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SEISMICITY AND FOCAL MECHANISMS FOR THE SOUTHERN GREAT BASIN OF NEVADA AND CALIFORNIA: 1987 THROUGH 1989

by

S. C. Harmsen and C. G. Bufe

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TABLE OF CONTENTS
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Seismicity and focal mechanisms for the southern Great Basin of Nevada and California: 1987 through 1989, by S.C. Harmsen and C.G. Bufe

	No. of pages
Published Open-File Report	~~208~~ 216 JML 06/30/92
Published Report Package:	
1. Table of Contents	1
2. DOE Form 1332	2
3. Letter to DOE for concurrence (02/27/92)	2
4. DOE concurrence letter (04/29/92)	2
5. USGS approval letter and MRS showing date of USGS approval of October 31, 1991 (11/8/91)	2
6. Reconstructed Manuscript Routing Sheet	2
7. QA review (02/21/92)	2
8. TPO review (02/25/92)	1
9. Reviewer selection form for Swolfs (06/06/91)	1
10. Reviewer selection form for Perkins (06/06/91)	1
11. Swolfs review (08/16/91)	1
12. Perkins review (04/05/91)	9
13. Author response to Perkins review (10/07/91)	15
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by

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CONTENTS

Page

Abstract 1
Introduction 1
Acknowledgments 2
Calibration procedures and results 2
Preliminary hypocenter determination for SGB earthquakes and explosions . . . 4
Can localized velocity anisotropy be inferred from NTS nuclear tests? 6
Earthquake magnitudes and detection threshold 10
Overview of local SGB seismicity, 1987 through 1989 13
Seismicity at Yucca Mountain, 1987 through 1989 21
1988 Boulder City, Nevada swarm 22
Earthquake focal mechanisms 26
Effects of modeling on focal mechanisms 29
Representativeness of focal mechanisms in the SGB catalog 30
Untypical focal mechanisms and source zones in the SGB 30
Evidence of seismically active detachment faults? 31
Yucca Mountain earthquake focal mechanisms 33
Reverse-slip focal mechanisms and compressional tectonism in the SGB 35
Focal mechanisms of other notable SGB earthquakes 36
Average directions of P and T and tectonic strain 38
Depth-of-focus distribution and deep-crust intraplate earthquakes 42
Conclusions 47
References cited 48
Appendix A. SGB earthquake locations for the years 1987, 1988, and 1989, and quadrangle names 51
Appendix B. Chemical explosion locations for the years 1987, 1988, and 1989 . . 135
Appendix C. NTS nuclear device test locations and low-frequency event listing for the years 1987, 1988, and 1989 152
Appendix D. Southern Great Basin earthquake focal mechanisms, 1987 through 1989 162
Appendix E. Station codes, locations, and instrumentation 200
Appendix F. Input parameters to HYPO71 206

ILLUSTRATIONS

Page

Figure 1.– SGBSN station locations and some physiographic features of the southern Great Basin 3

Figure 2.– SGBSN travel-time delays from NTS nuclear device tests 8

Figure 3.– Comparison of M_L determined from horizontal-component instruments with M_L determined from vertical-component instruments. 11

Figure 4.– Seismicity in the southern Great Basin, 1987. 14

Figure 5.– Seismicity in the southern Great Basin, 1988. 15

Figure 6.– Seismicity in the southern Great Basin, 1989. 17

Figure 7.– Seismicity in the vicinity of Oasis Valley, southern Nevada, 1979 through 1989. 18

Figure 8.– Epicenter counts in SGB quadrangles, 1987-1989 versus 1984-1986. . 19

Figure 9.– Epicenter counts in SGB quadrangles, 1987-1989 versus 1978-1983. . 20

Figure 10.– Epicentral scatter and variation of RMS travel time residual with depth of focus for a small Yucca Mountain earthquake 23

Figure 11.– Seismicity at Yucca Mountain, 1979 through 1989 24

Figure 12.– Preliminary epicenters for Boulder City vicinity swarm, 1988 25

Figure 13.– SGB earthquake focal mechanisms on regional map base, 1987 through 1989 28

Figure 14.– Epicentral scatter and RMS travel time residual as a function of depth of focus for a shallow Yucca Flat earthquake 37

Figure 15.– Focal mechanism P and T axes on lower hemisphere, 1987 through 1989 40

Figure 16.– Focal mechanism P and T axes on lower hemisphere, 1979 through 1986 41

Figure 17. Depth-of-focus distribution for a subset of SGB earthquakes, 1987 through 1989 43

Figure 18. SGBSN seismograms for a deep-crustal earthquake of August 8, 1989 44

Figure 19.– Epicentral scatter and RMS travel time residual as a function of depth of focus for a deep-crust Yucca Flat earthquake 45

Figure 20.– Epicentral scatter and RMS travel time residual as a function of depth of focus for an earthquake north of Las Vegas, Nev. having depth near the brittle-ductile transition zone 46

Figure A1.– Quadrangle names in the northeast quarter of the southern Great Basin. 52

Figure A2.– Quadrangle names in the southeast quarter of the southern Great Basin. 53

Figure A3.– Quadrangle names in the northwest quarter of the southern Great Basin. 54

Figure A4.– Quadrangle names in the southwest quarter of the southern Great Basin. 55

Figure A5.– Maximum earthquake magnitude per $7\frac{1}{2} \times 7\frac{1}{2}'$ quadrangle in the SGB, 1987 through 1989 and August 1978 through 1986 56

Figure B1.– Preliminary epicenter map of blasts and probable blasts in the SGB, 1987 through 1989 136

Figure C1.– Map of announced NTS nuclear device test epicenters and selected low-frequency phenomena, 1987 through 1989 153
Figure C2.– Contour map of P-wave velocity variation from the standard model for the NTS test "ALAMO" 154
Figure C3.– Contour map of P-wave velocity variation from the standard model for the NTS test "DISKO ELM" 155
Figure C4.– Contour map of P-wave velocity variation from the standard model for the NTS test "KAWICH" 156
Figure D1.– Focal mechanism for Stovepipe Wells earthquake 1982-03-16 163
Figure D2.– Focal mechanism for Alamo SE earthquake 1987-01-13 164
Figure D3.– Focal mechanism for Yucca Mountain (Bare Mtn. quadrangle) earthquake 1987-03-10 165
Figure D4.– Focal mechanism for Tin Mtn. earthquake 1987-04-08 166
Figure D5.– Focal mechanism for Specter Range SW earthquake 1987-04-20 . . 167
Figure D6.– Alternate focal mechanism for Specter Range SW earthquake 1987-04-20 168
Figure D7.– Focal mechanism for Yucca Mtn. (Topopah Spring NW quadrangle) earthquake 1987-06-01 169
Figure D8.– Focal mechanism for Desert Hills SE earthquake 1987-06-17 170
Figure D9.– Focal mechanism for Stonewall Pass earthquake 1987-07-13 171
Figure D10.– Focal mechanism for Timber Mtn. (Buckboard Mesa quadrangle) earthquake 1987-08-13 172
Figure D11.– Focal mechanism for Papoose Lake SE earthquake 1987-10-02 . . 173
Figure D12.– Alternate focal mechanism for Papoose Lake SE earthquake 1987-10-02 174
Figure D13.– Focal mechanism for Reveille Peak earthquake 1987-10-28 175
Figure D14.– Alternate focal mechanism for Reveille Peak earthquake 1987-10-28 176
Figure D15.– Focal mechanism for Specter Range NW earthquake 1987-12-10 . . 177
Figure D16.– Focal mechanism for Striped Hills earthquake 1988-01-14 178
Figure D17.– Focal mechanism for Thirsty Canyon NW earthquake 1988-01-26 . 179
Figure D18.– Focal mechanism for Yucca Flat earthquake 1988-02-07 180
Figure D19.– Alternate focal mechanism for Yucca Flat earthquake 1988-02-07 . 181
Figure D20.– Focal mechanism for Dry Mountain earthquake 1988-05-26 182
Figure D21.– Focal mechanism for Ammonia Tanks earthquake 1988-06-15 . . . 183
Figure D22.– Focal mechanism for Thirsty Canyon SW earthquake 1988-07-02 . 184
Figure D23.– Focal mechanism for Owens Valley, California, earthquake 1988-07-05 185
Figure D24.– Focal mechanism for Timber Mountain earthquakes 1988-07-03 and 1988-07-24 186
Figure D25.– Focal mechanism for Reveille Peak earthquake 1988-08-30 187
Figure D26.– Focal mechanism for Gold Flat (Mellan quadrangle) earthquake 1988-10-28 188

Figure D27.– Focal mechanism for Gold Flat (Mellan quadrangle) earthquake 1988-10-29 189

Figure D28.– Focal mechanism for Yucca Mtn. (Bare Mtn. quadrangle) earthquake 1988-11-18 190

Figure D29.– Focal mechanism for Gass Peak, Nevada, earthquake 1989-01-09 . 191

Figure D30.– Alternate focal mechanism for Gass Peak, Nevada, earthquake 1989-01-09 192

Figure D31.– Focal mechanism for Dead Horse Flat earthquake 1989-01-31 . . . 193

Figure D32.– Focal mechanism for Timber Mountain earthquake 1989-03-05 . . 194

Figure D33.– Focal mechanism for Ubehebe Crater earthquake 1989-04-12 . . . 195

Figure D34.– Focal mechanism for Alamo SE earthquake 1989-04-19 196

Figure D35.– Alternate focal mechanism for Alamo SE earthquake 1989-04-19 . 197

Figure D36.– Focal mechanism for Jackass Flats earthquake 1989-07-21 198

Figure D37.– Focal mechanism for Scottys Junction SW earthquake 1989-08-28 . 199

Figure E1. Magnification curves for SGBSN seismographs at Yucca Mountain, Nevada with telemetry to and computer recording at Golden, Co. 201

Figure F1.– The two P and S velocity models used for preliminary hypocenter determination in the SGB 208

LIST OF TABLES

Table 1.– Hypocentral parameters for selected Rainier Mesa nuclear device tests that display 180° P-wave azimuthal delay periodicity at SGBSN stations . 9

Table 2.– Preliminary hypocentral parameters for Yucca Mountain seismicity, 1987 through 1989 22

Table 3.– Preliminary SGB focal mechanisms, 1982 and 1987 through 1989. . . 27

Table C1.– Announced NTS nuclear device test locations for 1987, 1988, and 1989. 157

Table E1.– Seismographic systems in use in SGBSN in 1989. 200

Seismicity and Focal Mechanisms for the Southern Great Basin of Nevada and California: 1987 through 1989

Abstract

For the calendar year 1987, the southern Great Basin seismic network (SGBSN) recorded about 820 earthquakes in the southern Great Basin (SGB). Local magnitudes ranged from 0.2 to 4.2 (December 30, 1987, 22:50:42 UTC at Hot Creek Valley). Five earthquakes epicenters in 1987 within the detection threshhold of the seismic network are at Yucca Mountain, the site of a potential national, high-level nuclear waste repository. The maximum magnitude of those five earthquakes is 1.1, and their estimated depths of focus ranged from 3.1 to 7.6 km below sea level. For the calendar year 1988, about 1280 SGB earthquakes were catalogued, with maximum magnitude 4.4 for an Owens Valley, California, earthquake on July 5, 1988. Eight earthquake epicenters in 1988 are at Yucca Mountain, with depths ranging from three to 12 km below sea level, and maximum magnitude 2.1. For the calendar year 1989, about 1190 SGB earthquakes were located and catalogued, with maximum magnitude equal to 3.5 for an earthquake about ten miles north of Las Vegas, Nevada, on January 9. No Yucca Mountain earthquakes were recorded in 1989. An earthquake having a well-constrained depth of about 30 km below sea level was observed on August 21, 1989, in eastern Nevada Test Site (NTS).

The greatest concentration of SGB earthquakes in a small area during the three years 1987 through 1989 occurred at the Reveille Range (Reveille Peak quadrangle), about 115 km north of Yucca Mountain. Other concentrations of seismicity were observed at Rock Valley (southern Nevada Test Site), Pahranagat Shear Zone, Sarcobatus Flat, Gold Flat, and in the Grapevine Mountains. Seismicity near Boulder City, Nevada and Lake Mead produced very modest structural damage at Boulder City. The magnitude 3.5 earthquake in January, 1989, near Las Vegas, Nevada, resulted in a few cracked windows at Las Vegas, the only other case of damage being reported from earthquakes in the southern Great Basin for that three-year period.

Focal mechanisms from thirty-one SGB earthquakes are presented in this report. The solutions range from normal slip or oblique slip to strike slip, with a few having sub-horizontal nodal planes. Tension axes for most SGB earthquake focal mechanisms cluster in the northwest-southeast direction, and tend to display sub-horizontal angles of inclination. Alternate focal mechanism solutions resulting from different assumed hypocenters demonstrate that, in some instances, the current seismographic network cannot provide unambiguous focal mechanism solutions, even for some of the magnitude > 3 earthquakes. This is because the focal mechanism is dependent on depth of focus, which is often a poorly resolved parameter.

Examination of travel-time delays for P waves from NTS nuclear tests indicates a strong 180° azimuthal pattern, especially for data from Rainier Mesa and western Yucca Flat tests. This pattern could be the signature of stress-induced and/or crack-induced azimuthal velocity anisotropy, or alternatively, of a high-speed body having a longitudinal axis oriented approximately north 10° east to south 10° west, possibly the lower carbonate aquifer. Whatever the source, delays have no significant correlation with distance, probably indicating the presence of localized tectonic or geologic anomalies (radius < 50 km) rather than a regional feature.

Introduction

The SGBSN, one of several regional seismographic networks operating in the Great Basin, has monitored local seismicity and has recorded arrivals from regional and teleseismic earthquakes continuously since August, 1978. 54 permanent stations were in place by mid-1981, including a dense sub-array at Yucca Mountain, Nevada. Preliminary hypocenter listings and seismicity data analysis from data collected by the SGBSN for the period August, 1978 through December, 1986, are presented in Rogers and others (1987) and Harmsen and Rogers (1987). This report is an addendum/update to those reports. A broad-scope review of the seismotectonics of Nevada is available in

Rogers and others (1991), where contemporary SGB and other seismicity data are discussed in the context of the Cenozoic deformation of the Great Basin.

The SGBSN was initially composed entirely of vertical-component seismographic stations. Eight horizontal-component seismographs were added in 1984, and a vertical-component seismograph south of Boulder City, Nevada, was added in August, 1988. Figure 1 shows the seismic station locations and major physiographic structures discussed below. Appendix E lists station parameters. References to individual stations in the text below will be in bold font.

The primary purpose of the network is to investigate the seismotectonic environment in the immediate vicinity of Yucca Mountain, Nevada, the potential site of a high-level, national nuclear waste repository. Also, the network provides information on seismicity at greater distances, out to about 160 km radial distance of Yucca Mountain. Seismic signals from the network are continuously telemetered to the USGS data processing center in Golden, Colorado, where preliminary hypocenter determination is performed, along with research on focal mechanisms and faulting, on fluid-induced seismicity, on attenuation of seismic waves, on velocity structure, on crustal strain in the southern Great Basin, and other topics having relevance to the Yucca Mountain Project.

Operation of the seismic network is funded under an interagency agreement with the Department of Energy, which provides Quality Assurance regulations for the collection, analysis, interpretation, reporting and archiving of data. Digital, event-oriented SGBSN data (seismograms, station data, and so on) are permanently archived on magnetic tapes, and a nearly continuous record of analog SGBSN data is also maintained on 16 mm develocorder film. Because seismic data in the SGB come from sources and crustal paths that exhibit large degrees of geologic variability, with many details that are simply unknown, the hypocenters and analyses that are presented in open-file format must be considered preliminary. Uncertainty in many reported parameters, such as those associated with earthquake location and focal mechanism, is in most cases substantial and difficult to completely quantify. In this report, consequences of uncertainty are explicitly addressed by offering alternate hypocenters and focal mechanisms that are of comparable "goodness-of-fit" within the context of the simplified geologic models invoked to parametrize the earth. Since a possible consequence of this high level of ambiguity is that permissable licensing uncertainties about the seismotectonic component of the geologic system may be exceeded, as stipulated in 40 CFR Part 191, the U.S.G.S. response is to increase the density of seismic station coverage of southwestern Nevada during the next few years, with the expectation of reducing parameter estimate uncertainties for much of the recorded local seismicity.

Acknowledgments

Maintenance and periodic calibration of seismographs and related field equipment is performed by D. E. Overturf of the U. S. Geological Survey, and by contract technicians. Arrival time and amplitude data from earthquakes and blasts were initially scaled by Pingsheng Chang, a contract technician, and by Miles Weida and Mark Meremonte, of the U.S. Geological Survey.

The seismological laboratories of the University of Utah at Salt Lake City (UUT), the University of Nevada at Reno (REN), the California Institute of Technology at Pasadena (PAS), the USGS at Menlo Park, California (MNLO), and the National Earthquake Information Center at Golden, Colorado (NEIC), provided useful seismograms, first motion data, and/or magnitude estimates for several of the earthquakes discussed in this report.

Helpful reviews of this report were provided by David M. Perkins and Henri S. Swolfs of the U.S. Geological Survey, Branch of Geologic Risk Assessment. The manuscript benefited from suggestions and section reviews by R. E. Anderson, J. Gomberg, and K. F. Fox.

Calibration procedures and results

A complete discussion of the technical procedures used in field calibrations of SGBSN stations is presented in the Quality Assurance document, YMP-USGS Seismic Procedure 11. Seismometers

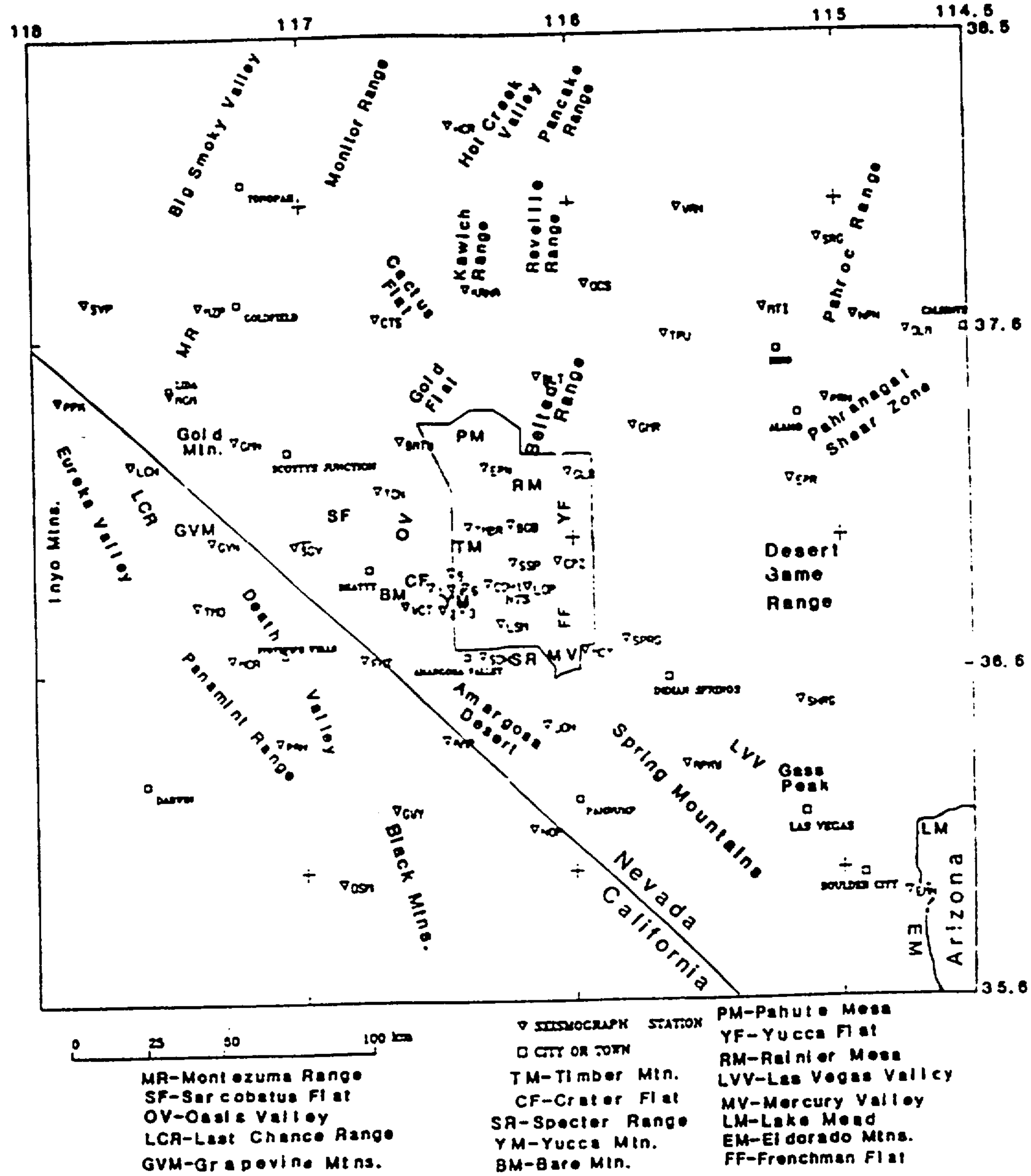

Figure 1.– Map of SGBSN seismograph station locations, cities and towns, and some major physiographic features of the southern Great Basin.

are visited and calibrated every six months, or as needed. A station calibration is deemed acceptable when the amplitude response of a seismographic system lies within a ±30% range of a nominal response, in the frequency band $2 \leq f \leq 10$ Hz. In practice, seismographs with Teledyne-Geotech S13 seismometers generally display responses within ±10% of their nominal (theoretical) values in the frequency band $0.1 \leq f \leq 20$ Hz during field calibrations. Seismographs with Mark L4C seismometers generally display responses within ±20% of their nominal values in the frequency band $1 \leq f \leq 10$ Hz. Whenever measured responses deviate beyond the prescribed limits, a notation is made in a log of station calibrations, the field technicians are informed, and maintenence is performed on the defective component(s). The system is then recalibrated until its amplitude response falls within the prescribed limits. Calibration results are *not* currently used to correct or modify amplitude data scaled from SGBSN seismograms in order to estimate SGB earthquake magnitudes.

An upgrade seismic network, composed primarily of three-component S13 seismographs with much wider dynamic range than the current network, and digital satellite telemetry, is currently being deployed in the SGB. This network is expected to provide a more accurate measure of ground vibrations than the current network.

Preliminary hypocenter determination for SGB earthquakes and explosions

Earthquakes, explosions, and low-coda-frequency seismic phenomena (e.g., some cavity collapses and some nuclear detonation aftershocks) occurring in the southern Great Basin are located with HYPO71, and listed in Appendices A, B, and C, respectively. The SGB velocity models and other pertinent parameter information are listed in Appendix F. HYPO71 (Lee and Lahr, 1975) employs several iterative algorithms, some of which perform forward modelling; i.e., ray tracing in a simplified geologic medium to determine T_c, the computed source-to-station travel time. Others perform inverse modelling, in which a trial hypocenter is assumed at some position, and new solutions are found that move the trial hypocenter in a direction that reduces the root-mean-square travel-time residual, RMS. The definition of RMS is,

$$RMS = sqrt(\frac{1}{n}\sum_i w_i(T_o - T_c)_i^{\,2}),$$

where n is the number of phase arrival time readings used in the determination (as discussed below, approximately 20% of the arrival time picks are not used in the final location), T_o is the "observed" source-to-station travel time (scaled arrival time − computed origin time) and w_i is the computed weight for the ith reading, with $\sum_i w_i = n$. Ideally, iterations towards a final solution continue until no significant reductions in RMS can be achieved by further adjustments. The directions/amplitudes of adjustments are determined by a Newton-Raphson scheme, known to seismologists as Geiger's method. In the absence of "noise" or errors in the velocity model, or in the data, the method is both fast and accurate. Even in the presence of moderate Gaussian-distributed noise in the data, the method continues to perform satisfactorily. In the real world, however, pitfalls of the method are known to exist. One shortcoming of the iterative scheme is that it is apt to converge to a local minimum of the RMS function, rather than the global minimum, depending on the initial trial hypocenter, (x_0, y_0, z_0). To partly ameliorate this problem, hypocenters for all earthquakes reported in Appendix A were relocated using different values of $z_0 = 0.0, 7.0$, and 12.0 km below sea level, respectively, selecting for reporting here the final iterate (x_f, y_f, z_f) having the minimum RMS residual. In the catalog, immediately following the two letter grades, the hypocenter is tagged with the letter "Z," "S," or "T," depending on whether the solution having the minimum RMS was derived from iterations having starting depth of zero km, seven km, or twelve km below sea level, respectively.

If different final iterates yield the same RMS residual (±0.005 sec), the hypocenter corresponding to the initial $z_0 = 7.0$ starting depth is selected for publication. This selection process may appear arbitrary, but statistically, has little effect on the overall depth-of-focus distribution. We define $RMS(k) = RMS|z_0 = k$ km, and similarly, depth estimate, $z(k)$, and standard error in depth estimate, $stz(k)$. We investigated the percentage of hypocenters listed in Appendix A, below, that were derived from $z_0 = 7$ or 12 km iterations, but which also have competing solutions within $\approx$ 10% of the sampled travel time residual minimum, $RMS(0) - RMS(k) \leq \max(0.01, 0.1 \min(RMS(k)))$ sec, $k = 7$ or 12 km. For the hypocenters of 1987, 570 hypocenters met this criterion. However, all but 92 of those 570 had the property that the depth estimate, $z(0)$, was within one standard error in depth of the reported depth estimate, $|z(k) - z(0)| \leq stz(k)$. Of the remaining 92, 49 competing depths were within two standard errors, $|z(k) - z(0)| \leq 2stz(k)$ (case A). The remaining 43 competing depths were greater than two standard errors from the reported depth of focus, $|z(k) - z(0)| > 2stz(k)$ ($\approx$ 5% of the catalog, case B). In Appendix A, hypocenters having misleadingly low stz estimates are flagged by a + sign to the right of stz for case A, or by ++ for case B. This procedure conforms to the tradition of providing point estimates for hypocenters in preliminary seismicity catalogs, but explicitly acknowledges cases where depth-of-focus uncertainty is clearly underestimated by HYPO71's standard error statistics.

A more comprehensive solution than that outlined above would describe the volume where the RMS function (or a similar function) approximately attains its minimum. In general, it is emphatically *not* the case that the point estimate $\pm$ one standard deviation is a reliable estimate of that volume, whether using HYPO71 or any similar least-squares software for hypocenter determination. One source of "undeserved optimism" regarding error estimates is that their statistical determination is based on the *local* behavior of RMS, which in some instances may display a steep-flanked trough at a depth corresponding to a local minimum, but which may display a broad, featureless minimum at another competing depth. In other instances the standard error estimate for focal depth may be unrealistically large, as occurs when the hypocenter locates in the immediate vicinity of the deepest sampled layer interface in the earth model.

The RMS travel time residual function is multivariate, and algorithmic attempts to minimize RMS are necessarily performed in lower-dimensional subspaces than its true domain. As a practical matter, hypocenter determination is performed by fixing many of these variables at "plausible" values, rather than routinely exploring all "equally likely" alternate values. In particular, RMS is obviously sensitive to weighting schemes, w_i, as well as to velocity model, T_c. Weighting of data has four components, (1) the analyst's subjective weight assignment at the time of phase data collection, which is based on the impulsiveness of the arrival, (2) the source-station distance, (3) the azimuthal quadrant which the source-station ray samples, and (4) the "feedback" residual weight. Weighs assigned by the analyst are discussed further in YMP-USGS Technical Procedure SP-01, "Procedure for the preliminary determination of the earthquake hypocenter." We note here that an S-arrival weight at a given station is always downweighted relative to the corresponding P-arrival weight, since the S-wave slowness is greater and would increase its relative influence on the location process if such downweighting were not performed (see Gomberg and others, 1990, eq. 6). Distance weights, w_d, depend on the model. For all earthquakes that are located using the Yucca Mountain velocity model, shown in Appendix F, $w_d = 1$ for $d < 5$ km, and w_d linearly decreases with d in the range $5 \leq d \leq 90$ km. Station arrival time data for stations greater than 90 km from Yucca Mountain epicenters are automatically zero-weighted. For all other earthquakes in the SGB, $w_d = 1$ for $d < 10$ km, and w_d decreases linearly with d in the range $10 \leq d \leq 220$ km, and $w_d = 0$ for $d > 220$ km. Azimuthal weights attempt to balance the sum of arrival time data weights in each 90° quadrant, or in each 120° sector if station coverage is very poor. The azimuthal weight algorithm is discussed in greater detail in Lee and Lahr (1975).

The last weight factor is computed from each station's travel time residual, $(T_o - T_c)_i$. After each iteration after the second, the station residual is examined by the algorithm, and if its amplitude is relatively large, the ith weight is reduced, sometimes to zero. The computed travel time to each station, T_c, is the minimum travel time for the direct ray and each of the possible refracted rays, for the given velocity model, plus any *a priori* delay that has been defined for the station.

Therefore, for a given set of arrival time data, there are infinitely many computable RMS functions, and the determination of the "quality" of a hypocenter is necessarily colored by the analyst's choice of station delays, weighting functions, and velocity model (earth parametrization). For the hypocenters of this report, HYPO71 assigns two grades to the hypocenter (A through D, never F!), but neither grade fully accounts for uncertainties in the velocity model or in the station delays, or for the effects of information censoring performed by the weighting functions. The first grade focusses on the quality of the hypocenter (low RMS residual, small standard errors of the epicenter and depth), and the second on the station distribution (number of phases, station azimuthal gap, distance from source to nearest station). Lee and Lahr (1975) discuss HYPO71's grading criteria in detail.

Where crustal velocities are not well known (for example, where velocities differ from the model velocities by more than 2 percent), primary and secondary wave arrival time data are usually insufficient to constrain the depth of focus estimate for local earthquakes to lie within approximately one standard-error-of-depth (as reported in Appendix A) of the true hypocenter (Gomberg and others, 1990). To some extent, this uncertainty is reduced by insuring that accurate P and S arrivals from a station within one focal depth epicentral distance are available - a condition which is absent for most data of this report, but which is driving the site selection for the upgrade seismic network, the deployment of which is presently under way. Although we routinely assign HYPO71's depth of focus estimate, z, to earthquake hypocenters discussed in this report, the true depth should not be considered known to within one standard error of z unless "DMIN," the source-to-nearest-station distance, is less than about $1.4 \times z$.

Estimated hypocenters for chemical explosions are reported in Appendix B. Many known chemical explosions are located treating depth a free parameter, and the results of some of those experiments are listed in Appendix B. If a blast's depth is constrained during iteration for its epicenter, the depth is generally fixed at -1.0 (one km above sea level). The fact that unconstrained depth estimates for known blasts can exceed ten km below sea level is an indication of poor station coverage and of problems with the velocity model, especially in the source zone (SGB mining detonations often occur in low-velocity alluvium, with $V_p \leq 2$ km/sec, while $V_p = 3.8$ km/sec in the shallow layer of the standard SGB velocity model). The fact that earthquake data usually include several secondary wave arrivals that constrain the depth estimate whereas chemical explosion data usually lack such arrivals, as well as the probability that the earthquake source zone is better modelled by the simple layered velocity structure used in hypocenter determination than explosion source zones, imply that earthquake location accuracy is better than would be indicated by blast location errors reported in the chemical explosion catalog.

Alternatives to the forward-inverse approach to hypocenter determination have been suggested in various seismological research articles. A maximum-likelihood approach yielding a more comprehensive description of the hypocenter is explored by Gomberg and others (1990). In that approach, the inverse problem is avoided by computing RMS or an equivalent measure of goodness-of-fit at all points on a grid that surrounds the true source. The resulting hypocenter is then a "probability cloud" whose dimensions are determined by requirements of Gaussian distribution of the station travel time errors. In the interests of conciseness, that approach has not been adopted for data analysis in this report, although the variation of RMS with constrained depth is examined for a few hypocenters discussed below.

Can localized velocity anisotropy be inferred from NTS nuclear tests?

Whereas the comparison of true location with the estimated hypocenter of blasts (either chemical or nuclear device) provides, at best, indirect information about earthquake mislocation in a highly heterogeneous crust- unless they occur in the same place - the examination of station residuals when using the true source location, and tracing rays using HYPO71 and the standard velocity model, provides useful, direct information about crustal rock velocities at shallow depths. This topic has been investigated for SGBSN P-wave arrival time data from several dozen nuclear device tests detonated at Pahute Mesa, Rainier Mesa, and Yucca Flat (manuscript in preparation). Although a complete description of the findings of this investigation is beyond the scope of this data report, some observations and speculations about their significance both to earth structure and to earthquake hypocenter determination are discussed below.

Arrival times of compressional waves at southern Great Basin seismic stations from nuclear device tests at NTS consistently display delay patterns with a strong directional signature or trend. Here, delay is defined as the difference between the observed arrival time and the theoretical time, when computed using the standard SGBSN velocity model, which is azimuthally isotropic. This apparent azimuthal anisotropy is observed to varying degrees in data from all testing regions, Yucca Flat, Rainier Mesa, and Pahute Mesa. Because seismic network station separation is on the order of 20-30 km, and the distribution of sources is limited, no detailed "tomographic analysis" of the upper crust is possible; however, the delay patterns are grossly related to known geology and to regional structural grain (orientation of microfractures, cracks, joints and faults), and to tectonic stresses.

Perhaps the most striking feature of the P-arrival delays for Rainier Mesa (southern Belted Range) nuclear device test data is their 180°-period azimuthal variation, which has peak-to-peak amplitude of one second, and appears to be nearly distance-independent for SGBSN station distances, ranging from 12 to 200 km. Figures 2a and 2b show the delays for Rainier Mesa tests Disko Elm and Mission Cybar, respectively, plotted as a function of azimuth. Figure 2c shows the "reduced" delays for the test detonation Disko Elm, plotted against source-to-station distance, where the 180°-period azimuthal effect, as defined in the next sentence, has been removed. Fitting the Disko Elm delays, T_i, with the function,

$$T_i(\theta) = a\cos^2(\theta_i - \theta_H) + b + \epsilon_i,$$

where θ_i is the source-station azimuth for the ith datum, θ_H is the "high-speed" azimuth, and ϵ_i is the unmodeled component of the ith delay (l^2 norm), yields $a = -0.741$, $b = -.133$, and a correlation coefficient, ρ, of 0.80 between the data and the function values. The angle $\theta_H \approx 10°$ maximizes ρ for the P-arrival data of Disko Elm, and lies in the range $10° \leq \theta_H \leq 15°$ for the other Rainier Mesa tests of Table 1. Furthermore, because P-delays show very weak distance dependence, it is reasonable to hypothesize that the azimuthal variations are generated in the inner 30 to 50 km of the source hypocenters (working points), or in a combination of the initial down-going and the final up-going portions of the raypaths.

Possible physical explanations for these anomalous travel time delays include the presence in the vicinity of Rainier Mesa of a high-speed body at shallow depth having longitudinal axis trending at $\approx \theta_H$, or stress-induced velocity anisotropy in much of the rock surrounding Rainier Mesa. The relevance of the stress-induced velocity anisotropy model (Nur, 1971) comes from the observation that θ_H is approximately perpendicular to the direction of average tension of SGBSN focal mechanism solutions, presented in previous SGB seismicity reports, and below, and to the direction of least compressive principal stress in the earth's shallow crust, as determined from a series of Yucca Mountain hydrofrac experiments (Stock and others, 1985 and 1986). It is possible that P-wave velocities are being strongly influenced by aligned, propped open, cracks and microcracks in rock at shallow depths, according to the "extensive dilatancy anisotropy (EDA)" model (see Leary and others, 1990, for a review of recent seismological investigations on this topic). The possibility that seismic anisotropy results in significant P-wave velocity variations in the shallow crust of the southern Great Basin of Nevada is a current area of research.

If EDA is the primary source of the observed travel-time delay patterns from many NTS nuclear detonations, an 180° P-wave amplitude modulation effect (not necessarily sinusoidal) should also be observable in local station seismograms. This potentially diagnostic effect cannot be verified by

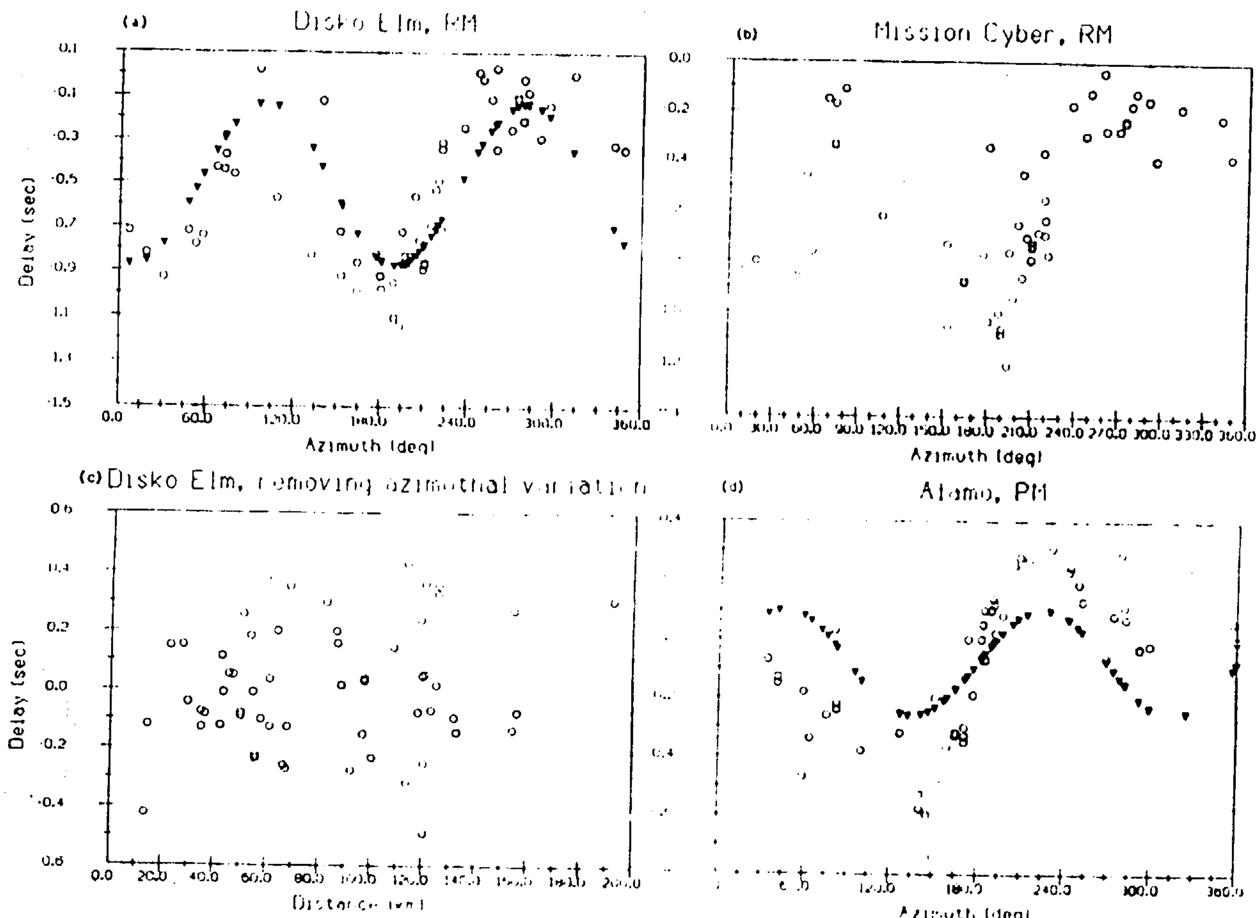

Figure 2.– Plot of P-wave travel time delays for NTS nuclear device tests recorded at SGBSN stations. Delays are relative to the predicted arrival times from the standard (azimuthally isotropic) velocity model shown in Figure F1(a). (a) For data from the Rainier Mesa test Disko Elm, open circles are observed delays plotted against source to station azimuth, closed triangles are values of $a\cos^2(\theta - 10^\circ) + b$, a sinusoid with 180° periodicity that attempts to fit the observed data. (b) Observed P-wave delays for the Rainier Mesa test Mission Cyber. (c) Disko Elm delays after removing $a\cos^2(\theta - 10^\circ) + b$ plotted against source-to-station distance. The lack of a linear trend in these residuals with distance suggests that the azimuthally varying component of the "signal" occurs near the source. (d) Observed delays (open circles) and a 180° period functional fit (dark triangles) for the P-wave arrivals for the Pahute Mesa test Alamo (880707 15:05:30 UTC), plotted against source-to-station azimuth. Note phase shift evident in (d) relative to (a) and (b). The larger average delay for Alamo arrivals relative to those of Rainier Mesa tests is the result of lower average compressional wave velocity in the shallow rock at Silent Canyon Caldera compared to that of other NTS testing areas.

the current SGBSN, since initial P-wave energy from most nuclear tests overdrives the telemetry electronics. Teleseismic P-wave amplitude modulations with period 180° have been observed from NTS explosions (Lay and others, 1984), but they were interpreted as radiation from strike slip tectonic release triggered by the tests. Although investigators are apt to model the propagation medium as isotropic, "one of the most powerful factors modifying radiation patterns of body waves in anisotropic media is focusing of energy near velocity maxima and defocusing near velocity minima. These effects are pronounced even for small anisotropy" (Tsvankin and Chesnokov, 1990, p. 11,330).

Large-scale heterogeneities in rock properties at NTS may also be the primary source of the strong variation in P-delay with azimuth. Measurements of some dolomite rock velocities from core samples taken from Rainier Mesa and northern Yucca Flat, NTS, indicate P-velocities approaching seven km/sec (Carroll and Magner, 1988). Much of the lower carbonate aquifer that extends through eastern and central NTS is comprised of dolomites and quartzites (Winograd and Thorardson, 1975). A $\geq$ 0.6 km thick dolomite section was encountered below a depth of 1.2 km at a borehole near Yucca Mountain, Nevada (Carr and others, 1986). The geographic extent of the lower carbonate aquifer is not precisely known. If it is terminated by the volcanic calderas of western NTS, and by an unknown relatively slow structure east of NTS, the lower carbonate aquifer may act as a high-speed corridor for seismic rays from Rainier Mesa and western Yucca Flat nuclear device source zones to many SGBSN stations that lie in sectors at azimuths $15° \pm 15°$ or $195° \pm 15°$ from those sources. The fact that the P-wave delays from sources at Pahute Mesa, for example, Alamo delays, plotted in Figure 2d, do not display the same high-speed phase angle, θ_H as those from Rainier Mesa tests, suggests that (1), directions of horizontal principal stresses within Silent Canyon Caldera may be rotated 50° to 60° from those at Rainier Mesa, *or* (2), structural heterogeneity is the primary source of the azimuthal variations in travel-time delays.

Table 1. Summary of PDE location parameters for selected nuclear device tests at Rainier Mesa, 1985-1989, having strong azimuthal P-wave delay pattern. Dmin is the approximate epicentral distance to the nearest reporting SGBSN station, M_L is the Berkeley observatory magnitude.

DATE TIME (UTC)	LATITUDE, N.	LONGITUDE, W.	Depth (km)	Name	M_L	Dmin (km)
850406 23:15:0.09	37°12.05′	116°12.43′	-1.85	Misty Rain	4.8	11
851009 23:20:0.09	37°12.58′	116°12.61′	-1.85	Diamond Beech	4.0	10.1
870318 18:28:0.09	37°12.61′	116°12.52′	-1.85	Middle Note	4.4	10.2
870620 16:00:0.10	37°13.20′	116°10.67′	-1.74	Mission Ghost	3.5	12.9
871202 16:30:0.08	37°14.08′	116°9.80′	-1.65	Mission Cybar	3.5	14
881210 20:30:0.06	37°11.94′	116°12.57′	-1.86	Misty Echo	5.0	17
890914 15:00:0.10	37°14.15′	116°9.77′	-1.60	Disko Elm	4.0	13.6

Contour maps of percent horizontal velocity variation from the underlying azimuthally isotropic model of Figure F1(a) are shown in Appendix C, figures C2, C3, and C4, for SGBSN station P-arrival delays computed for the NTS tests Alamo (a Silent Canyon Caldera test), Disko Elm, and Kawich (a Yucca Flat test), respectively. These contour maps show a similar high-speed corridor (the lower carbonate aquifer?) east of the caldera region of the western NTS, extending north and south of the NTS. The values of the velocity variation function, $\Delta V(x,y)$, are arrived at by the following reasoning. Let t_i be the ith source to station travel time (sec), Δ_i the source to station distance (km), v_i the ith apparent observed horizontal velocity, and u_i the ith apparent horizontal velocity computed by HYPO71 (u_i is a function of distance and station elevation). If we assume that the ith station residual computed by HYPO71, D_i, is the result of unmodeled horizontal velocity variations, then $t_i = \Delta_i/v_i = \Delta_i/u_i + D_i$, whence $u_i = \Delta_i v_i/(\Delta_i - D_i v_i)$. The percent velocity variation, computed at the ith station's location, is then

$$\Delta V_i(\%) = 100 \times \frac{v_i - u_i}{u_i} = 100 \times \frac{-D_i}{t_i}.$$

$\Delta V(x, y)$ is then computed by interpolation/extrapolation of ΔV_i onto a (constant-elevation) grid over the SGB, and is plotted. Common features in the contour plots of data from different source regions (Figures C2, C3, and C4) suggest that crustal heterogeneity rather than azimuthal anisotropy may have a dominant role in the production of observed P-wave delays.

It is difficult to determine the extent of azimuthal velocity anisotropy at shallow to mid-crustal seismogenic depths because earthquake locations are uncertain, and typical hypocenter algorithms adjust available free parameters to reduce data/model misfit, thereby obscuring unmodeled properties of the earth. A theoretical study (Rothman and others, 1974) on the sensitivity of hypocenters to unmodeled transverse isotropy showed that epicenters will be consistently biased, regardless of assumed isotropic velocity used, and that depth estimate error varies linearly with fractional error in average velocity. Using actual SGBSN data, relocating Disko Elm as a hypothetical earthquake, allowing latitude, longitude, depth of focus, and origin time to readjust freely, HYPO71's final solution using the standard SGBSN velocity model converges to a depth about three km below sea level, indicating a low model velocity. The station residuals for the free hypocenter continue to show a faint azimuthal periodicity, but the correlation of delays with $T(\theta)$ drops to $\rho = 0.51$, from $\rho = 0.80$ when fixing the hypocenter at the true working point. It is easy to imagine that if the anisotropy imprint on arrival time data is not very clear to begin with, what signal there is will be lost by the typical hypocenter-determining algorithm which uses an azimuthally isotropic velocity model. However, routinely invoking an azimuthally anisotropic velocity model when determining hypocenters is not justified until alternate explanations (crustal heterogeneity) for the seismic travel time delays from NTS nuclear device tests have been fully discounted. One investigation having relevance to the question of how seismic anisotropy varies with crustal depth concludes that there is no evidence of shear-wave polarization at depths greater than three to five km (Kaneshima, 1990). Although that investigation analysed seismograms from events in the Japan volcanic arc, the underlying rock physics is similar for the SGB, and may imply that EDA effects may be confined to the final upgoing portions of most source-to-station raypaths for most SGB earthquakes.

Earthquake magnitudes and detection threshold

The SGBSN routinely detects earthquakes having $M_L \geq 1.5$ throughout the southern Great Basin. This size threshold drops to $M_L \approx 1.0$ in the southern NTS and to $M_L \approx 0.0$ at Yucca Mountain. For the SGB earthquake data listed in Appendix 1, 90% of the hypocenters have $M_L \leq 2.2$, and 95% have $M_L \leq 2.4$. Size estimation is done using one or more of the following methods, discussed in greater detain in YMP-USGS SP-04, "Preliminary determination of earthquake magnitude," (1), M_L from horizontal-component amplitude/period data, (2), M_L-equivalent from vertical-component amplitude/period data (vertical component amplitudes are multiplied by 1.75 to convert them to horizontal), (3), M_{co} from fitting an envelope over the decaying S-coda in series of 5-second "windows" that do not contain overdriven amplitudes, (4), M_D from total coda duration, and (5), a M_L "lower bound" from clipped amplitude/period data. Measures (1) through (4) have been discussed in previous SGB data reports (Rogers and others, 1987). In previous reports, M_L was reported as the average of vertical-component and horizontal-component magnitude estimates; here, the two are reported separately. Figure 3 is a scattergram of the horizontal-component M_L estimates (scaled to the horizontal axis) versus the vertical-component estimates (scaled to the vertical axis) for about 800 randomly selected SGB earthquakes that occurred in the period 1987 through 1989. Least-squares regression of the y-values on the x-values for the data in Figure 3, constrained to pass through the origin,

$$y_i = ax_i + \epsilon_i,$$

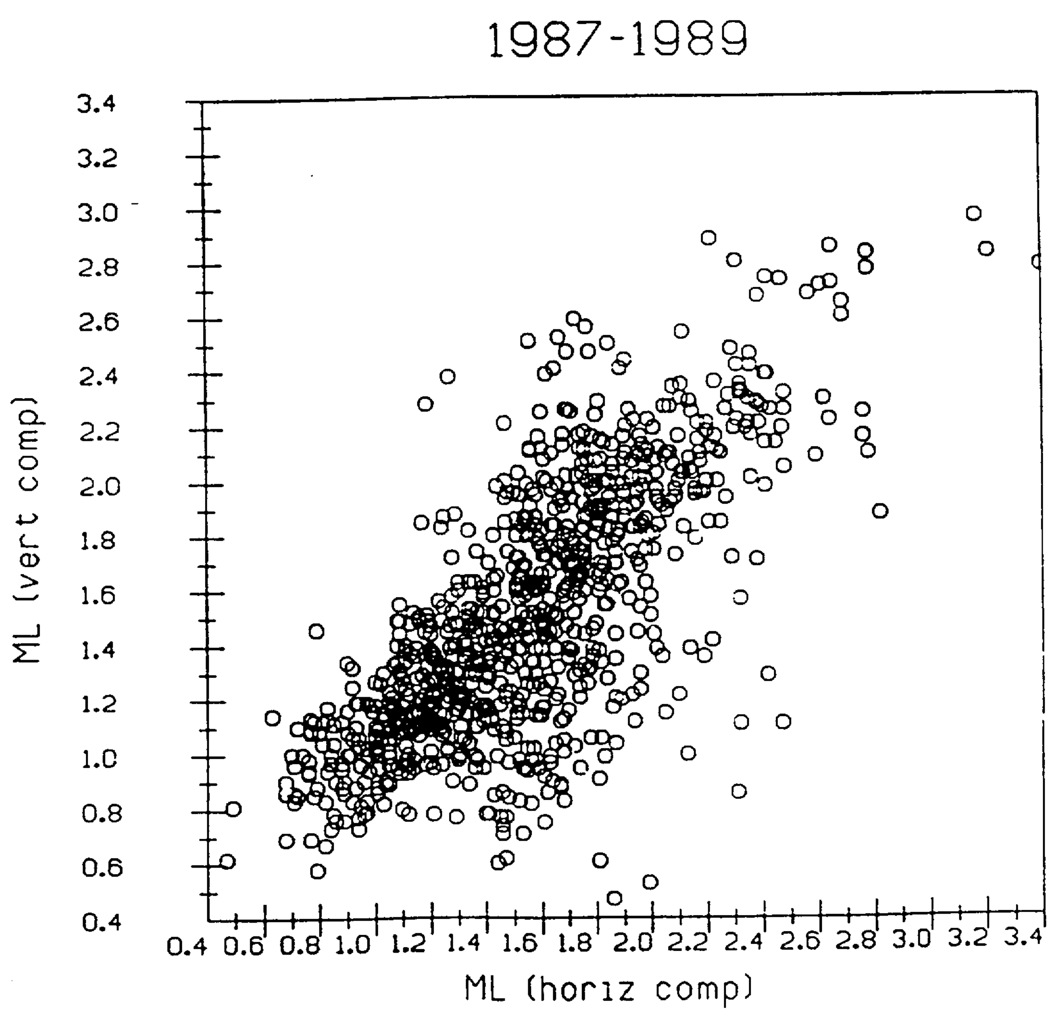

Figure 3.– Comparison of horizontal-component instrument-determined local magnitudes, M_L^H, with vertical-component instrument-determined local magnitudes, M_L^V, for a subset of the 1987 through 1989 SGBSN hypocenter data.

yields a slope $a = 1.00$, indicating that the 1.75 factor that is routinely used to convert vertical amplitudes to "equivalent" horizontal amplitudes is reasonable for SGBSN data, in the sense that, on average, no bias is thereby introduced.

The fifth magnitude, M_L from clipped or overdriven data, is theoretically a lower bound on magnitude because the clipped amplitude is, by definition, less than the actual amplitude. However, in practice, this magnitude is not necessarily a lower bound when compared to other M_L estimates, because the clipped M_L is defined as the maximum of $M_L(j)$, where j is an index over all clipped, scaled, post-S wavelets, whereas the other M_L estimates are averages of all unclipped scaled data. Because the earthquake radiation pattern, site conditions, and other geologic variability all contribute to a large range in reported station magnitudes, we frequently observe that the averages of on-scale station magnitude estimates are lower than the maximum of the off-scale estimates. Magnitudes derived from clipped records are provided as a check on M_L computed from on-scale records. The seismic network upgrade will alleviate many of the problems associated with the current network's high-gain, limited dynamic range design, including that of most stations' amplifiers going off-scale for input signals from SGB earthquakes having $M_L > 3.0$.

We are often faced with the apparent paradox of reporting M_L from 38-dB horizontal-component station data that is on the order of one unit higher than M_L from 84-dB, vertical-component station data, for a given earthquake. Examples of this discrepency are magnitudes for an earthquake on June 17, 1987, 0:00:50 UTC having $M_L^H = 4.18$ and $M_L^V = 2.8$ and an earthquake on October 28, 1988, 20:02:50 in Gold Flat (Mellan quadrangle) having $M_L^H = 3.40$ and $M_L^V = 2.78$ (the superscripts refer to horizontal-component and vertical-component, respectively). Tentatively, the primary reason for these discrepencies is that the network provides a severely biased sample of on-scale station data from earthquakes having $M_L > 3.0$. In other words, for larger microearthquakes in the SGB, an unbiased sample of the actual distribution of peak amplitudes of ground motion is not currently available; only those high-gain stations that sample the relatively low-amplitude tail of the distribution remain on-scale. Various calibration tests at the low-gain station at Little Skull Mountain and at high-gain stations run near the amplifier/VCO band edge have revealed no system non-linearity that might provide an alternate explanation. For a few earthquakes having $M_L \geq 3.5$, only low-gain horizontal-component station magnitudes are reported, since virtually all of the vertical-component station amplifiers are overdriven. Examples of such earthquakes are May 26, 1988, 03:56 UTC , for which $M_L^H = 4.2$, $M_L^{\mathrm{BRK}} = 3.9$, and $M_L^{\mathrm{PAS}} = 3.4$, in the Dry Mountain, California, quadrangle, and January 9, 1989, 05:08 UTC, for which $M_L^H = 3.5$, $M_L^{\mathrm{NEIC}} = 3.5$, and $M_D^{\mathrm{RENO}} = 3.6$, 10 miles north of Las Vegas, Nevada (Gass Peak SW quadrangle). The May 26, 1988 Dry Mountain magnitude discrepency may be the result of only one SGBSN station, LSMN, providing an on-scale amplitude for magnitude determination, which is too few for a robust estimate. Also, LSMN generally provides a magnitude estimate several tenths above that of any other SGBSN station for a given earthquake, suggesting a local site amplification effect. If so, it is peculiar that the high-gain vertical component station, LSM, does not display a systematic magnitude bias relative to other vertical-component SGBSN stations.

The magnitude determination procedure for the SGBSN, in summary, is internally consistent for earthquakes having $M_L < 3.0$. For larger earthquakes, we have to rely on meager on-scale amplitude data from the SGBSN, which are difficult to calibrate due to the relative rarity of such events, or on estimates from adjoining seismic networks. For earthquakes having $M_L > 3.9^{\pm}$, the SGBSN has ≤ 1 on-scale station, and that station displays hints of overestimating magnitude by $0.3 - 0.5$ units. Furthermore, the M_{ca} estimate has been calibrated against M_L for smaller earthquakes, having $M_L < 3$ (Rogers and others, 1987), but tends to underestimate larger earthquakes. Thus, the SGBSN magnitude estimates for earthquakes having $M_L \geq 3$ are preliminary and subject to revision as more data become available. For example, the upgrade seismic network, now being installed in the SGB, will have sufficient dynamic range to allow us to calibrate the current network's horizontal-component data against the upgrade network magnitudes.

Overview of local SGB seismicity, 1987 through 1989

In order to distinguish "local" seismicity from "regional" seismicity in this report, the southern Great Basin is defined as the interior of the region bounded by parallels 35.6° North and 38.5° North, and meridians 114.5° West and 118.0° West, respectively (definition 1). A more tectonically inspired definition would place the Sierra Nevada frontal fault as a western boundary, and the Garlock Fault as a southern boundary of the province (definition 2; see Carr, 1984); a few SGB earthquakes that are "regional" by definition 1 and local by definition 2 are discussed in this report. The SGBSN (Figure 1) does not extend to either the tectonic boundaries or to the above map boundaries, and no claims are advanced as to the completeness of the catalog outside the convex polyhedron with verteces at the outermost SGBSN stations. In particular, seismic activity in and southwest of the Panamint Mountains, California, is not routinely located, because the southern California seismic network covers that region. Also, north of 38.0° North, only one SGBSN station exists (HCR), and south of 36° North, only two SGBSN stations exist (QSM and EMN), not enough to constrain locations effectively in their vicinity. Station coverage east of the NTS, from Nellis Air Force Range to Alamo, Nevada, is also not sufficient to capture low-magnitude earthquakes in that area. With these limitations, the 1987 through 1989 catalog should be complete to a lower M_L bound of 1.5.

Data from "regional" earthquakes that are detected by the SGBSN's computer are permanently archived onto magnetic tapes, usually without analysis. These tapes include data from California earthquakes, including the seismically active Long Valley Caldera and the less-active southern Death Valley, from central Nevada earthquakes, and from earthquakes in eastern Nevada, western Utah, and northwestern Arizona. Regional earthquake data are available to and are frequently provided to seismologists investigating those regions.

SGB seismicity for 1987 is shown in Figure 4. Concentrations of southern Nevada earthquakes occur at the southern end of the Reveille Range, in the Pahroc Range, in the Pahranagat Shear Zone, in the Spotted Range (northwest of Indian Springs, Nevada), in the southern NTS (Rock Valley fault zone, Mercury Valley, Mine Mountain) in the central NTS (Eleana Range), in the northern NTS (Silent Canyon caldera), at Gold Flat, at Gold Mountain, Slate Ridge, and Mt. Dunfee, and in the Sylvania Mountains. A concentration of earthquakes near Mina, Nevada, occurred during July and August, 1987, with mainshock on July 28, at 13:55 UTC, having $M_L = 4.7$ (BRK), coordinates 38.383° North, 118.117° West, 14 km depth (not shown). Concentrations of California earthquakes occur in the Inyo Mountains, Eureka Valley, Last Chance Range, Grapevine Mountains, and in the Panamint Range. More diffuse activity occurs in Death Valley. All of these areas were active or moderately active in previous years (Rogers and others, 1987). Four earthquakes at Yucca Mountain, Nevada, are discussed in the next section.

SGB seismicity for 1988 is shown in Figure 5. The regions of concentrated seismicity for 1987 mentioned above continued to be active in 1988. Also, a second swarm area 10 km east of the first at the southern Reveille Range, Nevada, began to show activity in 1988. At Gold Flat, the seismicity level increased. A north-south trending concentration of microearthquakes in southwest Amargosa Desert, California, occurred in 1988 and 1989. Strongly felt earthquakes at Boulder City, Nevada, during the early part of 1988 (discussed below) prompted the installation of a permanent seismic station, EMN, in the Eldorado Mountains, south of Lake Mead, in August of 1988. Seismicity in the Eldorado Valley and in southern Lake Mead has been catalogued since that time by the SGBSN. The largest SGB earthquake for 1988 was a $M_L = 4.4$ earthquake in Owens Valley, California, on July 5, at 18:18 UTC. Although west of the SGBSN, the earthquake is within the physiographic province, and is of interest because a magnitude 7.5^+, MMI=X, earthquake occurred in Owens Valley in 1872 (Beanland and Clark, 1987). A normal-slip focal mechanism for the 1988 Owens Valley earthquake is shown in Appendix D, Figure D23. At Yucca Mountain, an isolated earthquake occurred on October

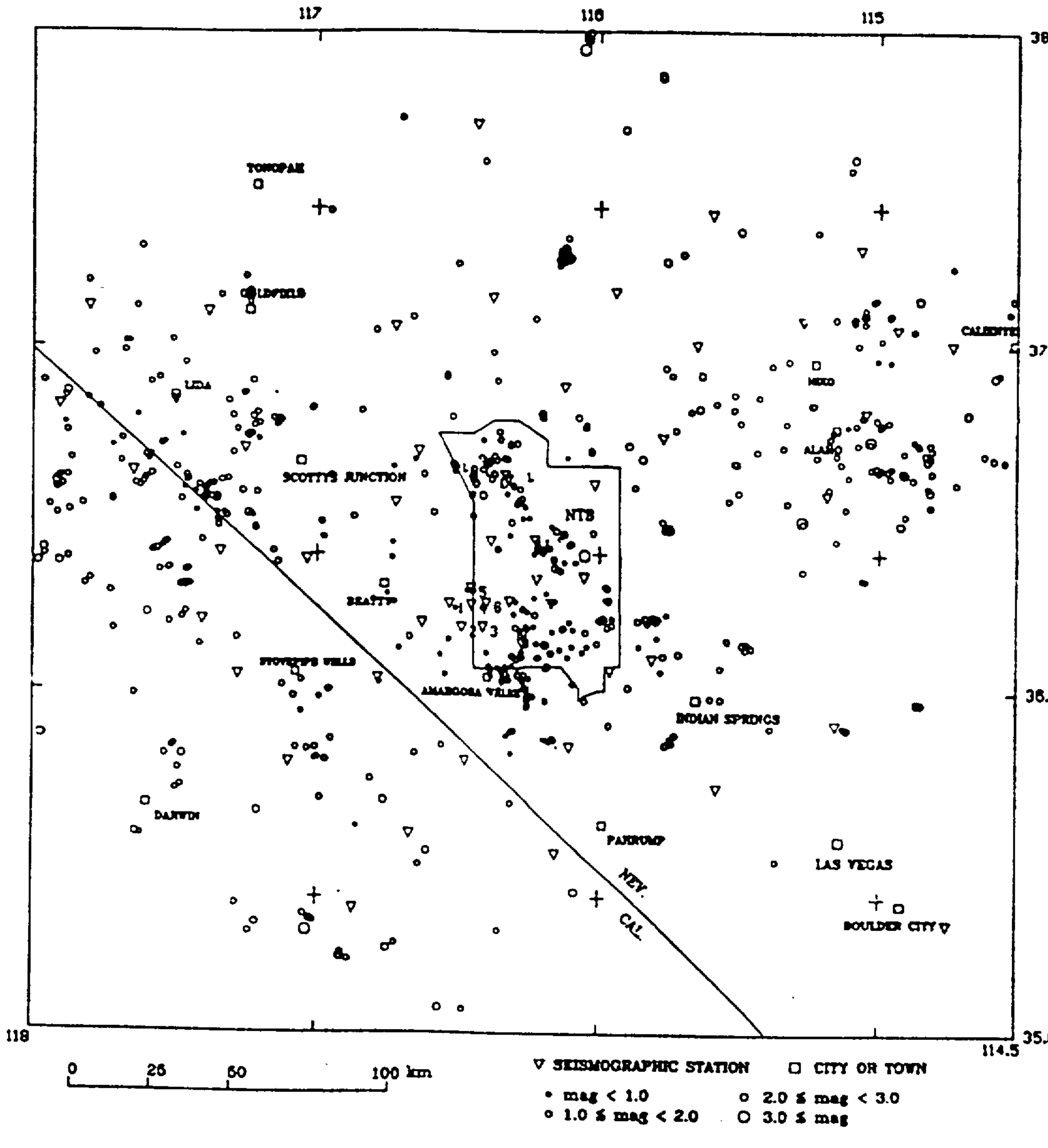

Figure 4.– Earthquake epicenters in the SGB and SGBSN stations for the year 1987.

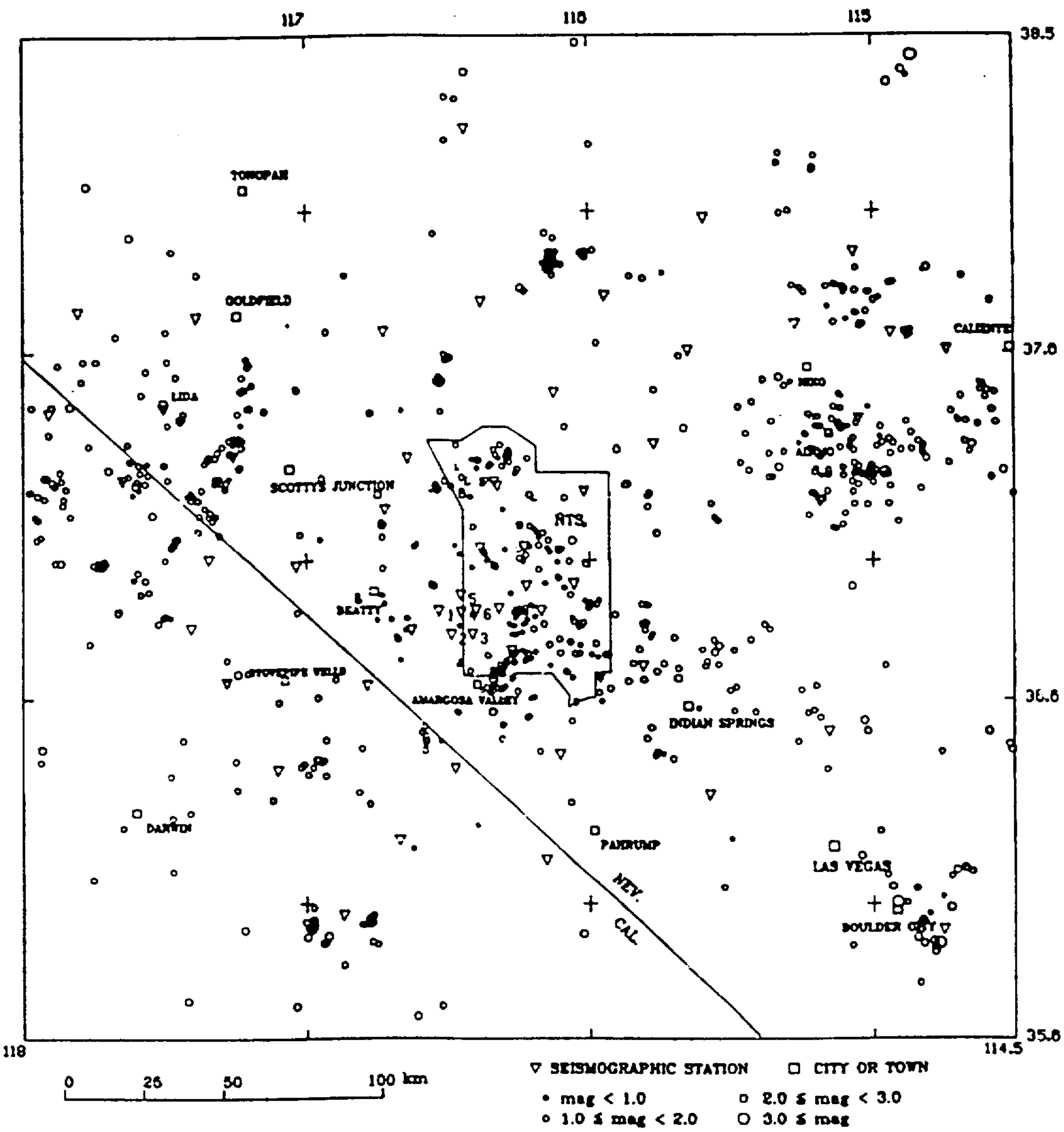

Figure 5.- Earthquake epicenters in the SGB and SGBSN stations for the year 1988.

5, 1988 and a small swarm of earthquakes occurred on November 18. Yucca Mountain seismicity is discussed in sections below.

