequency > 2 Hz).

DATA ACQUISITION AND INTEGRATION INTO THE CATALOG

Hypocenter data for all SGB earthquakes occurring during calendar year 1991 for which preliminary event locations could be determined are listed in Appendix A. SGB earthquake

[1] Use of trade names is for descriptive purposes only and does not constitute endorsement by the USGS.

epicenters for 1991 are displayed in figure 2. The southwestern part of the region (west of the Panamint Range, Calif.) shown in figure 2 is more densely covered by the USGS/California Institute of Technology seismic network at Pasadena, California, and any study of strain and seismicity rates in the southwestern SGB would benefit by adding data from their catalog to the SGBSN catalog. Other parts of the SGB shown in figure 1 are sparsely covered by SGBSN stations, or are not covered at all. Several subregions of the SGB have been the targets of short-duration local seismicity studies conducted by various laboratories; but, in general, their data have not been added to the SGBSN catalog. The SGBSN also archives regional and teleseismic data and regularly provides selected event seismograms to interested investigators.

Hypocenter information for chemical explosions and probable explosions that were located by the SGBSN are listed in Appendix B, and corresponding epicenters are shown in Appendix B, figure B1. Hypocenter information for announced nuclear device tests detonated during 1991 at Nevada Test Site (NTS) are listed in Appendix C, and their epicenters are shown in figure C1. Some epicenters of tectonic release from nuclear device detonations and associated cavity collapses located in the Silent Canyon Caldera and Yucca Flat are denoted by "L" (low-frequency event) in figures 2, 4, 5, and C1. Hypocenter information for located NTS low-frequency events is listed in Appendix C, table C2. Focal mechanism solutions computed from SGBSN station seismograms for 16 earthquakes of 1991 are shown in the figures of Appendix D. Appendix E contains station information, and Appendix F contains information about hypocenter location (HYPO71) input parameters, such as seismic velocities.

The seismogram data from which the earthquake hypocenters are determined (Appendix A) were digitized by a Digital Products PDP 11/34[1] computer, dedicated to seismic event detection. The time-domain event-detection algorithm is that of Johnson (1979). Data are also recorded on 16-millimeter Develocorder films, which serve as a backup to the computer detection system. Events whose arrival-time data are read from Develocorder records are labeled "A" in the third character of the three-letter "quality field" of each hypocenter record of Appendix A. Measurements made from CRT-displayed digital seismograms are generally more reliable than those scaled from films, with impulsive P- and S-arrivals being determined to an accuracy better than 0.02 to 0.04 sec (digitizing rate=104.167 sps/channel), versus 0.10 sec for most P-arrivals read from Develocorder film (S-arrivals scaled from film are much more uncertain than corresponding P-arrivals). Hypocenters derived from computer-recorded events are labeled "I" in the quality field. The PDP seismic computer downtime averaged about 7 percent per month during 1991, principally due to hardware problems and to magnetic tapes filling.

Seismograms from all SGBSN stations that display a moderate to good signal-to-noise ratio for a given local earthquake detected by the acquisition system are permanently archived on UNIX "tar"-format magnetic tapes. Copies of these tapes are periodically distributed to the USGS-Yucca Mountain Project (YMP) Local Records Center and are available to investigators after annual seismicity reports are published, when approved by USGS-YMP management. Develocorder film data are also permanently archived.

A variety of magnitudes may be computed from SGBSN waveform data for each earthquake and blast reported in Appendixes A and B. As many as five magnitude estimates are determined per event: (1) coda-average magnitude, M_{ca}; (2) duration magnitude, M_D; (3) local magnitude from horizontal component instruments M_L^{hor}; (4) local magnitude from vertical component instruments, M_L^{ver}; and (5) local magnitude from clipped records, M_L^{clip}. These are discussed in previous SGBSN data reports (Rogers and others, 1987b; Harmsen and Bufe, 1991). Figure 3 shows the maximum 1991 earthquake magnitude [avg(M_L^{hor}, M_L^{ver})] or the letter "Q" (quiet, no

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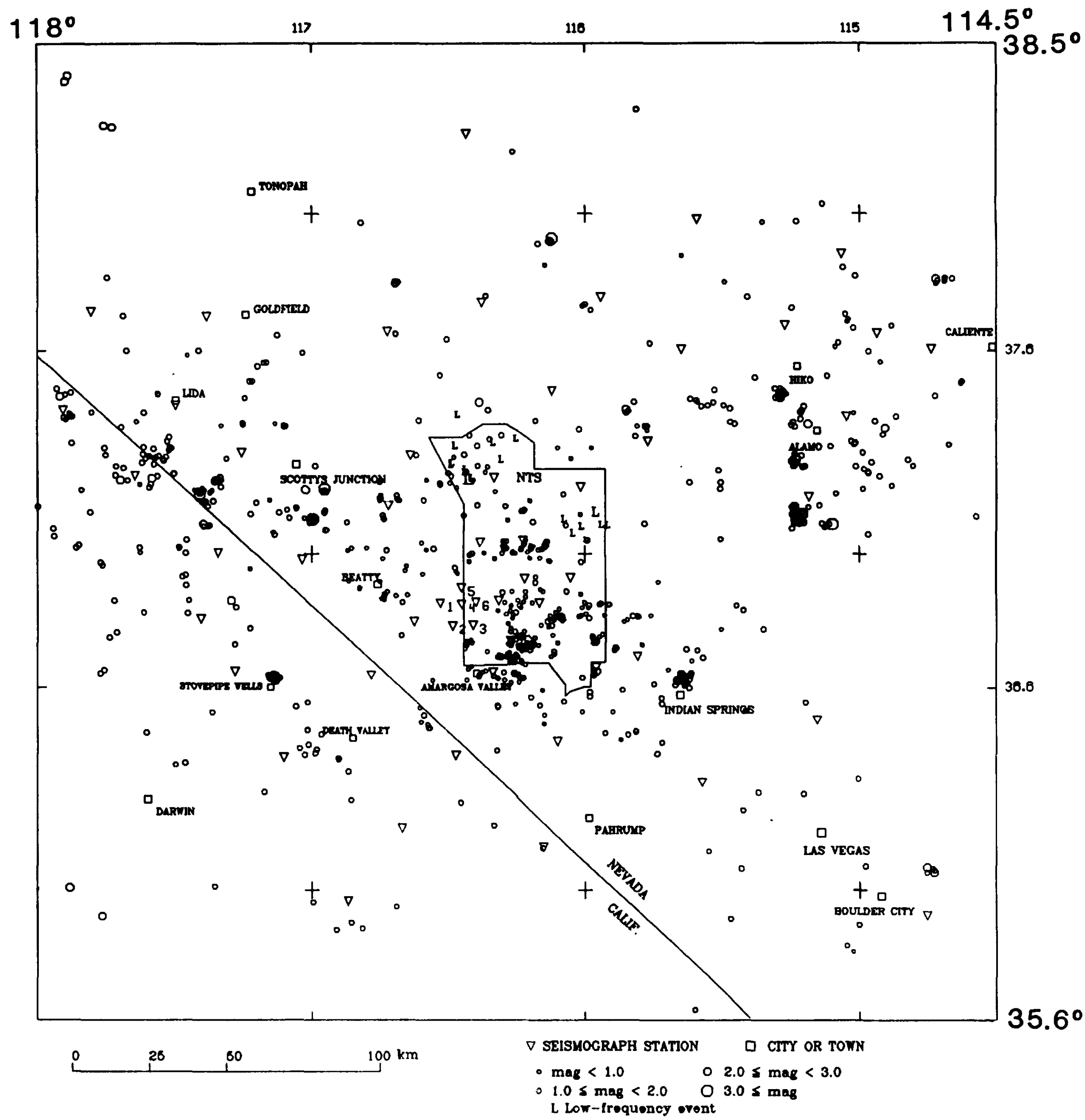


Figure 2.– Earthquake epicenters in the southern Great Basin, 1991. Symbol sizes are keyed to event M_L.

earthquakes detected) per $7\frac{1}{2}$-minute by $7\frac{1}{2}$-minute topographic quadrangle in the central part of the SGB. This figure indicates where natural seismic energy release was highest in the SGB for 1991, since energy release is dominated by the largest magnitude event in each quadrangle.

The SGBSN is a high-gain, low-dynamic-range network, consequently, for those earthquakes having magnitude > 2.7, most SGBSN seismograms are usually saturated for several seconds following the P- and S-wave arrivals. Only the lowest gain, horizontal-component stations, **LSME** and **LSMN**, are expected to record such events on-scale. Thus, ground-vibration amplitudes for many of the SGB's larger earthquakes ($M_L > 2.7$) are undersampled by the local network, and magnitude estimates for those earthquakes may be biased. For example, ground motion from possibly the largest SGB earthquake for 1991, occurring on March 10 in the southwestern Pahranagat Shear Zone of Nevada, was recorded on-scale only at the lowest-gain SGBSN stations. Although the M_L 4.07 determined from seismogram amplitudes at **LSME** and **LSMN** is comparable to M_L 4.0 estimated by the Berkeley Seismograph Laboratory, Berkeley's estimate may be high as a result of its using a California seismic attenuation curve for path corrections from all sources, rather than a lower rate SGB attenuation curve for SGB sources (Rogers and others, 1987a). Possible SGB earthquake magnitude bias is further discussed in Harmsen and Bufe (1992). Magnitude estimates such as M_{ca} (Johnson, 1979) are included in the hypocenter listing because potentially they could provide a useful estimate of earthquake size from saturated seismograms. The practical limitation of such estimates is that they must be calibrated against the amplitude/period magnitude, M_L, in the magnitude range of importance. Such a calibration has only been performed for earthquakes having $M_L < 2.7$ for SGBSN data (Rogers and others, 1987b), and we believe M_{ca} and M_d, as reported here, are biased *low* relative to the true magnitude for events having $M_L > 2.7$.

Hypocenter estimates are always approximate. Errors result from misidentified seismic phases (for example, the converted *SP* phase), from assumptions about crustal velocity structure, and from network geometry and other data limitations. Standard errors of hypocenter parameters are routinely calculated by HYPO71 (Lee and Lahr, 1975), and some of these are listed in Appendix A. Table 1 summarizes some hypocenter parameter distribution statistics computed by HYPO71 for the digitally recorded SGB earthquake data of 1991. In table 1, *RMS* is the average traveltime residual, *# P+S phases* is the number of arrival time phases used by HYPO71 (i.e., those having weight > 0), *Gap* is the maximum azimuthal angle without a station, *Depth* is the depth of focus estimate, *Err(z)* is the estimate of standard error in depth, and Δ_{min} is the minimum source-to-station epicentral distance.

Table 1. Selected statistical characteristics of a subset of the 1991 SGBSN earthquake catalog.[1]

Statistic	RMS (sec)	# P+S Phases	M_{ca}	M_L^{clip}	M_D	M_L^{hor}	M_L^{ver}	Gap (deg.)	Depth[2] (km)	Err(z) (km)	Δ_{min} (km)
Mean	0.134	12.8	1.42	1.63	1.13	1.43	1.22	159	5.27	2.3	14.1
Median	0.13	12	1.34	1.60	1.14	1.34	1.21	142	5.04	1.4	12.3
Maximum	0.81	58	3.38	3.30	2.58	4.07[3]	2.78	322	22.2	28.5	106.0
Minimum	0.02	5	0.68	0.70	0.15	0.06	0.05	36	-1.84	0.1	1.0
Quartile 3	0.16	15	1.60	1.90	1.50	1.63	1.47	203	7.71	2.9	17.5
Quartile 1	0.09	10	1.15	1.40	0.58	1.12	0.93	111	2.10	0.9	7.1
N# obs.	892	892	854	531	17	569	878	892	863	863	892

[1] Only events captured by digital computer monitoring system are included. Also, only those hypocenters having the property, 0 <Err(z)< 30 km, are included in the tabulations for Depth and Err(z).

[2] Depth of focus is relative to sea level (0.0 km), positive below.

[3] One-station estimate, BRK M_L 4.0 for this earthquake (March 10, 1991, 21:38:47 UTC).

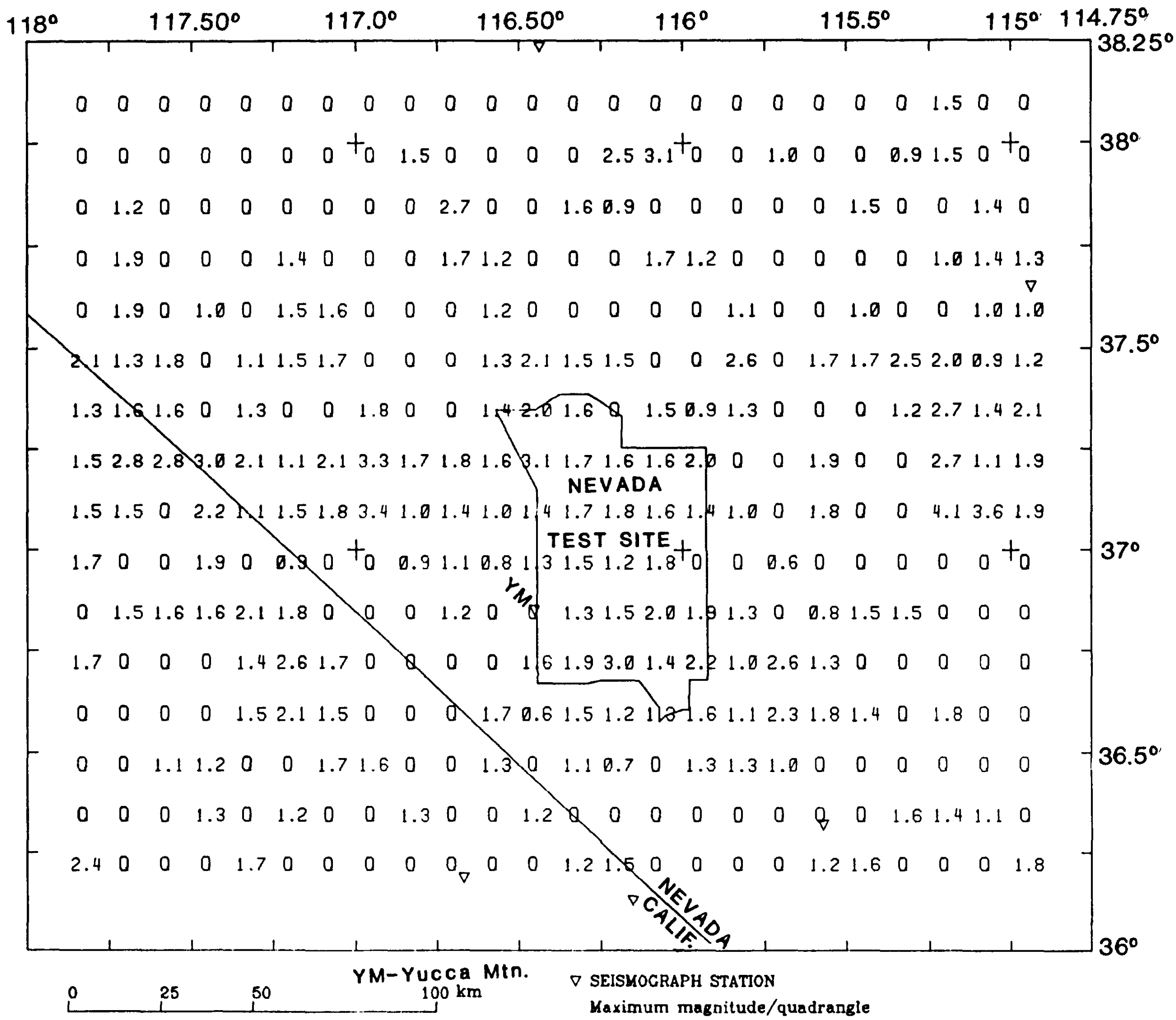


Figure 3.– Maximum earthquake magnitude per $7\frac{1}{2}$-minute by $7\frac{1}{2}$-minute quadrangle in the interior of the SGB for earthquakes of 1991. The letter Q represents a quiet quadrangle (no seismicity detected).

Defining magnitude for the ith event as avg(M_{Li}^{hor}, M_{Li}^{ver}), the average magnitude for digitally recorded SGB earthquakes in the 1991 catalog is about 1.3. Ninety-five percent of those earthquakes have $M_L < 2.4$, and one-half of them are in the range $1 \leq M_L \leq 1.6$. Estimated depths-of-focus range from the earth's surface to about 22 km below sealevel, with 99% of earthquake hypocenters being less than 15 km below sealevel. (The depth estimates of the deepest SGB hypocenters from the 1991 catalog are unreliable.)

SEISMICITY OF SELECTED AREAS IN 1991

Yucca Mountain Area

No earthquakes were detected within 5 km of the potential nuclear-waste repository site at Yucca Mountain in 1991. Earthquakes in the Yucca Mountain area are located by using the Yucca Mountain crustal velocity model shown in Appendix F, figure F1b. The epicenters of the nearest-to-site earthquakes for 1991, shown in figure 4, are approximately colocated in the resurgent dome of the Claim Canyon Cauldron segment of the Timber Mountain caldera complex (Byers and others, 1989). If the standard SGB velocity model (figure F1a; this model is used for sources away from Yucca Mountain) is used, the epicenters of those earthquakes are 2 km northwest of those presented here, farther from the site. Hypocenter parameters for the 1991 earthquakes in the Claim Canyon Cauldron are summarized in table 2. (Seismograms for these earthquakes are available only on Develocorder film; the seismic computer was not operating at the time of their occurrence. Data quality was inadequate for focal mechanism determination.) The epicenters of all earthquakes in the western NTS region for the previous period of monitoring by the SGBSN, August 1978 through December 1990, are shown in figure 5. Although epicenters in the vicinity of Yucca Mountain could be presented on a fault map, it is difficult to associate many of them with specific faults, due to relatively high fault density, unknown fault dip from the surface to seismogenic depths, and to hypocenter errors. Caldera boundaries, especially those of Timber Mountain and its resurgent dome, may play a significant role in the control of local seismicity in the Southwestern Nevada Volcanic Field. Much of the seismicity in the Silent Canyon Caldera is associated with the nuclear testing program, however.

Table 2. Summary of preliminary location parameters for three earthquakes located in the Claim Canyon Cauldron segment north of Yucca Mountain, Nevada, in 1991. "Distance to site" represents the epicentral distance estimate to the point 36°51′N., 116°27.5′W., near the center of a potential nuclear-waste repository. Depth is relative to sealevel (0.0 km). Sdx, sdy, and sdz are HYPO71 standard errors in estimates of hypocenter longitude, latitude, and depth of focus, respectively. M_D is duration magnitude (Rogers and others, 1987b).

DATE TIME (UTC)	LAT., ° N.	LONG., ° W.	N-S sdy (km)	E-W sdx (km)	Depth±sdz (km)	M_D	Dist. to site (km)
1991-12-17 05:14:49.7	36.942	116.467	0.2	0.2	3.3±0.3	0.71	10.2
1991-12-15 16:15:22.7	36.948	116.473	0.4	0.4	4.7±0.3	0.77	11.0
1991-12-15 10:51:57.3	36.959	116.477	0.4	0.4	4.9±1.0	1.05	12.2

Bare Mountain Area

Bare Mountain, unlike Yucca Mountain, has several active mines, with the resulting potential problem of discrimination between natural and manmade seismicity. Earthquakes at Bare Mountain are distinguished from chemical explosions by considering event origin times and individual station seismogram waveforms. Seismograms from Bare Mountain earthquakes generally have sharper P-wave onsets than blast seismograms, with dilatational polarities at

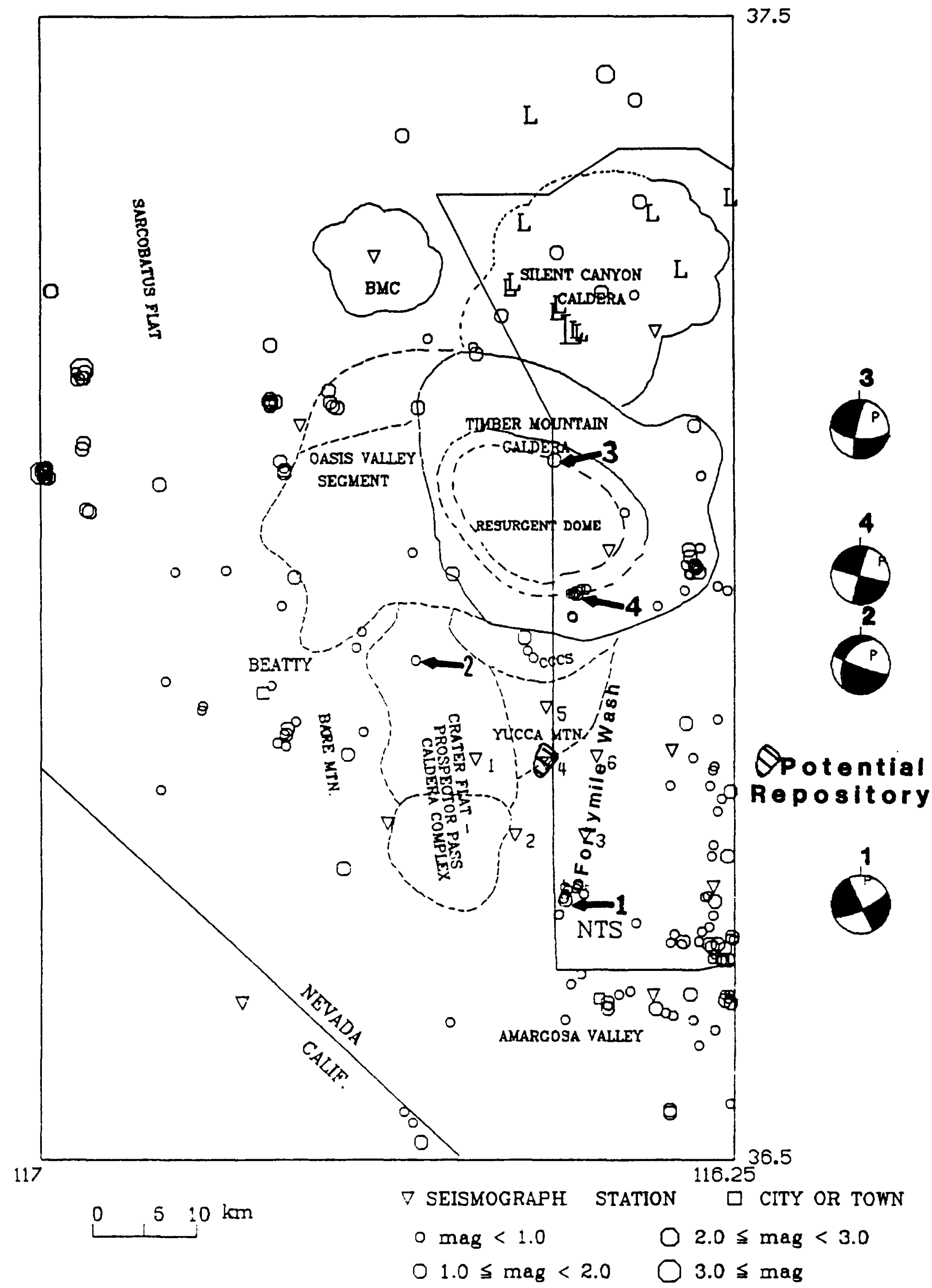


Figure 4.- Seismicity and focal mechanisms for earthquakes near the volcanic caldera complexes of western Nevada Test Site for 1991. Major calderas are labeled: BMC is Black Mountain Caldera, CCCS is Claim Canyon Cauldron segment of the Timber Mountain caldera. Caldera boundaries dashed where uncertain (W. J. Carr, 1991, written commun.).

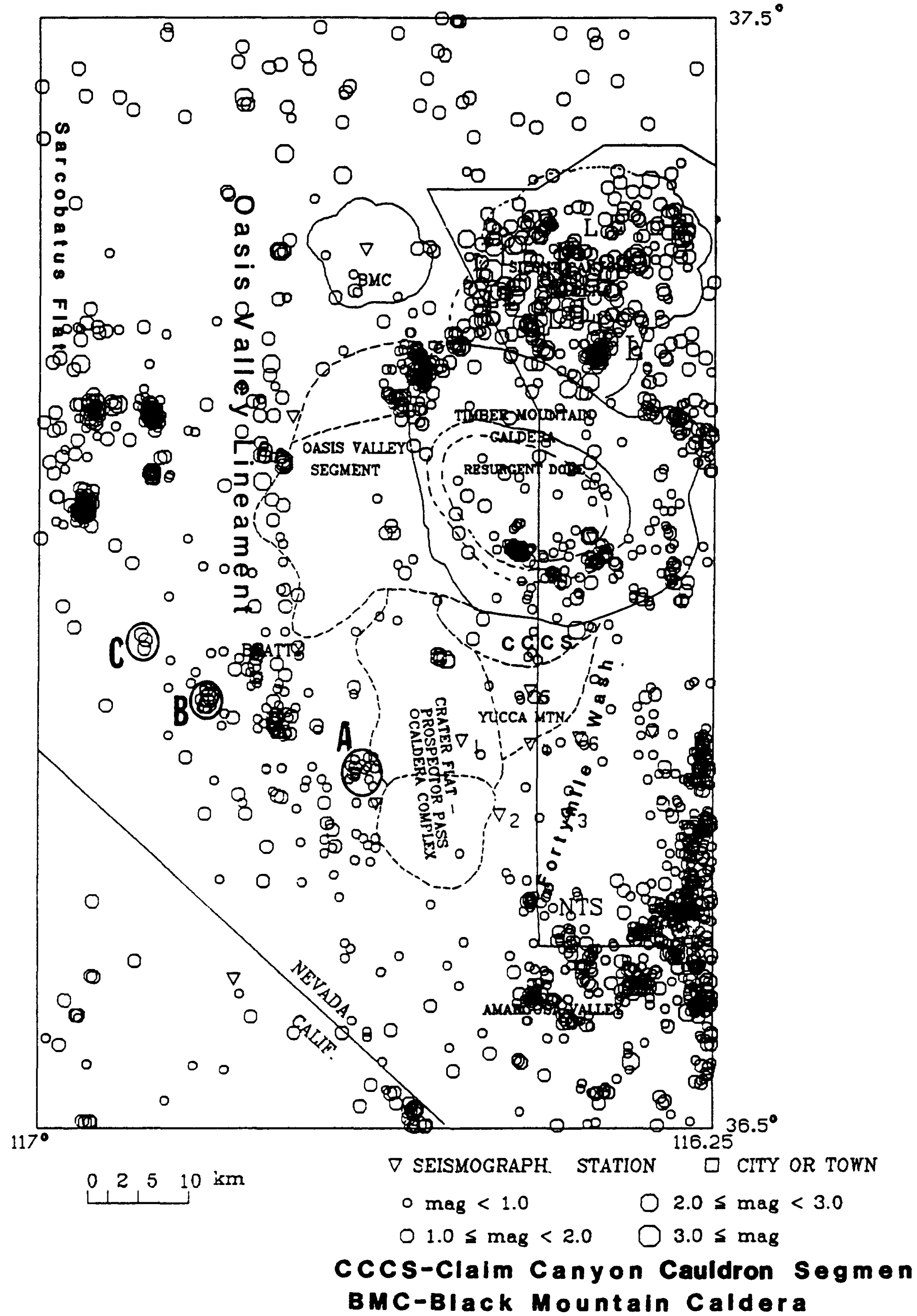


Figure 5.– Seismicity at and near the volcanic caldera complexes of western Nevada Test Site for the period August 1978 through December 1990. Circled cluster labeled "A" coincides with a mine on the eastern side of Bare Mountain, and may include some blast epicenters. Circled cluster "B" coincides with the Bond Gold Mine at Ladd Mountain, and circled cluster "C" coincides with the Gold Bar Mine, Bullfrog Hills. Both of these clusters probably include several blast epicenters.

stations having northeast and southwest azimuths from Bare Mountain, especially stations **TMBR** and **YMT5**. Blasts tend to generate large-amplitude Rayleigh phases on vertical-component seismograms; earthquakes do not. Bare Mountain blasts sometimes generate a high-amplitude, air-coupled Rayleigh wave, traveling at about 0.3 to 0.4 km/sec, evident on some Yucca Mountain station seismograms (Rogers and others, 1987b, their fig. D5). This phase is absent from SGB earthquake seismograms. In spite of our efforts to properly categorize events at Bare Mountain, some of the "natural" seismicity is located near active mines, and the possibility exists that a few of the smaller events designated as earthquakes, probable blasts, or blasts on the eastern flank of Bare Mountain have been misidentified in the listings of Appendixes A and B. Also, some of the hypocenters in the Bullfrog Hills west of Bare Mountain for earlier years of SGBSN operation, especially before 1987, may correspond to blasts at Ladd Mountain and at the Gold Bar Mine (see fig. 6). There is also limited natural (or mining-induced?) seismicity at Ladd Mountain.

These points are belabored because SGBSN data indicate that a fault in the immediate vicinity of the Beatty scarp (approximate coordinates, 36.88° to 36.9° N., 116.75° W.) is seismogenic. Swadley and others (1988) and Harding (1988) state that the Beatty scarp, a prominent Quaternary scarp, is a fluvial feature having no discernible expression in seismic reflection or refraction survey data. In 1991, six earthquake epicenters lay within 2 km of this erosional scarp. The scarp's trace and 1991 seismicity in its vicinity are shown in figure 6, just southeast of Beatty, Nev. None of those earthquakes were large enough for focal mechanism determination (maximum magnitude M_L 1.2, on August 1, 1991, 18:38:33 UTC); however, P-wave polarity data are consistent with right lateral strike slip on a north-trending fault. The P-wave data are also consistent with normal slip on a northeast-trending fault. The SGB seismicity catalog for 1978 through 1990 (fig. 5) also indicates activity near the Beatty scarp (also see Harmsen, 1991, his fig. 8). Seismicity in the Beatty region is coincident with the Oasis Valley seismic lineament (OVSL) (A. M. Rogers and others, USGS, 1989, written commun.) that extends in excess of 50 km in a north-south direction, at the western edge of the southwestern Nevada volcanic field. Although the OVSL might represent a fault zone, it may only be a zone of local stress concentration or of relatively elevated fluid pore pressure at the western boundary of several calderas. The north-south trend of the OVSL may be due to relative absence of seismicity in the western one-half of Timber Mountain caldera rather than to activity on a potentially important north-south fault.

During the first phase of the SGB network upgrade in 1992, Bare Mountain as well as Yucca Mountain will be more densely instrumented. With an upgraded network, it is likely that well-constrained focal mechanisms from earthquakes in the Bare Mountain area can be determined. Seismicity in northwestern Bare Mountain occurs within a kilometer or so of an inferred detachment fault with surface trace believed to lie at the western base of Bare Mountain. The detachment was most recently active about 11 million years ago (Hamilton, 1988). Thus, the possibility exists that denser seismic instrumentation may shed light on seismicity beneath a possible detachment fault.

Death Valley - Furnace Creek

The west side of Death Valley, two km north of Stovepipe Wells, Calif., experienced an earthquake swarm (about 36 earthquakes detected) that began in May, 1991, with maximum magnitude of 2.6, and continued into late September. Figure 6 shows the epicenters and the focal mechanism for the largest earthquake of that series. The focal mechanism displays predominantly right lateral strike slip on a northwest trending, steeply dipping nodal plane, or predominantly left lateral strike slip on a northeast trending nodal plane. The west-directed tension axis of this earthquake's focal mechanism is similar to those of other focal mechanisms

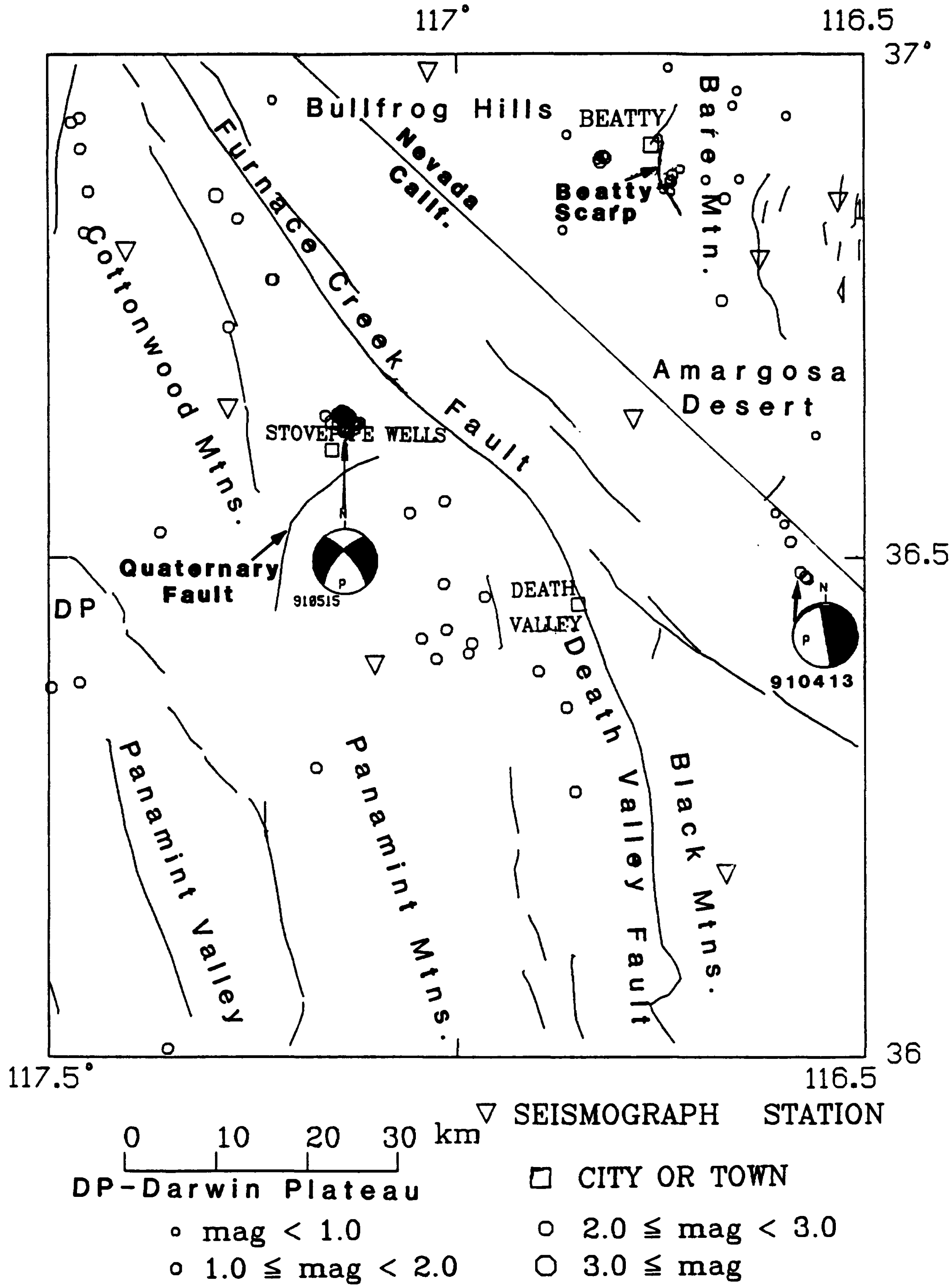


Figure 6.– Earthquake epicenters in the vicinity of Death Valley, California, for 1991, and faults that may have had surface movement in the last two to three million years. Focal mechanism in swarm west of Stovepipe Wells, California, with compressional quadrant darkened, is for an earthquake of May 15, 1991, 20:01 UTC. Focal mechanism with sub-horizontal nodal plane is for an earthquake of April 13, 1991, 16:06 UTC, in the Amargosa Desert, California.

in its vicinity, for example, that of the Stovepipe Wells earthquake on July 8, 1986 (Harmsen and Rogers, 1987). A known Quaternary fault strikes northeast along the north end of Tucki Mountain, just south of Stovepipe Wells, and probably dips towards the epicenters (fig. 6). At the estimated focal depth of 6.75 km, the May 15, 1991, earthquake, whose northeast-striking nodal plane has 67° ± 20° dip, may be an example of seismicity on this fault.

SGBSN focal mechanism data generally support the hypothesis that a counterclockwise rotation of principal horizontal stress directions occurs from Utah and the eastern part of the SGBSN to the western part of the network and the Sierra Nevada boundary zone. Further evidence of a nearly east-west minimum compressive stress direction in this part of the SGB is provided by analysis of slickensides in Neogene rocks from Darwin Plateau, about 50 km southwest of Furnace Creek fault (Schweig, 1989). Schweig found, when inverting his best slip data for a plausible fixed-direction local stress tensor, that $S_3 \approx S_h$ has azimuth N87°W-S87°E, and that $S_2 \approx S_H$ has magnitude comparable to $S_1 \approx S_V$. If such a stress field exists at seismogenic depths in Death Valley, then the Furnace Creek fault is favorably oriented for right lateral strike slip.

Seismicity continues to be conspicuously absent along the traces of the Furnace Creek and the Death Valley faults (fig. 6) as often noted in discussions of SGB seismicity, most recently in the 1990 seismicity report (Harmsen, 1991). Whether that fault system presents a significant seismic hazard is conjectural because little is known about its seismic coupling, i.e., whether aseismic or seismic slip is primarily responsible for relieving extensional strain at Death Valley. The paleoseismic record of faulting along much of the Death Valley-Furnace Creek system indicates it is a significant earthquake hazard. Hamilton (1988, p. 72) contends that the Death Valley region is now being widened, and that the Death Valley and Furnace Creek faults define the eastern limit of current deformation.

Amargosa Desert

Two of the most active parts of the Amargosa Desert south to southwest of Yucca Mountain, Nevada, during the SGBSN monitoring period (August 1978 to present), are the California-Nevada border region and Fortymile Wash. A third active sub-region of the Amargosa Desert occurs about 5 km west-southwest of Amargosa Valley, Nev. Like the Fortymile Wash seismicity, these earthquakes occur within the Spotted Range-Mine Mountain structural zone (Carr, 1984), a wide zone of predominantly northeast-striking, seismically active faults with a history of left-lateral slip.

Amargosa Desert state-border-vicinity seismicity for 1991 is shown in figure 6, along with a focal mechanism for a M_L 1.3 earthquake on April 13, 1991. This earthquake's P-wave first motions were dilatational (down) at consecutive SGBSN stations over a wide range ($> 200°$) of source-to-station azimuths, a response that would be observed if slip were occurring on a sub-horizontal fault plane. Indeed, all focal mechanism solutions for the hypocenter at 4.8 km display a sub-horizontal nodal plane (two such solutions are shown in Appendix D, fig. D5). Because double-couple focal mechanisms having a sub-horizontal nodal plane necessarily have a sub-vertical nodal plane, and neither nodal plane is mechanically preferred, it is not inferred that seismic slip on a detachment fault is evident in SGBSN data; however, focal mechanism solutions displaying a sub-horizontal nodal plane for earthquakes in other parts of the SGB are also presented in the 1987 through 1989 seismicity report (Harmsen and Bufe, 1992).

Another zone of recurrent seismicity in the Amargosa Desert is in the immediate vicinity of Fortymile Wash, labeled in figures 4 and 5, in the Lathrop Wells, Nevada, geologic quadrangle, about 15 km south of the site of a potential high-level nuclear-waste repository at Yucca Mountain, Nevada. A swarm of about 20 earthquakes occurred there beginning in January 1991, with the largest event (M_L 1.5) on January 5, displaying a strike-slip focal mechanism solution (fig.

4, mechanism labeled "1"). The northeast-trending nodal plane agrees in strike and left-lateral slip sense with many faults mapped in the Spotted Range-Mine Mountain structural zone (Carr, 1984).

Pahranagat Shear Zone

Pahranagat Shear Zone (PSZ) is a major northeast trending, left-lateral shear zone located south and southeast of Alamo, Nev., having relatively elevated seismicity rates. A map of the seismicity of 1991 at Pahranagat Shear Zone and vicinity with some local prominent faults is shown in figure 7. The largest SGB earthquake for 1991, M_L 4.1, was the mainshock of the series labeled "A" in figure 7. Focal mechanisms for the mainshock (March 10, 1991, 21:38:48 UTC) and one of the largest aftershocks (April 15, 1991) are also shown, along with a focal mechanism for a M_L 3.6 earthquake to the east of series A (November 7, 1991, 2:47:37 UTC). No felt reports[1] for these or other SGB earthquakes of 1991 are on record with NEIC, although two dozen public agencies were canvassed about the mainshock. Inasmuch as western U.S. earthquakes in this magnitude range near a town or city are usually reported as felt, the probable explanation for the "unfelt" reports following PSZ earthquakes is that local residents have been "desensitized" by frequent sonic disturbances by jet aircraft from Nellis Air Force Base maneuvering at low altitudes near Alamo and Hiko, Nev. (NEIC staff and D. E. Overturf, USGS, oral commun.).

Seismicity migrates with time at PSZ, with clear changes in concentrations of activity being visible over 2-year intervals. Series A is in a location having little previous seismicity recorded by the SGBSN. Figure 8 shows in map view the seismicity of the PSZ for the period 1984 through 1990. Rogers and others (1987b) discuss PSZ seismicity for the period 1978 through 1983, and attempt to decide whether it is more likely that the northeast-trending faults or the secondary, north-trending faults are currently more active (see their Figure 15). An additional 8 years of seismicity data do not resolve this issue. The other two PSZ series for 1991, labeled "B" and "C" in figure 7, are at locations that have experienced nearby earthquakes in previous years. The spatial centroid of seismicity in those two series migrates with time.

Las Vegas Valley Earthquakes

The Las Vegas Valley shear zone is considered to be the northeastern boundary of the Spring Mountains block of the Walker Lane belt (Stewart, 1988). If presently active, major northwest-trending faults in the Las Vegas Valley would be expected to experience right slip. SGBSN seismicity in Las Vegas Valley has been limited and has been difficult to associate with the concealed right-lateral Las Vegas Valley fault zone in the central part of Las Vegas Valley (Stewart and Carlson, 1978) because epicenter lineations in the valley are apt to trend northeast, perpendicular to the fault trace (see Rogers and others, 1987b).

Figure 9 shows the seismicity of much of the Las Vegas Valley and vicinity for the year 1991, along with major range front faults and the inferred trace of the Las Vegas Valley fault. A spatially diffuse series of 33 earthquakes occurred in a previously seismically quiet area about 3 to 6 km north of the town of Indian Springs, Nevada, during June and July of 1991. In the center of that series, SGBSN recorded on March 1, 1991, an isolated M_L 2.3 foreshock. Focal mechanism solutions for the March 1 foreshock and the July 12 16:41 UCT mainshock of the Indian Spring series, which had M_L 2.6, are also shown in figure 9 and, with greater detail, in Appendix D. Figure 10 displays the seismicity of the same region for the period 1984 through

[1] In this context, a "felt report" means that at least one person responded to the NEIC survey that the earthquake was felt in his/her community.

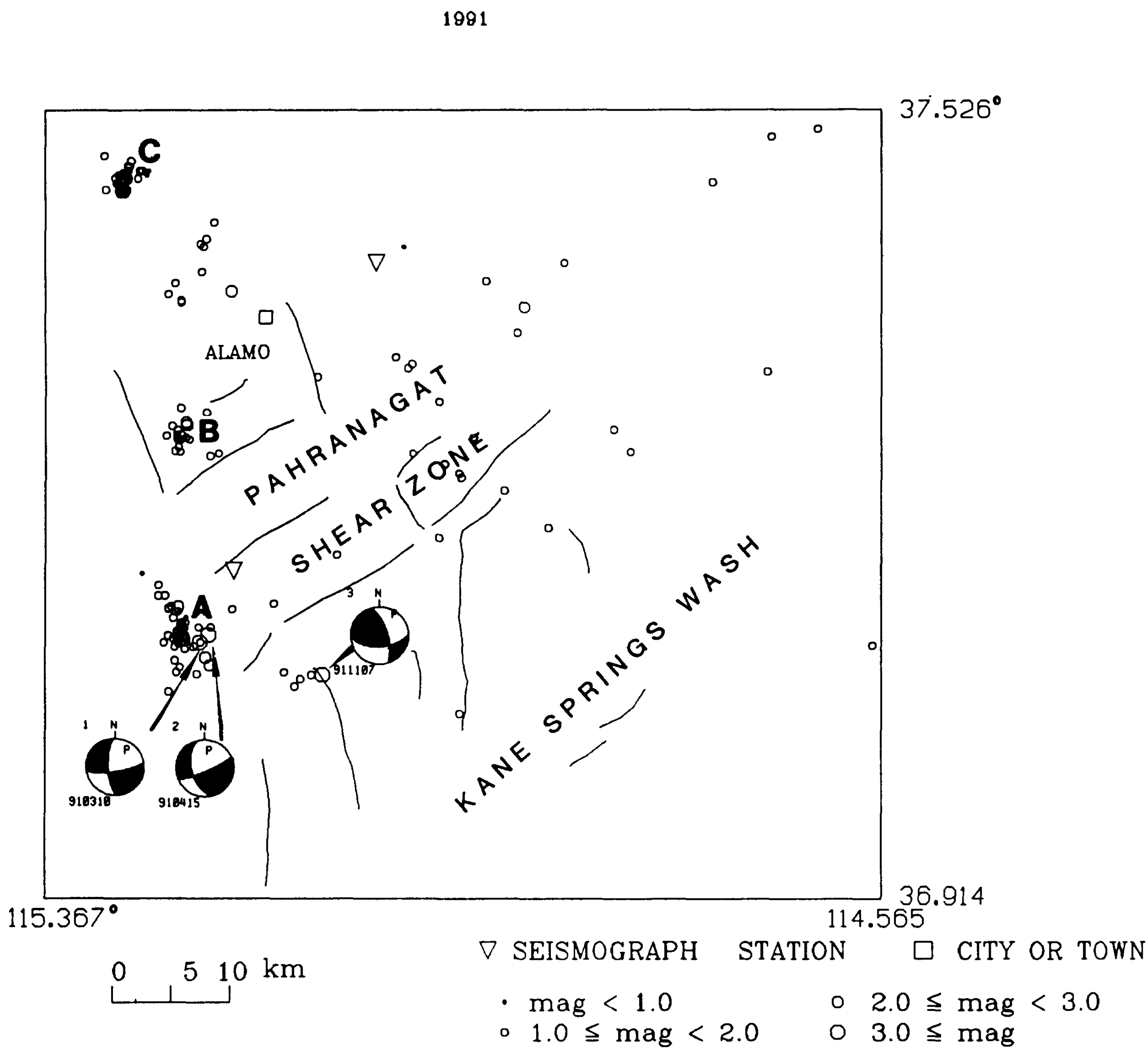


Figure 7.– Preliminary epicenters and focal mechanisms for the larger earthquakes of 1991 in the vicinity of Pahranagat Shear Zone, Nevada. Major faults shown include range front faults and others known or suspected to have had surface movement in the last 2-3 million years.

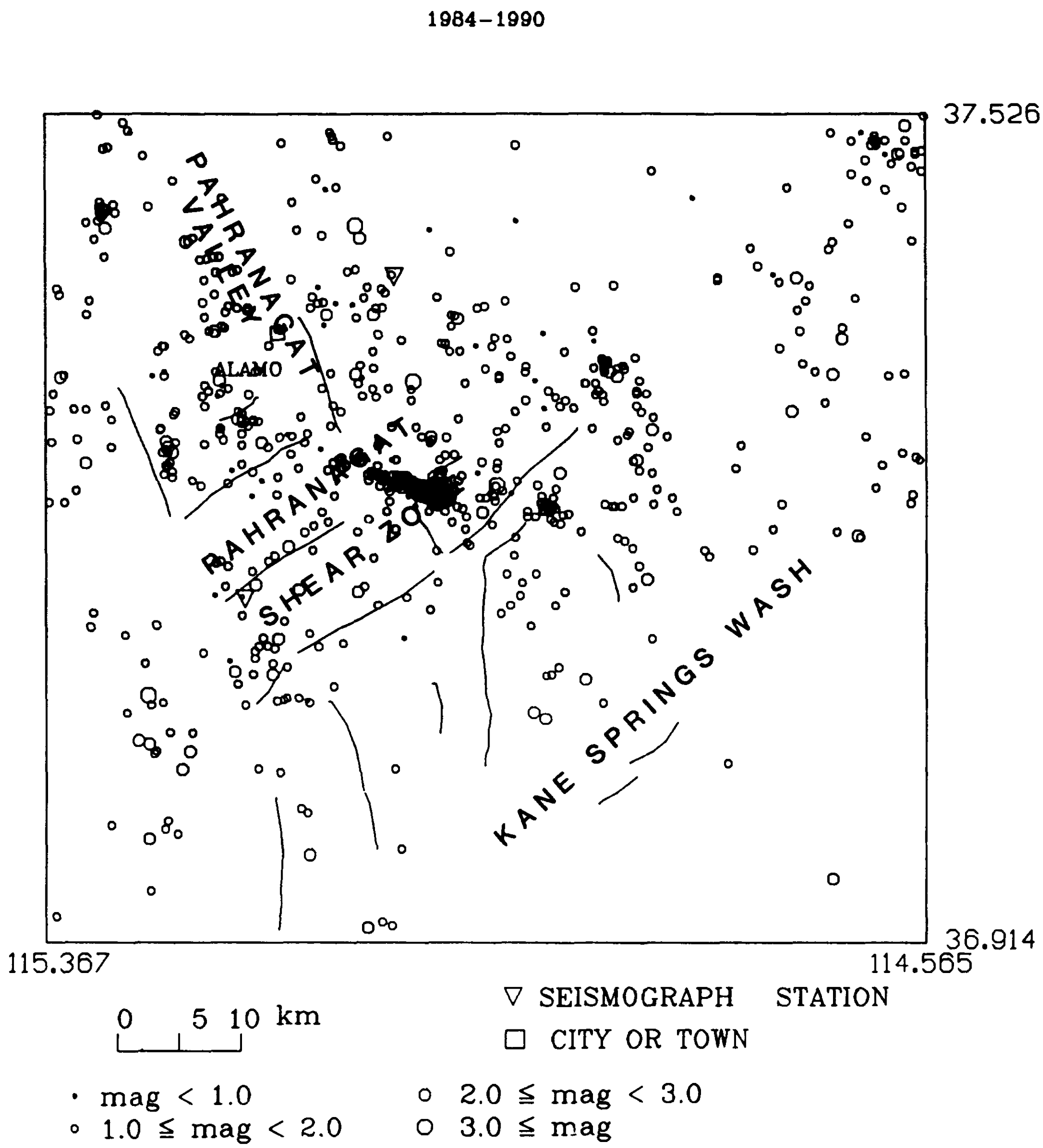


Figure 8.- Seismicity for the same region as in figure 7 for the period 1984-90.

1990. Rogers and others (1987b) discuss the geologic framework of that region and its seismicity for the period August 1978 through 1983.

As is observed in many other parts of the SGB, the majority of the local seismicity in the vicinity of Las Vegas Valley cannot be directly associated either with the main fault or with range-front faults. Most small ($M_L < 4.5$) local earthquakes recorded during any given year by SGBSN nucleate on splays and other features secondary to the main faults of the SGB. This phenomenon has been partially modeled (in two dimensions) as a seismic response to shear strain buildup away from zero-strength major faults that have moved, thereby perturbing an otherwise uniform strain field (Gomberg, 1991).

SGB EARTHQUAKE FOCAL MECHANISMS FOR 1991

Preliminary focal mechanism solutions for 14 SGB earthquakes of 1991 having $M_L \geq 1.4$ are shown in figure 11 (the focal mechanism for a M_L0.8 earthquake at northern Crater Flat is shown in fig. 4), and focal mechanism parameters are listed in table 3. The individual solutions are shown with SGBSN P-wave station polarity information and with alternate solutions in Appendix D of this report. An "alternate solution" is defined as one in which there are an equal number of polarity inconsistencies (usually 0) as in the preferred solution; however, alternate solution nodal planes may narrowly miss intersecting impulsive polarity points, where P-wave amplitudes from a point-source dislocation would be expected to be null (thus, the word "nodal"). Seismograms from which polarity interpretations are derived are stored on magnetic archive tapes by the SGBSN. Paper records of $\approx$ 10 seconds of data surrounding each station's P-arrival are available to investigators when requests for such data are approved by USGS-Yucca Mountain Project Management.

Focal mechanism solution **P**- and **T**- axes for the $M_L \geq 1.4$ earthquakes listed in table 3 are plotted in figure 12, along with average **P** and **T** azimuths. For these data, the average tension axis has azimuth N.57.2°W. and plunge 0.3° (using Watson statistics, Schuenemeyer and others, 1972), and the average pressure axis has azimuth N.34°E. and plunge 17°. Compressional quadrants of those 14 focal mechanism solutions are intersected, as are tension quadrants, and the resulting regions of intersection, projected onto the lower focal hemisphere, are shown in figure 13. If one assumes that the directions of principal compressive stresses, σ_1 (maximum) and σ_3 (minimum), in the portion of the earth's seismogenic crust sampled by a set of earthquakes are constant, then the intersected dilatational quadrants (containing focal mechanism **P**-axes) and compressional quadrants (containing focal mechanism **T**-axes) of those solutions must also contain the directions of the regional σ_1 and σ_3 axes, respectively (Angelier, 1979). In figure 13, σ_1 is contained in the (azimuth, inclination) patches covered with $\times$ symbols, and σ_3 is contained in the patches covered with $\diamond$ symbols, assuming such a constant stress field. Thus, when using the focal mechanism data of 1991, one infers that $285° \leq \text{azimuth}(\sigma_3) \leq 320°$, an estimate whose bounds could be tightened by including focal mechanism data of previous years. One also infers that $10° \leq \text{inclination}(\sigma_1) \leq 40°$, showing that SGBSN focal mechanism data tend to reject the hypothesis that, for the region as a whole, the maximum compressive stress direction is nearly vertical (however, for some parts of the SGB, normal slip may be the dominant form of deformation - one such subregion contains Gold Mountain, the Palmetto Mountains and the Montezuma Range; see figure 1). Patches of the lower focal hemisphere where all but one and all but two of the focal mechanism compressional (respectively, dilatational) quadrants intersect are also shown in figure 13. SGBSN focal mechanism solutions for earthquake data of 1991 are generally similar to solutions for previous years, reported in Rogers and others (1981, 1983 and 1987b), Harmsen and Rogers (1987), Harmsen (1991), and Harmsen and Bufe (1992).

When using regional network P-wave polarity data to determine the earthquake focal mechanism, it is known that solutions are often sensitive to the assumed focal depth, a point

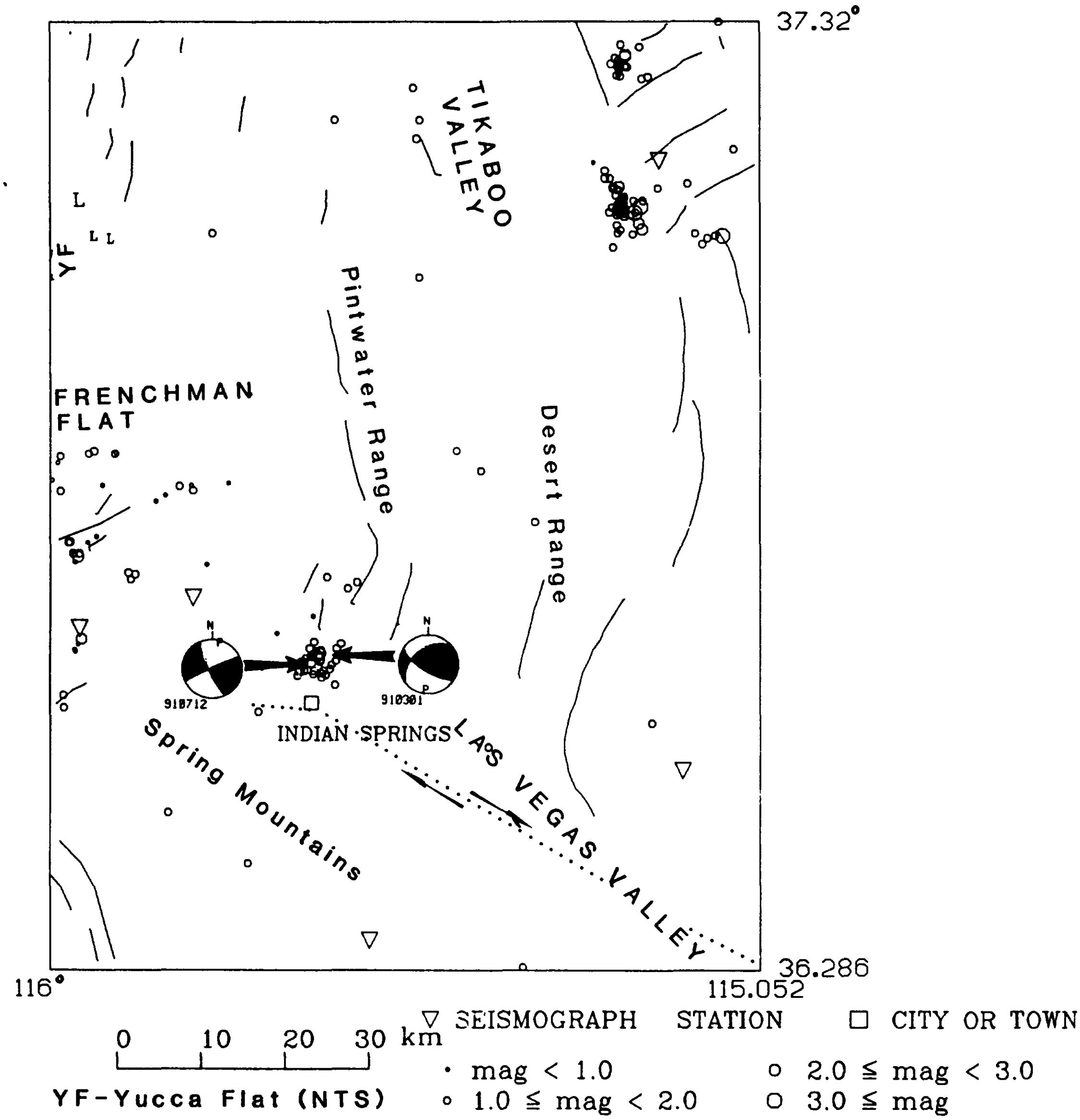


Figure 9.– Seismicity recorded in the vicinity of Las Vegas Valley, Nevada, and Nellis Air Force Range east of NTS for 1991, with two focal mechanisms for earthquakes from a swarm 5 km north of Indian Springs, Nevada, plotted near their corresponding epicenters. "L" epicenters are for low-frequency events associated with nuclear device tests at Yucca Flat.

1984-1990

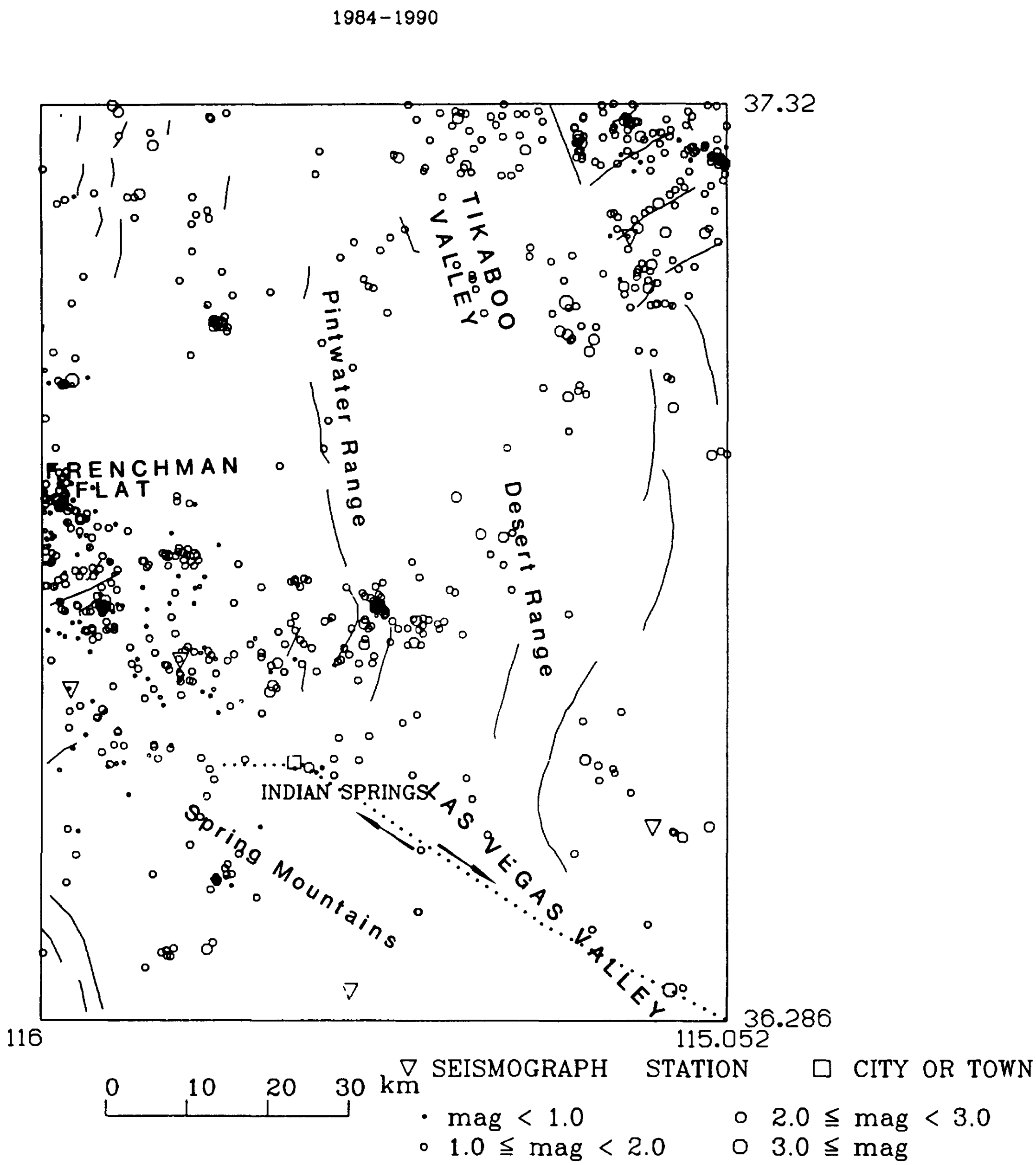


Figure 10.–Seismicity recorded in the vicinity of Las Vegas Valley, Nevada, and Nellis Air Force Range east of NTS for the period 1984 through 1990.

Table 3. Preliminary southern Great Basin earthquake focal mechanisms for 1991.

OT., *earthquake origin time*; St, *strike of nodal plane*; Dp, *dip of nodal plane*; Rk, *rake of slip vector*; Tr, *trend of axis*; Pl, *plunge of axis*. Angles are rounded to the nearest degree. ML, *local (SGB) magnitude*. All 1991 focal mechanism solutions are derived from single events. Nodal planes: No inferred fault planes for these focal mechanisms are presented here, although for many of the mechanisms, inferences about the preferred nodal plane based on lineations of epicenters and/or on the state of tectonic crustal stress are possible. For example, if the maximum horizontal compressional stress is oriented at about North 20° to 30° East, then right-lateral strike slip may be expected on steeply dipping, north-trending fault planes with greater likelihood than left-lateral strike slip on east-trending fault planes, other mechanical conditions being equal. Rmk: Remarks, An * in this column means that $(SV/P)_z$ amplitude ratios were used to constrain the focal mechanism. Rather than including uncertainty estimates for strike, dip, and rake in this table, we show alternate solutions in the figures of Appendix D as dashed-line nodal planes. For most of the focal mechanisms listed below, the uncertainties in dip and rake angles are about ±10°, and uncertainty in nodal plane strike is about ±5°. Focal mechanism solutions based on source-to-station rays from fixed-depth hypocenters are indicated by a * next to the focal depth listed below. Focal mechanism solutions for alternate, competing hypocenters are considered for the earthquake of November 7, 1991, 02:47:13 UTC (shown in Appendix D, Figures D15 and D16).

Figure	OT. (UTC)		Lat.	Long.	Focal depth	Mag.	Quadrangle Name or other	Nodal planes						Principal axes						R
								1st			2nd			P		T		B		m
Index	Date	Time	°N	°W	(km)	(ML)	Geographic ID	St	Dp	Rk	St	Dp	Rk	Tr	Pl	Tr	Pl	Tr	Pl	k
D1	910105	6:55	36.730	116.432	7.55	1.5	LATHROP WELLS NW	155.	88.	-165.	64.	75.	-2.	20.	12.	288.	9.	162.	75.	
D2	910301	17:24	36.631	115.644	1.11	2.3	INDIAN SPRINGS NW	231.	46.	27.	122.	71.	133.	182.	15.	75.	46.	285.	40.	
D3	910310	21:38	37.116	115.227	6.11	4.1	LOWER PAHRAN. LAKE SW	82.	76.	-21.	177.	70.	-165.	39.	25.	131.	4.	230.	65.	
D4	910312	13:54	36.939	116.594	6.95	0.8	CRATER FLAT	111.	82.	-55.	212	36	-166	57	39	171	26	284	40	
D5	910413	16:06	36.488	116.575	4.80	1.3	RYAN	260.	10.	0.	170.	90.	100.	250	44.	90.	44.	350.	10.	
D6	910415	6:53	37.121	115.211	3.79	3.1	LOWER PAHRAN. LAKE SW	67.	80.	-39.	164.	52.	-168.	18.	34.	121.	19.	235.	50.	
D7	910515	20:01	36.630	117.151	6.75	2.6	STOVEPIPE WELLS	319.	72.	-156.	221.	67.	-20.	181.	30.	89.	3.	354.	60.	*
D8	910608	14:56	37.103	116.998	6.31	3.4	SPRINGDALE	190.	74.	-143.	87.	55.	-20.	54.	37.	315.	12.	210.	50.	
D9	910612	22:39	37.192	116.956	6.0*	3.3	SPRINGDALE	91.	77.	-38.	183.	52.	-177.	44.	36.	145.	16.	255.	50.	
D10	910614	6:24	36.739	115.986	2.0*	2.2	MERCURY	345.	81.	120.	89.	32.	17.	51.	30.	286.	45.	160.	30.	
D11	910618	22:59	37.114	116.446	9.03	1.4	TIMBER MTN.	192.	80.	-152.	97.	62.	-11.	58.	27.	322.	12.	209.	60.	
D12	910704	0:22	36.997	116.421	7.67	1.4	TOPOPAH SPRING NW	105.	87.	-4.	195.	86.	-177.	60.	5.	150.	1.	255.	85.	
D13	910712	16:41	36.636	115.641	1.29	2.6	INDIAN SPRINGS NW	245.	87.	10.	155.	80.	177.	20.	5.	110.	9.	260.	80.	
D14	910805	11:40	37.180	117.414	5.71	3.0	GOLD MTN.	45.	60.	-90.	225.	30.	-90.	315.	75.	135.	15.	45.	0.	
D15	911107	2:47	37.089	115.088	7.39	3.6	LOWER PAHRAN. LAKE SE	343.	68.	145.	87.	58.	26.	37.	6.	302.	39.	135.	50.	
D16	911107	2:47	37.096	115.106	9.5*	3.6	LOWER PAHRAN. LAKE SE	332.	46.	125.	106.	54.	59.	217.	5.	317.	65.	125.	25.	
D17	911130	6:45	36.739	116.215	5.58	3.0	SPECTER RANGE NW	344.	63.	-142.	235.	57.	-33.	202.	45.	109.	4.	15.	45.	

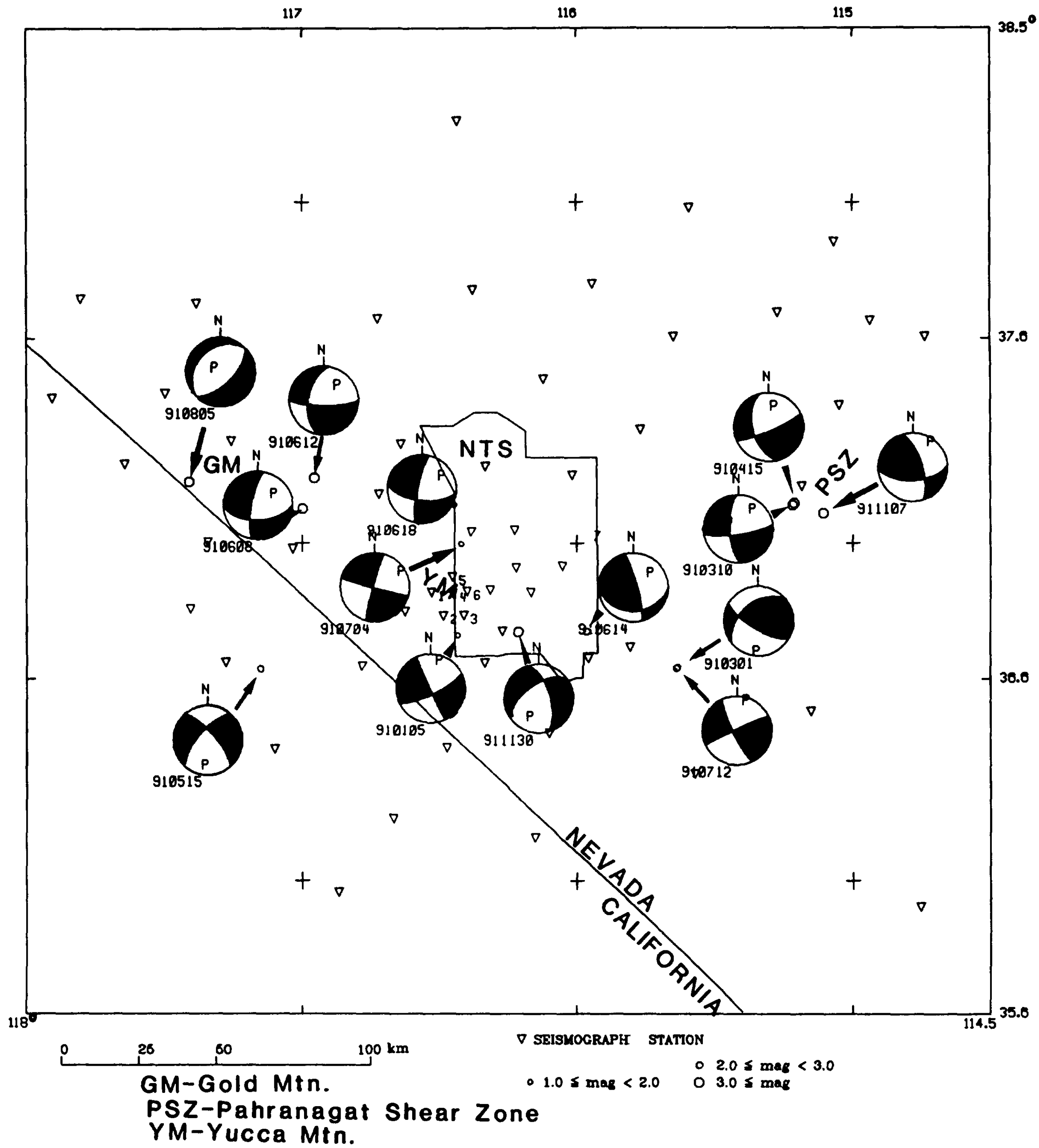


Figure 11.– Epicenters and focal mechanisms for the 14 largest SGB earthquakes of 1991 for which mechanism solutions could be determined.

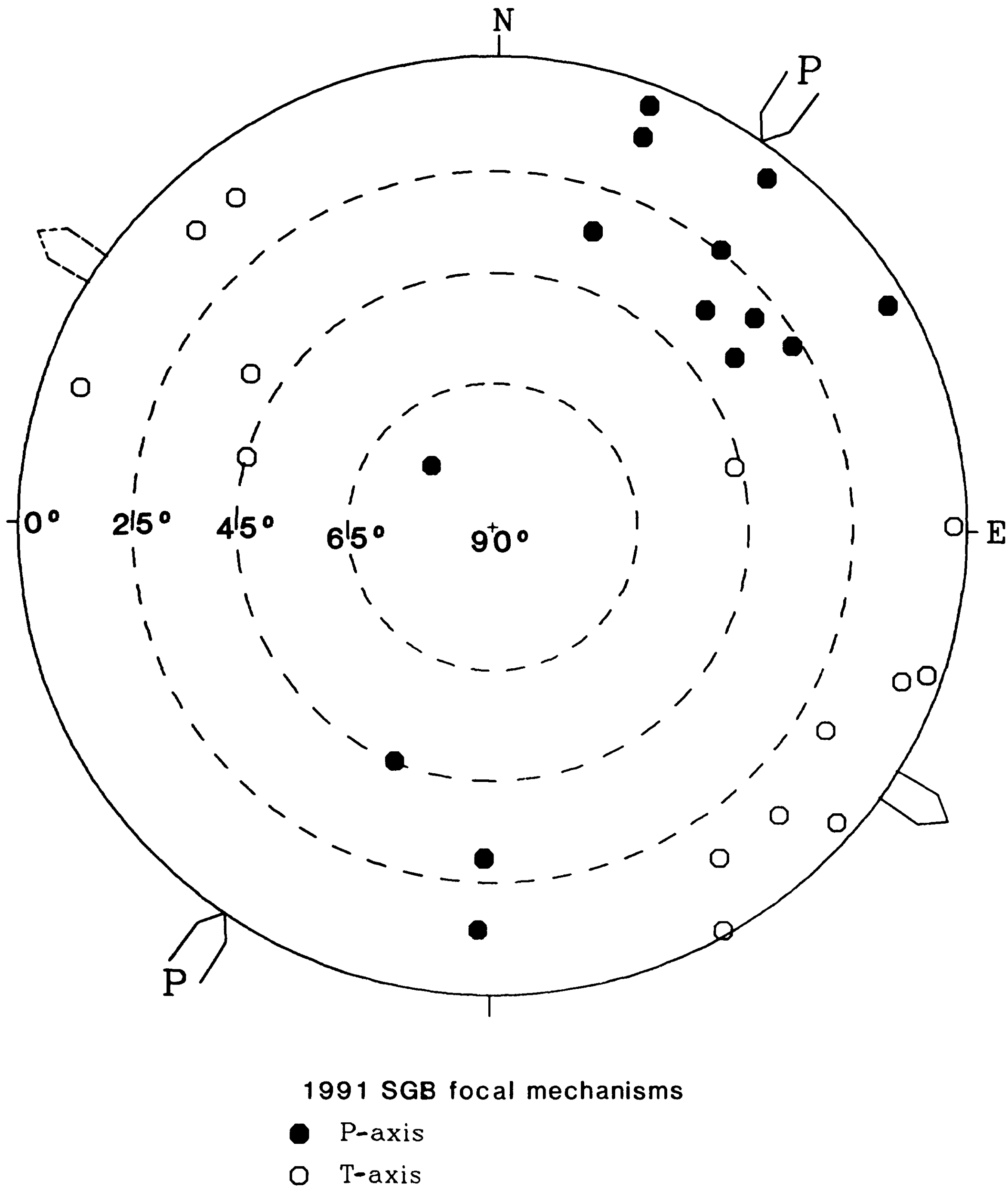


Figure 12.– Inclinations (plunges) and azimuths of 14 focal mechanism preferred solution **P**-axes and **T**-axes for SGB earthquakes of 1991 having $M_L \geq 1.4$ (listed in table 3 and shown in figure 11) are plotted on the equal-area lower hemisphere projection. The inward-directed tabs represent the orientation of the average P-axis for those data, and the outward-directed tabs represent the orientation of the average T-axis. Dashed circles represent inclinations of 25°, 45°, and 65°.

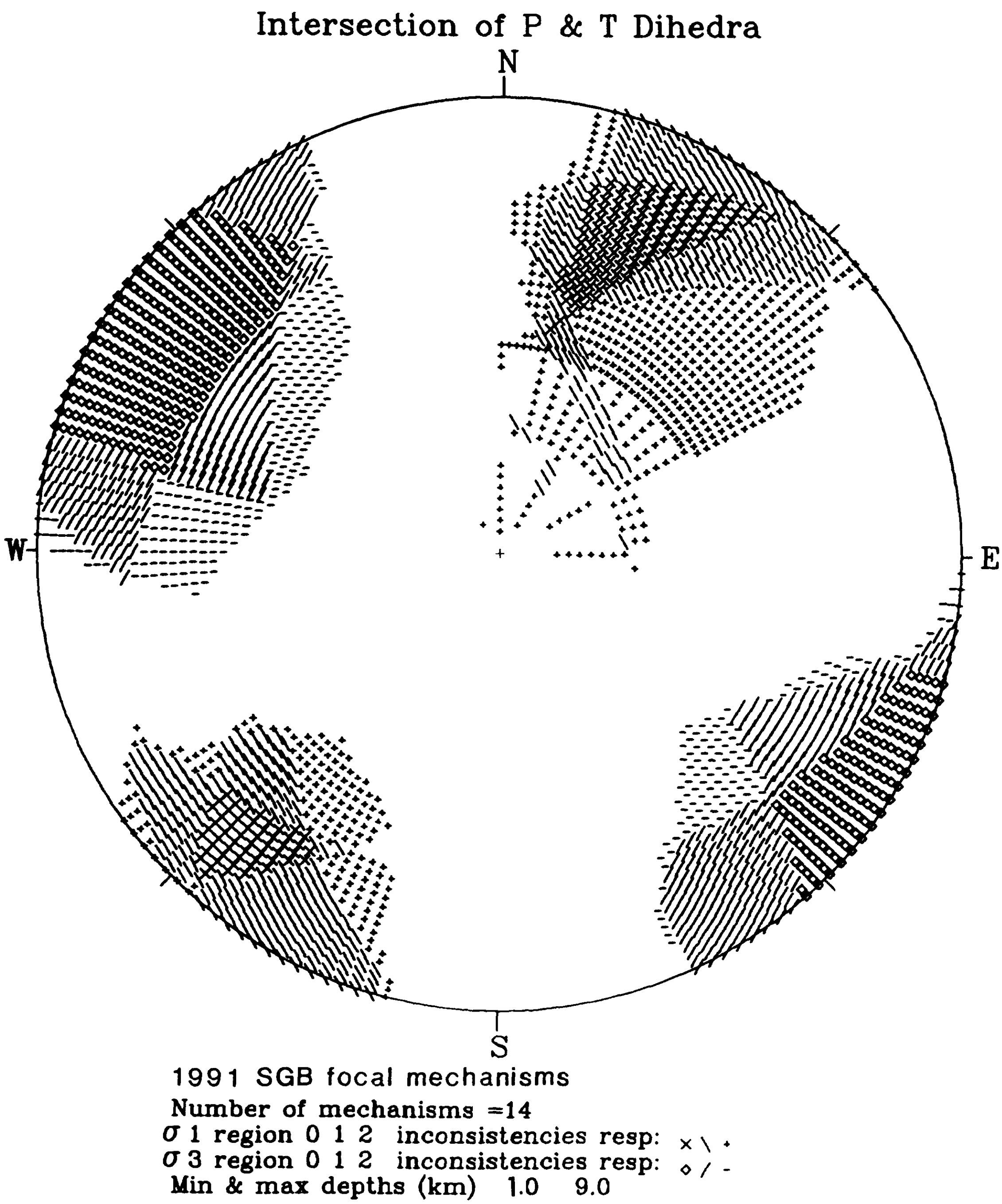


Figure 13.– Intersection of compressional first motion quadrants, containing the T-axes of 14 of the 16 SGB focal mechanisms of 1991, are shown with ◇ symbols. Similarly, the intersection of the 14 focal mechanism dilatational quadrants, containing the P-axes, are shown with × symbols. Regions where all but one and all but two compressional (respectively, dilatational) quadrants intersect are also highlighted, using different symbols.

demonstrated for selected SGBSN earthquake data in Harmsen and Bufe (1992). P- and S-wave arrival time data from stations near the seismic source ("near" means source-to-nearest-station distance < 1.5 focal depths) are necessary in most circumstances to reliably constrain the depth-of-focus estimate. Because station spacing in the SGBSN is about 20 to 30 km, such data are generally not available. In an attempt to quantify the uncertainty in focal depth beyond what is available from HYPO71's standard error in depth, which is often unrealistically small, graphs of root-mean-square (RMS) traveltime residual (sec) versus fixed depth (km) for hypocenters corresponding to Appendix D's focal mechanisms numbered D1, D2, D6, D8, D11, D12, D13, D15, D16, and D17 are shown in figure 14. The RMS graph for an earthquake on December 10, 1987, whose focal mechanism is reported in Harmsen and Bufe (1992), is also shown in figure 14, to indicate the similarity of its behavior to that of a nearby earthquake on November 30, 1991. Unfortunately, these graphs are not unique for a given arrival time data set and crustal model because, as discussed in Harmsen and Bufe (1992), the RMS function is sensitive to the manner in which individual phase data are weighted in the hypocenter solution with respect to source-to-station distance and azimuth, station residual, analyst's assignment of data quality, and to other factors deemed important. Figure 15 demonstrates that the graph of RMS may display a relatively well-defined minimum for a given data set when a certain distance-weighting scheme is used, but a less well-defined minimum when another equally plausible weighting scheme is used. Nevertheless, such RMS graphs provide useful guides to hypocenter uncertainty. In those instances where a 5- to 10-km-deep hypocenter has about the same traveltime residual as a near-surface (sea level ±1 km) hypocenter, caution needs to be exercised when using the focal mechanism data, for example, as input to computer programs that attempt to infer crustal stress-field properties from nodal plane and slip vector orientations.

Depth-of-focus ambiguity may be reduced by increasing seismic station density near source zones and by improving the velocity model used for locating earthquakes, i.e., by incorporating known rock properties, especially lateral velocity variations, into the earth model. Seismic properties of rock in the vicinity of Yucca Mountain and elsewhere in the SGB are actively being studied by several Yucca Mountain Project participants.

CONCLUSIONS

- The SGBSN computed hypocenters for 980 southern Great Basin earthquakes recorded in 1991. The maximum magnitude for SGB earthquakes of 1991 was M_L4.1. During the calendar year, no SGB earthquake was reported to the NEIC as felt.

- The Oasis Valley lineament continues to display limited seismicity along its ≈ 50-km length during 1991, including six events at northwestern Bare Mountain. This lineament may be more an artifact of the inactivity at the western part of the calderas of the southwestern Nevada volcanic field, which forms the eastern boundary of the lineament, rather than activity on a north-south fault or series of *en echelon* faults.

- Within a radius of about 10 km of a potential high-level nuclear-waste respository, the Yucca Mountain area experienced no earthquakes detectable by the SGBSN during 1991. Three earthquakes, the largest having magnitude 1.1, occurred just beyond that 10-km limit, in the Claim Canyon Cauldron segment of the Timber Mountain caldera complex.

- The major Death Valley-Furnace Creek fault system is presently seismically inactive, although isolated earthquakes and swarms of earthquakes occurred during 1991 about 5 to 10 km west of the trace of Furnace Creek fault in Death Valley, Calif. Various lines of evidence suggest that the local crustal stress field has an approximate east-west minimum compressive stress direction, and maximum horizontal stress of sufficient amplitude to produce strike slip deformation at

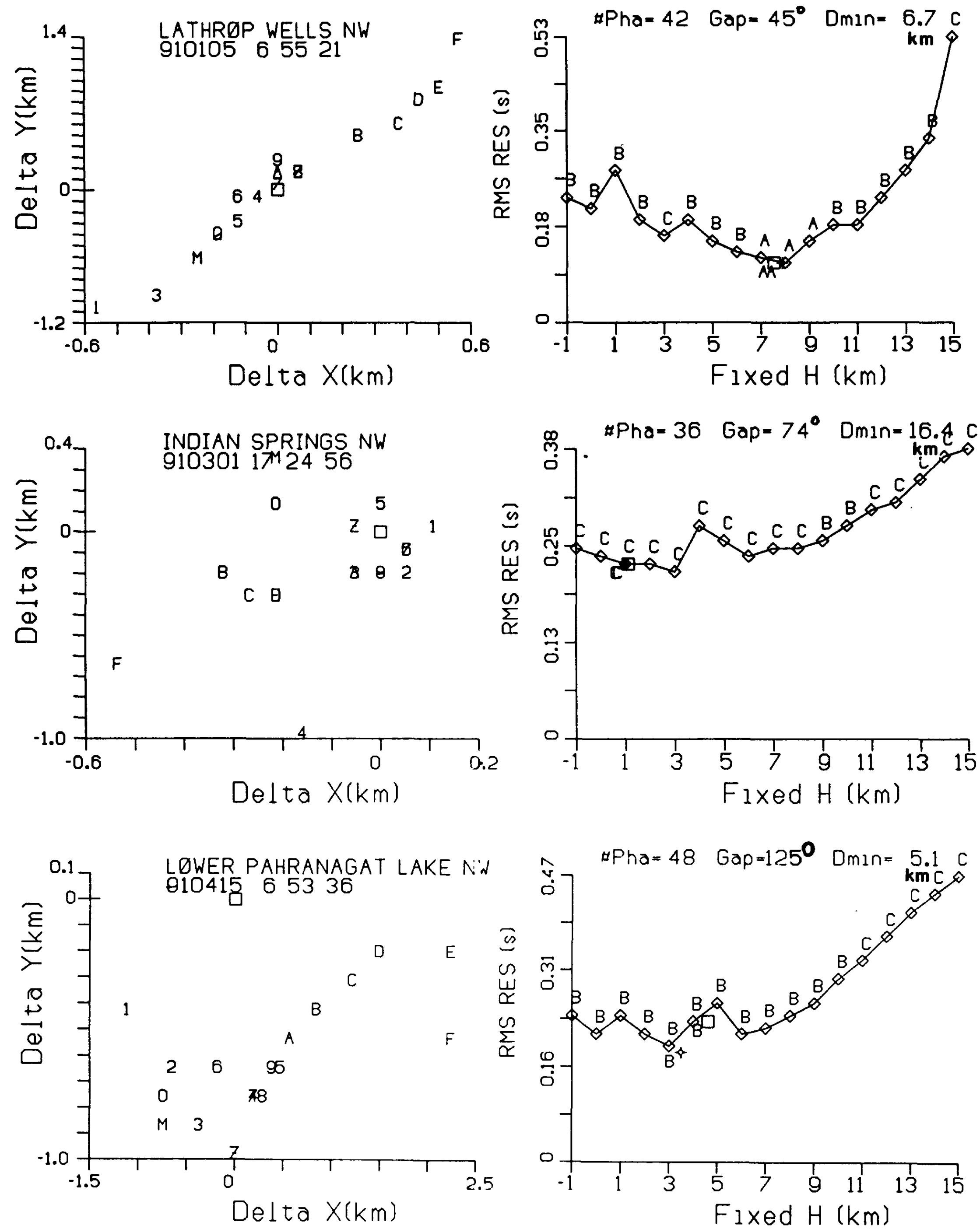


Figure 14. *Left Side:* Plots of fixed-depth and free-depth epicenters for HYPO71 hypocenters for selected earthquakes for which focal mechanisms were prepared. Symbols 0, 1, 2, ..., A, B, C, D, E, F are epicenter positions for hypothetical hypocenters at zero, one, two, ..., 10, 11, 12, ... below sea level (hexadecimal notation). "M" refers to the epicenter for the solution with depth fixed at 1 km above sea level. "S" and "Z" refer to free depth epicenters, with $z_0 = 7$ and 0 km, respectively. *Right Side:* Plots of RMS traveltime residual as a function of assumed depth of focus corresponding to the same earthquake data. The letters above the (x, y) points are "grades" that HYPO71 assigns to the respective hypocenters. Analysts frequently use such grades to assess the reliability of hypocenter estimates.

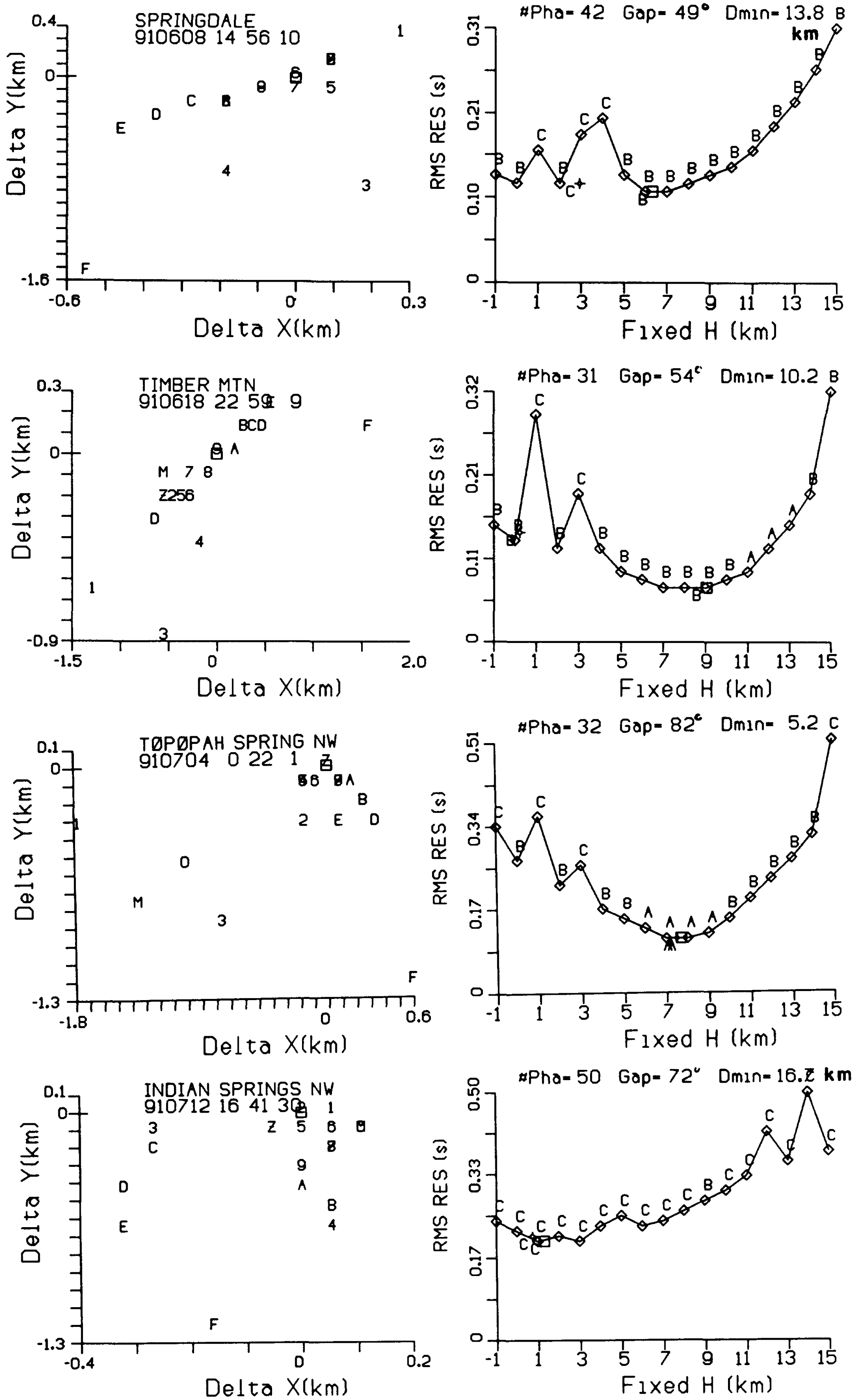
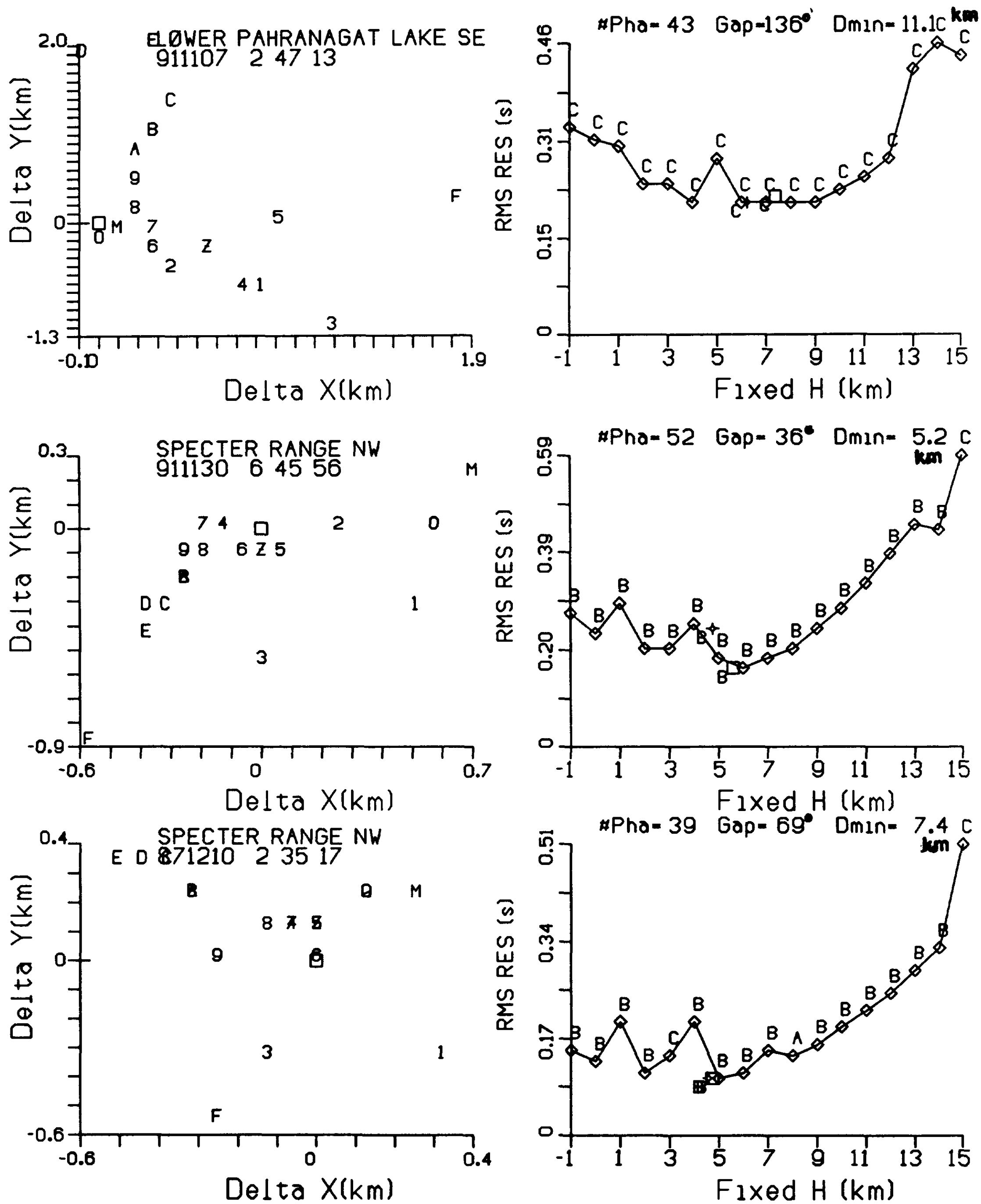


Figure 14 (continued)



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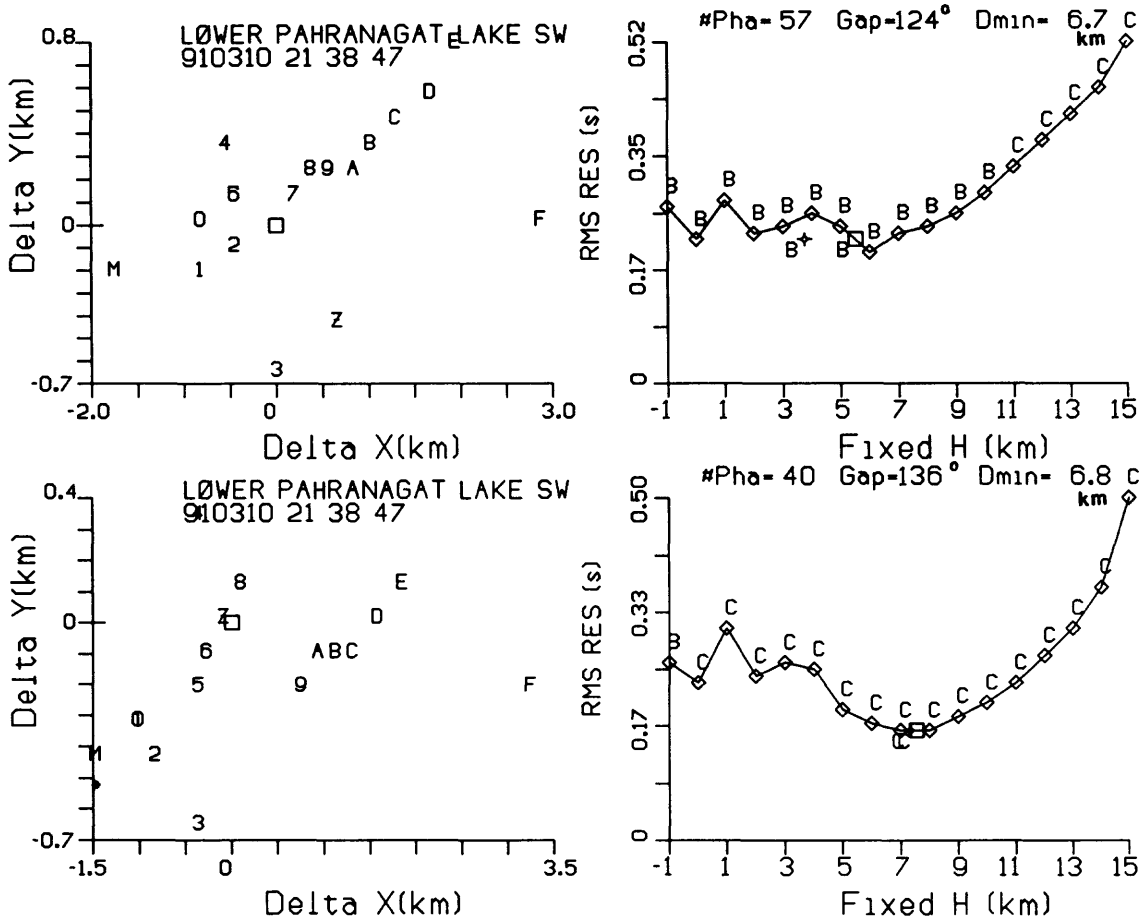

Figure 15. Same meaning of two sides as in figure 14. The *upper* pair of graphs is for the same earthquake data as the *lower* pair; only the manner in which arrival time data were weighed with respect to source-to-station distance is changed. Data from all SGBSN stations were used for upper graph calculations, whereas stations greater than 110 km from the epicenter were zero-weighted (excluded) for lower graph calculations. This plot demonstrates that a "well-constrained" hypocenter is not entirely independent of the analyst's point of view on how phase data from stations relatively far from the seismic source should be weighed in the location process.

seismogenic depths. Thus, the Furnace Creek fault zone is favorably oriented for right lateral slip.

• Boundaries of the southwest Nevada volcanic field caldera complexes with country rock are zones of earthquake activity in 1991, and previous years. This implies that strength anisotropy, stress concentrations near material interfaces, or variations in fluid pore pressures at those interfaces, or some mixture of these physical properties, play an important role in determining the seismic response of the earth's crust to regional strains in the immediate vicinity of Yucca Mountain.

• Generally, focal mechanism solutions for small SGB earthquakes of 1991 display predominantly strike slip on steeply dipping nodal planes. Certain zones, such as the Gold Mountain, California-Nevada border, exhibit seismicity having normal slip focal mechanisms.

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NOTE: Parenthesized numbers following each cited reference are for U.S. Department of Energy OCRWM Records Management purposes only and should not be used when ordering the publication.

Appendix A

SGB earthquake locations for 1991
and quadrangle map names to which locations are keyed

The local hypocenter summary column headings are for the most part self-explanatory. UTC is Universal Coordinated Time. Horizontal error equals $\sqrt{sdx^2 + sdy^2}$, where sdx and sdy refer to the HYPO71 standard errors in longitude and latitude, respectively. Vertical error is the HYPO71 standard error in depth (sdz). "AZI GAP" is the azimuthal gap, that is, the largest angle subtended by the epicenter and any two circularly adjacent stations with positive phase weight. "Q1" and "Q2" represent two HYPO71 hypocenter quality estimates as defined by Lee and Lahr (1975). "DS" is a code for data source: A for analog seismograms, (data scaled from Develocorder films, starting depth, z_0, at 7 km for iterations), I for data scaled from digital seismograms. The code "Y" means the Yucca Mountain velocity model [Appendix F, Figure F1(b)] was used to determine the hypocenter (either analog or digital data may have been scaled for those earthquakes). Various values are tried for z_0, the initial hypocenter guess. x_0 and y_0 are always taken to be near the earliest-reporting station. When equal final RMS values occur for solutions having different z_0, the solution derived from the $z_0 = 7.0$ km starting value is reported (although the choice is arbitrary).

Mca is the coda-average magnitude, Md is the duration magnitude estimate, MLh is local magnitude from horizontal-component instruments, MLv is local magnitude from vertical-component instruments, MLc is the maximum of station magnitudes from overdriven (clipped) records. Amplitudes recovered from vertical-component data are multiplied by 1.75 to provide an approximate horizontal-equivalent amplitude. The depths may be followed by one or two stars. One star means that the depth-of-focus standard error estimate was very large ($\geq$ half crustal thickness). Two stars imply that the depth was fixed by HYPO71 during the last several iterations for hypocenter, because the data lacked resolving power for that parameter. DELMIN is the minimum source to station distance in km, and RMS RES. is the root-mean-square traveltime residual in sec. #N PH. is the number of (P+S) phases having positive weight in the solution. Finally, U.S.G.S. quadrangle is the name of $7\frac{1}{2}$-minute or 15-minute topographic quadrangle in which the epicenter lies. The topographic quadrangle names appearing in this report are extensively revised from those appearing in previous open-file reports of SGB seismicity.

Appendix A excludes all "low-frequency" seismicity associated with NTS nuclear device tests. Such phenomena include aftershocks at ultra-shallow hypocentral depths and cavity collapses. Such events, though having a tectonic significance, are strongly associated in time and space with testing, and their inclusion in the Appendix A seismicity catalog would probably bias any effort to determine natural seismicity rates in the northern NTS from this catalog. See Appendix C of this report for further details on these "low-frequency" events.

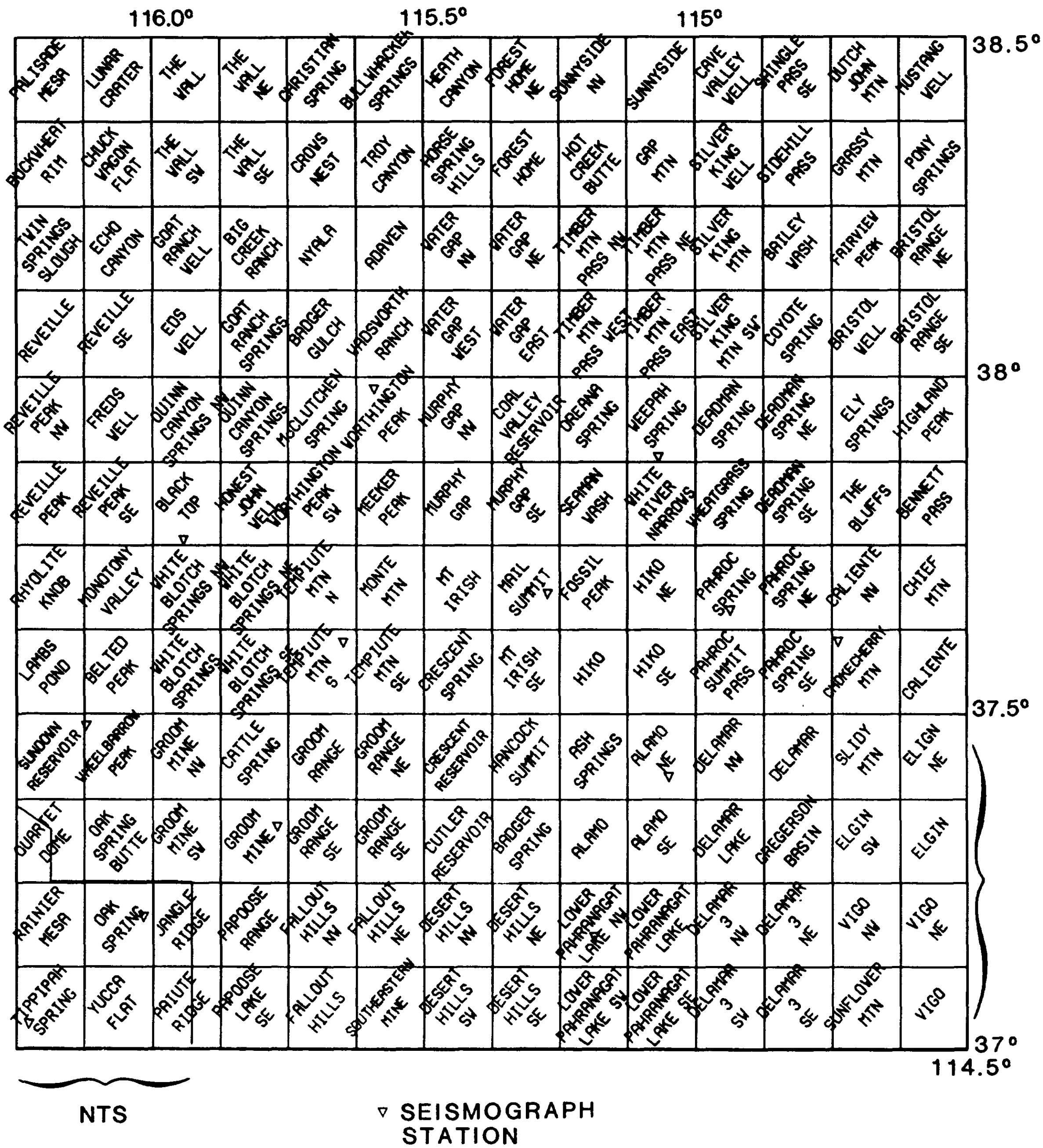

Figure A1.– USGS topographic quadrangle names in the northeast quarter of the southern Great Basin.

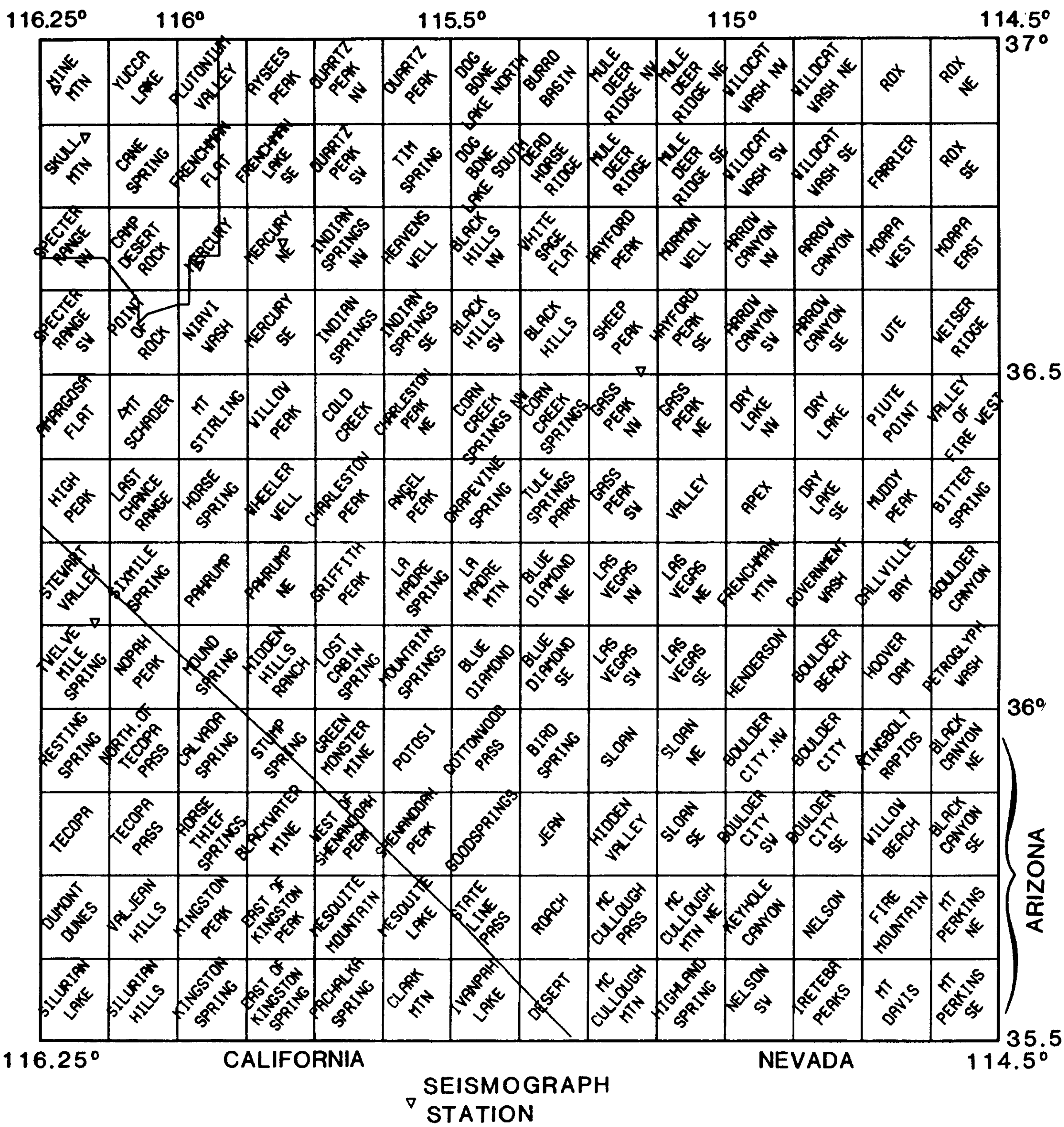

Figure A2.– USGS topographic quadrangle names in the southeast quarter of the southern Great Basin.

Figure A3.– USGS topographic quadrangle names in the northwest quarter of the southern Great Basin.

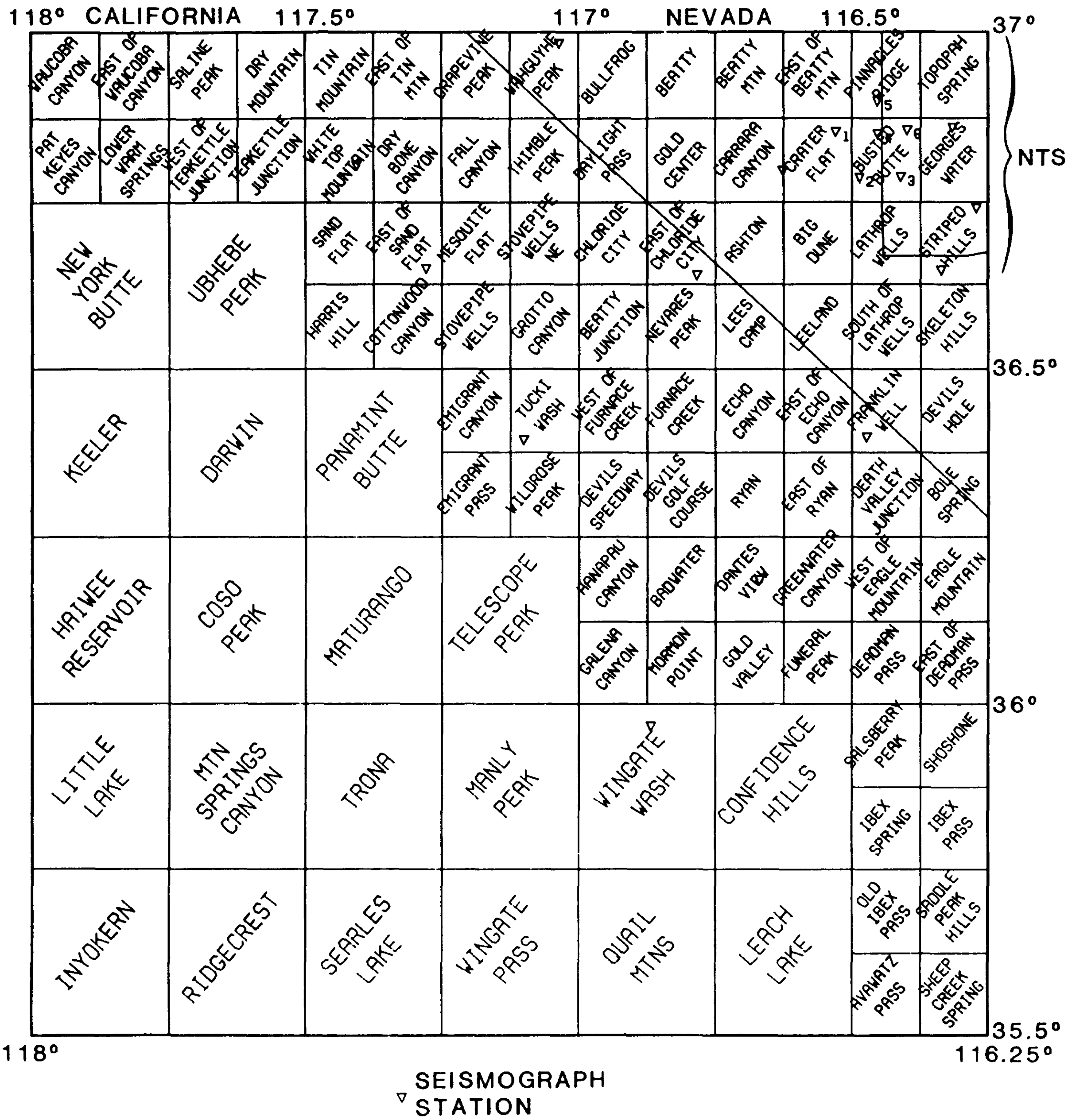

Figure A4.– USGS topographic quadrangle names in the southwest quarter of the southern Great Basin.