SGB seismicity for 1989 is shown in Figure 6. Areas of concentrated seismicity for 1987 and 1988 continued to be active in 1989, although Yucca Mountain was seismically quiet. Sarcobatus Flat, noted for several seismicity swarms in previous years (Rogers and others, 1987), showed renewed activity in 1989, after being quiet in 1987 and 1988. Bare Mountain, Nevada, had several earthquakes in 1989. Yucca Flat, NTS, was seismically active, moreso than in the previous two years. Although the Oasis Valley, the western boundary of volcanic calderas that comprise most of the western NTS, was not particularly active in any one calendar year, it does show a north-south trend of epicenters for the 11-year monitoring period, 1979 through 1989. Figure 7 shows epicenters in the vicinity of the Oasis Valley for that period, along with the westermost boundaries of major local volcanic caldera complexes (Christiansen and others, 1977; W. C. Carr, written communication, 1990). An earthquake on January 9, 1989, 10 miles north of Las Vegas, Nevada, was energetic enough to crack a few windows in Las Vegas, the only cultural damage reported to the NEIC from SGB earthquakes during the three-year period, 1987 to 1989. Its focal mechanism is discussed in a section below.

In an attempt to discern whether rates of seismicity are changing significantly with time in different parts of the SGB, we count the number of earthquakes recorded by the SGBSN in each of the 384 $7\frac{1}{2} \times 7\frac{1}{2}$ minute quadrangles contained in the region 114.875°W to 117.875°W, and 36.125°N to 38.125°N. (To increase legibility in the following figures, data for the outermost subregions of Figures 8 and 9, for example, those having longitude 117.875°W to 118°W, are not included in this compilation.) In each such quadrangle, two numbers are printed, the *top* being the number of earthquakes recorded in that quadrangle during the period 1987 through 1989, and the *bottom* being the number recorded during the previous three-year period, 1984 through 1986 (Harmsen and Rogers, 1987). A similar map shown in Figure 9 compares those same numbers of recorded earthquakes in 1987 through 1989 (*top* number) with those recorded in the period August, 1978 through December, 1983 (*bottom* number, Rogers and others, 1987). The two periods of seismic monitoring for which the data of Figure 8 are compared have the same station coverage, detection threshold, and instrumentation, whereas significant variations in station coverage, etc., occurred between the two periods compared in Figure 9. Therefore, caution needs to be exercised when comparing rates of observed seismicity in a given subregion. Also, significant spatial variation in detection threshold exists over the SGB, as noted earlier, so that comparisons of seismicity rates in different parts of the SGB should be made with caution.

Some of the most obvious temporal variations in seismicity rates for the data of Figure 8 occur at the Pahranagat Shear Zone, Nevada (roughly 37.25° North, 115.0° West), in the Reveille Range (roughly 37.8° North, 116.2° West), in the southern Montezuma Range (roughly 37.6° North, 117.4° West), at Gold Mountain (roughly 37.25° North, 117.25° West), at various locales within Sarcobatus Flat, in the Amargosa Desert south of NTS, and at Timber Mountain, which straddles the western NTS boundary (see figure 1 for locations of physiographic features). In these and other subregions, clear increases or decreases in rates are evident, suggesting that stable patterns of seismicity or aseismicity cannot necessarily be determined from a few years of seismic monitoring. This conclusion is reinforced by comparing the temporal variations evident when comparing the period 1987 through 1989 with 1978 through 1983. The Pahranagat Shear Zone was active during both of the periods, whereas the Reveille Range was seismically quiet during the earlier period. This quiescence is not the result of insufficient station coverage, as the SGBSN had a station, RVE, in the Reveille Range through July, 1981 (Rogers and others, 1987), which was then moved north to HCR, so that detection threshold in that subregion was comparable for all three periods.

While several zones having large temporal seismicity rate variations may be discerned, the majority of $7\frac{1}{2} \times 7\frac{1}{2}'$ quadrangles show relative rate stability. For example, within a 50-km radius of station YMT4, on Yucca Mountain (that station's location is shown in Figures 8 and 9), temporal

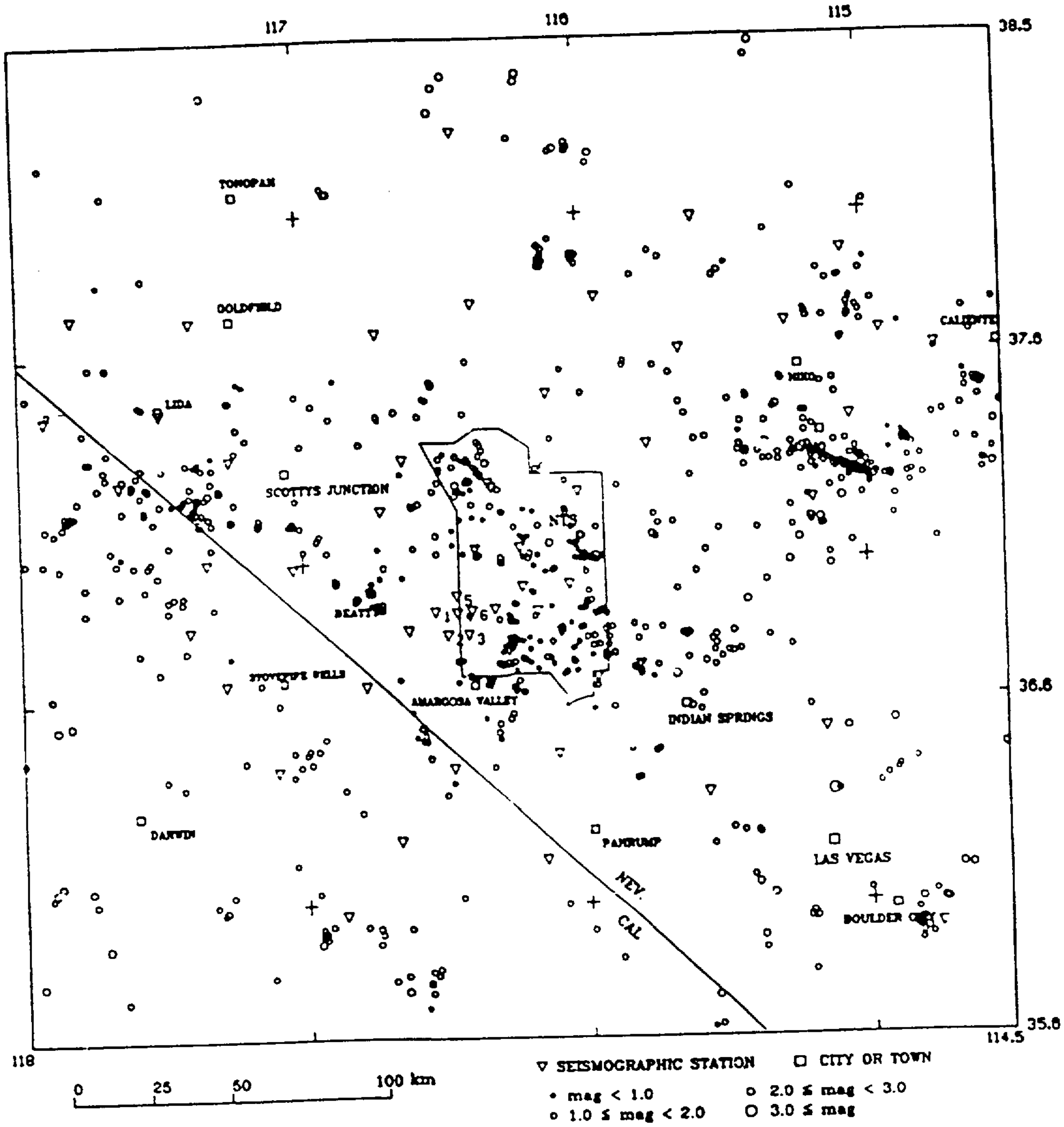

Figure 6.– Earthquake epicenters in the SGB and SGBSN stations for the year 1989.

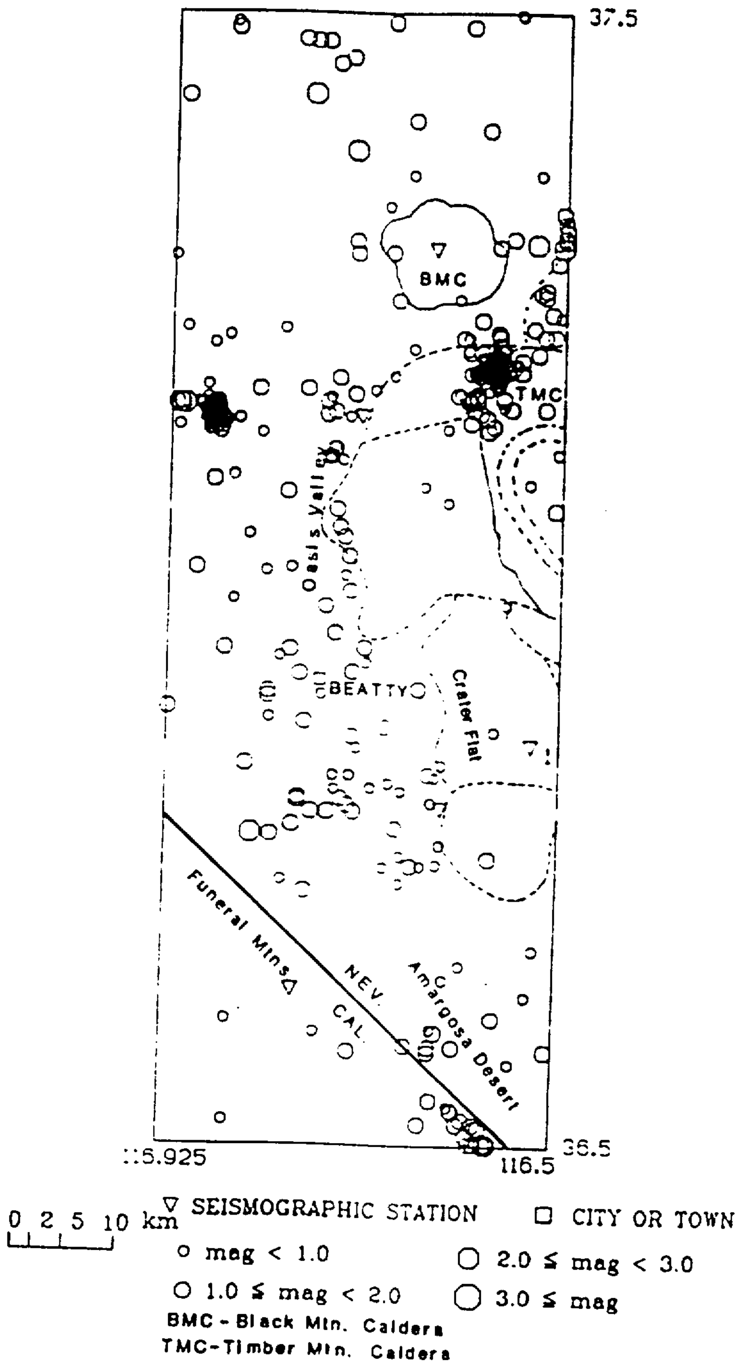

Figure 7.– Earthquake epicenters in the Oasis Valley region west of the Black Mountain and Timber Mountain calderas and east of Sarcobatus Flat, for the period 1979 through 1989. Caldera boundaries are shown as solid curves or dashed curves (written communication, Will Carr, 1990). An inner limit and an outer limit for the resurgent dome of Timber Mountain are partially shown as dashed rings.

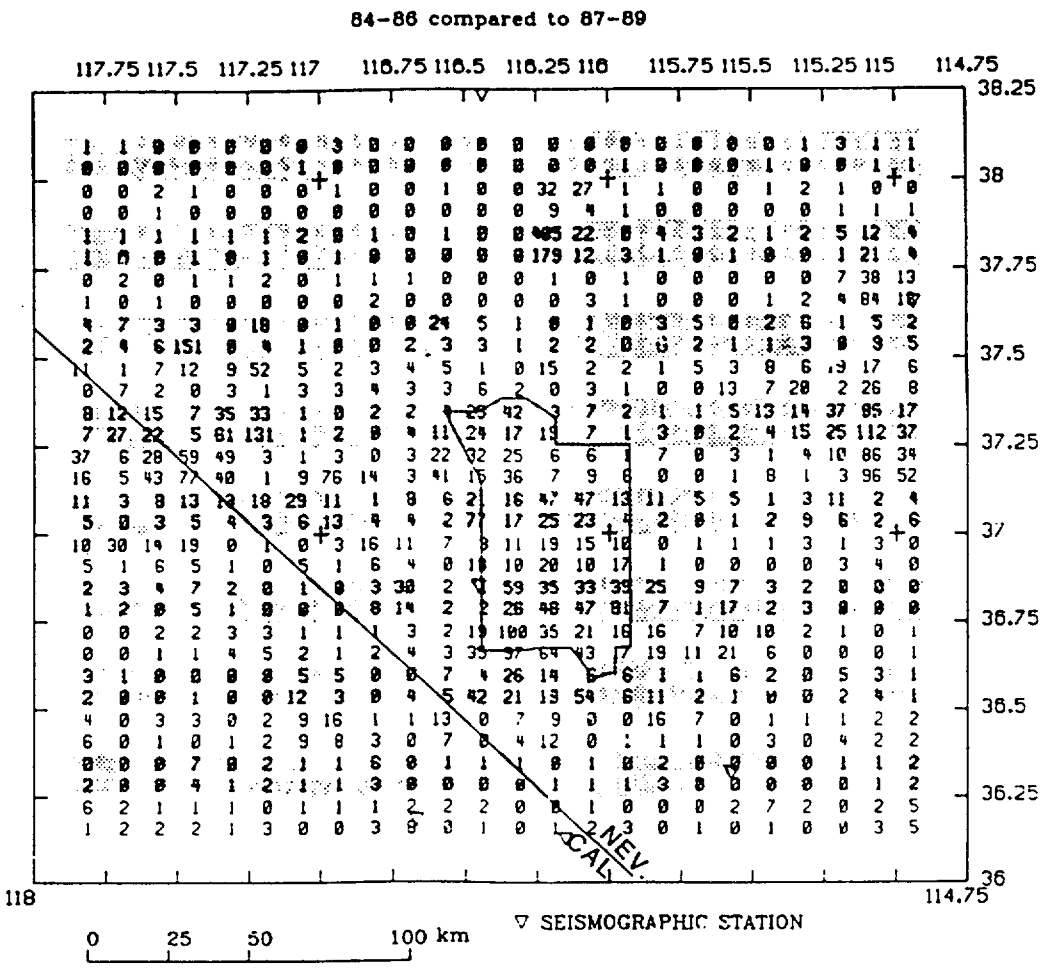

Figure 8.- Map of SGB region showing, on a $7\frac{1}{2}'$ quadrangle scale, the number of earthquakes recorded by the SGBSN in the three-year period, 1987 through 1989 (*top* number in each $7\frac{1}{2}'$ quadrangle) compared to number of earthquakes recorded by the SGBSN in the previous three-year period, 1984 through 1986 (*bottom* number in each quadrangle). Alternate rows are shaded to aid in visual separation of information in adjacent quadrangles.

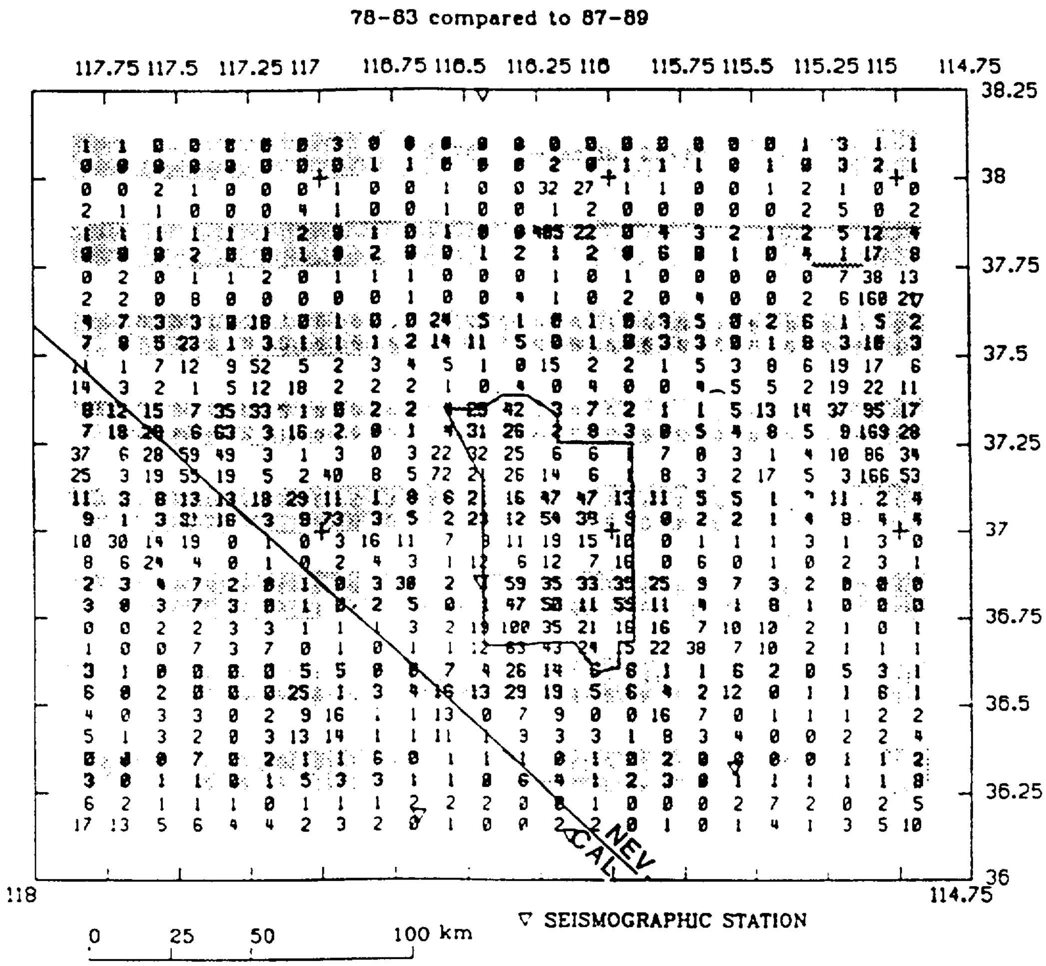

Figure 9.- Map of SGB region showing, on a $7\frac{1}{2}'$ quadrangle scale, the number of earthquakes recorded by the SGBSN in 1987 through 1989 (*top* number in each $7\frac{1}{2}'$ qurdrangle) compared to number of earthquakes recorded by the SGBSN in the period, August, 1978 through December, 1983 (*bottom* number in each quadrangle). Alternate rows are shaded to aid in visual separation of information in adjacent quadrangles.

fluctuations in seismicity rates detected by the SGBSN appear to be relatively modest when comparing time periods of at least three years. These observations are purely statistical in nature. If the region surrounding Yucca Mountain, Nevada, indeed exhibits a more uniform rate of seismic energy release than many other subregions of the southern Great Basin, a physical mechanism should be found that explains this phenomenon. In particular, an improved understanding of zones where distortional strain is accumulating without displaying concomitant rates of microseismicity is needed to predict where future potentially hazardous earthquakes may occur.

Yucca Mountain seismicity, 1987 through 1989

The SGBSN operates six vertical-component S13 seismometers and two horizontal-component L4C seismometers at Yucca Mountain, so that microearthquake detection capability is at its maximum sensitivity there. Four small earthquakes were detected at Yucca Mountain in 1987, and of these, two were further analysed to obtain focal mechanisms (data quality was inadequate in the other cases). Eight earthquakes at Yucca Mountain were recorded in 1988, seven of which were members of a swarm having total duration 10 minutes; of these, one was large enough to provide a well-constrained focal mechanism. No Yucca Mountain earthquakes were recorded by the SGBSN in 1989. For the purpose of this catagorization, Yucca Mountain is the interior of the region bounded by parallels at 36.75° N and 36.93° N, and meridians 116.375° W, and 116.56° W, respectively. This definition is somewhat arbitrary; the northwest end of Yucca Mountain blends topographically into the Timber Mountain Caldera, and the rest of Yucca Mountain rises from alluvial flats and washes. This region includes the Yucca Mountain area geologically mapped by Scott and Bonk (1984).

A Yucca Mountain velocity model, based on interpretations of Hoffmann and Mooney (1984), and shown in Appendix F, Figure F1(b), is input to HYPO71 for Yucca Mountain hypocenter determination. The effect of inputting the Yucca Mountain velocity versus inputting the standard SGB velocity model (shown in Figure F1(a)) on Yucca Mountain hypocenters is small. Figure 10(a) shows the effect that varying the assumed focal depth has on epicenter (*left* side) and on RMS (*right* side) when HYPO71 invokes the standard SGB velocity model for the Yucca Mountain earthquake of June 1, 1987 ($M_L = 0.1$). Figure 10(b) shows the same effects when the Yucca Mountain velocity model is invoked. For this arrival time data set, the minimum RMS occurs for hypocenters in the 5-6 km below sea level range, with $\min(RMS) = 0.04$ sec when using the standard model and $\min(RMS) = 0.08$ sec when using the Yucca Mountain model. The epicenters at a given depth derived from the two velocity models differ by about 0.2-0.3 km, which is a reasonable epicentral uncertainty estimate for Yucca Mountain earthquakes located using SGBSN station data, in agreement with HYPO71's standard error estimates. The fact that, in some cases, the Yucca Mountain velocity model fails to fit Yucca Mountain earthquake arrival time data better than the regional velocity model suggests that "fine-tuning" of the Yucca Mountain velocity model (for example, determining station corrections appropriate for that model and for local earthquake sources) may improve hypocenter estimates (or RMS). Table 2 summarizes Yucca Mountain earthquake location parameters for the period 1987 through 1989.

Table 2. Summary of preliminary location parameters for earthquakes located at or near Yucca Mountain, Nevada, for the years 1987 and 1988. "Distance to site" represents the epicentral distance to the point 36°51'N., 116°27.5'W., near the center of a potential national nuclear waste repository. Depth is relative to sea-level (0.0 km). Sdx, sdy, and sdz are HYPO71 standard errors in estimates of hypocentral longitude, latitude, and depth of focus, respectively.

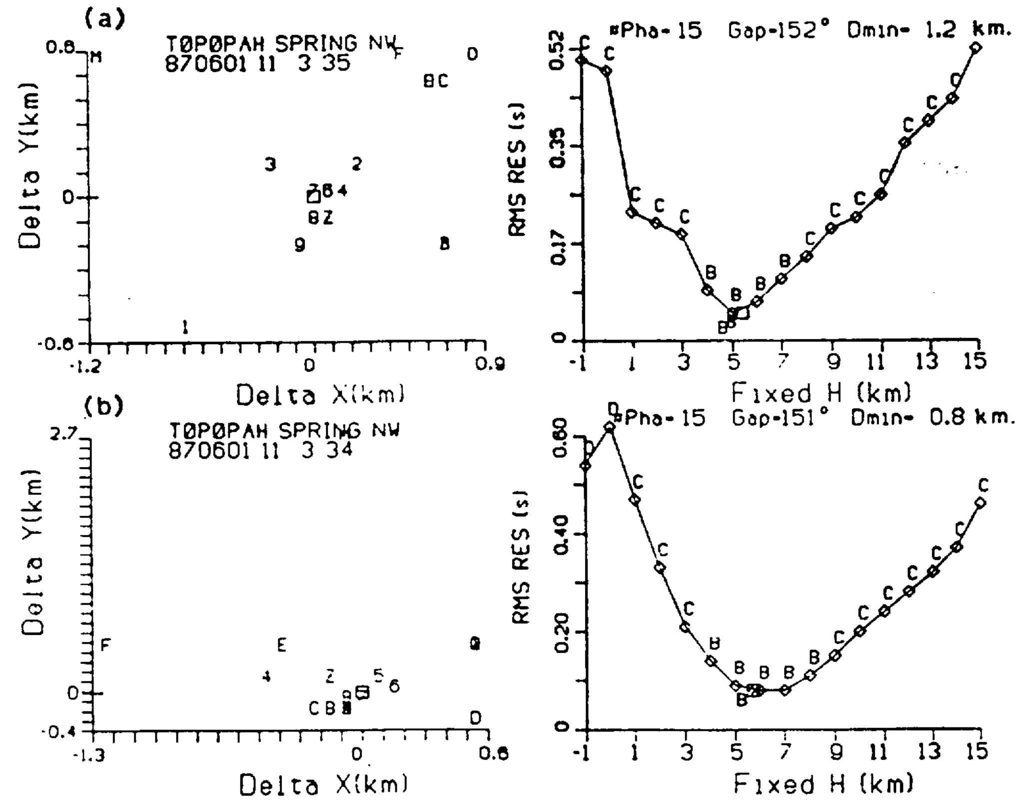

Figure 10.–(a) *Left* side, the distribution of epicenters for various fixed-depth hypocenter solutions for the Yucca Mountain earthquake of June 1, 1987, 11:03:35 UTC, where all hypocenters are determined using the standard SGB velocity model (Appendix F, Figure F1(a)). The epicenter symbols are M, 0, 1, 2, ..., A, B, C, D, E, F, corresponding to depth-constrained hypocenters having $z = -1, 0, 1, 2, \ldots, 10, 11, 12, 13, 14, 15$ km, respectively. The open square symbol at (0,0) is for a free-depth solution, with starting iterate depth 7 km, and the symbol "Z" is for a free-depth solution with starting iterate depth 0 km (at sea level). *Right* side, the variation in RMS travel time residual for various fixed-depth and free-depth hypocenters for that earthquake and velocity model. (b) The same distribution of epicenters (*left* side) and variation in RMS travel time residual (*right* side) as in Figure 10(a), except that here, the Yucca Mountain velocity model (Appendix F, Figure F1(b)) is used in hypocenter determinations.

DATE TIME (UTC)	LAT., ° N.	LONG., ° W.	N-S sdy (km)	E-W sdx (km)	Depth±sdz (km)	M_L	Dist. to site (km)
870207 16:04:53	36.895	116.450	0.2	0.2	7.6±0.3	1.11	5.0
870310 12:51:02	36.840	116.511	0.1	0.3	3.3±0.4	0.52	4.8
870601 11:03:35	36.894	116.469	0.1	0.1	5.3±0.3	0.10	5.0
871031 23:06:59	36.755	116.532	0.3	0.4	3.6±1.2	1.14	12.4
881005 14:14:36	36.811	116.458	0.2	0.4	2.3±0.4	-0.16	4.3
881118 20:29:36	36.924	116.558	0.1	0.1	10.7±0.6	1.28	12.4
881118 20:29:48	36.930	116.555	0.1	0.1	11.0±0.4	1.87	12.4
881118 20:31:26	36.925	116.547	0.2	0.2	11.2±0.3	1.21	11.5
881118 20:32:24	36.926	116.550	0.1	0.1	12.2±0.5	2.08	11.7
881118 20:33:46	36.927	116.556	0.1	0.1	11.9±0.5	1.40	12.2
881118 20:35:53	36.931	116.558	0.1	0.1	10.5±0.5	1.85	12.6
881118 20:39:35	36.928	116.555	0.1	0.1	11.8±0.4	1.30	12.2

Earthquake data gathered by the SGBSN to the present time indicates that Yucca Mountain is relatively inactive when compared to other nearby subregions, such as Rock Valley, southern NTS, Sarcobatus Flat, Oasis Valley, Timber Mountain, and parts of the Amargosa Desert. Bare Mountain is slightly more active, seismically, than Yucca Mountain. Crater Flat, separating those two mountains, is seismically quiet. A seismicity map of Yucca Mountain and the surrounding areas showing all catalogued earthquakes for the period 1979 through 1989 is shown in Figure 11.

Sometimes seismic hazard is estimated by considering the largest magnitude earthquake recorded in each subzone during a monitoring period. We present preliminary magnitude data to support this kind of analysis in Appendix A, Figure A5. In that figure a regional map, with Yucca Mountain at its center, shows the maximum earthquake magnitude (M_L where available, otherwise M_D or M_{ca}) recorded by the SGBSN in each $7\frac{1}{2}'$ quadrangle for two periods, (1) August, 1978 through December, 1986, and (2) 1987 through 1989. (Appendix A, Figure A5). (The location of station YMT4 near Yucca Crest is shown in Figure A5.) No earthquakes having magnitude $\geq$ 1.0 have been detected in the quadrangle containing Yucca Crest, although magnitude 3.0^+ earthquakes have been monitored within 50 km of Yucca Crest at Silent Canyon Caldera and at Yucca Flat, NTS, in the Amargosa Desert, Nevada, and at Sarcobatus Flat, Nevada, during the monitoring period August, 1978, through December, 1989 (Figure A5).

1988 Boulder City, Nevada swarm

An extended swarm of small earthquakes occurred near Boulder City, Nevada, in 1988. The largest of the earthquakes felt in the Boulder City area were magnitude (M_L, USGS NEIC) 3.7, on February 23 00:48 UTC (February 22, George Washington's birthday, local time) and on July 4 10:56 UTC (Independence Day). Minor damage to some roof structures at Boulder City was locally reported following the February 23, 1988, earthquake, with epicenter in the Eldorado Valley (Boulder City News, July 7, 1988).

Historically, the Boulder City area has been seismically active since the construction of Hoover Dam and impoundment of Lake Mead in 1935-36 (Carder, 1970). The largest earthquakes (M_L 4.9 to 5.0) occurred between 1939 and 1963. Although there have been several temporary networks operated at Lake Mead over the years, no permanent network exists.

In order to better evaluate the significance of the 1988 swarm and its relation, if any, to seismicity induced by the impoundment of Lake Mead, a permanent station, EMN, was installed in the Eldorado Mountains south of Lake Mead on August 11, 1988, and a temporary network of portable seismographs was deployed around the Eldorado Valley and at southern Lake Mead during August and September. Preliminary results from the analysis of data from this network (M. Meremonte and C. Langer, written communication) show two areas of microearthquakes, one in the Eldorado

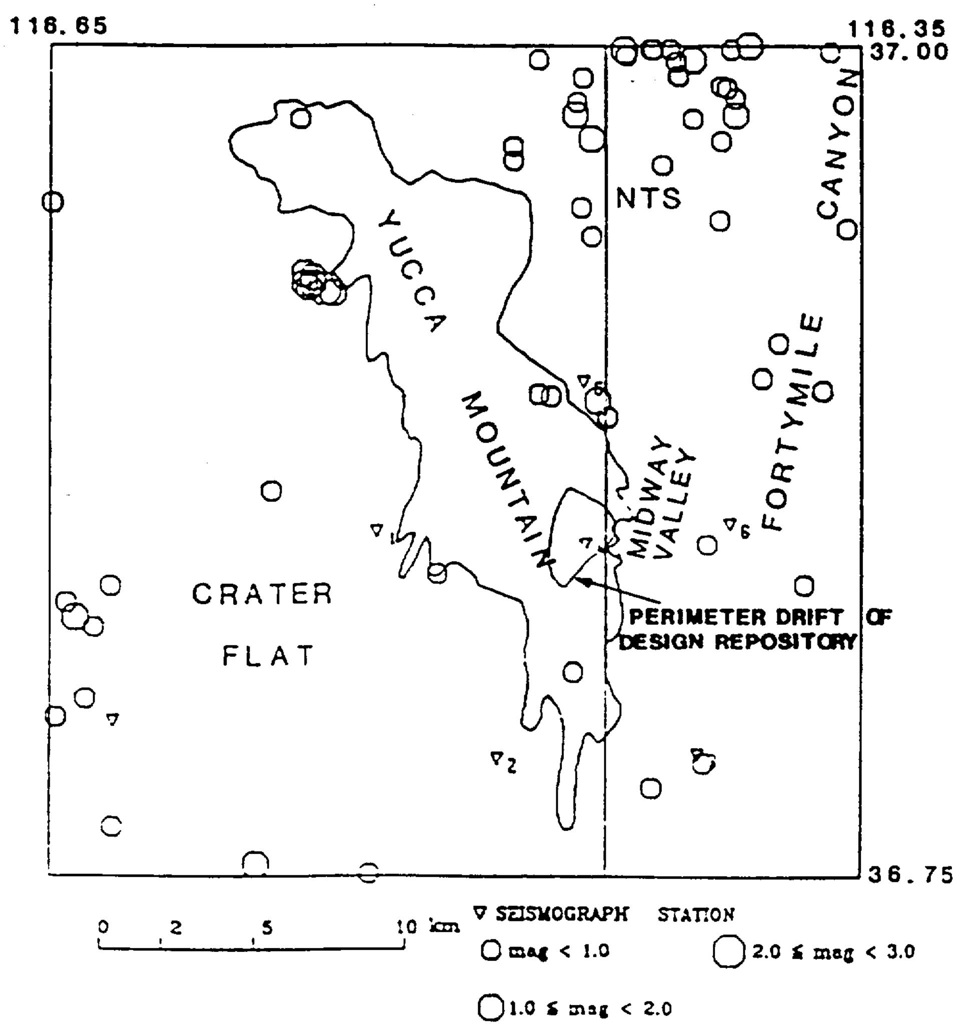

Figure 11.-Epicenters in the vicinity of Yucca Mountain, Nevada, for earthquakes recorded by the SGBSN in the 11-year period, 1979 through 1989. The small concentration of earthquakes in the northwestern part of Yucca Mountain occurred in November, 1988, with maximum magnitude 2.1. The concentration of seismicity at about 37° North latitude is within the southeast part of the Timber Mountain Caldera.

Valley south of Boulder City and the other northeast of Boulder City in the vicinity of Hoover Dam (see Figure 12). The earthquakes are relatively shallow (z < 10 km), and focal mechanisms are consistent with minimum stress (T axis) oriented between east-west and northwest-southeast, with maximum stress (P axis) ranging from north to northeast for the strike-slip mechanisms to vertical for the normal faulting events. These mechanisms are similar to those observed elsewhere in the SGB. Earthquake locations and focal mechanisms are also consistent with the observations of Rogers and Lee (1976) for the seismic network operated around Lake Mead during 1972-73, who proposed a physical model for impoundment-induced seismicity based on lower effective normal stresses on faults resulting from higher fluid pressure. If such a mechanism is still operating more than 50 years since the impoundment of Lake Mead, the recent seismicity may be a response to diffusion of water pressure into rock containing highly stressed faults. However, the pattern of occasional felt earthquakes followed by years of relative aseismicity in a locale is commonly observed in much of the Great Basin, and is not generally associated with reservoirs or with hydrologic cycles. In the vicinity of Lake Mead, stick-slip behavior may be operating much as it does elsewhere, but at lower stress levels. Expansion of the SGBSN into the Lake Mead region would provide an answer to the question of whether the vicinity of Lake Mead continues to be a region of elevated microearthquake activity.

Earthquake focal mechanisms

For the three year period 1987 through 1989, double-couple focal mechanisms obtained from thirty SGB earthquakes are discussed. Also, a previously unpublished focal mechanism for a Furnace Creek/north Tucki Mtn. (Panamint Range, California) earthquake that occurred on March 16, 1982, is included here. Most of the earthquakes are considered because of their relatively large size (maximum magnitude = 4.4); however, magnitude 0+ earthquakes at Yucca Mountain are analysed for their possible relevance to site characterization. For most of the focal mechanisms presented, the strike, dip, and rake of nodal planes are adequately constrained by P-wave polarities alone. For eight of the mechanisms, including those for three earthquakes at Yucca Mountain, first motions do not provide sufficient constraint, so vertical-component SV-to-P amplitude ratios, corrected for path and free-surface effects, are also used to constrain the range of focal mechanism solutions (Kisslinger and others, 1981 and 1982). The amplitude ratios and P-wave polarities are input into the computer program focmec.for (Snoke and others, 1984), along with instructions on how densely to sample the range of possible solutions, and how much data misfit to allow. The program outputs the set of solutions that satisfy the input criteria and data, and, if the range is sufficiently limited to be of practical use, the solutions are reported and plotted on an equal-area, lower hemisphere projection. The plotted subset always includes a solid-line solution (which may be unique, or, if not, has representative (average) strike and/or dip), and, optionally, one or two dashed-line solutions, which are shown to indicate the range of strike, dip, and/or rake angles that are consistent with the input data. The solid-line solution is designated as the primary solution, and the dashed-line solutions are designated as alternate solutions. Focal mechanism parameters are listed in Table 3, with indexes from 0 to 30, corresponding to the numbering in the epicenter/focal mechanism plot of Figure 13. To avoid crowding, Timber Mountain caldera focal mechanisms are plotted at the bottom of Figure 13. Individual focal mechanisms, showing the primary solutions of Table 3, and various alternates, are shown in Appendix D, Figures D1 through D37. The magnitude, M_L, that is reported for each earthquake is the average of the horizontal-component and vertical-component magnitudes, where each of those is the average of all on-scale horizontal-component magnitudes and vertical-component magnitudes, respectively, scaled at SGBSN stations, unless otherwise noted. "DMIN" is the minimum source to station distance. (Hypocenter parameters reported in Appendix D may not correspond exactly to those reported in Appendix A. Appendix D hypocenters often are the product of a more careful analysis of seismic wave arrival times, residuals, and polarities, than the routine data analysis that results in Appendix A hypocenters. *All* reported hypocenters and

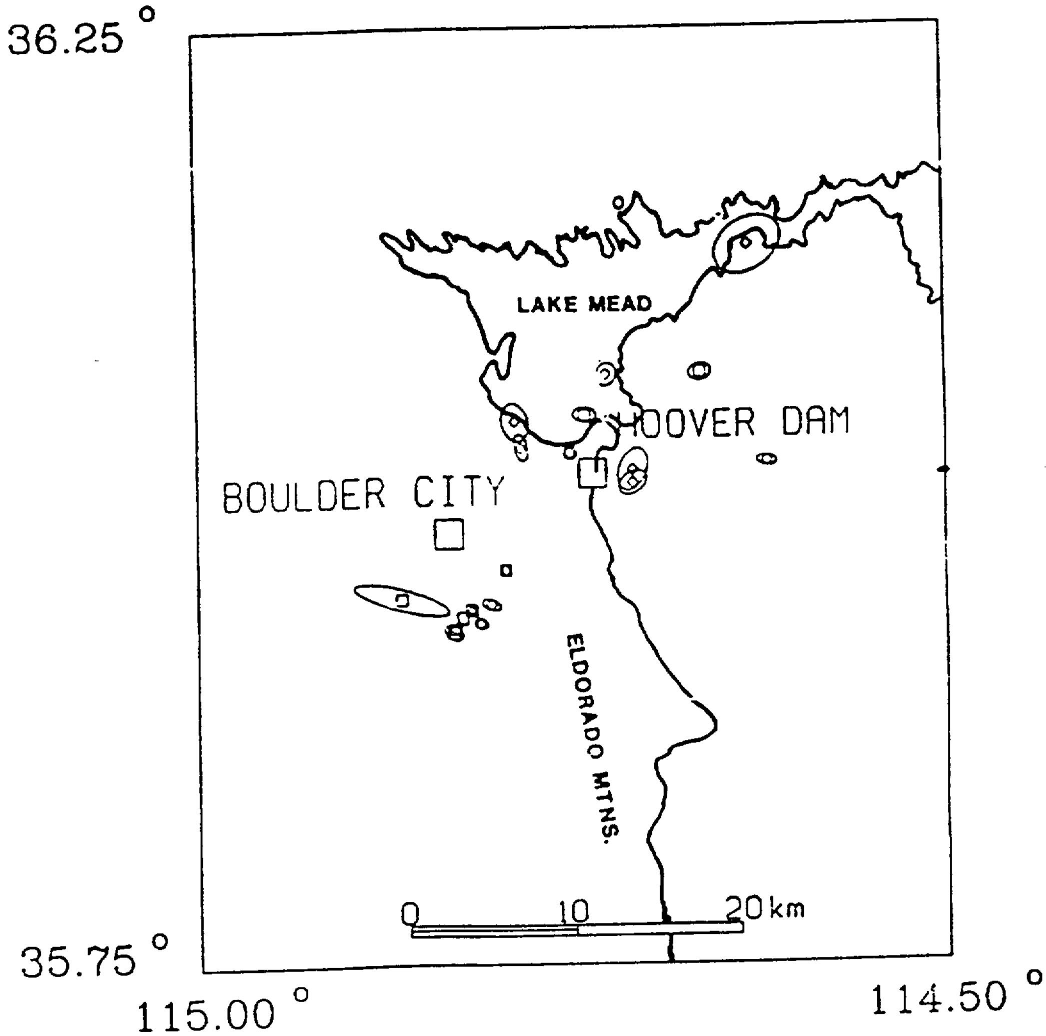

Figure 12.– Preliminary sample of microearthquake epicenters located from temporary Boulder City, Nevada, array during August and September, 1988, showing 1-σ epicentral error ellipses.

Table 3. Preliminary Southern Great Basin Focal Mechanisms 1982 and 1987-1989.

St, *strike of nodal plane*; Dp, *dip of nodal plane*; Rk, *rake of slip vector*; Tr, *trend of axis*; Pl, *plunge of axis*. ML, *local (SGB) magnitude*; Tsm, *type of source mechanism*: 1, *single event focal mechanism*; 2, *composite focal mechanism*. 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, designated by *, means that $(SV/P)_z$ amplitude ratios were used to constrain or help determine the focal mechanism. Alternate focal mechanisms: rather than trying to present uncertainty estimates for strike, dip, and rake, we present alternate solutions as dashed-line great circles. Other alternate primary and secondary solutions for different hypocenters are shown in Appendix D. Solutions based on fixed-depth hypocenters are indicated by a * next to the focal depth.

Figure Index	Origin time (UTC) Date	Origin time (UTC) Time	Focal depth (km)	Magnitude (ML)	Geologic Quadrangle or Geographic ID	Tsm	Nodal planes 1st St	1st Dp	1st Rk	2nd St	2nd Dp	2nd Rk	Principal axes P Tr	P Pl	T Tr	T Pl	B Tr	B Pl	Rmk
0	1982 0316	8:47	5.21	3.4	Stovepipe Wells	1	255.	70.	52.	141.	42.	25.	149.	16.	122.	50.	270.	35.	
1	1987 0113	1:15	8.39	3.2	Alamo SE	1	17.	51.	-146.	264.	64.	-44.	225.	49.	323.	8.	60.	40.	
2	1987 0310	12:51	3.13	0.4	Yucca Mountain	1	349.	66.	-141.	240.	55.	-30.	209.	44.	112.	7.	15.	45.	*
3	1987 0408	19:40	7.84	2.6	Tin Mountain	2	210.	68.	-46.	359.	11.	-117.	167.	48.	270.	11.	10.	40.	
4	1987 0420	11:24	-1.19	1.9	Specter Range SW	1	305.	85.	-90.	125.	5.	-90.	215.	50.	35.	40.	125.	0.	
5	1987 0601	11:03	5.94	0.1	Yucca Mountain	1	75.	88.	20.	345.	70.	178.	208.	13.	302.	15.	80.	70.	*
6	1987 0617	0:00	7.41	3.5	Desert Hills SE	1	200.	60.	-155.	90.	60.	-35.	55.	45.	325.	0.	234.	45.	*
7	1987 0713	20:10	-0.07	2.5	Stonewall Pass	1	101.	88.	-28.	193.	62.	-177.	53.	21.	150.	18.	277.	62.	
8	1987 0813	11:46	8.99	1.4	Buckboard Mesa	2	95.	90.	-5.	185.	85.	-180.	50.	4.	140.	3.	270.	85.	*
9	1987 1002	11:11	11.00	3.0	Papoose Lake SE	1	247.	80.	-80.	22.	14.	-135.	167.	54.	328.	34.	65.	10.	*
10A	1987 1028	17:25	0.65	2.8	Reveille Peak	1	91.	79.	9.7	179.	80.	10.	45.	1.3	315.	15.	140.	75.	
10B	1987 1028	17:25	10.92	2.8	Reveille Peak	1	343.	50.	123.	117.	50.	57.	50.	0.	320.	65.	140.	25.	
11	1987 1210	2:35	4.59	2.4	Specter Range NW	1	15.	90.	-140.	285.	50.	0.	248.	27.	142.	27.	15.	50.	
12	1988 0114	5:16	10.11	2.4	Striped Hills	1	181.	60.	-125.	56.	45.	-45.	39.	59.	295.	9.	200.	30.	*
13	1988 0126	18:17	9.89	2.3	Thirsty Canyon NW	1	230.	65.	-90.	50.	25.	-90.	140.	70.	320.	20.	50.	0.	
14	1988 0207	16:47	-0.21	2.0	Yucca Flat	1	178.	80.	-151.	80.7	52.	-12.	47.	34.	303.	19.	190.	50.	
15	1988 0526	3:56	7.00*	4.2	Dry Mountain	1	183.	70.	-95.	18.	21.	-76.	84.	65.	277.	25.	185.	5.	
16	1988 0615	6:23	0.12	1.6	Ammonia Tanks	1	130.	54.	-121.	357.	46.	-54.	342.	65.	242.	5.	150.	25.	
17	1988 0702	10:40	1.72	2.3	Thirsty Canyon SW	1	276.	85.	30.	183.	60.	174.	46.	17.	144.	25.	285.	60.	
18	1988 0705	18:18	6.00*	4.4	Owens Valley	1	331.	47.	-111.	180.	47.	-69.	165.	75.	75.	0.	345.	15.	
19	1988 0724	5:39	8.39	1.1	Buckboard Mesa	1	231.	76.	[illegible]	330.	59.	-164.	186.	33.	283.	11.	30.	55.	
20	1988 0830	2:30	5.00*	2.7	Reveille Peak	1	64.	60.	-55.	190.	45.	-135.	26.	59.	130.	9.	225.	30.	
21	1988 1028	20:02	10.87	3.1	Mellan	1	189.	52.	-129.	62.	52.	-51.	35.	60.	305.	0.	215.	30.	
22	1988 1029	6:37	10.15	2.3	Mellan	1	183.	69.	-139.	76.	52.	-27.	46.	43.	306.	11.	205.	45.	
23	1988 1118	20:32	11.86	2.0	Bare Mtn.	1	220.	74.	-37.	322.	55.	-160.	175.	37.	274.	13.	20.	50.	*
24	1989 0109	5:08	4.00*	3.5	Valley	1	0.0	90.	10.	270.	80.	0.0	225.	7.	135.	7.	0.	80.	
25	1989 0131	16:07	0.00	2.2	Dead Horse Flat	1	321.	45.	-90.	141.	45.	-90.	0.	90.	51.	0.	141.	0.	
26	1989 0305	22:31	8.29	1.2	Timber Mtn.	2	236.	58.	-48.	356.	51.	-137.	201.	55.	297.	4.	30.	35.	
27	1989 0412	20:24	7.91	3.2	Ubehebe Crater	1	22.	65.	-85.	189.	25.	-102.	303.	69.	108.	20.	200.	5.	
28	1989 0419	22:39	7.00*	3.6	Lower Pahranagat Lake	1	115.	81.	60.	17.	30.	171.	229.	30.	354.	45.	120.	30.	
29	1989 0721	23:01	2.75	2.6	Jackass Flats	1	78.	86.	-50.	173.	41.	-174.	23.	36.	136.	29.	255.	40.	
30	1989 0828	15:47	5.74	1.6	Scottys Junction SW	1	50.	54.	-59.	183.	46.	-126.	18.	65.	118.	5.	210.	25.	*

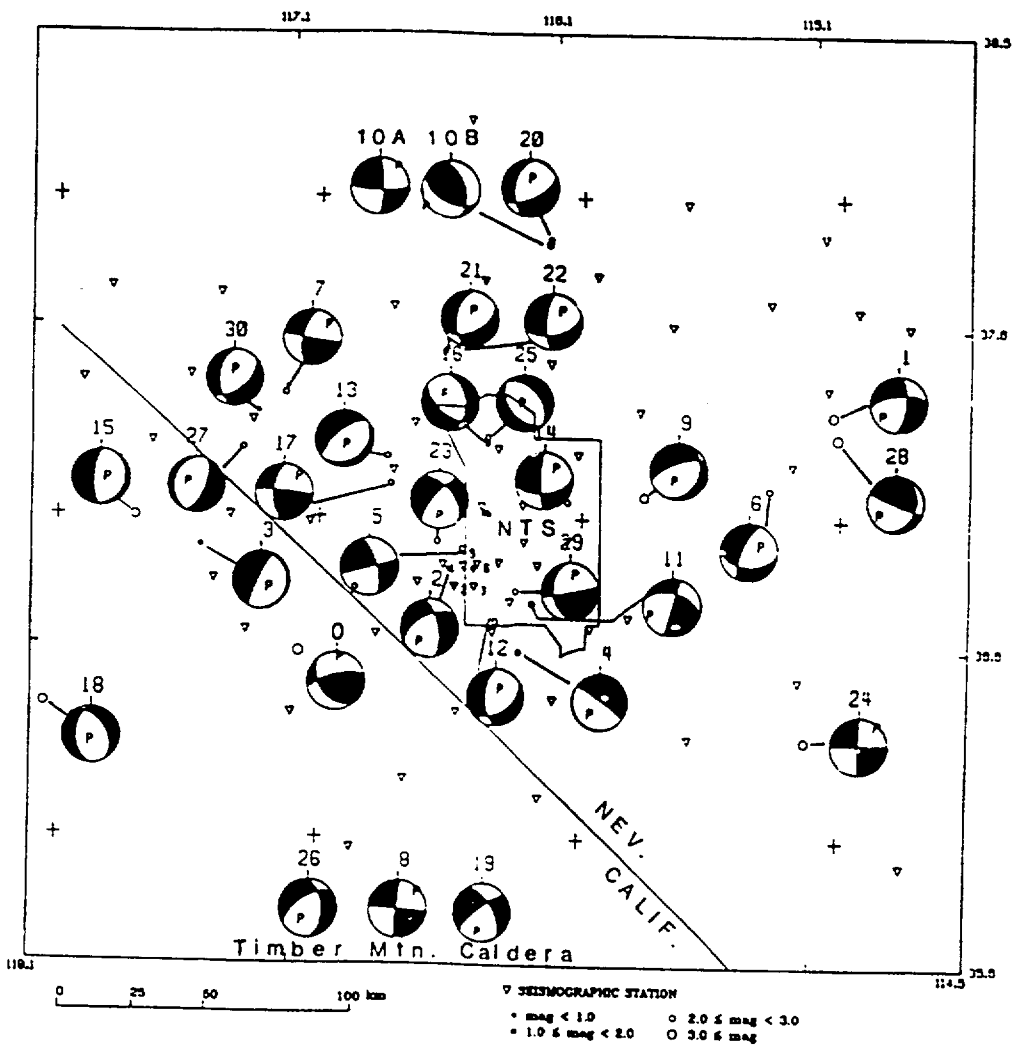

Figure 13.– Regional map of SGB showing lower-hemisphere projections of earthquake focal mechanisms indexed to Table 3. Event 0 occurred in 1982, all others (1-30) occurred in the period 1987 through 1989. The focal mechanisms are plotted near the earthquake epicenters, for all events except those at Timber Mountain (events 8, 19, and 26), which are plotted at the bottom of the map. Two mechanisms are included for event 10, to show how different interpretations are possible for the same earthquake first motion data, resulting from different assumed depths of focus.

focal mechanism solutions are preliminary.)

Effects of modeling on focal mechanisms

The SGBSN has very sparse station coverage away from Yucca Mountain, with average station spacing of 20 to 30 km. The main consequence of the limited station coverage is poor resolution of most earthquakes' depth-of-focus, when using the standard velocity model and first-arriving P and S waves to determine the hypocenter. For example, many earthquake arrival time data sets display nearly equal local RMS travel time residual minima for $z \approx 2$ km below sea level and $z \approx 7$ km below sea level. The effect of varying depth-of-focus on the earthquake focal mechanism is explicitly examined for many of the data presented here. When deriving focal mechanisms from various hypocenter solutions, we invoke the same velocity model for ray tracing; therefore, the observed variations in mechanism for a given earthquake are a consequence only of ray parameters varying due to different source depths and not to different velocity models. In some instances, the P-wave polarity data help to prescribe which velocity model is used in hypocenter determination (a good example is shown in Appendix D, Figure D20; also, see the following paragraph). It should be noted that changing the velocity model may change the solution set of focal mechanisms, even if the hypocenter remains the same. For example, ray tracing from a crustal model in which seismic velocities increase linearly with depth may yield different focal mechanisms than those from data derived from models in which seismic velocities are fixed within a series of layers with velocity discontinuities at the interfaces, as we presently use in preliminary hypocenter determination for SGB earthquakes. This report does not systematically investigate the effect on focal mechanism parameters of changing the seismic velocity model.

Experience computing earthquake focal mechanisms from SGBSN data indicates that adding an interface (sometimes referred to as the Conrad discontinuity) somewhere between 12 and 15 km below sea level, below which $V_p = 6.5$ km/sec, often improves the fit of P-wave polarity data to focal mechanism nodal plane solutions. This interface has been used for determining hypocenters and raypaths for many of the earthquakes for which focal mechanisms are presented in this report. Examples of focal mechanisms which require this interface are shown in Appendix D, Figures D4, D14, and D20.

In previous SGBSN data reports, the 15 km interface is absent, although another interface, located 24 km below sea level, below which $V_p = 6.9$ km/sec, is present in all reports, and may also be identified as the Conrad discontinuity. *RMS* for the vast majority of SGB earthquake hypocenters is not significantly affected by the presence/absence of the 15 km interface, and therefore cannot be invoked to justify its inclusion/exclusion. For a very small subclass of hypocenters, namely, those having depths near the 15 km interface, *RMS* is sensitive to its presence/absence; an example is discussed in the section entitled "depth-of-focus distribution and deep-crust intraplate earthquakes."

Whereas the RMS travel time residual from local earthquake data is not a very sensitive tool for ascertaining the presence of mid-crustal to deep-crustal layer interfaces, the earthquake focal mechanism often is, as long as we consider only those mechanisms that arise from pure shear deformation. Unless an active magmatic process or other high-fluid-pressure phenomenon is present, there is probably no compelling reason to doubt that the microearthquake source can be represented by a double-couple. Thus, this report takes the position that if quadrantal partitioning of unambiguous P-wave polarity data from SGB microearthquakes requires the modification of the velocity model, and if such modification does not degrade *RMS*, and does not contradict established models, then it is more scientifically justifiable to modify the velocity model than to argue that the polarity data imply other than pure shear source properties.

Independent confirmation of the presence of a strong P-wave velocity gradient or a velocity discontinuity at some depth between 12 and 15 km below sea level would be helpful. Seismic refraction is the natural tool for searching for such a discontinuity. Pakiser's review (1985) of papers written in the previous three decades that deal with interpretations of seismic refraction data in the Basin and Range province suggests that refraction seismologists have divided opinions on the visibility of P^* phase(s) that should arrive from such mid-crustal reflectors, both province-wide, and more specifically, at NTS. Hoffman and Mooney (1984) observe evidence for a 15 km interface in an east-west profile across Yucca Mountain, but not in an unreversed profile from a nuclear device detonation at Pahute Mesa. Ismail and Priestley (1986) also argue that a mid-crustal layer boundary (12 to 16 km) is present in the vicinity of Yucca Mountain, Nevada, based on their interpretations of P-arrivals from east-west and north-south profiles. Serpa and others (1988) note "a prominent zone of reflections at a traveltime of 5 ± 1.5 sec (15 km)" in the central Death Valley and surrounding mountain ranges (p. 1446), which they interpret as either a deep detachment, a zone of transition between the brittle upper crustal rocks and a ductile lower crust, or as an uplifted rock horizon originally formed at the base of the crust. In a recent interpretation of combined refraction, reflection, and gravity data in northwest to central Nevada (about 4° north of the SGB), Catchings and Mooney (1991) found mid-crustal reflectors at depths ranging from 12 to 18 km, below which $V_p = 6.3$ km/sec. These reflectors, which they interpreted as a possible brittle-ductile transition zone boundary, extended over the length of their survey, 200 to 300 km. In summary, available evidence appears to either support or not reject the existence of mid-crustal reflector(s) in the SGB.

Representativeness of focal mechanisms in the SGB catalog

Because the focal mechanism solutions presented in Appendix D of this report include data from only about one percent of the local earthquakes located and catalogued in the period 1987 through 1989, it is difficult to argue that they represent an unbiased and adequate sample of earthquake sources sufficient to characterize seismic deformation of shallow crust in the SGB. However, insofar as polarities can be determined for P-arrivals of smaller earthquakes for which focal mechanisms were not computed, there is a remarkable consistency of azimuthal partitioning of polarities for the vast majority of SGB earthquakes. For most earthquake source regions in the SGB, first motions of P rays travelling from the source into the northwest and southeast quadrants are compressional. First motions of P rays travelling in the interior of the northeast and southwest quadrants are usually dilatational. Near the edges of these quadrants, the first motions may be compressional or dilatational, depending on whether the seismic slip is predominantly normal or strike slip, respectively. A significant counterclockwise rotation of this first motion pattern is observed for many earthquakes in the westernmost part of the southern Great Basin, as is evident from several focal mechanisms presented in Appendix D, the most pronounced case being for the Owens Valley earthquake of July 5, 1988 (Figure D23). The rotation of the average strain field from the center of the SGB to its western boundary is further discussed in Rogers and others (1989) and below, in the section "average directions of $\vec{P}$ and $\vec{T}$ and tectonic strain."

The bulk of SGB earthquake P-arrival data, whether from earthquakes having well-constrained focal mechanisms, or from smaller earthquakes, tend to support the model of earthquake generation from uniform regional stresses and deformation processes more than it supports the model of microearthquakes being a nearly chaotic accomodation to local perturbations of the stress field. Conceptual models of the strain field in the shallow to mid-crustal rock of the SGB should account for the consistent patterns of P-wave first motions that are generally observed by the SGBSN for most SGB earthquakes.

Untypical focal mechanisms and source zones in the SGB

While the azimuthal distribution of P-wave first motions discussed above is likely to be observed for most SGB shallow-crustal to mid-crustal earthquakes, a few earthquake data sets do not conform to that pattern. An example of a data set having first motions that are 180° out of phase from the norm is that of an earthquake on May 30, 1985, at northern NTS (Tippipah Spring quadrangle), shown in Figure 13 of Harmsen and Rogers (1987). Two focal mechanisms from earthquakes in the epicentral vicinity of that May, 1985, earthquake, which occurred in July, 1984, also reported in Harmsen and Rogers (1987), display typical P-wave azimuthal distributions.

For sources within the Silent Canyon Caldera, in the vicinity of Pahute Mesa underground nuclear explosions (UNEs), earthquake seismograms from SGBSN stations often exhibit either dilatational or indeterminate first motions, even in the northwest and southeast quadrants of the focal hemisphere, indicating the possibility that these initiate predominantly as isotropic, volume-reducing events rather than as double-couple events. Because of the sparsity of U.S.G.S. seismic station coverage in the vicinity of the Silent Canyon Caldera, the proportion, $r : 0 < r \leq 1$, of deformation at the seismic source that is deviatoric (double-couple) rather than isotropic (spherical) cannot be determined using P-wave polarity information only; if we assume $r = 1$, the mechanisms exhibit approximate 90° rotation of pressure and tension axes from the regional averages. Two examples of double-couple interpretations for these peculiar Silent Canyon Caldera events are included in Appendix D, Figures D21 and D31. Another good example of a SCC earthquake having almost exclusively dilatational first motions is that of September 26, 1987, 22:52:31, listed in Appendix A, which occurred about 56 hours after the relatively large UNE, Lockney ($M_b = 5.7$). A possible explanation of such events at SCC is that they are seismic release from the closing of tension cracks formed during nuclear device tests, or from partial implosion of the cavity. If this is the case, it is probably true that $r << 1$ for these SCC events, in which case the double-couple interpretations are invalid.

Yet another class of events following UNEs (which probably overlaps the class of "dilatational sources" discussed above) is that of the "low-frequency events." Seismogram dominant frequencies for both P-coda and S-coda are significantly lower for these events than those observed in "natural" earthquake seismograms at comparable source-to-station distances. The remarks about typical distributions of P-wave first motions and focal mechanism properties therefore do not apply to the events that are most closely associated, both temporally and spatially, with UNEs. Such post-test phenomena are probably induced by the tests, and need to be separated both from the earthquake hypocenter catalog when we estimate rates of regional natural seismic strain, and from the focal mechanism catalog, when we compute the average direction of extension or other strain parameters. Most hypocenters of events during the period 1987 through 1989 having coda with lower-than-average frequency content, whether in the Silent Canyon caldera or elsewhere in the SGB, have been separately tagged and listed in Appendix C of this report. In general, because of the large number of such phenomena, and the noisy, emergent nature of first motions at many stations, no attempt is made to routinely determine hypocenters for the vast majority of these low-frequency events. However, their seismograms are all archived onto magnetic tapes to provide a permanent data base for future research. Of the three NTS nuclear device testing regions, Pahute Mesa, Rainier Mesa, and Yucca Flat, the most active region with respect to quantity of potentially induced seismicity per test of a given reported magnitude is Pahute Mesa, and the least-active region is Rainier Mesa.

Inasmuch as low-coda-frequency events have been occasionally recorded in the SGB away from the NTS, we cannot rule out the possibility that some are not induced by nuclear device tests. One class of low-coda-frequency seismicity that is definitely natural is that of relatively deep-focus earthquakes, at the crust-mantle interface, examples of which are discussed in the section, "depth-of-focus distribution and deep-crust intraplate earthquakes." If the event's hypocenter and origin time strongly suggest that it is not induced by cultural activity, it is included in the earthquake catalog and listed in Appendix A, regardless of the frequency content of SGBSN seismograms.

Evidence of seismically active detachment faults?

The possibility that detachment faults are seismically active in parts of the SGB has not been previously documented to the authors' knowledge. Much of the large-scale extensional tectonics of the southern Great Basin during the Neogene period is now understood to require a major component of block movement along gently dipping faults (Wernicke and others, 1988). Therefore, it should not be surprising if some of that movement is sufficiently "catastrophic" to result in earthquakes detectable by the SGBSN. However, under Hamilton's (1988) model for detachment faulting in the Death Valley region, detachment faults would originate as moderately-dipping or steeply-dipping normal fault segments. Fault dips become more gentle through unloading and ductile deformation of the lower plate, and fault segments may be inactivated as their dip becomes too gentle to permit further slip. Such fault segments would not be expected to be seismogenic.

All double-couple focal mechanisms have two orthogonal nodal planes. If the inclination or dip of one of those planes is ≈ 20° or less, that focal mechanism solution provides evidence of a possible seismically active detachment fault. Without further geological or geophysical information about deformation in the vicinity of that hypocenter, detachment is one of two possible interpretations, and not the most likely unless movement on the near-vertical auxiliary plane can be discounted. No instances are given in this report where we wish to imply that the probability of slip on the near-vertical auxiliary plane is significantly less than 0.5. However, in addition to the major, if not dominant, role that shallow-dipping faults must play in the large-scale Neogene extension of the southern Great Basin, shallow-dipping nodal planes of focal mechanisms are sometimes unavoidably present in SGBSN data sets. If these shallow dipping nodal planes are not the fault planes, we are left with vertical slip on very steeply-dipping faults, implied by the auxiliary nodal plane of such focal mechanisms. Such deformation yields almost no net crustal extension, and provides as many obstacles to plausibility from a rock-mechanics perspective as does seismic slip on gently dipping faults.

The first example of a shallow-dipping nodal plane for the focal mechanism solutions computed for this report is for an earthquake of April 20, 1987, in the Specter Range SW quadrangle (Appendix D, Figures D5 and D6). This shallow-dipping nodal plane is somewhat "robust," in the sense that, for two very different assumed hypocenters, the dip of the plane remains sub-horizontal, although the angle of slip changes from −90° (normal slip) for the surface focus hypocenter, to 0° (strike slip) for the six km below sea level hypocenter. Several focal mechanisms presented in this report have primary or alternate solutions with a nodal plane whose dip is less than 20° (Appendix D, Figures D7, D11, D17, D19, D20, D33, and D34). For some station geometries relative to SGB sources, the shallow dipping nodal plane "goes away" by changing the assumed hypocentral depth (compare Figures D18 and D19, for example). Other cases in which the focal mechanism primary solution contains a nodal plane whose dip is strongly dependent on the assumed hypocenter depth are discussed below. These observations are intended to emphasize that for the current SGBSN and probably for many regional seismographic networks, uncertainties in source properties inferred from their focal mechanism solutions are frequently substantial.

One possibly important example of a focal mechanism having a shallow-dipping nodal plane that does not "go away" by depth-of-focus manipulation is that for an earthquake in the Grapevine Mountains, California (Dry Mountain quadrangle), on May 26, 1988, 03:56:49 UTC. This earthquake is among the largest of SGB earthquakes recorded by the SGBSN in 1988. Because of its magnitude, this earthquake's P-wave polarities are exceptionally clear. The quadrantal distribution of first-motion P-polarities for SGBSN data *does not occur* for assumed hypocenters less than about 6-7 km below sea level, i.e., for shallower focus hypocenters, dilatations are hopelessly intermixed with compressions when plotted on the lower (equivalently, upper) hemisphere around the assumed source. The distribution of first motions does partition into quadrants of like polarity without significant inconsistencies for a source with assumed 7 km depth (Appendix D, figure D20), when source-to-station rays are computed using the velocity model of Appendix F, containing a velocity discontinuity at 15 km. Supplementary data from the southern California and central California seismic networks (PAS and MNLO, respectively) were included to help constrain the focal mechanism, which has a nodal plane dipping 21°. Slip is normal. This example may be among the strongest evidence yet collected by the SGBSN for possible seismic slip on a shallow-dipping surface. However, this plane, if the fault plane, is perhaps too steeply dipping to imply seismic activity on a detachment surface. Other examples presented in this report have more shallow-dipping nodal planes, but these are generally less well-constrained than the May 26, 1988 earthquake's focal mechanism.

Yucca Mountain earthquake focal mechanisms

Three earthquakes at Yucca Mountain are examined to see if it is possible to derive focal mechanisms; a magnitude 0.4 on March 10, 1987, a magnitude 0.1 on June 1, 1987, and a magnitude 2.1 on November 18, 1988. For each of these, hypocenters were relocated using a flat layer velocity model having P-wave velocities and layer interfaces that approximately correspond to those found by Hoffman and Mooney (1984) in a refraction survey of Yucca Mountain. These velocities are lower near-surface than those of the standard SGB model, with the consequence that seismic rays traveling to Yucca Mountain stations suffer more refraction towards the vertical than in standard model paths. The two models' P and S velocities are plotted as a function of crustal depth in Appendix F, Figure F1. Because none of the Yucca Mountain earthquakes was large enough to be adequately constrained by P-wave first motions, SV and P vertical ground vibration amplitude data were gathered, and had to be corrected for propagation effects to provide SV-to-P amplitude ratios representative of the source only. These path corrections are dependent on the earthquake's depth-of-focus, with greater amplitude corrections necessary for deeper focus hypocenters. The Yucca Mountain velocity model differs from the "standard" SGB velocity model in the important detail that all source-to-station rays from SGB crustal earthquakes arriving at Yucca Mountain stations are incoming at $\phi < \phi_c$, where ϕ is the free-surface angle of incidence, and ϕ_c is the critical angle. When ray tracing is performed using the standard SGB velocity model the opposite case is true, $\phi > \phi_c$. Although this modeling consideration may appear to be of only academic interest, the use of slow surface-layer velocities results in different focal mechanism interpretations for the extremely small Yucca Mountain earthquakes than would result when using the standard SGB crustal model for ray tracing and propagation effect corrections.

The largest recorded Yucca Mountain earthquake ($M_L = 2.1$) from the inception of the SGBSN in 1978-1979 through 1989 occurred on November 18, 1988, 20:32:24 UTC, at 36.925° North latitude, 116.553° West longitude, and 11 km below sea level depth. The epicenter is about 12 km northwest of the site of a potential national high-level nuclear waste repository (shown in Figure 11). Focal mechanism solutions for this earthquake are not sufficiently well constrained from SGBSN P-wave first motion polarities; thus, $(SV/P)_z$ amplitude ratios are used to limit the range of solutions. Seismic energy of the S-coda of the mainshock overdrove the telemetry electronics of all Yucca Mountain stations. Yucca Mountain station seismograms from a small foreshock, which preceeded the mainshock by a minute, were scaled to provide amplitude and period data for $(SV/P)_z$ ratios (this procedure assumes that the hypocenters *and* elastic energy radiation patterns of the two earthquakes are nearly identical). Path corrections having amplitudes several times those of the $(SV/P)_z$ ratios were added to remove propagation and free-surface effects (these corrections are sensitive to assumed incident angle of P and S waves at the free surface, thus to velocity model). If we accept the validity of these modelling assumptions, the resulting focal mechanism solutions are well-constrained. The azimuth of T is $276 \pm 3°$, its plunge is $18 \pm 5°$; the azimuth of P is $178 \pm 3°$, its plunge is $28 \pm 9°$. All solutions are predominantly strike slip, with some alternate solutions having a component of reverse slip. Two representative solutions are shown in Appendix D, Figure D28, with the "observed" and theoretical $(SV/P)_z$ ratio data for each solution. The tension axes for these solutions trend west, and are therefore rotated counterclockwise from the average direction of T for SGB focal mechanisms (see the section, "average directions of $\vec{P}$ and $\vec{T}$ and tectonic strain" below). The southwest-trending nodal plane of the primary solution, if imagined to project to the earth's surface as a planar fault, would crop out $3\frac{1}{2}$ km southeast of the hypocenter, or 8 km northwest of the potential repository's location on the crest of Yucca Mountain. Slip on that plane is oblique left-lateral strike slip with a substantial normal component. No Quaternary faults or lineaments have been mapped in the vicinity of that plane's surface projection (Reheis and Noller, 1990). The northwest-trending nodal plane has predominantly right-lateral strike-slip motion. If projected to the surface, it would crop out at Bare Mountain, cutting the trace of the Bare Mountain fault.