1991 LOCAL HYPOCENTER SUMMARY - SGB EARTHQUAKES

DATE	TIME (UTC)	LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JAN 2	15: 4:27	36.756	116.240	1.3	5.55	1.3	186	BDI	1.01			0.59	1.0	3.2	0.18	11	SKULL MTN
3	4: 0:30	37.043	115.507	0.4	3.41*	——	170	CCI	1.55		1.86	1.67		39.9	0.12	13	SOUTHEASTERN MINE
3	21:47:16	36.525	117.364	2.0	0.79	1.5	231	BDI	1.68		1.58	1.32		15.4	0.23	11	COTTONWOOD CANYON
4	9:47:38	37.013	116.234	0.5	5.49	0.7	78	AAI	1.59		1.83		2.0	2.7	0.12	15	TIPPIPAH SPRING
5	2:16:23	36.730	116.435	0.4	9.22	0.8	155	ACI	1.10			0.72		6.6	0.08	13	LATHROP WELLS
5	2:24: 0	36.734	116.414	1.3	8.92	0.8	306	BDI	0.88			0.05		5.8	0.10	9	LATHROP WELLS
5	2:48:27	36.734	116.433	0.6	9.21	1.0	111	ABI	1.30			0.88		6.1	0.14	18	LATHROP WELLS
5	2:48:35	36.742	116.420	1.0	9.25	0.9	162	ACI	1.35			0.92	1.3	5.0	0.15	15	LATHROP WELLS
5	3:16: 8	36.743	116.420	1.8	7.28	1.5	218	BDI	0.87			0.36		4.9	0.15	10	LATHROP WELLS
5	4:20: 0	36.739	116.421	1.1	8.60	0.9	223	BDI	0.88			0.22		5.4	0.10	11	LATHROP WELLS
5	5:58:17	36.738	116.430	0.8	8.95	0.7	228	ADI	1.05			0.56		5.7	0.08	12	LATHROP WELLS
5	6:55:22	36.729	116.433	0.3	7.57	0.6	67	AAI	1.87		1.63	1.42	1.3	6.7	0.12	37	LATHROP WELLS
7	4:10: 5	36.740	116.434	1.1	8.16	1.0	201	BDI	0.99			0.54		5.6	0.15	14	LATHROP WELLS
7	4:54:49	36.861	117.295	0.9	11.24	1.7	85	BBI	1.96			2.09	2.3	11.7	0.21	13	DRY BONE CANYON
7	13:40:30	36.699	116.315	0.6	2.32	1.3	162	ACI	1.07			0.41	1.0	6.1	0.07	9	STRIPED HILLS
7	17:31:52	36.751	117.739	2.3	10.95	6.9	263	CDI	1.90		1.45	1.44		30.4	0.23	9	WEST OF TEAKETTLE JUNCTION
8	7:15: 1	36.986	116.334	0.5	7.31	1.1	100	ABI	0.93			0.29		7.2	0.11	13	TOPOPAH SPRING
8	21:33:40	37.220	116.581	1.1	2.67	2.9	157	BCI	1.23			0.88		9.5	0.08	13	THIRSTY CANYON
9	20:33:23	36.826	116.108	1.5	14.95	2.4	161	BCI	1.38			0.64		6.3	0.16	10	CANE SPRING
11	9:47:35	37.381	117.332	3.4	1.12	7.4	209	CDI			0.75	0.72		11.1	0.13	6	MOUNT JACKSON
11	14:27:48	37.189	117.430	0.5	7.88	2.1	124	BCI	0.89		0.88	0.83		19.7	0.13	12	WEST OF GOLD MTN
12	8:48:44	36.976	116.425	0.3	1.66	1.6	172	ACI	1.26			0.75	0.8	7.4	0.08	13	PINNACLES RIDGE
12	14:51:49	36.977	116.426	0.3	0.84	0.4	92	ABI	1.04			0.56	0.8	7.4	0.07	14	PINNACLES RIDGE
12	16:42:34	37.844	115.062	4.0	2.58	7.6	141	CCI	1.51			1.27	0.8	4.3	0.16	8	WHITE RIVER NARROWS
12	18:25:13	37.016	116.288	0.5	5.00	0.9	126	ABI	2.25		1.52	1.66	1.9	5.7	0.13	17	BUCKBOARD MESA
12	18:26:15	37.019	116.292	0.6	1.44	3.1	129	BBI	1.48			1.15	1.1	6.0	0.17	15	BUCKBOARD MESA
12	18:31:37	37.022	116.293	0.2	4.53	0.4	153	ACI	0.94			0.54		6.0	0.02	8	BUCKBOARD MESA
12	19:50:42	37.022	116.293	0.4	4.56	0.7	131	ABI	1.05			0.82	0.9	5.9	0.08	16	BUCKBOARD MESA
12	20:48:39	37.030	116.298	0.5	7.86	0.8	139	ACI	1.88			1.66	1.6	6.2	0.11	16	BUCKBOARD MESA
12	22:40:23	37.019	116.292	0.4	3.74	1.0	129	ABI	0.90			0.47	1.9	6.0	0.11	18	BUCKBOARD MESA
12	23:39: 3	37.469	114.726	2.3	1.44	4.7	235	BDI	1.57			1.23	1.7	15.3	0.16	11	SLIDY MTN
13	3: 6: 1	36.639	116.387	0.3	6.53	0.5	135	ABI	2.03			1.63	1.4	4.3	0.07	18	LATHROP WELLS
13	5:34: 1	36.647	116.375	1.5	7.63	1.4	233	BDI	0.97			0.66		3.1	0.17	9	LATHROP WELLS
13	13:10:53	37.013	116.297	0.4	0.88	0.6	139	ACI	1.06			0.52		6.6	0.14	16	BUCKBOARD-MESA
15	3:12:48	36.888	116.269	0.7	10.79	0.6	261	ADI	0.90			0.47		5.0	0.06	13	TOPOPAH SPRING
15	19:48:48	36.351	116.866	0.5	7.63	2.6	102	BCI	1.16		1.37	1.21		21.6	0.13	14	DEVILS GOLF COURSE
16	3:35:55	37.131	117.092	0.7	2.60	4.4	125	BCI	1.32		0.94	1.12		17.3	0.16	9	BONNIE CLAIRE
16	9: 9:22	37.489	117.930	1.2	4.37	2.3	220	BDI	1.51			1.85	2.0	7.4	0.18	13	CHOCOLATE MOUNTAIN
16	14:51:55	37.022	116.293	0.5	3.90	1.2	131	ABI	1.27			1.00	0.8	5.9	0.11	14	BUCKBOARD MESA
19	3:10:31	37.022	116.302	1.2	2.14	2.4	154	BCI	0.93			0.49		6.7	0.13	12	BUCKBOARD MESA
19	3:31:55	37.015	116.299	0.4	1.50	2.3	143	BCI	0.90			0.41		6.7	0.13	13	BUCKBOARD MESA
19	7:34:45	37.111	114.573	3.1	7.00*	——	292	CDI	1.62	0.44	1.50	1.70	1.9	53.6	0.12	7	VIGO
19	8:49:48	37.190	117.406	0.3	8.07	1.2	117	ACI	1.06		0.85	0.81		18.0	0.08	11	WEST OF GOLD MTN
19	13:17: 9	37.262	116.989	0.3	9.90	1.1	64	ACI	1.63		1.97	1.60	1.6	24.1	0.11	27	TOLICHA PEAK SW

1991 LOCAL HYPOCENTER SUMMARY - SGB EARTHQUAKES

DATE	TIME (UTC)	LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JAN 19	15:58: 6	36.764	117.714	2.1	10.31	5.7	240	CDI	1.59		1.38	1.62		28.0	0.27	15	WEST OF TEAKETTLE JUNCTION
20	10:25:25	37.262	116.988	0.2	9.61	1.0	64	ACI	1.40			1.44	1.6	24.3	0.09	22	TOLICHA PEAK SW
21	3:27:41	37.347	117.522	1.3	4.88	4.6	150	BCI	1.16		1.08	1.22		10.6	0.22	9	TULE CANYON
22	9: 4:22	36.628	117.120	0.7	8.18	2.7	102	BBI	1.52		1.79	1.60	1.6	14.3	0.18	13	STOVEPIPE WELLS NE
23	15:46:39	37.039	116.218	1.7	5.72	1.3	259	BDI	0.94			0.68		1.0	0.19	9	TIPPIPAH SPRING
24	13:55:43	36.955	117.226	0.5	11.26	1.3	79	ABI			1.00	0.89		11.8	0.13	11	GRAPEVINE PEAK
25	7:21:32	37.317	117.615	0.5	5.26	1.7	102	ABI	1.05		1.13	1.24		9.8	0.13	13	TULE CANYON
26	1:31:13	36.126	116.156	—	8.51	—	231	ADA		1.53				0.2	0.00	4	STEWART VALLEY
26	2:31:31	37.293	116.618	3.8	0.95	0.9	196	CDA		1.36				2.0	0.17	5	TRAIL RIDGE
27	16:47:27	36.792	116.283	1.0	8.77	1.7	114	BBA		0.76				5.5	0.19	12	GEORGES WATER
28	0:12:46	37.041	115.993	2.0	7.86	3.1	212	BDA		1.14				13.7	0.17	9	PAIUTE RIDGE
28	12:43:31	37.085	116.073	3.4	3.10*	—	217	CDA		1.01				13.6	0.18	5	YUCCA FLAT
29	19:42:26	37.248	115.515	0.7	14.26	2.0	156	BCI	1.46		1.46	1.28		24.7	0.09	8	FALLOUT HILLS NE
30	3: 5: 0	37.385	115.455	0.6	3.31*	—	112	CCI	1.41		1.85	1.61		28.7	0.15	12	CRESCENT RESERVOIR
30	4: 8:50	37.427	116.357	0.2	6.48	1.5	118	ACI	1.30		1.84	1.12	1.5	21.6	0.06	15	APACHE TEAR CANYON
30	18: 8:10	36.907	117.460	0.7	8.87	1.0	179	ACI	1.37			1.25		12.3	0.10	10	TIN MOUNTAIN
30	21: 4:14	36.727	116.172	1.3	0.32	0.9	237	BDI				0.30		9.1	0.10	7	SPECTER RANGE NW
FEB 4	15:25:37	36.559	116.077	2.0	7.81	5.0	205	BDA		1.27				13.5	0.12	10	POINT OF ROCK
5	2: 2:26	37.449	115.533	1.3	7.00	7.6	141	CCI	1.23		0.95	1.10		20.1	0.24	10	GROOM RANGE NE
5	17: 4:19	36.634	116.388	0.4	6.77	0.5	180	ACI	1.28			1.03		4.5	0.08	15	LATHROP WELLS
6	16:33:36	37.381	117.104	0.4	0.48	0.5	83	ACI	1.34			1.43	1.5	16.2	0.11	19	SCOTTYS JUNCTION NE
7	17:38:25	36.412	116.323	0.4	6.48	1.3	109	ACI	1.06		1.17	1.01		13.8	0.10	14	DEVILS HOLE
9	20:51: 7	36.637	116.387	0.5	6.96	0.6	135	ABI	1.25			0.89		4.4	0.10	14	LATHROP WELLS
10	1:43:56	36.461	116.965	1.1	11.27	2.1	139	BCI	1.01		1.47	1.06	1.4	14.3	0.16	11	WEST OF FURNACE CREEK
10	21: 1:59	36.650	116.363	0.4	7.12	0.4	221	ADI	1.36			0.43		2.1	0.05	11	STRIPED HILLS
11	13: 0:54	37.177	116.081	0.2	0.97	0.8	109	ABI	1.79			1.64		6.2	0.04	9	OAK SPRING
13	22:56:15	36.690	116.307	0.9	1.60	2.2	171	BCI	1.11			0.45		5.8	0.12	13	STRIPED HILLS
15	8:46:43	37.379	117.105	0.5	0.93	0.8	138	ACI	1.20		1.46	1.19		16.1	0.10	12	SCOTTYS JUNCTION NE
17	12:50:28	36.758	116.120	2.2	7.69	2.5	259	BDI	1.06			0.63	1.4	11.5	0.18	9	CANE SPRING
17	16:54:32	37.421	115.218	0.7	1.75	2.7	84	BCI	1.23		1.12	1.05	1.4	14.9	0.16	10	ASH SPRINGS
17	23: 3:59	37.380	117.097	0.4	0.84	0.5	83	ACI	1.60			1.67	1.6	16.7	0.12	15	SCOTTYS JUNCTION NE
18	3: 8:46	37.419	115.215	0.5	1.32	1.7	123	ACI	2.23			1.89	2.0	14.6	0.14	13	ASH SPRINGS
18	10:18:41	37.438	115.205	0.6	2.25	1.7	109	BCI	2.34			1.92	2.0	14.1	0.21	27	ASH SPRINGS
18	22: 0:58	37.651	116.695	0.7	0.50	0.5	98	ABI	1.79	0.46		1.73	1.9	2.9	0.10	12	ROLLER COASTER KNOB
19	11:33:17	36.655	115.697	0.7	1.50	1.7	212	BDI	1.27			0.98		11.0	0.18	13	INDIAN SPRINGS NW
19	15:29: 1	37.720	115.980	0.6	1.32	1.6	125	ABI	1.03			1.25	1.4	5.2	0.12	11	WHITE BLOTCH SPRINGS NW
20	19:46:57	37.425	115.212	0.7	2.05	2.4	78	BCI	1.39		1.45	1.32	1.8	14.4	0.17	11	ASH SPRINGS
21	5:49:52	37.186	116.953	0.4	10.30	1.7	86	ACI	1.52		1.80	1.26		20.7	0.14	18	SPRINGDALE NW
21	16:46:46	37.118	115.249	0.9	1.28	2.1	183	BDI	1.48		1.48	1.29	1.7	7.9	0.16	15	LOWER PAHRANAGAT LAKE SW
23	1:14:47	37.391	115.243	0.4	0.73	0.8	93	ACI	1.22		1.17	0.95	1.4	17.1	0.13	10	ASH SPRINGS
24	2:47:43	36.750	116.186	0.4	1.91	2.2	113	BBI	0.87			0.45	1.1	7.7	0.14	13	SKULL MTN
24	5: 6:26	36.664	116.417	0.4	10.30	0.6	145	ACI	1.07			0.81		7.2	0.10	16	LATHROP WELLS
24	9: 3:46	36.724	116.202	0.4	11.18	0.8	126	ABI	0.88			0.75	1.2	6.5	0.10	15	SPECTER RANGE NW
24	13:28:19	36.628	116.317	3.2	2.56	1.6	295	CDI				0.61		2.8	0.29	9	STRIPED HILLS

1991 LOCAL HYPOCENTER SUMMARY - SGB EARTHQUAKES

DATE	TIME (UTC)	LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
FEB 25	9:48:42	37.296	114.257	1.0	8.66	0.8	244	BDI	3.38				2.8	54.7	0.21	46	***REGIONAL***
25	15:12:23	36.731	116.194	0.3	9.75	0.7	82	AAI	1.84		2.69	1.74	2.0	7.1	0.10	22	SPECTER RANGE NW
26	3:23:52	37.340	116.351	1.4	13.29	1.0	264	BDI	1.62		2.11	0.98	1.5	12.7	0.16	14	DEAD HORSE FLAT
27	6:11:10	36.267	116.856	0.2	9.76	0.9	121	ABI	1.21		1.20	1.38		19.0	0.07	14	DEVILS GOLF COURSE
28	19:41:26	36.724	116.200	0.4	10.39	0.8	127	ABI	1.22		1.75	1.25	1.3	6.8	0.13	21	SPECTER RANGE NW
28	20:41:18	36.725	116.195	0.6	9.56	0.8	127	ABI	1.06		1.40	0.82	1.2	7.2	0.14	15	SPECTER RANGE NW
MAR 1	4:32:28	36.556	115.197	0.7	11.07	0.8	141	BCI	1.86			1.76	1.8	6.5	0.21	19	SHEEP PEAK
1	4:54:24	36.729	116.202	0.3	11.39	0.6	123	ABI	1.14		1.75	1.09	1.5	6.5	0.09	15	SPECTER RANGE NW
1	15:32:43	37.188	117.366	0.9	6.93	4.2	106	BCI	1.16		1.07	0.87		15.7	0.21	10	GOLD MOUNTAIN
1	16:53:42	36.728	116.201	0.3	10.74	0.6	124	ABI	1.60		2.09	1.32	1.5	6.6	0.08	18	SPECTER RANGE NW
1	17:24:56	36.631	115.644	0.4	1.11	2.5	74	BCI	2.31			2.34	2.2	16.4	0.23	36	INDIAN SPRINGS NW
1	17:50:31	36.587	115.982	0.4	14.71	0.8	162	ACI	1.61			1.62	2.1	8.4	0.12	20	NIAVI WASH
2	15:38:16	36.544	117.058	0.4	9.70	1.3	107	ABI	1.32			1.52	1.7	17.2	0.12	17	GROTTO CANYON
2	18:11:23	37.388	117.254	0.3	0.18	0.4	120	ABI	1.32			1.06	1.4	9.7	0.10	17	MOUNT JACKSON
3	1: 4:38	37.384	117.252	1.3	2.53	3.1	119	BBI	1.05			1.06	1.4	9.2	0.19	10	MOUNT JACKSON
3	17:58:59	37.024	116.198	0.7	9.37	1.0	159	ACI	0.91		1.15	0.78		3.1	0.15	12	TIPPIPAH SPRING
4	1:45:32	37.144	115.148	1.4	7.23	1.0	239	BDI	1.60		1.72	1.57	1.6	4.4	0.18	13	LOWER PAHRANAGAT LAKE NW
4	3:20:18	37.016	116.199	0.3	8.81	0.6	89	AAI	1.22		1.56	1.21		3.5	0.11	19	TIPPIPAH SPRING
4	13:13:50	36.192	116.333	0.3	0.65	0.4	154	BCI	1.11			1.23		17.7	0.15	8	EAGLE MOUNTAIN
4	16: 4:33	36.714	115.892	0.9	4.15	2.6	139	BCI	1.65			1.30	1.5	7.6	0.20	17	MERCURY
5	7: 6:49	36.858	116.226	0.6	1.80	2.1	172	BCI	0.93			0.51		5.1	0.12	15	SKULL MTN
6	6:16: 7	36.616	116.272	0.5	3.77	1.6	156	ACI	1.33			0.76	1.3	6.9	0.11	13	SKELETON HILLS
7	0:46:60	37.261	114.805	2.0	7.00	10.3	244	CDI	1.48		1.58	1.26	1.6	27.1	0.21	10	GREGERSON BASIN
9	21:55:31	37.396	116.610	0.3	10.20	0.7	147	ACI	1.65			1.34		11.9	0.05	10	GOLD FLAT WEST
9	22:17:20	37.112	115.237	1.1	2.23	2.0	189	BDI	1.70		1.89	1.67	1.2	7.7	0.22	16	LOWER PAHRANAGAT LAKE SW
10	21:38:48	37.113	115.219	0.5	5.46	0.9	125	BBI	3.25		4.07		3.3	6.9	0.22	57	LOWER PAHRANAGAT LAKE SW
10	21:49:52	37.129	115.233	1.2	4.55	1.5	184	BDI	1.73		1.77	1.47	1.7	6.0	0.19	13	LOWER PAHRANAGAT LAKE NW
10	21:50:27	37.117	115.240	6.6	0.58	3.7	258	DDI	1.22		1.36	1.46	1.1	7.5	0.24	9	LOWER PAHRANAGAT LAKE SW
10	23:31:22	37.139	115.248	2.8	-0.19	1.1	237	CDI	1.48		1.09	1.07	1.0	6.4	0.21	11	LOWER PAHRANAGAT LAKE NW
11	1:36:45	37.122	115.240	1.3	1.98	2.2	185	BDI	1.67		1.73	1.54	1.7	6.9	0.20	13	LOWER PAHRANAGAT LAKE SW
11	2:56: 1	37.117	115.238	0.8	2.23	1.3	189	ADI	1.39		1.47	1.31	1.7	7.3	0.14	13	LOWER PAHRANAGAT LAKE SW
11	3: 7:49	37.120	115.239	1.0	1.63	2.1	187	BDI	2.32			2.04	2.4	7.1	0.19	17	LOWER PAHRANAGAT LAKE SW
11	4:55:55	37.141	115.239	0.5	2.88	0.6	143	ACI	2.43	0.62	2.80	2.69	2.5	5.6	0.14	27	LOWER PAHRANAGAT LAKE NW
11	9:51:51	37.282	115.231	0.5	1.71	1.3	112	BCI	2.51	0.54	2.81	2.53	2.9	13.2	0.23	35	ALAMO
11	15:19:56	37.271	115.240	1.1	5.26	5.8	121	CCI	1.35		1.36	1.40	1.6	12.2	0.16	10	ALAMO
11	15:35:57	37.118	115.233	0.7	2.23	1.6	139	BCI	1.70		1.77	1.58	1.7	7.0	0.16	14	LOWER PAHRANAGAT LAKE SW
12	0:24: 7	37.274	115.241	1.2	6.21	5.0	109	CCI	1.43		1.40	1.13	1.5	12.6	0.16	10	ALAMO
12	3:18:47	37.132	115.244	1.5	1.41	2.1	225	BDI	1.41		1.22	1.13	1.2	6.5	0.12	11	LOWER PAHRANAGAT LAKE NW
12	4:20:27	37.118	115.235	1.4	4.33	1.8	238	BDI	1.41		1.27	1.05	1.3	7.1	0.16	13	LOWER PAHRANAGAT LAKE SW
12	5: 5:13	37.121	115.237	1.7	4.87	1.8	237	BDI	1.39		1.43	1.31	1.3	6.8	0.16	10	LOWER PAHRANAGAT LAKE SW
12	12: 1:51	37.281	115.245	1.1	4.24	9.1	120	CCI	1.28		1.51	1.17	1.7	13.5	0.18	12	ALAMO
12	12:51:50	37.272	115.241	1.4	2.01	5.2	121	CCI	1.29		1.05	1.21		12.4	0.18	10	ALAMO
12	13:54:21	36.939	116.595	0.3	5.54	2.9	143	BCY	1.25			0.77	0.8	11.1	0.07	15	EAST OF BEATTY MTN
12	23:14:18	37.284	115.232	0.6	1.44	2.1	112	BCI	2.10			2.13	2.1	13.4	0.13	14	ALAMO

DATE	TIME (UTC)	LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
MAR 12	23:18:31	37.687	115.045	0.5	0.40	0.8	114	ACI	1.21		0.58	0.90		10.3	0.13	9	HIKO NE
12	23:36: 4	37.270	115.238	0.6	6.67	2.4	120	BBI	1.13		0.94	1.17		12.1	0.07	7	ALAMO
13	3:18:49	37.126	115.237	1.6	4.43	1.9	234	BDI	1.64	0.80	1.56	1.55	1.7	6.5	0.18	11	LOWER PAHRANAGAT LAKE NW
13	6: 0:47	37.275	115.237	0.8	2.77	2.4	118	BCI	1.34		1.21	1.44	1.8	12.6	0.11	12	ALAMO
13	22:39:15	37.261	115.238	0.7	3.11*	——	123	CCI	1.59		1.59	1.70	1.8	11.2	0.05	10	ALAMO
14	15:54:59	37.221	117.699	0.4	10.82	0.7	169	BCI	2.56	2.19	3.13	2.51	3.1	4.9	0.16	34	HANGING ROCK CANYON
14	19:22: 1	36.065	115.431	1.1	3.22*	——	200	CDI	1.93			1.59		31.6	0.17	9	BLUE DIAMOND
14	21: 2:47	37.185	116.955	0.3	7.00	2.2	131	BCI	1.61		1.70	1.49	1.9	20.8	0.13	24	SPRINGDALE NW
14	21:58:52	36.754	115.973	0.8	5.39	3.5	136	BCI	1.62			1.73	1.6	10.4	0.25	16	FRENCHMAN FLAT
14	22:52:40	36.750	115.973	0.4	0.48	0.6	134	ABI	1.47		2.02	1.41	1.8	10.0	0.11	16	FRENCHMAN FLAT
15	3:23:37	37.057	117.137	0.3	4.19	2.4	87	BCI	1.52			1.36	1.8	12.3	0.10	17	BONNIE CLAIRE SW
16	7:36:33	36.712	116.230	0.7	7.66	0.8	214	ADI	0.89			0.57		5.1	0.12	14	SPECTER RANGE NW
16	19:58:21	37.132	115.232	1.8	8.08	1.8	182	BDI	1.56		0.83	1.09	1.2	5.7	0.22	9	LOWER PAHRANAGAT LAKE NW
17	1:19:15	37.274	115.251	0.4	0.31	0.7	124	BCI	1.49		1.33	1.06	1.5	13.0	0.22	12	BADGER SPRING
17	12:53:45	37.262	115.243	0.6	7.78	1.9	126	ABI	1.28		1.32	1.15	1.5	11.5	0.10	12	ALAMO
17	17: 4:32	37.126	115.238	0.5	5.22	1.3	131	BBI	1.69		1.79	1.66	1.8	6.5	0.16	19	LOWER PAHRANAGAT LAKE NW
17	23:57:52	37.556	117.200	0.5	5.01	6.3	121	CCI	1.20		1.07	1.30		22.9	0.11	9	RALSTON
18	7:19:21	36.637	115.967	0.6	10.57	0.6	206	ADI	1.19		-0.06	1.24		2.6	0.11	16	MERCURY
18	10:22: 2	36.864	117.450	0.6	2.90	1.1	188	BDI	1.59		1.56	1.74	1.7	7.7	0.17	18	WHITE TOP MOUNTAIN
18	23:30:34	37.141	115.246	0.7	1.77	1.4	170	ACI	1.49		1.05	1.15	1.1	6.1	0.09	10	LOWER PAHRANAGAT LAKE NW
18	23:41:24	37.125	115.235	1.0	6.83	1.4	186	BDI	1.86		2.05	1.83	2.1	6.5	0.19	15	LOWER PAHRANAGAT LAKE NW
19	0:38:31	37.128	115.236	0.8	4.55	1.4	183	BDI	1.48		1.40	1.36	1.8	6.3	0.18	17	LOWER PAHRANAGAT LAKE NW
19	0:55:20	36.637	115.967	0.8	10.71	0.9	206	ADI	1.08			0.90		2.7	0.14	15	MERCURY
19	5:15: 4	37.114	115.241	0.6	4.71	1.5	188	ADI	1.76		1.79	1.51	1.7	7.7	0.13	13	LOWER PAHRANAGAT LAKE SW
19	19:24:48	36.643	115.963	0.7	11.00	0.8	142	ACI	1.12			0.75		2.0	0.11	10	MERCURY
20	15:45:41	37.124	117.810	0.8	5.45	3.9	211	BDI	1.45		1.25	1.44	1.6	18.8	0.15	14	EAST OF WAUCOBA SPRING
21	17:23:22	36.546	116.166	0.4	7.62	1.4	150	ACI	1.40		0.88	1.13	1.5	13.0	0.12	20	SPECTER RANGE SW
21	19: 6: 2	37.159	116.592	0.8	6.48	3.1	143	BCI	1.66			1.32	1.5	11.9	0.19	13	THIRSTY CANYON
22	11:30:36	37.019	117.629	0.9	4.47	10.3	191	CDI	1.24		1.50	1.43		23.8	0.17	12	LAST CHANCE RANGE SW
22	15:27:35	37.271	115.229	1.4	2.35	5.4	115	CCI	1.47		1.34	1.32	1.8	12.0	0.15	8	ALAMO
22	16:52: 0	36.894	116.164	1.1	5.57	1.1	241	BDI	1.03			0.66		4.4	0.15	12	MINE MTN
22	19:11:36	37.116	115.232	1.5	4.26	1.8	243	BDI	1.37		1.33	1.35	1.1	7.1	0.16	10	LOWER PAHRANAGAT LAKE SW
22	21: 0:16	36.622	116.559	0.7	10.08	1.5	193	ADI	1.20			0.85		19.3	0.10	12	LEELAND
23	1:52:25	37.129	116.953	0.4	4.57	4.7	112	BCI	1.53		1.62	1.48	1.8	17.9	0.13	14	SPRINGDALE NW
23	7: 2:13	37.272	115.232	0.9	8.35	2.4	117	BBI	1.34		1.16	0.96	1.5	12.1	0.11	8	ALAMO
25	8:33:40	37.278	115.240	1.3	1.83	5.2	109	CCI	1.31		1.31	1.13	1.5	13.0	0.19	10	ALAMO
25	15:18:53	37.110	115.245	1.7	6.08	1.8	260	BDI	0.80		0.45	0.66		8.3	0.12	7	LOWER PAHRANAGAT LAKE SW
26	2:33:49	37.123	116.955	0.5	5.11	4.1	110	BCI	1.29		1.07	1.33		17.2	0.16	15	SPRINGDALE SW
26	5:59:26	36.291	115.369	0.5	9.19	1.4	153	ACI	1.64			1.63	1.4	19.9	0.12	13	TULE SPRINGS PARK
26	14:11: 5	36.818	115.762	1.7	3.25*	——	263	CDI	1.31		0.58	1.18	1.4	14.4	0.18	10	FRENCHMAN LAKE SE
26	16:44:30	37.156	117.389	0.5	11.50	1.5	108	ABI	1.09		1.24	1.07		19.8	0.11	12	WEST OF GOLD MTN
30	13:54:25	37.647	117.129	0.5	2.45	3.4	163	BCI	1.22		1.34	1.39		23.4	0.13	14	GOLDFIELD
APR 1	20:13: 1	37.120	115.241	1.7	1.50	2.3	236	BDI	1.50		1.27	1.26	1.4	7.3	0.11	9	LOWER PAHRANAGAT LAKE SW
3	19:22:10	36.718	116.231	0.6	3.68	0.8	126	BBI	1.33		2.01	1.07	1.6	4.6	0.15	17	SPECTER RANGE NW

1991 LOCAL HYPOCENTER SUMMARY - SGB EARTHQUAKES

DATE		TIME (UTC)	LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
APR	4	1:19:11	36.677	116.257	0.3	3.69	0.6	223	ADI	1.35		2.06	1.14	1.4	7.4	0.06	15	STRIPED HILLS
	4	8:53:41	37.232	117.565	0.7	9.61	1.2	127	ABI	1.08		1.17	1.07		7.2	0.15	12	SAND SPRING
	5	2:33:59	36.836	116.096	0.7	12.29	1.2	130	ABI	1.28			0.57		6.8	0.13	12	CANE SPRING
	5	6:46: 3	37.650	116.694	0.7	0.55	0.5	96	BBI	1.56			1.52	1.0	3.0	0.15	14	ROLLER COASTER KNOB
	5	14:44:16	36.937	117.461	0.7	5.00	3.2	172	BCI	1.84			1.86	2.0	12.3	0.15	13	TIN MOUNTAIN
	5	14:45:46	37.021	116.195	0.5	4.90	0.7	189	ADI	0.97			0.84		3.5	0.11	15	TIPPIPAH SPRING
	5	18:26:48	36.753	116.231	0.5	8.11	0.6	106	ABI	1.35		1.56	1.36	1.3	3.9	0.14	19	SKULL MTN
	6	2:35:50	37.120	115.240	2.8	0.76	2.2	236	CDI	1.73		1.91	1.56	1.8	7.1	0.23	11	LOWER PAHRANAGAT LAKE SW
	6	8:49:31	36.757	116.231	0.5	6.95	0.7	104	BBI	1.21		1.71	1.33	1.2	4.1	0.15	18	SKULL MTN
	6	12:34:29	36.752	116.231	0.7	8.59	0.7	194	ADI				0.92		3.8	0.08	10	SKULL MTN
	6	15:39:14	37.277	117.541	0.7	4.63	3.0	91	BCI	1.13		1.03	1.08		10.6	0.15	11	TULE CANYON
	6	18:34:46	36.750	116.228	0.7	2.37	1.0	196	ADI	1.08			0.53	1.0	4.1	0.13	11	SKULL MTN
	6	18:55:38	37.011	116.727	0.8	4.37	11.2	97	CCI	1.47			1.14		15.0	0.26	16	THIRSTY CANYON SW
	7	5:43:37	36.751	116.239	0.5	8.92	0.9	106	BBI	1.06			0.70		3.1	0.15	16	SKULL MTN
	7	6:41:40	36.756	116.234	0.4	0.61	0.3	104	ABI	1.03			0.55		3.7	0.13	16	SKULL MTN
	8	8:54:13	37.022	116.191	0.7	4.55	0.9	195	ADI	0.84			0.71		3.7	0.10	9	TIPPIPAH SPRING
	9	4:53:22	37.341	114.321	—	6.00**	3.0	0	D U			3.40			40.0	0.00	0	***REGIONAL***
	9	6:51:56	36.290	117.174	0.3	1.41	0.5	204	ADI	1.34		1.17	1.23		13.2	0.04	9	EMIGRANT CANYON
	9	7:26: 3	36.974	117.770	1.3	7.00	7.7	226	CDI	1.86		1.61	1.82	2.0	30.7	0.22	12	EAST OF WAUCOBA CANYON
	9	19:56: 6	37.288	117.572	0.5	6.56	1.2	84	ABI	0.97		0.82	0.90		9.0	0.10	9	TULE CANYON
	10	12:12:52	36.966	117.764	1.1	3.39*	—	217	CDI	1.73		1.43	1.63	1.9	31.4	0.22	14	EAST OF WAUCOBA CANYON
	10	19:44:56	37.143	118.008	2.1	7.00*	—	246	CDI	1.83		1.96	1.88	2.0	32.5	0.21	10	***REGIONAL***
	11	13:17: 5	37.143	116.293	0.4	7.21	0.8	98	ABI	1.49		2.05	1.34	1.5	9.9	0.09	12	AMMONIA TANKS
	12	7:56: 0	36.694	116.124	0.5	6.60	1.4	150	ACI	1.14			0.91	1.3	14.3	0.09	14	CAMP DESERT ROCK
	13	1:57:27	37.601	117.676	0.3	0.07	0.6	108	ACI	1.89	1.47	1.82	1.89	2.0	16.9	0.11	18	LIDA WASH SW
	13	15:56:44	36.479	116.569	0.4	5.34	1.7	89	ACI	1.53			1.31		12.3	0.10	16	EAST OF ECHO CANYON
	13	16: 6:58	36.488	116.575	0.5	4.80	2.9	56	BCI	1.65			1.34	1.9	13.4	0.19	26	EAST OF ECHO CANYON
	15	6:53:37	37.119	115.211	0.5	3.44	1.4	125	BBI	2.78	2.58	3.39	2.78	3.0	6.0	0.19	47	LOWER PAHRANAGAT LAKE SW
	15	9:44: 4	37.517	118.313	5.5	-1.16	3.6	290	DDU	1.70			1.61		37.4	0.18	11	***REGIONAL***
	15	16: 3: 3	37.116	115.244	0.7	2.29	1.5	186	ADI		1.14	1.23			7.7	0.10	9	LOWER PAHRANAGAT LAKE SW
	15	18:16: 4	37.033	116.598	0.3	8.41	1.1	133	ACI	1.16			0.68		16.9	0.07	16	THIRSTY CANYON SE
	15	18:54:53	37.315	117.756	1.4	9.33	3.5	161	BCI			0.99	1.45	1.6	13.4	0.28	12	HORSE THIEF CANYON
	15	19:43:49	36.007	117.883	2.9	2.14	6.4	291	CDI	2.39		2.48	2.32	2.5	82.3	0.26	14	HAIWEE RESERVOIR
	16	22:24:28	36.649	115.958	0.6	11.95	1.0	59	BAI	2.24	1.53	2.13	2.29	2.0	1.3	0.24	32	MERCURY
	17	0:43:51	38.258	117.757	1.2	3.87	1.7	263	BDI	2.11		2.22	2.19	2.3	60.5	0.16	17	**Southern Great Basin**
	17	2:22:59	38.253	117.726	1.6	5.61	2.1	261	BDI	2.43			2.53	2.6	60.1	0.20	16	**Southern Great Basin**
	17	13:22:31	36.480	116.572	0.4	2.41	1.5	88	ACI	1.42			1.14		12.5	0.11	20	EAST OF ECHO CANYON
	19	7:42:52	37.282	117.574	0.5	6.78	0.9	82	ABI		1.42	1.00	0.93	1.4	8.5	0.11	11	TULE CANYON
	19	8:14: 0	37.081	117.379	0.7	1.05	2.3	121	BBI	1.20		0.83	1.10	1.3	9.6	0.19	12	UBEHEBE CRATER
	19	12:45:38	37.294	117.752	0.7	0.59	1.0	166	BCI	1.56	1.26	1.19	1.45	1.7	11.6	0.15	14	HORSE THIEF CANYON
	19	12:59:16	37.036	116.141	0.4	0.08	0.7	104	BBI	1.69			1.56	1.6	7.8	0.19	36	TIPPIPAH SPRING
	19	14:35:26	36.010	117.355	1.7	3.50*	—	261	CDI	1.84		1.90	1.60		44.3	0.27	18	MATURANGO
	19	14:37: 1	37.517	118.443	2.0	5.08*	—	315	CDU	1.75			2.01		48.5	0.13	8	***REGIONAL***
	19	18:35:12	37.070	116.951	0.3	0.79	0.4	95	ACI	1.55		1.11	1.17		12.3	0.11	21	SPRINGDALE SW

1991 LOCAL HYPOCENTER SUMMARY - SGB EARTHQUAKES

DATE	TIME (UTC)	LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
APR 21	15: 7:53	37.468	117.919	1.3	7.00	1.7	214	BDI	2.05			2.10	2.4	4.9	0.28	21	CHOCOLATE MOUNTAIN
21	19:57:18	36.572	116.197	1.3	3.72*	——	86	CCI	1.51			1.25		15.2	0.24	11	SPECTER RANGE SW
22	4:15: 5	36.980	116.136	0.3	7.57	0.6	106	ABI		1.13		0.51		8.9	0.08	15	MINE MTN
22	5:42:29	37.472	117.900	1.2	7.00	1.8	191	BDI	1.40		1.26	1.45		5.2	0.10	9	CHOCOLATE MOUNTAIN
22	9:18:47	37.554	118.473	2.6	7.00*	——	317	CDI	2.06			2.29	2.2	52.0	0.16	9	***REGIONAL***
23	13:51:60	37.878	115.650	1.0	5.12	5.0	141	CCI			0.88	1.09	1.5	12.5	0.12	8	McCLUTCHEN SPRING
24	0: 7:49	36.071	114.978	4.0	11.20	5.2	167	CCI				1.79		26.0	0.41	8	HENDERSON
24	8:46:58	36.840	116.236	0.3	2.41	0.8	122	ABI	1.03	0.61		0.55		6.2	0.10	16	SKULL MTN
24	21:13: 4	37.349	115.817	0.7	0.24	0.6	66	BAI	1.40			1.35	1.1	4.3	0.24	16	GROOM MINE
25	18:50:43	38.306	115.813	2.0	2.20	5.7	224	CDI			1.63	2.24		40.8	0.28	17	**Southern Great Basin**
25	22:58: 7	38.664	117.932	10.6	-1.54*	——	291	DDI			2.18			106.0	0.46	10	***REGIONAL***
26	22:56:40	38.180	116.266	4.8	15.25	6.9	179	CCI				1.24		16.1	0.15	6	**Southern Great Basin**
27	3:51:46	37.116	115.241	1.8	0.14	2.0	188	BDI	1.65		1.33	1.47	1.1	7.5	0.16	7	LOWER PAHRANAGAT LAKE SW
27	14:56:37	37.393	114.944	1.5	1.14	3.9	183	BDI	2.96	1.19	1.42	0.92		9.5	0.14	7	DELAMAR NW
28	9: 3:10	37.351	116.307	0.7	12.03	2.3	197	BDA		1.29				30.3	0.04	7	DEAD HORSE FLAT
28	21:57:36	37.334	117.529	0.6	-0.22	1.0	124	ACI			1.28	1.23		12.1	0.13	9	TULE CANYON
29	8:31:11	36.717	116.439	0.2	5.26	0.8	166	ACI				0.28		8.1	0.04	14	LATHROP WELLS
29	12:16:28	37.315	117.514	0.8	6.71	2.6	87	BCI			1.47	1.37		14.0	0.19	12	TULE CANYON
29	18:13:43	36.479	114.477	1.9	-1.13	2.1	213	CDI				1.46		61.3	0.44	11	***REGIONAL***
30	3: 4:31	38.660	116.447	4.8	-1.54	4.0	293	CDU	2.03		1.84	2.01		47.3	0.25	12	***REGIONAL***
30	11: 9:13	36.705	116.277	0.6	8.22	1.1	120	BBI				0.44	1.1	4.1	0.19	17	STRIPED HILLS
30	16: 3:48	38.407	117.888	5.3	-1.32	4.2	278	DDI	1.98		2.24	2.27		77.2	0.26	15	**Southern Great Basin**
30	20:32:18	38.389	117.898	6.2	-1.02	5.9	284	DDI	2.29			2.05		75.3	0.28	11	**Southern Great Basin**
30	22:46:33	35.635	115.600	6.9	2.09*	——	220	DDI				1.74		74.1	0.22	8	MESQUITE LAKE
MAY 2	2: 0:54	36.976	116.015	0.4	2.50	0.8	173	ACI	1.64			1.82	1.7	6.5	0.09	15	YUCCA LAKE
2	16: 7:15	37.191	117.024	0.3	5.47	3.3	87	BCI	1.99			2.09	1.8	23.2	0.10	17	BONNIE CLAIRE
2	19:11:55	37.075	115.248	2.2	8.41	2.2	274	BDI	1.45		1.12	1.23		11.7	0.19	9	LOWER PAHRANAGAT LAKE SW
3	3:19:46	37.238	117.505	0.5	8.31	1.5	115	BBI	1.21		1.37	1.23		12.6	0.16	16	SAND SPRING
3	3:54:35	37.239	117.504	0.7	7.85	1.8	115	BBI	1.15		1.34	1.15		12.6	0.18	15	SAND SPRING
3	20:18:29	36.916	115.734	2.2	2.48	7.6	295	CDI	1.08			0.61		25.5	0.07	6	QUARTZ PEAK NW
4	0:28:42	36.286	115.206	1.4	7.00	8.8	125	CCI	1.56			1.40	1.9	24.7	0.21	12	GASS PEAK SW
4	3:56:54	36.826	117.613	1.6	11.15	3.2	220	BDI	1.35		1.68	1.52		18.7	0.25	14	TEAKETTLE JUNCTION
4	5:10:36	36.808	116.268	0.4	2.02	3.5	123	BBI	0.78			0.38		7.3	0.13	12	GEORGES WATER
4	5:40: 3	37.160	116.681	0.2	7.31	0.3	125	ABI	1.46			1.06	1.3	4.2	0.07	25	THIRSTY CANYON NW
6	0: 1:44	36.728	116.272	0.4	2.67	0.5	108	ABI	1.42		2.26	1.62	1.5	1.6	0.13	17	STRIPED HILLS
6	5: 2:54	37.134	117.059	0.6	9.39	2.3	131	BBI	1.14		0.80	0.79		17.0	0.16	13	BONNIE CLAIRE
7	14:22:27	37.110	115.225	2.5	2.47	1.6	251	BDI	1.47		1.56	1.34	1.8	7.4	0.15	10	LOWER PAHRANAGAT LAKE SW
7	18:39:14	37.137	115.242	1.9	1.78	2.4	221	BDI	1.57		1.55	1.29	1.7	6.0	0.15	11	LOWER PAHRANAGAT LAKE NW
8	7:44:34	36.819	116.264	0.2	1.55	1.1	120	ABI	0.77			0.08		6.8	0.10	16	GEORGES WATER
10	3:40:40	37.271	117.620	0.3	6.41	0.5	96	ABI	1.42		1.55	1.58	1.3	4.8	0.09	17	TULE CANYON
10	12:44: 6	36.635	117.143	0.5	6.70	2.1	104	BBI	1.39		1.39	1.21		12.2	0.07	8	MESQUITE FLAT
10	13:17: 9	36.636	117.144	0.4	6.93	1.4	104	ABI	1.39			1.47	2.0	12.0	0.09	15	MESQUITE FLAT
10	22:22: 8	36.636	117.141	0.4	6.10	1.6	103	ACI	1.30		1.56	1.32		12.3	0.08	14	MESQUITE FLAT
11	9:46:19	37.108	115.233	1.1	1.74	2.0	190	BDI	1.55		1.75	1.44	1.7	7.8	0.21	15	LOWER PAHRANAGAT LAKE SW

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MAY 11	11:23:45	37.123	115.242	1.3	2.10	1.6	233	BDI	1.47		1.43	1.22	1.7	7.0	0.14	12	LOWER PAHRANAGAT LAKE SW
11	11:27: 6	36.634	117.132	0.3	0.57	0.5	102	ACI	1.64			1.72	1.9	13.1	0.12	17	MESQUITE FLAT
11	12:15:28	37.124	115.234	2.0	1.96	1.9	237	BDI	1.43		1.38	1.45	1.0	6.5	0.13	9	LOWER PAHRANAGAT LAKE SW
12	0:24:31	36.634	117.139	0.3	6.93	1.4	104	ABI	1.17		1.44	1.10		12.5	0.08	14	MESQUITE FLAT
12	3:56:21	36.635	117.138	0.2	2.82	1.5	102	ACI	2.46			2.05	2.2	12.6	0.11	17	MESQUITE FLAT
12	12:52:54	37.329	117.875	0.9	8.03	1.2	201	ADI	1.43		1.20	1.44	1.7	11.1	0.13	13	SOLDIER PASS
13	0:35:42	36.915	116.183	0.4	9.16	0.6	99	ABI	1.29			1.24	1.6	3.5	0.11	18	MINE MTN
13	8:34: 3	36.850	115.914	0.4	9.10	1.3	165	ACI	1.21			1.08		15.6	0.09	16	FRENCHMAN FLAT
13	10:45:27	37.625	115.078	0.7	0.61	1.1	114	BCI	1.61		1.57	1.14	1.6	12.8	0.22	11	HIKO NE
13	14: 9:45	36.851	115.913	0.4	8.59	1.4	166	ACI	1.10			0.78		15.6	0.09	16	FRENCHMAN FLAT
13	19:46:30	36.635	117.128	0.4	0.39	0.6	100	ACI	1.37			1.39	1.9	13.5	0.13	14	MESQUITE FLAT
14	4:30:56	37.395	116.181	0.2	4.37	1.1	133	ACI	1.30		1.74	1.33	1.6	11.0	0.07	15	SUNDOWN RESERVOIR
14	5:28:46	36.637	117.129	0.4	1.43	1.5	100	ACI	1.70			1.76	2.0	13.4	0.11	13	MESQUITE FLAT
14	10:54:13	37.286	117.571	0.2	2.31	0.5	83	ABI	1.14		1.08	0.96	1.3	8.9	0.06	9	TULE CANYON
14	11:41:13	36.633	117.137	0.5	6.92	2.3	103	BBI	1.31		1.54	1.26		12.7	0.12	11	MESQUITE FLAT
14	11:44:30	36.636	117.139	0.7	7.49	2.9	102	BBI	1.52		1.65	1.37	1.4	12.5	0.14	12	MESQUITE FLAT
14	21:46:21	36.635	117.141	0.4	7.00	1.7	103	ABI	1.26		1.60	1.34	1.4	12.4	0.09	12	MESQUITE FLAT
15	4:17:47	36.633	117.138	0.6	5.10	3.9	104	BCI	1.66			1.78	1.8	12.6	0.14	14	MESQUITE FLAT
15	11:18:42	36.635	117.144	0.4	7.42	1.5	104	ABI	1.44		1.72	1.42	1.4	12.1	0.09	13	MESQUITE FLAT
15	12:12:55	36.636	117.139	0.3	4.38	2.4	102	BCI	1.30		1.49	1.27	1.4	12.5	0.07	13	MESQUITE FLAT
15	20: 1:50	36.630	117.150	0.5	7.12	1.3	108	BBI	2.46		2.59		2.7	11.6	0.18	36	MESQUITE FLAT
16	9:10:42	36.639	117.144	0.3	7.68	1.3	102	ABI	1.91				1.9	12.0	0.09	15	MESQUITE FLAT
16	16:29:12	36.641	117.139	0.5	6.99	2.4	100	BBI	1.20		1.57	1.19		12.4	0.13	12	MESQUITE FLAT
18	1:50: 5	36.846	115.449	0.8	7.00	9.9	113	CCI	1.48			1.51		36.4	0.19	10	DOG BONE LAKE SOUTH
18	6:33:27	36.768	116.225	0.2	1.54	0.8	119	ABI	1.02		1.08	0.65	0.9	5.1	0.08	15	SKULL MTN
19	11:24:39	36.640	117.134	0.3	0.92	0.4	99	ACI	1.72			1.76	1.9	12.9	0.11	16	MESQUITE FLAT
20	11:48:57	37.599	114.968	0.6	1.43	2.1	111	BBI	1.09		1.01	1.01		6.5	0.12	11	PAHROC SUMMIT PASS
20	20:22:29	36.635	117.128	0.2	0.46	0.3	101	ACI	1.13		1.50	1.15		13.5	0.06	13	MESQUITE FLAT
21	2: 3:30	36.841	117.278	0.8	6.05	2.7	73	BBI	1.58		1.71	1.62	1.7	12.0	0.18	14	DRY BONE CANYON
21	2:14:41	37.113	115.218	1.4	5.10	1.5	240	BDI	1.79		1.89	1.81	1.7	6.8	0.17	12	LOWER PAHRANAGAT LAKE SW
21	18: 7: 9	37.920	116.137	0.5	1.56	1.9	119	ACI	1.39			1.46		24.9	0.13	12	REVEILLE PEAK NW
22	14:41:38	37.174	116.690	0.8	14.49	1.4	144	BCI	1.16			1.12		4.3	0.18	13	THIRSTY CANYON NW
22	19:23:47	37.161	116.685	0.5	7.12	0.8	130	ABI	1.66		2.01	1.59	1.6	3.9	0.14	14	THIRSTY CANYON NW
22	22:21:50	37.318	117.522	1.0	7.84	3.4	140	BCI	1.02		0.97	0.98		13.7	0.20	10	TULE CANYON
24	21:17:24	35.878	116.911	5.1	0.29	3.6	309	DDI	1.72		2.19	1.73	1.2	10.4	0.11	8	WINGATE WASH
24	22:20:23	37.003	116.268	9.4	18.34	9.4	277	DDI	1.37			0.43	2.1	18.8	0.12	5	BUCKBOARD MESA
24	23:58:30	36.855	116.295	0.5	7.29	0.9	112	ABI	1.37			0.75	1.6	2.2	0.09	12	GEORGES WATER
25	1:48:51	37.214	116.753	0.2	-0.82	0.2	127	ABI	1.45		1.04	1.07	1.3	7.9	0.08	19	SPRINGDALE NE
25	18:26:48	37.058	114.969	1.8	11.33	2.3	261	BDI	1.87		2.22	1.62	1.8	23.0	0.15	8	DELAMAR 3 SW
25	21:54: 0	36.830	116.320	0.7	0.44	0.7	83	BAI	1.22			0.47		3.7	0.20	12	GEORGES WATER
26	6: 1:38	37.479	117.878	1.2	4.38	3.0	171	BCI	1.11		0.95	1.17	1.4	6.5	0.13	9	CHOCOLATE MOUNTAIN
27	22: 4:35	36.830	116.276	2.4	12.49	1.5	272	BDI	1.22			0.35	2.0	5.2	0.15	8	GEORGES WATER
28	1:23:17	36.574	115.982	0.4	12.92	0.7	167	ACI	1.11		1.22	1.18	1.2	9.8	0.10	15	NIAVI WASH
28	17:51:49	37.117	116.019	1.0	4.70	2.8	162	BCI	1.07			0.83		9.2	0.20	12	YUCCA FLAT

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MAY 29	0: 8:40	36.636	117.159	0.3	6.31	1.3	107	ABI	1.31		1.21	1.20		10.7	0.08	14	MESQUITE FLAT
29	4:21:11	37.208	117.629	0.3	10.55	0.3	199	ADI			0.87	0.98		3.2	0.05	10	HANGING ROCK CANYON
29	6:54:50	37.158	117.362	0.7	4.42	6.8	164	CCI			1.09	0.94		18.3	0.17	13	GOLD MOUNTAIN
30	16:24:59	37.017	116.234	0.6	5.82	0.8	151	ACI	1.04			0.52		2.3	0.09	11	TIPPIPAH SPRING
31	3: 6:52	36.621	117.136	0.6	9.60	1.6	160	ACI	0.99		1.04	1.03		13.0	0.05	7	STOVEPIPE WELLS
31	21:55:51	36.709	116.357	0.7	5.11	1.6	163	ACI	0.96			0.25		7.2	0.11	9	STRIPED HILLS
JUN 2	1: 0:12	37.218	117.347	0.2	7.52	0.6	94	ABI	1.18			1.11	1.6	12.2	0.05	11	GOLD MOUNTAIN
2	1:38:19	36.730	117.280	0.4	10.42	0.7	128	ABI	1.28		1.57	1.22	1.4	9.3	0.07	15	EAST OF SAND FLAT
2	2:59: 3	37.217	117.346	0.4	7.56	1.3	94	ABI	1.52			1.65	1.6	12.2	0.14	16	GOLD MOUNTAIN
2	3:16:22	37.217	117.353	0.4	7.26	1.3	95	ABI	1.28			1.16	1.6	12.6	0.13	16	GOLD MOUNTAIN
2	5: 5:44	37.218	117.352	0.2	7.33	0.6	95	ABI	1.31			1.38	1.6	12.4	0.05	11	GOLD MOUNTAIN
2	6:14:15	37.218	117.348	0.3	7.46	0.5	152	ACI	1.26		1.20	1.12	1.6	12.3	0.05	11	GOLD MOUNTAIN
2	7: 6: 8	37.218	117.344	0.5	7.32	1.3	93	ABI	1.26			1.30	1.6	12.0	0.14	14	GOLD MOUNTAIN
2	20:39:55	36.678	116.275	0.4	9.20	0.7	144	ACI	1.21			0.81		6.8	0.10	15	STRIPED HILLS
3	0:47:37	37.265	115.239	0.4	3.01*	—	107	CCI	1.54			1.52	1.8	11.6	0.15	17	ALAMO
3	16:21:52	36.624	116.295	1.0	8.30	0.9	160	ACI	1.18			0.90	1.3	4.7	0.15	15	SKELETON HILLS
3	21:52: 8	37.295	115.237	0.8	8.59	2.9	113	BBI	1.36		1.47	1.31	1.5	14.7	0.14	9	ALAMO
4	8:48: 3	37.818	115.018	0.9	1.40	2.0	166	ACI	1.32		1.42	1.47	1.0	8.5	0.11	9	WHITE RIVER NARROWS
4	16:57: 2	37.093	116.872	0.4	0.03	0.6	99	ACI	1.24		1.08	0.94	1.5	14.3	0.15	15	SPRINGDALE
4	19: 6:44	37.153	117.205	0.5	7.60	1.6	89	ACI	1.05		1.31	0.99		17.0	0.14	15	BONNIE CLAIRE NW
5	2:41:52	37.329	115.015	1.2	1.87	2.1	182	BDI	1.38			1.12	1.4	9.1	0.13	9	ALAMO SE
5	10:34:43	37.214	117.356	0.4	5.77	1.5	143	ACI				1.14		13.0	0.08	10	GOLD MOUNTAIN
5	10:34:52	37.217	117.356	0.2	6.21	0.7	141	ACI	1.06			1.18	1.3	12.8	0.03	7	GOLD MOUNTAIN
6	0:23:41	37.799	116.697	0.4	5.23	3.9	121	BCI	2.28		3.02	2.34	2.3	16.1	0.15	21	STINKING SPRING SW
7	4:14:56	37.017	116.153	0.5	1.43	2.7	211	BDI	0.97			0.69		7.1	0.09	11	TIPPIPAH SPRING
7	6:51:33	37.024	116.148	0.3	4.05	1.1	112	ABI	1.34			1.17	1.3	7.4	0.12	19	TIPPIPAH SPRING
7	11: 4:24	37.796	116.695	0.5	1.83	1.9	125	BCI	1.61		1.80	1.73	2.1	15.8	0.17	15	STINKING SPRING SW
7	11:43:27	37.801	116.688	0.6	0.58	0.7	193	ADI	1.47			1.44		16.4	0.11	12	STINKING SPRING SW
7	14: 0:13	37.024	116.150	0.5	2.23	0.9	111	ABI	1.02			0.75		7.2	0.13	14	TIPPIPAH SPRING
8	3:46:50	36.876	116.693	1.1	0.87	0.9	271	BDI	1.13		0.93	0.56		10.6	0.11	16	BEATTY MTN
8	7:27: 7	37.800	116.696	0.4	0.22	0.5	126	ACI	1.64		2.43	1.64	2.1	16.2	0.13	16	STINKING SPRING SW
8	13: 4:14	36.701	116.111	0.4	4.15	3.2	145	BCI	1.10			0.65	1.3	14.2	0.10	16	CAMP DESERT ROCK
8	14:56:10	37.103	116.998	0.2	6.31	1.0	49	ACI	3.07		3.44		2.9	13.8	0.11	42	SPRINGDALE SW
8	15: 3:35	37.096	116.993	0.5	4.41	3.9	101	BCI	1.11		0.81	0.80		13.2	0.15	14	SPRINGDALE SW
8	15:12:48	37.099	116.990	0.4	0.54	0.7	102	BCI	1.53		1.33	1.44	1.7	13.5	0.16	17	SPRINGDALE SW
8	16: 9:42	37.106	116.994	0.4	1.77	1.5	104	ACI	1.63		1.49	1.45	1.7	14.3	0.12	15	SPRINGDALE SW
8	17:13:35	36.708	116.112	0.3	2.37	0.8	110	ACI	1.27		1.04	1.35	1.3	14.5	0.08	13	CAMP DESERT ROCK
8	18:15:49	37.017	116.154	0.5	1.90	3.0	210	BDI	0.99			0.68		7.1	0.08	10	TIPPIPAH SPRING
8	21: 8:47	37.107	116.993	0.4	4.47	3.0	104	BCI	1.14		0.91	0.96		14.3	0.11	15	SPRINGDALE SW
9	0:42:32	36.693	116.246	0.7	8.04	0.8	216	ADI	1.07			0.85	1.2	5.9	0.12	12	SPECTER RANGE NW
9	5: 7: 7	36.696	116.254	0.6	7.98	0.6	210	ADI	1.18			0.86	1.1	5.4	0.12	15	STRIPED HILLS
9	5:23:45	36.697	116.253	0.5	7.82	0.5	210	ADI	1.16			1.09	1.1	5.4	0.09	14	STRIPED HILLS
9	5:46:16	37.106	116.997	0.4	4.74	3.1	68	BCI	1.76			1.76	1.8	14.2	0.12	17	SPRINGDALE SW
9	11: 7:13	36.694	116.252	0.4	8.18	0.8	137	ACI	1.10			0.72		5.7	0.12	16	STRIPED HILLS

1991 LOCAL HYPOCENTER SUMMARY - SGB EARTHQUAKES

DATE	TIME (UTC)	LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JUN 9	11:49:40	36.625	115.619	2.1	0.79	1.2	225	BDI	1.35			1.14	1.5	18.7	0.15	11	HEAVENS WELL
9	13: 7:52	37.462	117.248	0.3	0.71	0.4	134	ACI	1.34			1.46	1.6	17.9	0.09	15	STONEWALL PASS
9	13:14:56	37.124	115.233	1.6	-0.54	0.6	237	BDI	1.52		1.49	1.41	1.0	6.4	0.16	11	LOWER PAHRANAGAT LAKE SW
9	13:28:56	37.020	116.152	0.6	1.63	1.3	176	ACI	0.93			0.72		7.2	0.13	15	TIPPIPAH SPRING
9	15:25:32	37.021	116.149	0.5	3.45	2.0	111	ABI	1.36			1.38	1.4	7.3	0.13	14	TIPPIPAH SPRING
9	18: 9:25	37.029	116.141	0.4	2.63	1.0	116	ABI	1.14			0.99		7.9	0.14	15	TIPPIPAH SPRING
9	23: 0: 6	37.693	115.041	0.9	0.57	1.4	117	BCI	0.95			0.70		10.2	0.24	10	HIKO NE
10	3:28:30	37.099	116.998	0.7	4.32	6.1	102	CCI	1.02		0.72	0.83		13.4	0.18	12	SPRINGDALE SW
10	6:11:45	37.026	116.148	0.4	2.43	1.0	113	ABI	1.02			0.95		7.4	0.13	15	TIPPIPAH SPRING
10	15:25:46	36.551	116.255	0.7	4.97	3.2	189	BDI	1.02		0.26	0.65		12.9	0.16	16	SKELETON HILLS
10	15:40: 6	37.025	116.144	0.5	2.48	0.9	114	ABI	1.66			1.48	2.0	7.7	0.12	13	TIPPIPAH SPRING
10	15:45:47	37.095	115.209	1.1	6.86	1.7	194	BDI	2.52				2.4	8.4	0.21	14	LOWER PAHRANAGAT LAKE SW
10	16: 9: 4	37.015	116.162	1.1	0.08	0.5	250	BDI	1.07			0.75		6.5	0.14	13	TIPPIPAH SPRING
10	19: 4:44	37.475	117.563	0.4	4.39	1.3	92	ABI	1.68		1.87	1.76	2.1	6.9	0.10	13	MAGRUDER MTN
11	4:23:48	36.677	116.264	0.7	1.99	0.9	248	ADI	0.77			0.01		7.3	0.03	6	STRIPED HILLS
11	4:23:53	37.104	116.996	0.5	4.65	4.5	103	BCI	1.36		1.22	1.32	1.4	14.0	0.17	14	SPRINGDALE SW
11	7:41:56	37.029	116.149	0.5	4.22	1.8	115	ABI	0.86			0.75		7.2	0.14	13	TIPPIPAH SPRING
11	12:12:41	37.015	116.155	0.4	1.45	1.4	207	ADI	0.93			0.46		7.0	0.07	10	TIPPIPAH SPRING
11	14:10:56	37.218	117.348	0.2	7.48	0.5	94	ABI	1.30	0.15		1.35	1.6	12.3	0.05	13	GOLD MOUNTAIN
11	15: 5:21	37.082	117.396	0.5	0.17	0.6	125	BCI	1.73			1.62	1.8	10.2	0.16	17	UBEHEBE CRATER
11	15:36:54	37.030	116.145	0.4	2.99	0.8	115	ABI	1.18			1.06	1.0	7.6	0.13	16	TIPPIPAH SPRING
11	18: 4: 9	37.104	116.996	0.6	4.35	5.0	103	CCI	1.36		1.19	1.05		14.0	0.19	15	SPRINGDALE SW
11	19: 0:42	37.012	116.171	1.6	0.50	1.3	241	BDI	0.93			0.59		5.9	0.12	9	TIPPIPAH SPRING
11	23:54:36	36.823	117.456	0.7	7.79	0.8	193	ADI	1.22		1.21	1.23	1.4	5.0	0.12	13	WHITE TOP MOUNTAIN
12	1:23:59	37.190	116.961	0.2	0.70	0.3	133	ACI	1.35		0.89	0.91		21.5	0.07	17	SPRINGDALE NW
12	5:26:53	37.429	115.852	0.4	0.74	0.8	63	BCI	2.87		3.10	2.19	2.8	12.6	0.15	22	CATTLE SPRING
12	7:15: 9	37.424	115.843	0.4	1.36	1.3	76	ACI	1.34			1.29		11.7	0.14	14	CATTLE SPRING
12	8:26:43	37.190	116.952	0.3	4.17	5.6	87	CCI	1.37		1.13	1.19		20.7	0.11	19	SPRINGDALE NW
12	11:59:56	37.279	114.825	1.6	10.83	3.8	237	BDI	1.75			1.69	2.1	24.5	0.14	9	GREGERSON BASIN
12	12:58: 4	36.628	115.649	0.5	1.58	1.5	155	ACI	1.77		1.79	1.92	1.9	16.2	0.10	14	INDIAN SPRINGS NW
12	13:44:57	37.418	115.852	0.4	4.69	2.7	68	BCI	1.56			1.64	1.4	11.7	0.17	16	CATTLE SPRING
12	18:32:43	36.609	115.671	1.1	4.81	8.2	148	CCI	1.46		1.26	1.29	1.4	15.7	0.28	12	INDIAN SPRINGS
12	18:46:22	36.850	115.948	0.5	4.87	3.6	128	BCI	2.26			1.86	2.2	13.2	0.15	17	FRENCHMAN FLAT
12	18:47:22	36.853	115.942	0.6	6.85	1.8	197	ADI	1.39			1.32	1.5	13.4	0.12	15	FRENCHMAN FLAT
12	19:45:45	37.014	116.158	0.6	1.41	7.5	205	CDI	0.92			0.67		6.9	0.11	10	TIPPIPAH SPRING
12	22:39:27	37.193	116.955	0.2	5.78	0.7	56	ACI	2.81		3.27		3.0	21.0	0.12	58	SPRINGDALE NW
13	1: 1:32	37.013	116.160	0.6	2.05	1.2	203	ADI	1.26			0.98	0.9	6.7	0.12	13	TIPPIPAH SPRING
13	3: 2: 6	36.616	115.627	1.4	1.20	3.8	293	BDI	1.37		0.99	1.26		18.5	0.16	10	INDIAN SPRINGS
13	4: 4: 3	36.711	115.591	5.2	4.34*	—	295	DDI	1.43			1.23	1.6	19.7	0.25	7	HEAVENS WELL
13	13: 4: 1	37.105	116.996	0.4	0.63	0.6	104	ACI	1.30		0.58	0.75		14.1	0.15	17	SPRINGDALE SW
13	13: 8:37	37.102	117.001	0.3	1.32	1.3	103	ACI	1.75			1.81	1.9	13.7	0.14	19	BONNIE CLAIRE SE
13	13:12:58	36.631	117.138	0.3	6.69	1.0	105	ABI	1.23		1.54	1.19		12.7	0.07	15	MESQUITE FLAT
13	16:48:41	37.473	117.561	0.6	4.37	1.3	131	ABI	0.96		0.62	1.03		6.6	0.11	10	MAGRUDER MTN
13	18: 3:11	37.028	116.224	0.9	3.00	0.7	149	ACI	1.32			1.15	1.0	1.1	0.11	9	TIPPIPAH SPRING

1991 LOCAL HYPOCENTER SUMMARY - SGB EARTHQUAKES

DATE	TIME (UTC)	LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JUN 14	2:30:58	36.626	115.649	0.9	4.09	6.4	154	CCI	1.67		1.24	1.54	1.6	16.3	0.18	12	INDIAN SPRINGS NW
14	3:48:37	36.680	115.611	3.2	3.06*	—	294	CDI	1.51		0.99	0.92	1.7	17.9	0.28	9	HEAVENS WELL
14	6:24:54	36.738	115.963	0.3	0.86	0.5	55	BBI	2.06		2.25	2.16	2.1	8.6	0.17	40	MERCURY
14	7:28:20	36.376	117.462	0.9	7.00	4.5	236	BDI	1.31		1.25	1.13		32.4	0.09	11	PANAMINT BUTTE
14	12:29: 8	37.121	115.235	2.1	4.58	2.6	239	BDI	1.29		1.21	1.20	1.4	6.8	0.17	8	LOWER PAHRANAGAT LAKE SW
14	19:19: 4	37.674	114.883	0.5	6.70	0.8	156	ACI	1.29		1.23	1.36		5.4	0.12	11	PAHROC SPRING
14	20:21:19	37.042	117.457	0.6	5.57	2.4	147	BCI	1.39		1.48	1.55	1.2	11.0	0.13	13	UBEHEBE CRATER
14	20:22:35	37.042	117.459	0.3	6.09	1.0	152	ACI	1.19		1.00	1.20	1.2	11.1	0.07	11	UBEHEBE CRATER
15	2: 5:37	36.635	116.335	0.5	3.57	0.5	184	ADI	1.29		1.39	1.30	1.4	1.2	0.11	20	STRIPED HILLS
15	2:38:48	36.641	115.650	2.3	9.69	5.1	176	CCI	1.95		1.95	2.05	2.0	15.5	0.44	11	INDIAN SPRINGS NW
15	8:22:48	37.924	116.132	0.3	3.08*	—	120	CCI	1.33			1.60	1.8	24.9	0.09	12	REVEILLE PEAK NW
15	15:47:51	37.190	117.395	0.4	6.83	2.1	124	BCI	0.85		0.82	0.98		17.3	0.08	7	WEST OF GOLD MTN
15	19:14:39	37.107	116.994	0.6	4.23	5.4	104	CCI	1.13		0.88	0.85		14.4	0.17	11	SPRINGDALE SW
15	21:46:40	37.217	117.354	0.5	4.81	2.4	88	BCI	2.04			1.78	2.0	12.6	0.12	14	GOLD MOUNTAIN
16	4:36:27	37.104	116.998	0.3	4.36	2.6	103	BCI	1.51		1.54	1.30	1.8	13.9	0.10	16	SPRINGDALE SW
17	0:24:33	36.639	115.618	9.4	2.54*	—	294	DDI	1.56		1.07	1.47	1.5	18.2	0.26	9	HEAVENS WELL
17	4:17:47	36.636	115.615	1.3	4.37	8.9	227	CDI	1.45		1.13	1.37	1.5	18.6	0.18	12	HEAVENS WELL
17	20:49:45	37.219	117.351	0.4	6.26	1.5	87	ABI	2.03			2.09	2.0	12.3	0.12	16	GOLD MOUNTAIN
17	20:53:48	37.219	117.336	0.7	7.60	2.0	91	BBI	1.19		1.36	1.07		11.4	0.17	11	GOLD MOUNTAIN
17	22:30:17	37.220	117.350	0.4	7.54	1.0	153	ACI	1.16		1.43	1.05		12.2	0.09	11	GOLD MOUNTAIN
17	22:51: 3	36.622	115.650	1.1	5.72	5.8	153	CCI	1.53		1.03	1.41	1.5	16.5	0.24	13	INDIAN SPRINGS
17	23:47:45	37.281	117.545	0.4	6.65	1.3	88	ABI	1.19		1.25	1.04	1.5	10.5	0.13	14	TULE CANYON
18	0:51:33	37.218	117.355	0.3	7.41	0.8	95	ABI	1.40			1.41	1.6	12.6	0.07	13	GOLD MOUNTAIN
18	9:58:50	37.031	116.144	0.4	2.77	0.8	116	ABI	1.19			1.18	1.2	7.7	0.14	15	TIPPIPAH SPRING
18	22:59:10	37.114	116.445	0.2	7.77	0.7	54	ABI	1.99			1.42	2.2	10.2	0.09	31	TIMBER MTN
19	4: 3:23	36.625	115.634	1.3	0.35	1.4	221	BDI	1.77		1.39	1.61	1.6	17.5	0.14	12	INDIAN SPRINGS NW
19	6:49:22	37.218	117.338	0.6	9.39	1.5	92	ABI	1.19		1.28	1.09	1.6	11.6	0.15	11	GOLD MOUNTAIN
19	17:22:56	37.290	117.594	0.3	8.02	0.6	82	AAI	1.42		1.74	1.49	1.4	7.9	0.08	14	TULE CANYON
19	18: 1: 8	37.103	116.996	0.6	4.46	4.9	103	BCI	1.49		1.52	1.51	1.7	13.9	0.18	14	SPRINGDALE SW
19	22:32:39	37.103	116.999	0.7	4.91	4.3	115	BCI	0.85		0.41	0.46		13.8	0.12	9	SPRINGDALE SW
20	2:45:47	36.637	115.639	0.9	1.07	2.2	222	BDI	1.67		1.35	1.49	2.0	16.6	0.10	10	INDIAN SPRINGS NW
20	5:28:32	37.216	117.352	0.3	7.94	0.8	95	ABI	1.68			1.81	2.0	12.5	0.08	15	GOLD MOUNTAIN
20	6:12:13	37.218	117.343	0.6	6.95	1.8	93	BBI	1.24			1.13	1.3	11.9	0.16	13	GOLD MOUNTAIN
20	17:42:47	37.137	115.239	2.3	1.90	2.8	223	BDI	1.36		1.26	1.28	1.0	5.8	0.14	7	LOWER PAHRANAGAT LAKE NW
20	18:59:59	37.217	117.351	0.2	7.91	0.7	88	ABI	1.90		1.32	1.95	2.0	12.4	0.07	15	GOLD MOUNTAIN
20	19: 6:14	37.221	117.344	0.7	7.46	2.1	92	BBI	0.91		1.37	0.97		11.8	0.16	10	GOLD MOUNTAIN
20	20:15:36	36.730	115.792	0.7	9.18	0.6	249	ADI	1.15			0.97		4.3	0.07	10	MERCURY NE
21	1:55:43	36.260	116.455	0.3	0.52	0.4	128	ACI	1.25		1.00	1.31		15.4	0.08	12	DEATH VALLEY JUNCTION
21	4:53:28	37.221	117.345	0.4	8.69	1.0	93	ABI	1.20		1.24	0.95		11.8	0.08	9	GOLD MOUNTAIN
21	4:54:48	37.223	117.357	0.8	7.81	2.0	155	BCI			1.09	0.79		12.4	0.13	9	GOLD MOUNTAIN
21	5: 0: 3	37.220	117.357	0.5	7.20	1.1	155	ACI	1.90		1.24	1.01		12.6	0.08	9	GOLD MOUNTAIN
21	5: 0:33	37.222	117.344	0.6	8.72	1.3	93	ABI	1.18		1.20	1.00		11.7	0.11	9	GOLD MOUNTAIN
21	5: 2:53	37.217	117.344	0.3	7.80	0.6	151	ACI	1.41			1.45	1.6	12.0	0.05	11	GOLD MOUNTAIN
21	5:12:19	37.219	117.335	0.6	7.76	1.7	91	ABI	1.65			1.18	2.0	11.4	0.15	12	GOLD MOUNTAIN

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JUN 21	5:13:17	37.219	117.356	0.3	6.11	0.9	155	ACI			1.14	1.06		12.6	0.06	8	GOLD MOUNTAIN
21	7:30:49	37.220	117.334	0.6	8.25	1.4	90	ABI	1.28			1.22	1.7	11.3	0.13	11	GOLD MOUNTAIN
21	7:33:52	37.216	117.360	0.5	5.40	1.7	157	ACI	1.21		1.33	0.95		13.1	0.10	11	GOLD MOUNTAIN
21	15:20:14	37.218	117.352	0.2	7.90	0.5	153	ACI	1.27			1.17	1.6	12.4	0.04	11	GOLD MOUNTAIN
22	1:55:27	36.610	115.633	2.5	7.26	8.1	220	CDI	1.49		1.14	1.37	1.5	29.9	0.07	6	INDIAN SPRINGS
22	4: 1: 3	37.366	115.774	2.3	4.37	3.1	163	BCI	0.90			0.84		3.6	0.14	6	GROOM MINE
22	5:38: 5	36.626	115.635	1.4	0.66	1.0	221	BDI	1.42		1.01	1.30	1.5	17.4	0.13	10	INDIAN SPRINGS NW
22	8:11:52	37.021	116.148	0.4	2.34	0.9	111	ABI	0.87			0.71		7.4	0.09	11	TIPPIPAH SPRING
22	10:49:58	37.221	117.346	0.7	9.41	1.1	151	ACI			1.12	0.58		11.9	0.12	9	GOLD MOUNTAIN
22	18:24:10	37.089	117.398	0.5	1.89	1.7	125	ACI	2.36			2.15	2.0	11.0	0.15	16	UBEHEBE CRATER
22	19:12:19	37.125	115.208	1.4	10.33	1.3	252	BDI	1.62		1.56	1.44	1.8	5.1	0.17	11	LOWER PAHRANAGAT LAKE NW
23	2:46:33	36.516	116.590	0.6	6.27	2.9	166	BCI	1.73		1.67	1.78	1.9	16.7	0.13	14	LEELAND
23	4:31:49	37.218	117.338	0.7	9.37	1.4	92	ABI	1.05		1.24	1.21	1.6	11.6	0.15	10	GOLD MOUNTAIN
23	23: 3: 9	37.400	115.217	1.0	6.84	3.3	176	BCI	1.11		1.24	0.86	1.4	14.7	0.09	7	ASH SPRINGS
24	1:43:49	36.599	115.620	4.3	2.48*	—	222	CDI	1.97			1.77	2.1	20.1	0.20	9	INDIAN SPRINGS SE
24	7:38:40	37.134	115.241	1.3	0.52	0.9	224	BDI	1.50		1.30	1.07	1.0	6.1	0.13	11	LOWER PAHRANAGAT LAKE NW
25	1:42:48	36.644	115.612	1.6	2.05	2.2	228	BDI	1.37			1.11		18.6	0.11	7	HEAVENS WELL
25	2:12:24	37.390	117.253	1.5	0.90	1.6	195	BDI				0.96	1.4	9.9	0.21	8	MOUNT JACKSON
25	2:39:14	37.376	117.695	0.6	4.65	5.9	142	CCI	1.16		1.35	1.35	1.6	16.5	0.12	8	SYLVANIA MOUNTAINS
25	3: 4: 8	37.234	117.717	4.3	2.58	4.7	230	CDI	1.37		0.92	1.08	1.2	6.2	0.24	6	HANGING ROCK CANYON
25	15:18:32	36.768	116.274	0.7	6.48	1.0	133	ABI	0.83			0.29		2.9	0.12	10	GEORGES WATER
25	16:59:58	37.922	116.131	0.3	2.86	2.2	120	BCI	1.68			1.88	2.3	24.7	0.11	15	REVEILLE PEAK NW
25	21:22: 4	37.922	116.134	0.5	2.95	3.0	120	BCI	1.60			1.77		24.9	0.13	11	REVEILLE PEAK NW
26	5: 2:15	37.923	116.130	0.4	3.00*	—	120	CCI	1.61			1.86	2.0	24.8	0.10	11	REVEILLE PEAK NW
27	6:54:55	37.102	116.738	0.5	0.41	0.4	130	ABI	1.34			1.01	1.1	5.1	0.12	11	THIRSTY CANYON SW
27	7:38:59	37.105	116.738	0.2	0.14	0.1	131	ABI	1.56			1.25	1.0	4.7	0.05	17	THIRSTY CANYON SW
27	11: 6:43	36.639	115.654	4.0	0.16	3.3	290	CDI	1.73		1.47	1.55	1.6	15.3	0.16	10	INDIAN SPRINGS NW
27	19: 0:42	36.628	117.144	0.5	7.77	1.9	108	ABI	1.19		1.74	1.32	1.4	12.2	0.09	11	MESQUITE FLAT
27	22:16:10	36.805	115.847	0.7	6.43	2.9	219	BDI	1.26			0.90		12.7	0.07	6	FRENCHMAN LAKE SE
27	22:56:19	36.799	115.859	0.8	7.56	1.6	210	ADI	1.05			0.86		12.4	0.05	6	FRENCHMAN LAKE SE
28	5:11:46	36.776	115.505	8.9	3.08*	—	348	DDA		0.82				68.6	0.28	7	TIM SPRING
28	12:44:47	37.185	116.331	1.4	4.82	1.6	178	BCA		0.81				4.6	0.09	8	AMMONIA TANKS
29	3:55:11	36.735	116.100	4.7	2.92*	—	270	CDA		0.67				14.7	0.27	10	CAMP DESERT ROCK
29	9:19:24	37.092	117.009	2.3	8.65	3.2	266	BDA		1.18				12.5	0.13	11	BONNIE CLAIRE SE
29	10:35:40	36.594	115.864	—	2.59	—	289	ADA		1.15				27.6	0.09	4	MERCURY SE
30	5:52:52	37.208	117.588	0.5	8.04	0.7	181	ADI	1.14		1.42	1.23		5.8	0.08	10	SAND SPRING
JUL 1	5:17:45	36.725	116.234	1.3	4.36	0.9	253	BDI	1.15		1.65	0.60	0.9	4.0	0.14	13	SPECTER RANGE NW
1	5:18: 5	36.733	116.280	0.9	3.38	0.9	172	BCI	1.06		1.31	0.48	0.8	1.2	0.17	13	STRIPED HILLS
1	17:29:22	36.816	115.812	0.8	1.26	1.6	203	ADI	1.07			0.98		13.6	0.13	12	FRENCHMAN LAKE SE
1	18:30:11	37.587	117.456	1.2	3.69*	—	216	CDI	1.00		0.87	0.70		16.7	0.11	8	MONTEZUMA PEAK SW
1	20:33:31	37.015	116.556	1.1	21.59	1.9	127	BBI	1.50			1.04		15.2	0.16	10	THIRSTY CANYON SE
2	5:13:25	36.815	115.828	1.4	0.96	1.2	217	BDI	1.47		1.09	1.40	1.5	13.5	0.17	11	FRENCHMAN LAKE SE
2	12: 7:47	36.886	116.219	0.6	4.79	1.0	131	ABI				0.37		4.3	0.10	12	MINE MTN
2	21:58:16	36.670	116.219	1.3	0.96	1.0	244	BDI	0.96			0.76		9.4	0.14	11	SPECTER RANGE NW

DATE		TIME (UTC)	LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JUL	3	17:44:29	36.680	116.233	1.1	0.85	0.9	232	BDI	1.42			0.89	1.2	7.8	0.14	12	SPECTER RANGE NW
	4	0:22: 2	36.997	116.421	0.2	7.67	0.5	82	AAI	1.41		1.49	1.21	1.6	5.2	0.11	32	PINNACLES RIDGE
	4	0:29:43	37.218	117.348	0.3	7.21	0.8	152	ACI	1.44			1.42	1.6	12.2	0.08	12	GOLD MOUNTAIN
	4	1: 8:51	37.001	116.410	0.6	8.46	0.9	175	ACI	0.99			0.49		4.3	0.09	11	TIMBER MTN
	4	2:56: 8	36.997	116.421	0.5	8.64	0.6	185	ADI	1.11			0.60		5.2	0.08	13	PINNACLES RIDGE
	4	3:13:41	37.001	116.416	0.7	9.02	0.9	183	ADI	1.04			0.71		4.6	0.14	14	TIMBER MTN
	4	3:31:38	36.997	116.424	0.3	7.58	0.4	108	ABI	1.13			0.68		5.4	0.06	17	PINNACLES RIDGE
	4	5:13:35	36.997	116.428	0.4	8.27	0.5	209	ADI	1.34			0.89	0.8	5.6	0.06	12	PINNACLES RIDGE
	4	11:42:39	36.639	117.136	0.2	2.36	0.8	100	ACI	1.66			1.71	1.9	12.8	0.07	14	MESQUITE FLAT
	4	12:57:32	36.673	116.230	1.7	3.43	4.3	237	BDI				0.55		8.6	0.17	8	SPECTER RANGE NW
	4	23:30:20	36.371	117.497	1.6	2.25	6.6	241	CDI	1.32		1.21	1.37		35.6	0.14	10	PANAMINT BUTTE
	5	1:45:16	36.629	117.122	0.4	10.29	1.2	102	ABI	1.61		1.59	1.73	1.7	14.1	0.08	11	STOVEPIPE WELLS NE
	6	3:25:12	37.420	117.803	0.6	10.19	1.1	128	ABI	1.23			1.50		9.2	0.09	9	SYLVANIA CANYON
	6	12:35:23	37.095	116.194	0.3	0.25	0.5	95	ABI			1.15	1.05		7.2	0.11	18	TIPPIPAH SPRING
	7	16:25:49	37.211	116.495	2.6	8.24	4.1	340	CDA		0.52				21.7	0.05	8	SCRUGHAM PEAK
	7	17:22:32	37.188	116.953	0.5	7.00	3.6	133	BCA		0.39				24.0	0.16	15	SPRINGDALE NW
	7	17:36:59	36.492	116.152	0.8	5.15	1.8	172	ACA		0.68				7.1	0.12	13	AMARGOSA FLAT
	7	23:18:31	37.011	116.581	3.7	6.42	8.1	307	CDA		0.79				16.9	0.14	8	THIRSTY CANYON SE
	7	23:22:56	36.389	116.905	3.5	17.47	9.6	262	CDA		0.74				30.9	0.14	6	WEST OF FURNACE CREEK
	8	22: 1: 0	36.622	115.664	0.9	0.79	1.0	152	ACI	2.17		2.76	1.91	2.2	27.0	0.13	11	INDIAN SPRINGS
	9	13:12:23	37.977	115.231	3.8	7.00*	——	223	CDI	2.86		1.39	1.64		31.8	0.34	6	OREANA SPRING
	9	15:26:36	37.854	114.454	1.9	3.22*	——	307	CDI	1.92		1.98	2.05	2.0	37.2	0.21	11	***REGIONAL***
	9	18:26: 3	37.219	117.344	0.5	9.74	1.2	93	ABI	1.16		0.89	0.94		11.9	0.09	9	GOLD MOUNTAIN
	9	18:30:44	37.215	117.351	0.3	8.31	0.9	95	ABI	1.20		1.19	1.13		12.6	0.08	12	GOLD MOUNTAIN
	10	2:48:17	37.218	117.350	0.6	8.11	1.6	94	BBI	1.36			1.41	1.6	12.3	0.16	13	GOLD MOUNTAIN
	10	6: 7:28	36.607	115.638	0.9	0.67	0.7	218	ADI	1.41		0.95	1.18		29.6	0.09	11	INDIAN SPRINGS
	10	9:51:12	37.291	117.558	0.7	2.09	1.6	82	ACI	1.16		1.12	0.91	1.4	10.2	0.14	8	TULE CANYON
	10	18:42:29	36.624	115.662	1.0	10.77	3.5	153	BCI	1.62		1.30	1.60	1.5	27.1	0.13	10	INDIAN SPRINGS
	11	9:48:59	37.568	114.925	0.4	7.96	1.0	136	ACI	1.08		1.02	0.96		9.4	0.08	9	PAHROC SUMMIT PASS
	12	3:24:44	36.881	116.017	1.4	1.48	2.0	298	BDA		0.85				13.8	0.13	9	YUCCA LAKE
	12	9:21:59	36.821	116.290	0.4	6.08	1.5	99	ABA		0.15				8.8	0.08	8	GEORGES WATER
	12	12: 7:48	36.612	115.749	1.7	3.22*	——	293	CDA		1.40				37.2	0.09	8	INDIAN SPRINGS
	12	12:40:50	37.380	115.781	1.3	-0.07	0.8	150	BCA		1.21				5.2	0.15	10	CATTLE SPRING
	12	12:41:34	37.380	115.774	——	1.48	——	155	ADA		1.66				5.1	0.06	4	CATTLE SPRING
	12	13: 1:11	37.379	115.810	1.9	0.44	2.5	167	CCA		0.90				6.1	0.31	7	CATTLE SPRING
	12	15:44:50	36.552	115.720	3.1	7.00	9.7	191	CDA		1.66				24.7	0.16	11	INDIAN SPRINGS
	12	16:41:31	36.633	115.640	0.3	1.30	2.0	71	BCI	2.60		3.17	1.97	3.0	16.7	0.19	52	INDIAN SPRINGS NW
	12	18:44:26	36.628	115.642	0.5	11.46	3.9	156	BCI	2.19		2.67	2.30	2.1	45.2	0.06	11	INDIAN SPRINGS NW
	12	20:38:41	36.638	115.642	0.9	0.97	1.1	158	ACI	1.51		1.20	1.45		16.3	0.12	11	INDIAN SPRINGS NW
	12	22:12:48	36.638	115.647	0.5	3.37*	——	220	CDI	1.97		0.52	0.85		28.3	0.05	6	INDIAN SPRINGS NW
	12	23: 8:30	37.296	117.617	0.7	2.67	1.9	111	ABI	1.52		1.63	1.49	1.8	7.5	0.11	9	TULE CANYON
	13	2:46:10	37.216	117.353	0.4	7.59	1.1	95	ABI	1.23		1.16	1.12		12.7	0.10	13	GOLD MOUNTAIN
	13	7:19:17	36.886	116.725	0.3	9.28	1.3	130	ABI	1.05		1.08	0.49		13.2	0.08	18	BEATTY MTN
	13	21:11:32	36.627	115.661	0.5	-1.84	0.5	153	ACI	1.68		1.56	1.71	1.6	15.3	0.09	13	INDIAN SPRINGS NW

1991 LOCAL HYPOCENTER SUMMARY - SGB EARTHQUAKES

DATE (UTC)	TIME (UTC)	LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JUL 13	21:56:11	37.419	117.615	0.5	7.70	1.3	122	ABI	1.12			1.18		10.5	0.09	8	MAGRUDER MTN
14	3:58:57	37.109	116.994	0.6	4.19	5.2	105	CCI	1.71		0.70	0.79		14.6	0.14	12	SPRINGDALE SW
14	4:57:10	36.622	115.637	1.6	0.78	1.8	220	BDI	1.33			1.13		17.5	0.12	10	INDIAN SPRINGS
14	6:59:55	36.716	115.631	1.4	7.00	8.4	233	CDI	1.41		0.85	1.15	1.5	30.1	0.18	10	INDIAN SPRINGS NW
14	8:57:60	37.455	115.596	0.6	0.05	1.0	98	BCI	1.35			1.32		17.2	0.21	13	GROOM RANGE NE
14	22: 2:33	36.626	115.665	0.6	1.45	1.7	153	ACI	1.82		1.77	1.79	1.6	15.1	0.12	12	INDIAN SPRINGS NW
15	4:24:53	36.718	115.886	1.0	1.85	2.6	145	BCI	1.44		1.03	1.29	1.4	7.2	0.26	14	MERCURY
16	3:59:21	36.768	116.258	0.6	4.18	1.0	165	BCI	1.03		1.32	0.82	0.9	3.1	0.16	16	GEORGES WATER
16	5: 2:48	37.225	117.584	0.3	6.42	0.5	117	ABI	2.26		2.82		3.1	5.6	0.13	29	SAND SPRING
16	5:19: 7	37.143	117.381	0.4	8.62	1.1	110	ABI	1.13		1.32	1.15		16.3	0.11	15	WEST OF GOLD MTN
16	8:40:31	36.832	115.425	0.7	7.00*	——	205	CDI	1.65		1.13	1.63	1.8	42.9	0.14	13	DOG BONE LAKE SOUTH
17	9:52:53	36.617	115.628	0.6	14.25	2.1	155	BCI	1.53		1.20	1.48	1.5	30.2	0.12	12	INDIAN SPRINGS
18	4:59:38	37.184	116.960	0.3	9.92	1.2	131	ACI	1.66		1.69	1.49	2.1	21.2	0.10	18	SPRINGDALE NW
18	8:28:28	36.753	115.950	1.1	7.16	2.1	212	BDI	1.16		0.41	0.93	1.1	10.2	0.12	7	FRENCHMAN FLAT
18	12:36:44	36.777	117.227	0.4	0.52	0.6	83	ACI	1.81		1.80	1.73	1.9	15.3	0.14	18	FALL CANYON
19	7:54: 9	37.105	116.738	0.2	0.22	0.1	132	ABI	1.58		1.60	1.23	1.1	4.7	0.06	16	THIRSTY CANYON SW
19	7:54:51	37.106	116.737	0.3	0.28	0.2	131	ABI	1.25			0.77	1.1	4.6	0.07	11	THIRSTY CANYON SW
19	8:25:32	37.113	116.742	0.5	2.42	0.8	140	ACI	1.39		1.04	1.09	1.2	4.1	0.12	14	THIRSTY CANYON SW
19	12:46:21	36.612	115.638	2.8	0.71	1.8	292	CDI	1.33		1.31	1.24	1.5	29.4	0.12	11	INDIAN SPRINGS
19	21:50: 7	36.629	117.124	0.3	2.78	1.7	102	ACI	1.49		1.53	1.55	1.6	13.9	0.08	14	STOVEPIPE WELLS NE
19	21:51:11	36.629	117.117	0.8	7.69	4.2	101	BBI	1.39		1.18	1.34	1.5	14.6	0.22	11	STOVEPIPE WELLS NE
19	21:53: 2	36.633	117.127	0.4	0.10	0.6	101	ACI	1.57			1.62	1.7	13.6	0.12	15	MESQUITE FLAT
19	23:31:40	36.635	117.130	0.6	4.83	4.3	101	BCI	1.50		1.37	1.52	1.4	13.3	0.13	12	MESQUITE FLAT
20	2: 4:39	37.022	117.484	0.8	8.40	2.3	165	BCI	1.42		1.51	1.49	1.9	12.5	0.15	11	UBEHEBE CRATER
20	22:25:13	37.018	117.486	0.6	7.03	2.6	157	BCI			1.09	1.05		12.6	0.17	13	UBEHEBE CRATER
21	13:50: 7	37.451	115.591	0.4	0.89	0.7	100	ACI			0.72	1.21		17.8	0.13	16	GROOM RANGE NE
21	15:53:57	36.896	116.827	0.6	9.99	4.0	112	BCI				0.60		20.9	0.15	13	BEATTY
21	18:22:24	37.353	114.914	2.4	2.37	3.9	201	CDI	1.30		1.26	1.13	1.2	13.5	0.41	11	DELAMAR LAKE
22	1:31:12	36.621	117.135	0.4	2.74	1.4	109	ACI	2.06		2.13		2.2	13.1	0.12	14	STOVEPIPE WELLS
22	3:19:54	37.123	117.122	0.3	4.15	4.2	98	BCI	1.05		1.25	0.94		17.5	0.09	14	BONNIE CLAIRE SE
23	1:48:49	36.760	115.938	1.0	8.60	1.8	220	BDI	1.11		0.29	0.86		11.2	0.16	12	FRENCHMAN FLAT
23	6:22:43	36.871	116.219	1.1	3.89	2.5	113	BBI	0.97			0.68		4.9	0.24	13	SKULL MTN
23	11:51: 2	35.882	116.816	1.2	0.01	0.8	268	BDI	1.54		1.46	1.44		10.2	0.08	11	WINGATE WASH
24	11:59:39	37.220	117.346	0.6	7.79	1.6	93	ABI	1.16			1.05	1.4	11.9	0.14	12	GOLD MOUNTAIN
24	12:35:19	37.090	115.241	1.9	7.96	1.8	271	BDI	1.49		1.61	1.41	1.8	9.9	0.17	10	LOWER PAHRANAGAT LAKE SW
24	12:58:52	37.099	115.243	1.9	6.80	1.8	261	BDI	1.78		1.85	1.70	1.8	9.2	0.17	10	LOWER PAHRANAGAT LAKE SW
24	14:14:40	38.027	115.135	2.3	7.89	3.9	319	BDI	1.87			1.51	2.1	17.1	0.13	6	**Southern Great Basin**
25	0:23:54	36.624	115.653	1.1	0.61	1.6	153	BCI	2.02		2.10	1.97	2.0	16.1	0.14	12	INDIAN SPRINGS
25	3:37:45	36.818	116.015	0.5	4.76	2.6	182	BDI	1.04			0.82		12.9	0.11	12	CANE SPRING
26	14:20:10	36.545	116.320	0.4	6.08	3.4	122	BCI	1.18		1.22	1.03	1.5	21.5	0.11	12	SKELETON HILLS
27	2:56:32	37.272	114.956	2.8	8.22	3.3	238	CDI	1.37			1.32	1.7	17.2	0.16	7	DELAMAR LAKE
27	7:30: 7	36.721	115.887	0.4	4.94	1.3	147	ACI	1.41		1.13	1.34	1.7	7.4	0.11	14	MERCURY
28	16:32:50	36.964	116.655	0.6	15.45	1.8	170	ACI	1.30		1.01	0.85		16.4	0.12	12	BEATTY MTN
29	3:10:43	36.542	116.319	0.3	2.76	1.9	110	ACI	1.41		1.71	1.29	1.6	21.3	0.09	19	SKELETON HILLS

1991 LOCAL HYPOCENTER SUMMARY - SGB EARTHQUAKES

DATE - TIME (UTC)		LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JUL 29	13:38:31	36.877	116.652	0.4	8.63	0.8	182	ADI	1.10		1.30	0.64		9.2	0.07	16	BEATTY MTN
29	19:14:41	36.875	116.737	1.0	2.41	1.2	322	ADI	1.00		1.05	0.46		13.1	0.06	9	BEATTY MTN
AUG 1	15: 8:51	36.950	116.660	1.3	22.21	2.1	175	BCI	1.18		0.86	0.74		15.7	0.17	10	BEATTY MTN
1	18:38:33	36.874	116.736	0.3	5.89	1.3	163	ACI	1.19		1.52	0.98		13.0	0.07	17	CARRARA CANYON
2	6: 6:22	37.193	117.402	0.2	5.14	1.9	115	ACI	1.11		0.97	1.11		17.6	0.06	11	WEST OF GOLD MTN
2	20:49:10	36.917	116.752	0.5	6.96	3.0	146	BCI	1.14		1.08	0.64		17.4	0.11	15	BEATTY
3	11:56: 9	36.530	115.415	1.1	12.42	3.3	149	BCI	1.37		1.33	1.52		23.0	0.16	9	BLACK HILLS SW
3	18:48: 4	37.051	117.940	2.4	10.68	8.1	268	CDI	1.35		1.14	1.49		33.0	0.20	8	WAUCOBA SPRING
4	1:33:55	36.429	117.013	1.0	12.41	1.6	90	BAI	1.45			1.27	1.6	8.8	0.18	10	EMIGRANT CANYON
4	15: 8:41	36.692	116.320	0.4	7.64	0.5	162	ACI	0.90			0.50		5.5	0.07	12	STRIPED HILLS
5	7: 7: 3	37.188	117.405	0.3	6.10	2.0	117	ACI	1.24		1.36	1.31	1.5	18.1	0.09	13	WEST OF GOLD MTN
5	11:22:12	37.183	117.414	0.4	6.75	2.1	121	BCI	1.76			1.49	2.0	19.1	0.10	12	WEST OF GOLD MTN
5	11:36:18	37.181	117.410	0.3	5.74	2.0	121	ACI	1.22		1.25	1.27		18.9	0.04	8	WEST OF GOLD MTN
5	11:36:40	37.182	117.407	0.3	9.21	1.0	120	ACI	1.21		1.34	1.18		18.7	0.06	10	WEST OF GOLD MTN
5	11:37: 2	37.188	117.403	0.8	11.88	2.5	121	BBI	1.10		0.97	1.06		18.0	0.15	8	WEST OF GOLD MTN
5	11:37:44	37.184	117.408	0.8	11.22	2.5	119	BBI	1.20		1.46	1.31		18.6	0.18	10	WEST OF GOLD MTN
5	11:39:38	37.185	117.412	0.5	9.29	2.0	120	ACI	1.04		1.08	0.77		18.8	0.13	10	WEST OF GOLD MTN
5	11:40:20	37.180	117.411	0.3	6.41	1.0	107	BCI	2.43		3.05		2.4	19.2	0.17	43	WEST OF GOLD MTN
5	11:44:43	37.181	117.413	0.5	10.95	1.6	122	ABI	1.10		1.35	1.19		19.1	0.13	11	WEST OF GOLD MTN
5	17:25:59	37.315	115.978	1.5	4.20*	——	133	CCA		0.92				18.3	0.22	9	GROOM MINE SW
7	14:29:14	37.392	117.640	0.2	9.40	0.4	245	ADI	0.99		0.78	1.04		13.7	0.02	7	SYLVANIA MOUNTAINS
9	2:25:17	37.200	117.334	0.3	10.19	0.9	95	ABI	1.12		1.01	1.17	1.6	13.1	0.08	11	GOLD MOUNTAIN
9	9: 1:16	36.899	116.825	0.8	15.50	3.2	123	BBI	1.33			0.81		20.9	0.17	13	BEATTY
11	2:10:51	36.519	116.149	0.4	9.06	0.9	109	ABI	1.16			0.90	1.2	9.6	0.13	16	SPECTER RANGE SW
11	13:13:54	36.569	115.722	1.0	0.69	1.0	186	BDI	1.74		1.52	1.61	1.9	15.9	0.20	14	INDIAN SPRINGS
12	11:48:40	37.090	115.784	1.1	-0.83	0.9	230	BDI	1.14		0.95	1.08		24.0	0.18	14	PAPOOSE LAKE SE
12	22:13:31	37.116	115.223	1.1	4.62	1.1	239	BDI	1.46		1.36	1.30	1.7	6.7	0.15	11	LOWER PAHRANAGAT LAKE SW
15	4:11:30	36.058	114.727	1.5	7.00	2.6	208	BDI	1.91		1.56	1.97		15.3	0.09	6	HOOVER DAM
15	22:49:41	37.117	115.239	1.4	2.33	2.2	188	BDI	1.69		1.70	1.61	1.7	7.4	0.21	12	LOWER PAHRANAGAT LAKE SW
16	1:38:14	37.011	116.172	0.6	1.58	1.3	163	ACI	0.86			0.53		5.8	0.11	11	TIPPIPAH SPRING
16	17:52:20	37.295	116.442	0.8	5.01	1.6	220	ADI	1.18		1.40	0.91		12.2	0.10	11	SILENT BUTTE
17	0:12:13	37.490	115.310	0.4	7.00	3.1	130	BCI	1.34		1.33	1.25	1.6	21.0	0.14	14	HANCOCK SUMMIT
18	11:36:41	37.292	115.212	2.2	10.93	2.9	181	BDI	1.38		1.71	1.42	1.6	13.9	0.17	7	ALAMO
19	4:36: 2	36.857	116.670	0.6	1.50	2.5	143	BCI	1.15		1.12	0.98		7.8	0.09	16	CARRARA CANYON
19	5:24: 1	36.776	115.352	0.9	0.29	1.5	132	BCI	1.81		1.26	1.73		34.5	0.15	9	DEAD HORSE RIDGE
19	11: 9:42	37.183	117.410	0.3	7.77	1.3	105	ACI	0.89		0.79	0.77		18.8	0.09	12	WEST OF GOLD MTN
19	11:13:20	37.183	117.410	0.3	8.51	1.0	105	ACI	1.27		1.37	1.46		18.9	0.08	12	WEST OF GOLD MTN
21	5:11:15	37.300	114.989	1.0	4.28	3.6	197	BDI	1.31		1.45	1.26	1.2	13.0	0.05	8	DELAMAR LAKE
21	8:42:30	37.529	116.532	0.4	1.63	1.7	123	ACI	1.12			1.17		22.2	0.06	10	TRIANGLE MTN
21	13:10:40	37.075	117.944	1.5	13.34	3.5	297	BDI	1.53		1.24	1.52	1.9	31.7	0.09	8	WAUCOBA SPRING
21	18:34:58	37.256	117.687	0.9	1.02	3.3	160	BCI	1.33		1.31	1.34	1.1	4.5	0.17	9	LAST CHANCE MTN
21	18:37:17	36.448	114.407	1.1	5.18	1.3	221	BDI	2.67			2.46	2.5	66.3	0.28	23	***REGIONAL***
22	5:33:16	36.064	114.733	0.5	1.69	1.3	188	ADI	1.73		1.27	1.60		15.9	0.05	10	HOOVER DAM
22	11:40:19	36.052	114.754	1.7	0.41	1.0	186	BDI	1.76		1.30	1.50		14.5	0.15	12	BOULDER BEACH

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AUG 22	15:39:14	37.202	114.883	1.7	0.84	1.5	246	BDI	1.47		1.23	1.32	2.1	27.2	0.13	9	DELAMAR 3 NW
22	20:24:22	37.261	117.715	1.2	0.15	1.4	186	BDI	1.38		1.52	1.58	1.2	6.9	0.21	12	LAST CHANCE MTN
22	21:38:34	37.005	116.211	0.4	2.36	0.6	191	ADI	0.91			0.69		3.9	0.05	10	TIPPIPAH SPRING
23	14:48:17	37.760	116.365	0.5	8.51	0.5	138	ACI	1.35		1.80	1.47	1.7	2.4	0.10	10	GEORGES WELL
23	15:31:10	37.812	114.691	1.3	3.25*	—	267	CDI	1.43		1.07	1.29		23.2	0.13	8	THE BLUFFS
23	19:17:37	35.893	115.002	2.7	8.50	2.0	211	CDI				1.45		22.5	0.13	11	SLOAN NE
23	19:55:29	37.241	114.968	1.3	4.51	7.2	221	CDI			1.57	1.37		19.8	0.14	9	DELAMAR 3 NW
23	19:57:49	37.251	114.984	1.1	8.34	2.5	214	BDI	1.27		1.16	1.19	1.4	18.3	0.15	9	DELAMAR LAKE
23	20:13:22	37.260	115.014	1.6	8.02	2.7	204	BDI	1.61		1.13	1.61	1.7	16.6	0.16	8	ALAMO SE
23	20:41:29	37.244	114.970	3.8	3.87*	—	220	CDI	1.29		1.46	1.12	1.5	19.5	0.16	8	DELAMAR 3 NW
23	21: 5:57	37.231	114.926	3.6	0.35	2.6	231	CDI	1.55			1.37	1.9	22.4	0.44	9	DELAMAR 3 NW
24	8:26:10	37.106	117.084	0.5	7.46	2.1	98	BBI	1.38		1.28	1.21	1.4	14.4	0.17	19	BONNIE CLAIRE SE
24	19:18:26	35.831	115.047	5.6	6.01*	—	219	DDI				1.32		28.2	0.81	6	SLOAN SE
25	1:52: 3	35.812	115.025	1.6	5.67	2.4	249	BDI						27.3	0.04	5	SLOAN SE
25	2:39: 8	36.867	116.746	0.4	7.76	1.9	109	ABI	1.06			0.45		13.2	0.11	17	CARRARA CANYON
25	3:15:59	36.617	116.241	0.3	7.39	0.8	142	ACI			1.19	0.68	1.3	9.3	0.09	16	SPECTER RANGE SW
25	14:32:26	37.762	116.365	0.4	8.60	0.7	103	ABI	2.12	1.67		1.63		2.6	0.14	20	GEORGES WELL
26	5:33:22	35.950	116.691	0.8	6.69	2.4	208	BDI	1.34		1.42	1.44	1.5	16.0	0.08	8	CONFIDENCE HILLS
26	13:28:37	37.552	118.472	1.3	0.33*	—	317	DDU	1.83			2.03	2.1	51.9	0.10	6	***REGIONAL***
27	9:38:33	37.805	114.717	1.7	3.20*	—	259	CDI	1.15			1.32		22.2	0.24	11	THE BLUFFS
27	15:42: 8	36.702	116.285	0.8	7.47	0.7	203	ADI				0.67		4.7	0.08	10	STRIPED HILLS
28	9:16:20	37.512	117.231	0.7	12.94	1.9	148	ACI	1.23		1.27	1.38		23.5	0.10	10	RALSTON
28	16:12:52	37.181	115.087	2.2	10.60	2.5	254	BDI	1.66		1.41	0.85	1.5	9.0	0.14	6	LOWER PAHRANAGAT LAKE
28	20:55:21	37.440	115.497	0.6	0.68	0.9	145	ACI	1.32		1.50	1.38	2.0	22.8	0.15	12	CRESCENT RESERVOIR
29	2: 8:51	37.512	117.221	1.6	10.73	4.9	147	BCI	0.99		0.96	1.09		23.7	0.15	7	RALSTON
29	17:26:33	37.326	115.019	1.0	6.81	1.3	182	BDI	1.62			1.35	1.7	9.4	0.07	9	ALAMO SE
29	19:24:27	37.266	117.577	0.4	10.34	0.5	94	ABI	1.02		1.05	1.00		7.2	0.07	11	TULE CANYON
29	21:34:23	37.460	115.617	1.2	14.58	2.5	128	BBI	1.52		1.28	1.41		16.3	0.15	8	GROOM RANGE NE
29	21:37:42	36.920	116.865	0.9	16.78	2.4	128	BBI				0.52		16.6	0.17	12	BEATTY
30	6:37:37	37.260	115.201	1.0	12.77	2.2	134	BBI	1.32		1.18	1.14	1.6	10.2	0.16	9	ALAMO
30	11:31: 8	36.653	117.757	4.1	0.13	3.2	276	CDI	1.73		1.61	1.78		35.7	0.20	12	NEW YORK BUTTE
30	11:31: 8	36.642	117.771	3.2	2.29	10.5	277	CDI	1.73		1.42	1.80		37.3	0.17	13	NEW YORK BUTTE
30	20:41:55	37.258	115.209	0.8	10.99	1.9	128	ABI	1.44		1.13	1.19	1.6	10.1	0.12	9	ALAMO
31	9:10:22	36.388	116.901	0.7	12.79	1.7	135	ABI	1.10		1.51	1.27		17.9	0.12	11	WEST OF FURNACE CREEK
SEP 1	5:50:59	36.840	115.990	0.8	0.13	1.0	167	BCI	1.15			0.68		11.6	0.15	11	FRENCHMAN FLAT
2	14:30:33	36.405	116.987	0.4	8.86	0.7	95	ABI	1.02		1.34	1.05	1.3	10.3	0.06	10	WEST OF FURNACE CREEK
4	22:29:48	36.619	117.129	0.4	5.18	2.1	108	BCI	1.84			1.84	2.1	13.7	0.08	14	STOVEPIPE WELLS
4	23:12:53	36.623	117.132	0.2	4.36	2.1	108	BCI	1.42		1.56	1.54	1.4	13.3	0.05	12	STOVEPIPE WELLS
5	11:12:43	37.373	114.907	0.6	2.31	1.1	197	ADI	2.12				2.2	13.2	0.07	8	DELAMAR LAKE
5	15:58: 4	36.623	117.136	0.6	8.57	2.0	109	ABI	1.83			1.69	1.9	13.0	0.11	13	STOVEPIPE WELLS
6	3:41: 5	36.631	116.324	0.3	3.36	0.2	299	ADI	1.14			0.99		2.2	0.04	11	STRIPED HILLS
6	13:49:22	37.334	115.031	2.8	4.74	5.0	176	CCI	1.28			1.21	1.1	8.2	0.19	8	ALAMO SE
6	14:47:39	37.308	117.523	0.8	6.77	2.4	99	BCI	1.25		1.30	1.15	1.6	13.8	0.17	10	TULE CANYON
6	14:51:14	37.310	117.522	0.4	5.71	1.4	78	ACI	0.99			1.00		14.0	0.09	11	TULE CANYON

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SEP 6	18:19:21	37.924	116.132	0.4	2.76	2.8	120	BCI	1.50		1.64	1.57		24.9	0.14	14	REVEILLE PEAK NW
6	19:22:31	36.623	117.135	0.2	5.95	1.3	108	ACI	1.07		0.88	0.90		13.1	0.05	12	STOVEPIPE WELLS
6	19:26:23	37.306	117.523	0.3	7.39	0.9	78	ABI	1.35		1.59	1.32	1.5	13.6	0.08	13	TULE CANYON
6	19:41:35	37.309	117.522	0.4	7.28	1.4	84	ABI	0.85		0.79	0.61		13.9	0.10	11	TULE CANYON
6	22:39: 5	36.635	115.966	0.5	9.52	0.6	145	ACI	1.28		0.30	0.69		2.9	0.10	12	MERCURY
6	23: 0:50	37.814	117.747	1.8	0.89	1.3	267	BDI	1.28		1.11	1.23		12.1	0.14	11	SILVER PEAK
7	3: 3:56	37.118	117.226	0.9	4.16	11.2	94	CCI	1.47			1.52	1.5	17.0	0.27	13	BONNIE CLAIRE SW
7	22:18:60	37.084	117.375	0.5	0.99	0.8	119	ABI	1.20		1.11	1.14	1.2	9.8	0.12	12	UBEHEBE CRATER
8	3:45:19	36.880	116.734	0.4	1.72	1.2	159	ACI	1.10		1.38	0.87		13.3	0.08	14	BEATTY MTN
8	12:55:26	37.810	114.724	1.9	1.21	3.4	258	BDI	2.16		2.02	2.23	1.9	22.7	0.20	11	THE BLUFFS
8	17:27:23	36.859	114.491	1.1	5.16	1.3	208	BDI	2.43		3.00	2.53	2.4	70.9	0.22	23	***REGIONAL***
9	5:39:26	37.220	117.673	0.1	12.35	0.2	165	ACI	1.27		1.43	1.39	1.7	2.8	0.03	13	HANGING ROCK CANYON
9	10:57: 0	36.467	117.605	4.9	2.45*	——	281	CDI	1.81		0.90	1.40		35.4	0.23	8	DARWIN
10	1:11:58	37.735	116.002	0.8	2.02	1.4	141	BCI	1.81		1.72	1.68	2.1	5.7	0.18	13	MONOTONY VALLEY
10	10:51:17	37.386	117.136	0.3	1.28	0.6	205	ADI	1.00		0.80	0.96		14.4	0.04	9	STONEWALL PASS
10	13:36:37	37.758	115.410	0.5	4.26	4.5	98	BCI	1.55		1.50	1.45	1.7	14.5	0.13	11	MURPHY GAP
10	17:45:36	37.206	116.529	0.4	0.83	0.6	128	ACI	1.63		1.81	1.39	1.6	13.7	0.12	14	THIRSTY CANYON
11	5:27:53	37.506	114.629	0.7	5.35	2.1	274	BDI	1.56		1.22	1.40		14.6	0.05	8	CHOKECHERRY MTN
11	7:45:58	37.805	114.691	1.3	5.09	8.2	266	CDI	1.51		1.26	1.49		22.5	0.12	8	THE BLUFFS
11	8:45:10	36.814	116.025	0.4	4.95	1.9	138	ACI	1.11			0.90	1.3	13.1	0.10	15	CANE SPRING
11	9: 0: 7	36.815	116.020	0.3	3.39	5.1	141	CCI	1.03			0.89		13.1	0.07	12	CANE SPRING
11	10:19:53	37.511	114.626	1.1	7.64	2.0	276	BDI	1.52		1.28	1.56	1.7	14.5	0.11	10	CHOKECHERRY MTN
11	10:23:26	36.988	116.203	0.4	0.54	0.7	140	ACI	0.83			0.45		6.0	0.11	10	MINE MTN
11	20:43: 2	37.213	115.620	0.8	2.48	5.9	134	CCI	1.59		2.12	1.69	2.0	19.0	0.17	10	FALLOUT HILLS NE
11	23:58: 9	37.036	116.299	0.4	6.87	0.7	97	ABI	1.17		1.66	1.01	1.4	6.2	0.12	16	BUCKBOARD MESA
12	13:16:11	36.677	116.264	0.6	4.40	0.7	248	ADI	1.65		2.30	1.48	1.2	7.3	0.08	16	STRIPED HILLS
12	16: 8:51	37.851	116.150	0.2	0.97	0.3	151	ACI	1.24		0.72	1.11		21.1	0.02	6	REVEILLE PEAK
13	1:54:27	36.861	117.720	1.1	5.59	8.6	236	CDI	1.51		1.18	1.64	1.8	28.8	0.16	14	WEST.OF TEAKETTLE JUNCTION
13	20:31:59	37.522	115.382	0.6	1.00	1.0	178	ACI			1.13	0.87		19.6	0.08	7	CRESCENT SPRING
14	11: 3:49	36.237	115.425	1.2	10.00	1.5	294	BDI	1.46		1.13	1.30	1.3	17.3	0.15	14	LA MADRE MTN
14	11:31: 4	36.856	116.194	0.9	0.15	0.6	114	BBI	1.11			0.55	0.7	2.3	0.21	13	SKULL MTN
15	2:50:56	37.001	116.370	3.9	0.97*	——	211	CDA		0.91				13.2	0.17	5	BUCKBOARD MESA
15	3:44:26	37.232	116.491	1.9	3.00*	——	225	CDA		1.08				31.7	0.20	9	SCRUGHAM PEAK
15	5: 1:44	37.351	116.423	2.9	7.00*	——	324	CDA		1.33				38.9	0.10	8	SILENT BUTTE
15	6:49:57	37.196	116.471	6.4	7.00*	——	301	DDA		0.75				27.8	0.20	7	SCRUGHAM PEAK
15	7: 1:13	37.145	116.397	3.7	10.44	6.6	288	CDA		1.06				19.1	0.11	6	SCRUGHAM PEAK
15	8: 1: 7	37.245	116.437	1.1	1.00	2.3	216	BDA		1.16				29.5	0.12	11	SCRUGHAM PEAK
15	8: 4:52	37.287	116.481	1.4	3.00*	——	316	CDA		0.88				35.6	0.10	8	SILENT BUTTE
15	11: 2: 4	36.856	116.004	9.4	2.87*	——	333	DDA		0.34				14.7	0.51	7	CANE SPRING
15	15:23:48	37.220	116.409	10.4	-0.53*	——	348	DDA		0.79				20.6	0.10	7	SCRUGHAM PEAK
15	15:39:50	37.320	116.395	1.3	16.82	4.1	322	BDA		1.09				34.7	0.03	6	SILENT BUTTE
15	18:37:37	36.731	116.282	0.7	3.41	0.7	172	BCI	1.00		1.25	0.71	0.8	1.6	0.16	16	STRIPED HILLS
16	5:35:43	37.284	116.052	0.7	2.39	2.3	93	BBI	1.18		0.87	1.07	1.5	9.9	0.15	10	OAK SPRING BUTTE
16	18:25:54	36.474	117.016	0.8	12.44	1.4	89	BAI	1.34			1.45	1.4	11.8	0.20	15	EMIGRANT CANYON