Selection of the fault plane for this Yucca Mountain earthquake from the two (solid-line) nodal planes of Figure D28 is possible based on plausibility arguments taken from rock physics. If the direction of minimum horizontal compressive stress in the vicinity of the hypocenter of November 18, 1988, is approximately the same as that inferred by Stock and others (1985 and 1986) from hydraulic fracturing measurements at various Yucca Mountain drillholes, azi(σ_3) = N60° – 65°W, then application of the Coulomb-Mohr failure criterion to the two nodal planes of the primary solution of Figure D28 selects the northeast- southwest trending plane as the fault plane. In other words, when considering the ratio of applied shear stress, τ_{xy}, to effective normal stress, σ_n, on each nodal plane, the condition

$$|\tau_{xy}| \geq 0.7\sigma_n$$

occurs when the fault normal direction, $\vec{n} = \vec{Y}$, where $\vec{Y}$ is the normal to the northeast-southwest trending nodal plane, but not when $\vec{n} = \vec{X}$, where $\vec{X}$ is the normal to the other nodal plane (see Figure D28). Here, in order to satisfy the Coulomb-Mohr criterion using a plausible friction coefficient, $\mu = 0.7$, it is assumed that the ratio of effective maximum principal compressive stress, to effective minimum principal compressive stress, $\frac{\sigma_1 - P_p}{\sigma_3 - P_p}$, is approximately four in the vicinity of the hypocenter. P_p is the local fluid pore pressure. To satisfy another plausibility criterion, that the direction of slip on the fault plane equals the direction of maximum shear stress on that plane, the amplitude of the intermediate principal compressive stress, σ_2, is considered a free parameter (in the range $\sigma_3 < \sigma_2 < \sigma_1$). This Coulomb-Mohr analysis also suggests that σ_1 is oriented sub-horizontally at the hypocenter, a conclusion that would also be valid if the alternate (dashed-line) nodal planes of Figure D28 had been considered. (Harmsen and Rogers (1986) discuss this process of fault plane selection from rock physics considerations in greater detail.) The dip of the inferred fault plane of the primary solution, 74°, is probably too great for that plane to correspond to Quaternary faults on Yucca Mountain having similar trend, mapped by Scott and Bonk (1984), who state that faults at Yucca Mountain that dip approximately 70° at the surface and display a "major dip slip displacement" tend to flatten somewhat with depth, with 60° dip at depth > one km.

The other two focal mechanisms for Yucca Mountain earthquakes occurring in 1987 were for earthquakes that, anywhere else in the SGB, would have been considered far too small to investigate ($M_L = 0.4$ on March 10, 1987, and $M_L = 0.1$ on June 1, 1987). The March 10 earthquake, with a focal depth of 3.1 km below sea level, has a well-constrained focal mechanism from six polarities and four ratios, if we require a very close fit between all theoretical and "observed" ratios (maximum difference between logrithms = 0.15). The resulting mechanism is predominantly strike slip, with substantial normal component, on either a north-northwest trending nodal plane or on a west-southwest trending nodal plane. The north-northwest striking nodal plane dips east at about 66°, and the west-southwest striking nodal plane dips northwest at about 55°. Mapped Quaternary faults in the vicinity of the epicenter, such as the Solitario Canyon fault and the Windy Wash fault, trend north, with gentle undulations. Most of the mapped faults on the west side of Yucca Mountain dip to the west, perhaps forming a headwall complex for the Bare Mountain detachment fault, most active 12.5 million years BP (Scott and Whitney, 1987). Because of its dip, the focal mechanism's north-south nodal plane does not appear to be related to remanent activity of that system. The auxiliary nodal plane's strike does not correspond to any mapped fault orientations in the vicinity of the epicenter. The orientation of the tension axis, with azimuth N68°W, approximately coincides with the direction of inferred minimum horizontal compressive stress at Yucca Mountain (Stock and others, 1985 and 1986). Because constraint on the range of focal mechanism solutions is achieved by closely fitting four $(SV/P)_z$ amplitude ratios (implying that many assumptions about the earth model are valid for this data set), our confidence in these focal mechanism parameters is relatively "low."

The set of plausible focal mechanisms for the $M_L = 0.1$ earthquake of June 1, 1987, with depth of 5.9 km below sea level, is not well constrained even when four amplitude ratio data supplement the five unambiguous P-wave polarities. A strike-slip focal mechanism solution, shown in Appendix D, Figure D7, has only marginally better amplitude ratio fit than an alternate normal-slip mechanism (RMS ratio error = 0.180 versus 0.197) when all "observed" ratios are required to have amplitudes within a factor of two of theoretical values. One of the nodal planes of the normal-slip mechanism dips about 10 degrees to the east, which, if the fault plane, is an example of a possible active detachment fault at Yucca Mountain. If the strike-slip solution is correct, the north-northwest trending nodal plane agrees in strike and dip with the Solitario Canyon fault, but not with mapped sense of slip. The T-axis for the strike slip solution also trends parallel to the direction of minimum horizontal compressive stress as determined from hydrofrac measurements at Yucca Mountain drillholes (Stock and others, 1985 and 1986).

In summary, focal mechanism solutions for Yucca Mountain, Nevada, earthquakes detected through 1989 are poorly to, at best, moderately well constrained when only P-wave polarities are used in their determination. This lack of constraint is the direct result of the inability of most SGBSN sensors to detect first motions, due to the very small size of Yucca Mountain earthquakes recorded through 1989. While supplementing polarity data with $(SV/P)_s$ amplitude ratios is sometimes, but not always, able to constrain the solution set to a narrow, geologically plausible, range, the ratio method borrows heavily on hard-to-validate assumptions. A better understanding of seismic slip at Yucca Mountain and vicinity requires that we improve seismographic coverage there, a project that is currently underway by YMP-USGS.

While we have attempted to relate the microseismicity at Yucca Mountain to relatively major mapped Quaternary faults there, it is probable that much of the SGBSN's monitoring is recording activity on secondary structures, such as Riedel shears; thus, correlation of focal mechanism parameters with major faults may be expected to be low. A second caveat may be in order. The shallow ($\leq$ 1.5 km below surface) hydrofrac determinations of minimum compressive stress that were invoked to determine the fault plane for the Yucca Mountain earthquake of November 18, 1988 (Appendix D, figure D28) may not be appropriate for seismogenic depths. Such factors as topographic influence on the crustal stress field (Swolfs and others, 1988) or a detachment surface may not justify extrapolation of those hydrofrac measurements to depths corresponding to earthquake hypocenters considered in this section.

Reverse-slip focal mechanisms and compressional tectonism in the SGB

Tucki Mountain and the Panamint Range, California, may have moved $\approx 125 \pm 7$ km in the direction N$65 \pm 7°$W from the Nopah block during the Neogene period (Wernicke and others, 1988), and may therefore be expected to display significant seismicity if this extensional process is still active. Prominent reverse-slip faults have been observed at Tucki Mountain (Wernicke and others, 1988). The mainshock of a short-lived Tucki Mountain series of earthquakes in March, 1982, reported in Rogers and others (1987), provides sufficient P-wave polarity data from the SGBSN and from the southern California seismic network (PAS) to yield a well-constrained focal mechanism (Appendix D, Figure D1). The focal mechanism of the earthquake ($M_L^{PAS} = 3.4$) has east-west trending and northwest-southeast trending nodal planes, each with oblique reverse slip. The mainshock's epicenter is at the northernmost end of Tucki Mountain (Panamint Range), about 25 km northwest of the northern end of the north-trending, right-lateral strike-slip Death Valley fault, and about 12 km southwest of the northwest-trending right-lateral Furnace Creek fault zone.

Although well-constrained oblique-reverse-slip focal mechanisms are extremely uncommon in the southern Great Basin, "most 'strike-skip' faults ... are associated with an assemblage of related structures including both normal and reverse faults" (Christie-Blick and Biddle, 1985, p. 1). The deformation implied by the March, 1982, Tucki Mountain mainshock may be the result of compressional strain west of the junction of the Death Valley and Furnace Creek fault zones in the manner predicted by laboratory-scale photoelastic models of segmented faults (see Freund, 1974, his figure 27).

Compressional tectonism is of some interest to site characterization, because of its potential to interact with the hydrologic subsystem. No unequivocal, predominantly reverse-slip focal mechanism solutions have been determined from SGBSN data for earthquakes within 70 km of Yucca Mountain to the present date. One oblique reverse-slip mechanism for a small earthquake (M_L = 1.7) in the Tippipah Spring quadrangle, also mentioned above in the section "unusual mechanisms," has epicenter 35 km northeast of a central point (coordinates 36°51'N, −116°27.5'W) on Yucca Mountain (Harmsen and Rogers, 1987). That solution has one glaring polarity inconsistency, so our confidence in the solution is low.

Focal mechanisms of other notable SGB earthquakes, 1987 to 1989

The October 2, 1987, 11:11 UTC, magnitude 3.4 earthquake in the Papoose Lake SE quadrangle (Table 3, Index 9) yields focal mechanisms that vary significantly as a function of assumed depth-of-focus. The nearest station is over 27 km from the epicenter, so depth resolution is necessarily poor. In Appendix D, two mechanisms are presented, one for an assumed five km below sea level focus shown in Figure D11, and the other for an assumed 11 km below sea level focus shown in Figure D12. RMS travel time residuals are of little help in narrowing down the hypocenter, being 0.19 sec for the shallower-focus solution and 0.20 sec for the deeper-focus solution when using the standard SGB crustal model. Both hypocenters' focal mechanisms possess a northwest-dipping and southeast-dipping nodal plane. The southeast-dipping nodal plane for the shallower-focus hypocenter dips at about 14 degrees, providing another example of a possible seismically active detachment fault. The northwest-dipping nodal planes for both solutions dip steeply, and are oriented favorably for normal slip if the extensional direction is north-northwest in the vicinity of the hypocenter. The earthquake was somewhat unusual in that only two other hypocenters were observed in its vicinity over the next month, an unusually low level of concomitant seismicity for an earthquake of its magnitude.

Focal mechanisms for a M_L = 2.0 Yucca Flat earthquake on February 7, 1988, (Table 3, Index 14) show strong dependence of strike, dip, and rake on assumed depth of focus. When treated as a surface-focus event, the focal mechanism indicates oblique slip on a steeply-dipping north-south fault (Yucca Fault?), or strike slip on an east-west oriented fault (Figure D18). When treated as a deeper-focus event, five km below sea level, the focal mechanism includes a 5° northwest dipping nodal plane, with strike-slip motion, and a northwest-oriented vertical nodal plane with vertical motion (Figure D19). The possibility of a seismic detachment fault thus reappears, although this example suffers from a poorer data fit to the velocity model, with RMS travel time residual = 0.20 seconds for the deeper hypocenter, versus 0.14 seconds for the surface-focus hypocenter. A graph of how the RMS travel time residual varies as a function of depth-of-focus when using HYPO71 to determine the hypocenter of this Yucca Flat earthquake is shown in Figure 14. The surface-focus solution is not particularly satisfying to many seismologists, who believe that ultra-shallow rock is generally not strong enough to store sufficient distortional strain energy for magnitude 2 earthquake generation. Thus, the relatively large travel time residual for the deeper focus solution may be more the result of an inadequate velocity model for this earthquake's arrival time data set than of an intrinsically poorer depth-of-focus estimate.

The Reveille Peak quadrangle earthquake of October 28, 1987, 17:25 UTC (Table 3, Index 10), is one of the larger (M_L = 2.8) of a few hundred earthquakes observed in a few km zone at the southern end of the Reveille Range from 1986 through 1989. The nearest seismic station to this series, QCS, is about 21 km east, so depth of focus is poorly resolved for these earthquakes. A rangefront fault on the west side of the Reveille Range may be active in the Quaternary, and may be associated with this long-running series. Focal mechanisms were computed for a near sea level focus,

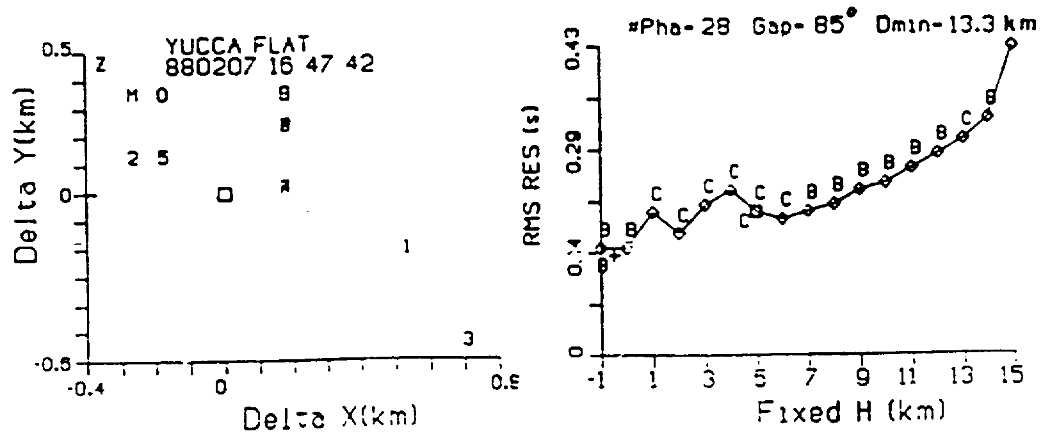

Figure 14.– *Left* side: epicentral scatter for various fixed depth and free depth HYPO71 hypocenters for a Yucca Flat earthquake of February 7, 1988, 16:47 UTC. The symbols correspond to the fixed depth hypocenters: M,0,1,2,. . ., A,B,C,D,E, and F for depths = -1,0,1,2,. . .,10,11,12,13,14, and 15 km below sea level. The open square is for the free depth solution, with starting iterate depth 7 km, and the Z is for the free depth solution with starting iterate depth 0 km (at sea level). *Right* side: The RMS travel time residual for the various fixed depth and free depth solutions for the same event. The letters above the fixed depth solutions, and below the free depth solutions, are HYPO71 "grades" assigned during the process of hypocenter determination. This plot shows a small variation in *RMS* for many shallow depth estimates, a pattern that is often present for SGB data sets where the nearest station is relatively distant from the epicenter.

and for a 5.7 km below sea level focus. The shallower-focus focal mechanism solutions, shown in Figure D13, indicate right-lateral strike slip on a steeply dipping north-trending fault, or left-lateral strike slip on a steeply dipping west-trending fault. The deeper-focus focal mechanisms shown in Figure D14, are less well constrained, but all solutions have a significant component of reverse slip on northwest-trending nodal planes, and a steeply plunging tension axis. Another earthquake in the southern Reveille Range series, occurring on August 30, 1988, at 2:30 UTC, has an oblique normal-slip strike-slip solution for a fixed-depth hypocenter at five km below sea-level, shown in Figure D36 (Table 3, Index 20). The near-surface layer velocities used for hypocenter determination were two to 25% faster than those of the standard model, based on observed negative travel-time residuals for stations north of Yucca Flat and Rainier Mesa nuclear device tests, relative to the standard velocity model.

A strike-slip earthquake occurred on January 9, 1989, 05:08 UTC, with epicenter about 10+ miles (17 km) north of Las Vegas, Nevada (Valley quadrangle), where it was strongly felt (M_L^H = 3.5; M_L^{NEIC} = 3.5; MMI= V to VI, Carl Stover, written communication). This is the only SGB earthquake during the 1987-1989 period for which property damage was reported to the National Earthquake Information Center (NEIC), although damage was slight (cracked windows). The focal mechanism solutions shown in Appendix D, Figure D29 and D30, indicate right-lateral strike slip on a steeply dipping north-trending fault, or left-lateral strike slip on a west-trending fault. The epicenter is in an alluvial valley at the base of the south flank of Gass Peak, with no immediately obvious fault to identify as the source. The inferred Las Vegas Valley fault strikes west-northwest in the vicinity of the epicenter, but SGBSN first-motion data do not fit the local trend of that fault. Variations in assumed focal depth for this earthquake have little effect on the focal mechanism solutions. For example, the angle of slip on the east-west nodal plane is $0° \pm 15°$ for a seven km below sea level hypocenter; it is $7° \pm 8°$ for the four km below sea level hypocenter shown in Figure D29; it is $-5° \pm 3°$ for solutions derived from a hypocenter at sea level, shown in Figure D30 (0° represents horizontal block movement). This earthquake is one of the few observed for the 1987 through 1989 period for which the regional SGBSN network P-wave polarities provide a fairly well-constrained set of focal mechanisms, relatively independent of assumed hypocentral depth.

In this section, focal mechanism solutions for four SGB earthquakes that occurred between 1987 and 1989, all having magnitude ≥ 2.0, have been discussed, with emphasis on the variety of solutions that result by changing the assumed hypocentral depth. In only one case, that of the January, 1989, earthquake north of Las Vegas, Nevada, was the focal mechanism solution set not strongly affected by changing the assumed earthquake depth of focus by a few km. In some cases, depth uncertainty translates primarily to nodal plane dip-angle uncertainty, and seismically active detachment faults become possible source interpretations. In some cases, predominantly strike slip solutions change to predominantly reverse slip solutions by increasing the assumed depth of focus. Although the earthquakes for which these ambiguous source interpretations are > 50 km distant from Yucca Mountain, they are often the mainshocks of relatively important earthquake clusters. These observations point to the need to put temporary portable networks over seismically active spots in the SGB if we wish to better understand seismotectonic processes in the region surrounding a potential national nuclear waste repository at the Yucca Mountain site.

Average directions of $\vec{P}$ and $\vec{T}$ and tectonic strain

When considered collectively, the focal mechanisms for SGB earthquakes provide a fairly consistent descriptor of certain components of the regional tectonic strain tensor at shallow to mid-crustal depths. Figure 15 is a plot of the thirty pressure axes (**P** or $\vec{P}$) and tension axes (**T** or $\vec{T}$) for the 1987-1989 mechanism primary solutions listed in Table 3. The pressure axes form a girdle or belt through the hemisphere, and the tension axes cluster in the northwest and southeast quadrants, with relatively small plunge angles. When using Watson's eigenvalue/eigenvector analysis of directional data on the sphere (Schuenemeyer and others, 1972), we obtain an *average* tension direction, azi($\bar{\vec{T}}$), of N59° W, with plunge 2.8°, for the data of Table 2. (Each datum was weighed equally, regardless of earthquake magnitude or degree of constraint on mechanism parameters.) When excluding the Silent Canyon caldera focal mechanisms, whose sources may be induced by nuclear device tests, the azimuth of avg($\vec{T}$)= N55° W, with plunge 2.8°. Figure 16 is a plot of the pressure and tension axes for previously published SGB earthquake focal mechanism data for the period 1979-1986 (Rogers and others, 1987, and Harmsen and Rogers, 1987). For these earlier data, azi($\bar{\vec{T}}$) =N57° W, with plunge = 2.0°. The distributions are very comparable. The average T-axis is the seismically determined direction of average minimum principal compressional strain within the seismogenic crust, and is sometimes taken as an approximation to the direction of minimum principal compressional tectonic stress. Furthermore, the avg($\vec{T}$) azimuth corresponds remarkably well with the direction of net Great Basin extension as determined from space geodesy and neotectonic constraints, N56 ± 10° W (Minster and Jordan, 1987).

The focal mechanism avg($\vec{T}$) is rotated about 15° clockwise from the direction of net Neogene extension from the Las Vegas fault system to the Death Valley fault system, as geologically determined, N73 ± 12° W (Wernicke and others, 1988), although the significance of this observation is not known.

Focal mechanisms provide relatively cheap indicators of tectonic stress parameters, but because of the multiple uncertainties in depth of focus, focal mechanism strike, dip, and slip, the particular mechanics of each fault (strength, friction, fluid pore pressures in fault zone, fault interactions), and the variability of the stress tensor with position due to crustal heterogeneity, there is no mathematically well-defined mapping between focal mechanism data and the crustal stress tensor. The majority of SGB focal mechanism solutions computed to the present date certainly conform to the model of a highly stressed shallow crust (earthquakes are triggered by many NTS nuclear device tests) in which the horizontal stress in the northwest to west-northwest direction is substantially reduced, releasing gravitational energy through normal faulting events on northeast trending faults and releasing horizontal strain energy through strike slip motion on steeply dipping, generally north-trending, faults. The mechanics permitting seismic slip on sub-horizontal (detachment) faults does not fit this conventional model.

Some of the earthquake focal mechanisms whose $\vec{T}$ axes differs markedly from the average $\vec{T}$ may be called "outliers." Outliers include (1), events with oblique to near-vertical $\vec{T}$ plunge angle, and (2), events with $\vec{T}$'s azimuth rotated significantly from the northwest-southeast direction. An example of an event having a 50°-plunging tension axis is the Furnace Creek eathquake of March 16, 1982, discussed briefly in an earlier section. Examples of events with obliquely inclined $\vec{T}$ (i.e., plunge($\vec{T}$) ≈ 45°) are discussed in the section on possible active detachment faults, above. Examples of events having rotated azi($\vec{T}$) include the Yucca Mountain mechanism for earthquakes on October 18, 1988, two Silent Canyon Caldera earthquakes discussed above, and the composite Timber Mountain mechanism for earthquakes on July 3, 1988 and July 24, 1988 shown in Appendix D, Figure D24. The focal mechanism for the Owens Valley earthquake of July 5, 1988, shown in Figure D23, has azi($\vec{T}$)= N105° W (longitude 118.05° W), and that of the Dry Mountain quadrangle earthquake of May 26, 1988, shown in Figure D20, has azi($\vec{T}$)= N83° W (longitude 117.71° W), providing evidence for the possible counterclockwise rotation of the direction of minimum crustal compression at the western edge of the SGB, in the vicinity of the Sierra Nevada block boundary, relative to the central SGB. Another southwest SGB hypocenter with a focal mechanism having azi($\vec{T}$) ≈ east-west is that for the Stovepipe Wells quadrangle earthquake of July 8, 1986, 03:02 UTC (Harmsen and Rogers, 1987). The northwest-southeast orientation of the Furnace Creek fault, northern Death Valley, California, may be favorable for right-lateral strike slip if the extensional direction is more east-west than would be suggested by the *average* strain tensor for SGB earthquakes, and if north-south crustal compression is sufficiently great in its vicinity. Very extensive sets of focal

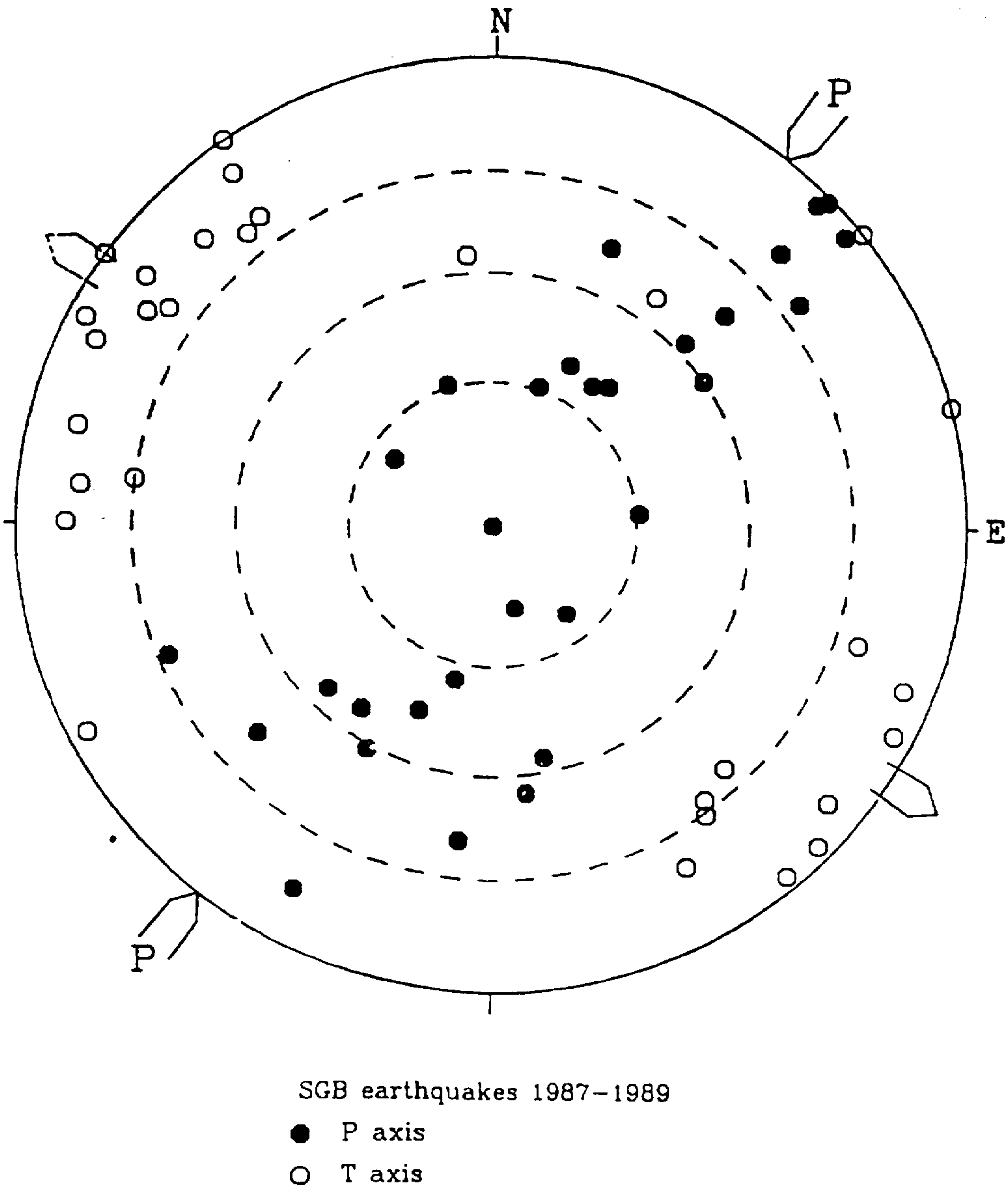

Figure 15.– Lower-hemisphere projection of pressure (P) and tension (T) axes for the earthquake focal mechanism primary solutions presented in this report for data in the period 1987 through 1989. Dashed rings are shown at inclinations of 25°, 45°, and 65° to indicate the relative mix of predominantly strike-slip, oblique slip, and normal slip focal mechanisms, respectively. Horizontal projections of average values of P and T, computed from Watson statistics, are plotted as tabs.

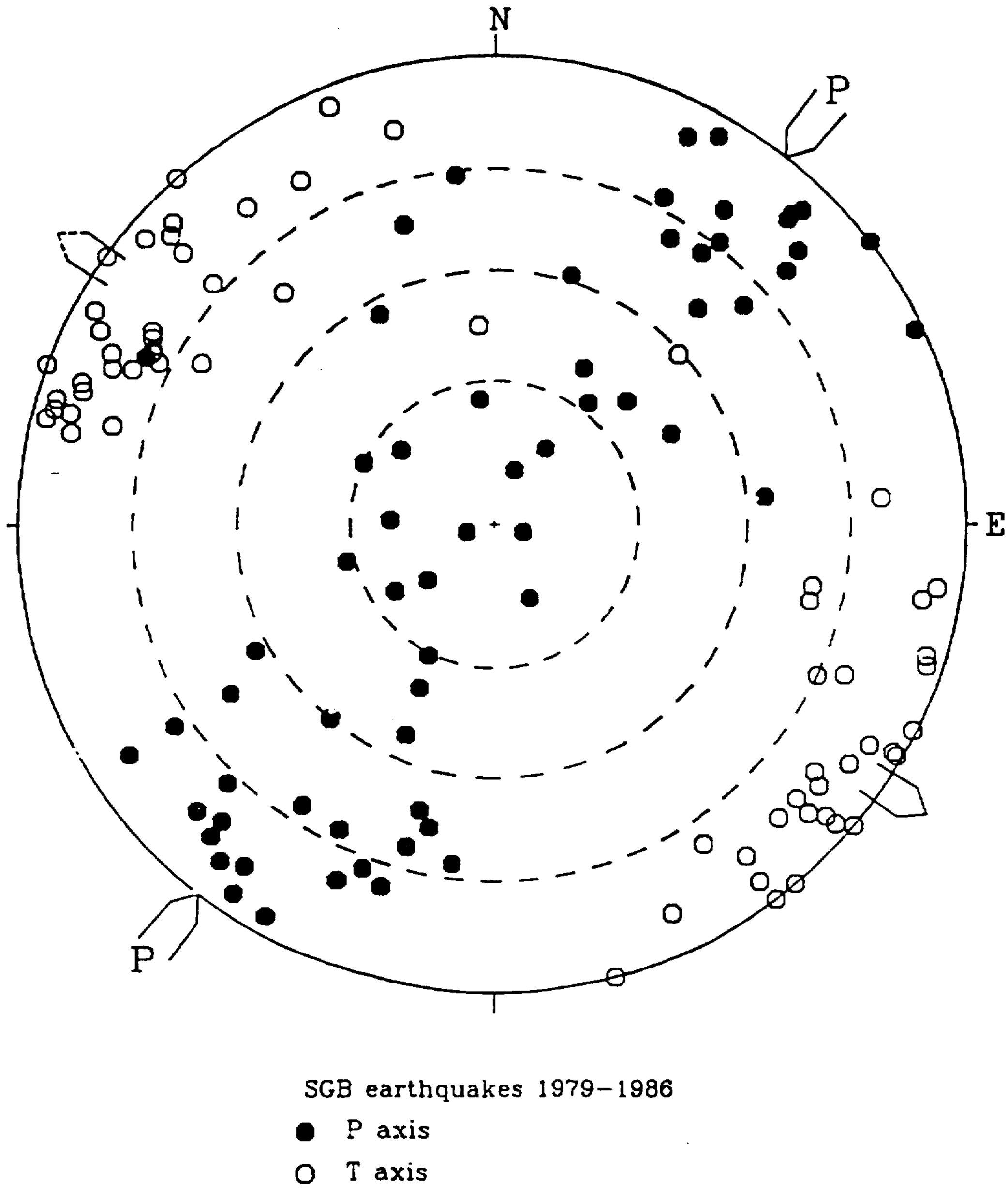

Figure 16.– Lower-hemisphere projection of P and T axes, and their averages, for SGB earthquake data of the period 1979 through 1986. Dashed rings are as in Figure 15.

mechanism solutions (hundreds) have been determined for the seismically active Mammoth Lakes, Round Valley, Chalfant Valley, and Mono-Walker Lake regions, as well as for central Nevada, and are used to infer crustal stress tensor rotation from central Nevada ($\approx$ 39.5° N, 118° W) to the Sierra Nevada rangefront ($\approx$ 37.5° N, 118.8° W) (Vetter, 1990). A clear counterclockwise rotation of σ_3, the minimum principal compressive stress, is evident from the Central Nevada Seismic Zone, where the inferred σ_3 azimuth is approximately N50°W (plunge negligible), to Mammoth Lakes, where the inferred σ_3 azimuth is approximately N100°W (plunge negligible) (Vetter, 1990).

Depth-of-focus distribution and deep-crust intraplate earthquakes

A widely-held view on the depth distribution of earthquakes in the Great Basin is that depths should be confined to the upper 15 km or so of crustal rock, with local variations based on higher-than-average or lower-than-average heat flow, different lithologies, and strain rates (Smith and Bruhn, 1984). The vicinity of 15 km depth is frequently termed the brittle-ductile transition zone. The SGBSN hypocenter catalog generally conforms to this model, in that less than two percent of the reported earthquake hypocenters for the 1987-1989 period have estimated depths, z, greater than 15 km below sea level. This property generally holds for depth distributions in other parts of the Great Basin where hypocenter data are available, with the exception of the Truckee, California, region, where depths of focus often lie between 15 and 20 km (Rogers and others, 1989). Figure 17 shows the frequency distribution of depth-of-focus of a subset of earthquake hypocenters from Appendix A of this report having the properties that the minimum source to station distance < 10 km, the standard error in depth, err_z < 5 km, and the HYPO71 average grade (Avg(Q1,Q2) in Appendix A listing) is C or better. Although these restrictions are not enough to insure well-constrained hypocenters, they reduce the population from $N \approx 3300$ to $N = 851$, and therefore result in a sample of what may be the best-constrained quartile of the population of 1987 through 1989 SGB hypocenters. Figure 17(a) shows a bargraph of the counts of such events in each 1-km interval, from one km above sea level to 20 km below sea level. Figure 17(b) shows the probability distribution of depth of focus for that sample, where cumulative probability within each interval is assigned by assuming that "depth" for the ith hypocenter is a normally and independently distributed random varible, with mean z_i and standard deviation err_{z_i}, respectively. The values z_i and err_{z_i} are the depth and standard error in depth, as reported in Appendix A. Also, the tails of the normal distributions are truncated at one km above sea level and 20 km below sea level, and any remaining area under the probability curves beyond those limits is accumulated into those extreme intervals. (A more realistic probability density function would, of course, have finite tails, with limits corresponding to the bounds of the seismogenic crust.) The distributions of Figure 17 are comparable to those reported in previous SGBSN data reports (Rogers and others, 1987, and Harmsen and Rogers, 1987). Although the "fine structure" of the distributions may be more a function of the location algorithm and velocity model than of any fundamental property of the earth's seismogenic crust, the main feature, a rapid tapering off of seismic activity at depth > 12 km, is probably real.

Of the relatively deep-focus hypocenter solutions for earthquakes in the SGB, very few depths are in the relatively well-constrained upper quartile as defined in the preceeding paragraph, the typical deep hypocenter being from a data set having a source-station gap > 180° and the nearest station > 25 km from the source. A very small subset of the deep-crust hypocenters is well-located, having both primary and secondary arrivals available at a station within 15 km of the epicenter, relatively low RMS residual, reasonable V_P/V_S ratio, and $\leq$ 180° gap in station azimuthal coverage. The V_P/V_S ratio is the ratio of primary to secondary wave velocity, as inferred from P-wave and S-wave arrival times at recording stations. For the period 1987 to 1989, the deepest hypocenter meeting all of these criteria is that of a magnitude one earthquake on August 21, 1989, 16:17:45 UTC, in the Halfpint Range, eastern NTS (Faiute Ridge quadrangle). The hypocenter is about 30 km below sea level, at a depth corresponding to the crust-mantle interface. Seismograms from the 12 nearest SGBSN stations that recorded this earthquake are displayed in Figure 18, with their corresponding P

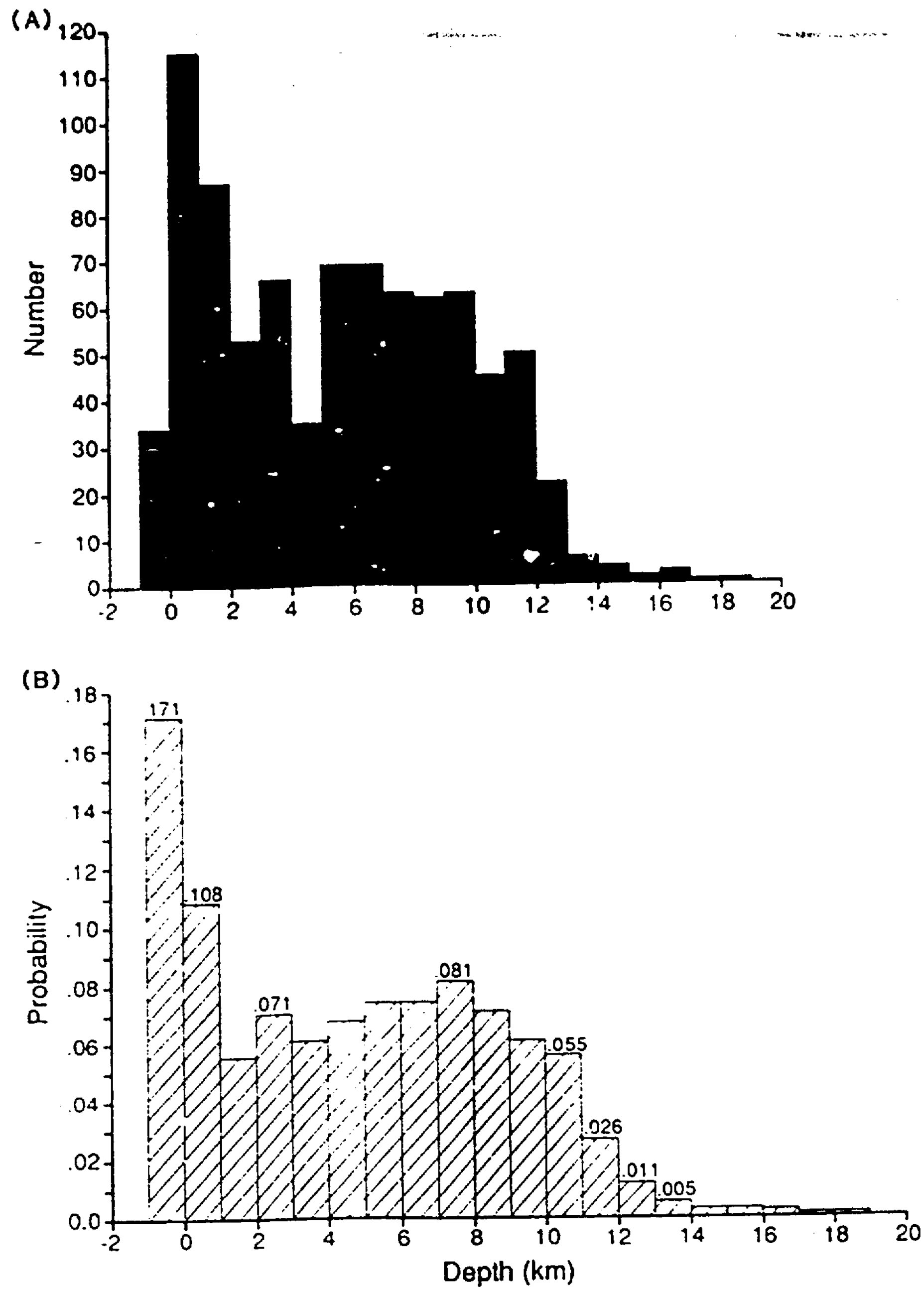

Figure 17.- Depth of focus distribution of the best-constrained upper quartile of SGBSN hypocenters for the period 1987 through 1989 (see text for definition of "best-constrained"). (a) Graph of counts of events versus focal depth, in one km intervals. (b) Graph of probability that an event occurs within a given one-km interval in the depth range $-1 < z < 20$ km, where negative depths are understood to be above sea level (see text for discussion of how probabilities are determined).

9 1 1 5 1   2 9 0 8

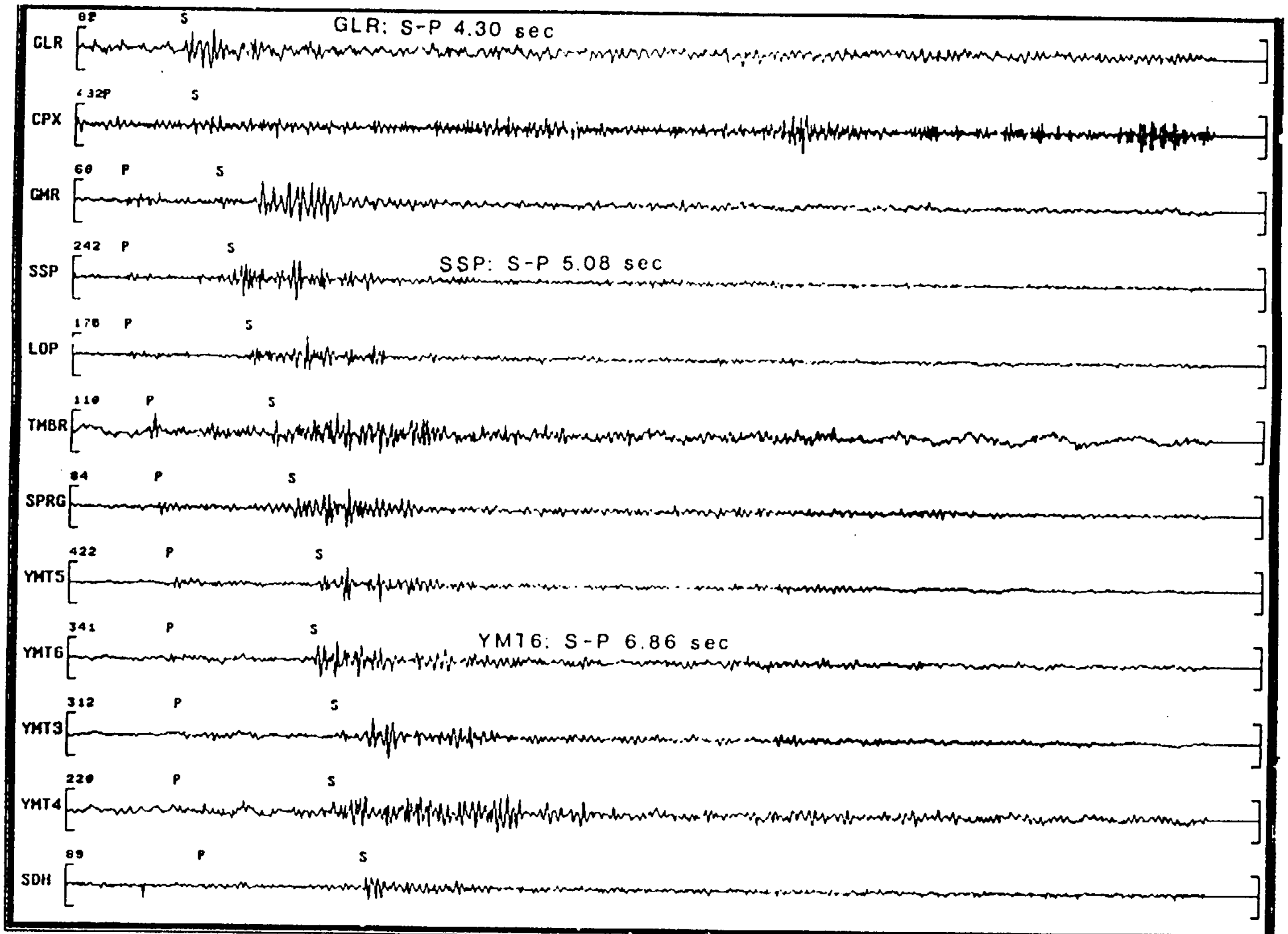

Figure 18.– Seismograms from a deep-crustal earthquake on August 21, 1989, 16:17:45 UTC, in the eastern NTS (Paiute Ridge quadrangle) are displayed for 12 SGBSN stations nearest to the espicenter. The total time between the left and right brackets is 56 seconds. Scaled arrivals for primary (P) and secondary (S) waves are also displayed. The $S - P$ time for the nearest station, **GLR**, is 4.30 seconds.

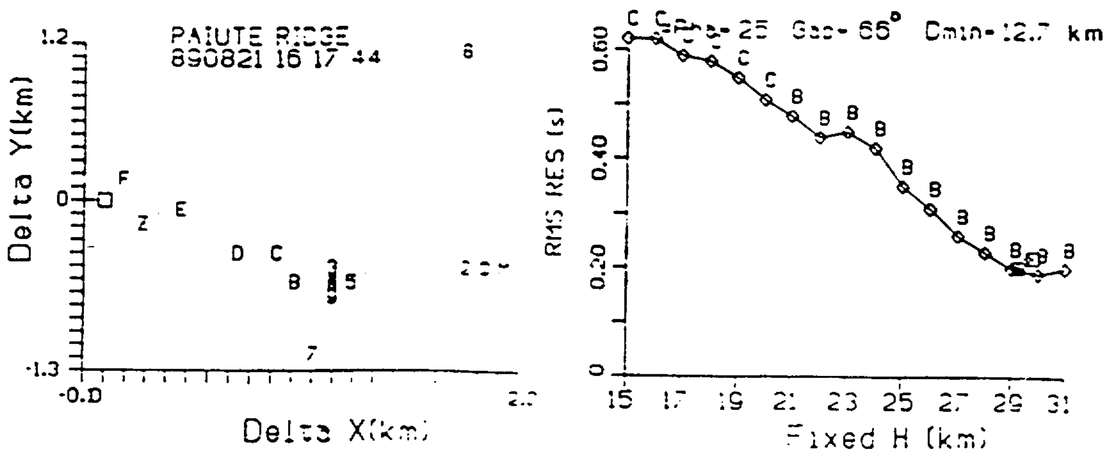

Figure 19.– *Left* side, epicentral scatte., and *right* side, behavior of *RMS* function, as a function of assumed depth of focus for HYPO71 hypocenters for an eastern NTS deep-crustal earthquake of August 21, 1989, 16:17 UTC. The symbols in the epicenter plot, M, 0,1,2,. . . . A,B,C,D,E,F now represent fixed-depth epicenters for solutions having depth 15, 16, 17, 18. . ., 26, 27, 28, 29, 30, and 31 km below sea level, respectively. The open square, arbitrarily plotted at (0,0), is the epicenter for a free-depth solution, with initial iterate depth 7 km, and the "Z" symbol is the epicenter for a free-depth solution with initial iterate depth 0 km. All epicenters are plotted relative to the position of the square

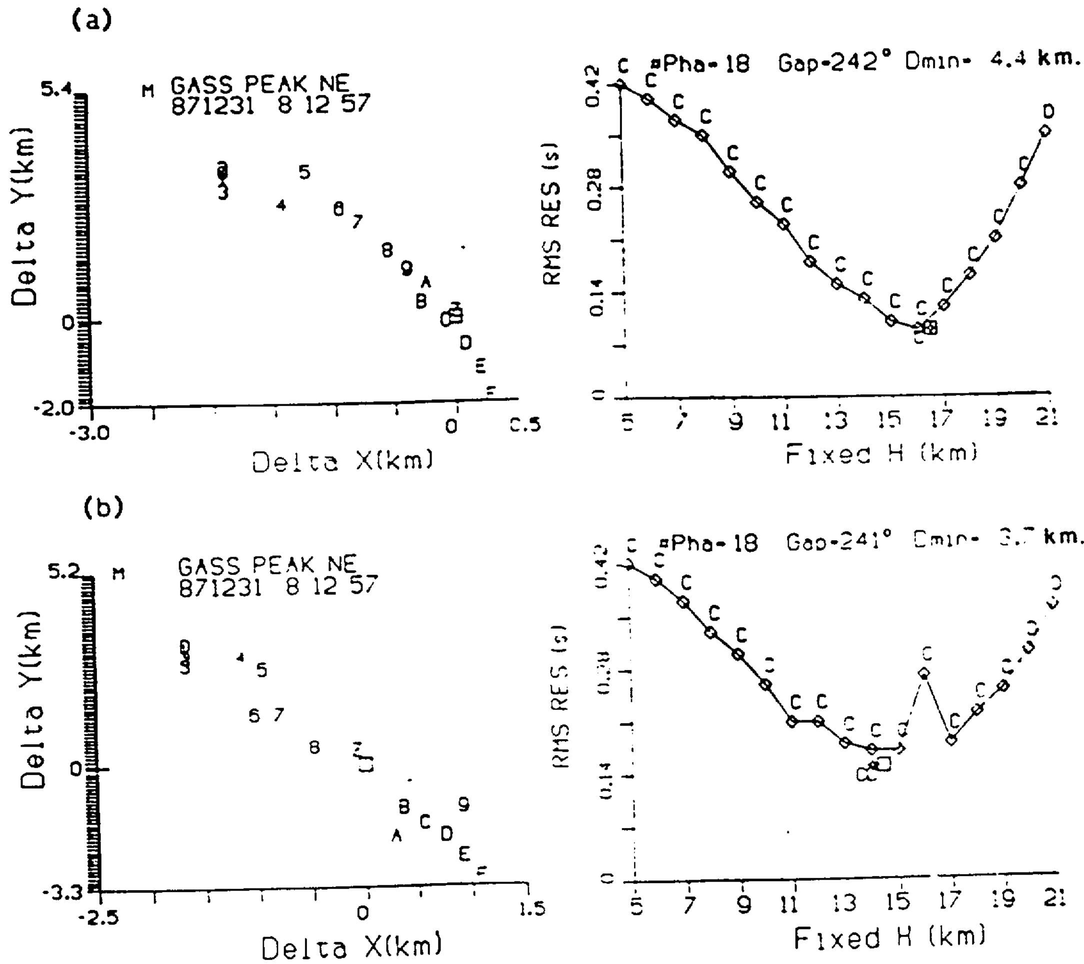

Figure 20.– *Left* side, epicentral scatter and *right* side, behavior of *RMS* as a function of fixed-depth and free-depth HYPO71 solutions, with symbols having same meanings as in Figures 10 and 14, for an earthquake north of Las Vegas, Nevada, on December 31, 1987 8:12 UTC having probable depth of focus near the brittle-ductile transition. (a) Hypocenters derived using a model with no interface at 15 km below sea level, $V_p = 6.15$ km/sec between 3 and 24 km below sea level, (b) Hypocenters derived using a model with an interface at 15 km below sea level, $V_p = 6.5$ km/sec below that interface (see Figure F1(a) for the velocity model). This figure shows that in some instances, the 15 km interface, or the relatively high velocity below that interface, is not well supported by arrival time data.

In summary, deep crustal earthquakes in the SGB are both rare and small (maximum magnitude = 1). Data quality of those earthquakes' seismograms is poor, probably due in part to peculiar source properties and to relatively high P-wave and S-wave attenuation (low Q) of rock at mid-crustal to deep-crustal depths. To depths of about 15 km below sea level, SGB microearthquakes yield seismograms that contain relatively high energy content in the 5-10 Hz range, whereas seismograms of microearthquakes originating at greater depths are depleted in those frequencies. Focal mechanism solutions have not been attempted for the data of deep-crustal SGB earthquakes, due to the ambiguity of P-wave onsets at SGBSN stations.

Conclusions

- Although epicentral constraint on most SGB earthquake locations is fairly good (probable epicentral error $\leq$ 1 km), hypocenter (depth-of-focus) constraint is often poor (uncertainty in depth frequently on the order of 5 km). A more accurate velocity model could reduce depth uncertainty, but in its absence, and given the high degree of structural variability of SGB rock, a denser seismographic network is necessary.

- An important consequence of depth-of-focus uncertainty is that focal mechanism solutions, even if well-constrained for a given assumed depth, sometimes vary significantly with changes in depth. However, some SGB focal mechanism parameters, especially the azimuth of the tension axis, are relatively stable or "robust" for those different solutions.

- Deep-crustal earthquakes in the SGB are rare (less than 2% of the total hypocenters) but not non-existent. Their presence at the crust-mantle interface ($\approx$ 32 km) provides an intriguing geophysical problem in a high heat-flow region.

- SGB earthquake focal mechanism solutions are generally strike-slip, oblique slip, or normal-slip, in roughly equal proportions, with tension axes clustering in the northwest-southeast quadrants, with relatively small plunge angles, and pressure axes forming a girdle or belt through the focal hemisphere. These solutions suggest a uniform crustal stress pattern in which compressional stress in the northwest-southeast direction is substantially lower than in other directions. Gravitational energy is released through normal faulting events on north-northeast to northeast trending faults and horizontal strain energy is released through dextral motion on steeply dipping, north trending faults and through sinistral motion on east-northeast trending faults. The mechanics permitting seismic slip on sub-horizontal (detachment) faults does not fit this conventional model.

- Exceptional focal mechanism solutions, including solutions having a nodal plane with dip$<$ 20°, strongly rotated tension axis direction, or reverse slip are encountered in the 1987-1989 SGB data. They do not conform to the regional pattern, and some may indicate local anomalous tectonic features. No unequivocal, predominantly compressional focal mechanism solutions have been determined from SGBSN data for earthquakes within 70 km of Yucca Mountain through 1989.

- SGB focal mechanism data are consistent with crustal stress models which display regional counter-clockwise rotation of principal horizontal stress directions from the California-Nevada stateline at 36°N to 37°N, and $\approx$ 116°W to 117°W to the eastern Sierra Nevada block boundary at about 118.1°W.

- Yucca Mountain, Nevada, is a seismically quiet site relative to surrounding areas. Focal mechanisms for Yucca Mountain earthquakes are difficult to constrain, because no Yucca Mountain earthquakes yet recorded have size greater than $M_L = 2.1$, and most have $M_L < 1.0$.

- Rock at shallow depths in the vicinity of Rainier Mesa displays a strong directional anisotropy for P-wave velocities; whether this apparent anisotropy is the result of aligned cracks and stresses or of the presence of crustal heterogeneity, i.e., a high-speed ridge under Rainier Mesa, is not determinable from P-wave arrival data alone. The ability to distinguish among competing explanations could be achieved by an analysis of shear wave splitting from on-scale, three-component recordings of nuclear device detonations which release tectonic strain over a range of azimuths; such data are not available from the current SGBSN.

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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

Earthquake locations for the years 1987, 1988 and 1989
and quadrangle map names to which locations are keyed

All earthquake hypocenters reported in Appendix A are preliminary. 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), all other letters are for data scaled from digital seismograms. Five digital data letters are defined: Z, S, and T are for minimum RMS travel time residual solution having $z_0 = 0, 7$, or 12 km below sea level, respectively, using the standard SGB crustal velocity model, modified to include a layer interface at 15 km, below which $V_P = 6.5$ km/sec; I is a solution using the standard SGB model without the 15 km interface, and Y is a solution using the Yucca Mountain velocity model. In each of the latter cases, $z_0 = 7$ km. for 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 priority for reporting is I, S, Z, and T. A and Y solutions were not extensively redetermined using different values of z_0.

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. Mca is computed from the post-S coda by fitting the envelope function,

$$A(t) = A_0(t - t_p)^{-1.8},$$

to a sequence of 5.12-second windows of peak amplitude data in the unclipped portion of the seismogram. In this formula, A_0 is statistically determined, and is transformed into Mca. The modeled time rate of decay is governed by the exponent 1.8, which lumps geometric spreading, scattering, and anelastic attenuation. Mca appears to underestimate the true event magnitude when $M > 2.7$.

Depth estimates 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. In some instances, the standard depth error estimate, *sdz* is followed by one or two +s. These cases, discussed in greater detail in the section, Preliminary hypocenter determination for SGB earthquakes and explosions, are for hypocenters whose depth-of-focus uncertainty is greater than would be suggested by *sdz*.

DELMIN is the minimum source to station distance in km, and RMS RES. is the root-mean-square travel time residual, defined in the text of this report. #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 $7\frac{1}{2}$ or 15 minute topographic quadrangle in which the epicenter lies. Regional events are not assigned quadrangle names.

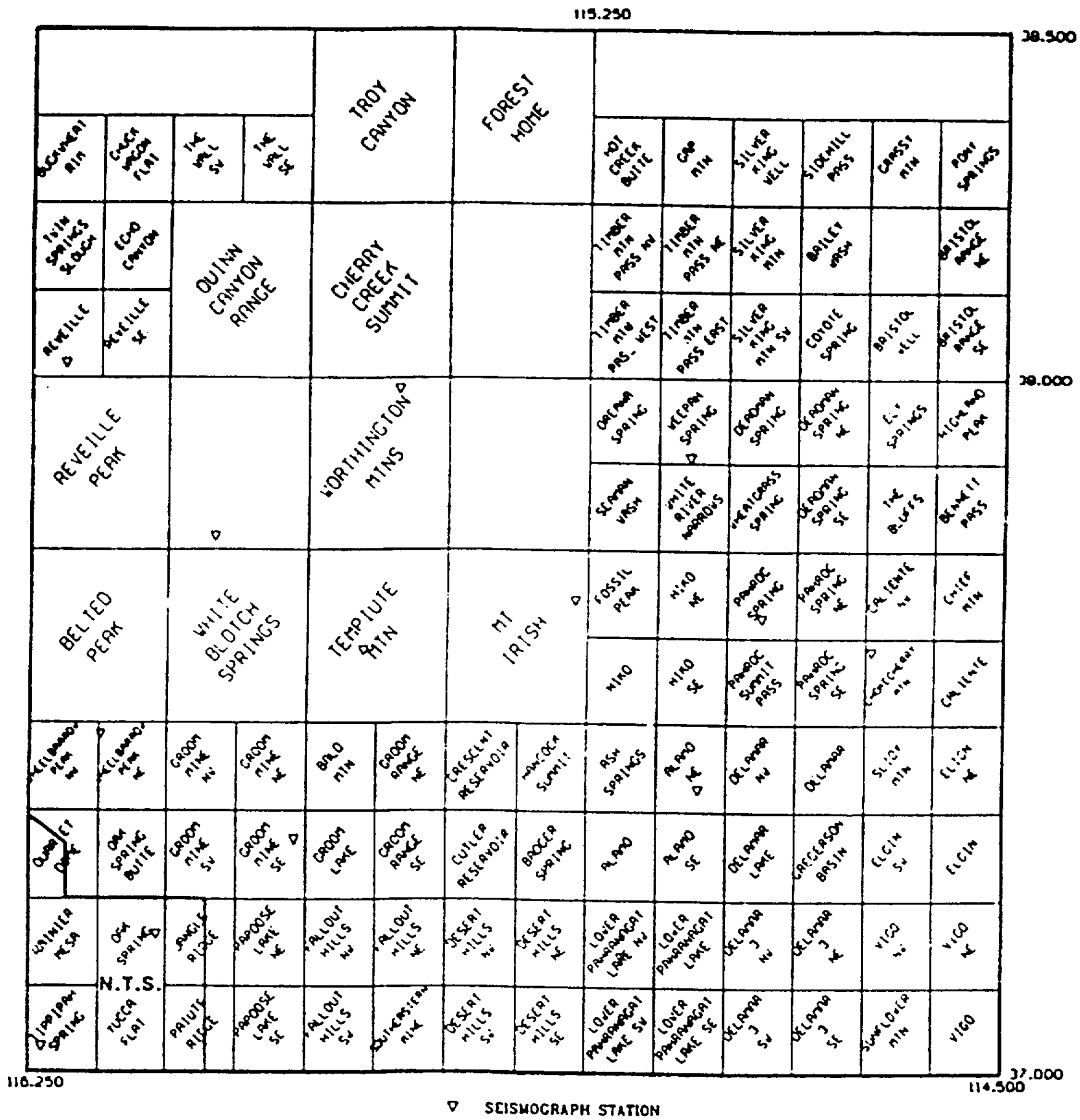

Figure A1.– Quadrangle names in the northeast quarter of the southern Great Basin.

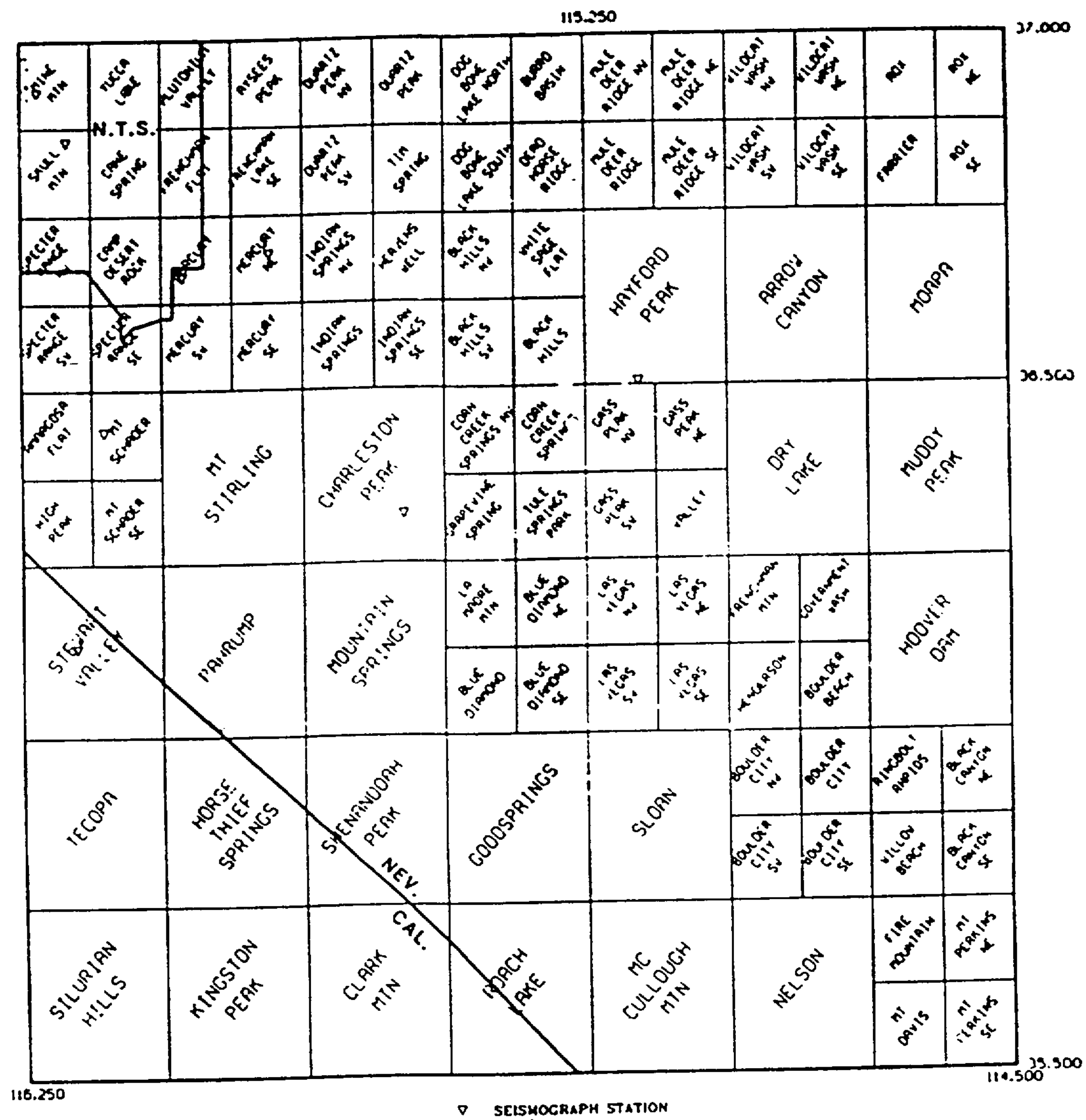

Figure A2.– Quadrangle names in the southeast quarter of the southern Great Basin.

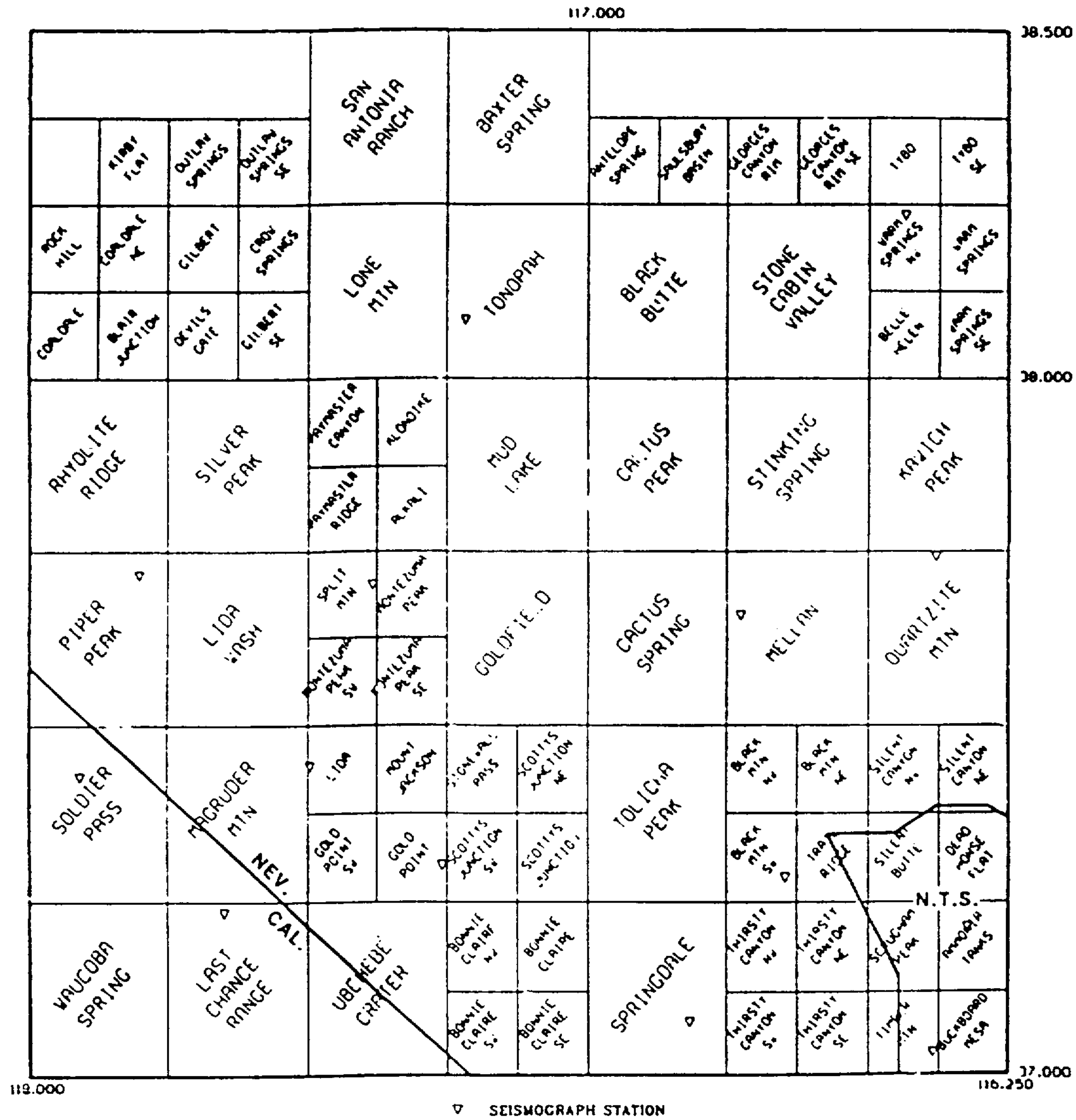

Figure A3.– Quadrangle names in the northwest quarter of the southern Great Basin.

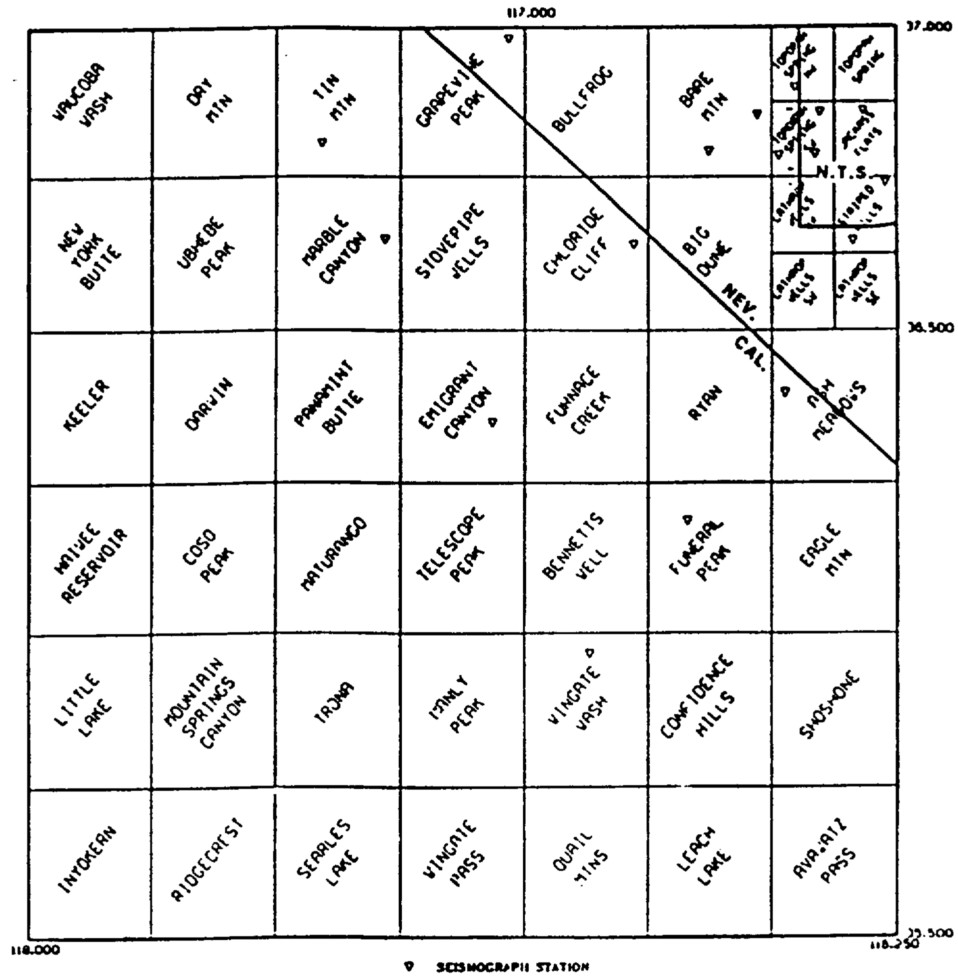

Figure A4.– Quadrangle names in the southwest quarter of the southern Great Basin.