DATE (UTC)	TIME (UTC)	LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
SEP 17	7:47:56	36.656	116.428	1.0	5.42	1.8	241	BDI	1.12			0.94		7.9	0.12	10	LATHROP WELLS
17	13:39:52	36.693	116.289	0.4	3.62	0.7	205	ADI	1.09		1.20	0.59	1.0	5.7	0.07	15	STRIPED HILLS
17	14:13:19	37.407	114.869	0.7	2.15	1.1	199	ADI	1.48		1.36	1.47		16.1	0.09	10	DELAMAR
19	0:24:58	37.160	117.157	0.5	7.00	2.3	107	BCI			0.57	0.48		18.0	0.09	8	BONNIE CLAIRE NW
19	5: 1:31	36.714	116.220	0.7	6.61	0.7	279	ADA		0.24				5.6	0.08	10	SPECTER RANGE NW
19	7:35:24	36.889	116.156	0.8	0.27	0.9	234	BDA		0.59				17.7	0.17	8	MINE MTN
19	20:41: 4	37.601	117.416	1.1	9.42	1.8	172	BCI	0.95		0.98	1.06		11.4	0.11	8	MONTEZUMA PEAK SW
19	23: 7: 4	37.242	116.367	14.0	2.91*	——	352	DDA		0.83				23.1	0.27	6	AMMONIA TANKS
20	23:23:31	36.459	115.843	0.9	7.10	2.4	258	BDI	1.26		1.04	1.02		23.6	0.10	10	WILLOW PEAK
21	7:32:11	37.405	117.906	2.2	9.68	2.1	226	BDI	1.37		1.15	1.38	2.0	2.2	0.28	11	CHOCOLATE MOUNTAIN
21	7:35:54	37.408	117.876	1.3	7.54	1.4	170	BCI	1.31		1.15	1.37	1.5	3.4	0.16	11	CHOCOLATE MOUNTAIN
21	7:49: 2	37.410	117.881	0.9	7.32	0.9	159	ACI	1.18			1.47	1.4	2.9	0.12	11	CHOCOLATE MOUNTAIN
21	8:33:48	37.400	117.895	0.9	9.01	0.9	207	ADI	1.40			1.52	1.9	3.0	0.14	13	CHOCOLATE MOUNTAIN
21	10: 7:56	37.416	117.884	1.1	9.22	1.1	162	BCI	1.09			1.11	1.4	2.3	0.14	11	CHOCOLATE MOUNTAIN
21	13:18:24	37.069	116.947	0.4	4.02	3.9	95	BCI	1.53			1.56	1.8	12.4	0.13	15	SPRINGDALE SW
22	8:59:58	36.825	116.254	0.5	6.65	1.2	123	BBI	1.40			1.26	1.3	7.0	0.15	17	GEORGES WATER
23	16:56:31	37.105	117.029	0.5	8.99	1.4	102	ABI	1.11		0.84	0.92		13.6	0.10	9	BONNIE CLAIRE SE
23	20:29: 3	37.471	115.288	0.4	8.76	2.0	85	ACI	1.58		1.74	1.05	1.5	22.2	0.12	13	HANCOCK SUMMIT
23	22:19:25	37.461	115.295	0.3	0.88	0.4	133	ACI	1.30		0.93	0.92	1.5	22.5	0.09	11	HANCOCK SUMMIT
24	9: 2:20	37.213	115.507	1.6	7.00	8.9	200	CDI	1.34		1.22	1.25		27.1	0.25	10	FALLOUT HILLS NE
24	9: 7: 8	37.193	115.510	2.8	11.58	6.7	208	CDI	1.60		1.62	1.60		28.1	0.24	7	FALLOUT HILLS NE
24	9:32:25	37.466	115.295	0.3	5.34	3.2	132	BCI	1.48		2.00	1.37	1.5	22.6	0.09	12	HANCOCK SUMMIT
24	9:43:41	37.469	115.300	0.8	3.94*	——	133	CCI				0.78		23.1	0.11	7	HANCOCK SUMMIT
24	14:49:19	36.630	117.124	0.4	4.57	3.5	102	BCI	1.69		1.59	1.69	1.9	13.9	0.10	15	STOVEPIPE WELLS NE
24	19:55:22	37.466	115.295	0.2	0.00	0.4	132	ACI	1.16		1.07	0.94		22.6	0.03	7	HANCOCK SUMMIT
25	2:58: 7	37.468	115.298	0.5	1.94	3.4	132	BCI	1.15		1.36	1.03	1.5	22.9	0.15	12	HANCOCK SUMMIT
25	3:43:34	36.419	117.044	0.8	11.68	1.0	91	ABI	1.27			1.12	1.4	5.9	0.10	9	EMIGRANT CANYON
25	7:46: 0	37.126	116.238	0.9	6.28	1.4	206	ADI	1.08		0.99	0.36		9.9	0.12	11	RAINIER MESA
25	9:33:18	37.810	114.663	3.9	2.88	10.7	273	CDI	1.83		1.63	1.54	1.9	23.7	0.18	9	THE BLUFFS
25	11:16:29	36.115	115.550	3.7	8.41*	——	291	CDI	1.50		1.00	1.34		54.4	0.10	6	MOUNTAIN SPRINGS
25	21:10: 6	37.462	115.296	0.3	0.93	0.4	146	ACI	1.67		1.50	1.53	1.5	22.5	0.08	12	HANCOCK SUMMIT
25	21:14:31	37.461	115.295	0.4	3.01*	——	133	CCI	0.94		1.20	0.89	1.5	22.4	0.11	10	HANCOCK SUMMIT
25	21:31:33	37.110	115.243	0.8	5.33	1.8	188	BDI	1.86		1.97	1.77	1.7	8.1	0.15	12	LOWER PAHRANAGAT LAKE SW
25	21:46:40	37.466	115.296	0.4	0.00	0.6	87	ACI	2.03			1.85	1.9	22.7	0.12	13	HANCOCK SUMMIT
25	21:57:12	37.485	115.278	1.1	9.53	4.4	125	BCI	1.18		1.10	0.89	1.5	21.5	0.20	9	HANCOCK SUMMIT
25	22: 4:22	37.460	115.290	1.9	17.60	3.4	191	BDI	1.62			1.58	1.6	22.0	0.16	6	HANCOCK SUMMIT
25	22:22:31	37.462	115.293	0.4	0.51	0.5	133	ACI	1.93		1.79	1.76	2.1	22.3	0.10	11	HANCOCK SUMMIT
25	23:15:36	37.114	115.234	0.4	6.53	0.9	136	ACI	2.21		2.15	2.07	2.1	7.4	0.10	14	LOWER PAHRANAGAT LAKE SW
25	23:44:24	37.465	115.291	0.5	7.67	2.6	87	BCI	1.31		1.60	1.19	1.4	22.2	0.14	13	HANCOCK SUMMIT
26	0:34:22	37.119	115.236	0.9	2.10	2.4	135	BCI	2.20			2.24	2.2	7.0	0.19	13	LOWER PAHRANAGAT LAKE SW
26	1:43:54	37.112	115.239	0.9	5.17	1.7	191	ADI	1.90		1.78	1.68	1.2	7.8	0.14	11	LOWER PAHRANAGAT LAKE SW
26	1:47:57	37.474	115.293	0.4	3.14*	——	130	CCI	1.24		1.22	0.85	1.5	22.7	0.08	9	HANCOCK SUMMIT
26	1:53:31	37.094	115.238	2.1	5.69	2.1	271	BDI	1.52		1.34	1.43	1.4	9.4	0.15	9	LOWER PAHRANAGAT LAKE SW
26	2:23:30	37.462	115.294	0.5	12.00	1.7	88	ABI	1.80		1.74	1.69	1.6	22.4	0.14	15	HANCOCK SUMMIT

1991 LOCAL HYPOCENTER SUMMARY – SGB EARTHQUAKES

DATE	TIME (UTC)	LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
SEP 26	2:57:50	37.465	115.298	0.6	4.08*	—	88	CCI	0.93		0.60	0.94		22.8	0.15	10	HANCOCK SUMMIT
26	6:40:34	37.115	115.240	0.8	6.45	1.2	188	ADI	1.95		1.94	1.92	1.8	7.6	0.12	11	LOWER PAHRANAGAT LAKE SW
26	7:49:50	37.130	116.224	0.7	7.89	1.1	189	ADI	1.32		1.97	1.30	1.3	10.3	0.11	15	RAINIER MESA
26	7:52:30	37.130	116.235	0.9	7.82	1.5	184	ADI	1.14		1.28	0.59	1.3	10.3	0.14	13	RAINIER MESA
26	9:44: 5	37.128	116.227	0.7	7.59	1.3	187	ADI	1.16		1.68	0.99	1.4	10.0	0.14	14	RAINIER MESA
26	11:24: 6	37.472	115.299	0.5	0.93	0.9	86	BCI	1.11		1.10	1.01	1.5	23.0	0.16	12	HANCOCK SUMMIT
26	12:19: 9	37.470	115.291	0.4	0.90	0.6	131	ACI	1.02		1.07	0.93		22.4	0.08	9	HANCOCK SUMMIT
26	13:17:47	37.473	115.292	0.5	7.00	3.6	85	BCI	1.19		0.93	0.80	1.5	22.6	0.15	12	HANCOCK SUMMIT
26	14:37: 6	37.369	116.022	0.8	3.04*	—	140	CCI	1.33		1.58	1.33	1.6	15.5	0.20	10	OAK SPRING BUTTE
26	15:45:26	36.889	116.068	0.6	10.96	0.7	149	ACI	1.25			1.19	1.5	4.5	0.13	16	YUCCA LAKE
26	19:14:24	37.478	115.274	0.6	3.08*	—	95	CCI	2.26		1.34	1.25		35.2	0.13	8	HANCOCK SUMMIT
26	22:51: 2	37.466	115.294	0.6	3.11*	—	144	CCI	1.29		1.24	0.90	1.5	22.5	0.13	11	HANCOCK SUMMIT
26	23:15:35	37.476	115.290	0.5	7.00	3.8	85	BCI	1.21		1.39	1.14		22.5	0.15	12	HANCOCK SUMMIT
26	23:31:46	37.474	115.296	0.5	7.00	3.3	131	BCI	1.13		1.29	1.04	1.5	22.7	0.10	9	HANCOCK SUMMIT
26	23:51:26	36.682	116.272	0.7	8.78	0.7	210	ADI	1.09			0.63		6.7	0.11	13	STRIPED HILLS
26	23:54:49	37.470	115.294	0.5	4.03	8.7	131	CCI	1.01		1.14	1.00		22.6	0.08	8	HANCOCK SUMMIT
27	0:21:16	37.467	115.295	0.2	0.04	0.3	132	ACI	1.39		1.50	1.25	1.4	22.6	0.04	8	HANCOCK SUMMIT
27	0:41:54	37.473	115.288	0.5	7.24	3.1	129	BCI	1.35		1.82	1.41	1.4	22.3	0.12	11	HANCOCK SUMMIT
27	0:44:37	37.475	115.270	1.4	1.62	4.0	190	BDI	1.15		0.99	0.87	1.4	20.8	0.09	6	HANCOCK SUMMIT
27	0:46:58	37.472	115.287	0.7	7.81	3.8	129	BCI	1.02		1.13	1.12		22.2	0.11	8	HANCOCK SUMMIT
27	1:25:50	37.463	115.292	0.4	6.56	2.8	87	BCI	1.61		1.79	1.50	1.5	22.3	0.11	13	HANCOCK SUMMIT
27	3: 2:35	37.463	115.289	0.3	7.43	2.0	87	ACI	1.71			1.52	1.9	22.0	0.09	13	HANCOCK SUMMIT
27	3: 9:15	37.478	115.287	0.6	7.75	3.3	84	BCI	1.38		1.55	1.34	1.5	22.3	0.14	11	HANCOCK SUMMIT
27	3:15:15	37.463	115.290	0.4	6.19	3.9	87	BCI	2.55		2.55		2.3	22.1	0.12	16	HANCOCK SUMMIT
27	3:19:44	37.466	115.291	0.6	4.64	9.1	87	CCI	0.96		1.09	0.73	1.5	22.3	0.16	11	HANCOCK SUMMIT
27	3:29:12	37.475	115.290	0.5	4.79	5.1	129	CCI	1.35		1.51	1.24		22.5	0.09	9	HANCOCK SUMMIT
27	7:11:54	37.472	115.278	0.8	-0.77	1.2	127	BCI	1.63		1.70	1.45	1.4	21.4	0.18	10	HANCOCK SUMMIT
27	10:34:27	37.490	115.290	1.0	10.74	3.7	126	BBI	1.49		1.47	0.92	1.5	20.9	0.19	9	HANCOCK SUMMIT
27	11:45:26	36.721	116.242	0.6	5.30	0.5	202	ADI	0.97		1.66	0.61	0.9	3.6	0.11	14	SPECTER RANGE NW
28	8:36:58	37.476	115.278	3.8	7.00*	—	249	CDI	1.04		0.99	0.65	1.5	21.5	0.28	6	HANCOCK SUMMIT
28	10:24:38	37.475	115.269	1.4	.5.96	6.3	190	CDI	1.12		0.82	0.66		20.7	0.21	9	HANCOCK SUMMIT
28	13:13:15	37.063	117.143	0.6	0.05	0.9	116	ACI	1.08		1.14	0.82		13.1	0.14	9	BONNIE CLAIRE SW
28	17:30:27	37.440	115.554	1.1	11.81	4.4	120	BBI	1.13		1.00	1.00		20.2	0.18	8	GROOM RANGE NE
28	18:16:15	37.466	115.295	0.3	0.49	0.6	132	ACI	1.24		1.18	0.87	1.5	22.6	0.10	11	HANCOCK SUMMIT
29	8:30:25	37.284	117.313	0.4	6.38	0.6	113	ABI	1.30			1.32	1.2	5.3	0.10	14	GOLD POINT
29	11: 6:50	37.165	116.689	0.3	7.47	0.5	139	ACI	1.26		1.28	0.97		3.8	0.09	15	THIRSTY CANYON NW
29	11:33:53	37.476	115.292	0.6	2.96	3.7	129	BCI	1.23		1.43	1.02	1.5	22.4	0.18	13	HANCOCK SUMMIT
29	17: 7:45	37.481	115.286	0.9	7.00	5.1	127	CCI	1.18		1.46	1.08	1.5	21.9	0.16	9	HANCOCK SUMMIT
29	17:37:41	37.089	115.221	2.2	1.30	3.4	276	BDI	2.18		2.07	1.89	1.5	9.3	0.15	9	LOWER PAHRANAGAT LAKE SW
29	22:48:38	37.139	115.188	1.5	11.09	6.4	206	CDI	1.37		1.38	1.31		32.2	0.20	8	LOWER PAHRANAGAT LAKE NW
29	23:20:56	37.463	115.308	0.8	1.07	3.3	135	BCI	1.13		1.28	1.10	1.5	23.6	0.09	7	HANCOCK SUMMIT
29	23:34: 9	37.470	115.292	0.6	4.27	11.0	86	CCI	1.24		1.21	0.89	1.5	22.5	0.14	10	HANCOCK SUMMIT
30	8: 7:47	37.107	115.227	0.5	4.76	1.2	191	ADI	1.66		1.70	1.40	1.8	7.7	0.10	11	LOWER PAHRANAGAT LAKE SW
OCT 1	4: 7:55	36.783	116.136	2.0	6.82	2.3	287	BDA		0.67				8.5	0.22	11	SKULL MTN

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OCT	1	11:56:39	37.010	116.869	1.1	8.69	1.7	188	BDA		0.81				15.1	0.08	10	SPRINGDALE
	3	3:43:30	37.101	115.213	0.9	0.49	1.6	164	CCI	2.19		2.13	2.17	2.4	7.9	0.31	33	LOWER PAHRANAGAT LAKE SW
	3	18: 5:36	36.330	115.005	10.8	4.00*	——	171	DCI	1.18			1.09		23.9	0.27	6	VALLEY
	4	1:49:11	37.114	117.004	0.3	8.48	1.2	106	ABI	1.06		0.81	0.96		14.9	0.10	14	BONNIE CLAIRE SE
	4	19:48:18	37.016	116.855	0.3	1.66	0.9	116	ACI	1.15		0.82	0.95	1.6	16.5	0.08	11	SPRINGDALE
	4	20:41:10	37.478	115.276	0.7	7.00	2.2	192	BDI	1.23		1.17	1.07		21.5	0.07	6	HANCOCK SUMMIT
	4	22:26:22	36.986	116.740	0.2	7.00	1.0	115	ACI	1.22			0.96		17.9	0.04	13	BEATTY MTN
	5	9:40:44	37.157	117.404	0.3	8.10	1.2	111	ACI	1.28		1.37	1.21		18.3	0.08	11	WEST OF GOLD MTN
	5	11: 6:35	37.159	117.399	0.4	7.80	1.5	125	ACI	1.08		0.75	0.96		18.3	0.08	9	WEST OF GOLD MTN
	8	1:32:55	37.213	116.533	0.5	6.91	1.9	133	ABI	1.15		0.92	0.82		12.9	0.12	14	THIRSTY CANYON
	8	12:43: 2	36.933	117.472	0.3	6.41	1.0	178	ACI	1.20		1.27	1.06	1.3	13.4	0.04	9	TIN MOUNTAIN
	8	14:47:46	37.003	117.461	0.6	2.59	1.4	160	ACI	1.25		0.86	1.16	1.3	10.2	0.14	11	UBEHEBE CRATER
	9	6:22:21	37.194	114.989	1.3	13.72	1.0	235	BDI	1.88		1.79	2.06	1.9	17.9	0.15	11	DELAMAR 3 NW
	10	5:14:47	36.727	116.201	0.8	10.25	0.8	223	ADI	1.07			0.60	1.2	6.6	0.12	12	SPECTER RANGE NW
	11	22:57:24	37.105	116.995	0.4	2.17	1.2	104	ACI	1.51		1.12	1.22	1.4	14.1	0.12	20	SPRINGDALE SW
	12	4:40:22	37.438	115.576	1.6	10.89	5.2	142	CCI	1.09		1.36	1.29		19.7	0.17	8	GROOM RANGE NE
	12	15:47: 6	35.962	116.995	1.0	4.38	3.1	260	BDI	1.36		1.06	1.07	1.3	11.5	0.09	7	WINGATE WASH
	13	4:33:60	36.777	117.225	0.4	0.39	0.6	83	ACI	1.68		1.74	1.74	1.6	15.3	0.12	15	FALL CANYON
	13	21:57:59	37.167	116.753	0.8	2.83	0.7	165	BCI	1.64		1.84	1.30	1.7	3.3	0.19	17	SPRINGDALE NE
	13	22:10:24	37.163	116.752	0.5	1.94	0.8	163	ACI	1.63		2.07	1.41	1.6	2.9	0.11	13	SPRINGDALE NE
	14	0:10:45	37.283	117.607	0.3	0.63	0.4	88	ABI	1.28		1.55	1.26	1.7	6.6	0.10	12	TULE CANYON
	14	2:41:34	37.161	116.753	0.5	2.13	0.7	163	ACI	1.35		1.31	0.93	1.0	3.0	0.12	13	SPRINGDALE NE
	14	7:25: 6	36.691	116.268	0.6	1.53	3.9	206	BDI	1.24		1.30	0.85		5.8	0.14	15	STRIPED HILLS
	14	17:41: 5	37.165	116.751	0.7	2.51	0.8	164	ACI	1.42		1.49	1.05	1.0	3.0	0.13	10	SPRINGDALE NE
	15	2: 0:43	36.680	116.243	0.5	1.01*	——	266	CDI	1.17		1.49	0.97	1.0	7.4	0.06	10	SPECTER RANGE NW
	15	12:24:18	36.690	116.277	0.7	0.99	0.6	200	ADI	1.19		1.45	0.63	1.0	5.8	0.11	12	STRIPED HILLS
	15	13:45:12	37.312	117.579	0.3	1.80	0.8	122	ACI	1.05		0.96	1.05		10.7	0.07	10	TULE CANYON
	16	7:50:54	36.687	116.261	0.6	1.54	2.9	245	BDI	1.15		1.25	0.80	1.0	6.2	0.08	13	STRIPED HILLS
	16	8:43:50	36.688	116.275	0.6	1.77	1.9	229	ADI	1.60		2.13	1.44	1.6	6.1	0.08	11	STRIPED HILLS
	16	11:26:14	37.449	116.389	2.3	9.37	4.7	297	BDI	1.78		2.70	1.59	1.7	25.2	0.20	10	GOLD FLAT EAST
	16	16:30:12	37.183	117.375	0.6	7.45	2.4	156	BCI	1.22		0.92	0.64		16.7	0.10	8	WEST OF GOLD MTN
	17	17:44:34	37.004	117.626	1.0	7.00	4.5	194	BDI	1.26		0.80	1.14		24.9	0.15	9	LAST CHANCE RANGE SW
	18	5:35:20	37.132	118.002	2.0	0.91	2.1	245	BDI	1.76		1.80	1.75	1.9	33.5	0.19	11	***REGIONAL***
	18	6:50: 9	36.821	115.998	1.1	0.86	1.4	194	BDI	0.89			0.62		13.1	0.22	8	FRENCHMAN FLAT
	19	22: 5:28	37.174	116.750	1.3	0.78	0.4	246	BDA		0.53				3.7	0.19	8	SPRINGDALE NE
	20	2:55: 8	37.164	116.754	0.5	2.93	0.6	164	ACI	1.25		1.27	0.80	1.1	3.2	0.12	14	SPRINGDALE NE
	20	15: 1:18	36.714	116.202	1.6	4.43	2.1	227	BDI	1.12		1.34	0.82	1.1	7.0	0.21	11	SPECTER RANGE NW
	21	12: 3:59	37.164	116.747	0.3	1.56	0.5	162	ACI	1.58		1.83	1.36	1.7	2.7	0.08	13	THIRSTY CANYON NW
	21	23:45:14	37.567	117.167	0.6	2.36	4.8	128	BCI	1.40		1.44	1.57		24.3	0.15	15	RALSTON
	22	3:19:25	36.757	116.248	1.1	4.82	0.9	180	BCI	0.69		1.24	0.66	0.9	2.7	0.17	11	SKULL MTN
	22	17:58:47	37.141	117.998	1.1	4.68*	——	249	CDI	1.58		1.56	1.52	1.9	32.6	0.13	10	JOSHUA FLATS
	23	8:39:44	37.708	115.052	0.5	5.70	2.7	117	BCI	1.29		1.31	1.25		11.9	0.13	10	HIKO NE
	23	12:30:16	37.164	116.751	0.3	0.77	0.2	164	ACI	1.49		1.65	1.27	0.9	3.0	0.09	16	SPRINGDALE NE
	23	12:31:15	36.415	116.982	0.8	11.69	1.3	89	BAI	1.50			1.60	1.5	10.9	0.16	12	WEST OF FURNACE CREEK

1991 LOCAL HYPOCENTER SUMMARY - SGB EARTHQUAKES

DATE	TIME (UTC)	LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
OCT 23	12:35:27	37.162	116.753	0.3	1.36	0.6	163	ACI	1.51		1.65	1.34	0.9	3.0	0.08	15	SPRINGDALE NE
24	6:41:25	36.816	115.930	0.4	8.93	1.5	184	ADI	0.91			0.58		17.0	0.06	7	FRENCHMAN FLAT
25	8:47:40	37.566	117.178	0.7	0.77	1.4	126	BCI	1.22		1.18	1.22		23.6	0.19	13	RALSTON
27	1:16:14	36.632	116.239	0.8	1.47	1.1	265	ADI	1.20		1.33	0.97		9.1	0.11	14	SPECTER RANGE NW
27	1:22:18	36.630	116.227	0.9	1.76	1.1	298	ADI	1.37		1.80	1.08	1.3	10.2	0.11	12	SPECTER RANGE NW
27	1:42: 9	36.640	116.254	0.7	4.31	0.7	283	ADI	1.42		1.31	0.78	1.2	7.7	0.06	10	STRIPED HILLS
27	4: 5: 5	36.643	116.256	0.7	3.50	1.2	279	ADI	1.06			0.56		7.5	0.06	9	STRIPED HILLS
27	5:52:57	36.642	116.261	0.9	5.17	0.8	279	ADI	1.36		1.48	1.11	1.2	7.1	0.08	10	STRIPED HILLS
27	9:29:56	36.641	116.245	0.4	2.25	0.3	285	ADI	2.09			0.92	1.3	8.4	0.03	9	SPECTER RANGE NW
27	10:33: 1	36.647	116.256	0.9	-0.17	0.7	276	ADI	1.26			0.35		7.5	0.05	10	STRIPED HILLS
27	15:49:17	36.632	116.230	3.9	0.65	3.2	296	CDI	1.51			0.60	1.3	9.9	0.13	9	SPECTER RANGE NW
28	4:25:40	37.527	115.120	0.6	6.09	2.4	165	BCI	1.07		1.09	0.95		14.7	0.08	7	HIKO SE
31	23:14: 5	37.732	116.009	0.9	-0.60	0.9	141	ACI	1.61		1.40	1.69	2.0	6.4	0.14	9	MONOTONY VALLEY
NOV 1	5: 7:18	37.221	117.360	0.6	9.22	1.1	156	ACI	1.07		0.68	0.87		12.7	[illegible]	8	GOLD MOUNTAIN
3	13:38:11	37.198	117.595	0.6	7.79	0.9	151	ACI	1.62			1.79	1.8	5.9	0.14	15	SAND SPRING
4	3:56:22	37.391	115.471	0.4	4.26	9.3	168	CCI	1.43			1.57	1.9	27.5	0.09	7	CRESCENT RESERVOIR
4	10: 5:58	37.451	115.823	0.6	4.66	2.9	119	BCI	1.25		1.46	1.28		13.7	0.05	6	CATTLE SPRING
4	22:32:57	37.704	117.687	2.5	2.05	7.4	174	CCI	1.63		2.04	1.77	2.0	10.4	0.21	10	LIDA WASH NW
5	7:20:23	37.190	117.841	0.9	7.25	2.7	232	BDI	1.28		1.14	1.41		17.9	0.13	10	EAST OF JOSHUA FLATS
6	5:35: 7	36.847	116.272	0.3	0.43	0.3	95	BBI	1.20		1.05	0.85	1.3	4.3	0.15	25	GEORGES WATER
6	6:11:16	36.885	116.303	0.4	10.45	0.5	41	BAI	1.64		1.82	1.25	1.7	2.6	0.15	33	TOPOPAH SPRING
6	14:49:18	37.183	117.416	0.4	0.01	0.5	122	ACI	1.03		1.10	0.79		19.2	0.11	14	WEST OF GOLD MTN
7	2:46:27	37.088	115.112	1.4	9.09	1.4	286	BDI	1.77		1.52	1.40	1.7	11.2	0.12	8	LOWER PAHRANAGAT LAKE SE
7	2:47:13	37.088	115.101	0.6	6.43	1.2	137	BCI	2.75		3.59		3.0	11.8	0.21	41	LOWER PAHRANAGAT LAKE SE
7	3: 5:37	37.090	115.138	0.3	9.66	0.3	221	ADI	1.55		1.63	1.40	1.8	9.7	0.03	7	LOWER PAHRANAGAT LAKE SW
7	5: 9: 6	36.844	116.273	0.3	1.57	3.8	97	BBI	1.01		0.76	0.65		4.4	0.12	17	GEORGES WATER
8	12:32:23	36.846	116.240	0.4	5.34	1.1	113	ABI	1.24		1.15	1.00	1.2	6.4	0.10	16	SKULL MTN
8	22:39:55	37.798	114.722	1.0	2.66	3.3	257	BDI	1.42			1.02		21.3	0.08	7	THE BLUFFS
9	6:58:29	36.726	116.246	0.6	6.81	0.6	197	ADI	0.88			0.56		3.0	0.10	11	SPECTER RANGE NW
9	10:12:45	37.019	117.859	1.9	7.00*	—	226	CDI	1.23		1.22	1.37		30.3	0.21	10	EAST OF WAUCOBA SPRING
10	1:24:40	37.026	117.849	1.0	6.72	4.5	293	BDI	1.44		1.33	1.74		29.2	0.06	8	EAST OF WAUCOBA SPRING
10	11:39:47	37.219	117.337	0.8	10.58	1.4	96	ABI	1.32			1.29	1.5	11.5	0.14	11	GOLD MOUNTAIN
10	11:50:46	37.219	117.348	0.2	8.13	0.6	94	ABI	1.33			1.26	1.6	12.1	0.06	13	GOLD MOUNTAIN
10	12:13:57	37.219	117.348	0.4	7.42	1.2	93	ABI	1.16		1.27	0.96		12.1	0.10	10	GOLD MOUNTAIN
10	16: 1:46	36.400	117.026	0.8	11.70	1.1	100	BBI	1.65			1.73	1.4	6.8	0.16	10	EMIGRANT CANYON
10	16:11:42	37.419	115.023	2.3	4.46	1.2	191	BDI	1.35		0.83	1.06	1.2	2.8	0.19	9	ALAMO NE
10	19:33: 5	36.756	116.674	0.4	0.80	0.6	138	ACI	1.34		1.41	0.98	1.6	6.1	0.10	15	CARRARA CANYON
10	23: 4:40	37.612	115.089	0.7	1.70	2.5	122	BCI	1.07		0.78	0.97		14.1	0.17	9	HIKO SE
11	4:30: 6	37.974	116.820	0.7	2.30	4.9	158	BCI	1.66			1.47		36.2	0.18	12	REEDS RANCH
12	23:59:39	36.631	116.010	0.3	10.84	0.6	133	ABI	1.34		1.16	1.55	1.6	5.5	0.06	13	CAMP DESERT ROCK
13	18:13:26	37.324	114.674	1.0	3.42*	—	296	CDI	1.80		1.84	1.76		31.7	0.08	8	ELGIN SW
14	9:46:46	36.647	116.261	0.5	5.46	0.6	249	ADI	0.90			0.64		7.0	0.06	10	STRIPED HILLS
14	10:23:45	37.085	115.122	1.4	9.92	1.3	248	BDI	1.86		2.08	1.79	1.8	10.9	0.16	11	LOWER PAHRANAGAT LAKE SE
14	10:33:12	37.079	115.128	1.7	10.44	1.4	286	BDI	1.61		1.66	1.41	1.8	11.3	0.12	7	LOWER PAHRANAGAT LAKE SW

DATE	TIME (UTC)	LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
NOV 14	16:30: 2	37.240	116.501	0.6	6.87	1.7	161	ACI	1.07		1.26	0.98	1.5	13.6	0.12	14	THIRSTY CANYON
15	2:25: 2	37.377	115.237	8.1	7.51*	—	232	DDI	1.31			1.18	1.4	16.8	0.08	6	ASH SPRINGS
15	4:29:29	37.258	116.358	2.8	3.81	2.1	231	CDI	1.19			0.93	1.7	4.1	0.19	8	DEAD HORSE FLAT
15	7: 1:57	37.378	115.237	0.6	4.93	5.3	135	CCI	1.37		1.11	1.30	1.8	16.7	0.11	9	ASH SPRINGS
15	7:37: 0	36.742	115.970	0.3	7.32	1.0	131	ABI	1.84		2.04	1.74	1.7	9.0	0.06	12	MERCURY
15	7:39:40	36.742	115.962	0.4	9.01	1.1	134	ABI	1.39		0.95	1.47	1.6	9.0	0.10	13	MERCURY
15	7:59:55	36.733	115.968	0.4	9.36	0.6	160	ACI	1.07			0.89		8.1	0.04	8	MERCURY
15	10:59:25	36.743	115.972	0.3	6.35	0.9	131	ABI	1.11			0.72		9.2	0.05	9	MERCURY
15	16:22:42	37.137	117.058	0.5	4.00	9.6	144	CCI	1.65			1.31	1.6	17.3	0.11	11	BONNIE CLAIRE
16	8:22:35	36.931	116.182	0.6	11.07	1.2	111	ABI	0.80			0.40		8.6	0.12	11	MINE MTN
16	10:55: 8	36.710	116.232	1.4	5.57	1.6	214	BDI	1.04			0.63	1.0	5.1	0.21	12	SPECTER RANGE NW
16	21:47:37	37.928	116.123	0.3	1.73	1.6	122	BCI	2.35		3.14		3.1	24.8	0.15	38	FREDS WELL
17	8:11:16	36.602	116.288	5.0	0.42	3.6	296	CDI	1.07			0.65		6.7	0.14	12	SKELETON HILLS
18	13:22:59	37.431	115.473	0.8	13.96	3.7	109	BBI	1.35		1.30	1.31		24.9	0.15	9	CRESCENT RESERVOIR
20	18:49: 5	37.261	116.393	1.4	9.95	1.6	208	BDI	1.60			1.31	2.4	6.5	0.24	15	SILENT BUTTE
21	4:10:60	37.288	117.533	0.3	8.81	0.7	86	ABI	1.45		1.24	1.54	1.5	11.7	0.07	11	TULE CANYON
21	4:54:19	37.154	117.394	0.3	7.80	1.0	125	ACI	1.16		1.13	0.84		17.8	0.06	9	WEST OF GOLD MTN
21	14:55:27	36.647	116.298	0.4	5.01	0.5	131	ABI	1.28		1.85	1.11	1.2	3.7	0.09	16	STRIPED HILLS
21	23:24:40	36.691	115.569	3.9	0.93	2.9	300	CDI	1.70			1.29	2.1	21.6	0.10	10	HEAVENS WELL
22	5:16:37	35.900	116.856	1.4	4.78	1.5	270	BDI	1.78		1.62	1.54		7.2	0.13	9	WINGATE WASH
23	9:15:26	36.528	116.011	5.7	12.19	6.1	251	DDA		0.68				12.9	0.20	9	POINT OF ROCK
23	13:41:55	36.840	116.013	—	7.00**	—	286	ADA		0.36				25.6	0.08	4	CANE SPRING
24	0:46: 4	36.068	114.756	0.6	-1.37	0.4	197	ADI	2.63		3.17	2.44	2.8	16.2	0.08	16	BOULDER BEACH
24	11: 5:29	37.319	115.106	1.0	6.16	1.8	158	ACI	1.50			1.29	1.5	10.9	0.11	9	ALAMO SE
24	17:39:42	36.404	115.737	0.5	11.68	1.1	152	ACI	1.31		1.00	1.05	1.3	16.3	0.07	10	COLD CREEK
25	8:30:39	36.744	116.255	2.5	4.27	1.5	309	CDA		0.32				1.5	0.16	8	STRIPED HILLS
25	10:17:59	36.445	115.871	4.2	14.98	3.2	299	CDA		0.96				21.0	0.17	10	WILLOW PEAK
25	10:20:26	36.528	115.899	1.5	-0.51	1.0	280	BDA		0.70				20.8	0.02	5	NIAVI WASH
25	10:21:55	36.741	116.274	—	1.44	—	243	ADA		0.93				0.2	0.03	4	STRIPED HILLS
25	10:23:27	36.467	115.928	6.5	12.74	7.9	304	DDA		1.33				16.1	0.19	9	MT STIRLING
25	10:48:12	36.469	115.814	6.4	2.29*	—	314	DDA		1.28				26.2	0.20	6	WILLOW PEAK
25	10:59:26	36.472	115.815	5.0	2.19*	—	301	CDA		0.94				26.2	0.03	5	WILLOW PEAK
25	11: 4:14	36.436	115.721	6.1	7.00*	—	313	DDA		1.01				34.4	0.07	5	COLD CREEK
25	15:41: 7	36.777	116.273	0.6	4.65	1.1	132	ABI	0.68			0.44		3.8	0.08	10	GEORGES WATER
25	19:31:17	35.913	115.469	2.0	2.49	10.7	202	CDI	1.80		1.41	1.67		46.4	0.29	11	COTTONWOOD PASS
25	23:24:42	36.624	116.433	1.9	0.78	1.5	270	BDI	1.27			0.62	1.5	8.6	0.11	11	SOUTH OF LATHROP WELLS
26	12:18:54	37.229	117.336	1.0	9.49	1.9	89	BBI	0.99		1.42	0.98		10.6	0.21	11	GOLD MOUNTAIN
27	3:50:14	37.813	114.690	1.2	3.01*	—	267	CDI	1.25		1.01	1.21		23.4	0.13	8	THE BLUFFS
29	2:34: 2	37.383	115.249	9.4	4.50*	—	236	DDI	1.36		1.55	1.12	1.4	17.8	0.17	7	ASH SPRINGS
29	12:51: 8	36.052	114.727	1.3	3.49	1.9	201	BDI	2.21		2.18	2.27	2.2	14.7	0.20	17	HOOVER DAM
29	13:31:36	37.594	117.036	0.6	6.94	3.8	145	BCI	1.46		1.62	1.48		28.2	0.11	12	STONEWALL SPRING
30	6:45:56	36.739	116.215	0.3	5.58	0.6	36	BAI	2.82		3.01		2.9	5.1	0.17	52	SPECTER RANGE NW
30	14:21:59	36.812	116.089	0.4	6.76	1.4	106	ABI	1.99		2.44	1.62	1.6	8.5	0.13	18	CANE SPRING
30	18:43:25	36.726	116.195	1.0	5.09	1.2	226	ADI	1.01		1.92	1.33	1.4	7.1	0.14	13	SPECTER RANGE NW

DATE - TIME (UTC)		LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
NOV 30	19: 8:46	36.733	116.196	0.9	5.96	1.0	223	ADI	1.68		2.53	1.42	2.0	6.9	0.14	14	SPECTER RANGE NW
DEC 1	23:47:54	37.913	116.174	0.7	11.90	2.2	159	BCI	1.43			1.43		26.3	0.12	9	REVEILLE PEAK NW
2	8:42:42	37.634	116.507	9.0	6.00*	——	126	DCI	2.22			1.16		16.3	0.59	6	MELLAN
2	12:13:45	37.385	115.189	0.7	9.51	2.0	100	BBI	2.12			2.03	2.2	12.5	0.20	14	ASH SPRINGS
3	3:58:37	36.733	116.214	0.5	4.96	0.6	212	ADI	1.33		1.95	1.09	2.0	5.3	0.09	14	SPECTER RANGE NW
3	4:25:50	37.974	115.355	1.5	2.99	8.1	200	CDI	1.02			0.94		20.9	0.16	6	COAL VALLEY RESERVOIR
4	13: 8:34	37.920	116.129	0.3	2.63	2.9	120	BCI	2.15		3.04	2.05	2.3	24.5	0.09	13	REVEILLE PEAK NW
5	2: 5:56	36.801	116.084	0.5	1.83	2.2	136	BCI	1.06			0.76		9.6	0.17	15	CANE SPRING
5	11: 1:55	36.802	116.083	0.7	4.03	5.9	136	CCI	1.01			0.63		9.6	0.18	13	CANE SPRING
5	14: 0:18	36.730	116.207	0.5	5.82	0.6	218	ADI	1.36		2.10	1.37	2.0	6.0	0.08	15	SPECTER RANGE NW
7	4:26:59	37.622	115.765	0.3	6.49	1.0	128	ABI	1.18		0.82	1.45	1.4	10.2	0.08	11	WHITE BLOTCH SPRINGS SE
7	6:41: 4	35.921	117.764	3.7	4.08*	——	291	CDI	2.14		2.29	2.23	2.3	79.4	0.31	10	LITTLE LAKE
9	8:34:20	36.809	116.083	0.3	5.06	2.0	137	ACI	1.36		1.22	0.99	1.4	9.1	0.12	22	CANE SPRING
10	4:10:12	36.809	115.986	0.4	1.78	1.2	155	ACI	1.25			1.19	1.6	14.8	0.09	14	FRENCHMAN FLAT
10	18:54: 6	37.800	115.493	0.3	15.15	0.9	124	ABI				0.89		22.0	0.04	6	MURPHY GAP
11	6: 2:42	37.726	115.248	1.8	6.85	2.0	195	BDI	1.19		1.12	0.91	1.4	6.0	0.11	7	FOSSIL PEAK
11	17: 5:43	36.805	116.080	0.6	4.28	3.8	139	BCI	1.02			0.91		9.7	0.17	13	CANE SPRING
11	22:17:37	36.693	116.306	0.8	4.83	1.0	181	ADI	1.85		2.09	1.13	2.0	6.1	0.11	12	STRIPED HILLS
12	0: 2:28	36.812	116.090	0.4	5.92	1.9	105	ABI	1.14			0.98	1.5	8.4	0.12	15	CANE SPRING
13	3:53:30	36.592	116.157	0.7	1.85	1.0	196	ADA		0.44				17.4	0.07	10	SPECTER RANGE SW
13	15:31:47	37.667	115.024	1.2	7.46	3.9	112	BBI	1.21		1.07	1.10		7.9	0.23	8	HIKO NE
13	23:22: 4	37.006	116.264	5.6	2.20*	——	282	DDA		0.74				11.4	0.16	7	BUCKBOARD MESA
14	1: 2:42	36.813	115.808	1.0	8.43	7.1	269	CDA		1.26				32.5	0.12	15	FRENCHMAN LAKE SE
15	3:13:25	37.037	116.287	2.5	9.58	2.3	298	CDA		0.32				8.9	0.08	6	BUCKBOARD MESA
15	3:14:21	37.000	116.304	0.7	1.05*	——	200	CDA		0.71				8.3	0.15	11	BUCKBOARD MESA
15	10:51:57	36.959	116.477	1.6	4.94	3.3	240	BDY		1.05				7.0	0.14	9	PINNACLES RIDGE
15	16:15:23	36.948	116.473	0.6	4.69	2.0	192	BDY		0.77				5.7	0.08	14	PINNACLES RIDGE
15	23:27:14	36.734	116.268	1.5	0.96	0.4	312	BDA		0.64				1.0	0.08	7	STRIPED HILLS
16	2: 2:58	36.799	116.139	1.2	8.70	1.9	250	BDA		1.34				6.7	0.14	11	SKULL MTN
16	3:56:57	36.788	116.121	0.6	1.93	0.8	261	ADA		1.00				8.5	0.09	12	CANE SPRING
16	4:34:53	36.805	116.114	0.3	5.21	0.5	270	ADA		0.48				7.3	0.02	7	CANE SPRING
16	5:22:43	36.806	116.132	1.1	3.62	1.7	257	BDA		0.99				6.2	0.12	12	SKULL MTN
16	5:26:41	36.813	116.113	1.9	2.92	1.8	272	BDA		0.59				6.8	0.18	9	CANE SPRING
16	6:38:40	36.847	115.987	2.9	0.52	2.3	294	CDA		1.08				16.2	0.12	12	FRENCHMAN FLAT
17	5:14:50	36.942	116.467	0.4	3.26	0.7	104	ACY		0.71				10.3	0.08	11	PINNACLES RIDGE
17	6:13:27	37.017	116.801	1.1	23.16	1.9	133	BBA		0.83				15.9	0.15	11	SPRINGDALE
17	12:59:19	37.487	115.530	0.6	0.71	1.2	126	ACA		1.71				16.9	0.11	9	GROOM RANGE NE
17	20:14:58	36.815	116.128	1.5	4.16	1.4	265	BDA		0.64				5.7	0.12	9	SKULL MTN
18	2: 6:12	36.806	116.114	0.7	2.64	0.8	285	ADA		0.74				7.2	0.07	9	CANE SPRING
18	9:28:28	36.787	116.163	1.0	4.74	1.4	247	ADA		0.64				7.5	0.11	10	SKULL MTN
21	14:19:28	36.988	116.165	1.0	4.50	1.4	246	BDA		0.68				7.9	0.10	10	MINE MTN
21	18:54:32	36.556	117.015	2.0	10.56	3.1	220	BDA		1.26				22.6	0.12	10	GROTTO CANYON
23	14:15:16	36.979	116.129	1.8	2.63	2.4	286	BDA		0.40				11.0	0.13	8	MINE MTN
24	5: 3:42	36.862	116.247	0.8	2.96	1.0	130	BBA		0.61				6.2	0.17	11	SKULL MTN

1991 LOCAL HYPOCENTER SUMMARY - SGB EARTHQUAKES

DATE - TIME (UTC)		LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
DEC 25	0:39:19	36.864	116.736	1.2	7.26	1.8	229	BDA		0.94				12.2	0.13	16	CARRARA CANYON
26	0:17:38	36.539	116.606	0.7	5.16	3.6	241	BDA		0.77				19.3	0.07	10	LEELAND
26	5:25:27	37.159	116.204	1.0	5.21	5.0	132	CCA		0.79				13.7	0:23	10	RAINIER MESA
26	18:18:15	37.002	116.257	1.1	4.60	2.5	122	BBA		0.76				4.7	0.20	12	BUCKBOARD MESA
27	11:29:60	36.498	116.600	2.5	3.26*	——	266	CDA		0.93				22.6	0.19	8	EAST OF ECHO CANYON
30	15: 3:56	37.314	116.101	1.6	-0.03	3.4	156	BCA		0.74				14.8	0.15	6	OAK SPRING BUTTE
31	18:11:53	37.100	116.286	0.6	0.96	1.1	161	ACA		0.85				8.6	0.13	10	BUCKBOARD MESA

Appendix B

Chemical explosion location data for 1991

The southern Great Basin of Nevada is seismically active from both natural and manmade sources. Seismograms from chemical explosion sources that are detected by the SGBSN are scaled to provide information on the accuracy of the crustal model and location algorithm used by the SGBSN. The following organizations have been contacted and have provided helpful information on source locations, times, and in some cases, TNT-equivalent source size:

(1) Bond International Gold, Denver, Col. Blasting at Ladd Mountain, Nev. (Beatty topographic quadrangle), daily on weekdays, 4 PM to 5 PM, with limited weekend blasting. Approximate coordinates, 36.89°N., 116.82°W.

(2) Chemstar, Inc., Las Vegas, Nev. Blasting at two limestone quarries, one in the Dry Lake, Nev., quadrangle, and one in the Sloan, Nev., quadrangle. The Dry Lake quarry coordinates are 36.361°N. latitude, 114.915°W. longitude.

(3) Cyprus Tonopah Mining, Tonopah, Nev. Blasting in the San Antonia Mountains (San Antonia Ranch quadrangle), weekdays, usually in the morning.

(4) Frehner Construction, North Las Vegas, Nev. Blasting at limestone quarry in Sloan, Nev., quadrangle.

(5) Saga Exploration Co., Beatty, Nev. Blasting at Bare Mountain, Nev., usually early to late afternoon.

(6) Gold Bar Mine, Beatty, Nev. This mine is about 10 km northwest of the Bond Bullfrog Mine, in the Bullfrog Hills. Less active than (1), blasting occurs from early to late afternoon.

A number of other organizations also known to be engaged in blasting in the southern Great Basin of Nevada have not been contacted.

Column headings for this Appendix are identical to those for Appendix A. The depth of all blasts is at the surface (plus < 100 feet, usually), but in many instances, hypocenters have been located with depth as a free parameter, to examine the location algorithm and velocity model. If the hypocenter depth is reported as -1.00 to -1.10 km, it was fixed at that value during hypocenter determination. All other depths are freely determined. If the letters "PB" follow the depth estimate, the event is a probable blast, but just enough ambiguity was present in the seismograms to prevent a certain judgment. Data from known chemical explosion sources are not scaled from Develocorder films, so "gaps" in the explosion record may exist for periods of seismic computer downtime.

Errors in hypocenters for chemical explosions are not necessarily indicative of errors in earthquake hypocenters. One reason for relatively large depth-of-focus error for explosions is that S-wave arrival times are often impossible to determine from such sources. As is well known, S-wave arrivals from near-source stations often provide important information for constraining focal depth. The Bullfrog Hills blast hypocenters reported here are usually from "ripple charges" that efficiently generate S-wave coda. Hypocenters from those sources generally settle at very shallow depths, although competing hypocenters in the 5 to 10 km below sea level range are frequently encountered. The nearest station to these Bullfrog Hills blasts is about 20 km away, so the station-near-source constraint is absent.

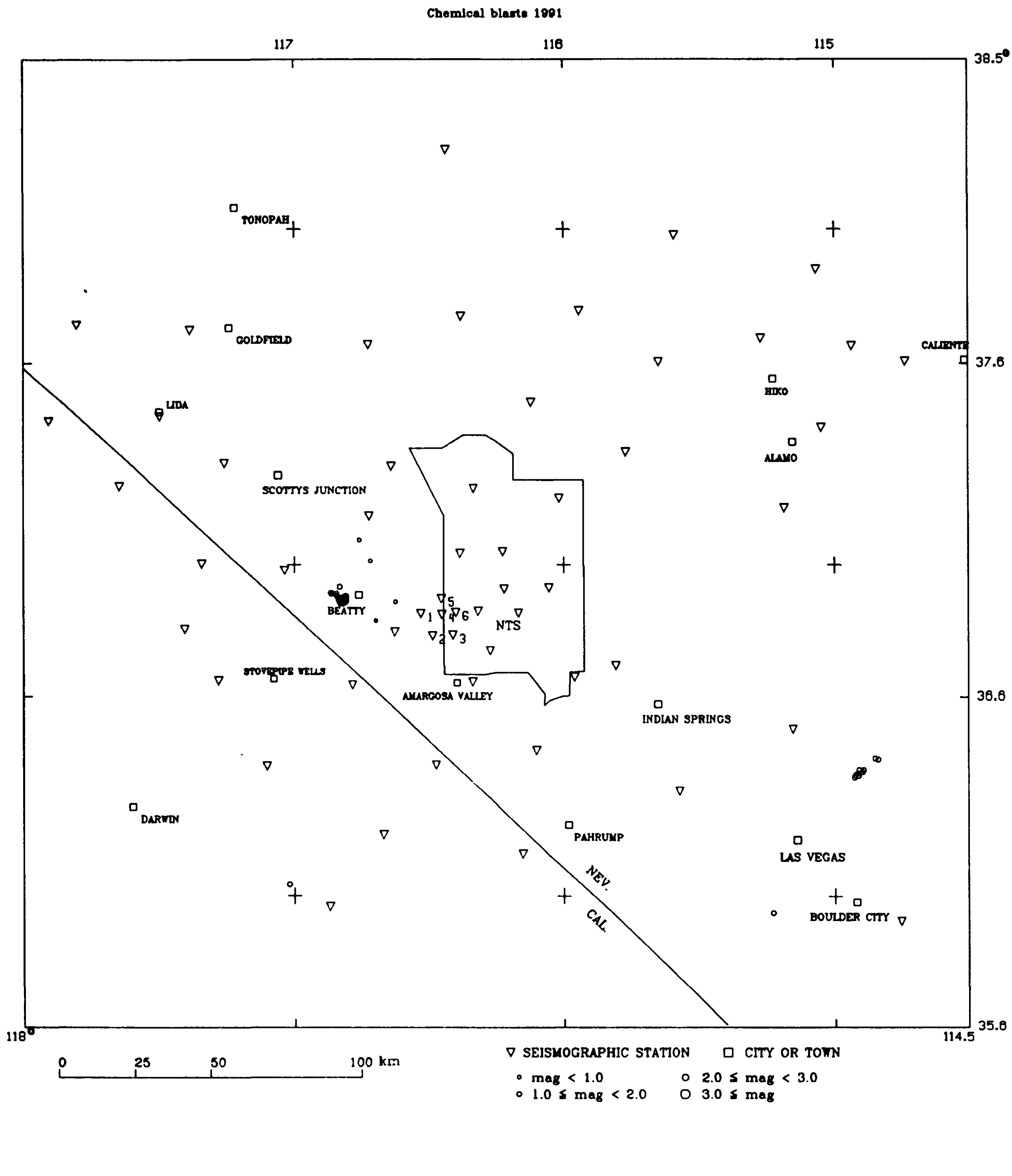

Figure B1. Epicenters for known and suspected chemical explosions detected by the SGBSN for the calendar year 1991 are plotted in map view.