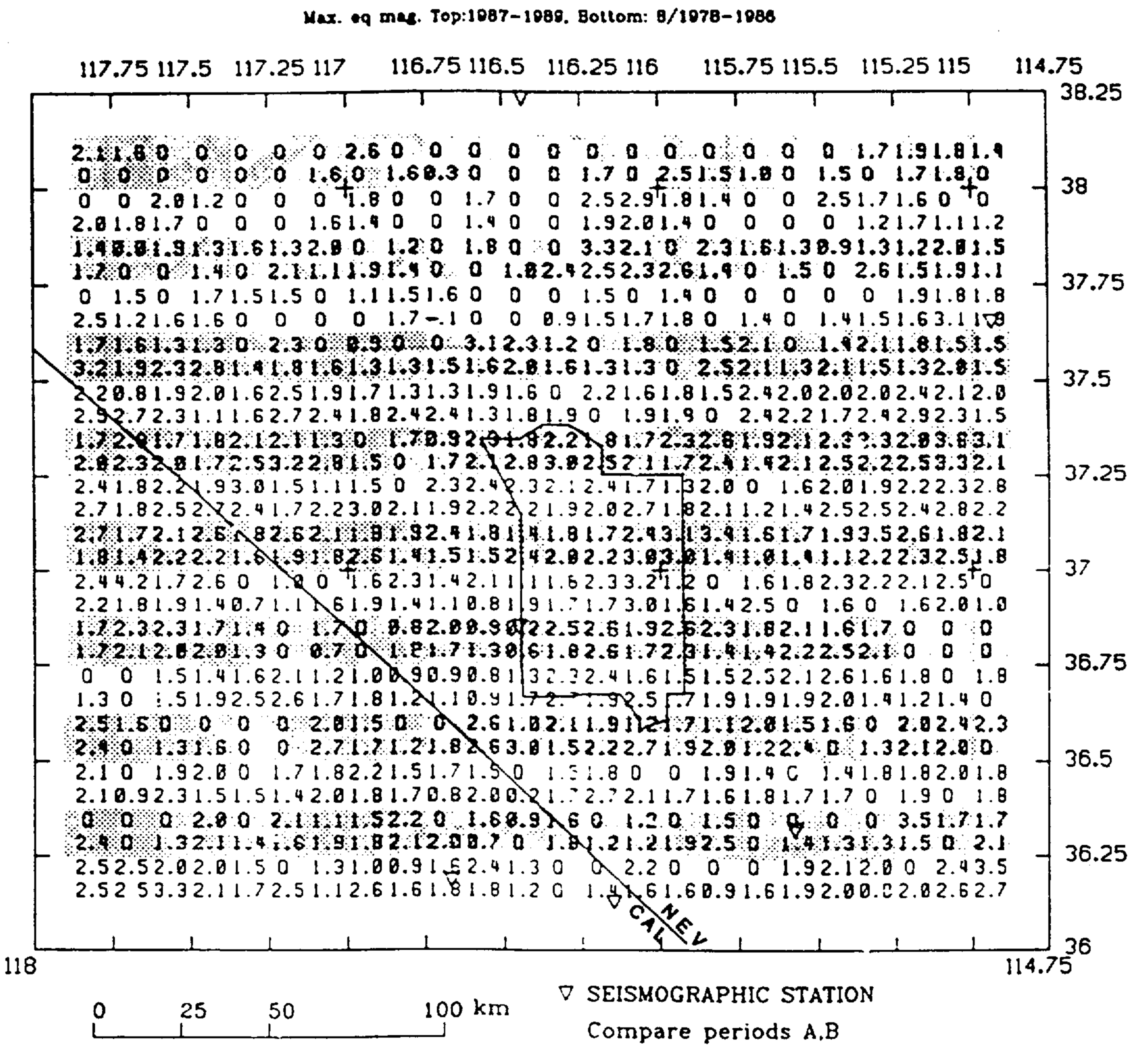

Figure A5.– Map tabulating maximum earthquake magnitude (M_L where available, otherwise M_D or M_{ca}) in each $7\frac{1}{2}'$ quadrangle within the ranges 114.875°W to 117.875°W and 36.125°N to 38.125°N recorded by the SGBSN. The *top* number is the maximum magnitude in the period 1987 through 1989, and the *bottom* number is the maximum magnitude in the period August, 1978 through December 1986. The letter "Q" (quiet) within a quadrangle means no earthquakes were monitored during that period by the SGBSN. The NTS boundary and part of the California-Nevada state border are shown. Alternate rows are shaded to aid in visual separation of information in adjacent quadrangles.

1987 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	1	1:27:48	37.289	114.837	1.7	11.91	3.9	233	BDI	1.80	1.81		1.79		23.0	0.12	9	GREGERSON BASIN
	1	4: 6: 5	36.806	115.987	0.3	0.32	0.4	176	ACS		0.72		0.94		15.3	0.10	23	FRENCHMAN FLAT
	1	13:26:38	37.540	115.760	0.2	4.32	1.1+	87	ACS		1.20	1.09	1.44		12.0	0.08	22	WHITE BLOTCH SPRINGS
	1	14:58:10	37.856	116.137	0.2	0.23	0.2	106	ACZ		1.57	1.09	1.55		20.4	0.06	15	REVEILLE PEAK
	2	13: 7:56	36.906	115.976	0.4	-0.65	0.4	156	ACI		0.94		1.10		7.5	0.11	13	PLUTONIUM VALLEY
	2	14:13:29	36.900	115.971	0.3	-0.16	0.4	128	ABI	1.60	1.30		1.25		8.2	0.11	20	PLUTONIUM VALLEY
	3	5: 7:29	37.854	116.140	0.2	3.92	8.8	105	CCI		1.68		1.53		20.5	0.04	9	REVEILLE PEAK
	3	7:40: 2	36.462	116.16[illegible]	0.2	10.64	0.2	64	AAI	1.72	1.16		1.35		5.8	0.07	32	AMARGOSA FLAT
	4	2:38: 5	36.464	116.159	0.4	10.64	0.5+	137	ACI		0.83	1.10	0.80		5.5	0.09	17	AMARGOSA FLAT
	5	19:48:18	35.671	116.478	0.9	11.69	3.0++	283	BDI	2.07	1.74	1.83	2.14		47.9	0.10	14	AVAWATZ PASS
	6	2:18:23	37.116	117.354	0.2	0.28	0.4	120	ACZ		0.97	0.85	1.04		13.0	0.11	20	UBEHEBE CRATER
	6	3:49:32	36.651	116.345	0.5	2.43	0.4	178	ACI		0.40		0.50		0.8	0.09	16	STRIPED HILLS
	6	12:20: 0	36.862	115.965	0.2	6.45	0.7	80	ABI	1.72	1.28	1.47	1.36		11.1	0.10	46	FRENCHMAN FLAT
	7	0:21: 8	37.651	114.878	0.2	5.22	0.4	146	ACI	1.59	1.20		1.43	1.7	5.2	0.05	12	PAHROC SPRING
	7	2:59:16	36.613	115.896	0.2	9.57	0.5	100	ABI	1.56	1.09		1.06		7.9	0.10	36	MERCURY SW
	8	7:24:37	37.346	117.234	0.3	0.17	0.2	71	ABS	2.10	1.65		1.72		5.4	0.09	20	SCOTTYS JUNCTION SW
	8	11:48: 3	37.140	116.289	0.2	6.88	0.5	85	ABI		0.95		0.67		8.7	0.09	26	AMMONIA TANKS
	8	17:24: 8	36.624	116.345	1.4	0.90	1.0	293	BDI	1.27	0.76		0.51		14.6	0.06	16	LATHROP WELLS SE
	9	7:39:17	37.857	116.143	0.3	8.25	2.6++	106	BCI		1.64		1.59		20.8	0.07	10	REVEILLE PEAK
	9	11:51:33	37.447	117.807	0.8	4.48	3.2	106	BBI		1.27	1.34	1.46		9.1	0.14	24	SOLDIER PASS
	9	22:47:36	37.833	114.737	1.2	3.07	2.6	250	BDS						25.2	0.08	12	THE BLUFFS
	10	6:10:17	37.874	116.130	0.4	7.49	5.5++	110	CCI	1.64	1.63		1.83		48.1	0.10	17	REVEILLE PEAK
	10	11:40:14	36.800	115.826	0.3	2.32	1.0	104	ACI	1.82	1.39	2.09	1.73		11.9	0.13	33	FRENCHMAN LAKE SE
	10	23:35:49	37.173	116.327	0.3	3.67	0.4	90	ABI		0.98	0.89	0.76		4.5	0.10	25	AMMONIA TANKS
	11	7:18:40	36.656	116.345	0.5	2.76	0.7	268	ADI		0.45		0.48	1.2	11.6	0.05	13	STRIPED HILLS
	11	7:31:17	37.406	114.682	0.7	5.11	1.4	216	ADS	2.57	2.40		2.86		22.7	0.06	12	SLIDY MTN
	12	3: 0: 2	36.705	115.771	0.3	1.71	0.6	159	ACI	1.68	1.36	1.22	1.35		3.7	0.09	32	MERCURY NE
	12	5:34:15	37.154	117.354	0.2	8.10	0.6	111	ACI		1.11	1.53	1.22		17.2	0.09	24	UBEHEBE CRATER
	12	20: 3:21	36.871	116.229	0.3	2.33	0.9	102	ABS		0.28		0.21		5.7	0.08	12	SKULL MTN
	13	0:42:57	37.157	117.401	0.1	0.00	0.2	111	ACZ	1.09	1.25	1.16	1.49		18.2	0.06	21	UBEHEBE CRATER
	13	1:15: 9	37.329	115.032	0.2	8.48	0.3++	177	ACI	2.85	2.93	3.77	2.79	3.0	8.8	0.10	40	ALAMO SE
	13	17:26:12	37.323	115.034	0.5	6.33	1.0	179	ACI		1.07		1.45		9.4	0.07	13	ALAMO SE
	16	0:53:22	37.376	115.084	0.8	5.87	0.5	160	ACI		1.15		1.11		4.5	0.06	9	ALAMO NE
	16	18: 8:27	37.215	117.316	0.3	7.69	0.8	87	ABI	1.54	1.46		1.60		10.8	0.10	21	UBEHEBE CRATER
	18	0: 6:49	37.859	116.137	0.2	-0.47	0.3	106	ACZ	1.98	1.83	1.96	1.83		20.6	0.08	18	REVEILLE PEAK
	18	15:12:35	37.855	116.113	0.2	0.07	0.4	107	ACZ		1.37	1.28	1.52		18.5	0.09	15	REVEILLE PEAK
	19	8:17:30	37.249	115.010	0.3	0.65	0.4	158	ACZ	2.04	1.89		2.32		17.9	0.08	22	LOWER PAHRANAGAT LAKE
	20	19:22:35	37.855	116.133	0.4	9.48	2.8	106	BCI		1.52		1.61		20.0	0.06	8	REVEILLE PEAK
	21	6:30:34	37.423	117.015	0.2	0.55	0.3	76	ACS	1.80	1.79		1.78		25.3	0.07	28	SCOTTYS JUNCTION NE
	21	9:32:50	36.464	116.163	0.2	10.05	0.3	62	AAI		1.13	1.78	1.06		5.9	0.09	40	AMARGOSA FLAT
	22	1:32: 2	36.975	116.124	0.3	2.14	0.7	182	ADI		0.56		0.41		7.8	0.06	20	YUCCA LAKE
	22	8:13:26	37.378	114.994	0.2	-0.05	0.2	174	ACI	1.74	1.54		1.67		5.9	0.07	17	DELAMAR NW
	22	10:39:13	37.188	117.390	0.1	-0.40	0.2	113	ACZ		0.96	1.06	0.96		17.2	0.06	21	UBEHEBE CRATER
	22	13:48: 2	37.376	114.991	0.5	-0.47	0.4	176	ACI	1.90	1.83	1.91	2.10		6.3	0.13	16	DELAMAR NW

1987 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 22	23:19:14	37.110	117.914	0.6	5.40	6.0	223	CDI	2.04	1.81	1.47	2.21	2.1	27.4	0.12	20	WAUCOBA SPRING
23	13:58:11	37.192	117.621	0.3	10.55	0.6	160	ACI		1.23	1.13	1.48		5.0	0.10	22	LAST CHANCE RANGE
23	18:24:17	36.459	116.162	0.2	11.11	0.4	77	AAI	1.93	1.40		1.80		5.6	0.08	30	AMARGOSA FLAT
23	21: 6:38	36.460	116.159	0.2	11.12	0.3+	77	AAI	1.66	1.26		1.22		5.3	0.11	38	AMARGOSA FLAT
24	14:59:17	37.379	114.997	0.3	-0.15	0.2	173	ACI		1.55	1.54	1.69		5.7	0.09	13	DELAMAR NW
25	4:23:43	37.699	115.060	0.3	6.95	1.5	112	ABI	1.64	1.42		1.85		12.6	0.09	14	HIKO NE
25	16:28: 3	37.696	115.060	0.3	5.89	1.3	112	ACI	1.34	1.19	1.66	1.32	1.7	11.9	0.08	14	HIKO NE
25	21:19: 2	37.501	116.363	0.2	0.84	0.3	130	ACZ	1.55	1.31		1.21		21.2	0.07	20	QUARTZITE MTN
26	11:48:51	36.699	116.220	0.2	6.39	0.4	86	ABI		0.55	0.98	0.40		6.7	0.08	27	SPECTER RANGE NW
26	12:37:11	37.855	116.138	0.2	0.50	0.4	186	ACZ		1.66	1.79	1.80		20.4	0.07	14	REVEILLE PEAK
26	18: 3: 4	37.225	115.110	0.5	5.99	1.4	189	ADI		1.57	1.81	1.65		9.3	0.09	18	LOWER PAHRANAGAT LAKE
26	19:11: 7	36.648	116.267	0.2	5.51	0.6	66	ABI	1.75	1.28		1.54	1.5	6.5	0.10	33	STRIPED HILLS
27	4:19: 2	37.143	116.289	0.2	7.68	0.3	63	ABI	1.62	1.23	1.26	1.30		8.5	0.09	47	AMMONIA TANKS
27	6:49:26	36.649	116.267	0.2	5.54	0.7	66	ABI	1.56	1.17		1.13		6.5	0.09	26	STRIPED HILLS
28	17:11:18	37.739	114.858	0.3	5.87	1.1	194	ADI	1.92	1.67	2.43	2.26		11.9	0.07	15	PAHROC SPRING NE
28	20:39:19	37.350	117.880	0.5	7.00	1.1+	199	ADI	1.45	1.41	1.43	1.51		8.6	0.10	17	SOLDIER PASS
29	9:42:13	37.419	117.764	——	29.92	——	120	CDA		1.64				12.7	0.48	4	SOLDIER PASS
29	15:59:49	36.605	116.388	0.9	2.78	0.7	228	ADI				0.65		6.3	0.06	7	LATHROP WELLS SW
29	16:48: 5	36.587	116.245	0.2	-0.99	0.3	82	ACZ	1.39	1.24	1.46	1.10		10.6	0.09	34	SPECTER RANGE SW
29	16:49:14	36.589	116.251	0.5	-1.86	0.3	167	ACZ		1.01		1.07		10.1	0.08	16	LATHROP WELLS SE
30	1:14:36	37.319	117.535	0.3	4.11	2.1	84	BCI		1.00	0.78	0.85		13.8	0.10	14	MAGRUDER MTN
30	3:23:23	36.583	116.258	0.3	-1.04	0.3	174	ACI	1.40	1.07		0.93		10.1	0.08	22	LATHROP WELLS SE
30	9:34:47	37.702	114.155	7.6	0.83*	——	324	DDA		1.86				52.5	0.09	6	***QUAD. NOT LISTED***
30	20: 3:35	36.650	116.288	0.2	5.17	0.3	66	AAI	1.59	1.16		1.14	1.6	4.7	0.08	33	STRIPED HILLS
31	9:15:40	37.888	116.118	0.7	-1.50	1.3	113	ACZ		1.71		1.60		21.3	0.11	9	REVEILLE PEAK
FEB 1	6: 3:43	36.790	116.256	0.3	-0.46	0.4	70	ABI	1.57	0.91		0.99		9.8	0.12	23	JACKASS FLATS
1	18:54:22	37.510	116.541	0.2	11.47	0.9++	74	ACI		1.11		1.40		23.1	0.08	21	MELLAN
3	21:57:37	36.436	117.508	0.7	2.10	2.3	240	BDI		1.47		1.40		31.1	0.10	19	DARWIN
4	13:24:52	37.144	116.293	0.2	8.63	0.4	80	AAI	1.58	1.17		1.30		8.3	0.09	29	AMMONIA TANKS
5	0:25:56	36.556	116.255	0.2	0.51	0.3	95	ACZ	1.69	1.14		1.10		12.5	0.09	27	LATHROP WELLS SE
5	7:58:43	37.147	116.273	0.6	8.87	0.4	193	ADI		0.99		0.71		8.7	0.07	18	AMMONIA TANKS
6	6:17:24	37.275	116.418	0.7	15.05	0.8	213	ADI	1.35	1.43		1.17		10.7	0.11	17	SILENT BUTTE
6	16: 6:23	37.215	117.603	0.5	5.45	0.7	160	ACI		0.87		1.09		4.3	0.09	11	LAST CHANCE RANGE
6	16:15:32	37.218	114.879	0.9	10.98	1.9	243	ADI	1.57	1.12	1.80	1.81		26.0	0.08	8	DELAMAR 3 NW
6	20: 5:11	37.346	117.241	0.3	-0.35	0.3	71	ABI	1.73	1.69		1.79		5.2	0.11	22	SCOTTYS JUNCTION SW
6	20:46:30	37.347	117.240	0.4	-0.39	0.3	134	ABI		1.11		1.20		5.3	0.10	13	SCOTTYS JUNCTION SW
7	8:12:24	37.517	116.541	0.2	10.36	0.7	53	ACI	1.67	1.33		1.53		22.6	0.08	26	MELLAN
7	11:48:38	37.872	116.126	0.7	0.00	1.1	110	BCI	1.28	1.78		1.62		20.5	0.17	12	REVEILLE PEAK
7	16: 4:53	36.893	116.449	0.3	7.03	0.4	118	ABZ				1.10		0.8	0.04	10	TOPOPAH SPRING NW
8	1: 9:25	36.716	116.060	0.4	-0.78	0.5	128	ACT				0.61		10.7	0.11	14	CAMP DESERT ROCK
8	5:36:48	36.409	116.998	0.4	1.93	1.0	94	ABI	2.04	1.42		1.57		9.0	0.11	22	FURNACE CREEK
8	6:50:16	37.345	117.239	0.4	-0.20	0.3	134	ABI		1.31		1.39		5.1	0.11	17	SCOTTYS JUNCTION SW
8	10:44:22	36.806	115.860	0.5	4.74	2.5	153	BCI		0.95		1.16		13.2	0.11	19	FRENCHMAN LAKE SE
9	5:17:48	37.338	117.244	0.4	0.59	0.2	101	ABI	1.21	1.29		1.32		4.3	0.09	16	SCOTTYS JUNCTION SW

1987 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 9	7:56:28	37.854	116.139	0.4	0.34	0.7	105	ACI		1.44		1.52		20.3	0.10	10	REVEILLE PEAK
9	11: 9:22	37.864	116.138	0.5	0.55	0.8	107	ACI		1.43		1.51		20.9	0.15	16	REVEILLE PEAK
9	18: 7:56	36.806	115.862	0.4	-0.85	0.5	177	ACZ		0.93		1.13		13.2	0.12	23	FRENCHMAN LAKE SE
9	18:15:51	36.815	115.834	1.0	7.38	2.3+	192	BDI		0.91		1.12		13.6	0.15	18	FRENCHMAN LAKE SE
10	0:43:32	36.569	114.852	1.1	6.98	1.7	242	BDI	2.09	1.81		2.18		28.5	0.15	20	ARROW CANYON
10	6:49: 3	37.163	117.354	0.2	9.07	0.6	109	ABI		1.05	1.16	1.10		17.5	0.08	17	UBEHEBE CRATER
10	6:49:55	36.571	114.865	1.0	7.92	1.1	257	BDI	2.28	1.94		2.18	2.5	27.4	0.14	23	ARROW CANYON
10	23: 1:15	37.192	115.871	0.3	0.68	0.2	198	ADI		1.30		1.32		13.0	0.04	14	PAPOOSE LAKE NE
11	13:34:13	36.604	115.9[illegible]7	0.2	16.77	0.6	80	ABI	1.71	1.29		1.45		16.0	0.07	23	CHLORIDE CLIFF
12	1: 0:34	37.229	116.445	0.7	-1.23	0.7	233	ADZ	2.12			1.24		26.5	0.08	16	SCRUGHAM PEAK
13	0:36: 1	37.878	116.121	0.4	0.26	0.6	111	ACS		1.78		1.74		20.7	0.08	12	REVEILLE PEAK
14	7:52:51	36.840	116.267	0.3	8.85	0.5	139	ACI	1.20	0.79		0.88		5.1	0.07	15	JACKASS FLATS
14	19:18:50	37.874	116.127	0.4	-0.68	0.6	113	ACS		1.63		1.75		20.8	0.07	9	REVEILLE PEAK
15	15:36:16	36.836	116.273	0.3	8.78	0.5	75	AAI		0.70		0.67		4.9	0.10	21	JACKASS FLATS
15	18:28:37	36.463	115.743	0.3	0.27	0.4	101	ACZ	1.78	1.24	1.18	1.45		21.2	0.09	18	CHARLESTON PEAK
15	19: 5:52	36.475	115.728	0.4	6.73	1.8	161	ACZ		0.97	1.11	1.40		21.3	0.07	14	CHARLESTON PEAK
16	21:51:34	36.609	116.257	0.2	7.27	0.6	79	ABI	1.57	1.15	1.28	1.25	1.0	8.4	0.06	23	LATHROP WELLS SE
17	18:50:51	36.866	115.963	0.4	6.18	1.2	192	ADI	1.64	1.12		1.28		10.9	0.11	25	FRENCHMAN FLAT
17	22:32:12	37.185	117.914	0.6	-0.70	0.5+	225	ADS	2.13	1.75		2.01		24.3	0.11	21	WAUCOBA SPRING
18	8:42:31	37.187	117.909	0.7	-0.88	0.7	227	ADZ	1.78	1.47		1.65		23.8	0.10	14	WAUCOBA SPRING
18	14: 6: 2	36.984	116.160	0.2	-1.53	0.3	98	ABT	1.93	1.58		1.74		8.4	0.11	30	MINE MTN
18	17:44:37	37.248	115.030	0.5	6.98	1.7++	205	ADI	2.06	1.87		1.88		16.5	0.07	12	LOWER PAHRANAGAT LAKE
18	22:12:44	37.282	115.223	0.2	6.84	1.2	116	ABI	1.65	1.48		1.77		13.0	0.05	13	ALAMO
19	4: 0:24	37.282	115.222	0.3	7.00	1.4	116	ABI		1.41	1.82	1.67		13.0	0.07	13	ALAMO
19	9:58:33	36.763	116.279	0.5	10.10	1.2	120	ABI				0.26		2.3	0.08	10	JACKASS FLATS
20	5: 2:33	37.108	116.446	0.6	7.21	0.5	277	ADI				1.10		9.6	0.08	18	TIMBER MTN
20	5: 2:39	37.107	116.446	0.8	6.77	0.8	286	ADI	1.55	1.09		1.30		9.6	0.10	13	TIMBER MTN
21	15:30:26	37.222	116.454	0.4	4.73	1.5	71	ACI	1.41			1.04		11.5	0.13	22	SCRUGHAM PEAK
22	17: 6:35	37.395	117.227	0.2	-0.34	0.3	125	ACS		1.22	1.08	1.11		10.8	0.07	21	STONEWALL PASS
22	21:33:29	38.221	115.909	0.2	7.88	1.4++	205	ADI	1.85	1.86		2.16		38.4	0.04	13	QUINN CANYON RANGE
23	0:53:23	37.243	116.445	0.7	8.86	0.9+	211	ADI				1.38		11.3	0.07	15	SCRUGHAM PEAK
23	4:50:50	36.442	116.557	0.3	-0.90	0.5+	123	ABI	1.58	1.41		1.35		8.8	0.10	19	RYAN
24	22:21:13	36.822	116.226	0.3	4.21	0.9++	72	ABI	1.59	1.10		1.32	1.6	6.3	0.12	28	SKULL MTN
25	2:40:46	36.758	116.671	0.4	-0.23	0.3	124	ABI	1.39	1.29		1.06		5.8	0.11	20	BARE MTN
25	10:24:37	37.407	117.213	0.2	0.09	0.3	129	ACI		1.28		1.45		12.4	0.08	25	STONEWALL PASS
26	1:29:37	37.867	116.136	0.4	0.55	0.7	108	ACI	1.92	1.65		1.87		21.0	0.14	15	REVEILLE PEAK
27	12: 8:30	37.346	117.241	0.3	-0.11	0.2	114	ABI		1.04		1.16		5.3	0.09	18	SCOTTYS JUNCTION SW
27	12:11:52	37.343	117.247	0.4	0.20	0.3	113	ABI		1.15		1.03		4.8	0.10	17	SCOTTYS JUNCTION SW
27	15:56:52	37.341	117.248	0.3	0.42	0.2	132	ABI		1.22		1.26		4.5	0.09	18	SCOTTYS JUNCTION SW
28	0:18:27	37.864	116.140	0.6	2.35	4.1	107	BCI	2.07	1.67		1.62	2.0	21.0	0.17	15	REVEILLE PEAK
28	0:22:47	37.869	116.133	0.5	0.24	0.7	109	ACS	2.34	1.64		1.63	1.7	20.9	0.14	15	REVEILLE PEAK
28	14:29:15	37.195	117.897	0.5	-1.99	0.5+	244	ADS	2.20	2.01		2.14	2.1	22.7	0.07	22	WAUCOBA SPRING
MAR 3	8:10:21	36.584	116.990	0.2	10.44	0.7	99	ABI				0.95		19.4	0.08	22	CHLORIDE CLIFF
3	8:14:37	36.401	116.969	0.3	11.85	0.5	119	ABI		1.13		1.12		10.5	0.09	22	FURNACE CREEK

1987 LOCAL HYPOCENTER SUMMARY - SGB EARTHQUAKES

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MAR 3	16:10:51	37.860	116.137	0.3	6.15	3.6+	107	BCI		1.26		1.45		20.6	0.04	8	REVEILLE PEAK
4	10:19:20	36.736	116.256	0.3	6.74	0.3	124	ABI	1.38	0.78		0.51		1.6	0.10	21	STRIPED HILLS
4	19:51:22	36.702	116.110	0.3	10.40	0.7	109	ABI	1.38	0.99		0.99		14.0	0.09	23	CAMP DESERT ROCK
4	23:26:55	36.604	116.957	0.2	10.80	0.9	80	ABI	1.94	1.20	1.15	1.39	1.9	16.0	0.11	28	CHLORIDE CLIFF
5	0:34:30	37.168	116.413	0.2	-0.40	0.1	92	ABI	2.35			2.11		9.4	0.06	21	SCRUGHAM PEAK
5	0:41:17	36.604	116.956	0.2	9.35	0.7	81	ABI	1.80	1.60		1.28		15.9	0.09	19	CHLORIDE CLIFF
5	20:23:53	37.194	117.897	1.1	-1.68	1.2	223	BDS		1.25		1.54		22.6	0.09	9	WAUCOBA SPRING
6	1:38:13	37.840	116.502	1.9	10.65	2.4	173	BCI				1.77		15.2	0.21	8	STINKING SPRING
6	2:26:42	36.694	116.293	0.2	8.34	0.3	83	AAI		0.92		0.67		5.7	0.06	21	STRIPED HILLS
7	2:38: 2	37.866	116.130	0.4	-0.76	0.7	108	ACS	1.91	1.76	1.80	2.00		20.5	0.14	18	REVEILLE PEAK
7	17:59:59	36.487	116.304	0.2	6.96	0.8	76	ACI	1.82	1.39	1.27	1.47	1.5	17.8	0.07	28	ASH MEADOWS
7	18: 0:59	36.471	116.328	0.4	6.34	2.2++	194	BDI						19.3	0.06	13	ASH MEADOWS
8	2:27:53	36.461	116.195	0.7	4.39	3.1	184	BDI						8.4	0.05	12	AMARGOSA FLAT
8	13: 9:14	36.462	116.190	0.8	5.34	2.5	182	BDI						8.0	0.08	14	AMARGOSA FLAT
9	14:58:49	37.346	117.235	0.4	-0.16	0.3	78	ABI	1.23	1.35		1.35		5.4	0.11	17	SCOTTYS JUNCTION SW
9	21:30:52	36.736	117.413	0.7	1.97	0.9	186	ADZ		1.34		1.39		7.7	0.13	21	MARBLE CANYON
10	12:51: 2	36.841	116.509	0.3	3.32	0.5	83	AAI		0.64		0.40		2.4	0.07	15	BARE MTN
11	0:23:56	37.203	116.438	0.2	0.50	0.7	66	ACI	2.12	1.78	2.29	1.72		10.3	0.07	23	SCRUGHAM PEAK
11	0:25: 1	37.199	116.438	0.2	-0.54	1.0	76	ACZ	2.02	1.78	1.72	1.45	1.6	10.2	0.05	17	SCRUGHAM PEAK
11	0:57: 0	37.158	116.272	0.3	2.61	0.7+	115	ABS	1.39	1.15		1.01	1.1	7.8	0.09	20	AMMONIA TANKS
13	17:34:45	37.861	116.132	0.4	0.36	0.5+	107	ACI	1.73	1.56		1.83		20.3	0.12	13	REVEILLE PEAK
14	22:45:46	37.074	117.220	0.3	5.95	1.5	128	ACS		1.15	1.03	1.15		14.0	0.08	13	BONNIE CLAIRE SW
14	23:24: 1	36.733	115.857	0.3	2.07	0.6	130	ABI		1.00		0.96		6.0	0.08	20	MERCURY NE
16	15:23:37	37.841	116.139	0.3	6.35	3.6	103	BCI	1.57	1.43		1.66		19.7	0.07	9	REVEILLE PEAK
16	18:33:17	37.397	117.630	0.7	-1.56	0.5	214	ADZ		1.16		0.84		18.3	0.05	7	MAGRUDER MTN
18	0:33:26	36.645	116.383	0.3	0.29	0.2	111	ABI	1.52	1.19		0.86		3.9	0.11	27	LATHROP WELLS NW
18	1:19:57	37.867	116.135	0.4	-0.54	0.6	108	ACI	1.66	1.59		1.79		20.9	0.12	16	REVEILLE PEAK
18	5:45:60	37.007	117.156	0.3	7.00	1.7++	88	ACI		1.12		1.32		17.0	0.09	19	BONNIE CLAIRE SW
19	6:19:48	37.857	116.135	0.6	0.73	0.9	106	ACZ	1.86	1.42		1.58		20.3	0.15	10	REVEILLE PEAK
19	16:56:34	36.016	116.084	0.6	7.47	0.8	237	ADI	2.08			2.15		13.9	0.09	16	STEWART VALLEY
21	12:12:32	37.873	116.139	0.6	0.10	1.1	109	BCS		1.40		1.47		21.6	0.18	14	REVEILLE PEAK
21	19: 5:31	37.271	114.828	1.0	3.21*	——	263	CDZ				2.50	2.6	24.9	0.08	10	GREGERSON BASIN
22	16:49:20	37.150	117.718	0.4	-0.04	0.4	186	ADI	1.62			1.81		11.2	0.09	15	LAST CHANCE RANGE
22	17: 7: 9	36.809	116.000	0.3	-0.21	0.5	147	ACS				1.43		14.5	0.09	10	CANE SPRING
22	17:17:54	37.156	117.718	0.5	-0.41	0.5	186	ADS				1.51		10.6	0.08	11	LAST CHANCE RANGE
23	4:20: 8	37.866	116.133	0.5	0.00	0.8	108	ACI		1.58		1.73		20.7	0.14	12	REVEILLE PEAK
24	4: 7:17	37.869	116.133	0.4	0.14	0.7	109	ACS	1.75	1.60		1.69		20.9	0.14	17	REVEILLE PEAK
24	12:41:12	36.798	117.519	0.6	6.62	1.1	206	ADI		1.12		1.35		10.2	0.12	16	DRY MTN
25	1:38:41	37.200	116.437	0.2	1.59	0.8+	45	ACS				1.89		10.2	0.08	23	SCRUGHAM PEAK
25	11:43:12	36.803	115.995	0.2	0.64	0.2++	189	ADI				0.79		15.3	0.05	13	FRENCHMAN FLAT
25	20:12:42	37.280	114.818	1.2	4.27*	——	293	CDI		1.22	2.01	1.44		24.9	0.08	8	GREGERSON BASIN
26	16:57:56	36.812	115.981	0.3	6.01	1.0+	178	ACI		0.46		1.06		14.9	0.10	16	FRENCHMAN FLAT
26	18:36:38	37.560	115.321	0.3	2.38	1.1	112	ACI		1.23		1.30	1.6	13.6	0.06	10	MT IRISH
28	2': 4:51	37.007	116.210	0.6	2.99	0.6	129	ABZ				0.38		3.8	0.13	14	TIPPIPAH SPRING

60

1987 LOCAL HYPOCENTER SUMMARY - SGB EARTHQUAKES

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MAR	30	3:22:14	36.693	116.291	0.2	7.64	0.3	70	AAI	1.62	0.93		1.23		5.7	0.09	32	STRIPED HILLS
	30	19:53:53	37.214	117.912	0.6	-1.15	0.6	219	ADS	1.79	1.84	1,69			23.5	0.09	17	WAUCOBA SPRING
	31	19:57:24	37.858	116.124	0.3	2.37	2.2	185	BDI		1.70		2.13		41.6	0.11	17	REVEILLE PEAK
APR	1	1: 1: 7	37.875	116.126	0.7	-0.42	1.1	110	BCS		1.49		1.46		20.8	0.15	11	REVEILLE PEAK
	1	9:38:15	36.278	116.312	0.2	-0.12	0.4	96	ACZ	1.52	1.28		1.63		19.8	0.08	17	ASH MEADOWS
	1	13:42:38	37.872	116.132	0.6	0.52	1.0	109	BCI		1.38		1.38		21.0	0.15	10	REVEILLE PEAK
	1	15:46:22	37.164	117.353	0.2	7.65	0.7++	108	ACI	1.54	1.44		1.59		17.4	0.08	23	UBEHEBE CRATER
	1	17:42:23	36.572	116.189	0.3	11.12	0.7	148	ACI		0.80		0.76		15.7	0.07	13	SPECTER RANGE SW
	1	18:29:46	36.860	116.295	0.4	-0.31	0.4	78	AAI		0.61		0.54		1.9	0.08	13	JACKASS FLATS
	1	21:43:25	37.091	116.310	0.2	9.15	0.4	62	ABI	1.92	1.54		1.77	2.1	9.2	0.10	43	BUCKBOARD MESA
	2	4: 7:33	37.155	117.477	8.9	3.10•	——	300	DDA		1.07				20.8	0.09	6	UBEHEBE CRATER
	2	10: 5: 7	37.433	118.123	5.7	-1.02	10.6	294	DDA		1.57				71.6	0.17	10	•••QUAD. NOT LISTED•••
	2	12:15:19	36.778	116.279	0.8	6.01	1.3	223	ADA		0.90				10.1	0.06	7	JACKASS FLATS
	2	14:17:30	37.464	118.105	8.6	7.60	3.1	292	DDA		1.64				68.8	0.17	10	•••QUAD. NOT LISTED•••
	2	23:17:14	36.576	116.189	0.2	11.09	0.6	146	ACI		0.80		0.80		15.5	0.07	16	SPECTER RANGE SW
	2	23:27:25	37.034	116.219	0.3	5.46	0.5	110	ABI	1.36	1.10		1.19		1.0	0.08	20	TIPPIPAH SPRING
	4	7:44:14	36.778	116.279	0.2	-0.32	0.2	72	AAI	1.21	0.73		0.47		4.0	0.09	26	JACKASS FLATS
	4	20:22:33	36.436	117.005	0.4	10.08	0.8	104	ABI				1.17		11.1	0.10	15	EMIGRANT CANYON
	5	18: 2:27	37.436	115.579	0.3	6.12	1.6++	102	ACI		1.31		1.65		19.8	0.09	18	GROOM RANGE NE
	6	4: 1:36	37.040	115.154	0.6	6.15	0.9	252	ADI		1.25	1.70	1.36		14.6	0.04	11	LOWER PAHRANAGAT LAKE SW
	7	6: 1:25	36.813	115.952	0.4	6.67	0.8	218	ADI		0.79		0.85		16.0	0.05	14	FRENCHMAN FLAT
	7	8:56:54	36.754	115.539	0.3	2.95	1.4	151	ACZ		1.27		1.63		25.2	0.07	14	TIM SPRING
	7	20:30:13	37.882	116.138	1.7	2.22•	——	111	CCA		1.49				47.0	0.28	9	REVEILLE PEAK
	8	6:36:49	37.871	116.134	0.7	5.00•	——	109	CCA		1.33				48.2	0.24	10	REVEILLE PEAK
	8	15:12:41	37.314	117.546	0.4	8.24	0.8	85	ABI	1.16	1.23		1.16		12.7	0.08	11	MAGRUDER MTN
	8	18:22:35	36.908	117.461	0.3	8.75	0.6	169	ACI	1.99	1.64		1.90		12.5	0.08	26	TIN MTN
	8	18:23:22	36.908	117.455	0.3	8.97	0.7	167	ACI		1.33		1.73		12.3	0.08	17	TIN MTN
	8	19:40:12	36.909	117.460	0.4	7.62	0.7+	168	ACS				1.37		12.6	0.08	15	TIN MTN
	8	19:40:19	36.910	117.467	0.3	7.84	0.4	171	ACS	2.25	1.99		2.59		12.9	0.08	28	TIN MTN
	8	20: 2:38	36.909	117.462	0.3	8.96	0.6	169	ACI	1.72	1.63	1.88	1.82		12.6	0.08	24	TIN MTN
	8	20:12:59	36.907	117.461	0.3	9.75	0.6	169	ACI	2.05	1.64		1.85		12.4	0.08	21	TIN MTN
	8	20:13:55	36.908	117.465	0.3	7.93	0.8	171	ACI		1.37		1.69		12.7	0.07	18	TIN MTN
	8	20:19:46	36.906	117.464	0.3	9.19	0.6	171	ACI	1.65		1.86	1.78		12.4	0.08	24	TIN MTN
	8	20:20:12	36.910	117.449	0.3	7.90	0.8	172	ACS			1.60	1.82		12.3	0.04	9	TIN MTN
	8	20:36: 2	36.910	117.461	0.4	8.91	0.8	168	ACI		1.28		1.60		12.6	0.09	14	TIN MTN
	9	0: 2:14	36.909	117.456	0.3	8.70	0.6	166	ACI	1.28	1.31		1.63		12.5	0.08	19	TIN MTN
	9	2:45:15	35.950	117.043	0.4	0.63	0.3++	260	ADI		1.47		1.75		15.9	0.02	10	MANLY PEAK
	9	14:33:12	36.950	117.462	0.5	0.34	0.7	161	ACZ		1.15		1.41		11.6	0.10	12	TIN MTN
	9	18:19:53	37.868	116.132	0.6	-0.49	1.0	109	BCI	1.48	1.55		1.72	1.7	20.7	0.16	11	REVEILLE PEAK
	10	8:49:33	37.139	117.824	0.7	9.23	1.6+	212	ADI		1.40		1.59		18.8	0.11	14	WAUCOBA SPRING
	10	12:35:24	37.870	116.131	0.5	-0.17	0.8	109	ACS	1.89	1.58		1.81		20.7	0.13	12	REVEILLE PEAK
	10	22:52:12	36.857	116.730	0.2	0.48	0.3	120	ACZ	1.22	0.88		0.47		11.4	0.07	16	BARE MTN
	11	3: 7: 1	36.623	116.092	0.2	-1.59	0.4	111	ACS	1.42	1.21	1.02	1.26		12.4	0.08	19	SPECTER RANGE SE
	11	3:12:50	36.621	116.095	0.3	-0.77	0.5	110	ACI		0.88		0.96		12.7	0.09	17	SPECTER RANGE SE

1987 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 11	19:30:59	36.953	117.454	0.5	4.54	2.9+	158	BCI	1.51	1.44	1.66	1.70		10.9	0.14	17	TIN MTN
13	12: 0:59	36.561	116.252	0.3	-0.05	0.3	185	ADZ				0.72		12.2	0.06	16	LATHROP WELLS SE
14	15:20:17	36.289	116.986	0.3	0.17	0.5	150	ACI	1.73	1.58		1.50		9.8	0.10	20	FURNACE CREEK
15	18:33:22	37.466	117.255	0.5	1.39	1.9	146	ACI		1.25	1.00	1.06		18.3	0.13	14	MOUNT JACKSON
15	19:56:12	37.463	117.260	0.4	-0.33	0.6	132	ACZ			1.04	1.13		18.0	0.10	12	MOUNT JACKSON
16	2: 5:45	37.861	116.134	0.6	0.70	0.6	188	ADI	1.89	1.53		1.63		20.5	0.13	15	REVEILLE PEAK
16	5:50:42	37.385	114.967	0.4	0.62	0.5	179	ACT		1.09		1.18		7.8	0.07	9	DELAMAR NW
18	1:48:47	37.869	116.130	0.4	0.47	0.7	109	ACI	1.88	1.55		1.63	1.8	20.7	0.11	13	REVEILLE PEAK
18	4: 1:43	37.870	116.131	0.2	0.20	0.4	109	ACI	1.77	1.75		1.83		20.8	0.09	20	REVEILLE PEAK
18	23:25:18	37.249	116.511	0.4	-0.55•	——	63	CCA		2.21				12.3	0.17	24	THIRSTY CANYON NE
19	0:13:55	37.519	115.631	——	6.22	——	253	ADA		2.13				97.9	0.01	4	TEMPIUTE MTN
19	5:55:54	37.121	117.871	5.5	6.71	2.9	260	DDA		1.84				77.4	0.17	7	WAUCOBA SPRING
20	11:24:34	36.589	116.243	0.2	-0.90	0.4	81	ACI	1.91			1.90		10.7	0.09	28	SPECTER RANGE SW
20	12:47:22	37.256	116.516	0.2	-1.98	0.3	47	ACZ	2.27	2.23		2.26		11.7	0.08	30	TRAIL RIDGE
20	18: 7:22	37.432	115.239	0.5	7.98	2.8+	86	BCI	2.37			2.40		16.9	0.10	13	ASH SPRINGS
20	18:21:21	37.432	115.237	0.4	8.42	2.0	110	BBI		1.50	1.62	1.43		16.7	0.11	11	ASH SPRINGS
21	5:21: 5	36.586	116.251	0.2	-0.67	0.5	169	ACI		0.96		1.08		10.3	0.07	20	LATHROP WELLS SE
21	12:23:41	37.686	115.157	0.3	0.94	0.5	102	ACI	1.34	1.21	1.71	1.38		10.8	0.08	12	FOSSIL PEAK
21	13:18:40	37.004	117.577	0.6	2.70	2.8	182	BDI		:.39	1.52	1.48		20.6	0.12	14	LAST CHANCE RANGE
23	0: 6:18	37.869	116.133	0.2	0.21	0.3	109	ACI	2.12	2.18	2.22	2.88	2.5	20.9	0.08	29	REVEILLE PEAK
23	4:44:48	37.863	116.138	0.6	0.71	1.0	107	ACI	1.53	1.34		1.63		20.9	0.14	11	REVEILLE PEAK
23	4:46: 7	37.009	117.564	0.4	2.99	2.8	178	BCI	1.99	1.80		2.10		19.4	0.11	21	LAST CHANCE RANGE
23	9: 4:12	37.007	117.576	0.5	4.44	6.5	181	CDI		1.31		1.38	1.5	20.4	0.11	13	LAST CHANCE RANGE
23	10:15:22	37.870	116.131	0.2	1.23	0.9	109	ACS	1.91	1.69		1.84		20.8	0.07	18	REVEILLE PEAK
23	18:50:56	37.863	116.138	0.2	0.97	0.3	107	ACI				1.44		20.9	0.02	7	REVEILLE PEAK
24	1:33:43	37.861	116.136	0.4	0.32	0.6	107	ACI	2.00	1.82		2.03		20.6	0.13	20	REVEILLE PEAK
24	2:37:23	37.290	117.297	0.5	-0.28	0.4	81	AAI		1.25		1.11		3.7	0.10	11	GOLD POINT
24	10: 5:59	36.722	116.139	0.3	-0.07	0.5	123	ACI				0.56		12.2	0.09	15	SPECTER RANGE NW
26	7:29:58	37.861	116.134	0.3	0.07	0.5	107	ACI	1.84	1.63		1.94		20.4	0.11	20	REVEILLE PEAK
26	15:29:31	36.645	116.323	0.6	2.94	0.3	131	ABI		0.72		0.66		1.5	0.07	14	STRIPED HILLS
26	16:45:45	37.296	115.432	0.4	0.79	0.5	91	ACI				1.29	1.7	25.9	0.08	12	CUTLER RESERVOIR
27	5:20:42	37.551	117.463	0.3	0.91	0.5	124	ACI			1.32	1.05		12.7	0.07	11	MONTEZUMA PEAK SW
27	6:37:31	37.873	116.129	0.5	-0.12	0.9	110	BCI	1.56	1.37		1.63		20.9	0.15	15	REVEILLE PEAK
27	7:34:21	37.204	117.919	0.6	-1.48	0.6	225	ADS	1.87	1.85		2.03		24.4	0.08	17	WAUCOBA SPRING
29	11:54:18	36.823	116.302	0.3	4.33	0.7	90	AAI		0.52		0.57		4.7	0.09	16	JACKASS FLATS
29	12:49:42	36.751	115.537	0.2	2.65	2.1	95	BCI	1.86	1.28		1.74		25.3	0.08	19	TIM SPRING
29	14:39: 0	36.699	116.215	0.6	7.60	0.5	228	ADI				1.14		7.0	0.03	6	SPECTER RANGE NW
30	13:49:38	36.757	117.284	7.3	31.90	2.4	239	DDA		1.41				33.4	0.22	6	TIN MTN
MAY 1	2: 6:31	37.259	116.388	0.6	9.90	0.6	212	ADS		1.21	1.68	0.83		7.6	0.07	13	SILENT BUTTE
1	13:14: 9	37.314	114.858	0.6	2.53	2.0	223	ADS	1.76	1.67	1.93	2.01		19.9	0.06	10	GREGERSON BASIN
2	6:54:47	37.412	115.670	0.5	0.95	0.8	107	ACZ	1.22	1.36		1.66		12.6	0.11	14	BALD MTN
2	9:32: 2	37.379	115.329	0.2	6.58	2.6	100	BCI	1.73	1.58	1.87	1.74	2.5	24.8	0.07	16	HANCOCK SUMMIT
3	3:12: 1	37.858	116.137	0.6	5.29	6.8	106	CCI		1.60		1.78		20.5	0.12	8	REVEILLE PEAK
3	3:16: 4	37.863	116.136	0.4	0.78	0.7+	107	ACI	1.88	1.74		1.71		20.7	0.12	14	REVEILLE PEAK

1987 LOCAL HYPOCENTER SUMMARY - SGB EARTHQUAKES

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MAY 3	3:16:34	37.853	116.137	0.2	1.90	0.7	105	ACI		1.28		1.41		20.2	0.04	6	REVEILLE PEAK
4	21:43: 9	37.853	116.146	1.0	7.09	4.5++	118	BCI				1.49		20.8	0.06	6	REVEILLE PEAK
4	22:39:32	37.865	116.133	0.4	0.66	0.5	108	ACI		1.38		1.43		20.6	0.09	11	REVEILLE PEAK
5	10:36:12	36.700	116.274	0.2	0.96	0.4	65	AAI	1.63	1.16	2.42	1.29		4.7	0.09	27	STRIPED HILLS
5	21:16:30	36.540	117.057	0.3	11.13	0.6++	119	ABS						21.2	0.05	11	STOVEPIPE WELLS
7	5: 8:29	37.002	116.201	0.7	5.06	0.8	203	ADS				0.55		4.6	0.09	11	TIPPIPAH SPRING
7	20:31:40	37.358	117.283	0.4	2.38	0.8	162	ACI		1.05	0.90	1.16	1.2	6.8	0.07	15	GOLD POINT
8	11: 0:32	37.042	116.139	0.2	0.01	0.3	116	ABZ		1.23		0.63		8.1	0.06	22	TIPPIPAH SPRING
8	11:19: 2	36.706	116.564	0.2	7.54	0.6	140	ACI	1.14	0.76		0.75		11.2	0.07	21	BIG DUNE
8	13:11: 0	36.624	116.268	0.2	5.07	0.5	146	ACI		1.11		0.76		6.9	0.06	18	LATHROP WELLS SE
8	15:36:45	37.102	116.269	0.2	3.58	1.1	104	ABI	1.35	1.19		0.82		8.0	0.05	16	BUCKBOARD MESA
8	18: 5:54	37.455	115.425	0.2	6.00	1.7+	100	ACI	1.03	0.96		1.32		26.0	0.05	12	CRESCENT RESERVOIR
9	10:58: 3	37.253	115.011	0.6	4.73	3.1	197	BDI	1.68	1.77	1.64	2.10		17.4	0.13	15	ALAMO SE
9	11: 4:27	37.239	115.003	1.7	3.16•	—	237	CDI		1.60		1.59		46.3	0.19	10	LOWER PAHRANAGAT LAKE
9	22:18:54	36.980	116.159	0.2	-1.20	0.2	92	ABI	1.43	1.00		0.73		8.2	0.07	17	MINE MTN
10	7:17:27	37.384	117.132	0.2	0.43	0.3	82	ACZ		1.28	1.03	1.30		14.4	0.09	23	STONEWALL PASS
11	13: 1:19	37.863	116.131	0.4	1.34	1.6	108	ACS	1.80	1.58		1.74		20.4	0.12	14	REVEILLE PEAK
11	13:56:37	37.001	116.197	0.2	2.99	0.4+	85	AAI		1.12		0.51		5.0	0.06	15	TIPPIPAH SPRING
11	19:18:32	37.856	116.129	0.5	0.56	0.8	106	ACI	1.78	1.58		1.74		19.8	0.14	14	REVEILLE PEAK
12	8:28: 5	36.373	117.488	0.8	1.62	3.1	240	BDI				1.20		35.7	0.08	14	PANAMINT BUTTE
14	2:39: 7	37.270	117.865	0.6	7.03	1.8	206	ADI	1.52	1.34		1.48		17.6	0.10	14	SOLDIER PASS
15	7:53: 1	37.243	114.972	0.7	8.94	1.8	164	ACA		1.68				19.5	0.12	13	DELAMAR 3 NW
15	18:16:19	37.317	116.290	0.9	2.67•	—	204	CDS				1.62		32.4	0.07	13	DEAD HORSE FLAT
16	12: 3:44	37.133	116.261	0.4	7.39	1.0	253	ADS						11.0	0.03	8	AMMONIA TANKS
17	7:37: 0	37.226	116.949	0.2	11.76	0.7++	139	ACI	1.71	1.34		1.47	1.8	21.7	0.09	29	SPRINGDALE
17	13:16:17	37.277	116.113	0.4	-1.39	0.7	108	ACS	1.17	1.31		0.93		12.1	0.10	11	OAK SPRING BUTTE
18	7:57:39	37.111	117.238	0.3	8.11	1.5	124	ACI						21.2	0.06	12	BONNIE CLAIRE SW
18	7:57:39	37.115	117.243	0.7	10.78	1.2	146	ACA		2.56				20.7	0.11	10	BONNIE CLAIRE SW
19	19:41:59	36.781	116.093	1.2	5.76	1.6	295	BDZ				0.84		10.6	0.04	6	CANE SPRING
20	5:33:45	37.111	117.231	0.2	7.40	0.9	75	ACT		0.97	0.71	0.83		16.1	0.07	19	BONNIE CLAIRE SW
20	15:53:23	37.245	117.492	0.2	-0.06	0.4	110	ACZ		1.18	1.12	0.93		13.8	0.09	16	UBEHEBE CRATER
21	12:40:21	37.397	117.299	0.1	-0.07	0.2	114	ACI		0.92	1.11	0.96		11.3	0.05	20	MOUNT JACKSON
21	12:40:44	35.980	117.286	1.7	2.70	4.9	261	BDS	1.60	1.35		1.49		37.8	0.11	11	TRONA
21	23:15:53	37.686	116.662	0.2	9.42	2.4++	128	BCI		1.29		1.58		43.8	0.06	18	MELLAN
22	20: 2:55	37.337	115.174	0.1	7.77	0.5	129	ABI		1.16		1.42		13.4	0.02	9	ALAMO
23	5:14:15	37.517	114.583	0.9	4.55	3.6++	281	BDI	2.34	2.00		2.63	2.3	16.9	0.08	11	CALIENTE
24	19:52:59	36.774	116.166	0.2	5.52	0.4	144	ACI		1.14		0.53		8.9	0.05	14	SKULL MTN
25	22: 8:51	37.377	117.140	0.5	4.68	2.3	133	BCI		1.12	0.93	1.19		13.4	0.13	21	STONEWALL PASS
26	7: 2:30	36.955	117.522	0.3	5.56	1.8	192	ADI		1.13		1.55		16.4	0.05	9	DRY MTN
26	7:14:56	36.956	117.521	0.4	6.28	2.0	178	ACI		1.17		1.29		16.3	0.09	11	DRY MTN
26	7:39:43	36.957	117.519	0.4	4.45	3.2	177	BCI		1.16		1.39		16.0	0.09	14	DRY MTN
26	8:30:14	36.956	117.518	0.4	5.12	2.3	177	BCI		1.11		1.29		16.0	0.08	14	DRY MTN
27	0:55:13	37.855	116.136	0.5	0.43	0.8	106	ACS		1.41		1.66		20.2	0.14	13	REVEILLE PEAK
27	23: 2:16	37.398	115.061	0.5	2.48	0.4	153	ACI	1.69	1.80	1.81	1.84		1.3	0.10	12	ALAMO NE

1987 LOCAL HYPOCENTER SUMMARY – SGB EARTHQUAKES

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MAY 27	23:58:36	36.607	116.269	0.4	7.56	0.7	163	ACI	0.98	0.45	0.85	0.78		7.7	0.06	14	LATHROP WELLS SE
28	7:50:23	36.781	116.129	0.3	9.62	0.7	87	AAI		1.08		1.05		8.9	0.09	25	SKULL MTN
28	8:29:37	36.785	116.124	0.2	8.62	0.9	89	ABI	1.31	1.06		1.07	1.3	8.7	0.09	25	CANE SPRING
29	4: 9:15	37.856	116.138	0.5	0.52	0.9	106	ACI	1.68	1.53		1.63		20.4	0.11	12	REVEILLE PEAK
29	9:34:14	36.634	116.320	0.4	2.34	0.3	167	ACI		0.68		0.52	1.3	2.1	0.08	20	STRIPED HILLS
29	10: 3:34	36.634	116.321	0.2	1.90	0.4	63	AAI	1.50	1.17	1.14	1.15		2.1	0.09	31	STRIPED HILLS
30	6:15:41	36.436	117.075	0.6	13.42	0.9	147	BCI	1.46	1.15		1.52		9.7	0.15	23	EMIGRANT CANYON
30	22:32:20	37.227	116.620	0.1	9.76	0.3	68	AAI	1.60	1.26		1.34		7.4	0.06	29	THIRSTY CANYON NE
JUN 1	11: 3:35	36.894	116.466	0.2	4.94	0.3	151	ACZ	0.74	0.70		0.07		1.2	0.04	14	TOPOPAH SPRING NW
1	13:11:42	37.328	114.874	0.8	9.23	0.9	216	ADS	1.63	1.58		1.51		17.9	0.07	8	GREGERSON BASIN
3	4: 4:58	37.336	115.176	0.2	6.05	1.6	128	ACI		1.33		1.25		13.6	0.05	10	ALAMO
4	17: 7:16	37.380	117.139	0.2	-0.10	0.3	134	ACZ		1.17	0.83	0.94		13.8	0.05	14	STONEWALL PASS
5	13:45:18	37.383	117.142	0.1	0.25	0.2	134	ACI		1.18	1.12	1.10		13.7	0.06	20	STONEWALL PASS
6	20:50:22	37.238	114.914	0.5	7.20	2.2++	174	BCI	2.41	2.30		2.14		22.3	0.04	11	DELAMAR 3 NW
7	5: 1:52	37.264	115.137	0.4	0.03	0.6+	160	ACI	1.76	1.81	2.12	1.83		11.5	0.06	11	ALAMO
7	15:52:24	37.377	117.140	0.4	-0.51	0.4	197	ADI		1.07	0.90	1.00		13.5	0.07	15	STONEWALL PASS
7	18:25: 4	37.873	116.126	0.5	0.00	0.9	110	BCS	1.80	1.83		1.96		20.7	0.19	18	REVEILLE PEAK
7	22:13:55	37.582	116.377	0.2	1.73	0.9+	89	ACI	1.91	1.80	1.52	1.95	1.7	17.7	0.08	25	QUARTZITE MTN
8	11:18:58	37.389	117.134	0.2	0.28	0.3	131	ACI	1.28	1.21	1.24	1.07		14.7	0.07	16	STONEWALL PASS
9	4:17:31	37.372	117.146	0.3	-1.17	0.4	178	ACI			1.01	0.86		12.7	0.06	13	SCOTTYS JUNCTION SW
10	7:27: 1	37.378	117.141	0.2	-0.47	0.4	133	ACI		1.16	0.97	0.79		13.4	0.06	16	STONEWALL PASS
10	23: 5:52	37.265	116.387	1.2	8.42	1.7	217	BDI	1.79		2.19	1.36		7.9	0.05	10	SILENT BUTTE
11	2:53: 9	37.269	116.387	0.7	8.36	1.0	221	ADI	1.41	1.22	1.21	0.95		8.3	0.07	15	SILENT BUTTE
11	5:41:59	36.828	117.461	0.6	9.04	0.5	188	ADI		0.97		1.29		5.6	0.10	18	TIN MTN
11	5:50: 0	37.380	117.141	0.4	-0.65	0.5	180	ADI		1.04	0.98	0.94		13.5	0.07	12	STONEWALL PASS
11	5:50:15	37.372	117.142	0.5	-0.84	0.5	201	ADS		0.97	0.71	0.86		12.9	0.07	9	SCOTTYS JUNCTION SW
11	7:10:33	37.385	117.136	0.1	0.65	0.2	82	ACI		1.32	1.29	1.16		14.2	0.06	24	STONEWALL PASS
11	7:37:12	37.389	117.141	0.2	0.63	0.2	131	ACZ		0.89	1.01	0.95		14.2	0.04	13	STONEWALL PASS
11	7:45:41	37.386	117.136	0.1	0.58	0.2	83	ACI	1.51	1.35		1.34		14.4	0.06	26	STONEWALL PASS
11	10:55:17	37.282	117.535	0.4	7.61	0.7	82	ABI		1.06		1.04	1.4	7.8	0.10	16	MAGRUDER MTN
11	11:42:28	37.030	116.731	0.2	0.42	0.4	73	ACI		1.36		0.85		13.0	0.09	24	THIRSTY CANYON SW
11	14:24:35	36.859	116.739	0.3	3.93	4.3	108	BCI		1.02		0.67		12.2	0.10	18	BARE MTN
11	23:12:46	37.392	115.010	0.2	0.45	0.1	219	ADI	1.40			1.21		4.0	0.01	7	ALAMO NE
11	23:58:31	37.389	117.138	0.2	0.90	0.4	131	ACI						14.5	0.05	16	STONEWALL PASS
11	23:58:34	37.385	117.135	0.2	0.24	0.3	83	ACZ	1.88	1.96		1.86		14.3	0.08	23	STONEWALL PASS
12	0: 1: 2	37.380	117.143	0.3	-1.21	0.5	133	ACZ		1.13		1.08		13.4	0.07	14	STONEWALL PASS
12	0:35:32	37.390	117.141	0.3	2.08	0.6++	206	ADI			1.01	0.88		14.3	0.05	13	STONEWALL PASS
12	7:27:57	37.380	117.143	0.2	-0.69	0.3	133	ACZ			1.00	1.07		13.5	0.06	16	STONEWALL PASS
12	7:28:44	37.379	117.143	0.2	-0.65	0.3	133	ACZ		1.12	1.02	1.05		13.3	0.07	21	STONEWALL PASS
12	8: 4: 4	37.117	116.587	0.2	11.16	0.6++	79	ABI	1.54	1.12		1.10		12.7	0.08	26	THIRSTY CANYON SE
12	8:20:20	37.864	116.134	0.7	-0.39	1.2	108	ACI		1.38		1.42		20.6	0.12	10	REVEILLE PEAK
12	12:56:58	37.370	114.997	0.3	-0.66	0.2	176	ACI	1.47			1.31		6.2	0.07	11	DELAMAR LAKE
13	5:12:16	37.103	116.245	0.1	7.15	0.3	104	ABI		1.22		0.93		7.4	0.04	22	TIPPIPAH SPRING
14	8:15:52	36.136	116.608	2.0	7.00*	——	246	DDA		2.38				47.4	0.08	5	FUNERAL PEAK

1987 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	15	13: 6: 4	36.283	116.761	——	7.00••	——	142	BDA		2.18				13.6	0.24	4	FURNACE CREEK
	15	13:21: 8	37.868	116.141	0.7	3.13•	——	108	CCA		1.44				48.1	0.18	14	REVEILLE PEAK
	16	7:26:40	35.865	116.720	0.9	4.63	3.3	249	BDI		1.33		1.35		17.2	0.09	11	CONFIDENCE HILLS
	16	13:16:26	37.865	116.134	0.3	1.34	1.3+	108	ACS	1.98	1.96	1.92	2.26	2.3	20.7	0.13	24	REVEILLE PEAK
	16	15:40:11	37.322	114.863	1.1	5.55	6.4	220	CDI		1.72		1.58		19.1	0.06	7	GREGERSON BASIN
	16	22:47:57	37.235	114.912	0.3	10.40	1.2	175	ACI	2.61			2.80		22.7	0.05	13	DELAMAR 3 NW
	16	22:55:34	37.234	114.908	0.3	4.95	2.4	213	BDI	2.43	1.97		2.60		23.0	0.04	11	DELAMAR 3 NW
	16	23: 1:46	37.234	114.913	0.7	6.12	3.2+	213	BDI	2.07		2.16	1.95		22.8	0.06	10	DELAMAR 3 NW
	17	0: 0:51	37.097	115.274	0.3	7.93	1.0	127	ABI	2.56	2.32	4.18	2.79		11.1	0.11	24	DESERT HILLS SE
	17	1:45:38	37.861	116.136	0.4	0.06	0.6	107	ACS	1.80	1.64		1.72		20.6	0.11	12	REVEILLE PEAK
	19	17:38: 4	37.204	117.610	5.4	2.46•	——	302	DDI		1.50		1.07		32.6	0.12	11	LAST CHANCE RANGE
	21	17:10:16	37.263	115.513	1.0	16.24	3.2	152	BCI		1.63				30.8	0.10	8	GROOM RANGE SE
	21	17:14:37	37.260	115.506	0.6	14.84	2.8	62	BCI		2.13				30.1	0.09	11	GROOM RANGE SE
	22	22:10:25	37.862	116.135	0.4	-0.49	0.7	107	ACS	1.91	1.71		1.85		20.6	0.13	14	REVEILLE PEAK
	23	6:10:49	36.586	116.235	0.2	-2.03	0.3	133	ACZ	1.39	1.09		1.22		11.4	0.06	19	SPECTER RANGE SW
	23	22:22:45	35.675	116.564	1.5	12.02	0.5	269	BDI	2.69		2.98			42.3	0.13	30	LEACH LAKE
	24	4:25:13	36.579	116.251	0.2	-1.82	0.5	173	ACZ	1.29	1.20		1.04		10.8	0.07	17	LATHROP WELLS SE
	24	7:55:54	36.648	116.289	0.3	2.34	0.6++	122	ABI		1.32				4.5	0.08	18	STRIPED HILLS
	24	14:27:59	36.825	117.595	0.4	-1.32	1.0	192	ADS	2.27	2.23	2.12	2.54		17.1	0.09	32	DRY MTN
	24	16:40:42	36.578	116.256	0.3	-1.61	0.5	176	ACZ	1.37	1.04		1.13		10.6	0.06	12	LATHROP WELLS SE
	25	6: 1:59	36.795	115.954	0.3	-0.23	0.4	162	ACI	1.39	1.19		1.42		14.9	0.08	22	FRENCHMAN FLAT
	25	13:58:16	37.688	115.089	0.1	0.92	0.2	102	ACI	1.62	1.51	1.87	1.44		14.0	0.03	12	HIKO NE
	25	16:43:32	37.155	115.533	0.2	-0.22	0.3	119	ACZ	1.55	1.30	1.58	1.30	1.9	29.1	0.08	17	FALLOUT HILLS NE
	26	15:37:56	36.778	117.715	0.9	5.69	3.8	236	BDI				1.17		27.8	0.07	11	DRY MTN
	26	23:57: 2	37.262	115.513	0.2	0.73	0.3	93	ACS	1.86	1.53	1.98	1.63		24.3	0.09	22	GROOM RANGE SE
	27	1:41:52	37.379	117.140	0.3	-0.14	0.3	180	ADI		1.19	1.05	1.06		13.5	0.04	12	STONEWALL PASS
	28	0:58: 2	37.713	115.053	0.3	6.34	1.1	118	ABI		1.10		1.12	1.7	12.3	0.07	12	HIKO NE
	28	4:47:18	37.352	116.356	0.2	0.42	0.3	107	ACZ		0.98		1.03		25.2	0.07	16	DEAD HORSE FLAT
	29	14:30:53	37.268	117.592	0.4	2.69	0.8+	79	ABI				0.97	1.2	6.2	0.10	15	MAGRUDER MTN
	30	16: 5: 0	36.995	116.054	0.5	-0.34	0.8	123	ABA		3.16				6.9	0.09	15	YUCCA LAKE
JUL	1	19:23:20	37.435	115.233	0.2	5.71	1.1	156	ACI		0.93	1.47	1.23		16.4	0.04	9	ASH SPRINGS
	2	0:32:47	37.848	115.759	0.1	0.40	0.3	99	ACS	2.12	1.91		2.28		19.1	0.05	17	
	3	7:10:14	38.369	115.775	1.2	-0.45	1.1	236	BDI	2.69			2.50	2.7	45.9	0.11	12	THE WALL SE
	3	14:48:38	37.686	115.094	0.4	1.46	1.2	100	ACS	1.35	1.17		1.33		14.3	0.05	9	HIKO NE
	3	14:48:59	36.907	117.478	0.3	11.11	0.5	176	ACI	1.86	1.77	2.05	2.09	1.8	13.0	0.09	28	TIN MTN
	4	4:35:51	36.815	115.986	0.5	8.51	0.9	197	ADI		0.67		1.06		14.4	0.09	15	FRENCHMAN FLAT
	5	11:24:47	37.370	117.224	0.2	-0.64	0.2	138	ACI		1.38		1.36		8.2	0.07	20	SCOTTYS JUNCTION SW
	5	16:43:40	37.193	114.826	0.8	-0.41	0.8	228	ADS				1.38		31.0	0.07	10	DELAMAR 3 NE
	5	16:58: 0	37.518	115.737	0.6	5.75	2.0	146	ACS	2.00	1.76		1.81	2.3	12.3	0.07	11	TEMPIUTE MTN
	5	23: 3:12	37.196	117.415	0.2	6.24	1.0	136	ACS		1.08	0.98	1.18		18.2	0.04	11	UBEHEBE CRATER
	6	17:23:35	36.812	115.828	0.3	-1.25	0.9	127	ACS	2.16	2.04	2.15	2.03		13.1	0.10	24	FRENCHMAN LAKE SE
	6	22:42:51	37.173	116.448	0.5	7.53	1.6	120	ABI		1.38		0.83		12.0	0.09	15	SCRUGHAM PEAK
	6	23:17:52	37.386	117.130	0.2	0.57	0.3+	83	ACS	0.95	0.99	0.94	1.06		14.7	0.08	16	STONEWALL PASS
	6	23:31:38	36.824	115.757	0.5	8.44	0.8++	264	ADI				0.93		15.2	0.05	13	FRENCHMAN LAKE SE

1987 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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JUL 7	6: 0:46	36.733	116.043	0.1	4.74	0.7	139	ACI	1.37	1.20		0.98		10.9	0.05	22	CAMP DESERT ROCK
7	19:24: 3	36.811	115.816	0.5	4.45	2.8	105	BCI	1.57	1.29		1.52		13.0	0.15	25	FRENCHMAN LAKE SE
7	19:53:37	36.805	115.795	1.3	8.59	1.9	257	BDS		1.18		1.00		12.4	0.14	16	FRENCHMAN LAKE SE
7	21:29: 9	37.991	116.955	0.3	5.95	4.6+	172	BCI	1.70	1.71		1.83		42.2	0.09	20	CACTUS PEAK
8	3:28:59	36.812	115.787	0.7	8.02	2.0	188	BDI	2.07	1.95	1.83	2.00		13.2	0.13	24	FRENCHMAN LAKE SE
8	3:51:41	38.253	116.702	2.2	5.07	5.0	229	BDS				1.68		63.3	0.18	6	GEORGES CANYON RIM
8	11:50:55	37.239	114.916	0.6	0.51	0.6	231	ADS	1.35		1.65	1.20		22.1	0.07	10	DELAMAR 3 NW
8	18:41:50	37.066	116.152	0.2	7.71	0.7	119	ABI				1.01		7.6	0.06	13	TIPPIPAH SPRING
8	18:42:22	37.064	116.152	0.3	7.10	0.8	111	ABI	1.20	1.30		1.14		7.5	0.09	19	TIPPIPAH SPRING
8	20:57:46	37.078	116.167	0.4	8.35	0.7	149	ACI				0.76		7.2	0.06	12	TIPPIPAH SPRING
8	20:58:28	37.064	116.150	0.2	8.62	0.6	111	ABI				1.02		7.6	0.06	18	TIPPIPAH SPRING
8	21:43:55	37.236	114.908	0.3	0.64	0.4	175	ACI	1.74			1.71		22.8	0.05	11	DELAMAR 3 NW
9	20:10:39	38.376	115.777	0.9	3.63•	——	237	CDI	2.06	2.12		2.22	2.7	46.7	0.11	11	•••QUAD. NOT LISTED•
9	21:31:48	36.913	117.453	0.3	10.18	0.5	164	ACI				0.97		12.7	0.06	12	TIN MTN
11	2: 2: 1	37.391	117.156	0.4	1.27	1.7	134	ACS			0.83	1.17		13.5	0.08	12	STONEWALL PASS
11	14: 9:33	36.922	117.798	1.1	2.45	4.0	240	BDS		1.14	1.26	1.31		37.0	0.13	12	WAUCOBA WASH
12	10:14:22	37.188	117.400	0.1	-0.03	0.2	115	ACS	1.16	1.28	0.70	1.00		17.8	0.04	19	UBEHEBE CRATER
12	15:53:12	36.971	117.981	1.2	2.74	4.1	248	BDI	2.24	2.14	2.41	2.39		41.6	0.14	20	WAUCOBA WASH
12	16:26:38	36.991	117.959	1.4	-1.44	1.4	243	BDS		1.29		1.57		38.6	0.09	10	WAUCOBA WASH
13	8:52:59	37.385	117.129	0.2	0.60	0.3	83	ACI	1.29	1.38	1.32	1.41		14.7	0.06	21	STONEWALL PASS
13	9:39:48	37.387	117.132	0.3	0.41	0.4	83	ACS		1.24	1.07	1.12		14.7	0.08	14	STONEWALL PASS
13	14:13:54	37.122	117.424	0.4	6.38	1.7	149	ACI	1.16	1.23	1.05	0.89		15.3	0.10	13	UBEHEBE CRATER
13	20:10:15	37.387	117.133	0.2	0.36	0.4	83	ACI	2.25	2.14		2.46		14.7	0.08	27	STONEWALL PASS
13	20:18:15	37.382	117.135	0.2	-0.07	0.2	158	ACS		1.36	1.00	1.10		14.1	0.05	15	STONEWALL PASS
13	21:22:20	37.385	117.132	0.3	0.07	0.5	83	ACI		1.14	1.11	1.03		14.6	0.09	15	STONEWALL PASS
14	10:56:17	37.166	116.453	0.1	-0.76	0.2	61	ACS	1.85	2.00		1.88		12.6	0.08	38	SCRUGHAM PEAK
14	13:13:11	37.383	117.136	0.1	0.13	0.1	158	ACS			0.93	0.88		14.1	0.03	14	STONEWALL PASS
14	19:21:32	37.080	115.748	0.3	10.39	1.2++	123	ACI	1.66	1.39	1.48	1.38		27.3	0.08	21	FALLOUT HILLS SW
14	20:31:27	37.069	115.743	0.2	1.70	1.4	111	ACI	1.69	1.37	1.53	1.60		28.3	0.08	22	FALLOUT HILLS SW
15	1:50:48	37.867	116.135	0.6	-0.45	1.0	108	ACS		1.52		1.37		20.9	0.13	11	REVEILLE PEAK
16	13:59:21	36.406	117.006	0.5	9.30	0.6	177	ACI				0.93		8.2	0.05	14	EMIGRANT CANYON
18	7: 4:58	37.386	117.132	0.2	0.29	0.4	83	ACI	1.57	1.53		1.54		14.6	0.08	19	STONEWALL PASS
18	12:31: 8	37.615	117.663	0.3	-0.82	0.5	117	ACS		1.43		1.53		16.7	0.09	11	LIDA WASH
18	17:20:50	37.386	117.130	0.2	0.20	0.3	83	ACS	1.84	1.67		1.89	1.9	14.7	0.08	22	STONEWALL PASS
19	10:51:31	36.606	116.355	0.2	7.22	1.5	99	ACI	1.39	1.36		0.84	1.4	16.9	0.07	18	LATHROP WELLS SE
20	8: 3:16	37.863	116.129	0.4	-0.18	0.7	108	ACI	1.92	1.74		1.78		20.2	0.13	15	REVEILLE PEAK
20	19:48:57	37.238	114.813	0.6	0.13	0.5	248	ADS	1.97	1.78	1.90	1.96		28.2	0.06	9	DELAMAR 3 NE
21	7: 8:56	37.384	117.133	0.2	-0.36	0.3	136	ACS	1.69	1.67		1.79		14.4	0.06	19	STONEWALL PASS
21	7: 9:40	37.215	117.600	0.4	4.66	0.7	178	ACS				0.88		4.5	0.05	8	LAST CHANCE RANGE
21	17:27: 3	37.221	117.878	0.7	4.40	4.4+	244	BDI		1.41		1.31	1.7	20.6	0.09	11	WAUCOBA SPRING
22	12:10:33	36.950	117.553	0.6	8.54	1.9	182	ADI		1.26		1.42		19.2	0.12	14	DRY MTN
23	1:30:33	36.971	117.908	0.5	5.57	5.1	250	CDI	2.08	1.86		2.30		37.2	0.07	22	WAUCOBA WASH
23	1:32:49	36.984	117.877	0.6	6.04	4.4+	257	BDI	1.80	1.67	1.98	1.75		34.4	0.12	22	WAUCOBA WASH
23	6:27:22	37.262	117.688	0.2	-1.14	0.2	179	ACS		1.32	1.26	1.19		4.9	0.05	16	MAGRUDER MTN

1987 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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JUL 24	3:38:15	37.096	117.353	0.2	-0.23	0.3	124	ACS		1.23		0.99		10.8	0.06	14	UBEHEBE CRATER
24	10:21:20	37.099	117.349	0.2	-0.94	0.3	110	ACI	1.72	1.56		1.65		11.1	0.09	24	UBEHEBE CRATER
25	1:25:27	37.169	117.387	0.6	-1.45	1.0	118	ACS				0.89		18.6	0.14	11	UBEHEBE CRATER
25	1:37:16	37.168	117.395	0.2	7.24	0.8	121	ACI				0.86		19.2	0.06	13	UBEHEBE CRATER
25	2:41:48	37.269	116.364	0.5	9.67	0.5	234	ADI	1.55		2.04	1.36		7.1	0.07	16	DEAD HORSE FLAT
25	2:57: 6	37.320	114.819	0.7	9.91	1.7	230	ADI	1.60	1.43	1.51	1.60		22.6	0.08	12	GREGERSON BASIN
25	7:58: 6	37.620	117.509	0.1	0.73	0.2	119	ACS		1.21		1.18		14.1	0.04	15	LIDA WASH
26	6:47:45	37.247	114.995	1.3	0.66	0.8	237	BDS			1.29	0.77		18.4	0.04	7	DELAMAR 3 NW
27	10: 3:29	37.418	115.515	0.5	3.11*	—	79	CCA		1.97				23.9	0.14	15	GROOM RANGE NE
27	17: 0: 7	36.736	116.191	0.2	4.71	1.1	69	ABI	1.72	1.62	1.34	1.82		7.3	0.08	29	SPECTER RANGE NW
28	16:44:55	36.497	115.384	0.6	16.30	1.1	136	ACI		1.40		1.44		20.1	0.09	12	CORN CREEK SPRINGS N
29	5:22:30	38.131	116.407	0.4	0.00	0.5	139	ACS	2.04	1.66		1.77		11.7	0.04	9	WARM SPRINGS NW
29	6:25:15	37.405	116.203	0.2	8.17	0.5	85	ABS	1.34	1.27	1.20	1.19		11.2	0.06	20	WHEELBARROW PEAK NW
29	21:?9:58	37.402	116.200	0.2	8.00	0.5	64	ABS	1.57	1.46	1.73	1.62	1.9	11.2	0.07	22	WHEELBARROW PEAK NW
30	4:27:27	37.508	117.555	0.3	2.92	1.0	79	ABS		1.09	1.05	1.01		9.0	0.12	15	LIDA WASH
30	5:39:37	37.405	116.202	0.2	8.25	0.6	85	ABS	1.37	1.30	1.18	1.22		11.1	0.08	20	WHEELBARROW PEAK NW
31	0:54:35	37.211	116.448	—	2.91	—	241	BDA		1.29				20.3	0.19	4	SCRUGHAM PEAK
31	3:45:30	37.216	116.326	—	4.77	—	303	ADA		1.14				0.2	0.09	4	AMMONIA TANKS
31	4: 6:19	37.281	116.372	5.6	4.27*	—	266	DDA		1.07				8.6	0.08	6	DEAD HORSE FLAT
31	4:29: 0	36.657	116.385	1.3	1.66	3.0	219	BDA		0.79				4.2	0.10	9	LATHROP WELLS NW
31	4:57: 2	36.670	116.361	10.1	0.73	9.4	193	DDA		0.15				3.4	0.06	7	STRIPED HILLS
31	11:20:33	37.393	116.202	0.3	-0.71	10.1	155	CCA		1.92				12.1	0.04	8	WHEELBARROW PEAK NW
31	11:24:45	37.400	116.199	0.4	8.11	0.8	143	ACS		1.40				11.3	0.06	14	WHEELBARROW PEAK NW
31	16: 8:23	37.205	114.722	1.7	9.75	7.0	266	CDS		1.30		1.51	1.7	36.7	0.10	8	VIGO NW
AUG 1	4:25:28	37.385	117.139	0.1	0.26	0.2	135	ACZ		1.35		1.45		14.1	0.04	18	STONEWALL PASS
1	7:36:37	37.403	116.202	0.2	8.26	0.5	63	ABI	1.60	1.25		1.31		11.3	0.08	21	WHEELBARROW PEAK NW
1	8:58: 0	37.189	115.180	0.6	6.93	0.7	156	ACT	1.60	1.24	1.87	1.70		2.4	0.09	16	LOWER PAHRANAGAT LAKE
1	19:34: 8	36.668	116.359	0.2	2.27	0.3	101	ABS	1.29	0.94		0.81	1.2	3.1	0.06	17	STRIPED HILLS
1	21:28:17	37.610	115.077	0.2	2.10	0.6	119	ACI	1.16	1.12		1.09		13.3	0.06	12	HIKO SE
2	5:41:57	37.403	116.203	0.2	8.50	0.6	85	ABI		1.43	1.31	1.18		11.3	0.07	18	WHEELBARROW PEAK NW
2	6:56:22	37.385	117.136	0.1	0.45	0.1	152	ACI		1.36	0.94	1.19		14.2	0.03	16	STONEWALL PASS
2	20:11:41	37.406	116.202	0.2	8.71	0.6	85	ABI	1.52	1.35	1 34	1.37		11.0	0.07	15	WHEELBARROW PEAK NW
3	4: 1:18	37.406	116.203	0.1	9.44	0.8	125	ACI			1.21	1.21		23.8	0.04	12	WHEELBARROW PEAK NW
3	10:27:59	37.404	116.201	0.3	8.60	0.6	85	ABI	1.63	1.45	1.70	1.62		11.2	0.10	21	WHEELBARROW PEAK NW
4	4:21:53	37.391	116.197	0.3	0.12	0.4	159	ACS	1.70	1.50	1.63	1.57		26.7	0.06	18	WHEELBARROW PEAK NW
4	11:50: 1	37.198	117.638	0.4	11.71	0.7	186	ADI	1.22	0.99		1.22		3.9	0.10	14	LAST CHANCE RANGE
4	13:16:53	37.398	116.201	0.3	0.00**	0.2	186	ADI	2.11	1.72		2.18	2.2	27.5	0.06	24	WHEELBARROW PEAK NW
5	14:33:15	36.637	116.274	0.4	6.62	0.5	134	ABZ	1.18	1.15	1.14	0.95	1.4	6.0	0.07	21	STRIPED HILLS
5	20:14:59	37.862	116.131	0.3	-0.36	0.5	107	ACS	1.83	1.61		1.78		20.3	0.10	13	REVEILLE PEAK
6	7:37:52	36.432	117.034	0.3	11.53	0.4	124	ABI	1.87	1.38		1.43		9.7	0.09	27	EMIGRANT CANYON
6	8:57:43	37.396	116.197	0.3	12.12	1.0	98	ABI				0.83		23.1	0.09	14	WHEELBARROW PEAK NW
6	13:15:35	36.951	116.136	0.3	7.54	0.5	89	ABI		0.95		0.84		7.6	0.07	22	MINE MTN
6	13:16: 3	36.956	116.148	0.2	7.41	0.4	166	ACI				0.24		7.4	0.06	14	MINE MTN
6	13:17:14	36.949	116.138	0.2	7.58	0.5	91	ABI		1.18		0.62		7.6	0.06	20	MINE MTN

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1987 LOCAL HYPOCENTER SUMMARY – SGB EARTHQUAKES

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AUG 6	13:25:34	36.951	116.137	0.3	7.26	0.5	147	ACI	1.38	1.08		1.07	1.2	7.7	0.09	26	MINE MTN
6	13:59:37	37.387	117.130	0.1	0.88	0.2	83	ACI	1.50	1.65		1.75	1.3	14.8	0.06	27	STONEWALL PASS
6	14:33:34	37.406	116.200	0.3	8.78	0.6	85	ABZ		1.36	1.20	1.37		10.9	0.07	15	WHEELBARROW PEAK NW
6	18:50:51	37.758	117.066	0.9	3.28•	——	208	CDI				1.46		53.5	0.09	13	MUD LAKE
7	0:53:25	37.242	116.414	0.2	-0.10	0.2	172	ACZ	1.85			1.35		8.6	0.03	15	SCRUGHAM PEAK
7	1:13:34	37.938	115.492	0.3	5.42	1.0	161	ACI	2.17	2.08		2.52	2.5	10.1	0.08	20	
8	2: 8:35	37.379	117.143	0.4	2.94•	——	133	CCA		0.78				13.4	0.06	10	STONEWALL PASS
8	15:13:20	36.712	116.170	0.6	14.11	1.0	161	ACS		1.24				9.7	0.07	9	SPECTER RANGE NW
8	15:13:20	36.713	116.168	0.4	15.48	0.7	159	ACI		1.21				9.8	0.05	9	SPECTER RANGE NW
9	13:34:25	36.484	116.311	0.2	6.07	0.8	132	ACS	1.48	1.15	1.06	1.21		17.7	0.05	21	ASH MEADOWS
9	16: 5: 1	37.419	117.018	0.2	0.86	0.2	90	ACZ	1.30	1.35	1.25	1.54		24.9	0.05	20	SCOTTYS JUNCTION NE
10	2:58: 4	37.402	116.205	0.2	6.30	0.8	51	ABI	2.11	1.94	2.30	2.19		11.5	0.08	39	WHEELBARROW PEAK NW
11	7: 9:42	37.371	115.113	1.1	8.96	1.3	142	BCI		0.64	0.81		1.1	6.8	0.07	7	ALAMO SE
11	9: 6:14	37.340	117.473	0.2	0.67	0.3	114	ACT			0.72	1.10		11.4	0.05	12	GOLD POINT SW
12	1:12:20	37.733	117.240	1.0	1.23	2.8	181	BDZ		1.96		1.30		13.3	0.16	13	GOLDFIELD
12	7:56:35	37.222	116.886	0.3	9.42	0.8	152	ADI		1.21				16.5	0.06	16	SPRINGDALE
12	21:39:16	37.615	117.672	0.8	6.30	4.5	116	BCI				1.16		16.0	0.10	9	LIDA WASH
13	11:18:55	37.862	116.126	0.5	-0.47	0.7	111	ACS		1.55		1.59		19.9	0.09	9	REVEILLE PEAK
13	11:46: 9	37.011	116.360	0.2	8.67	0.3	47	AAI	1.85	1.29		1.36		3.5	0.07	36	BUCKBOARD MESA
14	4:11:59	37.012	116.361	0.2	9.07	0.4	70	AAI	1.73	1.40		1.33		3.5	0.08	32	BUCKBOARD MESA
14	11:16:14	37.564	115.008	0.2	2.43	0.4	113	ACT		1.10		0.96		11.6	0.04	10	HIKO SE
15	11:43:40	36.988	116.733	0.3	5.96	2.0	113	BCI		0.76		0.63		17.7	0.07	16	BARE MTN
15	12:17:50	37.561	118.457	7.7	2.23•	——	311	DDI	2.17	2.11		2.26		50.9	0.08	9	•••QUAD. NOT LISTED•
16	0:34:52	37.030	117.527	0.5	4.44	6.0	166	CCI		1.23	1.30	1.21		16.4	0.11	12	LAST CHANCE RANGE
16	0:35:31	37.029	117.535	0.6	5.23	4.3	181	BDI				1.24		17.2	0.09	9	LAST CHANCE RANGE
16	22:16:49	37.377	117.144	0.2	-0.11	0.2	133	ACZ		1.40	1 20	1.37		13.1	0.04	11	STONEWALL PASS
16	23:13:49	37.249	116.728	0.3	4.53	0.7	196	ADI	1.30	1.15		0.94		9.1	0.06	22	THIRSTY CANYON NW
17	13:56: 6	37.673	115.055	0.4	1.54	1.4	106	ACI		1.16		1.00	1.2	10.7	0.10	11	HIKO NE
20	10: 3:25	37.223	114.960	0.6	10.59	0.6	229	ADS			1.59	1.26		21.1	0.07	10	DELAMAR 3 NW
20	10:16:34	37.109	117.320	0.2	9.36	0.3	104	ABI		1.17	1.07	1.18		12.4	0.05	21	UBEHEBE CRATER
20	10:32:53	36.456	116.175	0.3	1.68	0.7	146	ACI		1.13		1.32		6.6	0.07	18	AMARGOSA FLAT
23	23:18:58	35.902	117.034	1.3	7.53	1.0+	263	BDI			3.07		4.0	16.5	0.12	27	MANLY PEAK
24	12:11:33	37.201	117.365	0.2	-0.54	0.3	102	ACZ		1.25		1.13		14.6	0.05	17	UBEHEBE CRATER
25	1:35:19	35.931	117.009	0.1	7.13	0.2	280	ADI		0.93		1.25		13.3	0.01	7	MANLY PEAK
25	11:30:23	36.782	116.251	0.2	5.61	0.3	86	AAI				0.63		4.8	0.05	17	JACKASS FLATS
25	11:43:54	36.671	116.390	0.2	8.08	0.5	70	AAI	1.59	1.34		1.19		5.3	0.09	29	LATHROP WELLS NW
26	0:53: 6	37.805	117.255	1.1	10.93	1.1	245	BDI		1.93		1.56		16.3	0.08	11	ALKALI
26	11:19:52	37.133	117.940	0.7	8.54	2.7	238	BDI	1.83	1.61		1.82	2.0	28.3	0.11	15	WAUCOBA SPRING
26	15: 3:25	37.331	117.208	0.5	6.48	0.5	160	ACI			0.36	0.49		5.5	0.03	8	SCOTTYS JUNCTION SW
26	16:23:59	37.281	117.600	0.3	8.00	0.5	83	AAI	1.21	1.31	1.09	1.25	1.7	6.8	0.07	17	MAGRUDER MTN
27	3:40:57	37.302	114.813	1.5	4.65•	——	235	CDZ		1.00		1.18		24.0	0.08	8	GREGERSON BASIN
27	5:27: 7	37.188	117.465	0.2	8.09	0.8	134	ACI		0.91		0.90		16.9	0.05	14	UBEHEBE CRATER
27	10:45:15	37.411	116.841	0.2	6.54	1.5++	107	ACI				1.26		22.2	0.09	20	TOLICHA PEAK
28	1: 6: 6	37.764	117.239	1.0	7.26	2.1	188	BDI		1.86		1.33		14.6	0.18	17	MUD LAKE

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AUG 29	18:34:35	37.861	116.131	0.3	-0.16	0.5	107	ACI	1.77	1.75		1.85		20.3	0.12	17	REVEILLE PEAK
29	19:37: 3	36.659	115.779	——	-1.17	——	306	ADS				0.60		4.8	0.01	4	MERCURY NE
30	0:54:17	37.356	115.164	1.7	-1.14	1.1	[illegible]	BDZ	1.16		1.52	0.98		11.5	0.05	7	ALAMO
30	7:56: 9	37.322	114.862	0.8	1.91	1.0	220	ADI	1.53		1.65	1.51		19.1	0.06	8	GREGERSON BASIN
30	11:19:15	37.237	116.512	0.3	6.23	1.2	161	ACI	1.45	1.32	1.70	1.16		12.9	0.07	21	THIRSTY CANYON NE
30	12:46: 8	37.176	117.215	0.3	0.09	0.5	90	ACZ	1.34	1.36		1.52		14.3	0.10	23	BONNIE CLAIRE NW
30	17:59:17	37.272	116.327	0.4	-0.35	0.2	218	ADI	2.01			1.98		6.4	0.04	13	DEAD HORSE FLAT
31	10:34:59	37.060	116.022	0.1	-0.51	0.2	119	ACI	1.23	1.27	1.67	0.88		15.4	0.05	18	YUCCA FLAT
31	19:12:38	36.625	116.778	1.2	8.29	1.6	197	BDA		0.88				1.5	0.09	8	CHLORIDE CLIFF
SEP 1	4:10:40	37.227	117.581	0.4	1.13	0.9	136	ACI		1.14	1.11	1.14		5.8	0.07	17	LAST CHANCE RANGE
1	15:31:18	37.501	117.228	0.2	0.20	0.3	157	ACZ		1.29	1.14	1.36		22.4	0.05	15	GOLDFIELD
2	16: 4:55	37.561	114.960	9.9	0.91	5.5	231	DDZ			0.92	1.06		18.9	0.03	6	PAHROC SUMMIT PASS
3	2:46:28	36.467	117.969	0.9	10.07	0.9	259	ADI	1.84			2.00		62.8	0.11	17	KEELER
3	3:54:35	36.471	118.000	0.9	8.96	0.8	246	ADI		1.77		2.03		64.9	0.11	19	***QUAD. NOT LISTED*
3	23:35:39	37.185	116.279	0.4	1.11	1.2	182	ADI	1.57			1.29		19.1	0.08	15	AMMONIA TANKS
4	1:35:31	37.108	116.036	0.4	2.71	0.6	114	ACI	1.59	1.35		1.21	1.9	10.3	0.09	22	YUCCA FLAT
4	3:44:39	36.907	117.816	0.6	2.94	2.4	244	BDS	1.40	1.39		1.59		38.3	0.08	17	WAUCOBA WASH
4	18:30: 6	37.393	116.520	0.5	7.24	2.4++	262	BDI		1.15		1.10		32.9	0.05	13	BLACK MTN NE
5	4:23:24	38.142	115.091	2.4	2.46	8.2	264	CDS		1.85	2.36	2.42		28.9	0.08	7	TIMBER MTN PASS NE
5	4:39:44	37.741	114.858	0.3	6.22	0.7	194	ADI	1.99	1.85	2.02			12.0	0.04	10	PAHROC SPRING NE
5	17:30:35	36.734	116.191	0.4	4.26	0.5	225	ADI		1.22		0.64		7.3	0.07	19	SPECTER RANGE NW
5	21: 8:32	37.466	117.879	0.3	7.58	0.4+	165	ACI	2.06	2.07		2.23	2.2	5.1	0.07	20	SOLDIER PASS
6	5:52:35	37.453	117.885	0.5	10.50	0.6	161	ACI		1.38		1.37		3.7	0.06	9	SOLDIER PASS
6	8: 3: 0	36.703	116.311	0.2	4.80	0.3	163	ACI				0.59		5.6	0.03	14	STRIPED HILLS
6	23:20:55	37.394	116.074	0.5	1.12	[illegible]	249	ADI	1.73	1.55	1.27	1.21		22.2	0.06	12	WHEELBARROW PEAK NE
7	0:47:19	37.366	116.050	0.5	0.09	0.5	210	ADI	1.78	1.56		1.74	2.0	18.8	0.09	17	OAK SPRING BUTTE
7	1:36:12	37.372	116.047	0.5	-0.66	0.5	212	ADI		1.36	1.31	1.20		19.4	0.08	14	OAK SPRING BUTTE
7	11:34:44	37.366	116.046	0.6	-0.84	0.6	219	ADI	1.90	1.53	1.37	1.34		18.7	0.09	11	OAK SPRING BUTTE
7	11:46:30	37.295	114.911	0.6	11.01	0.6	216	ADZ			1.35	1.33		17.6	0.06	8	DELAMAR LAKE
7	13:25:46	36.930	115.061	0.7	-0.58	0.7	190	ADZ		1.47	1.97	1.85		28.8	0.11	9	MULE DEER RIDGE NE
8	5:48: 6	36.927	115.052	0.5	-0.19	0.6	171	ACZ			1.93	1.83		29.4	0.10	11	MULE DEER RIDGE NE
8	14:39: 4	37.161	117.371	0.2	10.60	0.5	115	ABI		0.92		1.12		18.1	0.07	14	UBEHEBE CRATER
8	20:50:46	37.181	117.263	0.3	0.66	0.4	92	ACI			1.22	1.35		13.2	0.08	14	UBEHEBE CRATER
9	11:10:14	37.113	114.906	1.8	18.17	3.3+	183	BDI	1.72	1.78		1.93		25.8	0.15	10	DELAMAR 3 SW
10	5:55:58	38.111	115.103	2.1	2.00	6.1	259	CDI	1.65	1.72		1.78		25.5	0.06	6	TIMBER MTN PASS EAST
10	5:56: 0	37.935	115.220	3.2	-1.54	1.2	195	CDZ	1.65	1.68		1.58		14.5	0.45	6	OREANA SPRING
11	3:10:11	37.329	116.351	1.0	6.23	1.6	269	BDI				1.30		13.0	0.05	10	DEAD HORSE FLAT
11	5:18:15	36.702	116.306	0.2	5.14	0.2	112	ABI	1.28	1.04		1.08		5.4	0.05	18	STRIPED HILLS
12	11:43:32	36.711	116.277	0.3	6.83	0.3	186	ADI	1.25	0.87		0.68		3.5	0.06	19	STRIPED HILLS
12	12:52:33	37.090	115.271	0.3	7.34	0.7	158	ACI	1.75	1.66	1.82	1.62	2.2	11.5	0.06	14	DESERT HILLS SE
12	15: 8:58	37.315	116.315	0.2	0.19	0.4	88	ACI	1.62	1.47	1.39	1.17	1.1	11.3	0.05	22	DEAD HORSE FLAT
13	[illegible]	36.185	117.636	0.7	5.49	6.7	266	CDI	2.24	1.98		2.46	2.4	54.4	0.11	20	COSO PEAK
13	7:25: 8	36.581	115.562	0.3	-0.71	0.6	81	ACZ	2.04	1.38		1.49		25.6	0.11	20	INDIAN SPRINGS SE
13	19:26:10	36.867	115.979	1.0	1.48	2.0	185	BDZ				0.60		9.9	0.19	16	FRENCHMAN FLAT

91051 2934

1987 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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
SEP 14	9:11: 4	37.212	117.337	0.2	7.13	0.6	93	ABI	1.23	1.31		1.43		12.1	0.07	24	UBEHEBE CRATER
14	19:34:32	36.631	116.343	0.2	2.79	0.4	101	ABS	1.40	1.23		1.16		1.6	0.08	21	STRIPED HILLS
15	6:42:16	37.155	116.286	0.2	7.22	0.3	81	ABS		1.29		0.84		7.4	0.06	23	AMMONIA TANKS
15	15:17:12	37.196	117.385	0.1	-0.36	0.2	109	ACZ			0.96	0.90		16.3	0.04	14	UBEHEBE CRATER
15	19: 7: 6	36.414	117.473	0.6	2.94	2.1	236	BDI	1.85	1.84		2.04		31.1	0.07	16	PANAMINT BUTTE
16	19:37:44	37.865	116.136	0.5	4.84	7.3	157	CCI	1.57	1.54		1.69		20.8	0.15	10	REVEILLE PEAK
16	23:17:22	36.883	116.749	0.3	0.54	0.6	178	ACI				0.61		14.5	0.05	11	BARE MTN
17	12:29:30	36.998	116.231	2.6	7.00•	——	172	DDA		0.28				4.4	0.20	5	MINE MTN
17	13: 8:42	36.975	117.140	1.0	1.47	3.7	165	BCA		1.00				18.6	0.08	10	GRAPEVINE PEAK
17	23:21:35	36.725	116.798	0.2	1.52	0.7	110	ACI	1.33	1.05		0.90		10.8	0.06	20	BIG DUNE
18	16:55:17	36.181	117.619	0.9	1.03	2.7	265	BDS		1.80	1.79	2.16	2.0	53.0	0.10	18	COSO PEAK
19	14:14: 0	37.270	116.654	0.3	-0.13	0.3	188	ADZ	1.43	1.40		0.64		30.0	0.07	15	BLACK MTN SW
19	23:26:48	36.635	116.336	0.7	12.46	0.7	296	ADI				0.71		1.2	0.10	16	STRIPED HILLS
20	22:38:51	37.328	117.684	0.3	6.89	0.8	136	ACI	1.60	1.62	1.37	1.74		11.1	0.09	25	MAGRUDER MTN
22	16: 3:58	37.073	115.763	0.2	10.13	1.2++	107	ACI	1.78	1.65		1.97		26.5	0.09	30	PAPOOSE LAKE SE
22	18:21:28	36.589	117.642	1.1	-1.02	0.8	275	BDZ		1.25		1.62		32.0	0.06	11	UBHEBE PEAK
22	19:26:13	36.672	116.333	0.9	4.46	1.4	156	ACI				0.28		3.0	0.11	10	STRIPED HILLS
23	4:18:34	37.276	114.586	1.1	2.44	3.7	278	BDI	1.38	1.81		1.35		38.9	0.05	10	ELGIN
23	6:31:59	36.666	116.384	0.4	6.97	0.6	206	ADI		0.85		0.57		4.6	0.06	12	LATHROP WELLS NW
23	7:20: 5	37.288	114.620	1.3	-1.02	1.0	272	BDZ		1.12	1.18	1.37		36.8	0.06	9	ELGIN
23	23:15:47	37.312	116.315	0.2	-1.00	0.2	74	ACS	1.69	1.44	1.51	1.34	1.3	10.9	0.08	34	DEAD HORSE FLAT
23	23:59:26	37.744	117.242	1.0	5.67	2.8	146	BCS				1.49		13.5	0.14	10	GOLDFIELD
24	0:54:38	36.788	115.970	0.3	8.65	0.9++	132	ABI	1.55	1.17		1.31		14.2	0.08	15	FRENCHMAN FLAT
25	20: 8:46	37.211	117.455	0.3	8.31	0.9	104	ACI	1.66	1.74		1.73		17.1	0.09	26	UBEHEBE CRATER
25	20:49:21	37.211	117.456	0.2	7.97	0.8	112	ACI	1.58	1.33		1.46		17.1	0.07	22	UBEHEBE CRATER
26	1:56:22	37.085	114.923	0.6	15.79	1.3+	182	ADI	1.99	2.20	2.08	2.06		25.3	0.08	13	DELAMAR 3 SW
26	19:17:54	37.213	117.457	0.2	7.66	0.8	103	ACI	1.62	1.69		1.69	1.8	16.9	0.08	24	UBEHEBE CRATER
26	22:52:31	37.228	116.370	0.3	-0.35	0.3	40	AAI	1.94			1.55		4.3	0.09	22	AMMONIA TANKS
27	7:48:18	35.849	116.748	1.2	1.69	1.6	260	BDS	2.25			2.36	2.4	16.7	0.09	18	CONFIDENCE HILLS
27	9:50:38	37.647	116.792	0.2	0.21	0.3	111	ACZ		1.56		1.52		37.7	0.06	19	CACTUS SPRING
27	9:52:48	36.634	116.330	0.6	4.11	0.3+	297	ADI		0.99		0.96		1.5	0.07	15	STRIPED HILLS
27	15:29:30	36.618	117.124	0.1	0.43	0.2	112	ACZ		1.42	1.39	1.58		14.2	0.05	23	STOVEPIPE WELLS
28	3:24: 9	37.494	117.583	0.3	-0.06	0.6	80	ABI				1.17		9.5	0.09	14	MAGRUDER MTN
28	8:43:42	37.015	116.223	0.3	3.64	0.4	133	ABI		1.26		0.75		2.6	0.09	20	TIPPIPAH SPRING
28	15: 9:11	37.223	117.458	0.2	8.81	0.7	115	ABS			1.20	0.97		16.8	0.07	14	UBEHEBE CRATER
28	21:49:39	37.865	116.131	0.3	0.70	0.5	108	ACI		1.33		1.52		20.5	0.09	13	REVEILLE PEAK
29	1:16:29	37.148	115.326	0.4	0.86	0.5	163	ACI	1.76	1.44	1.79	1.46		12.5	0.08	14	DESERT HILLS NE
29	11:48:39	37.890	117.616	0.7	5.11	4.5	238	BDI	1.53	1.71		1.74		25.5	0.09	14	SILVER PEAK
OCT 1	16: 0:17	36.957	116.156	——	7.00••	——	246	DDA		2.35				92.1	1.56	3	MINE MTN
1	20:20:15	36.739	115.482	0.2	7.88	2.0	103	ACI	2.59					29.8	0.07	27	BLACK HILLS NW
2	11:11:55	37.072	115.753	0.5	5.18	8.5	62	CCI			3.43			29.1	0.19	35	PAPOOSE LAKE SE
3	5:14:25	36.887	117.725	0.7	2.86	2.8	209	BDS	1.31	1.30	1.35	1.53		29.9	0.12	18	DRY MTN
3	7:40:45	36.095	116.639	0.3	6.27	1.4	150	ACI			1.79	1.36		10.4	0.11	16	FUNERAL PEAK
3	7:41:21	36.097	116.636	0.3	6.12	0.9	149	ACI			1.63	1.27		10.3	0.07	13	FUNERAL PEAK

1987 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)	QOD 12S	MAGNITUDE ESTIMATES Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
OCT	4	11:56:15	37.327	116.413	0.7	4.71	1.9	249	ADI				0.72		14.9	0.07	9	SILENT BUTTE
	4	13:30:11	36.802	116.105	0.2	9.84	0.6	123	ABI	1.42			0.87	1.0	8.2	0.08	25	CANE SPRING
	5	0:26:42	36.637	116.249	0.2	5.44	0.7	127	ABI		1.10		0.68		8.1	0.07	23	SPECTER RANGE NW
	5	20:26:41	36.975	116.084	0.3	10.40	0.6	196	ADI		1.25		0.63		14.7	0.06	14	YUCCA LAKE
	5	21:10:42	37.318	115.078	0.2	-0.11	0.3	167	ACS				1.40	1.7	10.1	0.02	8	ALAMO SE
	6	9:45:44	37.070	115.762	0.2	2.59	1.9	108	ACI	2.16	1.98	2.17	2.21		26.8	0.10	31	PAPOOSE LAKE SE
	6	17:29:28	37.717	117.634	0.5	6.77	1.4	186	ADI				1.46		14.9	0.07	10	LIDA WASH
	8	20:36:49	37.231	116.374	0.3	0.31	0.2	81	AAI		1.40	1.61	0.75		4.9	0.09	22	AMMONIA TANKS
	9	4:53:10	37.077	115.762	0.3	7.29	2.3++	152	BCI	1.73	1.46	1.75	1.82		26.4	0.08	22	PAPOOSE LAKE SE
	10	10:12:42	37.868	116.138	0.5	-0.44	0.8	108	ACS		1.60		1.55		21.1	0.14	13	REVEILLE PEAK
	11	0:37: 7	37.743	114.514	1.5	1.45	3.4	304	BDS				1.59		25.0	0.09	6	CHIEF MTN
	11	0:43:24	37.704	114.530	3.2	4.20•	——	327	CDI				1.69		21.3	0.07	5	CHIEF MTN
	11	1:27:50	37.197	116.306	0.3	0.29	0.1	69	AAI	1.37	1.38		1.01	1.6	2.4	0.10	25	AMMONIA TANKS
	11	2:43:31	36.634	117.057	0.1	9.78	0.5	92	ACI	1.09	1.11	1.37	0.98		19.8	0.04	19	STOVEPIPE WELLS
	11	3:16:16	37.177	117.428	0.4	9.43	1.2	120	ACI				0.81		20.4	0.11	15	UBEHEBE CRATER
	11	5:24:30	36.741	116.220	0.2	5.37	0.6	91	ABI	1.19	1.28		0.78		4.6	0.09	21	SPECTER RANGE NW
	11	8:42: 9	37.274	115.845	0.3	-0.77	0.7	52	ABI	2.64		2.57	2.68	2.8	9.2	0.13	30	GROOM MINE SE
	12	0:10:20	35.937	117.022	0.8	1.63	1.5	277	ADZ		1.28		1.43		14.2	0.07	13	MANLY PEAK
	12	0:19: 5	35.935	117.024	0.7	1.74	1.3	278	ADS				1.11		14.5	0.06	10	MANLY PEAK
	12	5:22:40	37.496	117.961	0.4	3.54	0.7	241	ADZ				1.40		9.2	0.05	13	SOLDIER PASS
	12	5:23:32	37.264	116.404	0.5	-0.90	0.4	184	ADI				1.67		9.0	0.06	10	SILENT BUTTE
	12	5:36: 4	37.194	116.304	0.3	-0.03	0.2+	109	ABI	1.40	1.29	1.39	0.95		2.9	0.09	20	AMMONIA TANKS
	12	14:53:45	37.214	116.381	0.2	0.29	0.1	69	ABI	1.39	1.39		1.43		5.1	0.07	23	SCRUGHAM PEAK
	12	19:29: 0	37.864	116.131	0.3	-0.04	0.4	108	ACI	2.05	1.94		2.22		20.4	0.10	21	REVEILLE PEAK
	13	7:34:44	37.116	117.329	0.4	7.31	0.7	190	ADI			0.86	0.76		13.1	0.02	6	UBEHEBE CRATER
	13	18:42: 8	36.583	115.597	0.3	11.81	1.1	149	ACI				1.45		22.7	0.08	12	INDIAN SPRINGS SE
	14	23:56:43	37.308	115.341	0.2	10.88	1.7++	136	ACI	1.30		1.84	1.28		20.6	0.04	7	BADGER SPRING
	15	1:56:51	37.231	116.334	0.8	6.17	0.7	231	ADI		1.55		1.10		2.1	0.07	9	AMMONIA TANKS
	15	13: 8:29	36.323	117.478	0.6	-0.72	0.5	241	ADZ	1.84	1.61	1.69	2.02	1.8	37.1	0.08	17	PANAMINT BUTTE
	15	13:39:39	36.313	117.495	0.7	5.69	5.2	244	CDI	1.74	1.68	1.68	1.94		38.7	0.10	20	PANAMINT BUTTE
	15	21:40:45	36.209	116.857	0.2	9.24	1.0	128	ABS			0.97	0.83		17.0	0.05	10	BENNETTS WELL
	16	2: 7:32	37.871	115.699	0.2	0.96	0.3	176	ACS	1.10	1.17		1.38		15.4	0.03	8	WORTHINGTON MTNS
	16	20: 5: 3	37.865	116.130	0.2	0.58	0.4	108	ACI	2.04	1.66	2.10	2.16		20.4	0.09	21	REVEILLE PEAK
	16	20:36:22	37.020	117.541	0.5	5.81	2.1	237	BDI				1.42		17.5	0.08	10	LAST CHANCE RANGE
	17	8:53: 8	37.871	116.119	0.5	1.60	2.1	164	BCA		1.13				20.0	0.03	7	REVEILLE PEAK
	17	21:57:29	36.773	116.048	0.4	0.71	0.5	145	ACI	1.22	1.37		1.13		14.6	0.10	15	CANE SPRING
	17	22:27:55	37.465	117.259	0.3	4.99	2.0	89	BCI	1.12	1.31		1.34		18.2	0.07	17	MOUNT JACKSON
	18	20:51:37	36.831	116.253	0.4	-0.16	0.2+	195	ADI	1.32	0.87		0.65		6.7	0.07	11	JACKASS FLATS
	19	21:15:24	37.791	117.805	——	7.00••	——	306	CDA		1.43				8.5	0.37	3	RHYOLITE RIDGE
	20	16:16:40	37.049	116.981	1.1	2.23	2.1	164	BCA		0.56				8.9	0.09	6	SPRINGDALE
	20	20:22:27	37.047	116.974	1.7	4.00	4.3	163	BDA		0.50				9.0	0.05	5	SPRINGDALE
	21	0:26: 5	37.274	116.335	1.1	1.32	1.1	272	BDS			1.79	1.39		6.7	0.06	12	DEAD HORSE FLAT
	21	23:59:17	36.462	116.949	0.2	6.83	1.0	132	ACI			0.88	1.12		16.4	0.05	19	FURNACE CREEK
	22	5:32:39	37.586	117.675	0.2	1.49	0.5+	102	ACI		1.21		1.22		18.2	0.09	12	LIDA WASH

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OCT 22	1?:42:13	37.862	116.129	0.2	-0.23	0.4	108	ACI	1.96	1.76		2.06		20.2	0.09	19	REVEILLE PEAK
22	14:45:33	37.183	114.819	0.7	8.47	2.2++	193	BDI	1.91	2.07	2.18	2.07		32.2	0.12	15	DELAMAR 3 NE
23	3:57:12	37.154	117.356	0.2	8.05	0.7	111	ACI	1.47			1.56		17.2	0.07	20	UBEHEBE CRATER
23	10:40:12	37.624	114.995	0.3	3.56	0.9	97	ABI	1.49	1.48	1.47	1.45		6.0	0.06	11	PAHROC SUMMIT PASS
23	17:12:12	36.731	116.096	0.3	8.92	0.5	149	ACS				0.89		14.3	0.05	14	CAMP DESERT ROCK
24	6:33:37	36.672	115.564	0.8	12.00•	——	244	CDT				1.22		22.1	0.07	12	HEAVENS WELL
25	1:53:30	37.563	118.005	0.4	4.69	1.6	256	ADI				1.52		17.5	0.08	17	•••QUAD. NOT LISTED•
25	2:52: 5	37.749	117.341	0.3	8.94	0.7	151	ACI	2.42	1.72	1.39	1.61		6.6	0.10	22	MONTEZUMA PEAK
25	4: 3:28	38.497	116.036	0.8	3.63	1.5	259	ADS	2.29			2.41		45.6	0.06	9	•••QUAD. NOT LISTED•
25	4: 4: 1	38.484	116.050	2.2	7.61	1.0++	269	BDI	2.74					43.7	0.05	7	•••QUAD. NOT LISTED•
25	8:10:49	38.476	116.042	1.2	7.95	0.6++	254	BDI	2.64				4.2	43.7	0.09	15	•••QUAD. NOT LISTED•
25	16:30: 1	37.198	117.37?	0.2	8.66	0.6	107	ABI		1.40		1.56	1.9	15.7	0.08	23	UBEHEBE CRATER
26	3: 2: 5	37.133	115.119	1.4	9.92	3.8++	222	BDI			1.96	1.54		31.0	0.12	9	LOWER PAHRANAGAT LAKE
26	13:48: 3	37.869	116.133	0.5	7.00	8.3	109	CCI		1.43		1.52		48.4	0.10	13	REVEILLE PEAK
27	3:28:52	37.069	115.754	0.5	4.55	9.4	125	CCS	1.51	1.26	1.46	1.46		27.5	0.12	21	PAPOOSE LAKE SE
27	7:52:20	37.868	116.134	0.4	7.00	7.2	108	CCI		1.44		1.45		48.5	0.10	15	REVEILLE PEAK
27	8:37:23	37.176	117.392	0.1	0.12	0.3	117	ACZ	1.32	1.28	1.41	1.30		18.3	0.05	21	UBEHEBE CRATER
27	10:42:16	37.871	116.127	0.2	0.16	0.3	109	ACS	2.03	1.75	1.97	2.13		20.6	0.07	22	REVEILLE PEAK
27	12:39:52	37.869	116.137	0.4	7.00	7.8	108	CCI		1.47		1.60		48.3	0.10	14	REVEILLE PEAK
28	6: 0: 3	37.864	116.131	0.3	0.42	0.4	108	ACI	1.79	1.82	2.21	1.85	2.0	20.4	0.11	26	REVEILLE PEAK
28	17:25: 9	37.869	116.132	0.2	5.87	2.6	109	BCI	2.39		2.85		2.7	20.8	0.08	27	REVEILLE PEAK
28	17:41: 6	37.861	116.136	0.3	0.60	0.6	107	ACS		1.47		1.70		20.6	0.07	10	REVEILLE PEAK
29	1:37:51	36.860	116.170	0.6	6.22	0.5	212	ADI	1.17	0.79		0.54		0.7	0.06	10	SKULL MTN
29	2:47:21	36.861	116.170	0.7	6.57	0.5	213	ADI	1.22	0.87		0.63		0.7	0.08	11	SKULL MTN
29	6:10:13	36.442	117.501	0.9	0.54	0.8	239	ADI	1.88	1.74		1.94		30.2	0.09	19	DARWIN
29	6:19:30	37.865	116.128	0.6	-0.61	1.0	108	BCI		1.26		1.53		20.3	0.15	14	REVEILLE PEAK
30	0:39:17	37.877	116.128	0.3	-0.44	0.6	111	ACS	1.91	1.75	2.03	1.92		21.1	0.13	20	REVEILLE PEAK
30	19:17:48	36.953	115.271	0.5	12.64	2.3	147	BCS				1.45		25.1	0.11	11	BURRO BASIN
30	22:23:46	37.270	118.199	2.0	0.43	1.5	305	BDI				1.19		31.1	0.07	11	•••QUAD. NOT LISTED•
31	12:46:23	37.308	117.718	0.4	-0.52	0.8	165	ADA		0.72				10.5	0.02	5	MAGRUDER MTN
31	13:26:21	37.374	117.887	——	2.72	——	217	ADA		0.75				6.0	0.05	4	SOLDIER PASS
31	17:20:27	36.574	116.052	0.3	12.75	0.5	157	ACI				1.09		12.6	0.04	12	SPECTER RANGE SE
31	23: 6:59	36.751	116.533	0.3	1.52	1.2	177	ACZ	1.42	0.91		0.85		5.6	0.07	14	BARE MTN
NOV 1	5:38:32	36.713	116.399	0.6	4.75	2.1	150	BCS	1.05	0.93		0.36		9.2	0.08	11	LATHROP WELLS NW
1	5:48:22	36.634	116.332	0.9	3.97	0.7	280	ADZ		0.61		0.77		1.4	0.11	13	STRIPED HILLS
1	12:48: 4	36.785	116.259	0.2	-1.40	0.2	148	ACZ	1.15	0.87		0.46		4.9	0.06	15	JACKASS FLATS
1	13:59:32	36.420	116.651	5.0	25.84	2.7	315	DDI				1.72		37.4	0.04	10	RYAN
1	18:47:46	37.420	115.638	0.3	0.97	0.5	74	ACI	2.06	1.77		2.13	2.1	15.3	0.13	30	BALD MTN
1	19:33:10	37.271	114.545	0.8	13.86	1.0++	238	ADI	1.60	1.70		1.73		40.9	0.07	11	ELGIN
2	22: 8:33	37.865	116.135	0.4	0.81	0.7	108	ACZ	1.78	1.72		1.91		20.8	0.13	18	REVEILLE PEAK
2	23:38:14	37.178	115.498	0.4	3.21•	——	124	CCI	1.96	1.73		1.97		27.7	0.13	22	DESERT HILLS NW
3	3:18:52	37.877	116.128	0.7	0.00	1.2	110	BCI		1.70		1.37		21.0	0.15	13	REVEILLE PEAK
3	8:59:18	37.883	116.127	0.5	-0.71	0.9	112	BCZ				1.58		21.4	0.17	16	REVEILLE PEAK
3	9: 2:48	37.870	116.132	0.6	0.77	1.0	109	ACS		1.55		1.41		20.9	0.15	12	REVEILLE PEAK

1987 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
NOV 3	17: 3:17	36.651	116.546	0.2	4.18	2.2	174	BCI	1.16	1.01		0.71		15.8	0.06	18	BIG DUNE
3	20:38:50	36.862	116.157	0.2	1.77	0.4	92	ABI	1.34			1.07		1.4	0.08	20	SKULL MTN
4	18:41: 9	37.376	117.207	0.1	-0.10	0.2	144	ACS		1.16		1.23		9.5	0.03	15	STONEWALL PASS
5	0:34:46	37.855	116.132	0.6	0.00	0.9	106	BCI		1.59		1.69		19.9	0.16	14	REVEILLE PEAK
6	4:45:42	36.421	116.311	0.2	4.02	2.5	103	BCI	1.64	1.00		0.96		15.1	0.05	15	ASH MEADOWS
6	12:31:32	37.878	116.138	0.8	-0.32	1.0	199	ADI	1.97	1.71		1.73	1.7	21.9	0.12	9	REVEILLE PEAK
6	14:20: 2	37.094	115.772	0.6	16.86	1.4	180	ADA		1.18				24.7	0.03	8	PAPOOSE LAKE SE
6	15:52:35	37.292	116.028	0.4	4.36	1.7	100	ACI	1.13		1.05	1.04		10.3	0.09	16	OAK SPRING BUTTE
6	15:57:53	37.297	116.029	0.2	0.46	0.4	102	ACI			1.14	1.09		10.9	0.08	16	OAK SPRING BUTTE
6	22:49:53	37.677	115.092	0.4	1.01	1.7	97	ACZ				1.21	1.6	14.0	0.05	8	HIKO NE
7	3:41:38	37.868	116.131	0.5	7.00	7.8	113	CCI		1.47		1.51	1.7	48.6	0.09	15	REVEILLE PEAK
7	6: 0:34	36.758	115.791	0.3	0.01	0.5	139	ACZ				0.78		7.3	0.07	17	FRENCHMAN LAKE SE
7	6:15:57	37.869	116.132	0.2	1.16	0.8	109	ACS		1.61		1.87	1.7	20.8	0.09	19	REVEILLE PEAK
8	14:27:57	37.484	114.446	2.2	-1.54	1.6	293	BDZ		1.55		1.66		29.2	0.04	8	•••QUAD. NOT LISTED•
9	10:14:49	36.813	117.474	0.7	1.93	1.4	166	BDI		1.24		1.44	1.5	6.3	0.15	22	TIN MTN
9	23:32:58	37.696	114.963	0.2	1.93	0.5	141	ACI	1.50	1.49	1.68	1.60		5.4	0.03	8	PAHROC SPRING
10	11:49:28	35.934	117.014	0.5	4.84	1.5	278	ADS	2.01	1.30		1.50		13.7	0.04	10	MANLY PEAK
11	4:41:35	37.051	116.317	0.2	2.65	0.2	102	ABI		0.88		0.65		6.4	0.05	17	BUCKBOARD MESA
11	8: 3: 1	37.139	114.815	0.6	5.33	4.9+	210	BDI	1.83	1.86	2.01	1.81		33.2	0.06	11	DELAMAR 3 NE
11	11:56:43	37.694	114.964	0.5	0.63	0.8	140	ACI	1.34	0.88		1.07		5.2	0.10	9	PAHROC SPRING
11	12:32: 4	37.694	114.963	0.3	1.91	0.6	141	ACI		0.93		1.05		5.2	0.05	10	PAHROC SPRING
12	22:10:20	36.771	116.265	0.2	-1.70	0.3	149	ACZ	1.12	1.09	1.81	0.61		3.2	0.07	21	JACKASS FLATS
13	4:15:46	37.866	116.135	0.5	7.00	8.7	108	CCI	1.77	1.61		1.74	1.7	48.7	0.12	15	REVEILLE PEAK
14	7:56:45	35.897	117.237	1.0	3.11•	—	280	CDI	1.71	1.35		1.61		34.2	0.10	9	MANLY PEAK
14	15:27:21	37.867	116.132	0.2	5.76	3.1+	108	BCI	2.58		2.78	2.77		20.7	0.11	30	REVEILLE PEAK
14	22:49:58	37.855	116.133	0.4	4.51	5.4	133	CCI		1.44		1.94		20.0	0.08	11	REVEILLE PEAK
15	3:37:40	37.868	116.127	0.4	0.09	0.6+	109	ACI		1.49		1.68		20.3	0.09	12	REVEILLE PEAK
15	4:17: 2	37.870	116.126	0.3	7.04	3.7	109	BCI	2.25		2.61	2.71		20.5	0.10	20	REVEILLE PEAK
15	5:53:22	37.853	116.137	0.5	7.43	2.0	205	BDI		1.30		1.59		20.2	0.04	7	REVEILLE PEAK
15	9:25:51	37.875	116.115	3.1	2.32•	—	244	CDA		1.63				50.7	0.16	11	REVEILLE PEAK
15	14: 7:50	37.850	116.118	2.2	2.58•	—	250	CDA		1.24				49.4	0.10	8	REVEILLE PEAK
15	14: 8:37	37.916	116.111	3.5	2.06•	—	208	CDA		1.98				53.3	0.23	7	REVEILLE PEAK
15	15:14:20	37.866	116.136	1.5	2.13•	—	199	CDA		1.64				51.7	0.18	14	REVEILLE PEAK
15	16:26:11	37.853	116.105	1.5	8.96	1.9	201	BDA		1.54				48.6	0.10	14	REVEILLE PEAK
15	18:43:60	37.848	116.124	3.6	2.47•	—	248	CDA		1.80				49.7	0.21	14	REVEILLE PEAK
15	20:56:19	37.381	115.492	0.6	2.77•	—	94	CCA		1.96				25.4	0.14	15	CRESCENT RESERVOIR
16	0:50:16	37.863	116.139	0.6	1.71	5.0	107	BCA		1.88				20.9	0.17	16	REVEILLE PEAK
16	17:58: 3	37.858	116.134	0.5	-0.18	0.9	107	ACI		1.61		1.90	1.8	20.3	0.14	12	REVEILLE PEAK
16	17:58:52	37.851	116.140	0.5	2.46	3.3	105	BCS				1.71		20.3	0.07	8	REVEILLE PEAK
16	21: 3: 4	37.856	116.135	0.6	2.00	1.8+	106	ACI		1.36		1.55		20.2	0.11	9	REVEILLE PEAK
16	23:29:47	37.860	116.102	0.6	-0.78	0.7	213	ADI				1.43		18.1	0.08	11	REVEILLE PEAK
18	2:31:50	35.924	117.215	1.9	2.62	5.7	268	CDI	2.03			2.12		31.7	0.09	16	MANLY PEAK
18	9: 6:34	37.741	115.014	0.4	0.68	0.5	139	ACI		0.89		1.16		12.0	0.06	9	HIKO NE
18	21:14:32	37.693	114.964	0.6	1.77	1.5	140	ACI						5.1	0.09	11	PAHROC SPRING

1987 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)	QOD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
NOV 19	1: 1:48	36.867	116.798	2.1	7.16	5.4	246	CDT				0.71		17.1	0.08	8	BULLFROG
19	15:45:23	37.037	117.405	0.4	-0.56	0.4	134	ABZ	1.43		1.19	1.26		6.7	0.12	15	UBEHEBE CRATER
19	15:53:49	37.524	114.566	0.5	4.30	2.7	301	BDI	1.91			1.75		17.7	0.08	6	CALIENTE
19	23:30:57	37.875	116.138	0.4	-0.37	0.5	201	ADI				1.52		21.6	0.06	9	REVEILLE PEAK
19	23:55:40	37.080	117.349	0.3	1.62	1.1	113	ABZ	1.46		1.57	1.52		8.9	0.08	19	UBEHEBE CRATER
20	8:27:53	37.863	116.139	0.4	-0.06	1.1	107	ACA		1.17				20.9	0.08	10	REVEILLE PEAK
21	10:10:35	37.010	116.211	0.2	3.74	0.4	82	AAI	1.71	1.01		1.24		3.4	0.05	19	TIPPIPAH SPRING
21	19:37:52	37.868	116.132	0.2	1.39	0.7	108	ACI	2.01	1.89		2.30	2.1	20.7	0.07	22	REVEILLC PEAK
21	19:50:46	37.868	116.130	0.2	6.06	2.8	109	BCI	2.55		3.04			20.5	0.11	24	REVEILLE PEAK
21	21: 5:27	37.737	115.023	0.4	5.39	2.0	134	BCI	2.13	1.19	1.77	1.67		12.1	0.08	10	HIKO NE
21	23:26:35	37.867	116.132	0.6	0.91	1.0	108	BCZ		1.43		1.65		20.6	0.15	13	REVEILLE PEAK
22	16:33:18	37.869	116.130	0.3	0.66	0.5	109	ACI	2.06			2.31	2.3	20.6	0.12	26	REVEILLE PEAK
22	22: 0:59	37.866	116.132	0.5	2.98	4.1	108	UCI	2.03	1.69	1.73	2.02		20.6	0.17	17	REVEILLE PEAK
22	22:18:28	37.865	116.137	0.6	2.48	4.8	108	BCI		1.39		1.62		20.9	0.12	11	REVEILLE PEAK
22	23:50:24	37.876	116.127	0.4	15.45	2.0	112	ACI		1.47		1.58		48.1	0.06	12	REVEILLE PEAK
23	18:14:16	37.287	115.154	0.4	2.23	1.2	147	ACZ			1.46			13.4	0.05	8	ALAMO
24	0:23:34	36.789	116.230	0.2	-0.38	0.2	69	ABS	1.35	1.09		0.87		6.4	0.07	21	SKULL MTN
27	7:22:39	37.867	116.131	0.4	-0.38	0.7	108	ACS		1.44		1.72		20.6	0.14	18	REVEILLE PEAK
27	7:38:38	37.864	116.135	0.3	5.40	3.7	108	BCI	1.67	1.81		1.94		20.7	0.15	27	REVEILLE PEAK
27	11:21:56	37.155	117.397	0.2	7.10	0.7	110	ACI		1.39	1.64	1.52	1.4	17.9	0.06	21	UBEHEBE CRATER
27	11:24:21	37.155	117.395	0.2	6.47	0.9	121	ACI			1.37	1.15		17.9	0.07	19	UBEHEBE CRATER
27	11:25:50	37.156	117.395	0.2	7.18	0.7	110	ACI		1.18	1.56	1.43		17.9	0.06	20	UBEHEBE CRATER
27	12:57:14	37.864	116.131	0.3	0.02	0.5	108	ACI	1.57	1.77		2.02		20.4	0.15	25	REVEILLE PEAK
27	14:51:10	37.869	116.133	0.3	0.13	0.6	109	ACS	1.78	1.73	1.93	2.07		20.9	0.15	25	REVEILLE PEAK
27	19:37: 4	37.864	116.133	0.4	0.00	0.6	108	ACI	2.01	1.86	2.24	2.11		20.6	0.11	14	REVEILLE PEAK
27	19:36:58	37.683	116.225	0.4	3.35•	——	120	CDI		1.85		1.52		52.8	0.07	12	BELTED PEAK
28	4: 0:24	37.698	114.960	0.6	1.79	1.7	143	ACI	1.72			1.47		5.5	0.10	11	PAHROC SPRING
28	14:53:17	37.698	114.959	0.7	1.75	1.6	143	ACI	1.80	1.37	1.76	1.69		5.5	0.09	8	PAHROC SPRING
28	16:28:18	37.442	117.313	1.3	0.49	0.8	209	BDI			1.33	1.14		16.4	0.08	11	MOUNT JACKSON
28	18:29:44	36.503	115.964	0.1	7.06	0.5	98	ACI	1.92	1.50		1.75	1.8	14.4	0.05	29	MERCURY SW
28	23:20:18	37.219	117.903	0.6	-1.89	0.7	223	ADS	1.66		1.76	1.83		22.9	0.07	19	WAUCOBA SPRING
29	1:27: 2	37.029	116.099	0.3	5.75	1.3	138	ACI	1.37	1.22		0.89		11.5	0.09	17	YUCCA FLAT
29	1:35:20	37.030	116.100	0.3	1.53	1.0	138	ACI				0.92		11.5	0.08	16	YUCCA FLAT
29	11:35:47	37.866	116.129	0.3	0.45	0.5	108	ACS	2.28	1.65		1.94		20.4	0.10	18	REVEILLE PEAK
29	18:13:31	36.860	116.725	0.2	2.71	0.7	104	ACI		1.30		0.85		11.2	0.08	24	BARE MTN
29	21:42:41	36.595	116.299	0.3	-0.93	0.3	173	ACS		0.85		1.11		6.7	0.05	15	LATHROP WELLS SE
30	12:18:49	36.785	116.295	0.6	-0.77	0.5	133	ABI			2.13	1.00		5.1	0.14	13	JACKASS FLATS
30	12:26:21	37.028	116.095	0.3	4.86	2.7	178	BCI	1.38	1.27		0.84		11.9	0.08	16	YUCCA FLAT
30	13:40:41	37.025	116.104	0.3	5.94	1.2	116	ABI	1.51	1.21		1.32		11.2	0.13	24	YUCCA FLAT
30	15:52:10	37.026	116.105	0.4	4.52	2.2	116	BCI		1.29		1.06		11.1	0.11	16	YUCCA FLAT
30	23:49:14	37.867	116.132	0.2	1.46	0.8	108	ACI	1.74	1.79		1.99	2.2	20.7	0.08	23	REVEILLE PEAK
30	23:53:19	37.865	116.134	0.4	0.40	0.6	108	ACI	1.78	1.69		2.00	2.1	20.7	0.15	21	REVEILLE PEAK
DEC 1	3:42:14	36.742	115.473	0.2	4.91	6.4	164	CCI				1.58		30.6	0.06	15	BLACK HILLS NW
1	5:13: 5	36.740	115.466	0.4	4.89	11.3	166	CCI				1.32		31.2	0.11	14	BLACK HILLS NW

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DEC	1	8:42:16	36.730	115.451	0.5	4.00*	——	169	CCI				1.54		32.4	0.09	13	BLACK HILLS NW
	1	15:49:33	35.826	116.915	1.2	1.18	2.1	274	BDZ	2.26	2.02		2.23	2.8	15.9	0.12	14	WINGATE WASH
	1	22:28:18	35.817	116.885	0.6	1.15	0.7	319	ADT				1.14		16.4	0.04	7	WINGATE WASH
	2	10:23:11	37.058	116.124	0.2	0.26	0.3	100	ABZ	1.71	1.44		1.54		9.6	0.07	27	YUCCA FLAT
	2	21:12:52	37.868	116.130	0.2	1.40	0.7	109	ACS	1.81	1.75	2.10	2.00	2.3	20.6	0.07	21	REVEILLE PEAK
	3	18:30:17	37.866	116.129	0.6	0.00	1.0	108	BCI		1.51		1.63		20.4	0.15	13	REVEILLE PEAK
	3	19:36:31	37.869	116.127	0.2	3.63	5.9	109	CCI	2.47		3.04			20.4	0.11	35	REVEILLE PEAK
	3	22: 8: 6	37.850	116.143	0.2	6.07	1.9	104	ACI				1.82		20.4	0.02	6	REVEILLE PEAK
	4	6:59:35	36.725	115.474	0.4	-1.81	0.6	165	ACZ		1.17		1.59		30.2	0.09	14	BLACK HILLS NW
	4	7: 6:42	36.712	115.713	0.5	-1.14	0.4	186	ADI	1.99	1.35		1.47		8.9	0.12	15	INDIAN SPRINGS NW
	4	7:59: 3	37.093	116.984	0.3	-0.41	0.4	122	ACI	1.68	1.46	1.40	1.41		13.1	0.09	18	SPRINGDALE
	4	9:43:48	37.547	115.380	0.4	-1.06	0.5	167	ACI		1.11		1.36		17.0	0.10	12	MT IRISH
	5	7:14: 4	36.816	115.806	0.6	2.74	1.7	179	ACZ	1.85	1.42	1.47	1.85		13.6	0.09	27	FRENCHMAN LAKE SE
	5	8: 9:57	37.610	115.075	0.4	6.63	1.3	95	ABI	1.48	1.42		1.53		13.1	0.09	13	HIKO SE
	5	10:15:14	36.813	115.791	0.8	9.41	1.9	213	BDS	2.10	1.83	2.36	2.17	2.2	13.3	0.15	19	FRENCHMAN LAKE SE
	5	13:15:24	36.812	115.796	0.5	7.53	1.0	210	ADI	1.35			1.62		13.2	0.09	21	FRENCHMAN LAKE SE
	6	14:11:60	37.382	117.136	0.3	0.21	0.3	199	ADI		1.26		1.27		14.0	0.06	16	STONEWALL PASS
	6	14:12: 0	37.380	117.135	0.5	4.66	1.8	198	ADT		1.26		1.27		14.0	0.10	16	STONEWALL PASS
	7	11:17:13	36.674	116.184	0.2	6.01	0.8	70	ABI	1.89	1.74	2.82	1.88		11.0	0.08	39	SPECTER RANGE NW
	7	11:27:35	36.671	116.187	0.2	5.70	0.6	94	ABI	1.71	1.37	2.38	1.71		11.0	0.05	21	SPECTER RANGE NW
	7	21:47:10	37.462	115.514	0.3	15.36	1.0	100	ABI	1.50	1.28	1.16	1.50		20.0	0.08	13	GROOM RANGE NE
	8	1:27: 0	37.319	115.182	0.5	6.22	1.9	131	ACI	1.61	1.27		1.41		15.1	0.07	12	ALAMO
	8	6:24:35	37.874	116.125	0.3	-0.51	0.5	110	ACZ		1.55		1.42		20.7	0.08	13	REVEILLE PEAK
	8	23:30:12	37.836	116.143	——	15.89	——	213	ADI				1.24		19.7	0.00	4	REVEILLE PEAK
	9	15:40:10	36.842	116.268	0.3	10.29	0.5	107	ABI				0.56		5.0	0.06	13	JACKASS FLATS
	9	17:16:22	37.866	116.128	0.2	0.29	0.3	108	ACI	1.83	1.72		1.97	2.2	20.3	0.07	20	REVEILLE PEAK
	10	2:35:17	36.737	116.189	0.2	4.82	0.8	69	ABI	2.12	1.45	2.31	2.42	2.3	7.4	0.10	38	SPECTER RANGE NW
	10	2:37:23	36.741	116.194	0.6	4.53	0.8	221	ADI				0.53	1.2	7.0	0.09	14	SPECTER RANGE NW
	10	10: 8:56	36.344	116.808	0.2	0.15	0.3	157	ACI				1.19		21.5	0.06	17	FURNACE CREEK
	11	13:31:59	36.748	116.260	0.3	0.96	0.1	75	AAI	1.58		2.47	1.11		1.2	0.09	22	STRIPED HILLS
	11	19:38:45	36.586	117.083	0.9	6.03	5.9	159	CCI				1.04		18.6	0.07	6	STOVEPIPE WELLS
	12	1:29:26	37.857	116.141	0.3	4.70	4.1	106	BCI		1.50		1.59		20.7	0.06	11	REVEILLE PEAK
	12	1:32:34	37.854	116.139	0.3	9.48	1.5	105	ACI				1.88		20.3	0.05	9	REVEILLE PEAK
	12	1:32:35	37.851	116.134	0.3	10.56	1.6	105	ABI				1.76		19.8	0.06	10	REVEILLE PEAK
	12	1:33:29	37.854	116.145	0.4	12.49	1.7	105	ABS				1.58		24.3	0.05	7	REVEILLE PEAK
	12	1:54:39	37.860	116.136	0.2	0.33	0.3	107	ACZ				1.50		20.5	0.03	8	REVEILLE PEAK
	12	3:53:10	36.735	116.192	0.3	4.95	0.9	157	ACI	1.54			0.73		7.2	0.09	19	SPECTER RANGE NW
	12	4: 8: 9	36.735	116.193	0.2	4.45	0.9	68	ABI	1.68	1.34	2.22	1.42	1.3	7.1	0.09	34	SPECTER RANGE NW
	13	0: 6:11	36.716	116.274	0.5	5.12	0.4	214	ADI				0.63		3.0	0.05	13	STRIPED HILLS
	13	5:45:49	37.056	116.121	0.2	0.88	0.4	126	ABZ		1.09		1.05		9.9	0.04	9	YUCCA FLAT
	13	10: 4:21	36.678	116.309	0.2	6.66	0.2	113	ABI	1.56			0.90		4.4	0.06	19	STRIPED HILLS
	14	6:42: 8	37.860	116.135	1.3	3.05*	——	176	CCA		1.34				20.4	0.13	6	REVEILLE PEAK
	14	19:57:17	37.865	116.129	0.2	-0.13	0.4	108	ACS	1.80	1.69		2.10		20.4	0.07	14	REVEILLE PEAK
	15	13:33:19	35.825	116.910	1.9	-0.16	10.8	276	CDI				2.28		15.9	0.05	7	WINGATE WASH