1991 LOCAL HYPOCENTER SUMMARY – SGB CHEMICAL EXPLOSIONS

DATE		TIME (UTC)	LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JAN	1	23: 4:19	36.895	116.816	0.4	-1.00BL	0.7	122	ACI	2.36		1.66	1.76	1.9	20.1	0.14	18	BEATTY
	2	23: 7: 8	36.892	116.818	0.4	-1.00BL	0.6	124	ACI	2.21		1.57	1.75	1.9	20.1	0.13	17	BEATTY
	3	23: 1:55	36.894	116.820	0.4	-1.00BL	0.7	124	ACI	2.61			1.88	2.0	20.3	0.14	15	BEATTY
	5	23:31:58	36.902	116.813	0.5	-1.00BL	0.7	119	BCI	2.11		1.68	1.86	1.8	20.3	0.22	16	BEATTY
	7	23:21:55	36.898	116.821	0.4	-1.00BL	0.7	123	BCI	2.36			1.83	2.0	20.6	0.17	15	BEATTY
	8	20:49:35	36.888	116.624	1.1	-0.82PB	2.2	136	BCI	1.47			0.80	1.1	9.2	0.19	11	EAST OF BEATTY MTN
	8	23:14: 6	36.891	116.814	0.4	-1.00BL	0.7	123	ACI	2.36		1.71	2.05	2.1	19.7	0.14	16	BEATTY
	9	23:32:52	36.888	116.817	0.7	-1.00BL	1.1	124	BCI	2.26			1.61	2.0	19.7	0.23	16	BEATTY
	13	23:15:21	36.901	116.817	0.6	-1.00BL	0.9	121	BCI	2.49		1.94	1.72	2.1	20.5	0.22	14	BEATTY
	14	23:30:51	36.896	116.815	0.4	-1.00BL	0.6	122	ACI	2.32		1.72	1.67	2.0	20.1	0.13	17	BEATTY
	15	23:32:48	36.892	116.824	0.5	-1.00BL	0.8	125	BCI	1.51			1.47	1.9	20.6	0.19	16	BEATTY
	16	21:50: 5	36.913	116.843	0.3	-1.52PB	0.4	170	ACI	1.40			1.13		18.8	0.12	13	BEATTY
	16	23:33:52	36.899	116.818	0.3	-1.00BL	0.5	122	ACI	2.24		1.60	1.62	2.0	20.5	0.14	17	BEATTY
	17	23:20:50	36.890	116.819	0.6	-1.10BL	0.8	124	BCI	2.28		1.78	1.62	2.1	20.0	0.20	17	BEATTY
	18	23:25: 9	36.895	116.814	0.6	-1.10BL	0.8	121	ACI	2.08		1.70	2.31	2.1	20.0	0.14	13	BEATTY
	20	21:41: 9	36.905	116.844	0.4	-1.00BL	0.6	127	ACI	1.44			0.79		19.1	0.10	12	BEATTY
	21	23:24:49	36.896	116.817	0.4	-1.10BL	0.6	122	ACI	2.07		1.68	1.65	1.8	20.2	0.13	16	BEATTY
	22	21:53:35	36.907	116.841	0.3	-0.90BL	0.5	125	ACI	1.48			1.01	1.4	19.2	0.10	12	BEATTY
	23	23:25:29	36.889	116.820	0.5	-1.10BL	0.6	125	ACI	2.24			1.74	1.7	20.0	0.14	17	BEATTY
	25	0:18:48	36.895	116.818	0.4	-1.10BL	0.6	123	ACI	2.34			1.62	2.0	20.2	0.12	15	BEATTY
	25	0:43:48	36.898	116.813	0.5	-1.10BL	0.8	120	ACI	2.16		1.73	1.88	2.1	20.1	0.14	15	BEATTY
	29	23:30:59	36.902	116.813	0.5	-1.10BL	0.8	119	ACI	2.14		1.64	1.71	1.8	20.3	0.14	16	BEATTY
FEB	4	23:36:45	36.896	116.817	0.5	-1.00BL	0.7	122	BCI	2.29		1.47	1.48	1.9	20.3	0.20	17	BEATTY
	5	23:36:44	36.892	116.833	0.6	-1.00BL	0.9	128	BCI	2.11		1.66	1.89	2.0	20.6	0.22	16	BEATTY
	6	23:37:55	36.900	116.818	0.3	-1.00BL	0.5	121	BCI	2.39			1.78	1.8	20.5	0.18	16	BEATTY
	8	19:57:54	36.893	116.817	0.3	-1.00BL	0.5	123	ACI	2.28		1.80	2.03	2.1	20.1	0.14	16	BEATTY
	9	1:25:54	36.892	116.817	0.4	-1.00BL	0.6	123	ACI	2.21		1.67	1.78	2.0	20.0	0.14	17	BEATTY
	11	23:30:44	36.900	116.813	0.4	-1.00BL	0.6	120	ACI	2.36			1.67	1.9	20.2	0.13	16	BEATTY
	12	23:10:45	36.887	116.822	0.5	-1.00BL	0.9	126	BCI	2.37		1.88	1.50	2.2	20.1	0.22	16	BEATTY
	13	23:14:42	36.899	116.815	0.4	-1.00BL	0.7	121	BCI	2.35		1.25	1.84	2.1	20.3	0.16	16	BEATTY
	14	23:30:54	36.896	116.815	0.4	-1.00BL	0.7	121	ACI	2.20			1.56	2.0	20.1	0.13	15	BEATTY
	16	0:40:44	36.889	116.824	0.5	-1.10BL	0.8	126	ACI	2.32		1.86	1.24	2.0	20.3	0.14	15	BEATTY
	16	21:51:52	36.906	116.844	0.3	-1.00BL	0.5	127	ACI	1.32			0.68		19.0	0.08	14	BEATTY
	16	23:29:58	36.900	116.812	0.5	-1.10BL	1.4	120	ACI	2.15			1.58	1.9	20.1	0.10	12	BEATTY
	18	23:59:38	36.888	116.821	1.7	1.63PB	5.5	125	CCI	2.21		1.82	1.55	2.2	20.1	0.40	14	BEATTY
	20	0:32:37	36.893	116.811	0.5	-1.10BL	0.7	121	ACI	2.37		1.91	1.63	2.0	19.6	0.14	16	BEATTY
	20	23:29:37	36.894	116.817	0.4	-1.10BL	0.6	123	ACI	2.29			1.77	2.0	20.1	0.12	16	BEATTY
	21	23:34:39	36.896	116.814	0.5	-1.10BL	1.0	121	ACI	2.40			1.86	2.0	20.0	0.12	14	BEATTY
	22	23:23:41	36.895	116.820	0.4	-1.27PB	0.9	123	ACI	2.47			1.71	2.2	20.4	0.12	15	BEATTY
	23	23:44:36	36.893	116.820	0.4	-1.10BL	0.6	124	ACI	2.58		1.79	1.26	2.1	20.2	0.13	16	BEATTY
	26	0:11:39	36.899	116.821	0.4	2.78BL	3.0	122	BCI	2.56			1.62	2.1	20.7	0.15	16	BEATTY
	26	23:24:35	36.895	116.812	0.4	-1.10BL	0.7	121	BCI	2.70			1.98	2.1	19.8	0.19	15	BEATTY
	27	23:49:39	36.905	116.809	0.3	-1.10BL	0.4	166	ACI	2.40			2.14	1.9	20.2	0.08	15	BEATTY
MAR	1	0: 7:30	36.896	116.815	0.5	-1.10BL	1.4	109	ACI	2.24			1.75	2.0	20.1	0.12	13	BEATTY

1991 LOCAL HYPOCENTER SUMMARY - SGB CHEMICAL EXPLOSIONS

DATE - TIME (UTC)			LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
MAR	3	0:20:30	36.896	116.818	0.4	-1.10BL	0.6	122	ACI	2.51			1.87	1.9	20.3	0.11	14	BEATTY
	5	0:22:29	36.898	116.819	0.4	-1.00BL	0.8	122	ACI	2.40			1.80	2.0	20.6	0.15	14	BEATTY
	5	23:44:38	36.889	116.827	0.5	-1.00BL	0.9	127	BCI	2.53		1.63	1.57	2.0	20.5	0.16	15	BEATTY
	6	15:46:59	36.831	116.698	0.7	-1.30PB	0.6	231	ADI	0.99			0.48		7.4	0.08	9	CARRARA CANYON
	7	0:32:27	36.895	116.819	0.4	-1.00BL	0.6	123	ACI	2.37			1.79	2.0	20.4	0.13	15	BEATTY
	8	0:13:27	36.891	116.824	0.5	-1.00BL	0.9	126	BCI	2.43			1.54	2.1	20.4	0.18	17	BEATTY
	8	23:33:35	36.897	116.815	0.4	-1.00BL	0.8	122	ACI	2.29		1.58	1.69	2.1	20.2	0.14	16	BEATTY
	12	0: 7:32	36.889	116.823	0.4	-1.00BL	0.7	126	BCI	2.50		1.93	1.90	2.2	20.3	0.16	14	BEATTY
	12	23:28:35	36.893	116.813	0.4	-1.00BL	0.9	122	ACI	2.08			1.52	1.9	19.8	0.12	13	BEATTY
	14	0:31:36	36.890	116.823	0.5	-1.00BL	1.0	126	BCI	2.69		2.26		2.1	20.3	0.18	13	BEATTY
	14	23:42:53	36.895	116.819	0.5	-1.00BL	0.9	123	ACI	2.09			1.61	1.9	20.3	0.13	13	BEATTY
	15	23:24: 3	36.899	116.811	0.5	-1.00BL	0.8	120	BCI	2.40			1.80	2.1	19.9	0.17	15	BEATTY
	18	23:45:28	36.890	116.823	0.5	-1.00BL	0.8	126	BCI	2.66			1.93	2.0	20.4	0.19	16	BEATTY
	19	23:32:43	36.898	116.813	0.5	-1.00BL	1.0	121	ACI	2.35			1.79	2.0	20.1	0.12	13	BEATTY
	21	1:12:19	36.889	116.818	0.4	-1.00BL	0.7	124	ACI	2.68		2.67		2.2	19.9	0.12	16	BEATTY
	23	1:38:32	36.897	116.817	0.3	-1.00BL	0.6	122	ACI	2.40		1.16	1.75	1.9	20.3	0.12	18	BEATTY
	25	23:45:30	36.897	116.819	0.3	-1.00BL	0.6	122	ACI	2.54			1.87	2.0	20.4	0.15	16	BEATTY
	28	0: 1:29	36.899	116.821	0.4	-1.00BL	0.7	123	BCI	2.36		1.32	1.57	2.0	20.7	0.18	16	BEATTY
	28	23:39:26	36.893	116.820	0.3	-1.00BL	0.6	124	BCI	2.38		1.84	1.62	2.2	20.3	0.17	14	BEATTY
	29	23:53:27	36.888	116.822	0.4	-1.00BL	0.7	126	ACI	2.53		1.73		2.1	20.1	0.13	15	BEATTY
	31	23:11:36	37.012	116.718	0.5	-1.48PB	1.1	102	ACI	1.29			0.91		14.9	0.09	9	THIRSTY CANYON SW
APR	1	23:24:29	36.898	116.818	0.4	-1.00BL	0.7	122	ACI	2.50		1.57	1.84	2.0	20.4	0.14	16	BEATTY
	3	0: 5:37	36.896	116.817	0.4	-1.00BL	0.7	122	BCI	2.26		1.82	2.10	2.2	20.2	0.18	16	BEATTY
	3	23:49:20	36.895	116.815	0.4	-1.00BL	0.7	122	ACI	2.58		1.28		2.0	20.1	0.15	17	BEATTY
	5	0:38:23	36.893	116.821	0.4	-1.00BL	0.6	124	ACI	2.51		1.46	1.66	2.1	20.4	0.12	16	BEATTY
	6	18:18:24	36.895	116.820	0.4	-1.00BL	0.8	123	ACI	2.49		1.20	1.55	2.0	20.4	0.14	15	BEATTY
	8	22:36:50	36.897	116.819	0.4	-1.00BL	0.9	122	BCI	2.23		1.28	1.67	1.9	20.5	0.15	13	BEATTY
	9	22:39: 7	36.890	116.822	0.4	-1.00BL	0.7	125	ACI	2.44		1.72	1.83	2.2	20.3	0.14	14	BEATTY
	10	22:39:15	36.898	116.814	0.4	-1.00BL	0.7	121	ACI	2.18		1.28	1.93	1.9	20.1	0.14	14	BEATTY
	12	0: 1:18	36.894	116.819	0.4	-1.00BL	0.7	123	BCI	2.37		1.72		2.2	20.3	0.19	14	BEATTY
	12	22:40:35	36.895	116.816	0.5	-1.00BL	1.7	110	BCI	2.07		1.55		2.5	20.1	0.17	23	BEATTY
	15	22:29:29	36.893	116.809	0.4	-1.00BL	0.9	84	BCI	1.63		1.52	1.77	1.9	19.5	0.16	19	BEATTY
	16	22:26:47	36.891	116.818	0.5	-1.00BL	1.2	124	ACI				1.84	2.5	20.0	0.12	12	BEATTY
	17	22:32:11	36.889	116.813	0.5	-1.00BL	1.4	62	ACI	1.78			1.81		19.5	0.13	18	BEATTY
	18	19: 3:43	36.035	117.018	6.3	0.00*	——	221	DDI			1.09			15.7	0.25	7	TELESCOPE PEAK
	18	22:31:17	36.883	116.819	0.6	-1.00BL	1.2	59	BCI		1.80	1.82	1.77		19.6	0.21	17	BEATTY
	19	22:43:17	36.897	116.809	1.0	-1.00BL	2.4	108	BCI	1.69		1.61	1.74		19.7	0.28	15	BEATTY
	22	22:39:12	36.890	116.820	0.3	-1.00BL	1.8	79	ACI	1.93				2.6	20.1	0.15	18	BEATTY
	23	22:22:27	36.890	116.814	0.4	-1.00BL	1.1	79	ACI	1.83			1.82	2.6	19.7	0.14	23	BEATTY
	24	22:27:36	36.891	116.815	0.6	-1.00BL	1.7	102	BCI	2.01			1.74		19.8	0.15	15	BEATTY
	25	22:39:16	36.894	116.813	0.5	-1.00BL	1.4	79	BCI	2.16	2.03	1.57		2.5	19.8	0.17	22	BEATTY
	26	21:47:18	36.896	116.813	0.4	-1.00BL	1.2	80	ACI	1.61			2.08	1.9	19.9	0.12	15	BEATTY
	29	18: 9:57	35.220	117.720	12.6	0.00BL	9.9	329	DDU				1.86		113.1	0.21	6	***REGIONAL***
	29	22:37:25	36.892	116.814	0.4	-1.00BL	1.0	68	ACI	1.72			2.03	1.9	19.8	0.12	19	BEATTY

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DATE (UTC)	TIME (UTC)	LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
APR 30	22:23:23	36.895	116.811	0.8	-1.00BL	2.8	109	BCI	1.45			1.46		19.8	0.14	8	BEATTY
MAY 1	22:22:20	36.898	116.813	0.5	-1.00BL	0.9	121	BCI	2.27		1.00	1.52	2.0	20.0	0.17	13	BEATTY
2	22:54:18	36.892	116.815	0.3	-1.00BL	0.9	123	ACI	2.60		2.10		2.1	19.8	0.10	14	BEATTY
3	22:24:30	36.894	116.814	0.3	-1.00BL	0.6	122	ACI	2.40		1.48	1.81	2.0	19.9	0.10	14	BEATTY
6	22:18:57	36.894	116.807	0.4	-1.00BL	2.3	108	BCI	1.74			1.89	2.6	19.3	0.14	18	BEATTY
7	22:47:27	36.893	116.819	0.3	-1.00BL	0.6	124	BCI	2.69			1.19	2.2	20.2	0.22	15	BEATTY
8	22:30:20	36.892	116.821	0.4	-1.00BL	0.8	124	ACI	2.71		1.42		2.0	20.3	0.13	15	BEATTY
9	22:10:54	36.894	116.817	0.4	-1.00BL	0.6	123	ACI	2.18		1.00	1.50	1.9	20.1	0.11	15	BEATTY
10	22:29:52	36.894	116.824	0.6	-1.00BL	1.2	125	BCI	2.30			1.67	2.0	20.6	0.19	13	BEATTY
11	21:57:21	36.895	116.812	0.4	-1.00BL	0.8	121	BCI	2.62		1.22	2.03	2.1	19.8	0.19	13	BEATTY
13	22:25:23	36.894	116.815	0.4	-1.00BL	0.9	122	ACI	2.42			1.91	2.1	19.9	0.12	13	BEATTY
14	23:29:26	36.890	116.826	0.5	-1.00BL	0.8	126	BCI	2.63			1.61	2.1	20.5	0.16	16	BEATTY
15	22:53:23	36.898	116.820	0.4	-1.00BL	0.7	122	BCI	2.42			1.69	2.0	20.6	0.20	18	BEATTY
17	0:14:17	36.888	116.825	0.5	-1.00BL	0.9	127	BCI	2.57			1.69	2.2	20.4	0.15	15	BEATTY
17	22:17:25	36.900	116.815	0.4	-1.00BL	0.8	121	BCI	2.31				2.0	20.3	0.23	14	BEATTY
20	23: 3:20	36.895	116.812	0.3	-1.00BL	0.7	121	ACI	2.58			1.49	2.2	19.8	0.12	15	BEATTY
21	22:51:56	36.894	116.824	0.5	-1.00BL	0.7	125	BCI	2.51			2.09	2.0	20.7	0.17	18	BEATTY
22	22:17:28	36.893	116.820	0.4	-1.00BL	0.6	124	BCI	2.68				2.1	20.3	0.20	16	BEATTY
23	22: 6:46	36.894	116.811	0.4	-1.00BL	0.8	121	BCI	2.50			1.84	2.0	19.7	0.15	18	BEATTY
24	23:23:25	36.890	116.820	0.3	-1.00BL	0.6	125	ACI	2.71				2.0	20.1	0.15	17	BEATTY
28	22:25:48	36.896	116.822	0.4	-1.00BL	0.7	124	BCI	2.50			1.41	2.0	20.7	0.20	15	BEATTY
29	20: 5:52	36.373	114.914	2.2	-0.80BL	1.4	220	BDI	1.38	0.55		1.55		26.5	0.14	7	APEX
30	0:14:29	36.909	116.809	0.5	-1.00BL	14.0	164	CCI						20.5	0.07	9	BEATTY
30	0:14:33	36.934	116.831	8.4	-1.00BL	19.2	156	DCI	2.90			1.26	2.1	19.0	0.25	7	BEATTY
30	22:43: 1	36.899	116.813	0.5	-1.00BL	0.9	120	BCI	2.57				2.0	20.1	0.17	15	BEATTY
31	23: 4:38	36.892	116.820	0.5	-1.00BL	0.9	124	BCI	2.64			1.62	2.1	20.2	0.20	15	BEATTY
JUN 3	23: 9:26	36.895	116.810	0.3	-1.00BL	0.7	120	BCI	2.78				2.0	19.7	0.16	14	BEATTY
4	22:26:52	36.896	116.819	0.4	-1.00BL	0.6	123	BCI	2.51			1.55	2.0	20.4	0.17	17	BEATTY
5	22:19:53	36.904	116.815	0.5	-1.00BL	0.6	168	BCI	2.46			1.59	1.8	20.6	0.16	13	BEATTY
6	18: 9:60	36.418	114.851	10.1	2.46BL	27.4	242	DDI	1.20			1.21		29.3	0.37	6	DRY LAKE
6	22:28:33	36.892	116.821	0.5	-1.00BL	1.1	124	BCI	2.57			1.95	2.2	20.3	0.18	14	BEATTY
7	23:49:35	36.888	116.824	0.4	-1.00BL	0.7	127	BCI	2.65				2.6	20.3	0.17	19	BEATTY
10	22:27:55	36.892	116.822	0.4	-1.00BL	0.7	125	ACI	2.57			1.56	2.4	20.4	0.15	17	BEATTY
12	0: 5:55	36.897	116.815	0.4	-1.00BL	0.7	121	BCI	2.49			1.83	2.6	20.2	0.17	18	BEATTY
12	22:45:50	36.890	116.821	0.4	-1.00BL	0.7	111	BCI	2.36			1.67	2.7	20.2	0.15	17	BEATTY
13	22:25: 4	36.896	116.820	0.4	-1.00BL	0.7	123	BCI	2.48			1.91	2.5	20.4	0.19	17	BEATTY
14	22:22: 5	36.890	116.817	0.3	-1.00BL	0.5	124	ACI	2.49			1.50	2.4	19.8	0.11	17	BEATTY
18	0: 3: 4	36.894	116.825	0.6	-1.00BL	1.0	125	BCI	2.45			1.94	2.6	20.7	0.21	17	BEATTY
18	22:31:17	36.897	116.818	0.3	-1.00BL	3.1	122	BCI	2.61			1.84	2.7	20.3	0.07	12	BEATTY
20	23: 0:37	36.892	116.816	0.4	-1.00BL	0.6	123	ACI	2.59			1.90	2.5	19.9	0.14	16	BEATTY
21	23:27:39	36.898	116.820	0.4	-1.00BL	0.7	123	BCI	2.57				2.6	20.6	0.19	16	BEATTY
24	22:37:37	36.888	116.813	0.4	-1.00BL	0.7	123	ACI	2.64			1.38	2.7	19.5	0.12	15	BEATTY
25	22:22: 8	36.898	116.818	0.4	-1.00BL	0.7	122	BCI	2.38		2.40	2.04	2.5	20.4	0.20	16	BEATTY
26	18:13:14	36.360	114.927	1.2	-1.02BL	1.2	168	BCI	1.59			1.64		26.4	0.13	7	APEX

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DATE	TIME (UTC)	LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JUN 26	22:27: 8	36.888	116.826	0.5	-1.00BL	0.9	127	BCI	2.61				2.7	20.5	0.18	17	BEATTY
27	22:50:38	36.891	116.811	0.4	-1.00BL	0.8	122	ACI	2.72				2.5	19.5	0.12	15	BEATTY
JUL 1	22:29:39	36.897	116.820	0.4	-1.00BL	0.7	123	BCI	2.63				2.6	20.6	0.19	18	BEATTY
2	22:21:25	36.896	116.813	0.4	-1.00BL	0.7	121	ACI	2.38			1.47	2.6	19.9	0.15	16	BEATTY
3	20:53:57	36.890	116.827	0.6	-1.00BL	0.9	127	BCI	2.46				2.5	20.6	0.20	15	BEATTY
8	23:11:13	36.886	116.813	0.6	-1.02PB	1.0	87	ACI	2.24			1.62	2.3	22.5	0.14	12	BEATTY
9	22:24:25	36.892	116.807	0.5	-0.69PB	0.9	87	BCI	2.05		2.01	1.86	2.0	22.7	0.16	13	BEATTY
10	22:29:43	36.894	116.821	0.4	-1.00BL	0.6	124	BCI	2.70			1.78	2.7	20.4	0.17	16	BEATTY
12	22:59:44	36.893	116.810	0.5	-0.80PB	0.7	84	BCI	2.12		2.28	1.84	2.1	19.5	0.18	19	BEATTY
13	22:28:41	36.892	116.821	0.4	-1.00BL	0.7	124	BCI	2.54				2.6	20.4	0.17	16	BEATTY
15	22:27:20	36.888	116.817	0.5	-1.00BL	0.9	125	ACI	2.47			1.48	2.7	19.8	0.14	15	BEATTY
16	22:23: 7	36.890	116.822	0.5	-1.00BL	0.8	125	ACI	2.01		2.30	1.47	1.8	20.3	0.15	13	BEATTY
17	22:21:49	36.895	116.815	0.4	-1.00BL	0.8	122	ACI	2.66				2.5	20.0	0.13	15	BEATTY
18	23: 2:45	36.894	116.813	0.3	-1.00BL	0.7	122	ACI	2.54			2.04	2.5	19.8	0.09	13	BEATTY
19	22:36:16	36.896	116.823	0.4	-1.00BL	0.6	124	BCI	2.38		1.39	1.96	2.6	20.7	0.16	15	BEATTY
22	22:42:43	36.898	116.821	0.5	-1.00BL	0.7	123	BCI	2.53				2.6	20.6	0.22	16	BEATTY
23	22:38:48	36.898	116.819	0.4	-1.00BL	0.6	122	ACI	2.40			1.88	2.5	20.5	0.14	14	BEATTY
24	22:54:47	36.893	116.817	0.5	-1.00BL	1.6	110	BCI				2.17	2.5	20.0	0.21	24	BEATTY
25	23:38:15	36.895	116.811	0.4	-1.00BL	0.9	121	BCI	2.56			1.83	2.6	19.7	0.16	14	BEATTY
26	23:43:45	36.894	116.820	0.5	-1.00BL	0.8	124	BCI	2.47		2.68	1.52	2.6	20.4	0.16	14	BEATTY
30	0:20:12	36.892	116.814	0.5	-1.00BL	0.8	122	ACI	2.59				2.5	19.7	0.15	15	BEATTY
30	23: 2:47	36.892	116.820	0.3	-1.00BL	0.6	124	ACI	2.54			2.00	2.6	20.2	0.12	14	BEATTY
31	23:32:47	36.897	116.811	0.5	-1.00BL	0.9	120	BCI	2.28				2.6	19.9	0.17	15	BEATTY
AUG 2	22: 7:47	36.886	116.821	0.3	-1.00BL	0.5	126	ACI	1.82		2.15	1.65	1.8	20.0	0.10	16	BEATTY
5	23:28:50	36.892	116.820	0.4	-1.00BL	0.7	124	ACI	2.40			1.67	2.5	20.2	0.13	16	BEATTY
7	22:26:33	36.891	116.814	0.4	-1.00BL	0.8	122	ACI	2.47			1.98	2.5	19.7	0.14	15	BEATTY
9	0: 8: 1	36.897	116.818	0.4	-1.00BL	0.7	122	BCI	2.59				2.5	20.3	0.17	17	BEATTY
9	21:49:47	36.898	116.819	0.4	-1.00BL	0.7	122	ACI	1.59		1.89	1.46	0.9	20.5	0.13	13	BEATTY
12	22:29:21	36.891	116.818	0.2	-1.00BL	0.4	124	ACI	2.40			1.95	2.6	20.0	0.12	18	BEATTY
13	22:18:15	36.890	116.822	0.5	-1.00BL	0.9	125	BCI	2.09		2.20	1.66	2.0	20.2	0.18	16	BEATTY
14	15:59:52	37.074	116.758	0.4	0.45PB	0.6	133	ABI	1.04			0.70		8.5	0.10	10	SPRINGDALE
14	22:31: 3	36.891	116.817	0.3	-1.00BL	0.4	123	ACI	2.43		2.57	1.69	2.5	19.9	0.10	19	BEATTY
15	16:10:35	37.097	116.003	0.8	0.00BL	1.0	149	ACI	1.27		0.43	0.82		21.2	0.09	8	YUCCA FLAT
15	22:17:12	36.891	116.820	0.4	-1.00BL	0.6	124	ACI	2.53			1.89	2.6	20.1	0.14	18	BEATTY
16	22:45:18	36.894	116.816	0.4	-1.00BL	0.7	123	BCI	2.05		2.28	1.57	1.9	20.0	0.15	17	BEATTY
20	0:29:56	36.891	116.812	0.5	-1.00BL	0.8	122	BCI	2.69				2.6	19.6	0.16	15	BEATTY
20	23: 9:52	36.888	116.822	0.7	-1.00BL	1.2	126	BCI	2.03		2.29	1.62	2.1	20.2	0.23	17	BEATTY
21	22:28: 2	36.895	116.809	0.6	-1.00BL	1.7	120	BCI	2.47				2.6	19.6	0.22	15	BEATTY
22	23:13:55	36.894	116.817	0.4	-1.00BL	0.6	123	ACI	2.46				2.5	20.1	0.15	18	BEATTY
23	22:11:29	36.894	116.824	0.4	-1.00BL	0.6	125	BCI	2.13		2.26	1.77	2.0	20.7	0.15	18	BEATTY
26	22:28:24	36.893	116.810	0.6	-1.00BL	1.4	79	BCI	2.12		2.29	1.94	1.7	19.6	0.19	20	BEATTY
27	22:22:15	36.890	116.826	0.5	-1.00BL	0.8	126	BCI	2.43			1.85	2.5	20.5	0.18	16	BEATTY
28	22:23:53	36.892	116.812	0.4	-1.00BL	0.7	122	BCI	1.90		1.98	1.48	1.8	19.6	0.15	19	BEATTY
29	18:17:17	36.365	114.913	1.8	-2.02BL	1.9	179	BCI	1.24			1.25		27.1	0.14	6	APEX

1991 LOCAL HYPOCENTER SUMMARY - SGB CHEMICAL EXPLOSIONS

DATE		TIME (UTC)	LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
AUG	29	22:28:55	36.895	116.811	0.4	-1.00BL	0.8	121	ACI	1.51		2.20	1.61	1.8	19.7	0.14	15	BEATTY
	30	18: 8:40	36.376	114.899	1.9	-1.25BL	1.2	224	BDI	1.54		1.29	1.49		27.5	0.09	6	DRY LAKE NW
	30	23:53:55	36.893	116.809	0.5	-1.00BL	0.9	121	BCI	2.60				2.6	19.4	0.16	15	BEATTY
SEP	2	18:39:51	36.915	116.862	0.5	13.98PB	1.3	129	ABI	1.35		1.49	0.92		17.1	0.13	19	BEATTY
	3	22:20:55	36.895	116.822	0.5	-1.00BL	0.8	124	BCI	2.02		2.19	1.69	2.0	20.6	0.16	17	BEATTY
	4	23:32:17	36.893	116.819	0.4	-1.00BL	0.6	124	ACI	2.41				2.5	20.2	0.13	17	BEATTY
	5	23: 9:31	36.894	116.820	0.4	-1.00BL	0.7	123	ACI	2.04		2.31	1.57	1.7	20.3	0.14	15	BEATTY
	6	22:43:16	36.893	116.827	0.4	-1.00BL	0.7	126	BCI	2.48			1.82	2.5	20.8	0.17	17	BEATTY
	8	18:48:26	36.915	116.864	0.5	13.53PB	2.0	129	BBI	1.24		1.49	0.85		17.0	0.13	17	BEATTY
	9	23: 7:27	36.893	116.821	0.4	-1.00BL	0.7	124	BCI	2.31		2.58	1.95	2.5	20.3	0.17	18	BEATTY
	10	22:21:28	36.890	116.830	0.5	-1.00BL	0.8	128	BCI	2.34		2.48		2.5	20.9	0.19	20	BEATTY
	11	22:33:17	36.895	116.816	0.4	-1.00BL	0.6	122	ACI	2.15		2.43	1.88	2.0	20.2	0.13	16	BEATTY
	12	22:16:60	36.893	116.824	0.6	-1.00BL	3.7	125	BCI	2.23		2.25	1.72	2.0	20.6	0.15	15	BEATTY
	13	22:27:20	36.895	116.811	0.5	-1.00BL	0.8	121	BCI	2.27			1.99	2.5	19.8	0.16	16	BEATTY
	15	20:34:39	36.916	116.857	1.0	10.81PB	5.2	172	CCI	1.22		1.12	0.47		17.5	0.14	12	BEATTY
	16	22:29:48	36.892	116.818	0.4	-1.00BL	0.7	123	ACI	2.50			1.83	2.6	20.1	0.15	16	BEATTY
	17	22:23: 2	36.891	116.827	0.6	-1.00BL	1.0	126	BCI	2.28			1.72	2.5	20.7	0.20	16	BEATTY
	18	22:33: 3	36.890	116.816	0.4	-1.00BL	0.9	124	ACI	2.54			1.96	2.6	19.8	0.14	17	BEATTY
	19	21:56:42	36.900	116.815	0.3	-1.00BL	0.7	120	ACI	2.34			1.83	2.5	20.3	0.09	14	BEATTY
	20	18:46:49	36.383	114.910	3.4	-1.57BL	1.4	223	CDI	1.46		1.31	1.44		26.2	0.12	6	DRY LAKE NW
	20	22:45: 1	36.894	116.809	0.6	-1.00BL	0.9	120	BCI	2.50			1.80	2.5	19.5	0.19	17	BEATTY
	21	18: 9:36	36.913	116.862	0.5	12.00PB	2.2	129	BBI	1.31		1.46	0.72		17.2	0.11	14	BEATTY
	23	22:23: 3	36.892	116.816	0.4	-1.00BL	0.6	123	ACI	2.53			1.96	2.5	19.9	0.12	17	BEATTY
	24	22:18:16	36.897	116.815	0.5	-1.00BL	1.0	121	BCI	2.06		2.32	1.81	1.8	20.1	0.17	17	BEATTY
	25	22:47: 3	36.894	116.814	0.5	-1.00BL	1.2	122	ACI	2.46				2.6	19.9	0.14	16	BEATTY
	26	23: 7:38	36.895	116.818	0.3	-1.00BL	0.7	123	ACI	2.29				2.5	20.2	0.13	15	BEATTY
	27	22:43:33	36.898	116.822	0.4	-1.00BL	0.6	123	BCI	2.30			1.90	2.5	20.8	0.16	16	BEATTY
	30	22:58:31	36.889	116.820	0.4	-1.00BL	0.7	125	BCI	2.39			1.86	2.6	20.0	0.16	16	BEATTY
OCT	1	23:11:44	36.901	116.818	0.5	-1.00BL	0.9	121	BCI	2.15		2.30	1.75	1.9	20.7	0.17	15	BEATTY
	2	22:56:27	36.894	116.821	0.5	-1.00BL	0.8	124	BCI	2.19		2.28	1.77	2.0	20.4	0.21	20	BEATTY
	3	23:49: 5	36.890	116.819	0.3	-1.00BL	0.5	124	ACI	2.32			1.84	2.5	20.0	0.13	19	BEATTY
	4	22:48: 4	36.886	116.815	0.4	-1.00BL	0.7	124	BCI	2.42			1.70	2.5	19.5	0.17	17	BEATTY
	5	21:55: 8	36.891	116.817	0.5	-1.00BL	1.1	123	ACI	2.27			1.75	2.1	20.0	0.15	13	BEATTY
	7	22:31:46	36.895	116.813	0.4	-1.00BL	0.7	121	ACI	2.54			1.91	2.6	19.9	0.11	15	BEATTY
	9	0:21:33	36.897	116.818	0.4	-1.00BL	0.8	122	ACI	2.12		2.28	1.61	1.8	20.3	0.12	15	BEATTY
	9	22:44:18	36.890	116.818	0.4	-1.18BL	0.6	124	ACI	2.48			1.96	2.6	20.0	0.13	22	BEATTY
	10	22:26: 6	36.891	116.822	0.5	-1.00BL	0.9	125	BCI	2.50			1.93	2.6	20.3	0.20	16	BEATTY
	11	21:50: 9	36.889	116.818	0.6	-1.00BL	0.9	124	BCI	2.41			1.66	2.5	19.9	0.19	17	BEATTY
	14	22:41:47	36.889	116.810	0.4	-1.00BL	0.6	122	ACI	2.54			2.10	2.7	19.3	0.13	16	BEATTY
	15	22:57: 8	36.893	116.818	0.4	-1.00BL	0.6	123	ACI	2.30			1.79	2.6	20.1	0.13	17	BEATTY
	16	18:14:40	36.414	114.840	7.1	1.38BL	30.0	242	DDI	1.39			1.53		30.5	0.23	6	DRY LAKE
	16	22:55:10	36.891	116.829	0.8	-1.00BL	1.4	127	BCI	2.24		2.38	1.68	2.5	20.8	0.22	14	BEATTY
	17	23:50: 8	36.890	116.815	0.3	-1.00BL	0.7	123	ACI	2.36		2.38	1.68	2.7	19.7	0.12	18	BEATTY
	18	22:43:48	36.898	116.813	0.4	-1.00BL	1.0	120	ACI	2.31		2.46	1.84	2.5	20.1	0.10	14	BEATTY

1991 LOCAL HYPOCENTER SUMMARY – SGB CHEMICAL EXPLOSIONS

DATE	– TIME (UTC)	LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
OCT 22	23: 9:31	36.892	116.816	0.4	-1.00BL	0.9	123	ACI	2.39			1.75	2.6	19.9	0.11	16	BEATTY
23	22:32:50	36.891	116.821	0.4	-1.00BL	0.7	125	BCI	2.11		2.56	1.72	2.6	20.2	0.16	15	BEATTY
24	22:48:32	36.892	116.817	0.3	-1.00BL	0.6	123	ACI	2.27		2.53	1.83	2.6	20.0	0.11	15	BEATTY
25	22:15:32	36.898	116.817	0.5	-1.00BL	0.9	122	ACI	2.31		2.52	1.98	2.6	20.4	0.14	16	BEATTY
29	0:23:18	36.891	116.812	0.4	-1.00BL	1.2	122	ACI	2.55		2.54	1.92	2.4	19.5	0.10	12	BEATTY
29	23:49:41	36.895	116.815	0.5	-1.00BL	0.9	122	BCI	2.49				2.5	20.0	0.15	14	BEATTY
31	0:38:43	36.894	116.816	0.4	-1.00BL	0.7	122	ACI	2.11		2.37	1.75	1.9	20.0	0.14	17	BEATTY
NOV 1	0:22:54	36.892	116.813	0.4	-1.00BL	0.7	122	ACI	2.60			1.91	2.6	19.7	0.14	17	BEATTY
2	0:23: 8	36.891	116.818	0.3	-1.00BL	0.6	124	ACI	2.53				2.5	20.0	0.12	18	BEATTY
2	19:18:60	36.896	116.821	0.4	-1.00BL	0.8	123	BCI	2.07		2.28	1.72	2.7	20.6	0.17	16	BEATTY
5	1: 3: 8	36.893	116.814	0.3	-1.00BL	0.5	122	ACI	2.56				2.1	19.8	0.08	13	BEATTY
5	19: 6:32	36.383	114.895	3.1	0.10BL	2.7	226	CDI	1.33			1.22		27.4	0.12	6	DRY LAKE NW
5	23:48:19	36.889	116.818	0.4	-1.00BL	0.6	124	ACI	2.45			1.67	2.6	19.9	0.13	17	BEATTY
6	19:28:29	35.948	115.229	—	0.00BL	—	189	ADI	1.67			1.64		42.9	0.06	4	SLOAN
6	23:44: 7	36.895	116.814	0.4	-1.00BL	0.7	122	ACI	2.15		2.36	1.68	2.1	19.9	0.12	17	BEATTY
7	23:48: 9	36.895	116.817	0.4	-1.00BL	0.7	123	ACI	2.52			1.44	2.5	20.2	0.12	16	BEATTY
9	22:52: 7	36.896	116.819	0.5	-1.00BL	0.9	123	BCI	2.59				2.5	20.4	0.16	16	BEATTY
12	0: 2:14	36.890	116.815	0.4	-1.00BL	0.8	123	ACI	2.44			1.91	2.6	19.8	0.13	16	BEATTY
12	23:40:44	36.894	116.815	0.4	-1.00BL	0.8	122	ACI	2.06		2.34	1.64	1.7	19.9	0.12	15	BEATTY
13	23:45:15	36.892	116.812	0.4	-1.00BL	0.9	122	ACI	2.30			1.89	2.5	19.6	0.14	15	BEATTY
14	23:17:11	36.890	116.822	0.5	-1.00BL	0.9	125	BCI	2.45		2.62	1.87	2.6	20.3	0.20	15	BEATTY
15	23:40:15	36.887	116.827	0.6	-1.00BL	0.9	128	BCI	2.31		2.57	1.79	2.5	20.5	0.23	17	BEATTY
18	23:50: 8	36.892	116.823	0.5	-1.00BL	0.8	125	BCI	2.41			1.73	2.6	20.4	0.19	16	BEATTY
19	23:41: 6	36.895	116.816	0.4	-1.00BL	0.7	122	ACI	2.20		2.30	1.55	1.9	20.1	0.13	16	BEATTY
20	23:14: 9	36.890	116.816	0.5	-1.00BL	0.9	124	BCI	2.43			1.93	2.5	19.8	0.16	17	BEATTY
21	23:51:28	36.889	116.818	0.3	-1.00BL	0.5	124	ACI	2.34			1.86	2.6	19.9	0.14	17	BEATTY
22	23:11:34	36.895	116.811	0.3	-1.00BL	0.7	121	ACI	2.49				2.5	19.7	0.14	15	BEATTY
26	0:10: 4	36.897	116.826	0.6	-1.00BL	0.9	124	BCI	2.23		2.22	1.85	2.0	20.9	0.22	16	BEATTY
26	23:46:20	36.890	116.811	0.4	-1.00BL	0.7	122	ACI	2.50		2.50	1.61	2.5	19.4	0.13	16	BEATTY
27	18:59:41	36.367	114.925	1.8	-1.37BL	1.7	178	BCI	1.65		1.86	1.66		26.1	0.11	6	APEX
27	23:24: 3	36.892	116.818	0.4	-1.00BL	0.7	124	ACI	2.33			1.67	2.6	20.1	0.13	16	BEATTY
DEC 1	22:57:52	36.884	116.826	0.3	-1.00BL	0.5	128	ACI	2.28		2.61	1.72	2.6	20.2	0.09	13	BEATTY
3	0: 1:57	36.888	116.823	0.6	-1.10BL	1.0	126	BCI	2.34		2.66	1.73	2.4	20.2	0.20	14	BEATTY
3	23:10:54	36.892	116.823	0.4	-1.00BL	0.6	125	BCI	2.25			1.96	2.6	20.4	0.16	16	BEATTY
4	23:43:10	36.886	116.824	—	-1.10BL	—	158	ADI						20.1	0.01	4	BEATTY
5	23: 6:19	36.891	116.828	0.7	-1.10BL	1.0	127	BCI	2.43			1.91	2.5	20.8	0.20	14	BEATTY
6	23:40:22	36.896	116.825	0.5	-1.10BL	0.8	125	BCI	2.26		2.50	1.90	2.6	20.8	0.17	15	BEATTY
9	23:45: 2	36.893	116.828	0.5	-1.10BL	0.8	126	BCI	1.94		2.03	1.51	1.8	20.9	0.17	16	BEATTY
10	23:40:16	36.893	116.811	0.4	-1.10BL	1.0	79	ACI	2.49				2.2	19.6	0.13	22	BEATTY
11	23:46:14	36.891	116.816	0.3	-1.00BL	0.6	123	ACI	2.23			1.80	2.6	19.9	0.14	15	BEATTY
12	23:40:10	36.891	116.813	0.3	-1.10BL	0.6	122	ACI	2.37				2.5	19.6	0.11	16	BEATTY

Appendix C

Nuclear device tests and low-frequency shallow seismicity in the NTS, 1991

Hypocenter data for announced Nevada Test Site underground nuclear device tests that were detonated in 1991 are listed in table C1, as they are reported to the National Earthquake Information Center (NEIC) by the Department of Energy. Magnitude estimates are provided by Berkeley Seismographic Laboratory (BRK) or by the NEIC. Ground vibration from most NTS nuclear detonations saturates all or most SGBSN stations for several tens of seconds; thus, only initial P-wave arrival times can be reliably scaled from SGBSN seismograms of those tests.

Relatively high levels of seismicity are regularly recorded in the vicinity of many NTS nuclear explosions by SGBSN stations for periods ranging from hours to days following the tests. The seismicity listed in Appendix C, table C2 (located events) and Table C3 (unlocated events), consists of events having characteristically lower-frequency P-wave coda and S-wave coda than the vast majority of earthquakes in the SGB. Most low-frequency local earthquakes, which we designate "LFE's," are associated in time and space with nuclear-device testing at Pahute Mesa, Yucca Flat, and in a few instances, at Rainier Mesa. Some of these events may be identified as the collapse of a given test. LFE seismicity is usually recorded by SGBSN stations at high levels until the time of the cavity collapse, after which the LFE seismicity level abruptly and sharply diminishes. Good examples of this pattern may be seen in table C3, for the events following the April 1991 tests BEXAR and MONTELLO at Pahute Mesa. In some instances, a heightened level of LFE seismicity continues for days to weeks following the collapse. This pattern was observed for the Pahute Mesa test LOCKNEY (Harmsen and others, 1991). Detectable LFEs rarely continue at a high level for more than a few hours following nuclear-device tests (or collapses, if any) at Yucca Flat or at Rainier Mesa. For example, relatively high levels were detected for about 4 hours following the Yucca Flat test LUBBOCK (and its cavity collapse) in October 1991 (see table C3).

Figure C1 is a plot of nuclear-device test epicenters listed in table C1 and of LFE epicenters listed in Table C2. Figure C2 displays several SGBSN seismograms for a pre-collapse LFE from BEXAR (note the high level of pre-P vibration at the nearest station to the hypocenter, **EPM**). A few LFE hypocenters outside the NTS are included in table C2. Most such LFE hypocenters from this and previous SGBSN catalogs are probably inaccurate due to low signal-to-noise ratios at near-source stations at the time of presumed P-wave onsets. However, it is possible that some LFE's occur at relatively great distances from the nearest underground nuclear test (15 km?, Harmsen and others, 1991). These events may be indicators of slow strain diffusion in shallow crustal rock at the NTS. The relative abundance of LFE's at random times in June and July 1991 provides evidence of ongoing shallow seismic strain release at northern NTS. Whether this "delayed" LFE seismicity is more closely associated with nuclear explosions or with temporal variations in the regional shallow-crust strain field is, in my opinion, not known.

Table C1. Announced nuclear-device tests at Nevada Test Site in calendar year 1991.

YRMODA	HR MN SEC. UTC	M_L or M_b SRC	Latitude °N	Longitude °W	Depth (km)	NAME
910308	21 02 45.08	4.6 BRK	37.1044	116.0740	-0.95	COSO BRONZE/GRAY/SILVER
910404	19 00 00.00	5.4 BRK	37.2961	116.3129	-1.54	BEXAR
910416	15 30 00.07	5.4 BRK	37.2454	116.4416	-1.39	MONTELLO
910815	16 00 00.00	4.0 BRK	37.0873	116.0018	-0.81	FLOYDADA
910914	19 00 00.0	5.5 NEIC	37.2256	116.4281	-1.32	HOYA
910919	16 30 00.0	4.0 NEIC	37.2357	116.1664	-1.68	DISTANT ZENITH
911018	19 12 00.00	5.1 BRK	37.0634	116.0453	-0.78	LUBBOCK
911126	18 35 0.073	4.6 BRK	37.0965	116.0696	-0.82	BRISTOL

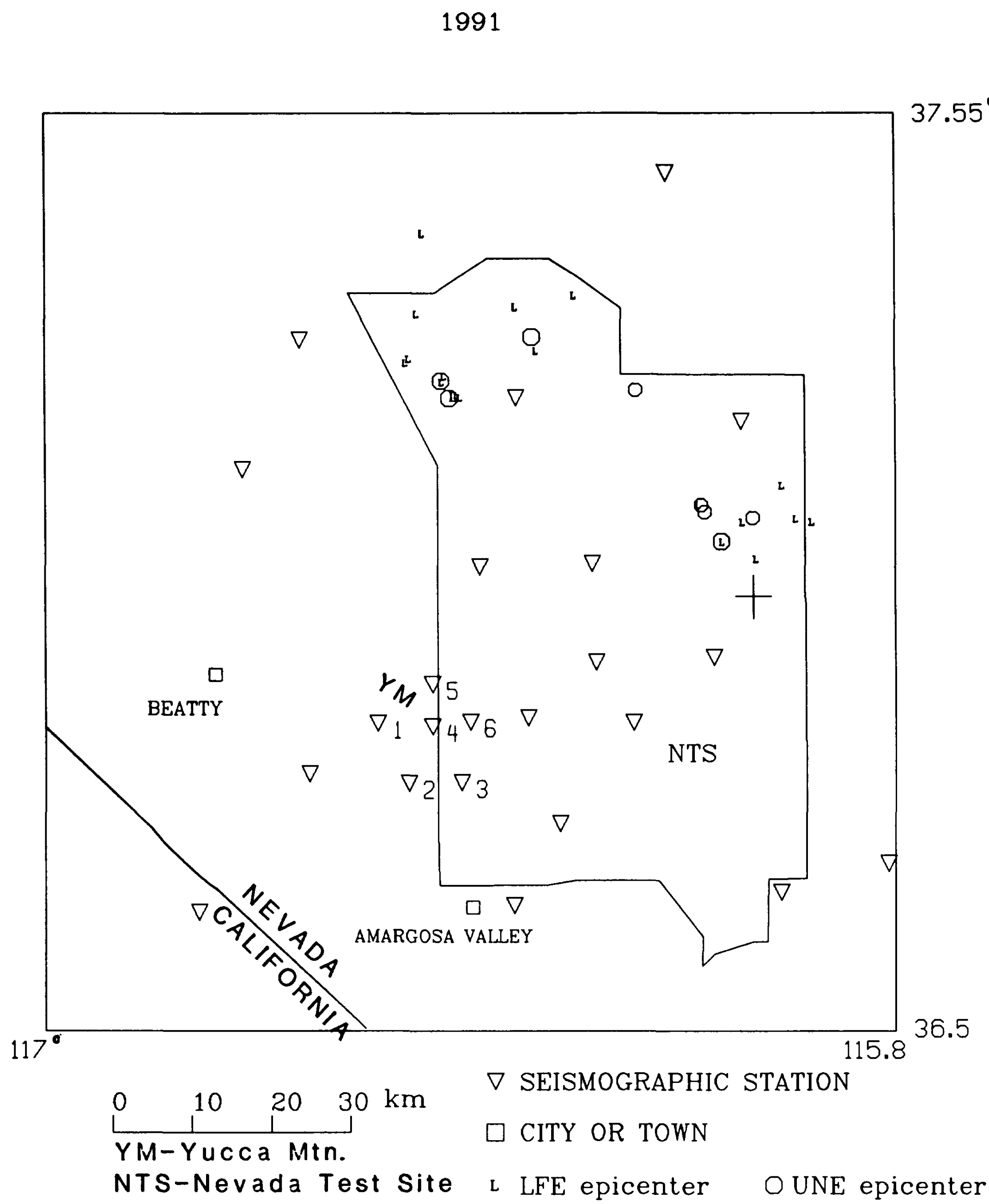


Figure C1. Epicenters for announced NTS nuclear device tests detonated during the calendar year 1991 are shown in map view (octogon symbols), along with some nuclear-testing-induced activity ("L" symbols). Location uncertainty of the "Ls" is high, due to low signal-to-noise ratios in the seismograms of SGBSN instruments that record the collapses.

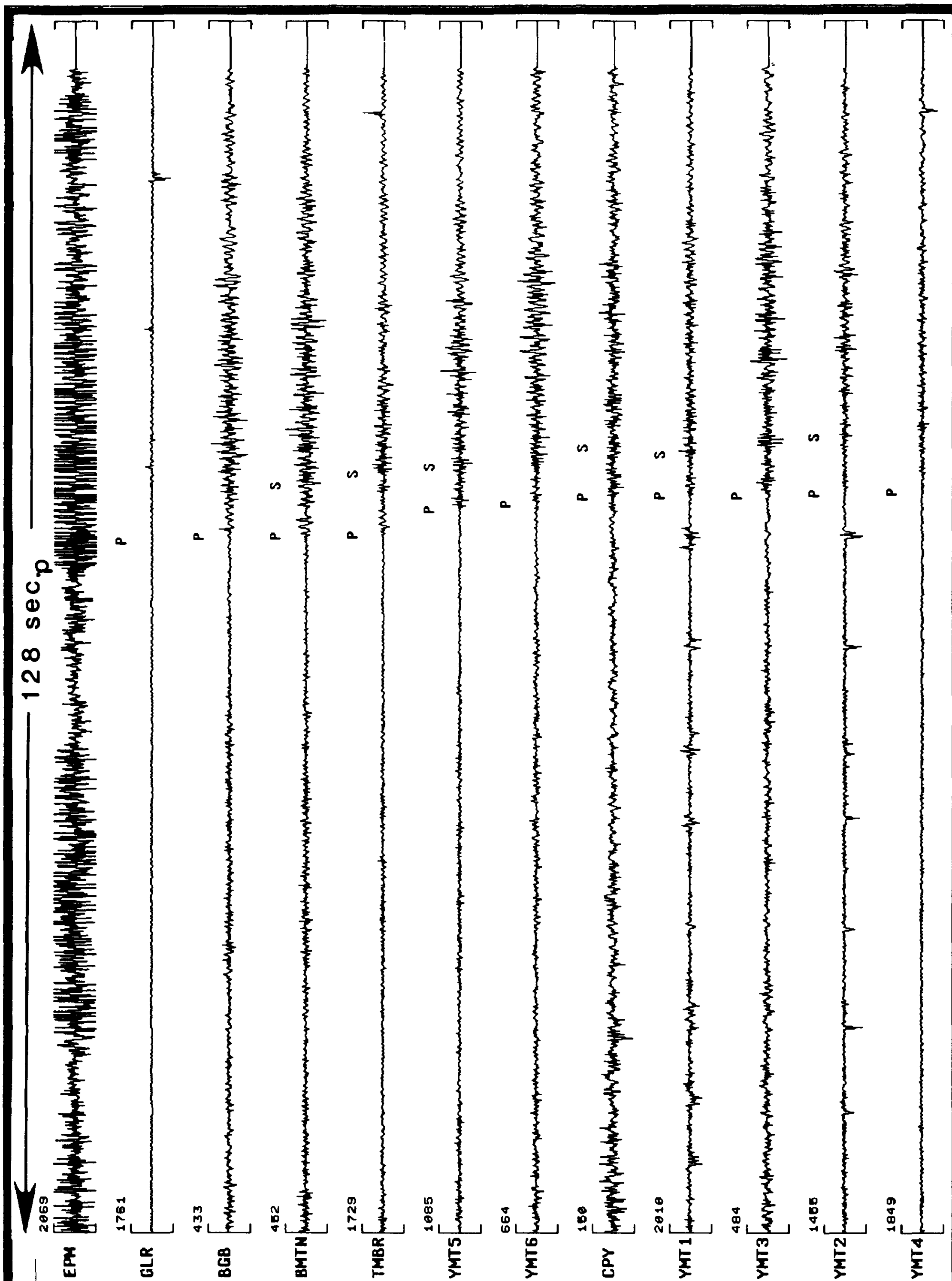


Figure C2.– Seismograms from several SGBSN stations for two or more induced low-frequency events occurring about 5 hrs after the Silent Canyon nuclear device test BEXAR (1991-04-04). The nearest SGBSN station, **EPM**, records almost continuous ground vibration for several hours following larger Silent Canyon Caldera tests.

TABLE C2.

1991 LOCAL HYPOCENTER SUMMARY – SGB LOW-FREQUENCY PHENOMENA

DATE – TIME (UTC)			LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
FEB	7	8:25:29	37.265	116.490	0.6	9.28	1.0	133	BBI	1.81			1.54	1.5	13.6	0.17	18	SILENT BUTTE
	7	17:34:15	37.414	116.467	3.0	22.62	1.5	282	CDI	1.56		2.09	0.97		20.5	0.12	7	GOLD FLAT EAST
	7	21:52:46	37.343	116.252	2.8	14.27	3.5	299	CDI	1.11		1.86	0.89	1.5	14.9	0.25	8	DEAD HORSE FLAT
	10	16: 1:21	37.321	116.475	2.6	14.14	2.5	232	CDI	1.58		2.33	1.37	1.8	15.0	0.13	8	SILENT BUTTE
MAR	6	17:57:57	37.330	116.336	2.8	12.72	1.2	278	CDI	1.26		1.91	0.90	1.6	11.5	0.15	8	DEAD HORSE FLAT
	8	21:28:13	37.104	116.077	1.0	19.23	1.7	148	BCI	1.45			1.22		11.8	0.16	11	YUCCA FLAT
	8	21:39:19	37.126	115.960	1.5	-1.67	1.2	222	BDI	2.71			2.04	2.4	9.5	0.22	13	JANGLE RIDGE (COSO COLLAPSE *)
APR	5	0: 1:39	37.280	116.306	2.0	1.79	2.9	197	BDI				1.56		6.5	0.25	11	DEAD HORSE FLAT
JUN	4	4:25:14	37.250	116.436	0.3	-0.70	0.3	123	ABI	1.69			1.40	2.3	9.4	0.08	13	SILENT BUTTE
AUG	15	16:12:15	37.088	115.941	0.8	1.66	1.7	128	ACI	1.80		1.47	1.31		14.0	0.12	8	PAIUTE RIDGE
	15	16:16:45	37.082	116.014	0.7	0.26	1.4	75	BCI	1.64		1.74	1.47	2.1	13.0	0.22	23	YUCCA FLAT (FLOWDADA COLLAPSE*)
	15	16:17:18	37.085	115.918	1.4	-1.0*	2.5	251	BDI	1.88		1.27	1.54	2.1	15.4	0.20	11	PAIUTE RIDGE (FLOWDADA COLLAPSE*)
	20	16:26:43	37.270	116.486	0.5	5.36	3.1	80	BCI	2.19		1.93	1.97	2.6	13.9	0.17	23	SILENT BUTTE
SEP	14	20: 4:43	37.227	116.422	0.3	2.93	2.9	46	BCI	2.74		3.24	2.95	2.5	20.6	0.15	39	SCRUGHAM PEAK
	17	14:32:21	37.228	116.418	0.5	-0.53	0.4	113	ABI	2.42			1.66	2.4	7.4	0.12	13	SCRUGHAM PEAK
	20	2:39:11	37.225	116.413	0.9	2.81	1.8	86	BBI	1.89			1.53	2.0	6.9	0.18	15	SCRUGHAM PEAK
	20	2:39:11	37.225	116.413	0.9	2.81	1.8	86	BBI	1.89			1.53	2.0	6.9	0.18	15	SCRUGHAM PEAK
OCT	18	19:59:38	37.043	115.997	1.9	9.34	3.0	222	BDI	1.09			0.98		17.4	0.22	12	PAIUTE RIDGE
	18	20: 5:25	37.062	116.044	1.0	-1.85	1.4	146	BCI	1.35		1.10	1.19		14.9	0.28	17	YUCCA FLAT
NOV	5	19:49:39	37.244	116.439	0.6	4.90	1.6	171	ACI	1.87		2.36	1.25	1.5	9.5	0.10	11	SCRUGHAM PEAK

* Nuclear-device test collapse times provided by S. R. Taylor, Los Alamos National Laboratory (1991, written commun.).