1987 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)	QOD 12S	Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
DEC 15	14: 4:26	35.837	116.908	1.7	-0.43	1.4	275	BDZ		1.52		1.91		14.5	0.06	9	WINGATE WASH
16	8:50:21	37.074	115.752	0.2	2.01	1.6	109	ACI	1.70		1.43	1.60		27.3	0.07	22	PAPOOSE LAKE SE
16	8:50:36	37.077	115.755	0.4	11.36	1.0	190	ADI			1.17	1.20		26.9	0.04	9	PAPOOSE LAKE SE
17	16:27: 7	36.452	115.738	0.6	11.23	1.2	151	ACI	1.46	1.12		1.38		19.9	0.08	15	CHARLESTON PEAK
17	21: 6:58	36.445	115.760	0.3	-0.08	0.4	93	ACI		1.15		1.37	1.5	20.8	0.11	23	MT STIRLING
17	23:33:29	36.449	115.759	0.3	0.26	0.4	93	ACI	1.76			1.74	1.5	21.1	9.12	24	MT STIRLING
18	0:19:16	36.635	116.334	0.6	3.76	0.5	273	ADZ		0.59		0.84		1.2	0.08	16	STRIPED HILLS
18	1:12:22	36.446	115.758	0.3	-0.38	0.4	93	ACZ	1.34			1.35		20.7	0.12	23	MT STIRLING
19	7:10: 5	37.868	116.130	0.4	-0.03	0.6	109	ACI		1.65		1.74	1.7	20.6	0.13	16	REVEILLE PEAK
20	4:50: 2	36.446	115.760	0.2	0.12	0.3	93	ACI	1.68	1.44	1.61	1.46		20.9	0.09	24	MT STIRLING
20	11:19:25	37.696	115.0[illegible]9	0.2	1.43	0.7	115	ACS		1.11		1.14		11.0	0.03	9	HIKO NE
20	22:45:57	36.742	116.008	0.2	-1.00	0.4	108	ABI	1.83	1.17		1.24		10.0	0.09	24	CAMP DESERT ROCK
21	3: 5:33	37.850	116.143	0.8	9.39	2.8	104	BCI				1.25		20.4	0.07	7	REVEILLE PEAK
21	10:57:37	37.011	116.187	0.2	1.83	0.4	91	ABI	1.36	0.87		0.92		4.8	0.07	20	TIPPIPAH SPRING
21	11:[illegible]1: 4	37.231	116.373	0.2	-0.82	0.2	73	AAS	2.20			1.75		4.8	0.07	23	AMMONIA TANKS
21	15:33:22	37.016	116.191	0.2	1.88	0.5	92	ABI	1.29	1.26		0.90	0.9	4.2	0.08	16	TIPPIPAH SPRING
22	1:28:44	37.013	116.186	0.2	2.59	0.4+	82	AAI	1.64	1.23		1.19		4.7	0.09	24	TIPPIPAH SPRING
22	1:38:47	37.014	116.173	0.6	3.58	1.0	210	ADI	1.20	0.80		0.82		5.6	0.08	15	TIPPIPAH SPRING
22	14:54:48	37.016	116.173	0.4	3.74	0.8	210	ADI	1.41			0.98		5.6	0.08	19	TIPPIPAH SPRING
23	9:36:20	37.020	116.212	0.8	2.56	0.7	261	ADI				0.25		2.4	0.02	5	TIPPIPAH SPRING
23	14: 7:32	37.010	117.961	1.3	11.93	4.2++	242	BDI	2.26			2.66	2.3	37.3	0.12	12	WAUCOBA SPRING
24	16:12:21	36.252	117.212	—	5.44	—	254	ADA		2.12				44.1	0.10	4	EMIGRANT CANYON
24	19:31: 9	37.312	115.894	0.6	5.97	1.0	184	ADS	2.04			2.31	2.7	11.0	0.09	19	GROOM MINE SW
25	1:33:27	37.106	116.868	0.2	-0.38	0.3	150	ACS	1.88			1.93		13.4	0.06	22	SPRINGDALE
26	22:28:32	37.576	117.782	0.5	0.59	0.9	139	ACI		1.42	1.72	1.59		15.6	0.08	10	PIPER PEAK
27	12: 1:52	37.013	116.188	0.2	1.75	0.5	138	ACI	1.36	1.24		0.85		4.5	0.07	16	TIPPIPAH SPRING
27	16:40:25	37.888	116.123	0.7	0.22	0.6++	251	ADI	2.08		2.[illegible]9	2.60		59.0	0.10	17	REVEILLE PEAK
28	5:29:40	36.414	117.534	0.4	4.92	0.8++	224	ADS		1.21		1.44		44.8	0.06	16	DARWIN
28	6:42:26	37.867	116.129	0.9	3.96•	—	274	CDI		1.51		1.80		67.0	0.06	14	REVEILLE PEAK
29	1:49:12	36.499	115.125	1.4	14.46	1.2	249	BDI		1.47		1.81	2.0	3.2	0.14	14	GASS PEAK NW
30	19:31:46	36.111	115.364	1.1	2.16	3.1	295	BDS				1.83		30.6	0.09	12	BLUE DIAMOND SE
30	22:50:42	38.450	116.056	1.6	11.28	0.7	261	BDI	2.87		4.35			83.6	0.11	32	SGBasin
31	3:27:18	37.843	116.142	0.9	2.53	3.7	238	BDS				1.64		65.2	0.07	12	REVEILLE PEAK
31	8:12:57	36.494	115.114	0.7	16.43	0.5	242	ADI	2.12			2.03		4.4	0.09	18	GASS PEAK NE
31	13:37:51	36.500	115.127	0.8	15.47	0.6	240	ADI				1.58		3.0	0.08	13	HAYFORD PEAK

1988 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 1	15:38:38	37.853	116.128	0.4	-0.25	0.7	106	ACI				1.49		19.5	0.12	13	REVEILLE PEAK
1	22:51:39	37.855	116.129	0.5	0.00••	0.9	106	ACZ		1.43		1.70		19.7	0.11	13	REVEILLE PEAK
2	8:19:41	37.853	116.132	0.3	0.72••	0.5	106	ACZ	1.82	1.77	1.96	2.16		19.8	0.13	25	REVEILLE PEAK
2	11:15:60	37.456	115.424	0.3	11.57	1.9++	100	ACI			1.10	1.12		26.0	0.08	10	CRESCENT RESERVOIR
2	13: 9:53	37.127	116.101	0.3	6.06	1.0	109	ABI		1.35		1.35	1.2	10.9	0.08	20	OAK SPRING
2	15:48:30	38.480	116.040	1.0	3.10•	—	256	CDI	1.91	1.83		2.11		44.1	0.10	9	•••QUAD. NOT LISTED•
2	19:38:45	37.854	116.132	0.4	0.62	0.7	106	ACZ		2.09				19.9	0.12	19	REVEILLE PEAK
2	23: 7: 1	37.317	115.066	0.0	-0.79	—	171	ADZ		1.34				10.0	0.00	5	ALAMO SE
3	8:36:30	36.677	116.339	0.3	10.72	0.2	132	ABI	1.18	0.95		0.87		3.5	0.05	21	STRIPED HILLS
3	9: 5:44	36.676	116.339	0.3	10.40	0.3	132	ABI	0.83	0.52		0.63		3.4	0.05	17	STRIPED HILLS
3	10:12:21	36.736	116.188	0.2	3.73	1.0	105	ABI	1.30	0.96		0.82		7.6	0.08	24	SPECTER RANGE NW
3	22: 8:56	36.435	115.767	0.4	-0.94	0.4	173	ACZ		1.01				20.5	0.05	10	MT STIRLING
4	11:14:49	37.851	116.132	0.4	1.45	1.3	105	BCZ	1.56	1.45	1.55	1.81		19.7	0.17	17	REVEILLE PEAK
4	15: 5:39	37.018	116.460	0.2	10.48	0.5	132	ABI	1.16	0.88		0.79	1.0	6.8	0.06	19	TIMBER MTN
4	15:49:56	37.928	117.620	0.7	1.95	3.4	218	BDI		1.87		2.04	2.3	28.7	0.07	11	SILVER PEAK
4	20:50: 1	37.848	116.137	0.5	0.80	0.9	104	BCZ	1.58	1.70	1.67	1.93	2.2	19.9	0.15	17	REVEILLE PEAK
6	2:41:46	37.852	116.136	0.6	3.15•	—	241	CDA		0.96				20.0	0.03	5	REVEILLE PEAK
6	5:19: 4	37.937	116.152	—	3.16	—	274	CDA		1.00				27.2	0.48	4	REVEILLE PEAK
6	8:21:55	36.573	115.613	—	3.14	—	247	ADA		0.57				28.1	0.09	4	INDIAN SPRINGS SE
7	10: 6: 8	37.129	115.224	0.5	8.89	0.8	188	ADI		1.31	1.72	1.52		5.5	0.08	11	LOWER PAHRANAGAT LAKE
7	13:57:27	37.860	116.138	1.0	-0.25	1.8	107	ACI		1.28		1.38		20.7	0.14	8	REVEILLE PEAK
8	16:33: 8	37.076	115.762	0.3	0.53	0.5	120	ACZ	2.23	1.84	2.35	2.21		26.5	0.10	28	PAPOOSE LAKE SE
8	20: 1: 8	37.852	116.131	0.4	0.28	0.7	106	ACI	1.60	1.74		1.86		19.6	0.13	16	REVEILLE PEAK
8	20:27:50	37.490	115.770	0.5	0.74	0.7	58	ACZ		1.52	1.43	1.64		16.5	0.12	11	GROOM MINE NE
8	23:16:53	37.332	116.469	0.2	0.08	0.3	61	ACZ		1.58		1.11		15.8	0.08	24	SILENT BUTTE
9	3:44:16	37.293	114.814	1.4	10.76	3.4	222	BDA		2.26				24.5	0.10	8	GREGERSON BASIN
9	11:31:53	37.589	115.680	2.8	1.29	3.9	121	CBA		1.23				3.0	0.27	6	TEMPIUTE MTN
9	16:40:58	37.857	116.148	—	0.37	—	244	ADA		0.92				21.2	0.13	4	REVEILLE PEAK
9	16:54:51	36.192	115.498	—	14.15	—	326	ADA		0.92				16.3	0.00	4	LA MADRE MTN
10	18:51:33	37.313	114.657	0.7	-0.23	0.8	229	ADZ	1.77	1.45	1.75	1.82		33.3	0.04	8	ELGIN SW
11	2:13:53	37.032	116.248	0.3	5.78	0.7	65	AAI	2.07	1.61		1.63	2.0	1.8	0.12	31	TIPPIPAH SPRING
12	13:46:20	36.268	117.408	0.6	1.18	2.0	236	BDI	1.52	1.38	1.30	1.60		32.0	0.08	17	PANAMINT BUTTE
12	14:53:20	37.185	115.793	0.3	8.03	0.9	102	ACI	1.74	1.50		1.66		16.5	0.09	30	PAPOOSE LAKE NE
13	9:35:20	36.591	117.097	0.3	8.07	1.1++	117	ACI	1.85	1.62		1.99		17.3	0.09	28	STOVEPIPE WELLS
13	20:29:43	36.426	115.703	0.3	7.10	1.0++	98	ACI	1.51	1.14	1.36	1.45		15.7	0.07	20	CHARLESTON PEAK
14	2:23:55	36.765	116.066	0.4	8.97	0.6	135	ABI		1.11		1.10		13.5	0.09	22	CANE SPRING
14	2:54: 6	36.677	116.339	0.3	10.49	0.3	131	ABI		0.86		0.86		3.5	0.07	19	STRIPED HILLS
14	5:16:33	36.681	116.328	0.2	9.98	0.3	47	AAU	1.95	1.68	2.59	2.09		4.1	0.08	44	STRIPED HILLS
14	5:29:56	36.680	116.329	0.4	10.10	0.4	157	ACI		0.75		0.92		4.0	0.06	15	STRIPED HILLS
14	5:46: 8	36.681	116.328	0.2	10.06	0.3	54	AAI	1.78	1.66	1.96	1.30		4.1	0.07	34	STRIPED HILLS
14	5:49:16	36.764	116.066	0.4	9.32	0.7	146	ACI				0.80		13.6	0.08	17	CANE SPRING
14	7:35:11	36.679	116.323	0.4	10.56	0.5	169	ACI				0.70		4.0	0.07	13	STRIPED HILLS
14	7:35:55	36.681	116.328	0.1	10.08	0.2	54	AAI	1.81	1.75	2.36	2.01		4.0	0.06	42	STRIPED HILLS
14	9:27:18	36.683	116.329	0.3	10.22	0.4	155	ACI				0.40		4.3	0.04	9	STRIPED HILLS

1988 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 14	9:27:27	36.678	116.335	0.3	10.34	0.3	144	ACI		0.68		0.77	1.2	3.7	0.06	16	STRIPED HILLS
14	14:59: 3	37.854	116.129	0.6	0.00**	1.0	106	ACI		1.34		1.64		19.6	0.14	14	REVEILLE PEAK
14	19: 8:52	36.677	116.331	0.3	10.23	0.3	156	ACI		1.28		0.71		3.6	0.04	13	STRIPED HILLS
14	21:38:59	36.682	116.330	0.4	10.02	0.4	155	ACI				0.78		4.1	0.06	12	STRIPED HILLS
14	22:17:39	36.681	116.331	0.3	9.94	0.3	154	ACI	1.31	0.68		0.77		4.0	0.04	11	STRIPED HILLS
15	11:22:33	36.682	116.334	0.3	10.04	0.3	147	ACI		1.17		0.72		4.0	0.04	13	STRIPED HILLS
15	11:30: 1	36.686	116.340	0.3	9.16	0.3	136	ACI				0.88		4.6	0.05	14	STRIPED HILLS
15	11:47:38	36.686	116.337	0.3	9.36	0.4	141	ACI		0.94		0.89		4.5	0.05	14	STRIPED HILLS
15	18:56:43	36.682	116.332	0.3	10.01	0.4	151	ACI				0.73		4.1	0.04	9	STRIPED HILLS
15	19:46:56	37.334	117.766	0.4	-0.84	0.6	158	ACZ				1.31		15.5	0.09	11	SOLDIER PASS
15	21:42:30	36.675	116.341	0.3	10.49	0.3	136	ACI		0.98		0.99		3.3	0.06	17	STRIPED HILLS
16	4:29:20	36.679	116.328	0.3	10.13	0.3	114	ABI				0.79		3.9	0.05	13	STRIPED HILLS
16	5:53:26	36.680	116.329	0.2	10.10	0.2	116	ABI	1.57	1.08		1.11	1.5	3.9	0.06	20	STRIPED HILLS
16	14: 0:40	36.517	115.782	0.5	0.66	0.8	184	ADI		0.61	1.15	1.11		22.6	0.07	11	MERCURY SE
17	3: 5:38	37.855	116.129	0.3	0.00**	0.6	106	ACZ	1.86	1.79	2.01	2.19		19.7	0.13	23	REVEILLE PEAK
17	9: 7:32	37.191	117.398	0.2	-1.18	0.3	114	ACZ		1.02	1.16	1.07		17.4	0.04	13	UBEHEBE CRATER
18	3:30:11	37.851	116.135	0.5	0.27	0.8	105	ACI		1.58		1.67		19.9	0.15	17	REVEILLE PEAK
18	4:12:60	37.225	114.997	1.3	8.32	2.3	243	BDI				1.33		18.0	0.06	6	DELAMAR 3 NW
18	6: 6:52	37.239	117.305	0.3	8.37	0.5	85	AAI				1.37		8.0	0.05	11	UBEHEBE CRATER
18	6:12:52	37.236	117.313	0.5	6.97	1.0	83	ABI		0.97		1.45		8.7	0.11	15	UBEHEBE CRATER
18	6:23:20	37.232	117.319	0.4	4.43	1.3	85	ABZ		1.07		1.27		9.4	0.11	19	UBEHEBE CRATER
18	6:24: 5	37.239	117.320	0.4	5.86	0.9	84	ABI			1.42	1.12		8.9	0.09	10	UBEHEBE CRATER
18	6:47:31	37.236	117.314	0.4	6.92	0.8++	83	ABI	1.47	1.17		1.59		8.8	0.10	17	UBEHEBE CRATER
18	23:52:38	36.307	117.119	1.0	7.93	0.8	190	BDI				1.09		6.7	0.07	7	EMIGRANT CANYON
19	8:32: 8	36.873	115.973	0.2	1.96	0.7	125	ACI	1.65	1.09		1.34	1.5	17.5	0.08	21	FRENCHMAN FLAT
19	15: 1:24	37.226	117.322	0.4	4.20	1.8	87	ACI		1.07		1.51		10.1	0.09	11	UBEHEBE CRATER
20	7:55:12	37.096	116.411	0.2	0.17	0.3	81	ABZ	1.48	1.13		1.23	1.1	7.1	0.06	19	TIMBER MTN
20	18:50:26	36.674	116.337	0.5	8.73	0.5	276	ADI				1.00		9.5	0.04	9	STRIPED HILLS
20	21:22:31	36.743	115.822	1.1	4.05	1.8	226	BDZ				1.06		5.5	0.06	10	MERCURY NE
22	10:50: 9	36.814	115.380	0.6	-0.72	1.0	127	ACZ		1.36		1.62		30.5	0.12	8	DOG BONE LAKE SOUTH
23	5:57:34	37.815	115.353	0.3	2.36	1.2	99	ACZ	2.00	1.80	1.82	2.15	2.1	10.3	0.11	20	
23	11:40:21	37.852	116.131	0.4	0.53	0.7	105	ACZ		1.70		1.83		19.6	0.14	18	REVEILLE PEAK
23	17:52:17	37.392	117.231	0.6	2.06	1.9	124	ACA		0.99				10.3	0.10	9	STONEWALL PASS
24	5:16:48	37.849	116.133	0.6	0.26	1.1	105	ACI	1.55	1.68		1.83		19.7	0.15	14	REVEILLE PEAK
24	12:48:44	36.819	115.799	0.5	4.59	2.6	182	BDI	1.90	1.78		1.99	2.1	13.9	0.10	22	FRENCHMAN LAKE SE
26	11:50:35	38.442	114.861	4.3	7.00	1.6	273	CDI			3.17	2.96	3.1	64.8	0.19	14	***QUAD. NOT LISTED*
26	11:57:33	36.445	115.759	0.2	0.23	0.3	93	ACZ		1.17	1.13	1.37		20.8	0.09	22	MT STIRLING
26	12:18:10	36.994	117.884	0.9	0.21	0.8	241	ADI		1.35		1.41		33.9	0.08	11	WAUCOBA WASH
26	12:18:15	37.234	117.648	8.2	0.00**	2.5	157	DCZ		1.27		0.90		0.2	2.16	11	LAST CHANCE RANGE
26	18:17:22	37.190	116.746	0.2	6.68	0.5	69	AAI	2.08		2.41	2.14	2.1	5.2	0.09	38	THIRSTY CANYON NW
26	19: 7: 6	36.422	116.936	0.3	12.20	1.1	117	ABI		1.29	1.32	1.20		14.3	0.10	17	FURNACE CREEK
26	23:54:10	37.852	116.131	0.3	0.74	0.6	106	ACZ	1.95	2.05	2.22	2.12	2.6	19.7	0.13	24	REVEILLE PEAK
27	5:59:54	37.271	116.305	1.1	2.95	0.6	267	BDI			1.43	1.09		6.5	0.08	12	DEAD HORSE FLAT
27	12:23:23	36.443	115.758	0.2	-0.04	0.3	94	ACI		1.03	1.23	1.11		20.6	0.08	21	MT STIRLING

1988 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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JAN 27	17:37:46	37.865	116.134	0.4	-0.29	0.7	108	ACI	1.60	1.73	1.55	1.86		20.7	0.13	17	REVEILLE PEAK
27	22: 5:47	37.549	117.562	0.4	-0.51	0.5	185	ADZ			1.32	1.22		13.3	0.09	12	LIDA WASH
28	14:58:53	38.402	114.895	3.4	0.00••	3.5	269	CDZ	2.48		2.69	2.65	2.4	59.7	0.16	11	•••QUAD. NOT LISTED•
28	16:47:12	36.770	115.558	0.7	3.27•	—	97	CCA		1.36				24.1	0.16	11	TIM SPRING
30	1:38:11	38.387	114.878	4.2	6.96	3.4	269	CDZ						58.5	0.15	10	•••QUAD. NOT LISTED•
30	6:57: 6	37.853	116.123	0.4	-0.08	0.8	106	ACI	2.23			2.55		19.6	0.11	15	REVEILLE PEAK
30	16: 4:14	37.516	118.025	1.0	5.29	2.2	256	BDI	1.78			1.88	1.9	14.5	0.08	10	•••QUAD. NOT LISTED•
30	18:38: 6	36.447	115.757	0.2	0.25	0.3	93	ACI		1.07		1.01		20.7	0.08	16	MT STIRLING
FEB 1	15:50:51	36.996	116.071	0.2	0.84	0.4	133	ACI	1.45	1.03		1.19		15.5	0.06	12	YUCCA LAKE
1	18:37:46	38.738	116.429	1.5	7.78	0.8	302	BDI				3.02		110.6	0.08	14	•••QUAD. NOT LISTED•
3	15:47:22	36.703	115.844	0.4	-1.53	0.8	146	ACI	1.73	1.42		1.38		11.5	0.09	16	MERCURY NE
3	21:13:22	36.800	115.803	0.8	-1.02	1.0	211	ADZ	1.76			1.32		21.0	0.09	12	FRENCHMAN LAKE SE
4	4:50:25	38.368	114.946	2.4	-1.54	1.6	264	BDZ	2.05	1.51	2.12	2.03		55.0	0.10	7	SILVER KING WELL
4	4:50:32	37.995	115.326	4.7	7.00•	—	194	DDI	2.05	1.44	1.88	1.62		23.5	1.53	7	
4	23: 6: 2	35.966	116.763	3.5	4.94	11.8	197	CDA		1.58				9.4	0.19	7	WINGATE WASH
5	0:36:29	35.947	116.770	1.0	2.99	4.0	212	BDI	2.18			2.13		9.0	0.11	12	WINGATE WASH
5	11: 6:55	37.792	118.152	5.2	2.58•	—	307	DDI		1.52		1.78	2.0	31.9	0.11	12	•••QUAD. NOT LISTED•
5	11:16:46	35.940	116.774	1.1	6.07	2.0	218	BDI	2.09			2.13	2.3	8.9	0.11	12	WINGATE WASH
5	11:50:55	37.782	118.135	5.2	-0.18	4.0	303	DDI		1.70		1.94		30.2	0.10	10	•••QUAD. NOT LISTED•
5	11:53: 1	37.804	118.192	1.2	3.40•	—	310	CDI		1.48		1.59		35.6	0.07	7	•••QUAD. NOT LISTED•
5	12:20: 8	37.799	118.150	5.2	1.50•	—	300	DDI				1.44		31.9	0.07	8	•••QUAD. NOT LISTED•
5	13:43: 5	35.948	116.768	0.9	3.21•	—	306	CDI		1.37		1.44		27.8	0.07	8	WINGATE WASH
5	22:43:38	35.939	116.804	6.5	2.69•	—	313	DDI		1.44		1.43		29.8	0.09	6	WINGATE WASH
6	2:58:36	37.214	116.487	0.2	-0.23	0.3	105	ACZ	1.67	1.01		1.10		14.5	0.09	26	SCRUGHAM PEAK
6	8:12:48	35.954	116.778	1.4	4.97	3.3	207	BDI	2.04		1.95	2.10		8.2	0.11	13	WINGATE WASH
6	12:58: 3	36.376	117.476	0.8	5.95	6.6	238	CDI		1.39		1.62		48.0	0.11	17	PANAMINT BUTTE
6	18:46:33	35.950	116.774	1.1	5.57	2.5	210	BDZ	1.89	1.60		1.87		8.6	0.10	10	WINGATE WASH
7	6:23:42	35.942	116.782	1.0	3.22	1.8	218	ADZ	2.18		2.39	2.21		8.1	0.14	22	WINGATE WASH
7	13:47:18	35.936	116.793	1.0	5.39	6.4	291	CDI		1.51		1.43		29.8	0.11	9	WINGATE WASH
7	16:47:42	37.054	116.056	0.4	4.51	3.0	112	BCI	2.11		2.10	1.98		13.5	0.22	38	YUCCA FLAT
7	17:16:32	37.364	115.445	0.2	0.58	0.2	130	ACZ	1.86	1.32	1.17	1.29		29.3	0.04	11	CUTLER RESERVOIR
8	4:30:33	37.865	116.131	0.4	-0.34	0.7	108	ACI		1.58		1.60		20.5	0.13	15	REVEILLE PEAK
8	7:52:47	37.101	116.015	0.3	4.95	1.0+	191	ADI				0.95		10.8	0.07	13	YUCCA FLAT
9	10:32:33	37.226	117.566	0.4	9.54	0.7	133	ABI		1.55				7.2	0.09	19	LAST CHANCE RANGE
9	11:28: 5	36.681	116.324	0.2	9.40	0.4	56	AAI		1.62				4.2	0.08	27	STRIPED HILLS
9	11:29:22	36.679	116.329	0.3	9.85	0.5	70	AAI		1.49				3.9	0.07	18	STRIPED HILLS
9	11:52:40	36.681	116.339	0.4	9.37	0.5	140	ACI		0.65				3.9	0.05	10	STRIPED HILLS
10	6:21:18	35.887	116.768	8.7	7.00	7.2	288	DDA		1.08				12.4	0.52	5	WINGATE WASH
10	15: 1:39	36.828	116.749	0.5	2.60	0.9	307	ADI				0.84		11.4	0.05	14	BARE MTN
10	17:22:55	35.946	116.768	1.0	5.41	2.1	213	BDI	2.14		2.14	2.04	2.3	9.2	0.08	10	WINGATE WASH
10	17:24:53	35.954	116.779	1.5	5.76	2.9	207	BDI	2.43			2.89		8.1	0.12	15	WINGATE WASH
10	17:26:11	35.942	116.765	3.2	5.00••	9.5	215	CDA		1.69				9.5	0.20	7	WINGATE WASH
10	20:43:58	35.955	116.768	2.2	9.52	2.8	288	[illegible]DZ				1.18		27.0	0.16	7	WINGATE WASH
10	20:44: 2	36.163	116.621	2.0	7.00	1.5	20[illegible]	[illegible]				0.84		5.0	1.26	7	FUNERAL PEAK

1051 2944

1988 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)	QQQ 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
FEB 11	5: 8:36	35.949	116.767	5.6	2.18•	—	210	DDA		1.04				9.2	0.21	8	WINGATE WASH
11	18:42:51	38.002	115.295	3.1	1.76	7.5	199	CDA		1.66				23.9	0.25	9	
11	22:32:15	36.298	116.066	9.3	-1.02•	—	215	DDZ				1.18		16.2	1.36	6	MT SCHZDER SE
12	0:54:53	37.336	114.930	0.5	1.46	0.9	201	ADI		1.08	1.31	1.10		13.3	0.06	10	DELAMAR LAKE
12	19:25:47	36.651	115.859	1.2	-1.21	0.7	252	BDZ				1.31		9.2	0.07	8	MERCURY NE
13	14:12:25	37.576	117.740	0.5	7.42	2.6+	119	BCI				1.26		16.4	0.08	9	LIDA WASH
13	17: 6:11	36.447	115.764	0.2	13.37	0.6	168	ACI			0.88	0.97		21.3	0.04	12	MT STIRLING
13	17:17:45	36.710	116.292	0.5	-0.22	0.3	185	ADI		0.58	1.86	0.47		4.0	0.04	11	STRIPED HILLS
13	18:48: 6	37.207	117.587	0.7	4.72	1.3	161	ACI				0.87	1.3	6.0	0.12	13	LAST CHANCE RANGE
13	19:52:39	36.702	116.297	0.3	7.67	0.4	178	ACI				0.74		5.0	0.05	16	STRIPED HILLS
14	0:52:15	37.291	117.625	0.3	-1.37	0.3	147	ACI			0.88	0.88		6.8	0.02	8	MAGRUDER MTN
14	3:23:54	35.668	116.608	1.6	14.65	0.5	273	BDI				2.41		40.4	0.10	15	LEACH LAKE
14	11: 5:42	37.482	117.579	0.4	-0.21	0.3	73	ABI				1.40		8.5	0.10	12	MAGRUDER MTN
15	6:31:48	37.338	114.966	0.9	7.00	3.4	192	BDI	1.69	1.41		1.50		27.1	0.09	9	DELAMAR LAKE
15	6:53:56	36.802	116.195	0.4	-0.31	0.4	105	ABI	1.57	1.03		1.14	2.6	6.2	0.11	20	SKULL MTN
15	13:54:52	36.631	116.320	0.2	8.77	0.4	71	AAI	1.61			1.32		2.3	0.07	21	STRIPED HILLS
15	20:51:46	36.679	116.330	0.2	10.20	0.2	117	ABI	1.42	0.92		1.18		3.8	0.05	19	STRIPED HILLS
15	21:28: 9	36.680	116.326	0.2	10.30	0.2	111	ABI	1.44	1.07		1.06		4.0	0.06	20	STRIPED HILLS
20	4:29: 2	36.677	116.331	2.5	1.23•	—	307	CDI		0.76				18.5	0.05	5	STRIPED HILLS
20	5:12:47	36.726	116.357	1.5	-1.67	1.7	250	BDZ		1.52				13.4	0.06	6	STRIPED HILLS
20	12:33:31	37.117	117.330	0.6	5.07	3.7	108	BCA		1.05				13.2	0.07	7	UBEHEBE CRATER
20	22: 3:54	36.830	116.218	0.4	8.53	0.4	129	ABI		0.96				5.2	0.04	10	SKULL MTN
21	0:33:37	36.659	115.686	0.4	-1.28•	—	136	CCA		2.18				11.8	0.10	17	INDIAN SPRINGS NW
22	7:33:15	37.808	115.808	0.3	0.08	0.4	143	ACZ		1.44		1.45	1.7	13.2	0.05	10	
22	11:32: 0	37.710	115.063	0.3	8.06	1.2	113	ABI	1.42	1.29	1.53	1.15	1.7	12.9	0.07	10	HIKO NE
22	20:43:39	37.078	116.163	0.2	1.73	0.8	105	ACZ	1.58			1.08		17.7	0.08	17	TIPPIPAH SPRING
22	23:32:48	37.243	117.913	1.0	1.17	1.7	225	ADA		1.84				20.3	0.09	12	WAUCOBA SPRING
23	7:33:33	36.610	118.091	5.8	5.00•	—	303	DDA		1.40				65.0	0.20	5	•••QUAD. NOT LISTED•
24	20:11:59	36.717	116.205	0.2	9.83	0.3	130	ABI				0.77		6.7	0.05	15	SPECTER RANGE NW
25	3:41:51	36.993	116.111	0.4	2.64	0.7	123	ABI				0.92		8.4	0.11	17	YUCCA LAKE
25	23: 0:28	37.307	114.939	0.3	0.59	0.3	207	ADZ	1.39		1.47	1.21		14.8	0.05	10	DELAMAR LAKE
26	13:34:12	36.733	116.102	0.2	-0.63	0.4	112	ACZ	1.52	0.94		1.13		14.8	0.07	21	CAMP DESERT ROCK
26	15:33: 9	36.862	116.244	0.4	1.79	1.3	81	BBI	1.64	1.24		0.98	1.3	6.4	0.17	22	SKULL MTN
26	16: 1:16	36.860	116.245	0.2	-0.32	0.2	95	ABZ	1.29	1.18		0.90		6.4	0.09	18	SKULL MTN
26	16:18:23	36.851	116.240	0.4	2.90	0.6	107	ABI		1.11		0.66		6.4	0.10	14	SKULL MTN
26	18:38: 2	37.242	117.922	0.5	10.81	0.4	225	ADI	2.27	1.85		2.01	2.4	20.4	0.08	17	WAUCOBA SPRING
27	2: 8:16	36.994	117.867	1.2	2.22	3.7	229	BDZ	1.82	1.79		2.09		46.3	0.14	14	WAUCOBA WASH
28	20: 0:38	36.793	116.233	0.5	0.89	0.7	171	ACI		0.78		0.62		6.6	0.08	8	SKULL MTN
29	0:46:36	37.244	115.104	4.4	8.95	2.9	183	CDI		1.06	1.42	1.13		11.2	0.08	7	LOWER PAHRANAGAT LAKE
29	12:30:27	37.433	114.577	0.4	6.50	1.9	278	ADI		1.24		1.34		23.9	0.04	9	ELIGN NE
29	13:23:40	37.871	116.127	0.8	0.00••	1.4	109	ACZ		1.48		1.38		20.6	0.14	8	REVEILLE PEAK
MAR 1	8:26:46	37.281	114.733	0.8	6.12	1.5++	254	ADI			1.11	1.38		31.5	0.07	11	ELGIN SW
1	17:34:47	36.506	114.589	3.8	-1.54•	—	279	CDZ		2.24		2.04		51.2	0.04	6	MOAPA
1	17:34:52	36.698	114.957	5.0	2.21•	—	227	CDI		2.19		1.82		28.0	0.46	6	ARROW CANYON

1988 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
MAR 1	20:15:10	37.291	116.290	0.4	0.08	0.4	203	ADZ			1.86			9.0	0.04	11	DEAD HORSE FLAT
2	11:42:46	37.845	116.137	0.3	0.21	0.6	104	ACI	1.66	1.85		1.83		19.7	0.12	19	REVEILLE PEAK
2	20:21:29	36.710	116.226	0.3	10.17	0.5	85	AAI				0.71		5.5	0.08	14	SPECTER RANGE NW
3	7:33:56	36.960	114.493	1.1	5.67	1.2	247	BDI						65.9	0.09	16	•••QUAD. NOT LISTED•
3	18:43:48	36.787	116.270	0.3	4.66	0.8	132	ABI		0.58		0.26		5.0	0.07	13	JACKASS FLATS
3	23:28:23	37.209	117.282	0.4	0.51	0.6++	81	ACI		1.25		0.97		10.4	0.13	12	UBEHEBE CRATER
4	0:16:11	37.210	117.288	0.4	-1.60	0.6	82	ACZ		1.53		1.23		10.4	0.12	13	UBEHEBE CRATER
4	3: 9:48	37.210	117.287	0.5	-0.22	0.8	82	ACI		1.32		0.76		10.4	0.10	11	UBEHEBE CRATER
4	4: 4:29	37.227	115.073	1.4	-1.44	1.6	202	BDZ	1.93	1.32	1.60	1.14		12.0	0.13	9	LOWER PAHRANAGAT LAKE
4	7: 5:59	37.253	115.202	3.3	10.58	1.9	216	CDI		1.09		1.21		9.5	0.03	6	ALAMO
6	3:48:55	36.444	115.758	0.2	0.14	0.4	93	ACI	1.97	1.64		1.43		20.6	0.08	27	MT STIRLING
6	3:49:59	36.444	115.759	0.2	-0.08	0.3	94	ACI		1.71		1.60		20.6	0.08	26	MT STIRLING
6	4:38:31	36.421	117.248	0.4	0.92	0.4	193	ADZ		1.53		1.70		25.2	0.08	17	EMIGRANT CANYON
6	16:21: 9	36.501	116.590	0.6	2.39	2.1	173	BCI		1.07		1.11		15.4	0.07	14	BIG DUNE
6	23:20:46	37.324	115.115	0.8	16.61	0.2	191	ADI			1.29	1.40		10.3	0.01	7	ALAMO SE
7	21: 6: 5	36.004	114.916	5.2	0.13	10.5	298	DDI			3.47			59.8	0.14	15	HENDERSON
8	7: 6:60	37.093	115.130	9.2	4.23•	—	314	DDI		0.96		0.76		9.8	0.02	6	LOWER PAHRANAGAT LAKE
8	13: 7: 0	36.536	116.061	0.2	11.70	0.3	72	AAI	1.60	1.27	1.19	1.18		11.3	0.06	22	SPECTER RANGE SE
8	14:14:58	37.163	117.859	0.5	9.37	1.5	214	ADI	1.50	1.64	1.74	1.69	1.9	20.4	0.09	16	WAUCOBA SPRING
8	21: 1:27	36.233	116.395	5.5	-0.82	3.1	220	DDZ				0.78		19.7	1.36	8	EAGLE MTN
8	21:15:13	35.880	116.747	1.7	3.44	—	295	CDZ				1.28		60.1	0.06	6	CONFIDENCE HILLS
9	3: 1:30	37.180	117.855	0.8	8.47	1.3	271	ADI		1.46		1.37		19.4	0.07	12	WAUCOBA SPRING
9	3:34:37	38.398	116.433	1.7	-1.01	1.8	238	BDI	2.36	2.12		2.55	2.9	18.3	0.15	11	•••QUAD. NOT LISTED•
9	6:47:47	37.092	115.127	0.4	5.31	0.5	247	ADI				1.50	1.3	10.0	0.02	8	LOWER PAHRANAGAT LAKE
9	16:40:47	37.647	114.867	0.6	2.76	0.7	197	ADI				0.81		6.2	0.03	7	PAHROC SPRING NE
9	17:23:23	37.256	117.583	0.3	8.63	0.6	83	AAI	1.69	1.73		1.74		6.2	0.09	19	MAGRUDER MTN
11	13:49:44	37.844	116.142	0.0	1.90	0.1	191	ADZ				0.81		20.1	0.00	5	REVEILLE PEAK
12	23:11:50	36.838	116.190	0.3	2.49	0.4	169	ACZ				0.41		2.7	0.04	10	SKULL MTN
13	1:15:54	37.495	117.220	0.3	-0.90	1.0	73	ACZ	2.17	1.80		2.27	2.5	21.9	0.11	30	STONEWALL PASS
13	15:26:51	37.870	116.132	0.5	-0.30	0.8	109	ACI	2.05	1.82		1.84	1.8	20.9	0.15	16	REVEILLE PEAK
13	19:57: 7	37.494	117.223	0.2	0.22	0.3	143	ACI	1.56	1.92		1.83		21.7	0.07	24	STONEWALL PASS
13	20:27: 6	37.850	116.127	1.3	1.62	2.2	191	BDA		1.32				19.3	0.17	8	REVEILLE PEAK
13	22:48: 2	37.864	116.134	0.6	-0.22	1.0	108	ACI				1.24		20.7	0.11	8	REVEILLE PEAK
13	23:36: 1	37.268	115.330	0.4	2.08	4.7	165	BCI				2.34		45.7	0.11	21	BADGER SPRING
14	0:22:43	36.983	116.339	0.1	0.73	0.2	94	ABZ	1.17	1.40		0.70	0.8	7.2	0.06	22	TOPOPAH SPRING
14	1:13:23	36.981	116.339	0.1	0.63	0.2	93	ABI		1.06		0.67		7.3	0.05	21	TOPOPAH SPRING
14	1:43: 7	36.402	116.975	0.3	0.24	0.5	146	ACZ		1.29		1.35		31.3	0.13	22	FURNACE CREEK
14	4:26:35	37.201	116.019	6.7	7.00	11.3	221	DDI		1.43		1.08		0.2	4.10	9	OAK SPRING
14	5:12:60	37.871	116.134	0.6	-0.25	1.2	109	ACI	1.93	1.86		1.65		21.1	0.15	13	REVEILLE PEAK
14	12:25:13	36.926	115.074	0.8	7.00•	—	218	CDI	2.15	2.40	2.39	2.67	2.6	81.1	0.08	13	MULE DEER RIDGE NE
14	19:38:34	37.866	116.135	0.9	2.13	3.9	108	BCA		1.49				20.8	0.15	8	REVEILLE PEAK
15	1:27:52	37.862	116.135	0.5	-0.51	0.8	157	BCI	1.65	1.93		1.67	2.2	20.5	0.16	16	REVEILLE PEAK
15	8:21:38	37.831	116.139	2.1	1.02	4.9	231	BDA		1.33				19.2	0.09	5	REVEILLE PEAK
15	15:50:37	36.990	116.340	0.3	5.12	0.7	101	ABI		1.02		0.42		6.5	0.06	17	TOPOPAH SPRING

1988 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)	QQQ 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
MAR 27	8:50: 1	37.426	117.241	0.6	11.84	1.1	147	ACI		1.39				14.0	0.13	13	STONEWALL PASS
27	18: 5:30	37.239	116.450	0.3	7.10	1.3	167	ACI		1.88				11.5	0.05	13	SCRUGHAM PEAK
27	19:15: 8	37.320	116.337	—	7.00••	—	301	ADA		1.11				11.8	0.08	3	DEAD HORSE FLAT
27	19:35:59	37.332	116.311	11.1	5.00••	7.3	295	DOA		1.53				13.2	0.08	5	DEAD HORSE FLAT
28	4:19:53	37.302	116.292	0.3	4.12	2.3	78	BCI		1.61				10.2	0.07	12	DEAD HORSE FLAT
28	9:59: 0	36.701	116.294	0.4	1.47	1.1	191	ADI		1.21				14.2	0.08	14	STRIPED HILLS
28	13:19:32	37.310	116.289	0.2	0.77	0.6	127	ACI		1.10				11.1	0.03	8	DEAD HORSE FLAT
29	3:28: 7	36.382	116.994	0.7	0.69	0.7	208	ADI		1.54				34.1	0.08	14	FURNACE CREEK
29	5:49:28	37.848	116.149	1.0	1.50	2.1	193	BDA		0.93				20.7	0.08	5	REVEILLE PEAK
29	13:52:26	37.851	116.138	—	2.73	—	241	ADA		1.21				20.2	0.03	4	REVEILLE PEAK
30	7:49:58	37.935	116.548	1.4	-1.02	1.9	155	BCZ				1.74	2.0	34.5	0.20	6	STINKING SPRING
30	7:50: 1	37.867	116.138	0.6	-0.45	1.5	158	BCI		1.88				21.1	0.16	12	REVEILLE PEAK
APR 1	5:56:55	35.697	117.036	1.0	14.25	0.4	289	BDI	2.30	2.16		2.63		33.3	0.07	16	WINGATE PASS
1	17:10:48	37.851	116.138	0.5	0.36	0.9	105	ACI				1.21		20.1	0.10	8	REVEILLE PEAK
2	0:55:54	36.417	117.937	8.0	-1.92	6.1	297	DDA		1.71				64.2	0.19	8	KEELER
2	3:52:21	36.088	114.950	2.4	7.00	2.2	266	BDA		1.80				50.0	0.08	10	HENDERSON
2	5: 7:34	37.220	115.049	—	7.00••	—	212	ADA		1.44				13.5	0.02	4	LOWER PAHRANAGAT LAKE
2	5:26:17	37.861	116.133	0.4	0.00••	2.0	107	BCZ		2.28				20.4	0.11	15	REVEILLE PEAK
2	23:31:28	37.310	116.280	0.3	2.52	1.1	128	ACI	1.89	1.81	1.70	1.35		11.3	0.11	23	DEAD HORSE FLAT
4	2:33:46	37.206	114.832	0.9	7.06	6.8	252	COS				1.30		29.5	0.04	6	DELAMAR 3 NE
4	2:39:41	37.658	114.881	0.3	5.97	0.4	148	ACI				0.75		5.0	0.05	8	PAHROC SPRING
4	2:41:38	36.849	116.260	0.2	10.00	0.3	46	AAI	1.71	1.30		1.57		5.3	0.06	29	JACKASS FLATS
4	10:30:31	37.862	116.133	0.5	0.00••	0.8	107	BCI	1.67	1.82		1.64		20.5	0.16	17	REVEILLE PEAK
5	18:52:60	37.027	116.106	0.4	0.75	0.8	134	ACZ	1.66	1.27		1.25		11.0	0.10	13	YUCCA FLAT
5	20:37:29	37.031	116.108	0.5	0.60	0.8	172	ACZ		1.49		0.76		10.8	0.07	12	YUCCA FLAT
5	23: 4:34	37.035	116.112	1.4	4.07	3.7	199	BDZ		1.41		0.59		10.5	0.09	10	YUCCA FLAT
6	0:45:54	37.863	116.135	0.1	1.68	0.2	157	ADI				0.92		20.6	0.00	5	REVEILLE PEAK
7	1:25:13	37.923	116.123	8.4	3.03•	—	264	DDA		1.33				24.3	0.22	5	REVEILLE PEAK
7	17:10:17	37.861	116.131	1.2	-0.01	1.9	157	BCI				1.31		20.2	0.12	6	REVEILLE PEAK
7	18: 1:21	36.425	116.960	0.5	14.52	1.0	82	AAI	1.79	1.80		2.02		12.7	0.14	22	FURNACE CREEK
7	20:22:11	37.029	116.108	0.2	0.18	0.4	115	ACZ	2.38		2.31			10.9	0.07	24	YUCCA FLAT
8	0: 3:16	37.029	116.103	0.2	0.30	0.3	117	ACI	1.33	1.30		0.96		11.3	0.06	17	YUCCA FLAT
8	2:58:40	37.870	116.132	0.6	0.22	1.0	161	BCI		1.47		1.71		20.8	0.16	14	REVEILLE PEAK
8	4:16:29	37.028	116.105	0.2	-0.14	0.2	116	ACZ		1.46		0.94		11.1	0.06	18	YUCCA FLAT
8	5:47:23	37.336	115.259	1.1	4.08•	—	150	CCI		0.96		0.75		19.6	0.08	7	BADGER SPRING
8	6:58:49	37.851	116.160	2.7	4.39•	—	205	CDI				0.98		23.0	0.05	5	REVEILLE PEAK
8	22:32:37	38.325	116.503	2.0	2.49	8.7	232	CDI				1.90		65.6	0.12	10	GEORGES CANYON RIM S
8	22:33:42	38.320	116.468	3.8	-0.42	2.6	284	CDZ				1.98		10.0	0.08	9	TYBO
9	2:31:20	37.279	117.588	0.3	8.19	0.6	80	AAI		1.37		1.30		7.3	0.08	16	MAGRUDER MTN
9	7:50:53	36.853	116.244	0.3	0.13	0.3	103	ABI	0.49	0.80		0.42		6.5	0.05	15	SKULL MTN
9	13: 2:50	37.026	116.106	0.3	-1.20	0.6	134	ACZ		1.34		0.88		11.0	0.06	13	YUCCA FLAT
9	21:15:43	37.410	117.443	0.3	5.84	0.8	58	ABI	1.72	1.91		2.02		6.0	0.13	22	LIDA
10	3:54:14	37.709	115.054	0.3	5.54	1.5	116	ACZ		0.99		0.94		12.1	0.05	8	HIKO NE
10	5:23:37	37.076	115.761	0.3	9.43	1.8++	123	ACI	1.89	1.61	1.71	1.70		26.5	0.09	23	PAPOOSE LAKE SE

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1988 LOCAL HYPOCENTER SUMMARY – SGB EARTHQUAKES

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MAR 15	16:26: 5	37.869	116.128	0.4	−0.56	0.8	159	ACI	2.11	2.14		2.18	2.4	20.5	0.14	20	REVEILLE PEAK
15	20:59:21	37.864	116.139	0.0	−0.82	——	157	ADZ				1.91		21.0	0.00	5	REVEILLE PEAK
15	21:36:57	37.303	116.282	0.4	−0.40	0.4	230	ADZ	1.60			1.38	2.0	10.6	0.04	10	DEAD HORSE FLAT
16	19:11: 2	36.691	116.302	0.5	7.20	0.5	189	ADI				0.33		6.1	0.05	10	STRIPED HILLS
17	4:12:13	36.735	116.225	0.4	4.66	1.0	141	ACI				0.63		4.3	0.09	12	SPECTER RANGE NW
17	11: 1: 5	36.144	115.042	5.7	5.00•	——	269	DDA		2.43				41.5	0.30	14	LAS VEGAS NE
17	19:28:31	36.447	114.761	3.3	−1.54	2.6	280	CDZ				1.68		36.3	0.10	10	DRY LAKE
18	0:21:26	37.351	115.069	0.3	6.00	0.6	162	ACI	1.91	2.30	1.71	1.67		6.4	0.07	13	ALAMO SE
18	2:49:30	38.678	116.446	7.4	9.10•	——	111	DCI		1.72		1.66		49.4	0.12	10	QUAD NOT LISTED
18	9:21: 0	36.817	115.813	0.5	0.90	0.5	202	ADZ		1.48		1.03		13.6	0.09	17	FRENCHMAN LAKE SE
18	12:53:13	37.881	116.139	1.3	−1.82	2.5	111	BDA		1.21				22.1	0.09	5	REVEILLE PEAK
19	8:50:30	36.836	117.477	1.7	5.36	2.3	201	BDA		0.50				7.3	0.12	6	TIN MTN
20	16:25:18	36.986	116.329	0.4	4.31	2.2	90	BCI		0.97				10.6	0.06	11	TOPOPAH SPRING
20	16:49:58	36.980	116.330	0.4	6.65	1.5++	93	ABI		1.19				11.0	0.08	13	TOPOPAH SPRING
21	12:34:36	37.879	116.138	——	−0.96	——	202	ADA		1.04				21.9	0.10	4	REVEILLE PEAK
22	1:52: 8	37.873	116.131	0.2	1.22	1.2	110	ACI		2.44				21.0	0.09	25	REVEILLE PEAK
22	4: 9:20	37.313	116.288	0.4	0.24	0.8	128	ACI		1.42				11.4	0.10	15	DEAD HORSE FLAT
22	4:46:12	37.252	116.258	4.5	5.00••	11.5	231	DDA		1.10				7.2	0.08	6	DEAD HORSE FLAT
22	5:12:38	36.223	117.646	2.6	3.28•	——	280	CDI		1.72				57.4	0.23	11	COSO PEAK
22	5:12:45	36.648	117.280	7.7	0.03••	3.4	192	DDZ		1.60				0.2	1.56	11	MARBLE CANYON
22	6:13:24	37.306	116.292	0.4	−0.18	1.0	84	ACZ		1.3[illegible]				10.6	0.12	16	DEAD HORSE FLAT
22	17: 1:39	37.849	116.136	0.7	−0.71•	——	105	CCA		2.09				19.8	0.15	11	REVEILLE PEAK
22	20:48:46	37.285	116.279	2.8	0.53	2.4	324	CDI		1.22				8.9	0.06	8	DEAD HORSE FLAT
23	3:35:60	37.059	116.949	0.4	0.20••	6.4	164	ACA		0.82				11.5	0.07	13	SPRINGDALE
23	3:36:32	37.059	116.951	0.2	0.20••	0.2	165	ACA		0.82				11.4	0.02	8	SPRINGDALE
23	8: 4: 5	36.440	115.736	1.8	3.21•	——	309	CDA		0.98				31.6	0.12	9	CHARLESTON PEAK
23	8:20:42	36.448	115.763	1.8	9.02	3.6	305	BDA		0.88				29.5	0.09	9	MT STIRLING
23	14: 2: 1	37.310	116.288	0.2	2.45	0.9	80	ACI		1.62				11.1	0.07	22	DEAD HORSE FLAT
24	9:59: 0	37.866	116.136	0.6	0.00••	1.2	108	ACZ		2.12				20.9	0.14	12	REVEILLE PEAK
24	11: 2:25	37.307	116.282	0.3	6.04	2.0	81	ABI		2.05				11.0	0.11	25	DEAD HORSE FLAT
24	12:10:49	36.777	115.783	4.4	11.47	6.4	271	CDA		0.93				9.5	0.16	6	FRENCHMAN LAKE SE
24	16:12: 2	35.988	116.976	4.4	2.16•	——	259	CDA		1.50				64.0	0.22	10	WINGATE WASH
25	20:49:38	36.715	116.280	0.4	5.54	0.7+	89	AAI		1.50				3.1	0.10	18	STRIPED HILLS
25	23:46:17	37.423	116.771	0.6	5.00••	5.0	133	BCA		1.09				18.7	0.11	7	TOLICHA PEAK
26	0:56:49	36.850	117.031	1.6	26.14	2.4	259	BDI		1.73				14.6	0.11	11	GRAPEVINE PEAK
26	6:34:36	37.858	116.138	0.8	−1.19	0.9	195	ADI		1.37				20.5	0.12	10	REVEILLE PEAK
26	12:29: 0	37.332	115.079	2.3	4.15	3.9	163	BCI		0.99				8.7	0.15	8	ALAMO SE
26	13: 8:20	37.865	116.136	1.6	3.10•	——	197	CDA		1.26				20.8	0.14	6	REVEILLE PEAK
26	13:45: 5	36.788	115.776	2.2	13.19	2.4	253	BDA		0.97				10.9	0.17	11	FRENCHMAN LAKE SE
26	14:22:34	37.327	115.082	1.2	−0.22	0.9	163	BCI		1.12				9.3	0.08	7	ALAMO SE
26	18:37:19	37.856	116.138	1.3	0.91	1.6	194	BDA		1.02				20.4	0.08	6	REVEILLE PEAK
27	5: 8:42	37.319	115.901	0.4	7.80	1.1	80	ABI		2.00				11.5	0.11	19	GROOM MINE SW
27	5:37:53	36.995	116.232	——	0.08	——	158	ADA		0.36				4.7	0.00	4	MINE MTN
27	5:56:57	37.039	116.210	4.7	6.23	4.4	266	CDA		0.47				1.7	0.10	5	TIPPIPAH SPRING

1988 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 10	18: 2: 5	36.636	116.339	0.2	4.16	0.4	69	AAI	2.15	1.46	2.32	1.57		1.0	0.08	28	STRIPED HILLS
11	6:59:35	37.097	116.207	0.3	6.39	1.0	95	ABI	1.57	1.44	1.61	1.24	1.1	6.9	0.08	16	TIPPIPAH SPRING
11	16:26:54	37.366	117.907	0.0	7.32	0.9	231	ADI		1.54		1.32	1.8	6.5	0.11	11	SOLDIER PASS
11	16:54:48	36.565	115.488	1.1	-1.02•	——	176	CCZ				1.26		28.6	0.07	8	BLACK HILLS SW
12	8:18:21	37.249	115.044	0.5	0.18	0.4	200	ADU			1.12	1.22		15.6	0.03	8	LOWER PAHRANAGAT LAKE
13	12:48: 8	37.031	116.102	0.3	2.20	0.7	137	ACU				0.86		11.4	0.07	14	YUCCA FLAT
13	18:29:43	36.469	114.516	1.8	-1.22	1.8	280	BDI	2.29	2.36	2.76	2.16	2.2	57.9	0.11	16	MUDDY PEAK
15	7:59:42	37.471	115.112	0.3	9.33	0.3	206	ADU			1.12	0.78		9.0	0.03	10	ALAMO NE
15	12:26:49	37.321	115.219	0.6	2.30	2.2	113	BCU	1.22		1.35	1.19		17.1	0.07	9	ALAMO
16	7:22:55	36.870	115.995	0.3	-0.97	0.3	177	ACZ	1.58	1.41		1.12		8.7	0.06	19	FRENCHMAN FLAT
16	20:10:33	36.865	115.998	0.2	-1.35	0.2	141	ACZ		1.29		0.65		8.9	0.04	13	FRENCHMAN FLAT
17	21: 0:42	36.798	116.648	——	7.00••	——	324	ADA		0.70				1.9	0.14	3	BARE MTN
18	3:30:14	36.072	117.751	2.1	-0.26•	——	277	CDA		1.57				68.5	0.08	10	HAIWEE RESERVOIR
18	7:12:42	35.714	117.417	5.3	15.95	1.5	285	DOA		2.73				80.5	0.18	23	SEARLES LAKE
18	17:47:47	36.864	116.000	0.2	-1.38	0.2	141	ACI				0.87		9.0	0.04	13	CANE SPRING
18	18: 5:30	36.673	116.307	0.2	7.17	0.2	123	ABI				1.01		4.2	0.06	18	STRIPED HILLS
18	18: 5:48	36.673	116.308	0.4	7.27	0.4	123	ABI				0.66		4.2	0.06	10	STRIPED HILLS
18	18: 6:37	36.672	116.307	0.2	7.37	0.2	123	ABI		0.98	1.58	0.98		4.2	0.06	20	STRIPED HILLS
18	19:18: 1	36.675	116.311	0.2	7.31	0.2	120	ABI		1.15		1.07		4.1	0.06	20	STRIPED HILLS
19	2:51:26	37.032	116.102	0.1	-0.76	0.3	118	ACI	1.66	1.34		1.41	1.3	11.3	0.06	23	YUCCA FLAT
19	4:44:35	36.877	116.003	0.6	5.51	1.2	176	ACI				1.11		7.6	0.07	9	YUCCA LAKE
19	9:24:48	36.588	116.049	0.5	9.67	1.1	136	ACZ				0.78		11.3	0.08	13	SPECTER RANGE SE
20	18: 9:25	36.519	116.582	0.2	5.63	1.2+	61	ACI				1.48	1.7	16.5	0.06	20	BIG DUNE
21	4:40: 0	36.820	116.223	0.5	8.19	0.8	239	ADI				0.57		9.6	0.08	15	SKULL MTN
21	23:27:32	37.356	114.975	1.3	1.69	3.2	185	BDZ			0 35	0.96		8.7	0.05	6	DELAMAR LAKE
22	3:56:41	36.898	116.729	0.4	4.32	5.1	99	CCI				0.80		14.5	0.13	19	BARE MTN
22	7:43:16	37.857	116.131	0.6	-0.29	7.3	156	BCI	1.53	1.85		1.82		20.0	0.17	15	REVEILLE PEAK
22	9:50: 4	37.797	114.931	0.5	6.06	2.6+	193	BDI	1.60	1.50		1.49		15.5	0.09	8	WHEATGRASS SPRING
22	18:49:14	36.417	116.946	0.4	12.29	0.9	87	ABI	2.05	1.65		1.79		14.2	0.11	24	FURNACE CREEK
23	1:11:23	37.032	116.095	0.8	2.54	1.0	249	ADI				0.66		11.6	0.04	9	YUCCA FLAT
23	18:48:17	37.431	116.665	0.2	-1.21	0.5	141	ACI				0.99		15.6	0.05	16	BLACK MTN NW
24	23: 0:47	36.595	116.047	0.3	10.12	0.6	134	ABI				0.95		10.6	0.07	18	SPECTER RANGE SE
25	7:31:43	37.203	117.973	1.4	2.26•	——	242	CDA		1.84				25.3	0.08	9	WAUCOBA SPRING
26	12:27:21	36.760	117.762	1.0	1.19	3.5	226	BDZ	1.57	1.49		1.66		32.2	0.15	20	WAUCOBA WASH
27	0:59:60	37.794	114.943	0.5	3.66	5.5	188	CDI				1.21		14.9	0.06	6	WHEATGRASS SPRING
27	7:49:39	37.437	115.115	0.4	-0.55	0.4	73	ABI				1.14		6.6	0.05	8	ALAMO NE
28	4:44:22	36.815	116.231	0.3	8.82	0.5	152	ACI				0.39		7.1	0.07	16	SKULL MTN
28	6:16: 9	35.572	116.349	3.1	4.11	1.2++	292	CDZ	2.06		4.06			64.0	0.11	16	AVAWATZ PASS
28	23:56: 3	36.904	116.276	0.3	9.34	0.4	59	AAI				0.44		5.4	0.07	16	TOPOPAH SPRING
29	8:42:15	38.137	115.334	1.1	-1.02	0.8	254	BDZ				1.40		28.5	0.05	9	
29	11:20:24	37.878	116.134	0.7	0.00••	1.1	110	BCI				1.46		21.6	0.16	12	REVEILLE PEAK
30	11:52:14	35.934	114.851	3.7	2.84•	——	293	CDI	2.57			2.69		69.2	0.08	11	BOULDER CITY
MAY 2	8:1[illegible]:49	37.064	116.732	0.2	-1.56	0.3	89	ABI	1.91			1.75		9.1	0.08	25	THIRSTY CANYON SW
2	23:59:16	37.576	117.785	0.5	4.15	8.3	141	CCI				1.26		15.5	0.05	9	PIPER PEAK

1988 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
MAY	3	0:53:14	37.864	116.132	0.4	0.09	0.6	108	ACI		1.97		1.95		20.5	0.13	18	REVEILLE PEAK
	3	3: 9:46	36.563	116.468	0.2	7.74	0.8	104	ABI		1.20		0.78		14.7	0.04	16	LATHROP WELLS SW
	3	7:50:25	37.765	115.103	1.0	4.11	8.2	135	CCI				0.83		13.3	0.15	9	WHITE RIVER NARROWS
	4	6:15: 5	36.564	116.466	0.2	7.38	1.0++	131	ABI		1.02		1.05		14.5	0.05	16	LATHROP WELLS SW
	4	6:53:28	36.850	116.264	0.4	3.91	1.4	115	ABI				0.62		4.8	0.12	12	JACKASS FLATS
	4	7:32:53	37.859	116.141	—	0.88	—	196	ADZ				1.00		20.9	0.00	4	REVEILLE PEAK
	4	11:57: 1	37.405	115.144	0.3	3.68	0.4	205	ADI			1.06			8.2	0.02	7	ASH SPRINGS
	4	21:11:54	36.645	116.333	0.6	3.46	0.4+	246	ADI				0.67		0.6	0.04	7	STRIPED HILLS
	5	10:41:31	37.678	118.267	9.9	7.82	11.5	353	DDA		1.34				42.4	0.05	5	•••QUAD. NOT LISTED•
	6	7:10:54	36.423	116.954	0.4	13.68	0.9	84	BAI	2.22	2.05		2.19		13.6	0.15	34	FURNACE CREEK
	6	8:34:29	36.456	116.803	0.2	5.02	2.3	97	BCI	1.89	1.71	1.58	1.39		20.2	0.07	20	FURNACE CREEK
	6	16: 0:58	37.851	116.144	0.4	3.58•	—	269	CDI			1.58	1.80	1.7	51.4	0.05	9	REVEILLE PEAK
	7	17:35:38	37.867	116.141	0.3	0.70	0.5	108	ACI	1.81	2.01	2.14	2.08		21.3	0.12	24	REVEILLE PEAK
	9	2:54:59	37.419	115.226	0.7	7.21	2.7+	126	BCI	1.28		1.23	1.11		15.6	0.10	8	ASH SPRINGS
	9	7:34:49	37.478	115.120	0.3	8.30	0.9	75	ABI	1.61	1.68		1.59		10.0	0.07	13	ALAMO NE
	9	14:29:19	37.290	116.397	0.2	6.45	0.5	58	ABI	1.73	1.50	1.39	1.12		10.7	0.06	22	SILENT BUTTE
	9	21:53:52	37.864	116.132	0.3	0.37	0.5	108	ACI	2.08			2.07		20.5	0.12	19	REVEILLE PEAK
	10	4:23:49	36.873	115.989	0.6	2.43	1.1	145	BCZ	1.51	1.38		1.12		8.8	0.17	15	FRENCHMAN FLAT
	10	4:33:23	38.074	117.772	2.4	2.11	8.2	283	CDI		1.98		2.09		39.9	0.10	10	BLAIR JUNCTION
	10	14:22:18	37.057	116.144	0.2	5.17	1.0	115	ABI	1.47	1.35		1.33	1.5	7.9	0.08	21	TIPPIPAH SPRING
	12	0:42:60	37.408	117.440	0.8	5.13	1.1	170	ACI				0.79		6.4	0.09	10	LIDA
	12	23:59:54	37.120	117.946	1.0	-1.02	1.1	262	BDZ		1.52		1.48		29.4	0.06	9	WAUCOBA SPRING
	13	12:23:22	36.404	117.018	0.5	6.18	2.5++	194	BDI		1.25		1.16		33.4	0.07	14	EMIGRANT CANYON
	13	15:15:21	37.031	116.103	0.2	-0.20	0.4	117	ACZ	1.59	1.39		1.38		11.2	0.08	21	YUCCA FLAT
	14	3:54:31	37.224	117.314	0.3	8.34	0.5+	85	ABZ			0.76	0.93		9.9	0.08	16	UBEHEBE CRATER
	14	11:39:20	37.860	116.140	1.4	0.00••	2.7	106	BCI		1.45		1.44		20.8	0.18	9	REVEILLE PEAK
	14	20:25:47	37.773	116.224	1.0	5.64	6.1	114	CCA		1.04				14.3	0.16	7	REVEILLE PEAK
	15	23:21:15	38.124	115.209	1.6	7.00	8.1	271	CDI				1.64		29.6	0.14	7	TIMBER MTN PASS WEST
	16	19:22:45	37.201	117.978	2.8	-1.54	2.7	262	CDU		1.55		1.59		25.7	0.07	6	WAUCOBA SPRING
	16	19:33:51	37.194	114.503	1.2	3.70•	—	242	CDI	1.72	1.60	1.72	1.77		50.3	0.07	7	VIGO NE
	17	0:37:51	38.116	115.211	1.4	9.73	4.0	258	BDI	1.66	1.37		1.84		28.8	0.15	9	TIMBER MTN PASS WEST
	17	3:54: 1	37.387	115.103	0.6	6.82	0.7	133	ABI						5.1	0.09	11	ALAMO NE
	17	15: 5:46	37.864	116.133	0.5	-0.88	0.8	108	ACI		1.75		1.81	2.4	20.5	0.14	13	REVEILLE PEAK
	17	18: 2:36	37.201	117.404	0.5	6.31	3.3	112	BCA		0.95				17.1	0.09	8	UBEHEBE CRATER
	17	19:36:33	37.847	116.097	—	7.00••	—	304	ADA		1.34				40.4	0.02	4	REVEILLE PEAK
	17	20:26:58	37.566	117.876	—	0.00••	—	192	ADI				1.40		15.9	0.13	3	PIPER PEAK
	17	20:40:43	37.849	116.111	0.8	1.96	2.1	189	BOA		1.18				18.1	0.09	6	REVEILLE PEAK
	18	19:59:21	36.633	115.481	0.6	-1.75•	—	133	CCA		1.65				30.2	0.13	15	BLACK HILLS NW
	19	0:12:36	37.030	116.109	0.2	4.29	1.0	132	ACZ	1.51	1.38		0.83		10.8	0.04	11	YUCCA FLAT
	19	19:38:58	37.862	116.130	0.7	-0.52	1.1	108	ACI		1.75		1.67	1.7	20.3	0.15	10	REVEILLE PEAK
	20	21:23:12	37.348	117.231	0.3	-0.21	0.3	72	ABI	2.03	2.11		2.11		5.8	0.12	28	SCOTTYS JUNCTION SW
	20	21:23:46	37.345	117.230	0.5	-0.18	0.4	71	ABI	1.74	2.04		1.70		5.5	0.15	15	SCOTTYS JUNCTION SW
	21	5:32:26	37.130	117.327	0.5	6.64	1.2	191	ADI			0.68	0.69		14.6	0.05	11	UBEHEBE CRATER
	21	8: 0:58	36.998	116.362	0.3	10.96	0.4+	105	ABI				0.92		4.7	0.05	17	TOPOPAH SPRING