TABLE C3. 1991 SGB LOW-FREQUENCY EVENTS WITHOUT HYPOCENTER DETERMINATIONS

MONTH	DA HR:MN	DA HR:MN	DA HR:MN	DA HR:MN	DA HR:MN	DA HR:MN	DA HR:MN
JANUARY	02 11:17	04 16:42	04 20:00	04 20:14	06 19:19		
FEBRUARY	16 13:46	23 20:44					
MARCH	ALL LOW-FREQUENCY EVENTS IN MARCH HAVE HYPOCENTERS (see table C2).						
APRIL	04 19:16	04 19:23	04 19:25	04 19:29	04 19:32	04 19:45	04 19:47
	04 19:48	04 19:54	04 20:01	04 20:03	04 20:06	04 20:10	04 20:12
	04 20:15	04 20:21	04 20:28	04 20:42	04 20:47	04 20:54	04 20:56
	04 21:00	04 21:09	04 21:27	04 21:31	04 21:45	04 22:00	04 22:02
	04 22:34	04 22:37	04 22:41	04 22:53	04 23:02	04 23:30	04 23:33
	04 23:40	04 23:42	04 23:48	04 23:50	04 23:52	05 00:00	05 00:04
	05 00:11	05 00:12	05 00:14	05 00:19	05 00:25	05 00:28	05 00:33
	05 00:36	05 00:41*	05 02:56	05 04:29	09 00:22	09 04:25	09 06:29
	09 06:31	13 17:04	13 17:18	16 15:38	16 15:41	16 15:43	16 15:48
	16 15:49	16 15:52	16 15:54	16 15:56	16 15:58	16 15:59	16 16:02
	16 16:05	16 16:09	16 16:10	16 16:12	16 16:16	16 16:20	16 16:23
	16 16:24	16 16:26	16 16:30	16 16:33	16 16:35	16 16:41	16 16:44
	16 16:47	16 16:54	16 16:57	16 17:00	16 17:03	16 17:10	16 17:13
	16 17:15	16 17:20	16 17:22	16 17:24	16 17:29	16 17:44	16 17:45
	16 17:51	16 17:55	16 17:58	16 18:01	16 18:02	16 18:04	16 18:08
	16 18:13	16 18:16	16 18:17	16 18:22	16 18:23	16 18:25	16 18:27
	16 18:31	16 18:34	16 18:44	16 18:47	16 18:48	16 18:50	16 18:52
	16 18:54	16 18:56	16 19:04	16 19:06	16 19:15	16 19:17	16 19:21
	16 19:27	16 19:31	16 19:38*				
MAY	29 20:32						
JUNE	01 00:17	07 20:14	14 22:18	16 14:14	17 00:17	17 04:29	18 09:32
	18 09:53	18 19:36	25 01:54				
JULY	04 00:23	06 19:52	09 01:20	12 20:31	13 12:04	13 14:19	13 18:38
	13 21:17	14 18:23	14 20:36	14 22:33	16 00:15	16 03:23	16 04:14
	16 04:24	16 04:31	16 04:47	18 04:53	18 12:28	23 00:11	28 22:25
AUGUST	01 12:23	01 21:05	03 06:08	15 16:10	15 16:11	15 16:16*	19 15:26
	20 16:26	20 17:31	25 04:43	26 10:00	28 13:04		
SEPTEMBER	02 00:14	12 03:35	14 19:06	14 19:07	14 19:09	14 19:11	14 19:13
	14 19:15	14 19:20	14 19:24	14 19:25	14 19:29	14 19:31	14 19:32
	14 19:34	14 19:38	14 19:43	14 19:46	14 19:48	14 19:50	14 19:56
	14 19:58	14 19:59	14 20:04	14 20:12	14 20:14	14 20:21	14 20:22
	14 20:26	14 20:29*	19 21:38	19 21:43	20 02:39	23 10:47	26 16:05
	27 00:57	27 18:47					
OCTOBER	01 20:16	02 02:35	05 04:40	08 10:49	16 11:29	18 19:18*	18 19:41
	18 19:43	18 19:49	18 19:59	18 20:05	18 20:34	18 21:14	18 21:28
	18 21:34	18 21:43	18 21:51	18 21:53	18 22:02	18 22:06	18 22:27
	18 22:36	18 22:40	18 22:46	18 22:47	18 22:59	18 23:00	18 23:01
	18 23:03	18 23:06	18 23:12	18 23:19			
NOVEMBER	03 03:37	06 23:33	13 00:05	26 18:36	26 18:59	26 19:09	26 19:25
	26 19:30	26 19:34	26 20:07	26 20:14	26 20:15	26 20:51	26 21:20
	26 21:26	26 21:40	26 21:49	26 21:51	26 21:58	26 22:23	26 22:25
	26 22:32	26 22:34	26 22:47	26 22:54	26 22:58	26 23:01	26 23:13
	26 23:24	26 23:29	26 23:35	26 23:37	26 23:38	26 23:42	26 23:44
DECEMBER	NONE.						

* Collapse time is at or shortly following this low-frequency event time (S. R. Taylor, Los Alamos National Laboratory, 1991, written commun.).

Appendix D

Southern Great Basin earthquake focal mechanisms for 1991

The focal mechanisms of Appendix D were obtained by selecting the best-fitting solution(s) from the application of the computer program "FOCMEC" (Snoke and others, 1984) to the ray data generated by HYPO71, and in some instances, to amplitude data. We plot data on the lower focal hemisphere using the equal-area projection (Lee and Stewart, 1979). The symbols represent first-motion $P-$polarities, and their positions represent the points where the HYPO71-determined raypaths intersect the focal hemisphere. The darkened circles represent impulsive compressional arrivals, the + symbols represent emergent compressionals, the open circles represent impulsive dilitationals, the − symbols represent emergent dilatationals, and the × symbols represent indeterminate or nodal readings. The + symbol at the center of each mechanism is *not* a compression; it is a point of reference for readers who may wish to search for alternative solutions using a Schmidt (equal area) net. SGBSN station names are printed adjacent to the first-motion symbol for many of the solutions presented in Appendix D. In the following figures the **P** and **T** symbols represent the pressure and tension axes, respectively. The **X** and **Y** symbols represent slip vectors for each nodal plane, and **B** is the null axis. Primed **P** and **T** symbols are the respective vectors for alternate (dashed) solutions when they are presented. Some mechanisms from previous SGB data reports are composited using data from several events that are clustered in time and space. Composite solutions are not present in the 1991 data set.

For one mechanism, shown in figure D7, the information contained in P-wave polarities was not adequate to effectively constrain the range of permissible nodal planes. For this earthquake (1991-05-15 20:01 UTC), first motion P- and SV-amplitude data were gathered at station **NOP**, indicated by a large square around its P-polarity symbol. The observed and theoretical far-field $\log_{10}(SV/P)_z$ ratios and the difference between the logarithms of observed and theoretical ratios are computed for hundreds of potential solutions whose nodal planes conform to P-wave first-motion polarities. The preferred nodal planes shown in figure D7 correspond to the "optimum" solution, having the minimum theoretical-to-observed ratio difference and no polarity inconsistencies. In general, five or six SV/P ratios should be computed, but for this earthquake all near-source stations' SV-wave amplitudes were overdriven.

Kisslinger and others (1981 and 1982) and Rogers and others (1987b) discuss several assumptions that must be satisfied for the $(SV/P)_z$ amplitude ratio method to be valid. Their comments and observations are included herein by reference. For completeness, the actual formula used to compute the theoretical (SV/P) amplitude ratio, as coded in *focmec.for*, is explicitly stated (from Kisslinger and others, 1981 and 1982). The formula for the ratio of SV to P wave-displacement amplitude in the far field for elastic waves leaving a shear dislocation point source may be written

$$(SV/P)_0 = \left(\frac{V_p}{V_s}\right)^3 \cot\phi$$

$$\left[1 - \frac{(\cot\delta - \tan\delta)\sin\lambda\tan\phi\sin A + 2\sin\lambda + \csc\delta\cos\lambda\tan\phi\cos A}{2D}\right],$$

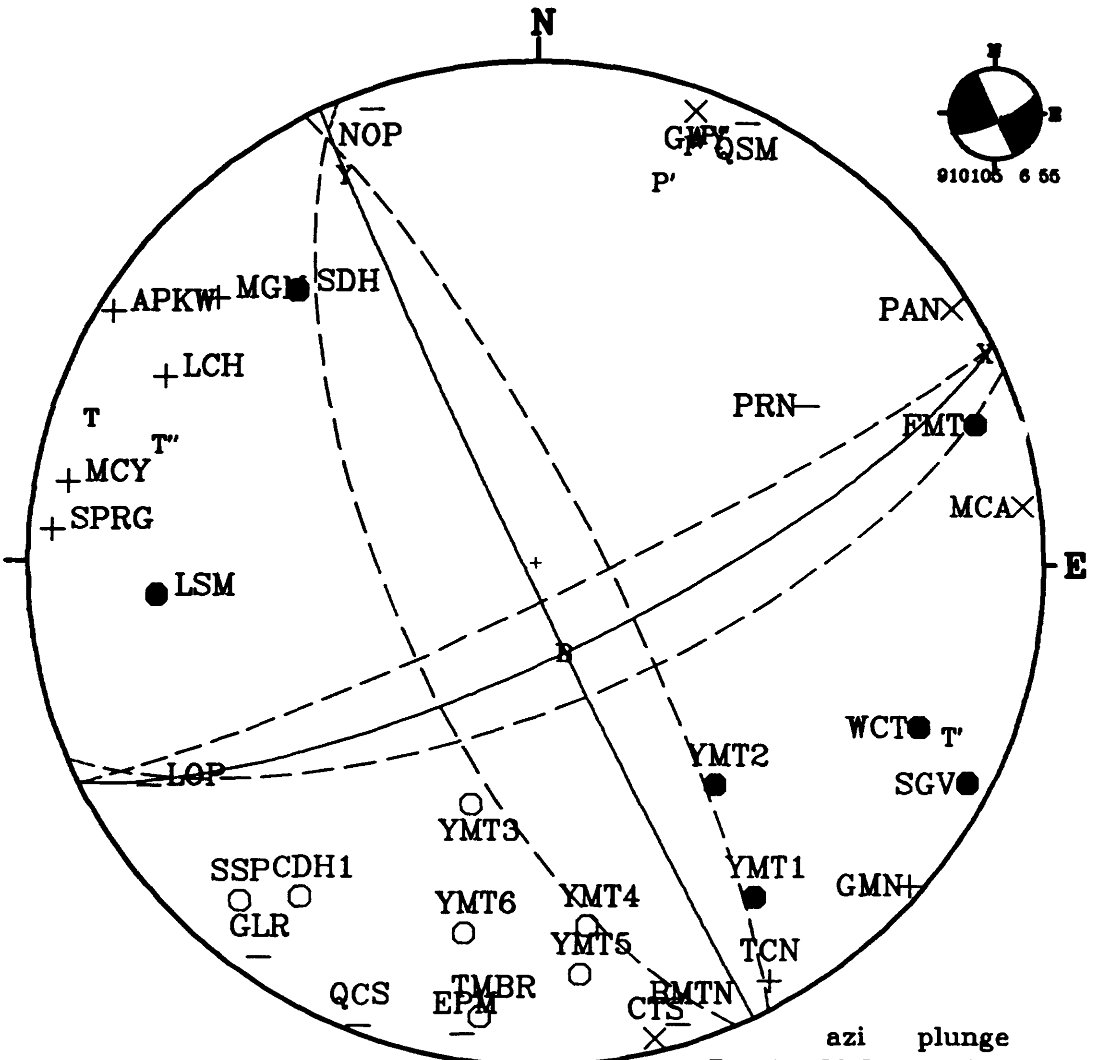
where

$$D = \cos\lambda\cos A\sin\phi[-\sin\phi\sin A\sec\delta + \cos\phi\csc\delta]$$

$$+ \sin\lambda\sin\phi\cos\phi\sin A(\cot\delta - \tan\delta) + \sin\lambda(\cos^2\phi - \sin^2\phi\sin^2 A).$$

In this formula, V_p is the compressional wave velocity at the source, V_s is the shear wave velocity, ϕ is the takeoff angle of the ray, measured upward from the $z-$axis, which points downward,

δ is the angle between the fault plane normal and the z axis, λ is the rake angle, measured in the fault plane, and A is the source-to-station azimuth. For comparison with theoretical $(SV/P)_0$, the observed $(SV/P)_z$ ratios are corrected for propagation effects (Rogers and others, 1987b). It is assumed that the raypaths for the P-wave and S-wave are identical, or, equivalently, that the ratio of V_p to V_s is constant over the source-to-station raypath.



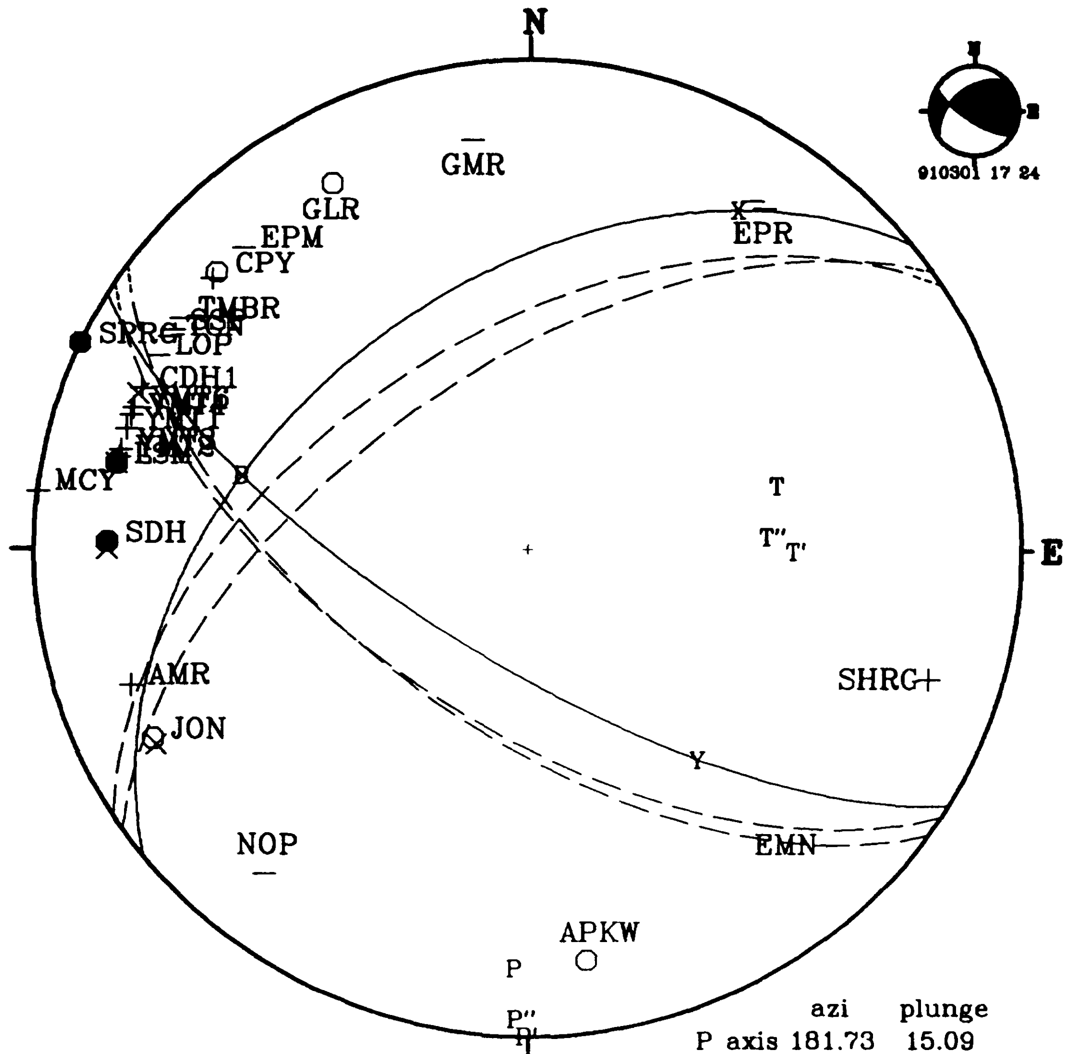
	azi	plunge
P axis	20.24	11.94
T axis	288.29	9.16
B axis	161.68	74.87
X axis	64.52	1.93
Y axis	334.00	15.00

	strike	dip	rake
Soln 1	64.00	75.00	−2.00
Var 2'	64.00	84.00	−24.00
Var 2"	67.00	67.00	11.00

LATHROP WELLS NW
DATE&TIME: 910105 6 55 21.64
LAT: 36.730 LONG: 116.432
DEPTH, km: 7.55 +/- 0.6 ML: 1.5
DMIN (km)= 6.5

Constraint on solution set of nodal planes is fair using P-wave polarities: AMR not operating at the time of this earthquake would have helped. This is the mainshock of a small series s. of Yucca Mountain.

Figure D1. Focal mechanisms for this earthquake near Fortymile Wash, southwest NTS, January 5, 1991, display mostly strike slip, right lateral on the North 335° West nodal plane, and left lateral on the auxiliary nodal plane. The small mechanism in the upper right of this figure (and all other figures of Appendix D) is a copy of the large mechanism's preferred solution, with compressional quadrants darkened, shown here to help the reader identify this mechanism when discussed in the main text of this report.



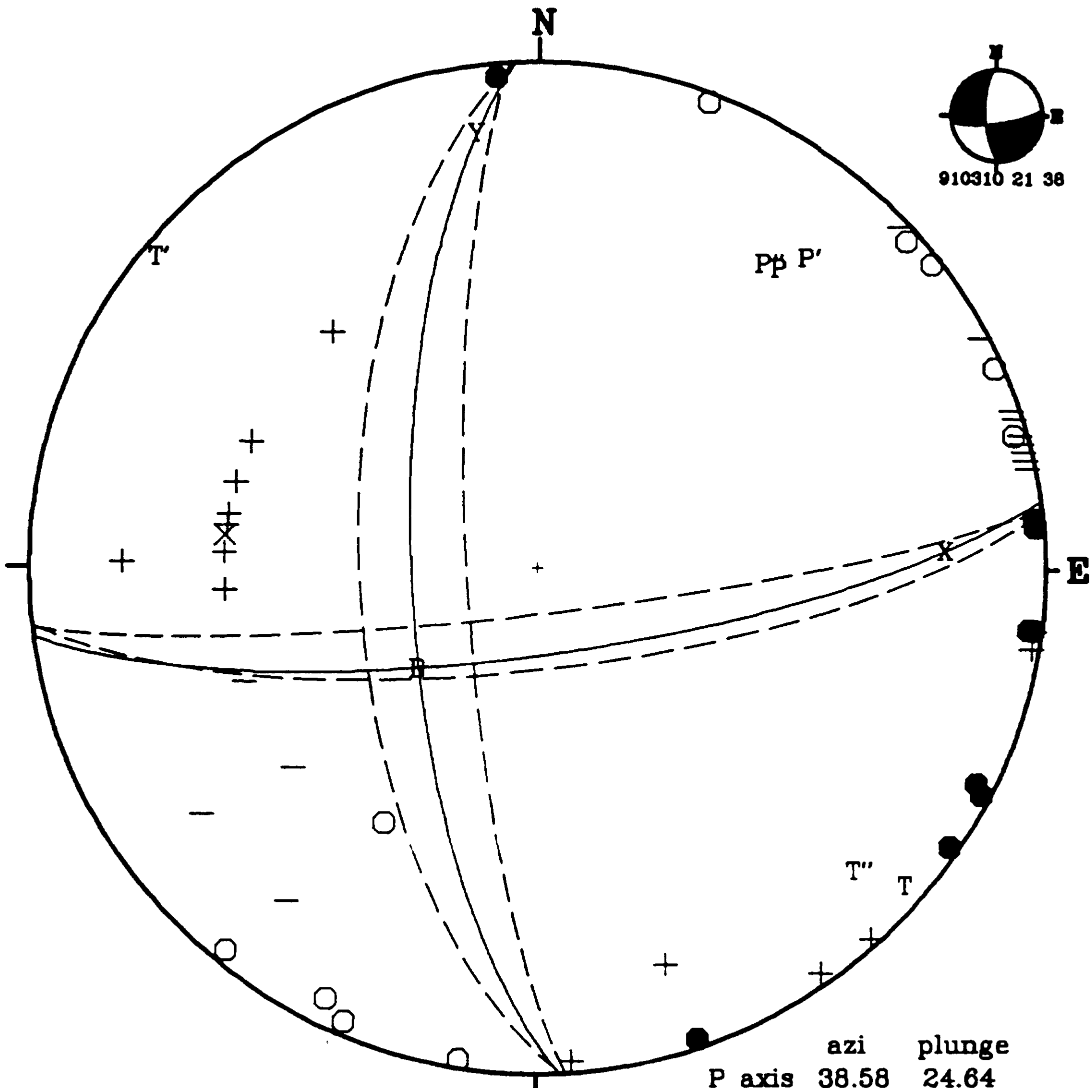
INDIAN SPRINGS NW
DATE&TIME: 910301 17 24 56.03
LAT: 36.631 LONG: 115.644
DEPTH, km: 1.11 +/- 2.5 ML: 2.3
DMIN (km)= 16.4

This earthquake is a foreshock to a series at Indian Springs. Nev. from June to July. 1991. An emergent compressional polarity inconsistency occurs at station BGB.

	azi	plunge
P axis	181.73	15.09
T axis	75.39	46.23
B axis	284.74	39.86
X axis	31.51	19.06
Y axis	141.00	44.00

	strike	dip	rake
Soln 1	231.00	46.00	27.00
Var 2'	235.00	60.00	35.00
Var 2''	237.00	54.00	37.00

Figure D2. The focal mechanism solutions for this Indian Springs, Nevada, "foreshock" of March 1, 1991, display predominantly right-lateral strike slip motion on the northeast-trending nodal plane, and predominantly *left-lateral* strike slip on the west-northwest-trending nodal planes. The sense of motion on this plane is opposite that expected for the central Las Vegas Valley fault. All nodal plane slip vectors contain a substantial component of thrust.

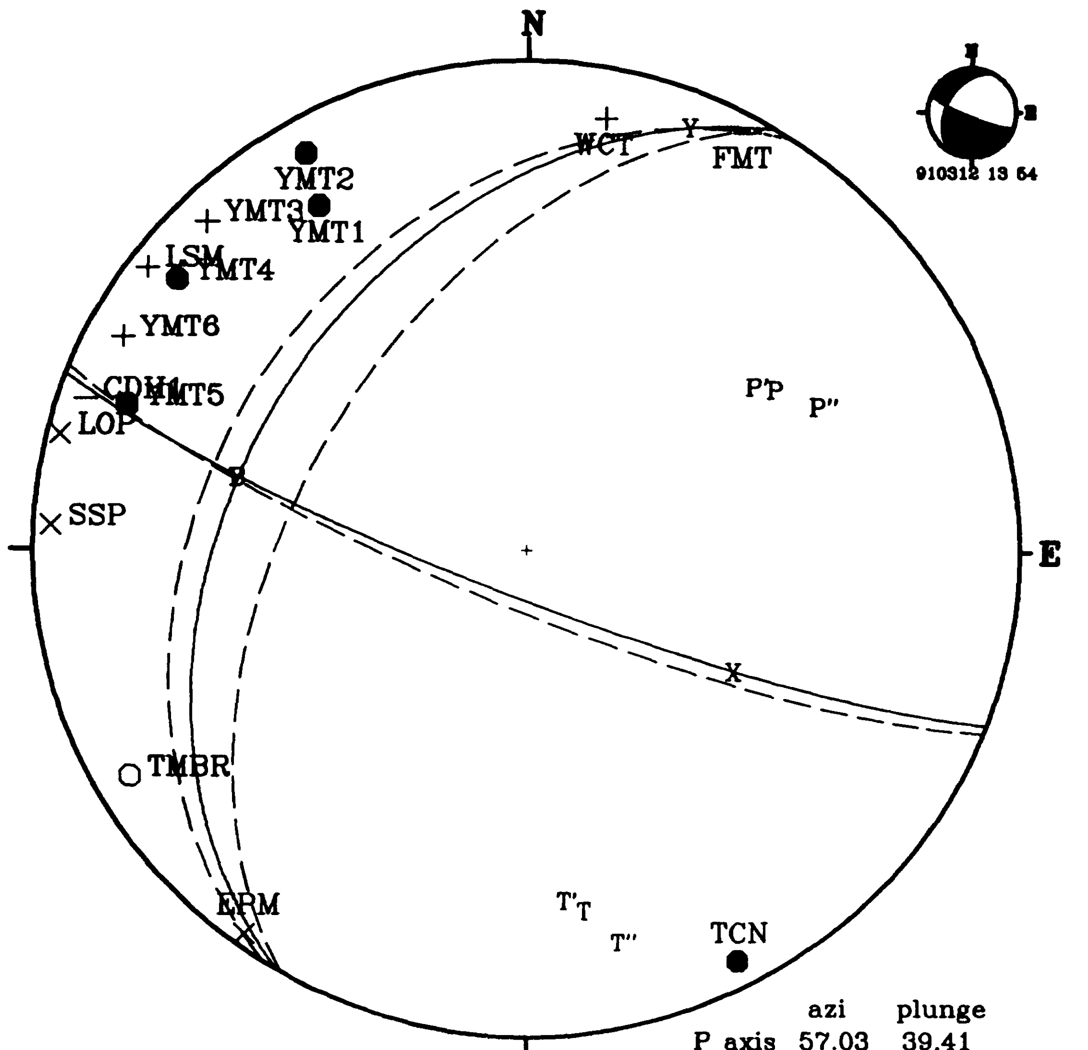


LOWER PAHRANAGAT LAKE SW
DATE&TIME: 910310 21 38 47.89
LAT: 37.116 LONG: 115.227
DEPTH, km: 6.11 +/- 0.6 ML: 4.1
DMIN (km)= 6.8

	azi	plunge	
P axis	38.58	24.64	
T axis	130.55	4.29	
B axis	229.78	64.94	
X axis	87.31	20.35	
Y axis	352.00	14.00	
	strike	dip	rake
Soln 1	82.00	76.00	-21.00
Var 2'	83.30	73.70	-11.80
Var 2''	83.06	82.56	-29.15

The earthquake for which this focal mechanism was prepared is the mainshock of a series in the Pahranagat Shear Zone beginning on March 10, 1991.

Figure D3. The focal mechanism solutions for this Pahranagat Shear Zone mainshock of March 10, 1991, display predominantly right lateral strike slip on the north-south trending nodal planes, and left lateral strike slip on the east-west trending nodal planes.



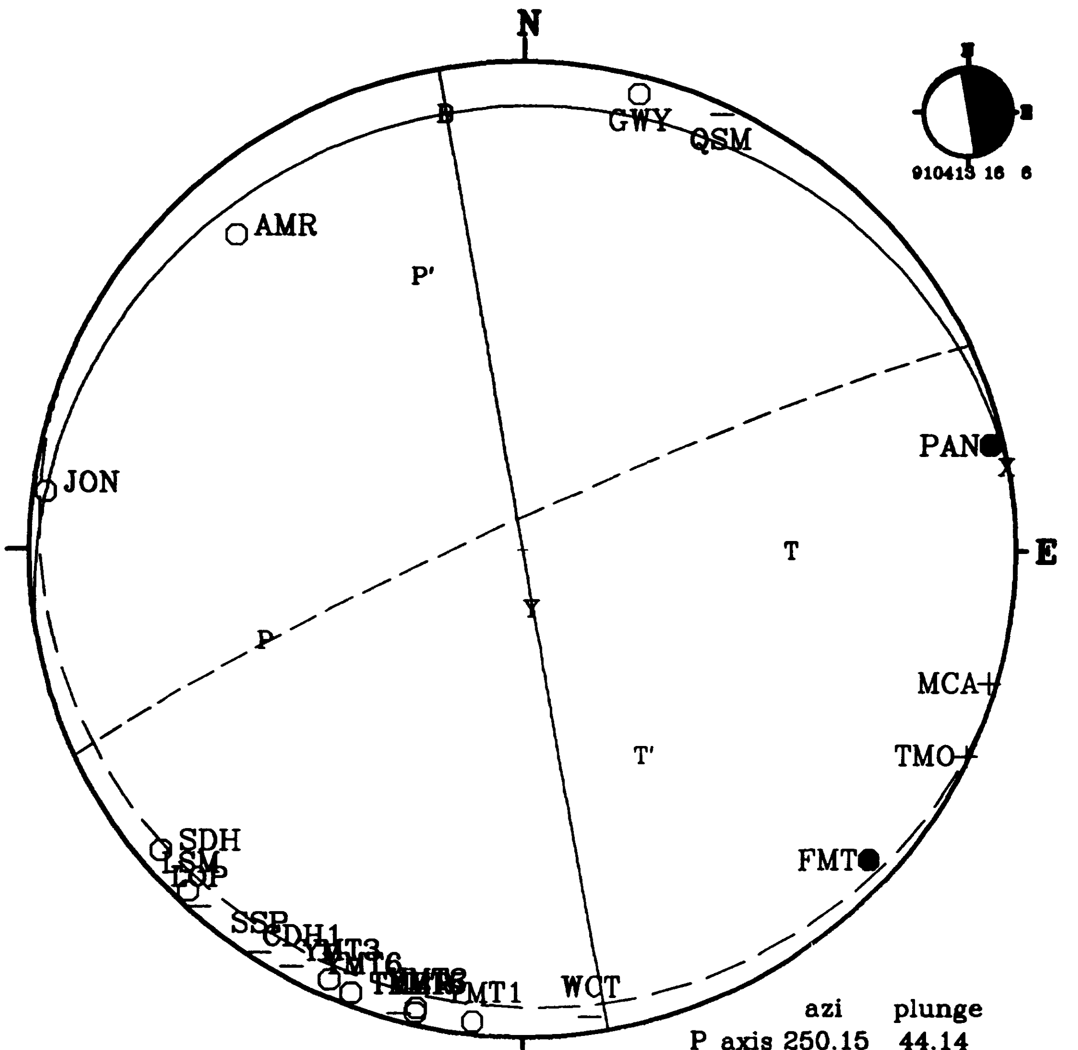
BARE MTN
DATE&TIME: 910312 13 54 21.48
LAT: 36.939 LONG: 116.594
DEPTH, km: 5.94 +/- 1.9 ML: 0.8
DMIN (km)= 11.1

The focal mechanism nodal planes shown are selected from a much larger solution set, most of whose members display reverse slip (rather than normal slip shown here).

	azi	plunge
P axis	57.03	39.41
T axis	170.63	25.98
B axis	284.34	39.53
X axis	120.42	49.34
Y axis	21.00	8.00

	strike	dip	rake
Soln 1	111.00	82.00	−50.00
Var 2'	111.00	82.00	−55.00
Var 2"	112.00	80.00	−39.00

Figure D4. The focal mechanism solutions for this earthquake at northern Bare Mountain, Nevada, indicate oblique strike slip normal slip. A large number of alternate solutions, having varying components of reverse slip, are not shown. Because the magnitude of this earthquake is so small, M_L 0.8, and because a wide range of alternate solutions are also possible, data from this earthquake are not used to compute average **P** and **T** directions in this report.



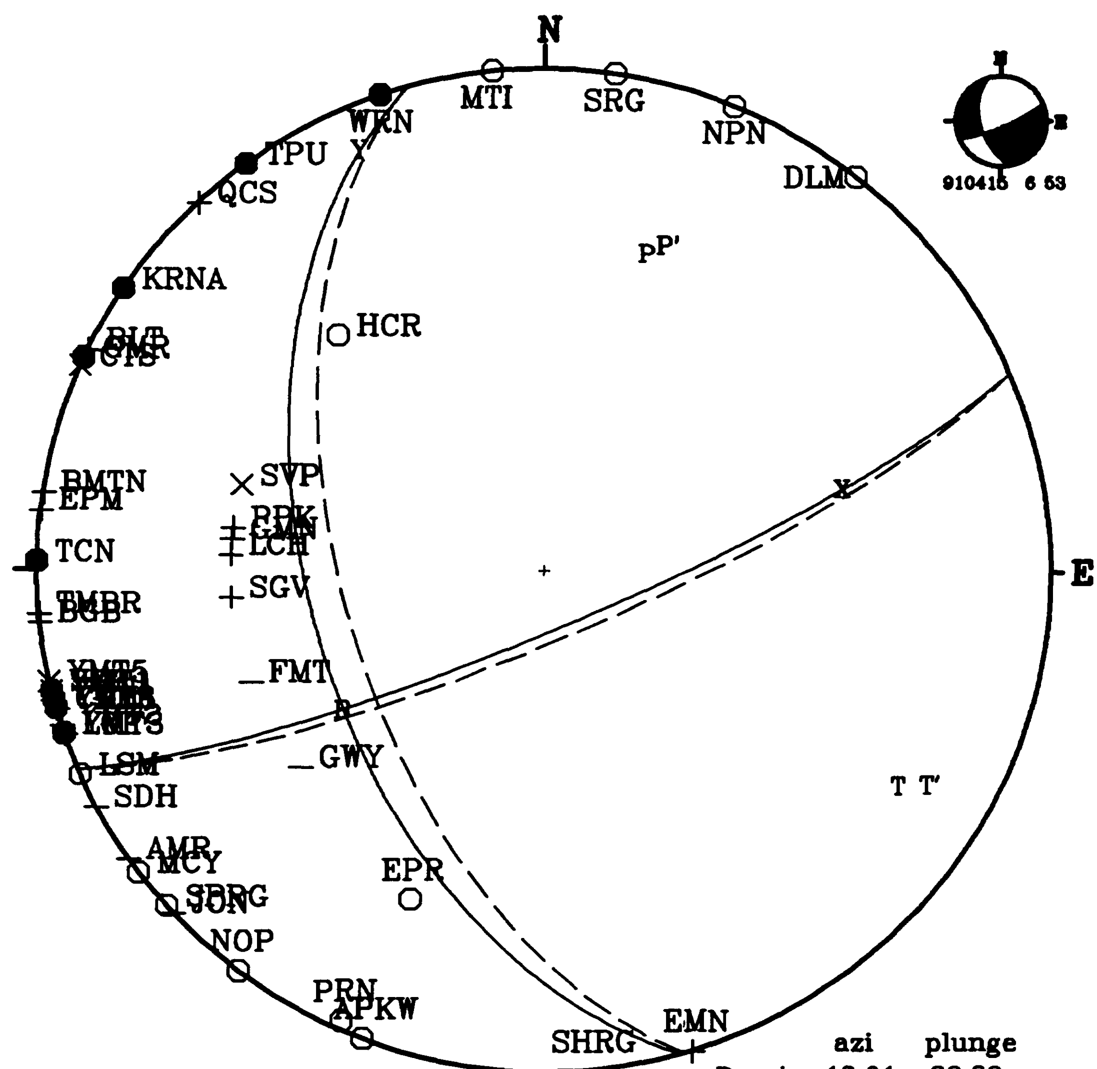
RYAN
DATE&TIME: 910413 16 6 57.86
LAT: 36.488 LONG: 116.575
DEPTH, km: 4.80 +/- 2.9 ML: 1.3
DMIN (km)= 13.4

	azi	plunge
P axis	250.15	44.14
T axis	89.85	44.14
B axis	350.00	10.00
X axis	80.00	0.00
Y axis	170.00	80.00

	strike	dip	rake
Soln 1	260.00	10.00	0.00
Var 2'	245.00	85.00	85.00

AMARGOSA DESERT. CALIFORNIA-NEVADA BORDER
Dilatational first motions for this earthquake are observed over a very wide range of source-to-station azimuths. suggesting the possibility of seismic slip on a sub-horizontal (detachment) fault. The 4.8-km depth of focus does not correspond to a minimum traveltime residual hypocenter solution.
All focal mechanism solutions for this hypocenter have a sub-horizontal nodal plane.

Figure D5. The focal mechanism solutions for this Amargosa Desert (Ryan quadrangle, Calif.) earthquake all display a sub-horizontal nodal plane when using the 4.8-km focal depth. However, surface-focus hypocenters have lower average traveltime residuals, and display a much wider variety of possible focal mechanism solutions. Data from this earthquake are not used to compute average **P** and **T** directions in this report.



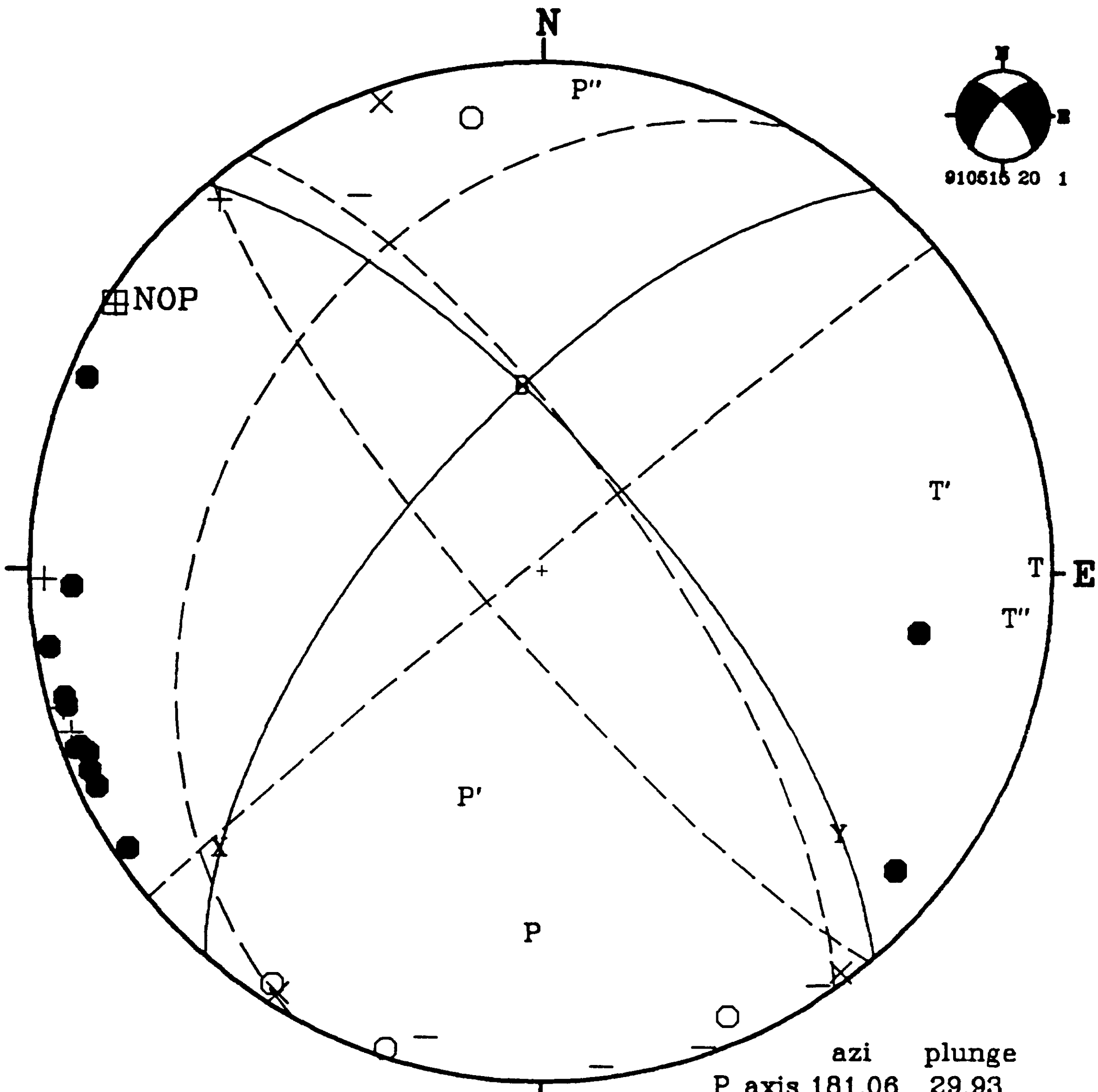
LOWER PAHRANAGAT LAKE SW
DATE&TIME: 910415 6 53 37.04
LAT: 37.121 LONG: 115.211
DEPTH, km: 3.79 +/- 1.3 ML: 3.1
DMIN (km)= 5.7

	azi	plunge
P axis	18.01	33.83
T axis	121.14	18.71
B axis	234.96	50.02
X axis	74.29	38.35
Y axis	336.60	9.60

	strike	dip	rake
Soln 1	66.60	80.40	-39.00
Var 2'	66.60	78.70	-33.30

The hypocenter for which these focal mechanisms were prepared is the mainshook of a series in the Pahranagat Shear Zone in April, 1991.

Figure D6. The focal mechanism solutions for this Pahranagat Shear Zone earthquake display oblique strike slip normal slip.



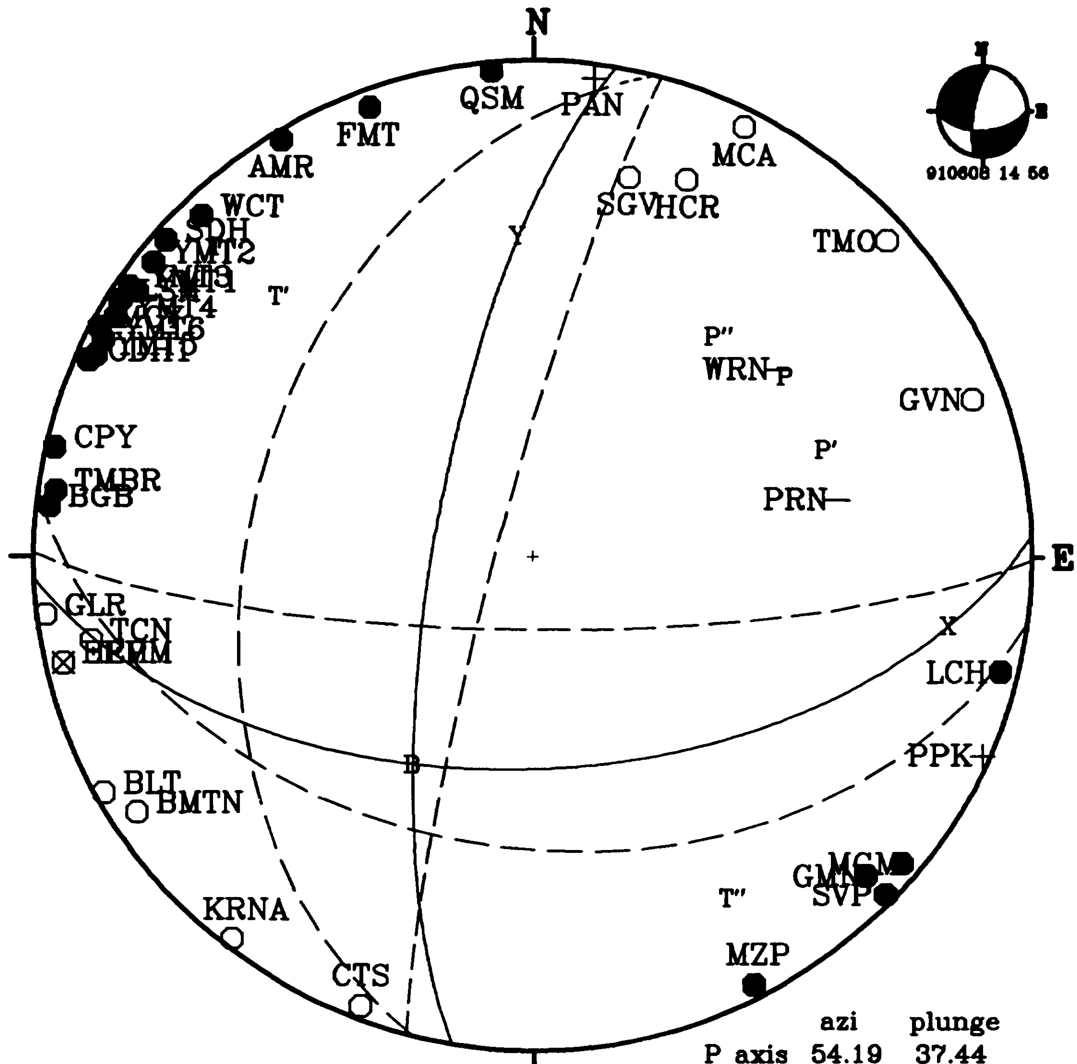
STOVEPIPE WELLS
DATE&TIME: 910515 20 1 50.43
LAT: 36.630 LONG: 117.148
DEPTH, km: 6.75 +/- 1.2 ML: 2.6
DMIN (km)= 11.8

	azi	plunge
P axis	181.06	29.93
T axis	89.29	3.08
B axis	353.97	59.88
X axis	229.09	18.35
Y axis	131.00	23.00

	strike	dip	rake
Soln 1	221.00	67.00	-20.00
Var 2'	208.90	35.50	-30.60
Var 2''	230.10	88.20	9.80

Largest earthquake of a series in mid-May 1991, with epicenter about 3 km north of Stovepipe Wells, Calif.

Figure D7. The focal mechanism solutions for this Death Valley earthquake display a wide range of nodal plane dip angles. However, the tension (T) axes of these solutions all trend ≈ east-west, providing potentially useful information about crustal stresses in the vicinity of Stovepipe Wells, California.



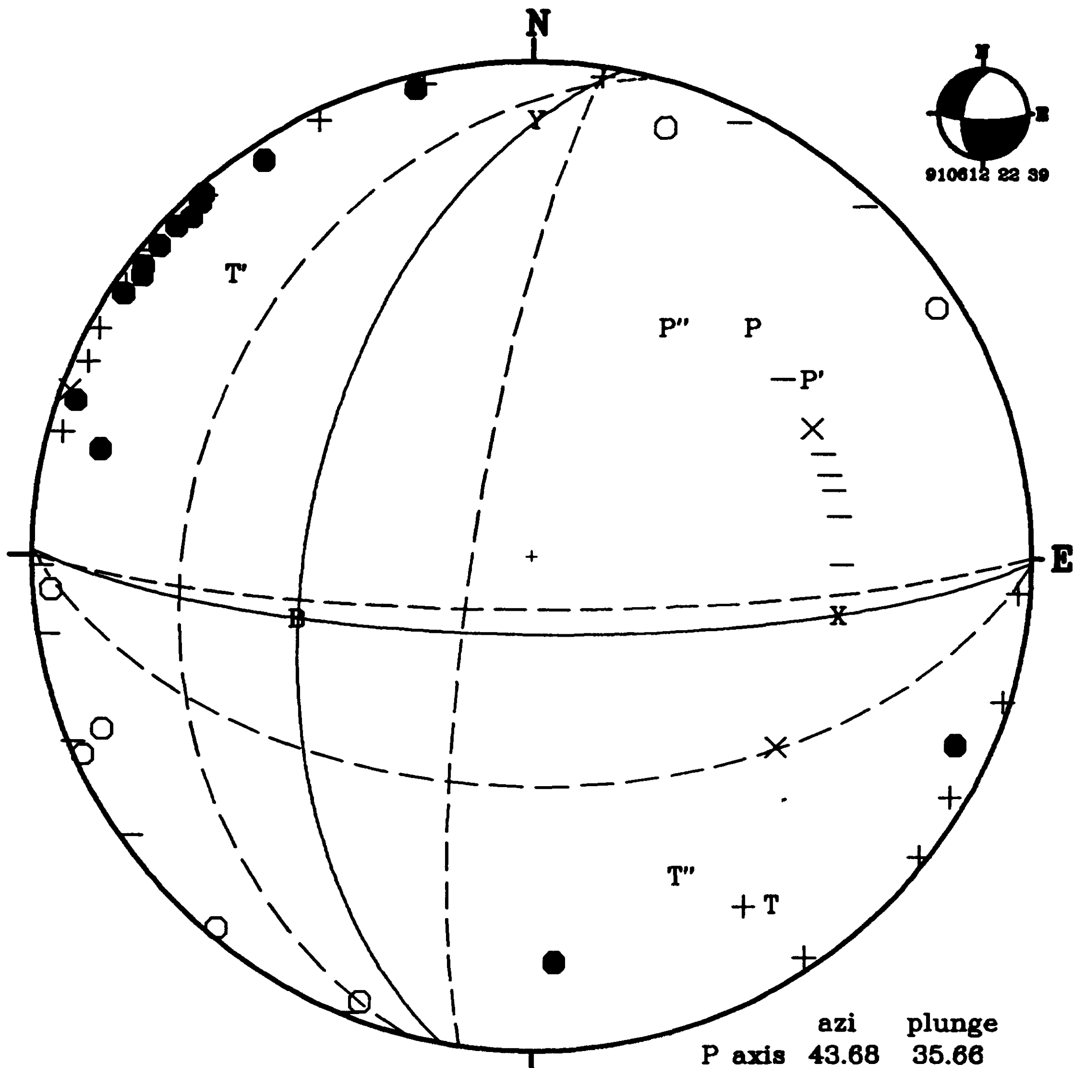
SPRINGDALE
DATE&TIME: 910608 14 56 10.12
LAT: 37.103 LONG: 116.998
DEPTH, km: 6.31 +/- 1.0 ML: 3.4
DMIN (km)= 13.8

Constraint on the solution set using P wave first motions is fair for this Sarcobatus Flat earthquake. Slip vectors range from predominantly strike-slip to oblique normal, strike-slip.

	azi	plunge
P axis	54.19	37.44
T axis	314.76	12.08
B axis	209.99	49.99
X axis	99.50	16.37
Y axis	357.50	35.30

	strike	dip	rake
Soln 1	87.50	54.70	−20.20
Var 2'	97.70	40.70	−9.40
Var 2''	90.40	77.80	−48.90

Figure D8. The focal mechanism solutions for this Sarcobatus Flat, Nevada, earthquake are, for the most part, predominantly strike slip. Constraint on the range of nodal plane dip angles is poor.

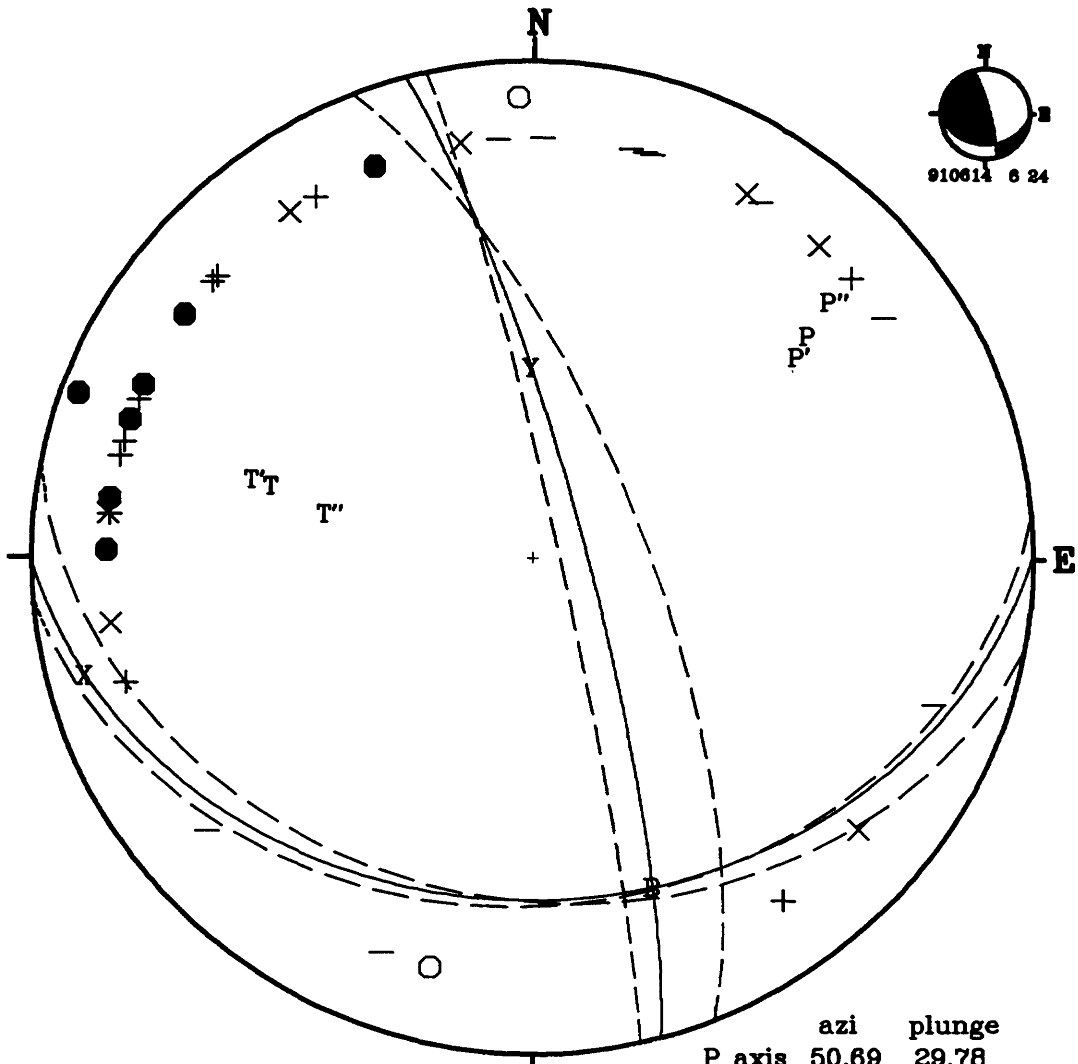


SPRINGDALE
DATE&TIME: 910612 22 39 26.84
LAT: 37.192 LONG: 116.956
DEPTH, km: 6.00 +/- 0.7 ML: 3.3
DMIN (km)= 21.0

	azi	plunge	
P axis	43.68	35.66	
T axis	145.38	15.79	
B axis	255.04	49.96	
X axis	100.45	37.20	
Y axis	0.60	12.70	
	strike	dip	rake
Soln 1	90.60	77.30	−38.30
Var 2'	90.70	51.60	−12.30
Var 2''	90.00	81.40	−59.60

This Sarcobatus Flat earthquake focal mechanism solution set ranges from predominantly strike-slip to oblique normal slip. The 6 km fixed depth is at the minimum of the RMS residual graph (RMS = 0.12 seconds). Magnitude based on readings from 38 dB LSMN and LSME station data only: all vertical component data were clipped.

Figure D9. The focal mechanism solutions for this Sarcobatus Flat, Nevada, earthquake also display a wide range of nodal plane dip angles.

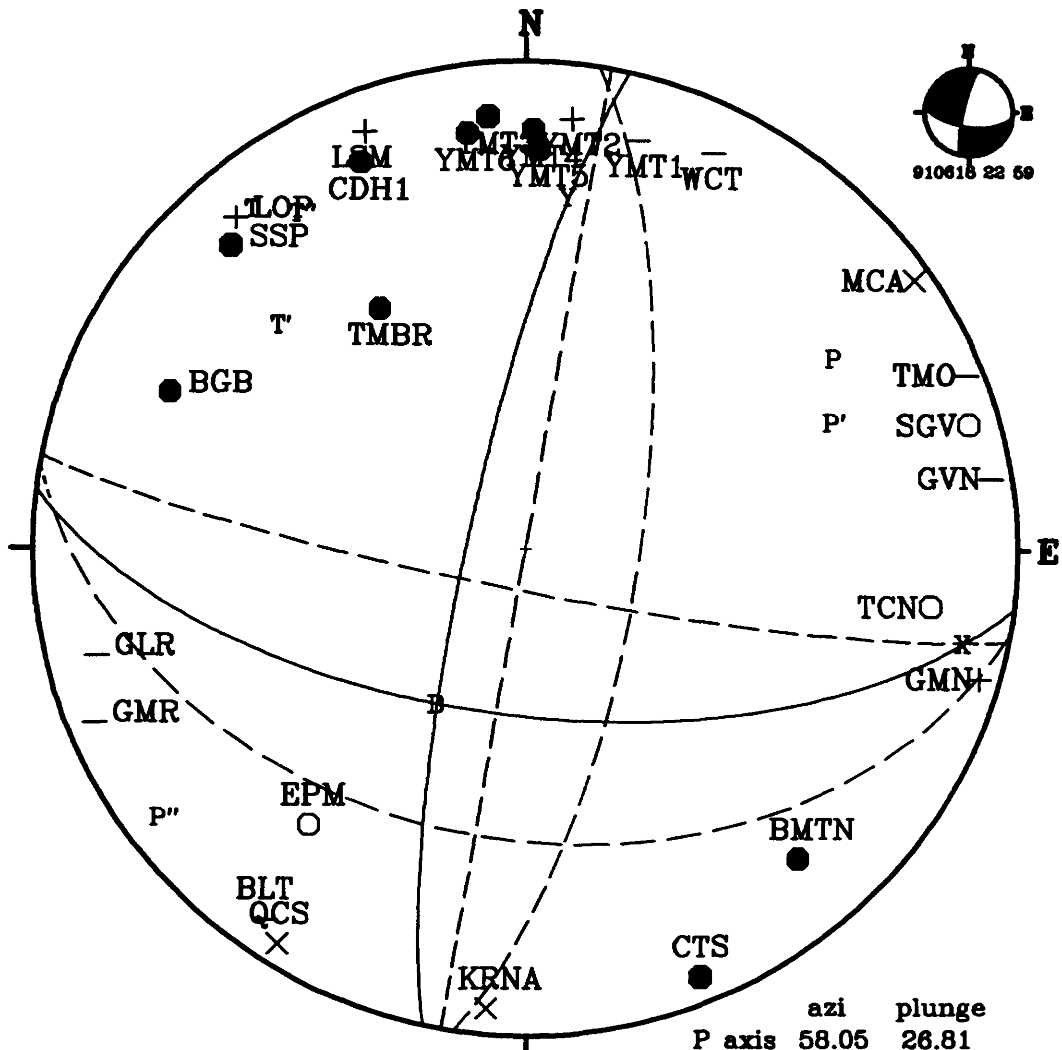


MERCURY
DATE&TIME: 910614 6 24 54.46
LAT: 36.739 LONG: 115.965
DEPTH, km: 2.00 +/- 1.1 ML: 2.2
DMIN (km)= 8.7

	azi	plunge	
P axis	50.69	29.78	
T axis	285.56	45.16	
B axis	160.01	30.03	
X axis	255.05	8.64	
Y axis	359.40	58.50	
	strike	dip	rake
Soln 1	89.40	31.50	16.70
Var 2'	84.90	30.40	8.60
Var 2''	100.70	31.60	36.30

This Frenchman Flat. NTS. earthquake displays dual RMS travel time residual minima. at z=2 km below sea level (data shown here) and at z at or just below sea level (RMS resid=0.14 sec). The dilatation at SHRG (azimuth North 109 deg. West) is questionable.