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MAY 22	1:20:33	36.992	117.722	0.7	0.25	0.7	215	ADI		1.32		1.52		27.5	0.10	13	DRY MTN
22	1:44:26	37.288	116.389	1.5	0.84•	—	234	CDI				1.31		10.0	0.05	9	SILENT BUTTE
22	16: 9:26	35.884	116.937	1.3	5.44	2.1+	269	BDI	2.37			2.45		10.9	0.13	16	WINGATE WASH
22	16:30:23	35.904	116.922	2.6	-0.54	2.2	266	CDI		1.76	2.09	1.94		38.6	0.11	11	WINGATE WASH
22	16:45:14	35.888	116.928	0.5	2.45	1.9	270	ADZ			1.92	1.57		58.2	0.02	8	WINGATE WASH
22	21:42:21	37.519	117.792	0.9	9.80	3.9	133	BBI				1.24		14.6	0.11	8	PIPER PEAK
23	6:39: 7	37.023	116.139	0.3	2.40	0.5	114	ABI	1.32	1.41		0.79		8.2	0.08	18	TIPPIPAH SPRING
23	7:53:38	36.986	117.729	0.6	1.27	3.3	203	BDI	2.26	2.07		2.34		28.4	0.12	25	DRY MTN
23	8:19:14	36.983	117.731	0.9	7.00	4.2++	203	BDI		1.66		1.83		28.7	0.12	13	DRY MTN
23	9:32: 1	36.992	117.723	0.8	4.80	8.7	201	CDI		1.66		1.69		27.6	0.11	11	DRY MTN
23	9:38:47	36.989	117.726	0.7	5.17	6.8	202	CDI	1.96	1.81		1.94	2.0	27.9	0.13	17	DRY MTN
23	9:58:28	36.984	117.725	0.7	0.94	0.8	202	ADI	1.80	1.83		1.99		28.5	0.12	16	DRY MTN
23	11:31:26	36.987	117.726	0.7	0.16	0.9	202	ADI				1.49		28.1	0.08	10	DRY MTN
23	11:36:17	36.921	116.087	0.2	7.00	0.3	1:0	ABI				0.82		3.2	0.05	16	YUCCA LAKE
23	11:57:57	36.999	117.711	0.8	9.12	2.0++	199	ADI		1.48		1.62		26.6	0.08	9	DRY MTN
23	12: 4: 5	36.991	117.720	0.7	-0.05	0.8	201	ADZ	1.64	1.80		1.80		27.6	0.11	15	DRY MTN
23	16:13: 2	37.852	116.139	0.1	2.04	0.5	105	ACI				1.33		20.2	0.03	7	REVEILLE PEAK
23	17:41:49	37.857	116.142	0.2	0.91	0.3	106	ACZ				1.55		20.8	0.02	7	REVEILLE PEAK
23	19:57:53	36.994	117.717	1.2	0.00••	1.0	200	BDI				1.44		27.2	0.12	9	DRY MTN
24	16:49:22	36.988	117.731	2.1	2.42	8.3	251	CDI				1.65		28.2	0.12	7	DRY MTN
24	20:42: 4	36.712	116.666	0.7	7.89	0.9	162	ACI				0.77		10.0	0.07	13	BIG DUNE
24	21:33:15	36.843	116.250	0.3	4.05	1.0	110	ABI				0.44		6.3	0.06	10	JACKASS FLATS
25	4:57:56	36.994	117.712	0.7	2.99	3.3	199	BDI				1.48		27.1	0.08	10	DRY MTN
25	8:49: 8	37.406	115.052	—	11.20	—	177	BDI			1.61			0.2	0.29	5	ALAMO NE
25	23:52:58	37.400	114.671	0.6	10.30	1.3	286	ADI				1.17		23.6	0.03	6	SLIDY MTN
26	1:46: 7	36.740	116.236	0.3	3.63	0.6	135	ACZ				0.53		3.2	0.08	18	SPECTER RANGE NW
26	2:21: 4	36.741	116.233	0.3	3.70	0.4+	86	AAI		1.40		0.37		3.5	0.08	19	SPECTER RANGE NW
26	3:56:49	36.988	117.722	0.6	2.22	2.9+	195	BDI	2.93		4.21			28.0	0.15	38	DRY MTN
26	4: 0:58	36.988	117.718	1.0	0.92	1.2	201	ADI	2.11	2.20		2.47	2.2	27.9	0.14	18	DRY MTN
26	4: 9:60	36.992	117.714	0.9	1.73	4.7	200	BDI				1.66		27.3	0.13	13	DRY MTN
26	4:20:15	35.911	116.023	1.0	-0.73	1.0	234	BDI		1.64		2.12		26.8	0.11	14	TECOPA
26	4:43:31	36.982	117.729	0.8	3.04•	—	203	CDI	2.22	2.16		2.36		28.8	0.12	15	DRY MTN
26	4:49: 7	36.993	117.711	1.0	0.00••	1.2	205	BDI	2.03			2.36	2.2	27.2	0.15	14	DRY MTN
26	4:50:41	36.990	117.725	0.7	8.35	2.8++	216	BDI				1.80		27.8	0.10	11	DRY MTN
26	6:38:43	36.993	117.719	0.7	9.54	3.1	201	BDI		1.55		1.86		27.4	0.08	8	DRY MTN
26	6:40:18	36.993	117.733	0.8	0.85	0.7	236	ADZ		1.71		1.77		27.7	0.06	10	DRY MTN
26	6:52: 3	37.441	115.138	0.4	-1.73	0.4	209	ADZ	1.53		1.04			8.6	0.04	7	ASH SPRINGS
26	7: 2:19	36.980	117.736	0.8	2.11	3.6	204	BDI	2.00		2.02	1.97	2.0	29.2	0.12	18	DRY MTN
26	7:29:57	36.993	117.723	1.6	0.31	1.4	252	BDZ				1.61		27.4	0.08	8	DRY MTN
26	9:47:41	36.991	117.723	0.8	0.07	1.0	201	BDI	2.03	1.91		2.25	2.3	27.7	0.15	22	DRY MTN
26	15: 7:20	37.239	115.364	0.4	-1.19	0.9	97	ACI	1.68		1.91			17.6	0.08	10	DESERT HILLS NE
26	15:49:38	36.981	117.720	1.0	7.00	5.6	202	CDI				1.90		28.7	0.11	12	DRY MTN
26	19:52:55	37.660	117.492	0.2	0.90	0.3	142	ACI		1.84	1.72	1.70		10.5	0.05	14	SPLIT MTN
26	21: 1:40	36.992	117.716	0.7	7.00	3.9+	200	BDI		1.79		1.81		27.4	0.12	12	DRY MTN

1988 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
MAY 27	8:16:38	37.261	115.008	0.4	-0.34	0.5	197	ADZ	2.09			2.16		16.7	0.05	13	ALAMO SE
27	13:37:34	37.195	115.787	0.6	8.29	3.0	51	BBA		1.90				15.5	0.18	19	PAPOOSE LAKE NE
27	22:58: 6	37.273	117.233	0.3	5.91	0.4	65	AAI	1.84	1.56		1.65		3.7	0.09	18	SCOTTYS JUNCTION SW
28	1:26:27	36.771	115.429	0.7	-1.96	0.6	188	ADZ		1.11		1.64		35.1	0.11	16	DOG BONE LAKE SOUTH
28	6:29:28	37.864	116.130	0.6	-0.17	1.1	108	BCI		1.77		1.80		20.4	0.15	14	REVEILLE PEAK
28	10:51:14	35.873	114.785	3.8	3.02	1.6	282	CDA		2.82				77.9	0.12	17	BOULDER CITY SE
28	16:39:31	37.227	117.281	0.4	-0.60	0.4	78	ABI	2.16			1.96	2.2	8.4	0.09	17	UBEHEBE CRATER
29	18:20:29	36.986	117.734	1.9	3.38•	—	237	CDA		1.41				28.5	0.14	9	DRY MTN
31	0:31:34	37.239	117.271	0.4	7.05	0.5	92	ABI				0.92		6.9	0.08	13	UBEHEBE CRATER
31	9:34:53	36.710	116.453	0.2	6.73	0.7	121	ABI	1.54	1.28	0.29	1.07		8.9	0.06	20	LATHROP WELLS NW
31	13: 6: 3	37.866	116.131	0.7	0.59	1.2	108	ACI		1.79		1.73		20.6	0.14	11	REVEILLE PEAK
JUN 1	5: 8:26	37.348	114.943	0.5	-1.09	0.6	195	ADI	1.34			1.14	1.5	11.6	0.04	6	DELAMAR LAKE
2	3:40:25	37.878	116.125	0.8	0.00••	1.4	111	BCI	1.54	1.87		2.01	2.1	20.9	0.17	12	REVEILLE PEAK
2	5:26:58	36.731	116.215	0.2	5.29	0.5	92	ABI	1.40	1.27		1.14		5.3	0.07	22	SPECTER RANGE NW
2	12:38:14	36.707	116.263	0.2	4.63	0.3	73	AAI	1.49	1.35	1.94	1.12		4.0	0.06	22	STRIPED HILLS
3	15:59: 7	36.801	115.362	0.5	3.49•	—	178	CCI				1.52		41.9	0.09	12	DEAD HORSE RIDGE
3	16:57:27	37.100	116.731	0.2	0.05	0.4	55	ABA		2.40				5.2	0.09	34	THIRSTY CANYON SW
3	18:55:22	37.123	115.555	0.5	0.67	0.6	124	ACZ				1.37		30.3	0.08	9	SOUTHEASTERN MINE
4	1:24: 1	36.934	116.156	0.3	1.49	2.9	153	BCI				0.65		5.9	0.05	8	MINE MTN
4	16:42:59	36.606	116.191	0.2	-0.49	0.5	84	ACZ				0.96		14.0	0.07	15	SPECTER RANGE SW
4	18:11:41	37.265	116.397	1.0	1.59	2.2	246	BDI				0.98		8.6	0.02	5	SILENT BUTTE
4	22:44:12	36.604	116.200	0.1	0.77	0.2	153	ACI				0.93		16.7	0.02	10	SPECTER RANGE SW
4	23:15: 0	37.184	116.421	0.7	1.39	1.0	268	ADI				0.83		16.8	0.04	7	SCRUGHAM PEAK
5	0: 5:45	36.603	116.202	0.3	6.13	1.9+	137	ACI				0.93		13.2	0.06	10	SPECTER RANGE SW
5	0:25:57	36.602	116.204	0.8	-1.64	1.5	164	ACI				0.72		16.7	0.08	7	SPECTER RANGE SW
5	10:40:49	37.191	117.947	2.8	-1.30•	—	236	CDA		1.39				26.3	0.13	5	WAUCOBA SPRING
5	13:17:21	38.202	116.500	9.1	1.61•	—	253	DOA		1.29				7.0	0.19	6	STONE CABIN VALLEY
6	18:37:35	37.129	117.831	1.3	10.90	4.0	215	BDI				1.66		20.1	0.11	8	WAUCOBA SPRING
7	7:47:38	36.049	115.525	2.1	1.99	6.7	289	CDU				1.93		30.6	0.11	11	MOUNTAIN SPRINGS
8	18:39:18	36.448	114.409	5.0	3.37•	—	270	CDI				2.30		67.6	0.14	9	•••QUAD. NOT LISTED•
8	21:24:19	37.115	115.548	0.5	0.00••	0.7	137	ACI				1.33	2.0	31.4	0.07	8	SOUTHEASTERN MINE -
8	22: 9:53	36.545	115.185	2.1	15.48	1.7	145	BCI		1.16		1.47		4.9	0.09	7	HAYFORD PEAK
9	16:59:10	36.987	117.750	1.3	7.00	5.9+	255	COI				1.64		28.7	0.03	5	WAUCOBA WASH
10	3:11:21	37.246	114.943	0.8	-1.07	1.4	207	ADI					2.6	20.2	0.10	14	DELAMAR 3 NW
10	3:18:34	37.244	114.959	0.3	0.88	0.3	222	ADI			2.00	1.51		19.8	0.03	8	DELAMAR 3 NW
10	3:19: 4	37.252	114.956	0.5	6.01	2.8+	166	BCI	2.35			3.06		19.1	0.10	18	DELAMAR LAKE
10	15: 1:34	37.488	117.227	0.4	-0.73	0.7	143	ACI				1.04		20.9	0.06	9	STONEWALL PASS
10	22:32:35	37.583	117.211	0.4	7.54	1.5++	187	ACI	1.80	1.82		1.60		20.2	0.07	14	GOLDFIELD
11	1:48:44	37.259	114.988	0.9	10.27	1.3	211	ADI	1.79			1.49		17.3	0.07	7	DELAMAR LAKE
12	0:43:28	37.002	117.495	0.3	1.92	1.1	162	ACI	1.74			1.71		13.3	0.10	21	UBEHEBE CRATER
12	6:45: 5	36.910	117.552	1.1	2.65	7.8	186	CDI				1.54		17.5	0.14	11	DRY MTN
12	7: 1:52	37.246	114.963	0.3	0.40	0.4	220	ADI				0.78	1.4	19.4	0.02	7	DELAMAR 3 NW
12	8:13:34	38.164	115.328	1.6	0.00••	1.4	225	BDI	1.79	1.85		1.94	2.3	30.8	0.10	9	COAL VALLEY
12	8:46:52	37.489	114.595	2.9	0.67	2.3	280	CDI	1.67			1.56		18.1	0.06	8	ELIGN NE

1988 LOCAL HYPOCENTER SUMMARY - SGB EARTHQUAKES

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JUN 12	9: 6:17	37.492	114.619	3.8	-1.02	2.9	296	CDZ		1.35		1.07		16.4	0.04	7	ELIGN NE
13	4: 2:29	36.877	115.994	0.5	7.35	2.7	144	BCI		1.22		1.20		20.9	0.11	13	PLUTONIUM VALLEY
14	10:44:45	36.821	116.020	0.3	0.57	0.4	127	ACI		1.01		1.03		18.6	0.07	15	CANE SPRING
15	4:12:55	36.688	115.684	0.8	-0.72	0.9	196	ADI		1.38		1.33		11.3	0.13	18	INDIAN SPRINGS NW
15	4:32:51	37.113	115.542	0.4	1.08	2.4	128	BCZ	1.87			1.43		31.9	0.09	13	SOUTHEASTERN MINE
15	6:23:40	37.233	116.364	0.4	0.13	0.3	74	AAI	1.94			1.57	1.8	4.2	0.09	19	AMMONIA TANKS
15	8: 4:50	37.870	116.128	0.3	-0.67	0.6	109	ACI	1.79	1.83		1.90		20.6	0.12	21	REVEILLE PEAK
15	12:15:15	37.862	116.132	0.5	-0.32	0.8	107	BCI		1.80		1.97		20.3	0.16	15	REVEILLE PEAK
15	18:54:52	37.387	115.*19	0.6	3.12	1.0++	124	ABI				1.02		6.4	0.10	11	ALAMO NE
15	19: 9:49	37.392	115.124	0.3	5.31	0.6	116	ABI			1.43			6.7	0.04	9	ALAMO NE
15	22:40:55	36.681	116.421	0.2	9.07	0.5	73	AAI	1.96	1.54		1.32		8.3	0.07	27	LATHROP WELLS NW
16	9:50:34	37.745	114.998	0.6	1.18	2.8	147	BCI	1.49			1.16		11.7	0.11	8	PAHROC SPRING
17	0:43:23	37.245	117.624	0.6	7.00	0.9	79	AAI	1.32		1.36	1.63		2.4	0.13	14	LAST CHANCE RANGE
17	11:33:51	36.875	115.997	0.4	-0.11	0.6	143	ACZ	1.54	1.51		1.06		8.2	0.09	15	PLUTONIUM VALLEY
17	12:50:43	37.532	117.457	0.5	1.46	1.4	172	ACI				1.26		10.8	0.07	12	MONTEZUMA PEAK SW
18	2:28: 9	35.903	116.354	0.7	-0.63	0.6	222	ADZ		1.42		1.68		30.8	0.09	12	SHOSHONE
18	10:29:22	37.358	115.724	0.3	5.79	1.2	139	ACI	1.93	1.94		1.93	1.8	5.1	0.11	22	GROOM LAKE
19	1:26:32	37.251	114.957	1.4	5.72	3.7+	272	BDI	1.67		1.78	1.32		19.2	0.08	7	DELAMAR LAKE
19	4:22:44	36.884	116.187	0.6	6.38	0.6	187	ADI		0.68		0.70		3.7	0.09	16	MINE MTN
19	16:45:33	37.530	117.226	1.2	2.14	9.0	154	CCA		1.44				23.6	0.20	9	GOLDFIELD
20	5:49:20	37.441	117.198	1.1	4.55	9.4	138	CC?		1.56		1.22		16.5	0.17	9	STONEWALL PASS
20	23: 2:14	37.097	116.243	0.2	6.92	0.5	105	ABI	1.58	1.41		1.28		6.7	0.09	21	TIPPIPAH SPRING
21	7:11:42	37.063	116.177	0.3	4.07	0.9++	100	ABI		1.53		0.93		5.4	0.07	16	TIPPIPAH SPRING
21	11: 8:19	36.949	116.108	0.3	2.85	0.5	95	ABI		1.22		1.16		5.1	0.09	16	YUCCA LAKE
21	20:46:29	37.317	116.282	0.4	11.47	2.0++	194	ADI				1.21		31.9	0.06	11	DEAD HORSE FLAT
22	0:24:35	37.108	116.733	0.3	0.36	0.2	111	ABZ	1.64	1.55		1.25	1.2	4.3	0.08	20	THIRSTY CANYON SW
22	1: 3:56	37.111	116.734	0.5	0.55	8.4	114	ABI	1.60	1.66		0.83		4.1	0.08	15	THIRSTY CANYON SW
23	0:46:46	36.774	116.105	0.4	5.07	1.7	167	ACI	1.45	0.96		1.06		10.6	0.07	12	CANE SPRING
23	3:27:39	36.974	116.729	0.2	9.34	1.0	173	ACI	1.31	0.91		1.00		19.1	0.06	18	BARE MTN
23	10: 8:42	37.692	115.094	0.4	5.86	1.9	101	ACI	1.40	1.01		0.95		14.5	0.08	9	HIKO NE
23	12:32:15	37.848	116.134	0.4	0.60	0.7	114	ACZ		1.49		1.48		19.7	0.04	7	REVEILLE PEAK
24	3: 8:20	37.075	117.023	0.3	0.39	0.5	113	ACI	2.08		1.53	1.84		27.6	0.10	24	BONNIE CLAIRE SE
24	16:12:27	37.658	116.929	0.4	-1.23	1.1	119	ACZ			1.05	1.10		49.2	0.12	11	CACTUS SPRING
25	3: 9: 3	37.386	115.087	0.7	4.76	0.5	278	ADI				0.97		3.9	0.05	7	ALAMO NE
25	10:28:27	37.851	116.130	0.5	0.07	0.8	105	ACI		1.61		1.46		19.5	0.14	15	REVEILLE PEAK
25	13:45:18	38.701	116.538	12.3	1.06•	—	321	DDA		1.39				52.7	0.13	6	•••QUAD. NOT LISTED•••
26	1:19: 9	37.781	116.238	1.4	2.98•	—	206	CDA		2.30				13.3	0.16	10	REVEILLE PEAK
26	13:56:28	37.881	116.134	—	2.35	—	255	ADA		1.02				21.8	0.03	4	REVEILLE PEAK
26	14: 2:47	37.879	116.128	0.6	2.51•	—	111	CCA		2.49				21.2	0.15	15	REVEILLE PEAK
26	16:27:30	37.884	116.139	2.1	3.22•	—	256	CDA		1.03				22.3	0.11	5	REVEILLE PEAK
26	17:53:27	35.923	117.218	1.1	2.92	4.1	268	BDI				2.36		32.0	0.10	21	MANLY PEAK
26	20:29:17	36.874	116.723	0.2	-0.01	0.4	168	ACZ		0.49		0.57		12.2	0.06	14	BARE MTN
27	7: ?:50	36.411	117.006	0.3	5.28	0.9	91	ABI		1.66		1.36		8.8	0.09	24	EMIGRANT CANYON
27	14:30:39	36.862	116.002	0.3	-1.28	0.3	168	ACI	1.54	1.47		1.13		9.0	0.06	18	CANE SPRING

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JUN 28	5:39:43	37.880	116.134	0.4	-0.86	0.6	111	ACI	2.04	2.15		2.18	2.3	21.7	0.14	24	REVEILLE PEAK
28	15:46:25	37.752	114.980	0.5	2.64	0.6	156	ACZ		0.93		0.96		11.8	0.03	6	WHEATGRASS SPRING
28	20:47:46	36.052	114.932	2.5	5.99	1.2	278	CDI				2.12		54.4	0.11	13	HENDERSON
29	0: 4: 6	37.887	117.471	0.4	6.06	1.7++	235	ADI				1.20		22.1	0.05	9	PAYMASTER CANYON
29	2:34:10	37.251	115.063	0.6	5.63	1.8	194	ADI	2.24			1.73		14.3	0.09	13	ALAMO SE
29	3:19:28	37.244	115.037	0.5	-0.52	0.3	227	ADZ				0.98		15.7	0.02	6	LOWER PAHRANAGAT LAKE
29	4:14:45	37.237	117.313	0.2	6.97	0.4	82	ABI		1.41		1.39		8.6	0.07	21	UBEHEBE CRATER
29	5:40: 3	37.191	117.[illegible]82	0.1	0.70	0.2	115	ACI			0.97	1.02		17.7	0.02	10	UBEHEBE CRATER
29	5:51:16	37.873	116.134	0.8	-1.26	1.3	109	BCZ				1.52		21.2	0.16	11	REVEILLE PEAK
29	9:34:21	37.875	116.135	0.8	0.31	1.4	110	BCI		1.75		1.57		21.4	0.20	14	REVEILLE PEAK
29	12: 8:28	37.661	114.870	0.5	5.39	0.8	154	ACI				1.30		6.0	0.07	7	PAHROC SPRING NE
29	18: 9:14	37.875	116.137	0.5	-0.42	0.9	110	BCI	1.99	2.05		2.15		21.6	0.18	18	REVEILLE PEAK
29	22:54:27	37.297	115.189	2.8	4.26	8.3	210	CDI			0.78	1.12		14.3	0.08	6	ALAMO
30	0:14:14	37.657	114.891	0.5	6.45	1.2	145	ACI	1.81	1.68	1.95	1.71		4.1	0.11	11	PAHROC SPRING
30	3: 3: 0	37.856	116.133	0.4	0.00••	0.7	106	ACI	1.99	1.94		2.17		20.1	0.13	18	REVEILLE PEAK
30	11:13: 9	36.698	116.138	0.3	1.47	0.9+	113	ACI		1.01		0.82		13.0	0.07	16	SPECTER RANGE NW
JUL 1	2:43:15	37.268	115.105	——	12.29	——	172	ADI			1.22	1.28		13.2	0.00	5	ALAMO SE
1	3:45:44	37.283	117.557	0.4	8.20	0.8	109	ABI		1.17		0.88		9.7	0.07	10	MAGRUDER MTN
1	23:30:57	37.768	115.016	1.0	0.16	1.3	156	ACZ	1.43	1.05		1.11		13.5	0.10	7	WHITE RIVER NARROWS
2	2:31:53	37.880	116.137	0.3	-0.94	0.6	111	ACI	2.04			2.10		21.9	0.14	26	REVEILLE PEAK
2	10:40:14	37.104	116.732	0.2	-0.08	0.2	42	AAI	2.10		2.08	2.34		4.8	0.10	45	THIRSTY CANYON SW
2	20:51:22	37.104	116.732	0.2	-0.26	0.2	117	ABI				1.08		4.8	0.06	19	THIRSTY CANYON SW
3	2:58:58	36.978	116.414	0.5	10.61	0.8	125	ABI		1.06		0.64		6.8	0.11	15	TOPOPAH SPRING NW
3	3:29:57	37.852	116.132	2.3	0.00••	4.1	105	BCI				1.25		19.8	0.15	7	REVEILLE PEAK
3	18: 9:10	37.028	116.375	0.2	7.37	0.3	73	AAZ	1.30	1.32		1.06	0.8	1.3	0.07	21	TIMBER MTN
3	18:13:34	37.029	116.377	0.4	7.28	0.5	124	ABI				0.45		1.1	0.09	14	TIMBER MTN
4	4:27:46	37.841	116.140	0.4	2.00	1.2	103	ACA		1.19				19.7	0.05	6	REVEILLE PEAK
4	4:29:32	37.845	116.141	0.5	1.68	1.2	104	ACA		0.98				20.0	0.06	6	REVEILLE PEAK
4	10:56:53	35.884	114.769	3.6	-1.24	6.4	281	CDA		3.14				77.4	0.12	15	BOULDER CITY
4	12:28:51	36.481	117.432	2.8	3.24•	——	248	CDA		1.22				23.0	0.33	12	PANAMINT BUTTE
4	12:40:31	36.558	115.229	1.3	-0.40•	——	142	CDA		1.98				8.5	0.09	5	HAYFORD PEAK
4	16:40:38	37.851	116.136	1.0	0.00••	1.6	105	ACI		1.59		1.68		20.0	0.09	7	REVEILLE PEAK
4	20:41:32	37.849	116.140	0.2	7.00	1.6	151	ADI				1.23		20.2	0.01	5	REVEILLE PEAK
5	9:14:25	37.296	115.183	0.4	7.18	1.0	167	ACI			1.20			14.1	0.04	9	ALAMO
5	15:44:20	37.859	116.132	0.3	-0.20	0.6	107	ACZ	2.40			2.80		20.1	0.12	28	REVEILLE PEAK
5	18:18:48	36.417	118.049	0.7	6.00	1.1	73	BCS			4.44			37.3	0.19	44	OWENS VALLEY
6	0:28:41	37.334	114.649	0.9	12.26	0.6	250	ADI	2.74					31.2	0.08	19	ELGIN SW
6	3:24:13	36.629	115.924	0.3	1.61	0.8	146	ACI				1.03		4.8	0.08	18	MERCURY
6	3:50:22	36.834	116.260	0.3	3.45	0.9	112	ABU				0.28		6.0	0.07	12	JACKASS FLATS
6	7:26:48	35.889	114.789	1.8	4.10	1.0	280	BDI	2.49	2.33		2.56		76.1	0.18	23	BOULDER CITY
6	7:56:38	37.492	117.227	0.2	0.16	0.3	142	ACI			1.27	1.39		21.4	0.07	24	STONEWALL PASS
6	7:56:48	37.490	117.233	0.3	-0.31	0.4	141	ACI			1.26	1.45		21.1	0.04	9	STONEWALL PASS
6	8:26:26	37.070	117.936	0.9	-1.02	0.8	265	ADZ•		1.47		1.41	1.9	31.4	0.06	10	WAUCOBA SPRING
6	9:40:57	37.844	116.137	0.5	0.93	0.8	104	ACI		1.42		1.48		19.6	0.08	7	REVEILLE PEAK

1988 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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JUL 6 13:40:19	37.855	116.131	0.5	-0.12	0.8	106	ACI		1.74		1.75		19.9	0.13	16	REVEILLE PEAK
6 14:43: 5	37.025	116.373	0.3	7.26	0.3	123	ABZ		1.24		0.75		1.7	0.07	16	BUCKBOARD MESA
6 19:21: 3	37.838	114.813	0.8	3.05•	—	242	CDI	2.07	2.00		2.10		23.0	0.10	10	DEADMAN SPRING SE
7 7:17:28	37.854	116.133	0.7	0.00••	1.3	106	BCI		1.56		1.66		19.9	0.15	12	REVEILLE PEAK
7 11: 0:15	36.755	116.032	1.2	4.32	5.7	194	CDI		0.89		0.74		12.3	0.12	10	CANE SPRING
7 20:18:57	37.846	116.139	0.3	7.00	3.0+	104	BCI				1.47		20.0	0.04	7	REVEILLE PEAK
8 5:17:15	36.688	116.301	0.2	2.41	0.3	115	ABI		1.08		0.35		5.9	0.04	13	STRIPED HILLS
8 7:29:37	37.847	116.136	0.5	0.84	0.8	104	ACZ				1.54		19.8	0.08	8	REVEILLE PEAK
8 7:29:46	37.844	116.132	0.9	0.00••	1.5	104	ACI		1.62		1.76		24.8	0.14	7	REVEILLE PEAK
8 21: 0:40	37.844	116.140	0.4	0.94	0.6	103	ACI		1.36		1.43		19.9	0.08	8	REVEILLE PEAK
8 23:51:42	37.879	116.128	0.4	-0.28	0.7	111	BCI	2.03			2.41		21.2	0.16	26	REVEILLE PEAK
8 23:52:12	37.585	116.493	0.9	-0.99	1.7	99	BCZ		2.05		2.31		20.0	0.18	9	QUARTZITE MTN
9 0: 8:51	37.579	116.508	0.2	-1.06	0.5	98	ACZ	1.77	1.61		1.51		21.1	0.07	19	MELLAN
9 0:10:56	37.593	116.511	0.4	12.25	1.6	104	ABI	1.54	1.42		1.41		20.1	0.09	16	MELLAN
9 0:53:37	37.581	116.490	0.4	17.48	0.8	212	ADI	1.98	1.54		1.31		43.4	0.05	13	QUARTZITE MTN
10 4: 3:58	37.853	116.136	0.5	0.10	0.8	105	ACI		1.80		1.74		20.1	0.13	12	REVEILLE PEAK
10 8:48:20	37.136	115.097	0.8	-1.93	0.9	174	ACZ	2.55			1.96		8.8	0.09	9	LOWER PAHRANAGAT LAKE
10 11:37: 0	37.251	115.006	0.3	-0.50	0.5	158	ACI	2.57			2.70	2.6	17.7	0.10	27	ALAMO SE
10 11:59:31	37.247	115.024	1.4	8.79	1.9	207	BDI	1.96			1.61		16.8	0.06	9	LOWER PAHRANAGAT LAKE
10 12:14:12	37.243	114.997	0.7	-1.01	0.7	214	ADZ	1.89	1.85		1.68		18.8	0.07	11	DELAMAR 3 NW
10 17:17:52	37.584	116.497	0.4	17.44	1.4++	184	ADI				1.30		52.5	0.05	10	QUARTZITE MTN
10 17:41:28	37.397	114.563	0.4	10.39	1.1	269	ADI	1.78	1.84		1.90		27.8	0.03	9	ELIGN NE
10 19:47:20	36.655	116.894	0.2	8.41	0.5	128	ABI		1.06		1.03		10.1	0.07	14	CHLORIDE CLIFF
11 3:59:14	37.062	117.951	1.1	-1.02	1.1	231	BDZ				1.36		33.1	0.11	11	WAUCOBA SPRING
11 6:33:29	37.879	116.127	0.4	-0.89	0.7	111	BCI	1.78	1.80		1.83	2.2	21.2	0.16	19	REVEILLE PEAK
11 11: 5:51	37.852	116.132	0.6	0.00••	0.9	105	ACI		1.68		1.69		19.7	0.13	11	REVEILLE PEAK
11 15: 8:14	36.741	115.487	1.1	16.27	2.5	232	BDI		1.46		1.60		29.4	0.08	6	BLACK HILLS NW
12 7:42:31	37.470	114.601	0.8	7.71	1.5	299	ADI	1.80	1.67	1.39	1.59		19.4	0.03	6	ELIGN NE
12 14: 4:59	37.368	115.155	2.0	9.66	1.7	236	BDZ			1.77	1.31		10.2	0.18	9	ALAMO
12 19:37:27	37.320	114.828	—	10.08	—	282	ADI			1.61			21.9	0.00	4	GREGERSON BASIN
12 19:37:30	37.330	114.825	0.2	4.34	2.0+	279	BDI	1.56		1.56	1.62		21.7	0.02	7	GREGERSON BASIN
12 23:20:51	37.858	116.133	0.3	-0.45	0.6	106	ACI	2.37			2.36		20.2	0.12	23	REVEILLE PEAK
13 2:14:11	37.760	114.435	0.5	3.28•	—	311	CDI	1.92	1.51		1.58		31.7	0.02	6	•••QUAD. NOT LISTED•••
13 2:14:16	37.608	114.740	7.7	0.00••	2.5	185	DDI	1.92	1.45		1.02		0.2	1.84	6	CHOKECHERRY MTN
13 2:35:51	37.853	116.134	1.1	0.00••	1.9	106	BCI		1.20		1.40		19.9	0.12	8	REVEILLE PEAK
13 3: 0: 2	37.848	116.136	0.8	0.74	1.3	104	ACI	1.69	1.60		1.62	1.6	19.8	0.14	10	REVEILLE PEAK
13 7:33:31	37.238	115.011	1.4	4.71	7.7	213	CDI	1.80	1.69		1.41		17.4	0.12	9	LOWER PAHRANAGAT LAKE
14 1:27:17	37.858	116.132	0.3	-0.56	0.6	107	ACI	2.26	2.13	2.38	2.28		20.1	0.13	25	REVEILLE PEAK
14 4: 8:24	37.206	116.536	0.1	-0.13	0.3	57	ACZ	2.08		1.69	1.72	2.0	13.3	0.06	30	THIRSTY CANYON NE
14 9: 0:32	37.472	114.690	0.5	9.39	0.9	273	ADI	1.24	1.01		1.04		15.4	0.03	7	SLIDY MTN
14 15: 9:50	37.863	116.136	0.5	-0.20	0.9	107	BCI	1.77		2.01	2.07		20.7	0.16	18	REVEILLE PEAK
15 11:14:15	37.856	116.134	0.5	-0.22	0.9	106	ACI	1.98	1.95		1.97	2.0	20.1	0.15	18	REVEILLE PEAK
15 11:24:28	37.856	116.132	0.5	-0.34	0.9	106	BCI	1.81	1.83		1.86		20.0	0.16	16	REVEILLE PEAK
15 23:44:32	37.849	116.134	1.7	0.20	2.3	105	BCI				1.62		19.7	0.13	6	REVEILLE PEAK

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1988 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)	QUD 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JUL 16	1:18:48	37.851	116.136	1.5	-0.32	2.3	105	BCI		1.72		1.76		20.0	0.14	6	REVEILLE PEAK
16	4: 9:15	37.294	116.216	0.3	8.51	1.1	112	ABI		1.32		1.08		13.1	0.09	16	QUARTET DOME
16	4: 9:58	37.579	116.508	0.4	0.85	1.7	98	ACZ		1.39		1.20		21.1	0.09	11	MELLAN
16	4:14:52	37.578	116.504	0.2	-1.53	0.5	77	ACZ	1.88	1.99	1.52	1.65		21.2	0.09	25	MELLAN
16	15:28: 7	36.478	116.577	0.3	2.25	1.1	119	ACZ	1.52	1.23		1.37		12.7	0.09	17	RYAN
16	15:38:45	36.450	116.579	1.0	12.26	1.8	197	BDI	1.50	1.17		1.08		10.9	0.18	16	RYAN
16	15:39:27	36.469	116.578	4.1	1.32•	——	185	CDI	1.30	1.07		0.87	2.4	12.1	0.12	10	RYAN
16	19:59: 4	37.837	115.059	0.9	7.36	1.9	143	ADZ				1.08		5.1	0.03	5	WHITE RIVER NARROWS
16	22:38:13	37.846	116.137	0.5	0.89	0.8	104	ACZ		1.36		1.46		19.7	0.09	8	REVEILLE PEAK
17	6:16:20	36.463	116.578	0.9	7.52	3.9+	132	BBI				0.75		11.7	0.16	14	RYAN
17	7:28:21	36.478	116.573	0.4	-0.83	1.0	123	ACZ		1.20		1.17		12.5	0.13	18	RYAN
17	15: 7: 6	37.854	116.136	0.7	0.36	1.2	105	ACI		1.61		1.71		20.1	0.13	11	REVEILLE PEAK
17	15:56:50	37.856	116.131	0.3	-0.08	0.5	106	ACI	1.72	1.87		2.04		19.9	0.12	20	REVEILLE PEAK
18	4:41:39	37.105	116.241	0.2	6.58	0.5	104	ABI				0.96		7.6	0.07	17	TIPPIPAH SPRING
18	22:22:40	37.409	114.703	0.4	9.63	0.9++	277	ADI	1.31			0.77		22.1	0.02	6	SLIDY MTN
19	2:58:50	37.105	116.247	0.3	5.91	0.7	103	ABI		1.27		0.86		7.6	0.08	15	TIPPIPAH SPRING
19	6:50:15	36.863	116.222	0.7	1.51	4.4	165	BCI		1.39		0.77		4.9	0.05	8	SKULL MTN
19	6:52:41	37.857	116.130	0.3	-0.12	0.5	106	ACI	2.25	1.97	2.31	2.22		19.9	0.11	26	REVEILLE PEAK
19	9: 8:27	37.883	116.134	0.9	0.00••	1.6	111	BCI				1.39		47.1	0.17	10	REVEILLE PEAK
19	12: 0:23	37.856	116.133	0.3	-0.26	0.6	106	ACI	2.34	2.14	2.38	2.29		20.1	0.12	23	REVEILLE PEAK
19	12: 7:58	36.454	117.932	3.5	2.45•	——	272	CDA		2.10				61.2	0.12	9	KEELER
19	13:47:33	37.816	116.862	2.7	5.00••	7.9	237	CDA		1.18				21.3	0.14	8	CACTUS PEAK
20	15:14:45	37.428	114.724	0.5	8.08	1.3++	269	ADI	1.51	1.51	1.76	1.72		19.7	0.03	7	SLIDY MTN
20	19:33:12	37.844	116.136	0.6	2.90	4.0	104	BCI	1.48	1.52		1.46		19.6	0.10	7	REVEILLE PEAK
21	1:49: 0	37.858	116.130	0.6	-0.83	0.9	107	ACZ		1.73		1.60		19.9	0.13	11	REVEILLE PEAK
21	11: 3:40	37.848	116.137	0.8	0.30	1.5	104	ACI	1.32	1.63		1.72		19.9	0.10	8	REVEILLE PEAK
21	17:59:11	37.780	115.255	0.5	0.14	0.6	174	ACI	2.11	1.18		1.26		11.5	0.03	6	COAL VALLEY
21	18:32:10	37.769	115.242	0.7	-0.05	1.2	189	ACI	1.69			1.14		10.6	0.11	7	SEAMAN WASH
22	11:22:58	37.294	117.343	0.3	0.48	0.4	75	ABZ		1.50		1.53		7.6	0.09	19	GOLD POINT
22	19:24: 7	37.857	116.132	0.3	-0.31	0.6	106	ACI	2.45		2.57			20.0	0.13	28	REVEILLE PEAK
23	2:18: 6	37.845	116.136	0.5	2.76	3.2	104	BCI		1.40		1.56		19.7	0.10	8	REVEILLE PEAK
23	2:56: 7	36.732	116.270	0.2	4.23	0.3	122	ABZ	1.27	0.92		0.64		1.2	0.05	18	STRIPED HILLS
23	10:59:41	37.002	116.357	0.2	10.88	0.3	107	ABI	1.23	0.94		0.98	0.8	4.5	0.04	15	BUCKBOARD MESA
23	13: 7:39	37.843	116.138	0.3	1.74	0.7	103	ACI				1.22		19.6	0.04	6	REVEILLE PEAK
23	16:18:18	37.331	117.295	0.2	9.72	0.1	190	ADI			1.20	1.09		4.7	0.01	6	GOLD POINT
23	18:35:27	37.846	116.134	0.6	0.84	0.9	104	ACI	2.16	1.72		1.94	1.7	19.5	0.15	12	REVEILLE PEAK
23	20: 2:37	37.509	114.611	0.6	10.37	1.1	298	ADI				1.19		15.5	0.03	6	CALIENTE
23	20:20:47	37.294	117.347	0.3	0.00	0.3	76	ABZ				1.12		8.0	0.12	15	GOLD POINT
23	21:15:56	37.300	117.344	0.4	4.94	1.0++	95	ABI		1.15		0.95		7.7	0.07	11	GOLD POINT
24	1:24:55	37.294	117.343	0.3	4.84	1.0++	75	ABI		1.29		1.32		7.7	0.10	17	GOLD POINT
24	4:46:57	37.297	117.338	0.4	5.84	0.9	113	ABI	0.94	1.31		1.17		7.2	0.07	10	GOLD POINT
24	4:55:10	37.300	117.342	0.4	5.48	0.8	96	ABI			1.24	0.96		7.5	0.07	10	GOLD POINT
24	5:39: 8	37.019	116.370	0.2	10.37	0.3	51	AAI	1.43	1.13		1.09		2.3	0.07	27	BUCKBOARD MESA
24	5:40:10	37.020	116.370	0.3	10.30	0.3	124	ABI	1.10	1.17		0.57		2.2	0.05	13	BUCKBOARD MESA

1988 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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JUL 24	6:12:27	37.020	116.371	0.3	10.36	0.4	76	AAI	1.28	1.03		0.95	0.8	2.2	0.09	24	BUCKBOARD MESA
24	6:56: 3	37.283	117.356	0.7	0.25	0.5+	216	ADI	1.01	1.31		1.15		9.0	0.03	8	GOLD POINT
24	14:17: 8	37.301	117.345	0.4	4.55	1.2	96	ABI			1.19	1.12		7.8	0.06	9	GOLD POINT
24	14:37:54	37.302	117.341	0.4	5.31	0.9	133	ABI	0.96	1.23		0.73		7.4	0.05	9	GOLD POINT
24	17:42:55	37.857	116.130	0.4	-0.14	0.6	106	ACI	2.00	1.92		2.11	2.4	19.9	0.13	19	REVEILLE PEAK
24	22: 3:33	36.732	116.259	0.5	1.53	0.4	186	ADI	0.91	1.06		1.07		1.7	0.08	15	STRIPED HILLS
24	23: 1:34	36.737	116.256	0.9	1.65	0.5	178	ACZ	0.82	1.08		0.76		1.5	0.10	14	STRIPED HILLS
25	1:36:48	36.734	116.271	0.6	0.83	0.2	177	ACZ				0.54		1.0	0.08	9	STRIPED HILLS
25	7:22:36	37.484	114.568	0.0	9.73	——	307	ADI		1.26		1.49		20.2	0.00	5	ELIGN NE
25	23:31:27	37.404	117.441	0.7	4.22	1.7	99	BBI	1.17	1.44	1.20	1.44		6.6	0.16	13	LIDA
26	4:55: 4	37.856	116.129	0.5	-0.24	0.8	106	ACI	1.95	1.58		1.88	1.7	19.8	0.14	16	REVEILLE PEAK
26	6: 4:39	37.195	115.212	0.8	8.08	1.1	127	ABI		1.31	1.32	1.36		3.6	0.05	10	LOWER PAHRANAGAT LAKE NW
26	6: 5:32	37.861	116.134	0.8	-0.37	1.2	107	BCI				1.66		20.4	0.16	10	REVEILLE PEAK
26	7:22: 4	37.229	117.894	0.6	2.99	2.7	220	BDI	2.43	2.20		2.42	2.4	21.8	0.16	39	WAUCOBA SPRING
26	15:29:41	38.156	115.205	1.7	5.32•	——	266	CDI	1.88	1.65		1.90		32.6	6.16	9	TIMBER MTN PASS NW
26	18:56:31	37.844	116.132	0.8	2.25	2.4	104	BCI				1.33		19.2	0.13	7	REVEILLE PEAK
26	22:47:17	36.478	116.523	0.2	8.16	0.5	152	ACI		1.02		0.97		9.8	0.04	15	RYAN
27	4: 7:51	37.839	116.142	0.6	6.10	9.9	102	CDA		1.03				19.8	0.05	5	REVEILLE PEAK
27	4:19: 2	37.840	116.135	1.3	2.18	2.5	188	BDA		1.51				19.3	0.13	6	REVEILLE PEAK
27	9:36:59	37.847	116.144	0.5	4.78	6.4	192	CDA		1.02				20.4	0.06	6	REVEILLE PEAK
27	9:59:48	37.878	116.132	1.0	0.30	3.0	111	BCA		1.73				21.5	0.21	12	REVEILLE PEAK
27	15:52:19	37.303	117.342	0.5	0.17	9.4	133	ABZ	1.25	1.49		1.36		7.5	0.11	16	GOLD POINT
27	16:16:57	37.297	117.343	0.2	2.87	0.4	95	ABI	1.34	1.66		1.58	1.8	7.6	0.08	25	GOLD POINT
27	17:39:48	36.485	115.796	0.2	9.03	1.1++	91	ACI	1.97			1.81	1.5	23.3	0.10	28	MT STIRLING
27	18: 4:51	37.858	116.129	0.5	-1.05	0.9	107	ACZ	1.79	1.72		1.79		19.9	0.12	10	REVEILLE PEAK
28	0:39: 9	37.299	117.320	0.2	8.72	0.3	134	ABI	1.05	1.27		1.06		5.6	0.02	9	GOLD POINT
28	0:39:44	37.315	117.312	0.3	9.69	0.4	159	ACI		1.24	1.66	1.09		5.1	0.03	9	GOLD POINT
28	0:47:44	37.294	117.348	0.2	0.65	0.3	124	ABI		1.24		1.28		8.0	0.04	10	GOLD POINT
28	2:13:15	37.858	116.130	0.3	0.00••	0.4	107	ACI	2.07	2.22	2.32	2.33		20.0	0.13	29	REVEILLE PEAK
28	3:20:10	37.302	117.340	0.3	4.55	0.9++	97	ABI		1.34		1.30		7.4	0.09	14	GOLD POINT
28	9:40:14	37.841	116.133	1.5	0.00••	2.6	103	BCI				1.70	2.2	19.2	0.25	8	REVEILLE PEAK
28	9:48: 7	37.680	115.047	0.4	1.40	1.1	197	ADZ				0.79		10.2	0.03	6	HIKO NE
28	17:59:39	37.268	117.238	0.4	1.13	0.9	112	ABI	1.59	1.43		1.25		4.0	0.11	20	SCOTTYS JUNCTION SW
28	18:21:26	37.506	114.612	9.8	9.68	1.4	278	ADI	1.79	1.71	1.64	1.76		15.7	0.05	8	CALIENTE
29	12:53:36	37.859	116.128	0.9	-0.78	1.5	107	BCI	1.31	1.79		1.56		19.9	0.15	10	REVEILLE PEAK
29	20:43:16	36.397	115.162	12.2	10.82	3.2	236	DDZ	2.26			1.82	2.0	12.1	0.78	13	GASS PEAK NW
29	20:55:50	36.883	116.016	1.2	2.85	1.7	171	BCI				0.72		6.4	0.12	11	YUCCA LAKE
29	23:51: 1	37.190	117.417	0.3	7.25	1.2	119	ACI			0.72	0.85		18.7	0.08	13	UBEHEBE CRATER
30	1:35:46	37.856	116.129	0.1	-0.74	0.2	148	ADZ				1.25		41.4	0.01	5	REVEILLE PEAK
30	1:46:14	37.843	116.137	0.3	1.63	0.8	103	ACI		1.52		1.32		19.6	0.07	8	REVEILLE PEAK
30	10:32:38	37.138	118.019	0.7	0.00••	0.5	242	ADI	1.73	1.63		1.67		33.4	0.09	16	•••QUAD NOT LISTED•••
30	10:35:18	37.512	115.289	0.8	11.53	2.9	121	BBI				0.95		18.5	0.12	7	MT IRISH
30	14:52:39	36.689	116.307	0.2	2.20	0.3	178	ACI	1.37	1.00		1.03		5.7	0.04	17	STRIPED HILLS
30	15:55:43	36.449	116.174	0.3	7.56	0.7	186	ADI	1.51	1.14		1.15		6.3	0.07	19	AMARGOSA FLAT

1988 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)	GOO 12S	MAGNITUDE ESTIMATES Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JUL 30	19:51:39	37.399	114.884	12.2	2.53•	—	313	DDI	1.50	0.87			1.4	14.8	0.02	6	DELAMAR NW
31	2:38: 6	36.714	116.275	0.2	6.82	0.3	54	AAI	2.06	1.49			2.2	3.1	0.07	40	STRIPED HILLS
31	4:24:25	37.507	114.615	0.3	8.50	0.8	299	ADI				0.98		15.4	0.01	5	CALIENTE
31	4:45:28	37.507	114.610	1.2	9.99	2.4	300	BDI		1.64		1.20		15.7	0.04	5	CALIENTE
31	6:13:48	36.708	116.265	0.8	8.46	0.8	233	ADI				0.66		3.8	0.06	13	STRIPED HILLS
31	7: 1:47	37.505	114.611	0.9	8.51	2.2	299	BDI		1.01		1.03		15.8	0.05	6	CALIENTE
31	7:31:32	37.858	116.126	0.5	-0.48	0.8	113	ACI				1.74		19.7	0.08	9	REVEILLE PEAK
31	18:47:18	37.843	116.133	0.6	3.70	3.8+	134	BCI				1.66		19.3	0.09	7	REVEILLE PEAK
31	21:56:25	37.193	117.610	0.6	9.49	0.8	162	ACI				0.88		5.5	0.13	14	LAST CHANCE RANGE
AUG 1	1:45:34	37.045	116.611	0.4	11.25	0.8	135	ACI				1.01		15.2	0.06	16	THIRSTY CANYON SE
1	1:46:20	37.039	116.618	0.3	11.42	0.7	130	ABI				1.05		15.3	0.05	15	THIRSTY CANYON SE
1	2:39:58	37.171	118.005	2.6	2.60	9.5	250	CDA		1.71				29.5	0.15	8	•••QUAD. NOT LISTED•••
1	9:59: 2	36.481	116.928	0.8	14.91	3.6	165	BCA		1.20				40.1	0.13	10	FURNACE CREEK
1	15:42:58	37.239	115.350	0.8	6.16	4.8	102	BCI				1.36		16.4	0.11	13	DESERT HILLS NE
2	0: 4:29	37.219	117.886	2.6	4.44•	—	218	CDI	1.39	1.45		1.33		21.4	0.22	8	WAUCOBA SPRING
2	0:25:16	37.857	116.131	0.4	0.78	0.7	114	ACI	1.91			1.60		20.0	0.09	13	REVEILLE PEAK
2	0:38:14	37.860	116.129	0.2	-0.14	0.8	107	ACI	2.72		3.29			20.0	0.08	30	REVEILLE PEAK
2	1:30:15	37.250	115.009	0.7	-0.31	0.6	209	ADZ	1.76		1.61	1.34		17.8	0.05	8	ALAMO SE
2	4:21:48	37.859	116.129	0.2	0.17	0.4	107	ACI	2.00			1.99		20.0	0.07	20	REVEILLE PEAK
2	11:25:28	37.854	116.118	0.4	-0.72	0.4	194	ADI	1.90	1.84		1.81	2.2	18.9	0.05	13	REVEILLE PEAK
2	12:39:11	37.503	114.614	1.0	11.20	1.4	278	ADI	1.42	1.31		1.55		15.8	0.08	9	CALIENTE
2	13:31:24	37.857	116.119	0.5	-0.32	0.4	195	ADZ	1.93	2.05		1.69		19.1	0.04	9	REVEILLE PEAK
2	14:58:40	36.733	116.274	0.2	6.22	0.3	176	ACZ	1.13	0.97			1.0	1.0	0.04	16	STRIPED HILLS
3	1:38:34	37.848	116.141	0.3	7.94	1.8	104	ACI		1.78		1.65		20.2	0.06	11	REVEILLE PEAK
3	2:45:31	37.863	116.131	0.3	-0.27	0.6	108	ACI	1.64	1.91	2.18	1.96		20.3	0.13	19	REVEILLE PEAK
3	6:33:59	36.672	117.240	0.9	14.68	2.5	178	BCA		2.12				20.9	0.07	9	STOVEPIPE WELLS
3	10:41: 1	37.828	116.132	4.3	2.78•	—	226	CDA		1.88				23.9	0.26	7	REVEILLE PEAK
3	13:24: 8	37.432	117.148	0.3	5.00••	2.8	111	BCA		1.68				17.5	0.13	9	STONEWALL PASS
3	14: 0:44	37.836	116.151	1.9	4.32•	—	294	CDA		1.30				22.8	0.18	5	REVEILLE PEAK
3	22:22:31	37.277	116.346	1.5	0.90	1.4	277	BDZ	1.84			1.25		7.2	0.04	12	DEAD HORSE FLAT
4	14:34:29	37.841	116.139	0.3	5.17	3.5+	103	BCI	1.52	1.97		1.83	1.7	19.7	0.10	16	REVEILLE PEAK
4	15:33:22	37.857	116.120	0.9	-0.52	1.4	112	ACZ				1.19		19.2	0.09	7	REVEILLE PEAK
4	21:21:57	37.843	116.138	0.5	0.78	0.7	103	ACI				1.45		19.7	0.09	8	REVEILLE PEAK
4	22:32:30	37.840	116.142	11.9	1.88•	—	235	DDI	1.31			1.60		19.8	0.09	5	REVEILLE PEAK
4	22:45:26	36.832	116.644	0.5	-0.81	0.5	110	ABI	1.44	1.36		0.74		4.3	0.08	9	BARE MTN
5	2: 9:38	37.412	117.438	0.4	5.74	0.7	67	ABI	1.08	1.37		1.37	1.3	6.2	0.11	16	LIDA
5	3:43: 3	37.853	116.134	0.9	-0.32	1.5	106	ACI	1.76	1.56		1.55		19.9	0.12	8	REVEILLE PEAK
5	6: 3:45	37.843	116.140	0.3	1.60	0.9	103	ACI	1.46	1.86		1.84	1.8	19.8	0.08	17	REVEILLE PEAK
5	6:27:39	36.484	116.307	0.2	7.99	0.7	64	ACI	1.54	1.57	1.29	1.48	1.8	18.0	0.07	25	ASH MEADOWS
6	4:12:15	37.840	116.138	0.3	7.00	2.0	103	ACU	1.28	1.54		1.62		19.5	0.09	12	REVEILLE PEAK
6	4:47:59	37.841	116.134	0.3	6.34	2.4	103	BCI	1.87	1.81		1.69		19.2	0.08	14	REVEILLE PEAK
6	6:33:13	37.863	116.132	0.4	-0.41	0.6	108	ACI	1.69		1.94	1.83	2.1	20.4	0.13	19	REVEILLE PEAK
6	15:58:21	37.840	116.138	0.3	8.65	1.3	103	ACI		1.62		1.59		19.5	0.06	9	REVEILLE PEAK
6	16: 9:48	37.851	116.132	0.5	0.85	0.9	105	BCZ	1.97	1.94		1.78		19.7	0.16	15	REVEILLE PEAK

1988 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
AUG	6	17: 0:44	37.841	116.132	0.3	7.00	1.8++	103	ACI	1.41	1.84		1.76	1.7	19.1	0.10	15	REVEILLE PEAK
	6	20:41:44	37.839	116.135	0.6	1.52	1.7	103	ACI				1.32		19.2	0.10	7	REVEILLE PEAK
	6	22:18:12	37.844	116.144	0.3	7.34	1.8	103	ACI		1.54		1.65		20.2	0.08	11	REVEILLE PEAK
	6	22:34:48	37.816	116.128	—	16.55	—	142	ADZ				1.91		17.6	0.13	4	REVEILLE PEAK
	6	22:35: 9	37.843	116.134	0.1	3.12•	—	120	CCI				1.96		50.0	0.03	8	REVEILLE PEAK
	6	23:23: 6	37.836	116.142	0.5	3.13•	—	127	CDA		1.20				19.6	0.04	5	REVEILLE PEAK
	7	4:41:50	37.851	116.140	0.9	2.04	3.9	105	BCA						20.3	0.22	11	REVEILLE PEAK
	7	4:42:18	37.851	116.131	0.9	3.01•	—	105	CCA		2.35				19.6	0.16	9	REVEILLE PEAK
	7	4:57:23	37.844	115.1[illegible]5	1.0	2.10	1.8	191	ADA		1.45				20.2	0.08	5	REVEILLE PEAK
	7	5:16:56	37.838	116.143	0.9	1.77	1.7	189	ADA		1.46				19.8	0.10	6	REVEILLE PEAK
	7	5:33:51	37.839	116.142	0.7	4.21•	—	189	CDA		1.21				19.8	6.06	5	REVEILLE PEAK
	7	5:37:42	37.849	116.146	1.8	2.07	3.0	193	BDA		1.19				20.6	0.11	5	REVEILLE PEAK
	7	6:40:27	37.842	116.134	1.8	3.06•	—	189	CDA		1.16				19.3	0.18	6	REVEILLE PEAK
	7	7: 9:60	37.073	117.307	0.4	4.56	5.6	104	CCA		1.28				25.6	0.09	14	UBEHEBE CRATER
	7	7:31:41	37.835	116.140	1.5	2.76	6.9	187	CDA		1.03				19.4	0.10	5	REVEILLE PEAK
	7	8:13:47	37.852	116.142	1.3	3.06•	—	193	CDA		1.26				20.5	0.15	7	REVEILLE PEAK
	7	8:27:20	37.843	116.138	1.6	3.06•	—	190	CDA		1.06				19.7	0.12	5	REVEILLE PEAK
	7	10:18:48	37.839	116.139	0.7	1.95	2.2	103	BCA		1.52				19.6	0.15	9	REVEILLE PEAK
	7	10:32:54	37.841	116.142	0.8	2.35	3.6	190	BDA		1.18				19.8	0.06	5	REVEILLE PEAK
	7	11: 1: 1	37.840	116.145	—	2.20	—	235	ADA		1.02				20.1	0.11	4	REVEILLE PEAK
	7	12: 3:55	37.843	116.139	1.1	3.09•	—	190	CDA		1.38				19.7	0.14	7	REVEILLE PEAK
	7	12: 6:45	37.845	116.142	1.3	1.44	2.3	191	BDA		1.81				20.1	0.20	10	REVEILLE PEAK
	7	13:56:29	37.837	116.136	1.1	1.97	3.4	102	BCA		1.36				19.2	0.21	8	REVEILLE PEAK
	7	17:57:31	37.842	116.137	0.3	0.00••	0.4	103	ACI	1.96	1.97		1.98		19.5	0.10	14	REVEILLE PEAK
	8	0:22:56	37.858	116.131	0.2	-0.08	0.4	107	ACI	2.56		2.78	2.83		20.0	0.11	33	REVEILLE PEAK
	8	14:52:29	37.855	116.126	0.4	-1.01	0.7	106	ACI		1.70		1.74		19.4	0.13	15	REVEILLE PEAK
	8	16:50:39	37.262	116.251	0.2	7.39	0.6	109	ABI	1.20	1.28		1.18		8.4	0.08	23	DEAD HORSE FLAT
	8	17:48:60	37.837	116.146	1.0	9.07	2.7	102	BCZ		1.23		1.33		19.9	0.25	10	REVEILLE PEAK
	8	23: 1: 9	37.494	117.035	0.3	0.00••	0.4	155	ACI			1.65	1.39		29.1	0.07	16	SCOTTYS JUNCTION NE
	9	3:48: 0	37.857	116.126	0.6	-0.64	0.9	107	ACI	1.98			1.64		19.6	0.14	15	REVEILLE PEAK
	9	6:50:24	37.845	116.143	0.3	8.41	1.6	103	ACI	1.22	1.51		1.47		20.2	0.08	12	REVEILLE PEAK
	9	6:53: 0	37.175	117.381	0.2	-0.55	0.3	102	ACZ		1.25	1.08	1.34		17.8	0.08	24	UBEHEBE CRATER
	9	7:34:47	35.699	116.520	1.1	3.57•	—	262	CDI		1.49		1.70		43.1	0.17	15	LEACH LAKE
	9	9:20: 9	37.789	115.129	0.6	5.31	3.2	160	BCI		1.39		1.23		11.6	0.09	9	SEAMAN WASH
	9	21:27: 6	37.563	118.434	7.5	-0.74	6.0	300	DDI	2.14	2.17		2.07		49.0	0.18	14	•••QUAD. NOT LISTED•••
	10	2:57:20	37.239	114.579	1.4	4.78•	—	281	CDI				1.54		43.1	0.04	6	VIGO NE
	10	23:40:28	36.561	115.413	1.2	-1.02	2.8	153	DCZ				1.59		23.4	0.86	10	BLACK HILLS SW
	11	1:16:59	36.813	116.274	0.4	5.78	0.9+	115	ABI		0.93		0.50		6.8	0.09	11	JACKASS FLATS
	11	3:46:54	37.837	116.140	0.7	2.27	1.1	183	ADI		1.71		1.70		19.5	0.08	8	REVEILLE PEAK
	11	8: 4:23	37.773	115.062	0.8	4.71	7.2	126	CCI	1.45			1.51	2.2	12.2	0.12	8	WHITE RIVER NARROWS
	11	18:42:57	37.841	116.134	1.2	2.23	2.5	188	BDI		1.61		1.55		19.3	0.12	6	REVEILLE PEAK
	11	21:27:28	37.846	116.135	1.4	1.63	2.4	191	BDZ		1.55		1.75		19.6	0.14	6	REVEILLE PEAK
	12	1:37:26	37.328	114.985	1.2	-0.58	1.6	190	BDZ			1.32			10.5	0.07	5	DELAMAR LAKE
	12	2:21: 9	36.537	115.030	0.7	13.92	0.6	241	ADI	2.23		2.48	2.26		12.2	0.11	23	HAYFORD PEAK

1988 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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
AUG 12	3:18:11	36.508	115.018	0.9	15.36	0.7	244	BDI	2.34		2.48	2.32		12.7	0.15	21	HAYFORD PEAK
12	6:34:34	37.822	117.384	1.2	0.72	1.4	204	BDI				1.32		38.9	0.12	11	PAYMASTER RIDGE
12	13:47:22	35.948	114.821	1.5	-0.93	2.8	163	BCI				1.95		6.6	0.10	9	BOULDER CITY
12	13:47:23	36.003	114.884	2.1	-0.90•	——	282	CDI				1.91		113.2	0.05	8	HENDERSON
12	21:42:39	36.813	116.033	0.5	6.08	2.3	132	BCI	1.86	1.53		1.46		13.0	0.15	21	CANE SPRING
12	22:44:22	37.229	116.511	0.3	1.81	0.8	109	ACI	1.47	1.48		1.11		13.4	0.08	18	THIRSTY CANYON NE
13	0:25:29	36.810	116.026	0.2	-0.96	0.3	160	ACZ				0.99		13.7	0.04	9	CANE SPRING
13	5:39:29	36.634	116.362	0.6	8.45	0.5	138	ACI		0.84		1.02		2.4	0.10	15	STRIPED HILLS
13	6:28:14	36.845	116.260	0.2	8.42	0.4	46	AAI	1.58	1.22	1.23	1.09		5.4	0.09	30	JACKASS FLATS
13	7:55:11	36.020	114.757	——	7.00••	——	245	ADI				0.54		10.9	0.13	3	BOULDER BEACH
13	9: 9:18	36.617	116.347	1.0	8.58	0.6	300	ADZ				0.80		3.2	0.06	7	LATHROP WELLS SE
13	12:14:45	36.619	116.353	1.0	9.20	0.6	313	BDI				0.73		3.1	0.07	8	LATHROP WELLS SE
13	13:48:25	36.811	116.028	0.7	6.20	2.1	170	BCI				0.85		13.4	0.09	9	CANE SPRING
13	20:22:19	37.864	116.132	0.6	-1.00	0.5	189	ADI		1.71		1.65		20.5	0.09	11	REVEILLE PEAK
13	20:51: 7	37.861	116.134	0.8	-0.48	0.8	188	ADI				1.58		20.5	0.09	8	REVEILLE PEAK
14	8:12: 7	35.971	114.804	4.7	16.40	6.0	203	DDI					2.0	32.4	0.16	7	ELDORADO VALLEY
14	13:45:54	37.815	114.687	1.3	3.13	3.3	269	BDZ	1.80	1.12	1.97	1.98		23.6	0.08	8	THE BLUFFS
14	18:22:39	37.231	117.593	0.4	9.29	0.5	112	ABI	1.11	1.33		1.15		4.8	0.10	15	LAST CHANCE RANGE
15	5:53:60	37.411	117.439	0.4	5.04	0.8++	58	ABI		1.36		1.21		6.2	0.12	20	LIDA
15	10:34:49	37.861	116.135	0.8	0.12	1.0	188	ADI	2.54		2.36	2.46		20.5	0.14	14	REVEILLE PEAK
15	11:30: 8	37.205	116.534	0.2	0.22	0.3	42	ACZ	1.84		1.98	2.05		13.5	0.08	33	THIRSTY CANYON NE
15	17:16: 2	37.868	116.135	1.5	-1.20	1.3	189	BDZ		1.38		1.58		21.0	0.08	7	REVEILLE PEAK
15	18:44:49	36.637	115.199	0.5	15.34	0.8	145	ACI	2.03	1.70		1.85		15.0	0.09	12	HAYFORD PEAK
15	18:49: 6	37.385	115.201	0.3	-0.22	0.4	125	ACZ	1.57			1.40		13.6	0.05	7	ASH SPRINGS
15	18:59:36	37.384	115.183	0.6	7.80	1.5	165	ACI	1.44		1.57	1.25		12.0	0.08	7	ASH SPRINGS
15	19:36:31	37.384	115.193	0.4	4.65	2.5	100	BCI	1.62			1.54		12.9	0.09	10	ASH SPRINGS
16	2:13:59	37.272	116.353	0.9	0.05	0.4	243	ADI	1.68	1.73	1.67	1.12		7.0	0.11	15	DEAD HORSE FLAT
16	5:45: 6	37.566	117.207	0.3	-0.33	0.6	121	BCI	2.03		2.33	2.32		21.7	0.17	33	GOLDFIELD
16	6:46:45	36.809	116.035	0.2	-0.06	0.4	130	ACZ	1.45	1.33		1.24	1.5	12.9	0.08	18	CANE SPRING
16	7:52:26	36.818	116.038	0.4	2.94•	——	195	CDA		1.86				12.3	0.06	12	CANE SPRING
16	7:54:48	36.813	116.036	1.0	1.98	1.5	243	ADA		1.24				12.7	0.11	8	CANE SPRING
16	9:15:48	37.258	117.869	1.7	9.43	3.3	209	BDA		1.38				18.8	0.12	8	SOLDIER PASS
16	10:35:33	37.206	116.533	0.2	4.87	1.4	41	ACA		2.42				13.5	0.08	26	THIRSTY CANYON NE
16	11: 3:39	37.204	116.558	10.8	6.38•	——	197	DDA		0.83				12.1	0.12	5	THIRSTY CANYON NE
17	7:28:13	37.829	116.145	1.1	0.87	1.2	186	BDA		1.25				19.5	0.13	6	REVEILLE PEAK
17	8:10:38	37.218	116.540	0.5	8.13	1.4	139	ACA		1.18				12.1	0.09	16	THIRSTY CANYON NE
17	11:14:35	37.843	116.139	0.9	2.27	2.7	103	BCA		1.34				19.7	0.17	8	REVEILLE PEAK
17	11:20:10	37.848	116.141	1.3	3.63•	——	192	CDA		1.10				20.2	0.34	6	REVEILLE PEAK
17	12:10:58	36.626	115.252	3.7	7.00•	——	249	CDA		1.37				50.5	0.14	10	WHITE SAGE FLAT
17	16: 9:30	36.493	116.577	0.3	0.18	0.6	63	ACI	1.69			1.45		13.9	0.12	19	RYAN
18	3:12: 2	36.378	116.930	0.4	10.56	0.9	103	ABI			1.45	1.33		15.5	0.13	23	FURNACE CREEK
18	21:30:27	36.618	115.963	0.3	10.45	0.6	155	ACI				1.11		4.8	0.05	15	MERCURY SW
18	22: 4:12	37.864	116.127	0.8	2.20	2.7	108	BCI				1.57		20.1	0.14	7	REVEILLE PEAK
18	22:22:46	37.301	116.286	0.3	-0.17	0.8	80	ACI	2.21			2.07		10.3	0.11	27	DEAD HORSE FLAT