Figure D10. The focal mechanism for this Frenchman Flat, NTS, earthquake are predominantly strike slip on the shallow-dipping east-west nodal plane, and oblique slip on the almost vertical dipping north-south nodal plane.



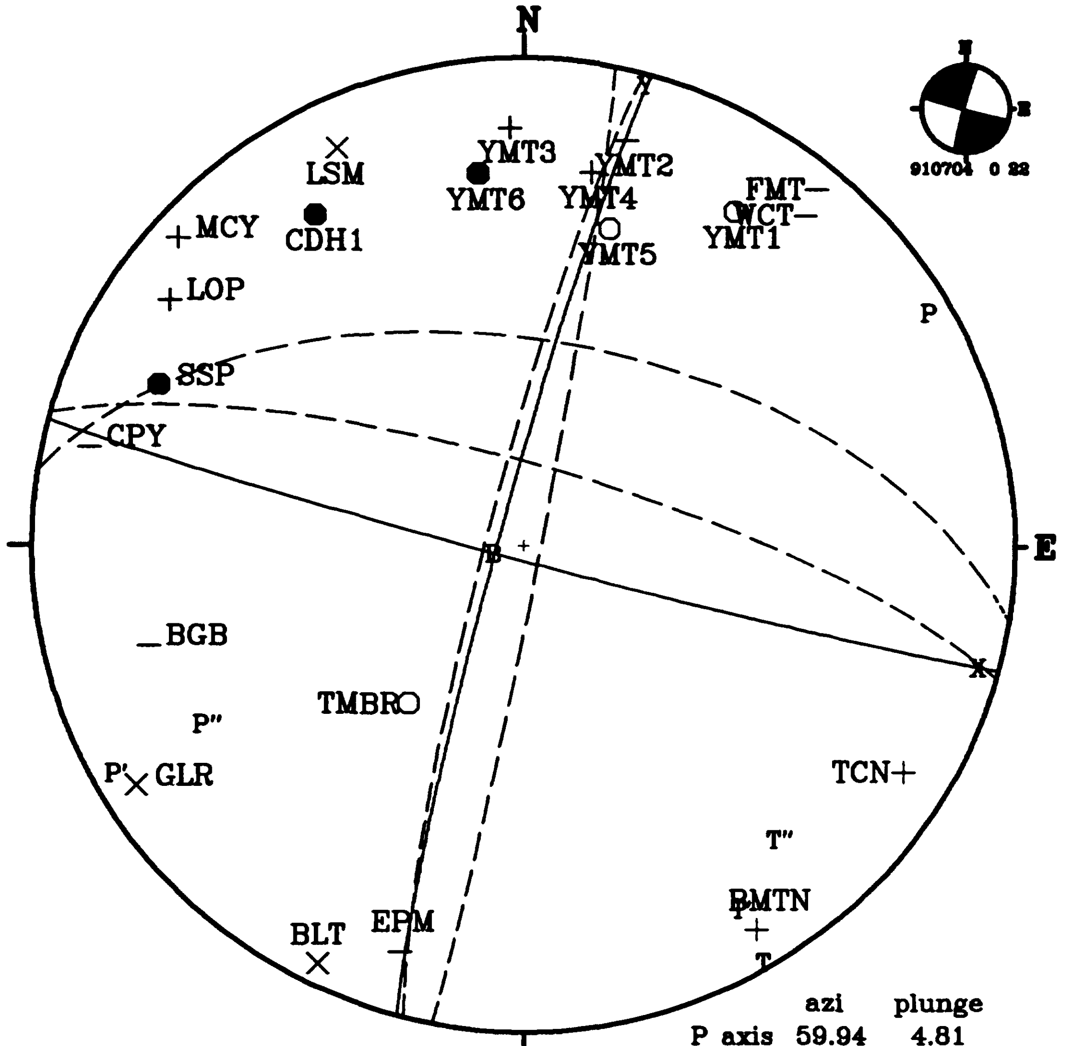
TIMBER MTN
DATE&TIME: 910618 22 59 9.87
LAT: 37.114 LONG: 116.446
DEPTH, km: 9.03 +/- 0.5 ML: 1.4
DMIN (km)= 10.2

	azi	plunge
P axis	58.05	26.81
T axis	321.73	12.29
B axis	209.49	60.08
X axis	102.21	9.70
Y axis	7.00	28.00

	strike	dip	rake
Soln 1	97.00	62.00	-11.00
Var 2'	100.00	40.00	0.00
Var 2"	101.00	83.00	19.00

The hypocenter for this earthquake at the northern boundary of the Timber Mountain Caldera displays a RMS travel time minimum for depths ranging from 7 to 9 km below sea level. Most focal mechanism solutions are predominantly strike slip on steeply dipping nodal planes.

Figure D11. The focal mechanism solutions for this Timber Mountain earthquake are all predominantly strike slip.



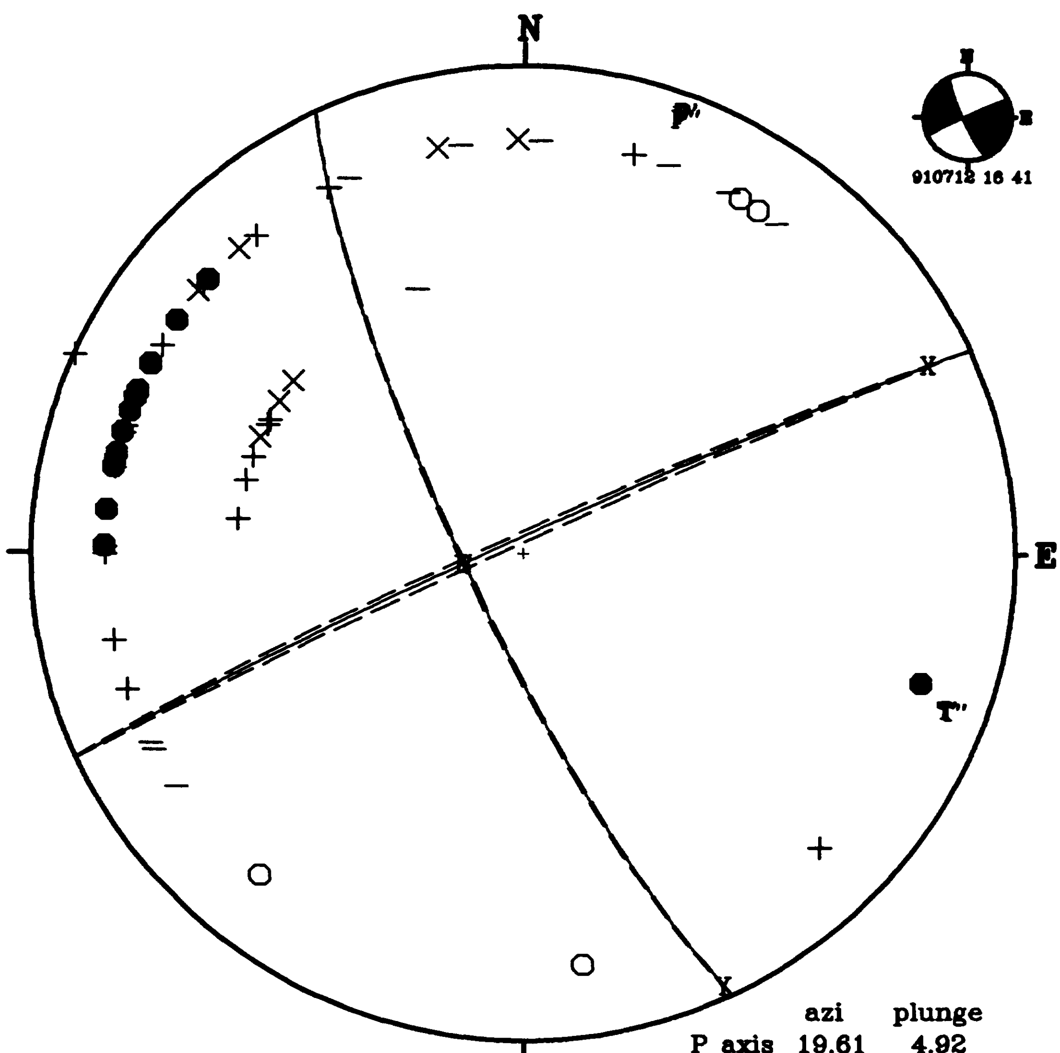
TOPOPAH SPRING NW
DATE&TIME: 910704 0 22 1.51
LAT: 36.997 LONG: 116.421
DEPTH, km: 7.67 +/- 0.5 ML: 1.4
DMIN (km)= 5.2

This hypocenter is well constrained at a depth of 8 pm 1 km below sea level. The epicenter is at the south rim of the resurgent dome of the Timber Mountain Caldera complex. Focal mechanism solutions are all strike-slip.

	azi	plunge
P axis	59.94	4.81
T axis	150.05	1.27
B axis	254.78	85.03
X axis	105.09	4.30
Y axis	14.90	2.50

	strike	dip	rake
Soln 1	104.90	87.50	-4.30
Var 2'	285.80	76.40	6.50
Var 2"	278.90	55.20	-3.40

Figure D12. The focal mechanism solutions for this Timber Mtn. resurgent dome earthquake are all predominantly strike slip.



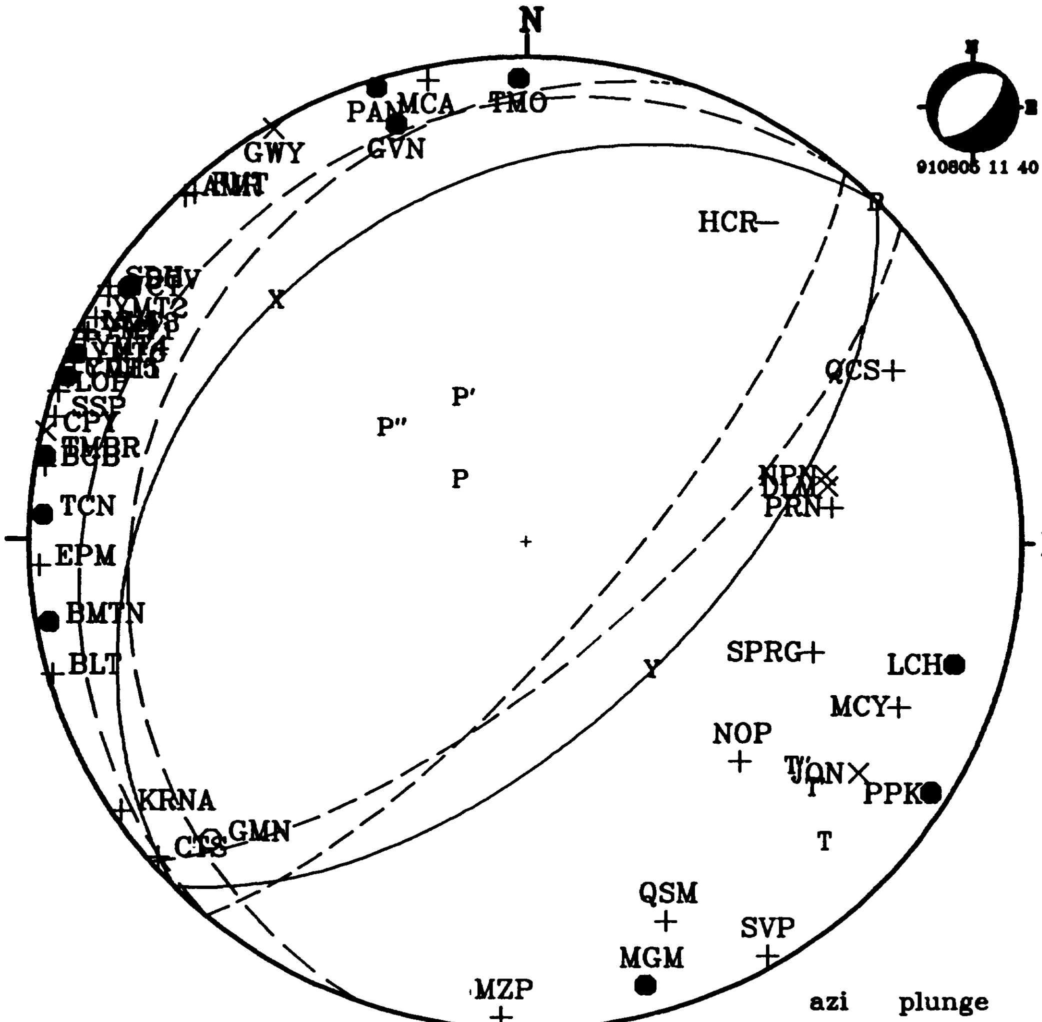
	azi	plunge
P axis	19.61	4.92
T axis	110.36	8.62
B axis	260.21	80.06
X axis	64.76	9.59
Y axis	155.20	2.60

	strike	dip	rake
Soln 1	245.20	87.40	9.60
Var 2'	245.30	86.60	9.40
Var 2''	245.15	88.30	9.90

INDIAN SPRINGS NW
DATE&TIME: 910712 16 41 30.61
LAT: 36.633 LONG: 115.640
DEPTH, km: 1.29 +/- 2.0 ML: 2.6
DMIN (km)= 16.7

Hypocenter for this earthquake near Indian Springs, Nevada, has RMS minimum at 1 km below sea level or shallower. These focal mechanism solutions have one polarity inconsistency, at station MTI.

Figure D13. The focal mechanism solutions for this Indian Springs, Nevada, earthquake are very well constrained. They are strike slip. The nodal planes do not agree in trend with the major Las Vegas Valley fault, although the sense of slip on the north-northwest trending plane agrees with that expected on the Las Vegas Valley fault.



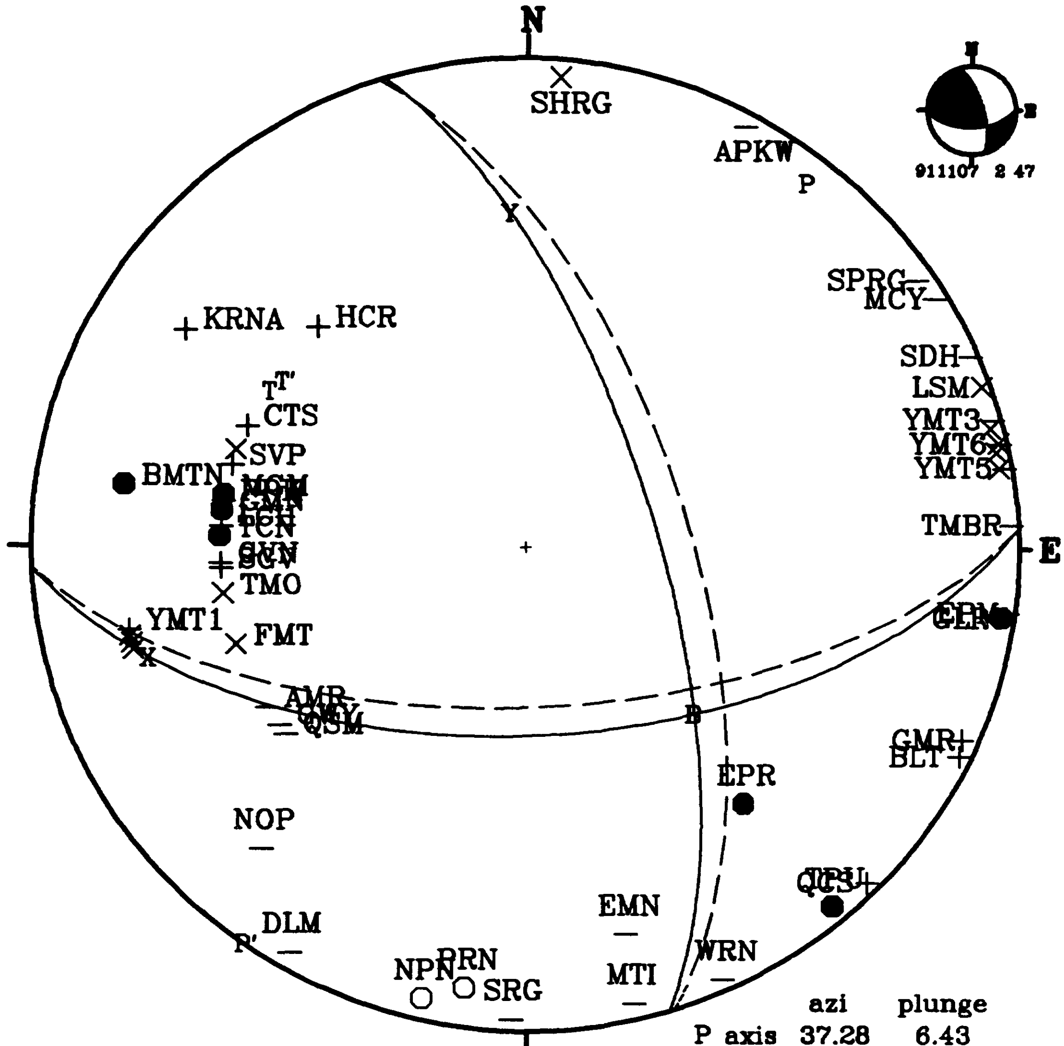
UBEHEBE CRATER
DATE&TIME: 910805 11 40 19.96
LAT: 37.180 LONG: 117.414
DEPTH, km: 5.71 +/− 1.0 ML: 3.0
DMIN (km)= 19.3

Mainshock of a 12-eq series.
This earthquake's coda
clipped all vertical-comp.
instruments that were scaled.
ML determined from horiz.-comp.
data.

	azi	plunge
P axis	315.00	75.00
T axis	135.00	15.00
B axis	45.00	0.00
X axis	315.00	30.00
Y axis	135.00	60.00

	strike	dip	rake
Soln 1	225.00	30.00	−90.00
Var 2'	49.00	70.00	−79.00
Var 2"	220.00	15.00	−90.00

Figure D14. The focal mechanism solutions for this Gold Mountain, Nevada (Ubehebe Crater quadrangle), earthquake all display normal slip. Some solutions have a shallow dipping nodal plane (possibly indicating a seismically active detachment fault).



LOWER PAHRANAGAT LAKE SE
DATE&TIME: 911107 2 47 13.21
LAT: 37.091 LONG: 115.105
DEPTH, km: 7.39 +/- 1.1 ML: 3.6
DMIN (km)= 11.4

	azi	plunge
P axis	37.28	6.43
T axis	301.99	39.29
B axis	134.99	49.98
X axis	253.17	21.63
Y axis	357.40	31.80

	strike	dip	rake
Soln 1	87.40	58.20	25.70
Var 2'	87.50	63.00	30.70

This event's magnitude is based on
LSMN's S-amplitude only (may be biased high).
Mainshock of a swarm. Polarity inconsistencies
occur for stations WRN and EPM. These stations
are > 100 km from the epicenter, and their first
motions are somewhat ambiguous for this earthquake.

Figure D15. The focal mechanism solutions for this 7.4 km below sea level Pahranagat Shear Zone earthquake of November 7, 1991, display nodal planes with predominantly strike slip motion, although a substantial component of thrust is also present.

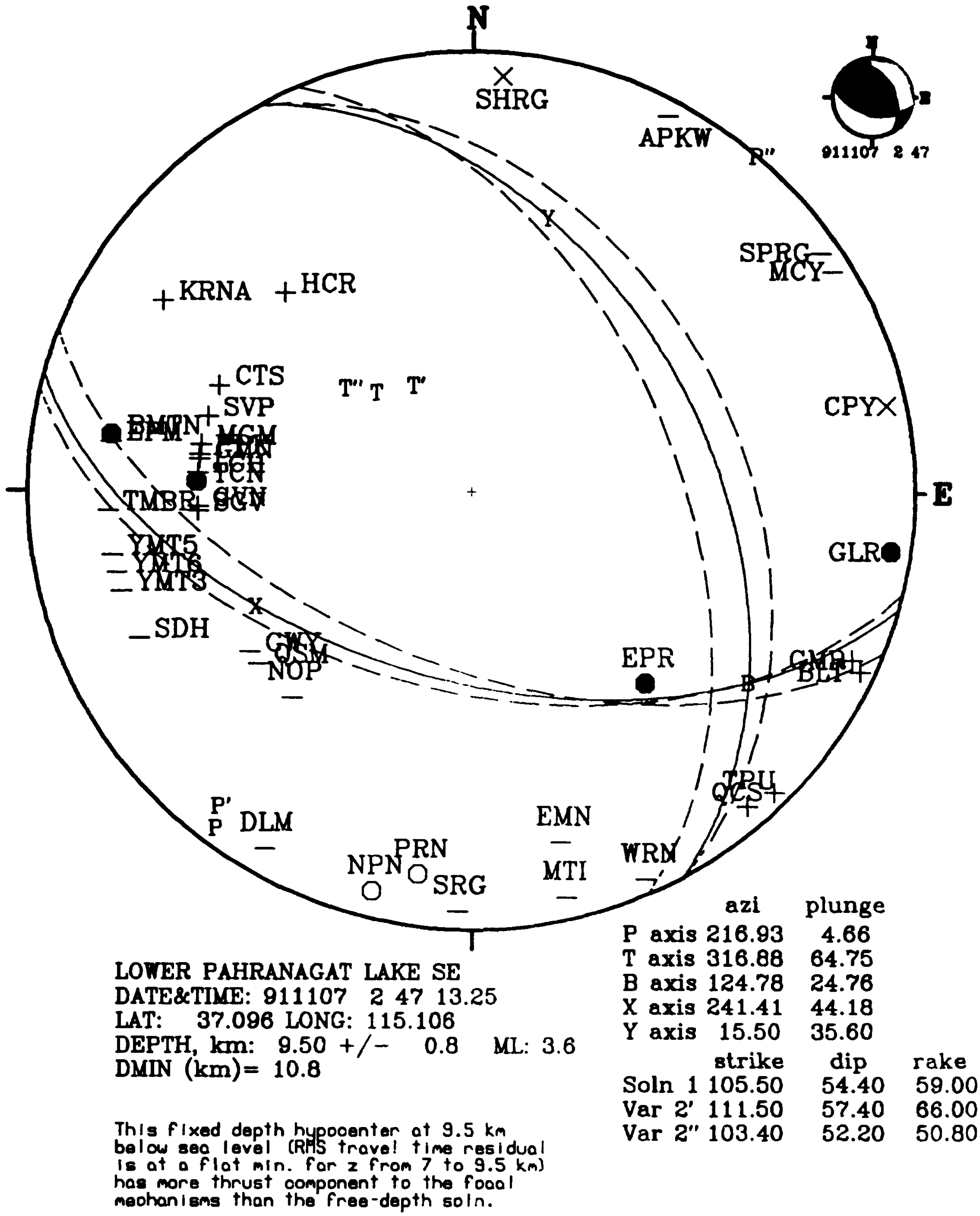
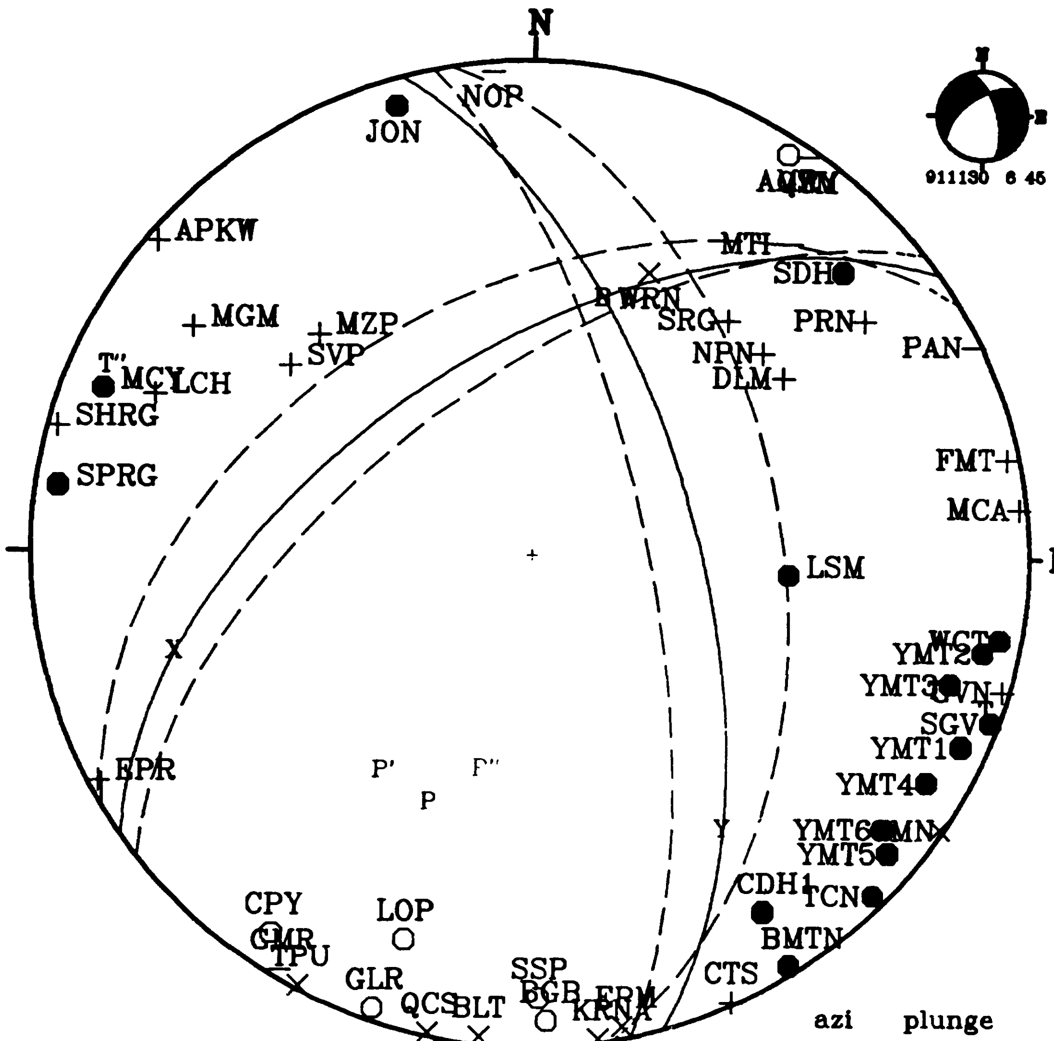


Figure D16. The alternate focal mechanism solutions for this Pahranagat Shear Zone, Nevada, earthquake of November 7, 1991, display greater amounts of thrust than the solutions shown in figure D15. These solutions correspond to a hypocenter fixed at 9.5 km below sea level.



	azi	plunge
P axis	202.13	45.08
T axis	108.55	3.56
B axis	15.01	44.70
X axis	254.48	27.18
Y axis	145.00	33.00

	strike	dip	rake
Soln 1	235.00	57.00	−33.00
Var 2'	239.00	46.00	−26.70
Var 2"	232.00	62.00	−49.00

SPECTER RANGE NW
DATE&TIME: 911130 6 45 56.39
LAT: 36.739 LONG: 116.215
DEPTH, km: 5.58 +/− 0.6 ML: 3.0
DMIN (km)= 5.1

NEIC magnitude 3.3. This earthquake
clipped all SGBSN station
seismograms. Polarity corrected at GLR and SDH.
PRN ray treated as refraction: PAN.
on epd arrival. displays polarity error
for all solutions.

Figure D17. The focal mechanism solutions for this November 30, 1991, earthquake in the southern Nevada Test Site display oblique strike slip normal slip. The next figure also deals with this earthquake's focal mechanism data.

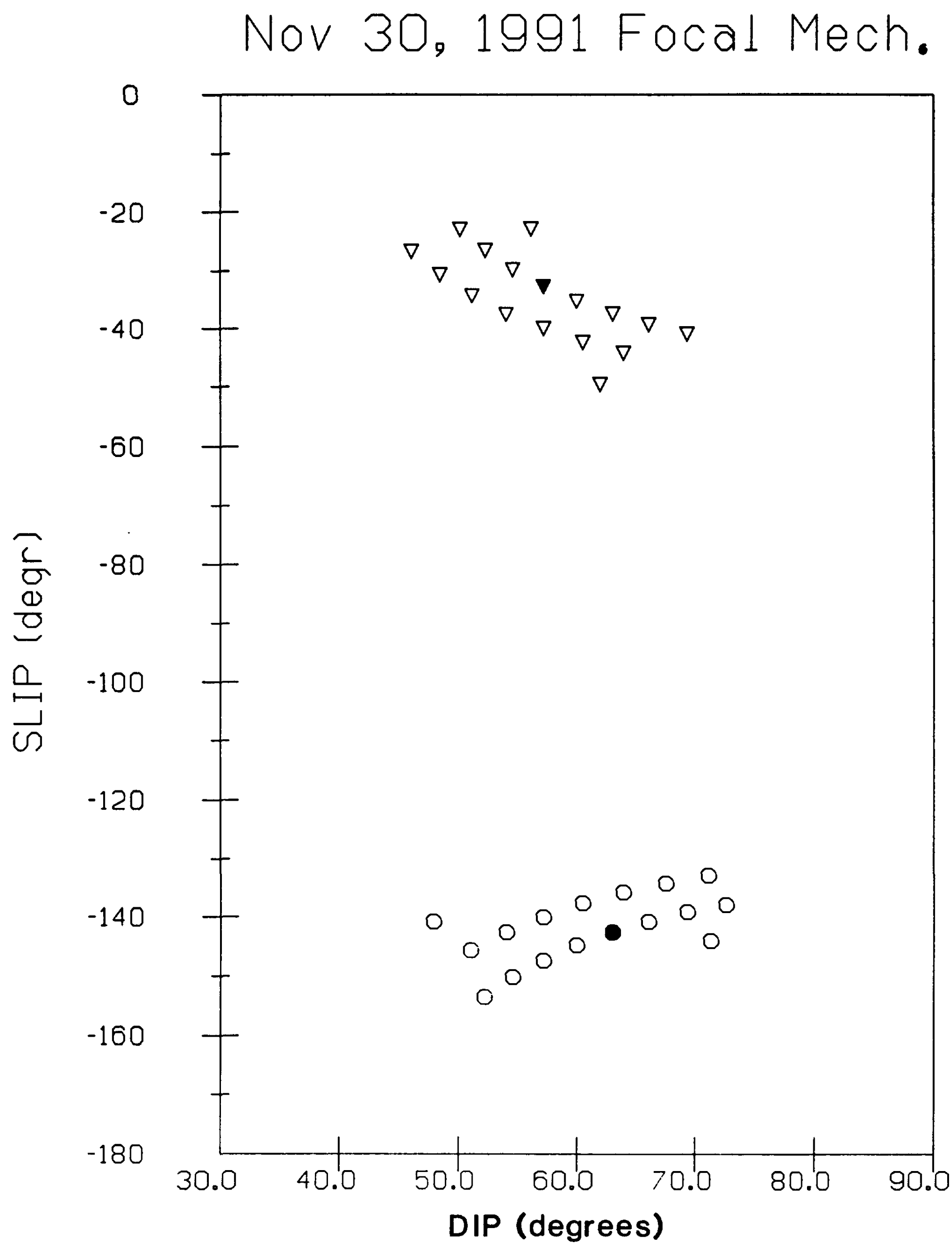


Figure D18. For the Specter Range NW earthquake of November 30, 1991, 06:45:56 UTC, the range of ***dip*** angles and corresponding ***slip*** angles consistent with SGBSN first motions are plotted, using a ∇ symbol for the (***dip***, ***slip***) pair corresponding to each plausible northeast-southwest trending nodal plane, and using a ∘ symbol for each north-south nodal plane (see Figure D17). The symbols are filled in for the "preferred solution" (***dip***, ***slip***) pairs, which are shown as solid-line nodal planes in Figure D17. This plot is provided as evidence that an approximate ±10° uncertainty in nodal plane dip and slip angles, mentioned in Table 3 of the text, can be demonstrated, at least for the better-constrained SGB earthquake focal mechanisms.

Appendix E

Station codes, locations and site geology, and instrumentation

Appendix E contains a list of SGBSN station names, coordinates, and other descriptive information. Instrument codes refer to the seismometer, amplifier/VCO, and discriminator packages for each station. For the current network, codes 1 through 7 are valid. Any other codes are for systems having unknown frequency response and which are no longer operating in the SGBSN. The following table shows the major components comprising the seven current seismographic systems.

Table E1. Major components in seismographic systems comprising the SGBSN in 1991. All seismometers have natural frequency, $f_n = 1.0$ Hz. The (analog) output of the discriminators is digitized on a PDP 11/34 computer, with sampling rate = 104.167 sps/channel.

KIND	SEISMOMETER	Motion	Amplifier/VCO	Discriminator
1	Mark L4C	vertical	Tricom 649	Tricom 642
2	Teledyne S13	vertical	Tricom 649	Tricom 642
3	Teledyne S13	vert., horiz.	Teledyne Geotech 42.50	Teledyne 4612
4	Mark L4C	vertical	Teledyne Geotech 42.50	Tricom 642
5	Mark L4C	horizontal	Teledyne Geotech 42.50	Teledyne 4612
6	Teledyne S13	vertical	Teledyne Geotech 42.50	Tricom 642
7	Ranger RR-1	vertical	Teledyne Geotech 42.50	Teledyne 4612

Magnification curves for representative seismographic systems in the SGBSN may be found in Rogers and others (1987b) and in Harmsen and Bufe (1991). Rock types and geologic ages at each station are listed in table E2.

Table E2. SGBSN station site geology (preliminary).

STA	Rock Type	Geologic Age
AMR	Conglomerate	Tertiary
APKW	Limestone, dolomite	Paleozoic
BGB	Bedded tuff	Tertiary
BLT	Ash-flow tuff	Tertiary
BMTN	Trachyte lava	Teritary
CDH1	Argillite	Mississippian
CPY	Limestone	Cambrian
CTS	Intrusive mafic rocks	Tertiary
DLM	Limestone, dolomite	Paleozoic
EMN	Andesite and basalt flows	Tertiary
EPM	Ash flow tuff	Tertiary
EPR	Volcanic rock	Tertiary
FMT	Metamorphic rock	Precambrian
GLR	Limestone and dolomite	Paleozoic
GMN	Granite	Mesozoic
GMR	Limestone and dolomite	Paleozoic
GVN	Fanglomerate	Tertiary
GWY	Volcanic rocks	Miocene
HCR	Ash-flow tuff	Tertiary
JON	Quartzite	Precambrian
KRNA	Ash-flow tuff	Tertiary
LCH	Limestone and dolostone	Cambrian
LOP	Lava	Tertiary
LSM	Basalt	Tertiary
MCA	Limestone, dolostone	Paleozoic
MCY	Dolomite, limestone	Devonian
MGM	Quartzite	Precambrian
MTI	Carbonates	Devonian
MZP	Volcanic tuff	Tertiary
NOP	Limestone	Paleozoic
NPN	Ash-flow tuff	Tertiary
PAN	Limestone and dolostone	Cambrian
PPK	Granite	Mesozoic
PRN	Ash-flow tuff	Tertiary
QCS	Basalt	Tertiary
QSM	Tuff	Tertiary
SDH	Quartzite	Precambrian
SGV	Rhyolite	Miocene
SHRG	Limestone,dolomite	Cambrian
SPRG	Tuffaceous sediments	Tertiary
SRG	Volcanic rocks	Tertiary
SSP	Ash-flow tuff	Tertiary
SVP	Andesite flows and breccias	Tertiary
TCN	Ash-flow tuff	Tertiary
TMBR	Granitic ring-dike intrusion	Tertiary
TMO	Limestone and dolomite	Paleozoic
TPU	Shales and sandstone	Mississippian
WCT	Alluvium of Crater Flat	Quaternary
WRN	Limestone and dolomite	Ordovician
YMT1	Ash-flow tuff	Tertiary
YMT2	Welded tuff	Tertiary
YMT3	Welded tuff	Tertiary
YMT4	Welded tuff	Tertiary
YMT5	Welded tuff	Tertiary
YMT6	Welded tuff	Tertiary

STATION INFORMATION - SOUTHERN GREAT BASIN SEISMOGRAPHIC NETWORK

CODE	STATION	PERIOD OF OPERATION (YR/MO/DA-YR/MO/DA)	LATITUDE (DEG MINUTES)	LONGITUDE (DEG MINUTES)	ELEVATION (METERS)	SEISMOMETER MODEL/COMP.	GAIN (DB)	INST. CODE	S L
AMR	Amargosa, Cal.	78/07/24-present	36 23.85 N	116 28.56 W	690	L-4C	84	1	*
APK	Angels Peak, Nev.	75/06/15-81/03/21	36 19.17 N	115 34.46 W	2680	S-13	84	2	
APK		81/03/21-83/08/04				L-4C	84	1	
APKW	Angels Peak, Nev.	83/08/05-88/08/10	36 19.19 N	115 35.25 W	2600	L-4C	84	1	*
APKW		88/08/11-present				L-4C	84	4	*
BGB	Big Butte, Nev.	79/01/23-present	37 02.24 N	116 13.75 W	1730	L-4C	84	1	*
BLT	Belted Range, Nev.	79/05/30-present	37 28.98 N	116 07.41 W	1854	L-4C	84	1	*
BMT	Black Mountain, Nev.	80/02/26-83/04/01	37 17.02 N	116 38.74 W	2191	L-4C	84	1	
BMTN	Black Mountain, Nev.	83/04/01-present	37 17.50 N	116 38.41 W	2040	L-4C	84	1	*
BRO	Bare Mountain, Nev.	78/11/28-81/04/08	36 45.76 N	116 37.52 W	920	L-4C	84	1	
CDH1	Calico Hills, Nev.	80/02/06-81/11/18	36 51.82 N	116 18.97 W	1353	L-1-3DS (vert.)	90	1	
CDH1		81/11/18-present				L-4C	84	1	*
CDH5	Calico Hills, Nev.	80/02/06-81/11/18	36 51.82 N	116 18.97 W	1055	L-1-3DS horzntl	108	1	*
CPX	CP-1, Nev.	77/—/——80/03/01*	36 55.94 N	116 03.26 W	1258	NGC-21	?	8	*
CPX		80/08/05-90/08/29				L-4C	84	1	*
CPZ	CP-1, Nev.	90/08/29-91/01/15	36 55.73 N	116 03.53 W	1368	L-4C	84	1	*
CPY	CP-1, Nev.	91/01/15-present	36 55.73 N	116 03.53 W	1368	L-4C	84	4	*
CTS	Cactus Peak, Nev.	79/04/24-present	37 39.37 N	116 43.59 W	1868	L-4C	84	1	*
DLM	Delamar Mountains, Nev.	78/06/08-present	37 36.35 N	114 44.27 W	1730	L-4C	84	1	*
EMN	Eldorado Mtns., Nev.	88/08/11-92/05/14	35 55.31 N	114 45.33 W	846	Ranger SS-1	84	7	*
		92/05/14-present	35 55.31 N	114 45.33 W	846	L-4C	84	1	*
EPN	Echo Peak, Nev.	75/09/02-80/04/25	37 12.84 N	116 19.43 W	2260	S-13	84	2	*
EPN		80/04/25-90/09/26				L-4C	84	4	*
EPM		90/09/26-present	37 13.57 N	116 20.08 W	2408	L-4C	84	4	*
EPNH	Echo Peak, Nev.	84/06/06-86/01/28	37 12.84 N	116 19.43 W	2260	L-4C horizontal	78	5	*
HEPN		86/01/29-90/09/26				L-4C horizontal	60	5	*
HEPM		90/09/26-present	37 13.57 N	116 20.08 W	2408	L-4C horizontal	60	5	*
EPR	East Pahranagat Range, Nev.	79/01/23-present	37 10.12 N	115 11.23 W	1305	L-4C	84	1	*
FMT	Funeral Mountains, Cal.	78/11/28-present	36 38.27 N	116 47.00 W	1025	L-4C	84	1	*

GLR	Groom Lake Road, Nev.	75/11/20-present	37 11.94 N	116 01.01 W	1432	L-4C		84	1	*
GMN	Gold Mountain, Nev.	79/07/13-present	37 18.04 N	117 15.44 W	2192	L-4C		84	4	*
GMNH	Gold Mountain, Nev.	84/07/30-present	37 18.04 N	117 15.44 W	2192	L-4C	horizontal	78	5	*
GMR	Groom Range, Nev.	79/01/23-present	37 20.02 N	115 46.36 W	1528	L-4C		84	4	*
GMRH	Groom Range, Nev.	84/09/09-present	37 20.02 N	115 46.36 W	1528	L-4C	horizontal	78	5	*
GVN	Grapevine, Cal.	78/11/28-present	36 59.94 N	117 20.78 W	812	L-4C		84	1	*
GWV	Greenwater Valley, Cal.	78/07/24-88/02/16	36 11.11 N	116 40.22 W	1530	L-4C		84	1	*
GWY	Greenwater Valley, Cal.	88/04/01-present	36 11.15 N	116 40.21 W	1540	L-4C		84	1	*
HCR	Hot Creek Range, Nev.	81/07/21-present	38 14.01 N	116 26.20 W	2040	L-4C		84	1	*
JON	Johnnie, Nev.	78/07/24-present	36 26.39 N	116 06.28 W	910	L-4C		84	4	*
JONH	Johnnie, Nev.	84/06/22-present	36 26.39 N	116 06.28 W	910	L-4C	horizontal	78	5	*
KRN	Kawich Range, Nev.	79/05/30-80/04/22	37 42.37 N	116 20.07 W	2570	L-4C		84	1	
KRNA	Kawich Range, Nev.	80/04/23-present	37 44.53 N	116 22.89 W	1963	L-4C		84	1	*
LCH	Last Change Range, Cal.	79/07/13-present	37 13.95 N	117 38.78 W	1404	L-4C		84	1	*
LOP	Lookout Peak, Nev.	79/01/23-present	36 51.27 N	116 10.11 W	1648	L-4C		84	1	*
LSM	Little Skull Mt., Nev.	79/12/13-84/07/20	36 44.55 N	116 16.33 W	1113	L-4C		84	4	*
LSM		84/07/20-present				S-13		84	6	*
LSMN	Little Skull Mt., Nev.	84/07/17-85/07/02	36 44.55 N	116 16.33 W	1113	L-4C	horizontal	78	5	*
LSMN		85/07/02-86/01-28				L-4C	horizontal	72	5	*
LSMN		86/01/28-86/06/24				L-4C	horizontal	60	5	*
LSMN		86/06/24-present				S-13	horizontal	38	3	*
LSME	Little Skull Mt., Nev.	84/07/17-85/07/02	36 44.55 N	116 16.33 W	1113	L-4C	horizontal	78	5	*
LSME		85/07/02-86/01-28				L-4C	horizontal	72	5	*
LSME		86/01/28-86/06/24				L-4C	horizontal	60	5	*
LSME		86/06/24-present				S-13	horizontal	38	3	*
MCA	Marble Canyon, Cal.	79/01/23-present	36 38.77 N	117 16.69 W	270	L-4C		84	1	*
MCY	Mercury, Nev.	80/03/07-present	36 39.64 N	115 57.67 W	1303	S-13		84	2	*
MGM	Magruder Mountain, Nev.	79/07/13-present	37 26.44 N	117 29.93 W	2075	L-4C		84	1	*
MTI	Mount Irish, Nev.	79/06/08-present	37 40.68 N	115 16.72 W	1540	L-4C		84	1	*
MZP	Montezuma Peak, Nev.	79/07/13-present	37 42.03 N	117 23.10 W	2353	L-4C		84	1	*
NMN	Nasa Mountain, Nev.	78/11/28-83/11/01	37 04.85 N	116 49.09 W	1500	L-4C		84	1	

NOP	Nopah Range, Cal.	78/07/24-80/04/25	36 07.63 N	116 09.26 W	911	L-4C	84	1	*
NOP		80/04/25-present				S-13	84	2	*
NPN	North Pahroc Rg, Nev.	79/06/08-present	37 39.12 N	114 56.21 W	1660	L-4C	84	1	*
PAN	Panamint Range, Cal.	88/04/01-present	36 23.59 N	117 06.05 W	1690	L-4C	84	4	*
PANH	Panamint Range, Cal.	88/04/01-present	36 23.59 N	117 06.05 W	1690	L-4C horizontal	78	5	*
PGE	Panamint Range, Cal.	78/11/28-88/02/13	36 20.93 N	117 03.95 W	1850	L-4C	84	4	
PGEH	Panamint Range, Cal.	84/10/11-88/02/13	36 20.93 N	117 03.95 W	1850	L-4C horizontal	78	5	
PPK	Piper Mountain, Cal.	79/07/13-present	37 25.51 N	117 54.42 W	1851	L-4C	84	1	*
PRN	Pahroc Range, Nev.	72/01/21-80/06/19	37 24.40 N	115 03.05 W	1402	NGC-21	?	8	*
PRN		80/06/19-present				S-13	84	6	*
PRNH	Pahroc Range, Nev.	84/08/28-present	37 24.40 N	115 03.05 W	1402	L-4C horizontal	78	5	*
QCS	Queen City Summit, Nev.	79/06/08-present	37 45.39 N	115 56.58 W	1914	L-4C	84	1	*
QSM	Queen of Sheba Mine, Ca	78/11/28-present	35 57.85 N	116 52.05 W	450	L-4C	84	1	*
SDH	Striped Hills, Nev.	78/07/24-present	36 38.72 N	116 20.38 W	1050	L-4C	84	1	*
SGV	South Grapevine Mts, Ca	78/11/28-81/06/15	36 58.92 N	117 02.11 W	1550	L-4C	84	1	*
SGV		81/06/15-82/06/16				S-13	84	2	*
SGV		82/06/15-present				L-4C	84	1	*
SHRG	Sheep Range, Nev.	79/05/22-present	36 30.33 N	115 09.61 W	1590	L-4C	84	1	*
SPRG	Spotted Range, Nev.	79/05/28-present	36 41.64 N	115 48.63 W	1191	L-4C	84	1	*
SRG	Seaman Range, Nev.	79/06/08-present	37 52.93 N	115 04.15 W	1640	L-4C	84	1	*
SSP	Shoshone Peak, Nev.	73/10/10-80/05/25	36 55.53 N	116 13.26 W	2021	NGC-21	?	8	
SSP		80/05/27-present				L-4C	84	1	*
SVP	Silver Peak Range, Nev.	79/07/13-present	37 42.89 N	117 48.20 W	2595	L-4C	84	1	*
TCN	Thirsty Canyon, Nev.	84/11/02-present	37 08.80 N	116 43.52 W	1469	L-4C	84	1	*
TMBR	Timber Mt., Nev.	82/02/19-87/05/05	37 02.11 N	116 23.21 W	1754	L-4C	84	1	*
TMBR		87/05/05-present				S-13	84	6	*
TMO	Tin Mountain, Cal.	78/11/28-present	36 48.29 N	117 24.30 W	2113	L-4C	84	1	*
TPU	Templute Mountain, Nev.	79/06/08-present	37 36.27 N	115 39.06 W	1910	L-4C	84	1	*
WCT	Wildcat Mountain, Nev.	81/04/08-88/01/05	36 47.79 N	116 37.62 W	930	L-4C	84	1	*
WCT		88/01/05-88/03/11				L-4C	66	1	*
WCT		88/03/11-present				L-4C	84	1	*
WRN	Worthington Mts., Nev.	79/06/08-present	37 58.89 N	115 35.58 W	1725	L-4C	84	1	*

YMT1	Yucca Mountain, Nev.	81/03/05-present	36 51.22 N	116 31.86 W	1006	S-13	84	3	*
YMT2	Yucca Mountain, Nev.	81/03/05-present	36 47.14 N	116 29.22 W	1006	S-13	84	3	*
YMT3	Yucca Mountain, Nev.	81/03/05-present	36 47.21 N	116 24.75 W	1060	S-13	84	3	*
YMT4	Yucca Mountain, Nev.	81/04/01-81/10/13	36 50.99 N	116 27.18 W	1248	S-13	84	3	*
YMT4		81/10/13-83/07/01				S-13	72	3	*
YMT4		83/07/02-present				S-13	84	3	*
YM4N	Yucca Mountain, Nev.	84/06/29-85/05/23	36 50.99 N	116 27.18 W	1248	L-4C horizontal	78	5	*
YM4S		85/05/24-86/01/28				L-4C horizontal	72	5	*
NYM4		86/01/28-present				L-4C horizontal	60	5	*
YM4E	Yucca Mountain, Nev.	84/06/29-85/05/23	36 50.99 N	116 27.18 W	1248	L-4C horizontal	78	5	*
YM4W		85/05/24-86/01/28				L-4C horizontal	72	5	*
EYM4		86/01/28-present				L-4C horizontal	60	5	*
YMT5	Yucca Mountain, Nev.	81/04/01-81/10/13	36 53.91 N	116 27.25 W	1355	S-13	84	3	*
YMT5		81/10/13-83/07/02(?)				S-13	72	3	*
YMT5		83/07/02-present				S-13	84	3	*
YMT6	Yucca Mountain, Nev.	81/04/01-81/10/13	36 51.36 N	116 24.02 W	1090	S-13	78	3	*
YMT6		81/10/13-83/07/02(?)				S-13	66	3	*
YMT6		83/07/02-present				S-13	84	3	*

NOTES: All instruments are vertical-component unless otherwise noted. If one horizontal-component instrument exists at a site, it has north-south polarity; if two horizontals exist at a site, they have north-south and east-west polarities, resp. The polarity is suggested by the station name. A * in the final column indicates satellite-determined station coordinates. Elevations of stations with *s in the final column were obtained using altimeters calibrated against nearest USGS benchmark. Locations are preliminary.

Appendix F

Input parameters to HYPO71

HYPO71.FOR, version 1.001, was baselined for use by the Yucca Mountain Project, with CID YMP-USGS/GDD0001.02, on October 22, 1990. This version of HYPO71 requires a minimum of three input files: (1) a header file containing crustal velocity information, weighting scheme information, iteration-controlling parameters, and I/O-controlling parameters; (2) a station file containing most of the information shown in Appendix E, above; and (3) a phase file, containing P and S phase arrival times and information for determining earthquake magnitude. The data of item (1) are presented in Appendix E, and will not be repeated here. The data of item (3) are too extensive for inclusion in this report, but are available on request, when approved by USGS-YMP management.

One of two header files is used, depending on the source zone. For most earthquakes occurring in the SGB, the file **nvhead.dat**, having the velocity model shown in figure F1 (a) is input. For earthquakes occurring in the immediate vicinity of Yucca Mountain, the file **nvhead.ymt**, having the velocity model shown in figure F1 (b), is input. Copies of these two files are shown on the next page. For meanings of the "Control Card" parameters, the reader should consult Lee and Lahr (1975).

(A) The below lines are a listing of nvhead.dat, used as an input file to HYPO71.

```
HEAD
RESET TEST( 1)=   0.5500
RESET TEST( 2)=  20.0000
RESET TEST( 3)=   0.5000
RESET TEST( 4)=   0.0500
RESET TEST( 5)=   5.0000
RESET TEST( 6)=   1.0000
RESET TEST( 7)=  -1.27600
RESET TEST( 8)=   1.66600
RESET TEST( 9)=  0.00227
RESET TEST(10)= 100.0000
RESET TEST(11)=  12.0000                !max # of iterations/solution
RESET TEST(12)=   0.5000
RESET TEST(13)=   1.0000
RESET TEST(14)=  -2.0500
RESET TEST(15)=   0.0000
RESET TEST(16)=   0.852
RESET TEST(17)=   -1.766
   .38000000E+01   .00000000E+00
   .59000000E+01   .10000000E+01
   .61500000E+01   .30000000E+01
   .65000000E+01   .15000000E+02
   .69000000E+01   .24000000E+02
   .78000000E+01   .32000000E+02
   .00000000E+00   .00000000E+00
   7.  10. 220. 1.71    3    0    0    0    7    0    1 1111   0  0.00   0  0.00
```

(B) The below lines are a listing of nvhead.ymt, used as an input file to HYPO71.

```
HEAD
RESET TEST( 1)=   0.1000
RESET TEST( 2)=  30.0000
RESET TEST( 3)=   0.5000
RESET TEST( 4)=   0.0500
RESET TEST( 5)=   5.0000
RESET TEST( 6)=   1.0000
RESET TEST( 7)=  -1.27600
RESET TEST( 8)=   1.66600
RESET TEST( 9)=  0.00227
RESET TEST(10)= 100.0000
RESET TEST(11)=   8.0000
RESET TEST(12)=   0.5000
RESET TEST(13)=   1.0000
RESET TEST(14)=  -1.2000
RESET TEST(15)=   0.0000
RESET TEST(16)=   0.852
RESET TEST(17)=   -1.766
   .32000000E+01   .00000000E+00
   .46000000E+01   .05000000E+01
   .57000000E+01   .25000000E+01
   .62000000E+01   .40000000E+01
   .65000000E+01   .15000000E+02
   .78000000E+01   .32000000E+02
   .00000000E+00   .00000000E+00
   7.   5.  90. 1.71    3    0    0    0    7    0    1 1111   0  0.00   0  0.00
```

In file (B), a slightly different weighting scheme with respect to distance is invoked than in nvhead.dat, file (A) above. In the former file, weights taper from 1. to 0. in a linear manner for epicentral distances between 10 and 220 km. In the latter file, weights taper from 1. to 0. for distances between 5 and 90 km.

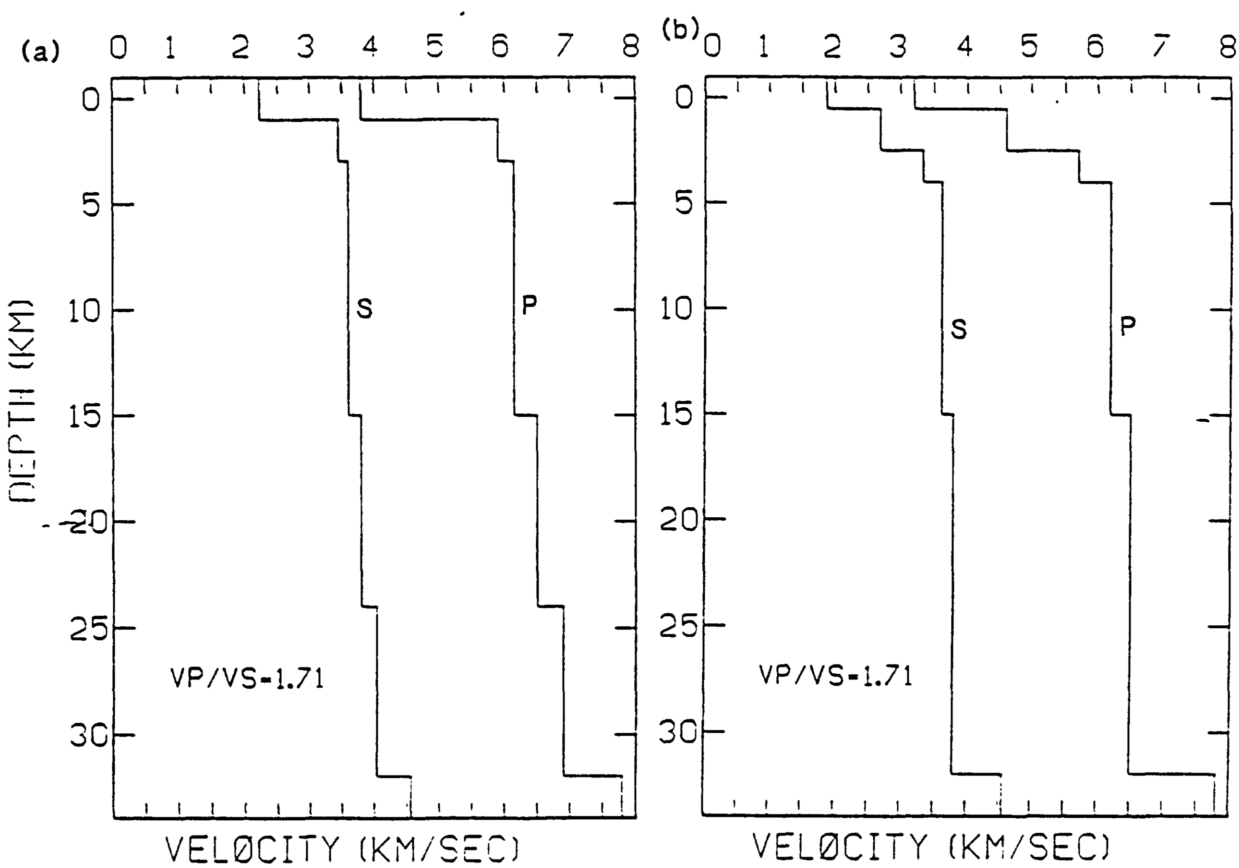


Figure F1. (a) Primary (P) and secondary (S) wave velocities as a function of depth (0.0 = sea level) for the standard model used to locate southern Great Basin earthquakes. The interface at 15 km is optional. (b) P and S wave velocities as a function of depth for the Yucca Mountain region, being an idealization of the model proposed by Hoffman and Mooney (1984).

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