9 1 0 5 1 2 9 6 0

1988 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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
AUG 18	22:25:59	37.301	116.289	9.3	0.44	0.8	79	ACI	2.05		2.25	1.85		10.1	0.11	23	DEAD HORSE FLAT
19	0:26:34	37.251	115.031	0.4	5.56	1.6+	195	ADI	2.17	2.09		1.93		16.6	0.07	10	ALAMO SE
19	2:57:43	37.856	116.130	0.4	-0.13	0.7	106	ACI	1.79	1.89	1.96	2.01	2.2	19.9	0.13	20	REVEILLE PEAK
19	3:56:45	37.570	117.208	0.4	8.94	1.6	125	ACI		1.31	0.77	1.09		21.3	0.08	14	GOLDFIELD
19	14:27:14	37.567	117.200	0.6	0.22	0.9	125	BCI		1.60	0.92	1.32		22.1	0.15	14	GOLDFIELD
19	15: 1:58	37.567	117.202	0.5	0.15	0.9	124	ACZ				0.99		21.9	9.11	11	GOLDFIELD
20	1:14: 0	37.566	117.205	0.7	0.68	1.1	124	ACI				1.37		21.8	0.13	10	GOLDFIELD
20	7:57:39	37.568	117.207	0.5	7.00	2.9+	124	BCI				1.12		21.5	0.10	12	GOLDFIELD
20	10:58:37	37.854	116.131	0.5	0.37	0.8	106	BCI	1.44	1.75		1.85		19.8	0.16	17	REVEILLE PEAK
20	11:26:29	37.447	117.898	0.7	9.69	0.9	177	ACZ				1.58		2.5	0.07	10	SOLDIER PASS
20	14:18:55	36.629	116.368	0.2	2.52	0.5	132	ABZ	1.53		1.14	0.98		3.4	0.07	25	STRIPED HILLS
20	14:31:15	36.636	116.295	0.3	0.99	0.3++	142	ACI		1.37		0.80		4.1	0.05	13	STRIPED HILLS
20	15: 2:29	36.845	116.258	0.3	8.61	0.6	103	ABI				0.51		5.5	0.08	16	JACKASS FLATS
20	18:13:58	37.566	117.203	0.5	0.68	0.7	124	BCI				1.30		21.9	0.16	15	GOLDFIELD
20	18:34:23	37.574	117.208	0.4	10.72	1.7	126	ABI				1.24		20.9	0.08	13	GOLDFIELD
20	23:48:24	37.571	117.208	0.4	7.09	2.2++	123	BCI		1.78		1.63		21.3	0.09	16	GOLDFIELD
21	7:58:21	37.851	116.129	0.7	0.00••	1.1	105	ACI		1.76		1.82		19.5	0.12	9	REVEILLE PEAK
21	9:46:48	37.714	115.024	1.0	8.73	3.1	127	BBI	1.39	1.47	1.26	1.32		10.3	0.14	6	HIKO NE
21	13: 8: 1	37.161	115.017	5.1	19.92	10.2	247	DDI			1.21	1.37		15.1	0.13	5	LOWER PAHRANAGAT LAKE
21	13:22:40	37.671	115.044	0.7	-1.84	0.9	108	ADZ				0.85		9.7	0.05	5	HIKO NE
22	4:32:40	37.857	116.133	0.4	2.85•	——	106	CCA		2.51				20.1	0.12	13	REVEILLE PEAK
22	5:25:50	37.853	116.138	0.3	-0.88•	——	105	CCA		2.27				20.2	0.11	12	REVEILLE PEAK
22	8:13: 5	36.713	117.280	8.3	11.05•	——	133	DBA		1.61				7.5	2.51	9	MARBLE CANYON
22	11:35: 1	37.858	116.131	0.7	3.51•	——	107	CCA		1.97				20.0	0.34	12	REVEILLE PEAK
22	22:44:31	37.855	116.127	0.8	0.00••	1.3	106	ACI				1.52		19.5	0.10	8	REVEILLE PEAK
22	22:53:16	37.841	116.128	0.6	0.73	0.9	104	ACZ				1.34		18.8	0.10	7	REVEILLE PEAK
23	14:23:38	36.108	114.676	2.3	1.16	7.8	220	CDI	2.58			2.05		21.8	0.06	10	HOOVER DAM
23	14:46:12	37.209	116.543	0.3	5.60	1.0	70	ACI	1.45			1.21		12.6	0.09	25	THIRSTY CANYON NE
23	19: 5:15	37.295	116.318	1.4	2.86	1.0	274	BDZ	1.55			0.83		9.0	0.08	9	DEAD HORSE FLAT
23	20:37:38	35.900	114.847	5.3	2.67•	——	208	DDI				2.22		8.6	0.10	10	BOULDER CITY
24	5: 3:33	36.662	116.060	0.4	6.85	1.1	144	ACI				0.75		8.9	0.08	12	CAMP DESERT ROCK
24	7:35:26	35.931	116.976	1.5	5.17	2.7	267	BDI		1.63		1.96		10.4	0.07	8	WINGATE WASH
24	7:59:48	35.942	116.972	3.0	0.54	2.5	266	CDI		1.58	1.65	1.84		38.3	0.09	9	WINGATE WASH
24	9: 4:11	35.929	116.972	2.8	2.42	9.0	274	CDI				1.75		39.4	0.07	9	WINGATE WASH
24	10:20:18	35.931	116.978	1.1	5.95	1.4	268	BDI				2.06		10.6	0.10	14	WINGATE WASH
24	11:57:24	35.934	116.972	1.0	5.30	1.8	264	BDI	2.11			2.37		10.0	0.11	16	WINGATE WASH
24	12: 8:13	36.293	116.776	4.1	7.00	10.9	149	DCI				1.32		15.3	1.03	10	FURNACE CREEK
24	14:13:24	37.858	116.130	0.4	-0.39	0.7	107	ACI		1.84		2.06		19.9	0.13	17	REVEILLE PEAK
24	14:27:38	37.858	116.127	0.4	-0.60	0.8	107	ACI	1.72			1.92	2.2	19.8	0.13	15	REVEILLE PEAK
24	14:38:23	35.922	116.981	0.7	6.15	1.4	266	ADI	2.17			2.38		11.3	0.08	14	WINGATE WASH
24	14:39:35	35.927	116.993	3.6	-0.01	3.0	269	CDI				1.35		12.1	0.08	7	WINGATE WASH
24	14:56:24	35.952	116.981	1.0	0.21	0.9	265	BDI				1.19		10.3	0.04	6	WINGATE WASH
24	15:36:37	35.946	117.003	1.8	2.94•	——	328	DDI				1.22		12.4	0.05	5	MANLY PEAK
24	17:45:44	35.926	116.978	0.8	6.59	1.0++	275	ADI				1.16		10.8	0.07	9	WINGATE WASH

1988 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)	QOD 12S	MAGNITUDE ESTIMATES Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
AUG 25	2: 6:31	36.327	116.812	8.1	5.41•	——	145	DCA		1.69				20.2	0.99	7	FURNACE CREEK
25	3:30:53	37.626	115.972	2.3	2.35	7.4	175	CCA		1.41				14.7	0.12	10	WHITE BLOTCH SPRINGS
25	6:33:34	37.852	116.140	2.0	5.41•	——	193	CDA		1.14				20.3	0.15	5	REVEILLE PEAK
25	10:50:40	37.853	116.140	1.9	7.15•	——	194	CDA		1.23				20.4	0.14	5	REVEILLE PEAK
25	12:26:47	35.954	116.973	——	5.90	——	271	BDA		1.37				37.5	0.27	4	WINGATE WASH
25	13:11:14	35.902	116.996	2.9	-0.14•	——	268	CDA		2.34				43.0	0.14	12	WINGATE WASH
25	14:14:50	35.925	116.976	1.0	6.27	1.4++	275	ADI	1.21			1.15		10.7	0.07	8	WINGATE WASH
25	16:59:58	37.337	117.631	0.2	0.51	0.4	105	ACZ	1.69			1.74		11.7	0.07	23	MAGRUDER MTN
25	17:29:52	35.930	116.982	1.3	5.18	2.3	275	BDI		1.11		1.28		11.0	0.07	7	WINGATE WASH
25	17:45:57	36.701	115.736	0.2	11.69	0.5	170	ACI	1.97	1.31	1.58	1.60		6.7	0.06	22	INDIAN SPRINGS NW
25	18:10:40	37.320	115.208	3.2	7.05•	——	220	DDI			1.09		1.4	16.9	0.09	6	ALAMO
25	20:57:15	37.339	117.626	0.2	0.01	0.4	102	ACI			1.12	1.00		11.9	0.06	14	MAGRUDER MTN
26	2: 7:25	35.989	114.728	1.7	4.11	1.6	255	BDZ	2.01			2.25		7.8	0.05	6	RINGBOLT RAPIDS
28	2:32:20	37.280	115.462	0.7	-1.02	0.9	126	ACZ	1.43		1.19	1.49		27.4	0.12	9	CUTLER RESERVOIR
28	3:59:28	37.863	116.123	0.2	-1.29	0.4	108	ACI				1.70		19.8	0.04	10	REVEILLE PEAK
28	5:56:58	35.879	115.074	0.8	3.26•	——	223	CDI				1.32		29.1	0.07	8	SLOAN
28	10:48:49	36.721	115.969	0.2	-0.51	0.3	120	ABZ				0.75		6.8	0.08	17	MERCURY
28	16: 8:39	37.858	116.126	0.2	-0.94	0.4	107	ACI				1.72		19.7	0.04	10	REVEILLE PEAK
29	2:27:27	37.884	116.116	0.2	-1.11	0.3	113	ACI				1.65		20.8	0.04	11	REVEILLE PEAK
29	2:51:35	36.695	115.588	1.2	9.78	4.2	153	BCI				1.41	1.9	19.9	0.28	14	HEAVENS WELL
29	4: 1:28	37.263	115.198	2.4	-1.02	2.7	160	DCZ			0.84	0.73		10.5	0.64	7	ALAMO
29	4:25:10	36.678	116.078	0.3	0.36	0.6	108	ACZ		1.28		0.77		10.6	0.10	18	CAMP DESERT ROCK
29	10:13:41	37.786	115.164	1.7	4.58	11.5	178	CCI	1.45			1.14		13.5	0.16	7	SEAMAN WASH
29	12:51:10	37.134	117.540	0.3	9.18	0.9	153	ACI	1.85	2.10	2.75	2.10	2.1	14.4	0.10	26	LAST CHANCE RANGE
29	13:46:59	36.708	115.583	0.6	-1.50	0.9	86	BCZ				1.49		20.4	0.17	16	HEAVENS WELL
30	2:30:32	37.857	116.135	0.2	0.42	0.5	106	ACI	2.42		2.65	2.72		20.3	0.11	33	REVEILLE PEAK
30	2:46:43	37.859	116.130	0.4	-0.95	0.7	107	ACZ				1.77	1.7	20.0	0.12	12	REVEILLE PEAK
30	3:33: 4	37.850	116.132	0.8	0.00••	1.3	105	ACI				1.43		19.6	0.13	9	REVEILLE PEAK
30	11: 4:10	37.834	116.142	0.7	4.32	11.1	187	CDA		1.34				19.5	0.08	6	REVEILLE PEAK
30	13:53: 8	37.840	116.145	1.1	3.18•	——	190	CDA		1.61				20.1	0.15	8	REVEILLE PEAK
30	15:28:19	37.207	116.539	0.2	-0.01	0.3	132	ACZ				0.82		12.9	0.06	16	THIRSTY CANYON NE
31	2:49:51	37.843	116.137	0.7	2.29	2.0	103	ACI				1.49		19.7	0.13	8	REVEILLE PEAK
31	2:59:29	37.850	116.134	0.4	-0.06	0.7	105	ACI	1.89		2.23	2.16		19.8	0.15	21	REVEILLE PEAK
31	3:19:25	36.812	116.262	0.6	6.28	1.2	126	ABI				0.47		7.5	0.12	11	JACKASS FLATS
31	9:22:56	37.854	116.130	0.4	-1.06	0.7	106	ACI	1.75		1.68	1.91	2.4	19.7	0.13	15	REVEILLE PEAK
31	12:45:39	36.728	115.941	0.1	4.30	0.7	132	ABI	1.85	1.55		1.48		7.7	0.05	23	MERCURY
31	14:55:39	37.243	115.021	2.1	4.96	7.9	209	CDI			1.87	1.04		16.9	0.07	8	LOWER PAHRANAGAT LAKE
31	18:20:15	36.726	115.938	0.2	4.10	0.8+	132	ABI	1.82	0.96		1.34		7.5	0.05	15	MERCURY
31	19:27:52	36.699	115.542	3.0	1.40	10.4	278	CDZ		1.01		1.19		37.7	0.12	9	HEAVENS WELL
31	19:27:58	36.662	115.963	4.8	7.00	3.1	146	DCI		0.93		0.86		0.2	1.96	9	MERCURY
31	23:45:19	37.258	115.434	0.4	0.74	0.8	101	ACZ	1.61		1.46	1.54		24.0	0.08	13	CUTLER RESERVOIR
SEP 1	3:10: 8	37.512	114.623	1.5	13.27	1.9	297	BDI		1.22		0.93		14.5	0.08	6	CALIENTE
1	9:24:16	37.300	117.339	0.4	5.18	0.9	112	ABI				1.10		7.2	0.10	13	GOLD POINT
1	9:24:35	37.292	117.346	0.3	0.41	0.5	88	ABZ	1.22			1.52		7.9	0.11	17	GOLD POINT

1988 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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
SEP 1 9:26:29	37.296	117.339	0.3	4.76	0.9	91	ABI				1.37		7.2	0.10	18	GOLD POINT
1 9:38:30	37.295	117.346	0.4	0.12	0.5	114	ABZ				1.08		7.9	0.11	13	GOLD POINT
1 21:55:21	37.492	117.032	0.3	0.81	0.6	109	ACI	1.84	1.96		1.93		29.1	0.11	27	SCOTTYS JUNCTION NE
2 6:59:19	37.878	116.128	0.5	0.02	0.8+	111	BCI	1.73			1.86		21.1	0.16	18	REVEILLE PEAK
2 14:12:56	36.988	116.013	0.2	-0.20	0.2	152	ACZ	1.54			1.26	1.7	7.2	0.08	18	YUCCA LAKE
2 21:14:24	37.843	116.138	0.7	0.74	1.0	103	ACZ				1.34		19.7	0.10	6	REVEILLE PEAK
2 21:46: 6	36.562	116.341	0.2	7.99	1.0	100	ABI	1.99		2.27	1.94	2.2	9.3	0.09	28	LATHROP WELLS SE
3 11:53:19	37.147	116.304	0.3	-0.08	0.3	74	ABI				0.80		7.7	0.08	18	AMMONIA TANKS
3 17:47:50	37.861	116.130	0.5	-0.21	0.8	107	ACI	1.51		1.96	1.84		20.2	0.14	15	REVEILLE PEAK
4 13:20: 2	37.428	116.524	0.2	8.49	1.0	102	ACI	2.08		1.73	1.64		18.3	0.07	27	BLACK MTN NE
4 22:13:29	37.852	116.133	1.9	-1.02	4.7	154	BCZ				1.60		20.0	0.14	6	REVEILLE PEAK
5 3: 5:54	37.862	116.131	0.5	0.04	0.9	107	ACI	1.91		1.94	1.91	2.1	20.3	0.14	15	REVEILLE PEAK
5 11: 2:25	37.661	114.875	0.5	6.24	1.1	152	ACI	1.28	1.75	1.55	1.63	1.7	5.6	0.09	10	PAHROC SPRING
6 18:42:54	36.729	115.931	0.5	4.91	0.8	223	ADI				1.31		8.1	0.07	20	MERCURY
7 0:51:45	37.238	116.945	0.3	13.16	1.2	149	ACI				1.20		27.7	0.08	17	SPRINGDALE
7 7:36:11	35.859	114.784	0.6	3.06	0.6	312	ADI	2.59			2.15		79.3	0.03	9	BOULDER CITY SE
7 18:14:31	36.096	114.652	1.2	-1.57	1.6	220	BDI	2.65			1.99		21.4	0.09	12	HOOVER DAM
7 18:58:20	36.100	114.706	6.2	1.27•	—	205	DDI	2.74			2.19		20.3	0.07	8	HOOVER DAM
8 8:59:51	36.810	116.027	0.3	-1.16	0.4	171	ACZ		0.89		0.93		13.6	0.07	14	CANE SPRING
8 19:20:10	37.850	116.133	0.6	0.60	0.9	105	ACI				1.27		19.7	0.06	7	REVEILLE PEAK
8 20: 7: 3	37.216	116.544	0.2	8.40	0.5	136	ACI				1.04		12.0	0.04	15	THIRSTY CANYON NE
9 12:49:58	36.899	116.817	0.4	0.00••	1.0	121	ACI				0.93		20.4	0.09	15	BULLFROG
9 18:29:50	36.946	117.607	1.3	0.70	1.7	202	BDI				0.90		23.9	0.07	6	DRY MTN
11 7:24: 2	37.856	116.129	0.4	0.00••	0.7	106	ACI	1.66			1.80		19.8	0.13	15	REVEILLE PEAK
11 15:18: 2	37.503	114.609	0.6	8.87	1.2	300	ADI				1.44		16.1	0.04	7	CALIENTE
12 1:43:49	37.848	116.135	0.6	0.74	1.0	104	ACI				1.46		19.7	0.12	9	REVEILLE PEAK
12 7: 7:55	37.861	116.130	1.1	-0.56	2.0	107	BCI				1.32		20.2	0.15	8	REVEILLE PEAK
12 17:47:39	37.729	115.158	0.3	6.00	1.4	132	ACI				0.89		12.0	0.06	9	FOSSIL PEAK
14 7:58: 1	37.845	116.136	2.0	3.03•	—	190	CDA		0.99				19.6	0.12	5	REVEILLE PEAK
14 11: 1:44	37.218	116.539	0.9	7.32	2.8	139	BCA		0.85				12.1	0.10	9	THIRSTY CANYON NE
14 16:34:32	37.043	116.474	0.1	-0.74	0.1	125	ABI	1.13	1.16		0.38		7.8	0.02	11	TIMBER MTN
14 20:53: 4	37.607	114.465	4.2	15.77	1.3	353	CDI				1.01		24.1	0.04	6	•••QUAD. NOT LISTED•••
15 1:48:30	37.519	115.384	0.1	0.87	0.2	153	ACZ				1.11		19.9	0.02	11	MT IRISH
15 2:32: 4	37.196	115.208	0.5	8.57	0.6	106	ABI	1.86			1.96		3.6	0.11	17	LOWER PAHRANAGAT LAKE NW
15 6:14:34	37.180	116.087	0.8	-0.40	1.0	99	BBI				1.66		6.6	0.15	14	OAK SPRING
15 11: 4:44	36.046	114.850	5.6	4.59	12.0	155	DCZ				1.83		16.2	0.17	6	BOULDER BEACH
15 11:41:33	37.848	116.128	0.8	0.17	1.9	105	ACI				1.20		19.2	0.09	6	REVEILLE PEAK
15 11:41:35	37.850	116.127	0.4	-0.11	0.8	119	ACI				1.60		19.3	0.06	7	REVEILLE PEAK
15 15:53:58	37.319	114.865	1.4	-0.32	1.7	220	BDI				1.60		19.1	0.12	7	GREGERSON BASIN
16 5:31:56	36.597	116.303	0.5	9.18	0.5	194	ADI				0.70		6.3	0.06	13	LATHROP WELLS SE
16 14:32:21	37.281	115.064	0.6	5.46	0.9++	182	ADI			1.16	1.20		14.0	0.04	9	ALAMO SE
16 18:25:45	37.844	116.133	0.4	0.96	0.7	104	ACI				1.13		19.3	0.07	7	REVEILLE PEAK
16 18:35:11	36.885	116.817	0.6	0.36	2.0	128	ACI				1.08		19.6	0.09	14	BULLFROG
16 18:36:12	36.882	116.813	0.6	-1.21	1.9	127	ACI				0.86		19.1	0.10	11	BULLFROG

1988 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 16	20:56:60	37.846	116.138	0.3	1.72	1.0	104	ACA		1.45				19.9	0.06	8	REVEILLE PEAK
16	23:24:43	37.307	115.363	0.1	3.22*	——	236	CDI				1.11		21.8	0.01	6	BADGER SPRING
17	6:41:11	36.837	117.501	0.6	1.78	1.1+	187	ADI			1.70	1.69		9.2	0.13	19	DRY MTN
17	6:42:11	36.839	117.492	0.7	1.56	1.0+	186	ADI				1.30		8.7	0.10	12	TIN MTN
17	6:44:15	36.840	117.498	0.5	1.96	1.3	186	ADI	1.53			1.70		9.2	0.12	19	TIN MTN
17	7:27:31	36.841	117.493	0.8	2.35	1.3	186	ADI				1.28		8.8	0.12	13	TIN MTN
17	23:42:23	37.857	116.130	0.4	0.00**	0.7	107	ACI		1.51		1.65		19.9	0.14	16	REVEILLE PEAK
18	0:51:51	37.860	116.135	0.6	0.00**	1.5	107	ACI		1.40		1.63		20.4	0.14	12	REVEILLE PEAK
18	2:11:37	37.861	116.130	0.6	0.00**	1.0	107	BCI		1.53		1.66		20.7	0.15	13	REVEILLE PEAK
18	8:29: 7	37.859	116.138	0.6	0.00**	1.3	106	BCI				1.77	1.7	20.6	0.16	14	REVEILLE PEAK
18	8:49:26	37.192	115.202	1.3	-0.38	1.3	123	BBI				1.35		2.9	0.12	8	LOWER PAHRANAGAT LAKE NW
18	18: 4:43	37.857	116.132	0.4	-0.22	0.6	106	ACI	2.40		2.62	2.30	2.8	20.0	0.14	24	REVEILLE PEAK
18	18: 7:10	37.849	116.137	0.9	0.19	1.6	105	ACI				1.48		19.9	0.12	7	REVEILLE PEAK
18	18: 9:24	37.844	116.141	0.2	0.96	0.3	103	ACI				1.88		19.9	0.05	10	REVEILLE PEAK
18	18:10: 8	37.837	116.142	0.5	9.59	3.5	127	BDI				1.59		19.7	0.03	5	REVEILLE PEAK
18	18:55: 6	37.857	116.131	0.5	-0.39	0.9	106	BCI	2.19	1.83		2.06		20.0	0.16	15	REVEILLE PEAK
19	4: 0:10	37.961	116.130	0.5	-0.70	0.9	107	ACZ		1.45		1.51		20.1	0.13	13	REVEILLE PEAK
19	4:22:46	37.410	115.212	0.3	-0.38	0.4	124	ACZ	1.37		1.30	1.47		14.3	0.06	10	ASH SPRINGS
19	7:17: 3	36.900	116.067	0.2	2.59	0.3	118	ABI		1.33		1.01	1.3	3.8	0.06	14	YUCCA LAKE
19	11:13:56	37.854	116.131	1.0	0.03	1.7	106	ACI				1.44		19.8	0.11	8	REVEILLE PEAK
19	12:23:16	37.421	115.313	0.4	5.13	6.0	97	CCI				1.34		23.3	0.09	13	HANCOCK SUMMIT
19	16:49:23	37.848	116.133	0.3	0.53	0.5	121	ACZ		1.54		1.58		19.5	0.04	7	REVEILLE PEAK
19	20: 0:27	37.679	115.035	0.6	0.44	1.1	115	ABZ	1.66		1.70	1.39		9.2	0.09	8	HIKO NE
19	22:50:50	37.079	116.183	1.3	5.30	1.4	282	BDI				0.84		6.2	0.10	9	TIPPIPAH SPRING
20	1: 0:30	37.353	117.244	0.4	-0.95	0.4	168	ACI				1.44		6.0	0.06	10	SCOTTYS JUNCTION SW
20	2:31:15	37.411	115.197	0.7	7.32	2.5+	120	BBI			1.41	1.28		12.9	0.16	11	ASH SPRINGS
20	5:34:14	37.412	115.193	1.3	10.45	3.1	119	BBI			1.41	1.45		12.6	0.17	9	ASH SPRINGS
20	8:20:44	37.852	116.132	0.9	0.55	1.4	105	ACI		1.61		1.77		19.7	0.12	9	REVEILLE PEAK
20	15: 1: 8	37.844	116.133	0.2	1.88	0.7	104	ACZ		1.45		1.18		19.3	0.03	6	REVEILLE PEAK
21	1:38:50	37.352	117.246	0.3	-1.06	0.4	71	ABI	1.59			1.44		5.8	0.10	16	SCOTTYS JUNCTION SW
21	15:45: 5	37.355	117.243	0.3	-1.24	0.3	72	ABI				1.29		6.2	0.07	11	SCOTTYS JUNCTION SW
22	1: 7:21	36.716	116.220	0.2	7.43	0.4	88	AAI		1.43	'.93	1.22		5.5	0.07	20	SPECTER RANGE NW
22	2:57:58	37.527	115.329	0.4	0.24	0.8	86	ACZ	2.21			2.13		17.3	0.09	11	MT IRISH
22	3:43:25	37.306	114.824	0.5	5.02	4.2	232	BDI	1.62	1.21	1.55	1.42	1.9	23.0	0.04	9	GREGERSON BASIN
22	4:51:50	37.857	116.127	0.3	-0.25	0.5	107	ACI	2.00		2.23	2.36		19.7	0.12	22	REVEILLE PEAK
22	7:17:25	35.938	114.837	2.5	-0.53	0.7	192	BDI	2.17	1.51				7.6	0.11	11	BOULDER CITY
22	14:58:34	37.856	116.135	1.4	0.76	2.3	106	BCI				1.36		20.2	0.12	6	REVEILLE PEAK
22	22: 8:52	37.679	115.041	0.4	0.50	0.6	113	ABI	1.57		1.23	1.23		9.7	0.06	8	HIKO NE
23	0:20:24	37.672	115.052	0.3	-1.89	0.4	106	ACI				0.95		10.4	0.03	6	HIKO NE
23	12: 0:36	37.679	115.035	0.4	0.60	0.7	115	ABI	1.71			1.85		9.2	0.07	10	HIKO NE
23	17:36:13	37.847	116.136	0.3	7.10	2.7	104	BCA		1.49				19.7	0.03	6	REVEILLE PEAK
24	21: 6:32	37.348	117.272	0.6	15.16	1.3++	225	ADI		1.30		1.56		39.3	0.06	13	GOLD POINT
25	0: 9.23	36.337	117.243	0.5	5.26	1.2	214	ADI				1.43		14.2	0.09	19	EMIGRANT CANYON
25	4: 1: 2	36.524	116.306	0.2	6.96	1.1	110	ABI	1.57			1.20		13.7	0.06	21	LATHROP WELLS SE

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1988 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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
SEP 25	4:32: 2	37.346	117.250	0.3	-0.28	0.4	70	A3I	1.84			1.99		5.1	0.11	25	GOLD POINT
25	5:20:57	37.219	117.599	0.2	10.12	0.3	130	ABI	1.86	1.96	2.20	2.21		4.4	0.07	28	LAST CHANCE RANGE
25	6: 5:28	36.526	116.303	0.2	5.72	1.4	109	ACI				1.11		13.6	0.06	16	LATHROP WELLS SE
25	14: 2:20	37.351	117.240	0.6	-0.48	0.4	183	ADI				1.22		5.8	0.10	9	SCOTTYS JUNCTION SW
25	16:12:53	37.190	116.447	0.2	5.15	0.7	102	ACI	1.86		1.76	1.33	1.9	11.2	0.05	20	SCRUGHAM PEAK
25	19:37:43	37.676	115.044	0.2	-0.96	0.2	112	ADI			1.16	1.15		9.8	0.01	5	HIKO NE
26	4:52:34	37.641	114.880	0.6	5.46	0.9	183	ADI				0.76		5.2	0.04	6	PAHROC SPRING
26	19:25: 3	37.288	117.618	0.2	6.63	0.4	99	ABI			1.10	1.18		6.6	0.03	9	MAGRUDER MTN
26	20:37:17	36.860	116.260	0.2	9.30	0.4	90	ABI				0.46		5.0	0.03	11	JACKASS FLATS
26	23:46:38	37.350	117.250	0.4	-0.71	0.3	71	ABI	1.21			1.50		5.5	0.10	13	GOLD POINT
26	23:52:21	37.349	117.247	0.1	-0.11	0.1	181	ADI				1.06		5.5	0.01	8	SCOTTYS JUNCTION SW
26	23:52:50	37.349	117.243	0.2	0.00	—	259	ADI				0.82		5.5	0.01	7	SCOTTYS JUNCTION SW
27	2:23:54	36.626	116.377	0.5	6.07	0.4	274	ADI				0.82		4.0	0.05	12	LATHROP WELLS NW
27	3: 7:41	37.342	117.254	0.6	0.15	0.3	178	ACI				1.11		4.6	0.07	9	GOLD POINT
27	3:57:31	37.346	117.249	0.4	-0.02	0.3	118	ABI				1.23		5.1	0.09	12	SCOTTYS JUNCTION SW
27	4:55: 1	36.995	117.731	0.7	5.39	5.1	236	CDI				1.41		27.4	0.06	9	DRY MTN
27	5: 3: 6	36.567	115.208	0.9	13.41	1.1	140	BCI				1.56	2.3	8.1	0.18	14	HAYFORD PEAK
27	7:37:49	37.343	117.257	0.2	0.18	0.2	153	ACI				1.07		4.7	0.04	10	GOLD POINT
27	8:56: 7	37.355	117.238	0.5	-0.84	0.3+	184	ADI				1.08		6.2	0.08	9	SCOTTYS JUNCTION SW
28	2:42: 5	37.852	116.137	0.8	1.86	2.4	105	BCZ				1.18		20.1	0.14	8	REVEILLE PEAK
28	5:13:14	37.354	117.255	0.6	-1.55	0.6	163	ACI		1.22		1.10		5.9	0.11	10	GOLD POINT
28	6: 8:29	37.296	117.335	0.3	0.28	0.3	128	ABZ				0.91		6.9	0.05	10	GOLD POINT
28	10:54:45	37.291	116.415	0.7	7.94	0.8	226	ADI				0.84		11.7	0.09	14	SILENT BUTTE
28	11:29:15	37.342	114.676	1.2	7.00	5.8	258	CDI		1.67		1.58		29.8	0.08	8	ELGIN SW
28	22:58:12	36.903	117.582	0.7	5.35	6.0	191	CDI				1.48		19.2	0.13	12	DRY MTN
29	5:56:43	37.844	116.133	1.1	2.80	8.3	104	CCI				1.06		19.4	0.11	7	REVEILLE PEAK
29	9:43:31	37.825	115.740	1.1	6.36	6.1	149	CCZ				0.82		19.4	0.13	6	WORTHINGTON MTNS
29	13: 5:57	36.679	115.760	0.8	-0.15	0.7	202	ADI				1.37		4.8	0.14	12	MERCURY NE
29	14: 7: 2	37.257	115.061	2.1	11.02	2.4	192	BDI			1.53	0.71		14.9	0.06	7	ALAMO SE
29	14:59:42	37.856	116.134	0.7	-0.13	1.3	106	ACI				1.56		20.2	0.12	9	REVEILLE PEAK
29	15: 1:29	37.858	116.129	0.4	-0.32	0.7	107	ACI		1.79		1.94		19.9	0.12	15	REVEILLE PEAK
29	19:53:51	37.112	114.911	2.0	3.03*	—	269	CDI			1.28	1.14		25.3	0.15	6	DELAMAR 3 SW
29	21:36:36	37.857	116.126	0.6	-0.53	1.0	107	ACI		1.40		1.69		19.6	0.14	12	REVEILLE PEAK
30	1:11: 4	37.679	115.035	0.4	-0.08	0.8	116	ABI				0.71		9.2	0.06	7	HIKO NE
30	7:15: 4	36.868	116.197	0.6	4.64	1.0	139	ACI				0.52		2.9	0.10	11	SKULL MTN
30	10:51:14	36.965	117.592	0.5	5.38	3.6	186	BDI				1.64		22.2	0.13	16	DRY MTN
30	22:34:56	37.844	116.138	0.2	2.97	1.6	113	ACI				1.44		40.1	0.04	6	REVEILLE PEAK
OCT 1	9:54: 8	37.398	115.356	0.2	9.57	1.3	162	ACI				1.31		27.0	0.04	8	HANCOCK SUMMIT
2	4:37: 4	36.730	116.048	0.3	-1.39	0.5	139	ACI		0.89		1.05		10.9	0.09	16	CAMP DESERT ROCK
2	6:24:17	37.852	116.137	0.5	-0.20	0.9	105	ACI		1.44		1.53		20.2	0.13	13	REVEILLE PEAK
2	17:25:29	37.346	117.248	0.4	-0.27	0.3	102	ABI				1.31		5.1	0.09	12	SCOTTYS JUNCTION SW
2	19: 6:34	36.853	116.222	0.3	10.35	0.5	45	AAI	1.31	1.22		0.99		4.8	0.10	25	SKULL MTN
2	19:16:24	36.851	116.227	0.3	9.48	0.6	41	AAI	1.72		1.24	1.83		5.3	0.12	32	SKULL MTN
2	19:19: 5	36.849	116.221	0.3	11.98	0.4	119	ABI		0.78		0.67		4.7	0.05	16	SKULL MTN

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1988 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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
OCT 3	4:55:46	37.244	115.180	0.1	5.66	0.3	166	ACI			0.97	1.00		8.4	0.00	6	LOWER PAHRANAGAT LAKE NW
3	9:45:59	36.735	115.555	0.4	3.05•	——	92	CCI	2.11			2.08	2.5	23.3	0.15	26	HEAVENS WELL
3	21: 9:11	37.855	116.128	0.0	0.01	0.9	106	ACI				1.68		19.6	0.12	12	REVEILLE PEAK
3	21:54:13	37.879	116.018	0.6	5.17	4.2	116	BCI		1.35		1.60		15.1	0.13	10	REVEILLE PEAK
3	22:10: 8	37.877	116.017	0.1	6.19	0.8	116	ACI		1.69		1.82		14.9	0.02	10	REVEILLE PEAK
4	17:17:38	37.884	116.012	0.3	5.97	2.1+	118	BCI	2.26			2.62		15.4	0.10	20	REVEILLE PEAK
4	19:37:18	37.868	116.011	0.3	7.86	0.8	163	ACI				1.26		13.7	0.03	7	REVEILLE PEAK
4	19:46:14	36.871	115.797	0.7	12.61	0.9	257	ADI				1.36		19.7	0.08	14	FRENCHMAN LAKE SE
4	20:16:35	37.876	116.018	0.3	6.52	2.3	115	BCI	1.55	1.75		1.81		14.8	0.08	13	REVEILLE PEAK
5	0:19:57	37.647	117.670	0.8	8.87	3.1	134	BBI				1.17		14.0	0.12	9	LIDA WASH
5	1:16:29	37.384	114.973	0.1	3.72	0.3	178	ACI			1.52	0.83		7.3	0.01	8	DELAMAR NW
5	9:34:33	37.228	117.301	0.5	8.79	0.8	103	ABI			1.10	1.28		8.9	0.10	13	UBEHEBE CRATER
5	14:14:36	36.811	116.458	0.4	2.31	0.4	98	ABU				-0.16		3.9	0.08	9	TOPOPAH SPRING SW
5	17:29:12	37.674	115.041	0.4	-1.05	0.4	111	ABI			1.19	1.19		9.5	0.05	6	HIKO NE
5	17:31:54	37.875	116.018	0.2	6.26	1.3	115	ACI				1.59		14.7	0.05	12	REVEILLE PEAK
6	13:18:35	37.848	116.139	0.9	0.99	1.3	104	ACZ				1.44		20.0	0.15	8	REVEILLE PEAK
7	14:21:40	37.202	116.449	0.4	7.92	0.8	143	ACI		1.33		0.90		11.2	0.06	13	SCRUGHAM PEAK
8	2:58:24	36.872	116.205	1.1	0.82	1.1	144	BCI				0.57		3.8	0.05	8	SKULL MTN
8	5:36: 9	37.856	116.128	1.0	0.00••	1.8	106	BCI		1.48		1.53		19.7	0.15	9	REVEILLE PEAK
8	7:35:31	37.141	117.336	0.2	0.23	0.3	107	ACZ		1.44	1.35	1.47		15.7	0.06	17	UBEHEBE CRATER
8	9:26:12	37.317	114.902	0.6	5.96	2.0++	205	ADI	1.86			1.73		16.5	0.08	12	DELAMAR LAKE
8	20:41:36	36.854	117.662	0.8	0.00••	1.5	206	ADI	2.33			2.28	2.6	23.6	0.12	21	DRY MTN
9	14: 5:18	37.849	116.131	0.7	2.03	3.0	105	BCA		1.81				19.5	0.17	12	REVEILLE PEAK
9	14:35:28	36.252	117.470	4.6	4.77•	——	270	CDA		1.61				36.6	0.23	6	PANAMINT BUTTE
9	14:37:11	36.849	117.663	1.3	0.65•	——	206	CDA		1.54				23.6	0.11	9	DRY MTN
10	20:58:32	36.594	115.956	0.2	13.46	0.3	168	ACI				0.68	1.2	7.4	0.03	9	MERCURY SW
10	22:19:50	36.732	116.033	0.4	8.73	0.7	144	ACI		1.10		1.13		10.2	0.07	13	CAMP DESERT ROCK
11	11: 4:57	37.507	117.191	0.4	4.83	7.9	126	CCA		1.60				23.6	0.08	8	GOLDFIELD
12	22:30:29	37.875	116.020	0.2	7.16	1.3	115	ACI	1.54	1.70		1.81	1.9	14.8	0.05	12	REVEILLE PEAK
12	23:33:14	36.657	116.272	0.4	-0.08	0.4	110	ABI				0.78		6.2	0.09	16	STRIPED HILLS
12	23:36: 1	36.659	116.268	0.4	-0.15	0.5	127	ABI				0.72		6.6	0.06	14	STRIPED HILLS
13	0:17:33	37.872	116.018	0.2	8.27	1.3	114	ABI				1.45		14.4	0.04	8	REVEILLE PEAK
14	1: 7:19	37.035	116.147	0.2	2.80	0.5+	112	ABI		1.48		0.92	1.2	7.3	0.07	17	TIPPIPAH SPRING
14	1:18:40	37.441	115.017	1.0	7.40	1.5	164	BCI			0.92	0.83		4.9	0.06	7	ALAMO NE
15	11:46:10	37.311	115.312	0.9	9.85	3.5	114	BBI			1.31	1.06		19.3	0.15	9	BADGER SPRING
16	4: 3:46	37.251	117.554	0.3	9.84	0.6	136	ACI			1.01	1.03		8.4	0.06	10	MAGRUDER MTN
16	16:35:35	37.440	117.208	0.3	-0.91	0.4	136	ACZ				1.44		16.0	0.07	12	STONEWALL PASS
16	19:57:56	37.577	117.488	0.3	0.62	0.5	99	ACI				1.18		15.1	0.07	10	MONTEZUMA PEAK SW
17	6:53: 1	37.341	115.081	0.9	4.49	1.1	160	ACI			1.16			7.7	0.04	7	ALAMO SE
17	14:38:51	37.214	114.939	1.8	19.79	2.9	172	BCI				1.38		22.6	0.09	8	DELAMAR 3 NW
17	18:27:38	37.154	115.793	0.4	10.63	2.0	93	BBI				1.81		20.5	0.12	19	PAPOOSE LAKE NE
17	19:20:17	37.205	116.542	0.3	-0.36	0.4	129	ACZ				1.18		13.0	0.09	14	THIRSTY CANYON NE
17	22:14:28	37.312	117.267	0.3	0.42	0.1	65	AAZ	2.28			2.07	2.3	1.5	0.09	24	GOLD POINT
18	4:14:10	37.258	115.156	1.3	8.51	2.5	152	BCI	1.81		1.89	1.20		10.3	0.11	8	ALAMO

1988 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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
OCT 18	16:19:19	37.445	117.969	0.7	6.56	1.0	241	ADI	1.93	1.61		1.79		5.9	0.12	16	SOLDIER PASS
18	19:28:17	37.176	117.404	0.1	-0.06	0.3	106	ACZ				1.46		19.0	0.05	19	UBEHEBE CRATER
18	21:19:26	37.177	117.403	0.3	-0.11	0.4	117	ACI			1.25	1.14		18.9	0.06	11	UBEHEBE CRATER
19	0:29:28	36.561	116.463	0.3	9.71	1.1	134	ABI				1.02		14.5	0.05	14	LATHROP WELLS SW
20	1:27:32	36.743	115.600	1.0	5.37	2.5	316	BDI				1.35		19.6	0.07	14	HEAVENS WELL
20	19:14:34	37.513	116.530	0.3	7.80	2.0	75	BCA		1.58				23.5	0.04	8	MELLAN
21	3:19:30	37.337	117.256	0.4	0.46	0.2	176	ACI				1.00		4.0	0.04	9	GOLD POINT
21	5:32:32	37.338	117.259	0.6	0.24	0.4	176	ACI				0.80		4.1	0.05	8	GOLD POINT
21	11:41: 4	35.768	114.838	9.8	11.87	9.6	280	DDZ				1.90		18.7	0.26	7	BOULDER CITY SE
21	12:19: 5	36.624	115.502	0.5	-1.54	0.5	187	ADZ				1.38		28.6	0.10	8	INDIAN SPRINGS SE
22	3: 5:28	36.777	115.698	—	2.47	—	289	ADZ				1.33		13.6	0.00	4	QUARTZ PEAK SW
22	19:39:15	37.164	115.065	0.4	1.86	1.3	270	ADI	1.85		1.44			10.8	0.01	7	LOWER PAHRANAGAT LAKE
23	20:57:58	36.834	116.059	1.0	13.07	0.9	232	BDI				0.59		10.0	0.09	11	CANE SPRING
23	23: 1:59	36.699	116.460	0.4	8.65	0.9	138	ACI				0.62		9.9	0.09	17	LATHROP WELLS NW
23	23:27:51	35.951	114.827	0.8	0.36	1.4	163	ACI	2.42			2.06		7.2	0.08	11	BOULDER CITY
24	6:48:13	37.095	115.137	0.7	1.33	1.2	246	ADI				1.36		9.3	0.07	10	LOWER PAHRANAGAT LAKE SW
24	14:30:49	37.395	115.058	0.5	0.42	0.2	154	ACI	1.36			1.34		1.5	0.08	10	ALAMO NE
24	21:41:25	36.082	114.725	0.9	-0.96	0.6	208	ADZ				1.60		18.0	0.05	8	HOOVER DAM
25	6:23: 3	37.779	115.101	0.4	3.97	3.3	107	BCI	2.19		2.04		1.5	11.7	0.07	10	WHITE RIVER NARROWS
25	15:35:52	36.953	116.112	1.4	0.31	1.7	162	BCI				0.77		5.6	0.06	8	YUCCA LAKE
25	16:27:27	37.562	117.210	0.5	7.00	2.7	120	BCI	1.37			1.49	1.9	21.8	0.10	12	GOLDFIELD
25	20:41: 4	37.043	116.177	0.2	5.00	0.4	132	ABI				1.02		4.7	0.05	13	TIPPIPAH SPRING
26	3:22:25	37.154	117.356	0.3	-0.66	0.4	161	ACZ				1.15		17.3	0.07	11	UBEHEBE CRATER
26	7:16:14	36.816	116.159	0.4	0.64	0.3	78	AAI	1.45			1.33		4.3	0.12	19	SKULL MTN
26	12: 2:16	37.179	115.176	0.5	7.31	0.6	140	ACZ	2.34			2.19		1.5	0.12	19	LOWER PAHRANAGAT LAKE NW
26	20:21:15	37.513	116.529	0.2	7.60	1.6++	68	ACI				1.55		23.6	0.09	26	MELLAN
26	21:20:49	36.679	116.083	0.3	9.92	0.9	108	ABI	1.71			1.64		11.0	0.09	20	CAMP DESERT ROCK
27	12:46:32	37.561	117.207	0.5	-0.43	0 9	120	BCI	1.89			1.88		22.0	0.17	19	GOLDFIELD
27	21:13:52	37.858	116.127	0.3	0.00	0.6	107	ACZ	2.18			2.55	2.5	19.7	0.14	26	REVEILLE PEAK
28	20: 2:50	37.515	116.527	0.3	10.86	0.8	54	ACI	2.49		3.40	2.78		23.6	0.13	48	MELLAN
28	20: 4:35	37.842	116.134	0.4	1.45	1.1	103	ACI				1.98	1.6	19.4	0.05	6	REVEILLE PEAK
28	20:17:44	37.528	116.528	0.3	13.31	1.0	80	ABI	1.76			1.37		22.6	0.08	16	MELLAN
28	20:19: 2	37.516	116.531	0.2	10.50	0.9++	68	ACI			1.93	1.74		23.2	0.09	21	MELLAN
28	20:19:58	37.513	116.536	0.2	-0.23	0.3	122	ACZ	1.85	1.92	?.00	1.58	2.1	23.2	0.07	14	MELLAN
28	21:29:23	37.516	116.529	0.2	10.05	0.9++	55	ACI	2.12		2.40	2.27	2.2	23.4	0.09	30	MELLAN
28	21:30:58	37.517	116.538	0.2	10.94	0.6	122	ACI	1.69		1.69	1.47		22.7	0.06	15	MELLAN
28	21:53:17	37.514	116.535	0.2	-0.69	0.4	67	ACZ				1.56		23.1	0.09	20	MELLAN
29	6:37:18	37.516	116.530	0.2	8.30	1.4++	54	ACI	2.26		2.27	2.26	2.3	23.3	0.08	28	MELLAN
30	1: 7:56	37.858	116.128	0.5	-0.77	0.8	107	BCI				1.97	2.2	19.8	0.15	19	REVEILLE PEAK
30	10:31:17	36.818	116.281	0.6	3.64	2.1	106	BBI				0.60		5.9	0.17	14	JACKASS FLATS
30	16:58:16	37.200	115.159	2.5	5.47	4.5+	194	CDI				1.12		4.3	0.10	6	LOWER PAHRANAGAT LAKE NW
30	22:44:31	37.563	117.206	0.7	0.00••	1.4	121	BCI	1.53			1.52		21.9	0.18	15	GOLDFIELD - poss. expl.
NOV 1	2:16:58	36.622	116.251	0.3	6.09	1.4	125	ACZ	1.62			1.13		13.5	0.07	17	LATHROP WELLS SE
1	5:29:46	37.745	114.584	0.8	8.67	1.4	290	ADI				1.10		20.5	0.03	6	CHIEF MTN

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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
NOV 1 7:44:57	37.515	116.529	0.2	-0.84	0.4	68	ACZ				1.65		23.4	0.07	18	MELLAN
1 11: 8:38	37.245	115.157	1.8	4.38	8.3	155	CCI	1.62		1.18			8.9	0.14	8	LOWER PAHRANAGAT LAKE NW
2 6:31:17	37.410	117.438	0.5	5.48	0.8	107	ABI			1.05	1.23		6.4	0.11	13	LIDA
2 7:15:31	37.413	117.433	0.6	4.80	1.3	107	BBI			0.80	1.08		6.6	0.15	14	LIDA
2 10:56:25	37.344	117.249	0.3	0.08	0.2	70	AAI				1.52		4.8	0.08	18	SCOTTYS JUNCTION SW
2 17:19:58	37.515	116.527	0.2	8.66	1.2	69	ACI	1.82			1.68		23.6	0.06	20	MELLAN
2 18:46:36	37.684	115.137	0.7	0.94	1.3	86	BCZ				1.58		12.5	0.16	12	FOSSIL PEAK
2 19:11:55	37.426	117.430	0.5	8.47	0.6	178	ACZ				1.02		6.3	0.08	10	LIDA
3 8:28:32	37.030	116.235	0.2	6.69	0.4	60	AAI				0.93		6.0	0.07	24	BUCKBOARD MESA
4 5:28:58	37.271	115.048	3.5	11.53	3.7	191	CDZ			1.20	1.11		15.1	0.07	5	ALAMO SE
4 5:56: 4	36.906	117.582	0.7	4.85	7.2	190	CDI		1.48		1.47		19.3	0.15	16	DRY MTN
4 21:59:11	37.501	115.310	0.5	0.52	0.7	127	ACZ				1.22		19.9	0.09	9	MT IRISH
5 5:17:56	37.514	116.531	0.3	9.67	1.5++	75	ACI		1.23		1.20		23.4	0.07	11	MELLAN
5 20:29:22	36.103	114.673	2.0	-1.02	1.4	222	BDZ				1.64		21.4	0.14	7	HOOVER DAM
6 15:18:28	35.924	114.833	1.9	4.44	2.7	189	BDI	2.37	1.96	2.38	2.29		7.0	0.14	15	BOULDER CITY
7 10:38:18	37.131	117.375	0.4	7.94	1.0	171	ACI				1.10		14.8	0.10	15	UBEHEBE CRATER
8 2:26:35	37.519	116.533	0.3	11.09	1.1++	68	ACI				1.55	1.5	22.9	0.09	20	MELLAN
9 1:21:59	37.864	116.132	0.3	-0.18	0.6	108	ACI	1.84		2.21	2.12	2.0	20.5	0.14	23	REVEILLE PEAK
9 8:10:54	37.854	116.137	0.5	-0.19	0.8	106	ACI				1.68	2.1	20.3	0.14	14	REVEILLE PEAK
9 14:11:16	37.776	115.099	0.4	0.21	0.9	108	ACZ	1.86		1.60	1.49	1.7	12.1	0.09	10	WHITE RIVER NARROWS
9 15: 8:35	37.785	115.106	0.2	6.37	0.9+	145	ACI	1.33			1.21		11.3	0.04	9	WHITE RIVER NARROWS
9 21:21:57	37.854	116.129	0.8	0.00**	1.6	106	BCI				1.67		19.7	0.15	12	REVEILLE PEAK
10 7: 2:39	37.207	116.539	0.1	-0.13	0.2	131	ACZ	1.34			1.09		13.0	0.05	19	THIRSTY CANYON NE
10 10: 5:32	37.856	116.131	0.4	-0.15	0.8	106	ACI		1.80		1.82		19.9	0.14	16	REVEILLE PEAK
11 1:19:56	37.860	116.134	0.4	-0.37	0.7	107	ACI	1.83	2.01	2.20	2.18	2.3	20.4	0.14	19	REVEILLE PEAK
11 6: 7:42	36.760	115.975	1.7	9.12	2.8	224	BDZ				1.15	1.2	11.0	0.19	12	FRENCHMAN FLAT
14 15: 1:29	37.178	117.381	0.2	8.59	0.8	113	ACI	1.50	1.46		1.66		17.5	0.06	22	UBEHEBE CRATER
15 16:20:47	37.063	117.451	0.5	1.75	1.3	153	ACA		1.29				11.7	0.05	7	UBEHEBE CRATER
15 23:47:39	36.549	116.211	0.3	6.38	1.4	93	ACI	1.50			1.32	1.1	15.4	0.08	22	SPECTER RANGE SW
16 0:47:19	36.545	116.217	0.1	6.72	0.7	176	ACI			1.31	1.00	1.4	15.5	0.04	21	SPECTER RANGE SW
16 4:27: 5	37.516	116.528	0.2	8.79	1.1++	69	ACI	2.01		1.86	2.13	2.4	23.4	0.07	27	MELLAN
16 11:20:14	37.877	116.129	0.8	0.00**	1.5	111	BCI				1.54		21.2	0.17	13	REVEILLE PEAK
16 16:22:11	37.875	116.127	0.9	-0.54	1.6	110	ACZ				1.51		20.9	0.12	9	REVEILLE PEAK
16 21:47:51	37.881	116.022	0.8	5.45	3.3+	190	BDI	1.87			2.04		15.5	0.10	9	REVEILLE PEAK
17 5: 7: 5	37.840	116.136	0.1	5.25	1.8	103	ACI				1.51		19.4	0.01	6	REVEILLE PEAK
17 16:13:13	37.050	117.464	0.7	0.05	1.0	157	ACZ				1.56		11.9	0.15	13	UBEHEBE CRATER
17 18:29: 2	37.878	116.126	1.1	-1.42	1.9	111	BCZ				1.41		21.0	0.12	7	REVEILLE PEAK
17 19:43:31	36.215	114.975	2.2	-1.54	2.4	176	BCZ				1.50		36.3	0.21	7	FRENCHMAN MTN
17 20: 3:19	37.304	116.330	0.7	1.66	0.7	293	ADI	1.66		1.65	1.20		10.0	0.04	11	DEAD HORSE FLAT
18 6:55: 5	37.855	116.130	0.4	-0.69	0.7	106	ACI	2.14		2.34	2.19		19.8	0.13	16	REVEILLE PEAK
18 20:29:36	36.928	116.558	0.2	10.74	0.6	126	ABI			1.56	0.98		8.6	0.04	12	BARE MTN
18 20:29:48	36.930	116.555	0.2	11.00	0.4	44	AAI	2.25		1.81	1.91		8.7	0.06	27	BARE MTN
18 20:31:26	36.925	116.547	0.3	11.19	0.3	203	ADI			1.56	0.82		8.0	0.05	18	BARE MTN
18 20:32:24	36.926	116.550	0.2	12.23	0.5	49	AAI	2.12	2.06	2.03	2.12		8.2	0.08	38	BARE MTN

103

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1988 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)	QQQ 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
NOV 18	20:33:46	36.927	116.556	0.2	11.93	0.5	83	AAI				1.40		9.6	0.04	18	BARE MTN
18	20:35:53	36.931	116.558	0.2	10.45	0.5	85	AAI	1.68			1.85		8.9	0.06	23	BARE MTN
18	20:39:35	36.928	116.555	0.2	11.77	0.4+	83	AAI	1.60			1.30		8.5	0.05	22	BARE MTN
18	23:23:42	35.946	114.833	0.8	0.26	1.1	169	ACI				2.11	2.4	7.5	0.08	13	BOULDER CITY
19	20:26:13	36.884	115.966	3.5	0.49	2.6	296	CDZ				0.85		9.5	0.12	8	PLUTONIUM VALLEY
20	8:59:57	37.411	117.444	0.5	5.44	1.1++	91	ABI	1.78			1.70		5.9	0.13	20	LIDA
20	9: 2: 7	37.417	117.437	0.9	6.18	0.9	180	ADI				0.94		6.1	0.09	9	LIDA
20	10:43:55	37.047	117.467	0.5	5.48	2.8	158	BCI	1.89			2.07	1.7	12.0	0.12	14	UBEHEBE CRATER
20	19:30:18	37.792	115.136	1.2	5.30	5.0	165	BCI				1.01		11.6	0.12	8	SEAMAN WASH
21	7:53:12	36.624	116.338	0.3	4.96	0.4	104	ABI			1.08	1.08		2.4	0.09	20	LATHROP WELLS SE
21	8: 7: 6	37.278	117.567	0.7	5.96	1.5	146	ACI			0.94	0.73	1.4	8.7	0.11	10	MAGRUDER MTN
22	7:31:13	37.049	117.463	0.4	5.36	2.3	147	BCI	1.97		2.48	2.05		11.7	0.11	19	UBEHEBE CRATER
25	8: 3:49	36.830	116.697	0.2	0.00	0.4	99	ABI				0.64		7.3	0.07	17	BARE MTN
25	17: 3:12	37.410	117.430	0.4	0.56	0.6	68	ABZ			0.83	1.13		7.0	0.13	14	LIDA
25	19:44:12	37.199	115.069	0.9	8.01	1.5	239	ADI			1.84			11.1	0.08	9	LOWER PAHRANAGAT LAKE
26	4: 4:60	36.825	116.054	0.3	9.14	0.9	124	ABI	1.32			1.01		10.7	0.08	18	CANE SPRING
27	2:35: 8	37.104	115.105	1.2	-0.47	1.3	204	BDI	1.51		1.73	1.66		10.2	0.14	11	LOWER PAHRANAGAT LAKE SE
27	8:25:58	37.403	114.698	1.1	5.16	7.6	248	CDI			1.08	1.40		22.8	0.01	5	SLIDY MTN
27	15: 3:47	37.854	116.142	0.0	0.82	——	194	ADZ				1.06		20.6	0.00	5	REVEILLE PEAK
27	19:35:39	37.265	117.696	0.4	-0.09	0.6	160	ACI	2.52		2.87			5.7	0.15	30	MAGRUDER MTN
27	22:36:53	37.264	117.694	0.3	-0.11	0.4++	160	ACI	2.44		2.65	2.85		5.5	0.13	34	MAGRUDER MTN
28	3:59:44	37.391	114.629	5.8	-1.02	5.1	265	DDZ				1.17		25.7	0.11	6	SLIDY MTN
28	9:43:51	36.753	115.541	0.3	0.85	0.8	95	ACI	2.21		2.07	2.10	2.1	24.9	0.14	26	TIM SPRING
28	20:47:31	37.832	114.825	0.8	2.90	3.5	238	BDI				0.79		22.1	0.07	6	DEADMAN SPRING SE
29	10:28:19	37.861	116.134	0.4	-0.24	0.6	107	ACI				1.88		20.4	0.12	16	REVEILLE PEAK
29	15:34:26	37.060	117.464	0.5	0.71	0.7	156	ACI				1.31		12.5	0.11	11	UBEHEBE CRATER
29	19: 6: 2	37.040	117.473	0.5	-1.00	2.1	160	BCZ	2.36			2.57		12.2	0.14	20	UBEHEBE CRATER
30	4:44:43	36.779	116.680	0.5	1.49	1.2	95	ABZ	1.71			1.50	1.6	5.2	0.13	17	BARE MTN
30	8: 3:19	36.772	116.675	0.3	1.77	0.8	98	ABI	1.76			1.22	1.2	5.1	0.06	15	BARE MTN
30	19: 4:10	37.234	117.864	1.6	6.60	4.9	230	CDA		1.46				19.3	0.34	5	WAUCOBA SPRING
DEC 1	18:12:10	37.768	115.019	1.3	1.28	2.6	157	BCZ	1.61		1.40	1.25		13.4	0.09	8	WHITE RIVER NARROWS
2	9:50:20	37.064	117.455	0.5	0.10	0.7	154	ACZ				1.15		12.0	0.11	11	UBEHEBE CRATER
3	6:21:17	36.655	115.808	0.7	10.74	0.5	231	ADI				1.17		4.3	0.06	11	MERCURY NE
3	23: 9:30	37.005	116.245	0.3	5.36	0.5	93	ABI	1.69			1.38	1.7	3.9	0.07	19	TIPPIPAH SPRING
4	4:17:54	37.088	116.192	1.1	4.81	1.0	215	BDI	1.36			0.94		6.5	0.10	12	TIPPIPAH SPRING
4	4:39:46	37.128	117.956	1.2	7.00	4.2	241	BDI		1.75	1.55	1.80	1.9	29.8	0.15	17	WAUCOBA SPRING
4	9: 8: 1	38.190	115.994	2.2	0.00••	1.7	258	BDI				1.48		42.1	0.10	7	QUINN CANYON RANGE
5	1:54:20	36.945	117.565	0.6	7.00	2.8+	188	BDI			0.79	1.46		20.3	0.12	15	DRY MTN
5	8:31:33	37.366	114.868	1.4	-0.88	1.9	209	BDZ				1.31		16.8	0.07	6	GREGERSON BASIN
5	14:44: 3	36.605	116.958	0.2	9.43	0.7	90	ABI				1.01		16.1	0.08	15	CHLORIDE CLIFF
5	20:44:17	37.341	114.841	0.3	5.79	1.5++	221	ADI	1.43		1.69	1.61		20.0	0.04	10	GREGERSON BASIN
5	20:50:27	37.328	117.228	0.4	-0.56	0.3	133	ABI	1.68	1.34		1.57	1.8	4.0	0.11	18	SCOTTYS JUNCTION SW
8	16:17:14	36.758	116.139	0.3	7.54	0.7	117	ABI	1.50			1.11	1.3	11.0	0.06	14	SKULL MTN
8	16:33:35	37.129	117.318	0.3	6.68	0.9	102	ACI			1.29	1.25		14.6	0.06	11	UBEHEBE CRATER

1988 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 8	23:57: 8	37.866	116.126	0.3	-0.77	0.5	113	ACI		1.73		1.76		20.2	0.06	10	REVEILLE PEAK
9	15:23:31	37.868	116.123	0.5	-0.71	0.9	109	ACI				1.87		20.1	0.08	9	REVEILLE PEAK
10	9: 0:12	36.097	117.468	—	2.10	—	278	ADA		1.97				72.5	0.08	4	MATURANGO
10	12:47:47	37.380	115.664	1.3	8.32	1.7	161	BCA		2.44				16.9	0.16	12	BALD MTN
10	13:13:40	37.219	115.864	1.2	9.21	2.6	143	BCA		2.03				13.8	0.15	10	PAPOOSE LAKE NE
11	21: 3:44	37.164	114.944	0.5	12.49	0.8	251	ADI	2.13			1.56		21.6	0.06	9	DELAMAR 3 NW
12	4:13:29	37.058	117.458	0.5	0.28	0.7	155	ACI				1.48		11.9	0.10	10	UBEHEBE CRATER
12	20: 6:24	35.820	116.866	2.2	7.00	1.8	276	BDI				1.93		16.0	0.26	10	WINGATE WASH
13	10: 9:19	37.249	114.936	4.9	11.47	6.5	213	CDI			1.26	1.02		18.2	0.13	7	DELAMAR 3 NW
13	12:13:26	37.271	115.008	0.5	7.97	1.2	202	ADI			1.00	1.27		15.5	0.05	7	ALAMO SE
13	12:25:52	37.274	115.003	1.8	8.37	3.3	202	BDI				1.06		15.3	0.03	5	ALAMO SE
15	8:24:23	37.236	117.486	0.3	-0.47	0.4	104	ACZ				1.32	1.6	14.2	0.08	10	UBEHEBE CRATER
15	10:39:33	36.873	115.814	0.4	0.98	0.8++	121	ACI	1.73			1.75		19.9	0.13	24	FRENCHMAN LAKE SE
15	11: 8: 5	36.870	115.789	2.3	10.34	2.3	273	BDI				0.98		19.6	0.04	7	FRENCHMAN LAKE SE
15	16:52:29	37.423	116.776	1.4	-0.97	1.7	248	BDI				1.04		18.9	0.05	7	TOLICHA PEAK
16	4:20:36	36.819	117.519	0.5	1.79	0.8	204	ADI				1.05		10.3	0.07	14	DRY MTN
16	10:59:46	37.448	117.832	0.7	9.44	1.1+	116	ABI	1.98			2.15		7.1	0.13	20	SOLDIER PASS
16	16:58:48	37.393	117.486	0.6	5.05	1.7	102	ABA		1.82				5.4	0.12	9	LIDA
17	8:15:33	37.882	116.015	0.3	0.99	0.5	117	ACZ	2.08			2.10	2.2	15.3	0.11	18	REVEILLE PEAK
17	13: 7: 7	36.883	114.464	4.8	4.02•	—	253	CDA		1.79				75.0	0.32	10	•••QUAD. NOT LISTED•••
17	20:12:42	36.702	116.315	0.2	8.34	0.3	107	ABI				0.93	0.9	5.9	0.07	20	STRIPED HILLS
18	2:11:15	37.384	116.086	0.3	7.49	0.8	69	ABI	1.25			1.62		11.4	0.11	19	WHEELBARROW PEAK NE
18	5:20:23	37.788	115.283	0.7	1.76	2.0	113	BCI				1.06		12.2	0.11	8	
18	9:39:54	36.843	115.909	0.4	0.10	0.7	91	ACI	1.74	1.28		1.27		16.3	0.13	23	FRENCHMAN FLAT
18	20:26:48	35.884	114.824	8.6	-0.69	10.8	311	DDI				2.23		75.3	0.17	12	BOULDER CITY
18	20:26:59	36.476	115.263	3.9	-0.20	5.4	169	DCZ				1.80		9.8	1.80	12	CORN CREEK SPRINGS
19	5:50:16	37.849	116.139	0.5	-1.26	0.8	105	ACI	1.48	1.77		1.91		20.1	0.12	12	REVEILLE PEAK
19	9:13:42	37.164	115.569	0.4	4.89	6.9	113	CCI			1.80	1.48		26.1	0.10	14	FALLOUT HILLS NE
19	21:13:58	37.210	117.845	0.8	0.17	0.8	208	ADZ			1.28	1.36		17.8	0.10	12	WAUCOBA SPRING
20	8:18:40	37.248	114.951	0.8	10.23	1.3	222	ADI	2.00			1.71		19.7	0.12	11	DELAMAR 3 NW
20	17:22:38	36.675	117.207	0.4	8.86	0.7	80	AAI				1.41		7.1	0.09	15	STOVEPIPE WELLS
20	20:58:33	37.311	114.828	0.2	3.26•	—	230	CDZ	1.37		1.61	1.44		22.4	0.01	6	GREGERSON BASIN
21	19:30:47	37.191	116.206	0.7	-1.19	0.8	87	BCI	1.92			1.40	1.2	10.8	0.18	15	RAINIER MESA
22	15:53: 2	37.189	116.210	0.4	-0.25	1.5+	87	ACI	1.98			2.42	2.0	10.5	0.14	26	RAINIER MESA
22	19:51:16	37.889	115.985	0.6	-0.64	1.0	119	ACZ	1.88	1.92	1.79	1.89	1.9	15.2	0.14	14	
23	11: 7: 9	37.014	116.222	0.3	1.72	0.5	73	AAZ	2.18		1.63	1.67		2.6	0.10	31	TIPPIPAH SPRING
23	21:27:31	37.208	117.368	0.3	7.21	1.1	101	ABI	1.43	1.39	1.50	1.06		14.3	0.12	19	UBEHEBE CRATER
24	23:38:39	37.281	117.498	0.3	-0.72	0.5	91	ACI	1.73			1.60	1.5	14.2	0.09	16	GOLD POINT SW
25	1: 9:20	37.215	115.871	0.4	5.70	2.2++	113	BCI				1.42		15.8	0.10	14	PAPOOSE LAKE NE
25	4:11:32	36.900	116.736	0.4	1.94	0.6	236	ADZ				0.81		15.1	0.05	8	BARE MTN
26	21: 0:43	37.361	115.236	0.4	5.11	4.2	96	BCI	2.37		1.89	1.63		17.1	0.11	12	ALAMO
26	22:29:38	37.364	115.240	0.3	0.01	0.6	98	ACZ	2.06		2.03	1.84		17.4	0.09	13	ALAMO
27	4: 9:45	37.278	117.499	0.4	-1.25	0.7	92	ACI	1.60			1.78		14.0	0.12	17	GOLD POINT SW
27	7: 0:33	36.972	116.178	0.2	2.28	0.4	144	ACI	1.56			1.02		6.4	0.05	15	MINE MTN

1988 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)	QQQ 12S	MAGNITUDE ESTIMATES Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
DEC 27 14:38:30	37.388	115.114	0.6	1.64	1.5	125	ABZ	1.68		1.68	1.58		6.0	0.07	7	ALAMO NE
27 17:25:45	36.728	115.992	1.0	11.25	1.1	152	ACI				0.89		8.0	0.07	8	MERCURY
27 19:50:53	36.454	114.508	0.7	-0.37	0.9	225	ADI	2.11			2.13		58.7	0.07	11	MUDDY PEAK
27 23:35: 3	37.882	116.125	0.4	-1.36	0.6	112	ACZ	1.46			1.65		21.3	0.12	13	REVEILLE PEAK
27 23:54:40	37.884	116.121	0.4	-0.41	0.6	112	ACI				1.47		21.1	0.07	10	REVEILLE PEAK
28 0:19:25	37.442	115.473	1.3	13.31	5.2	106	CBI			1.19	1.51		23.9	0.12	7	CRESCENT RESERVOIR
28 12:56:17	37.260	114.538	1.0	5.10	2.6+	238	BDZ	2.40			2.60		42.3	0.12	13	ELGIN
29 3:38:45	37.379	115.111	0.2	2.23	0.4	136	ACI	1.99		2.20	2.00	2.0	6.1	0.03	10	ALAMO NE
29 8:20:54	37.128	117.341	0.8	9.09	1.2	199	ADI			1.21	1.19		14.3	0.09	13	UBEHEBE CRATER
29 22:13:59	37.182	117.923	0.8	-0.89	0.9	223	ADI	2.07		1.76	2.12		25.2	0.08	12	WAUCOBA SPRING
30 1:40: 2	36.789	116.255	0.3	5.01	0.8	72	ABI	1.17			0.84		5.3	0.09	16	JACKASS FLATS
30 1:59:54	36.711	116.452	0.3	7.40	0.7	174	ACI	1.27			0.74		8.9	0.07	19	LATHROP WELLS NW
30 11:50:13	36.785	116.256	0.4	5.90	0.8	115	ABI	1.28			0.83		4.9	0.10	15	JACKASS FLATS
30 16:36:53	37.399	115.119	0.4	0.79	0.5++	153	ACI					1.4	6.1	0.06	7	ALAMO NE
30 19:55:55	35.921	114.842	0.7	-0.71	0.8	191	ADI	2.42			2.58	2.6	7.8	0.09	18	BOULDER CITY
31 12:16:46	37.856	116.130	0.4	0.46	0.6	114	ACI				1.69		19.8	0.11	13	REVEILLE PEAK
31 21:40: 4	37.086	117.380	0.9	-0.54	0.9	194	ADI				1.36		26.2	0.12	10	UBEHEBE CRATER

1989 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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JAN 1	0: 4:39	37.161	117.559	0.5	11.46	0.6+	198	ADI	1.60			1.71		11.1	0.09	17	LAST CHANCE RANGE
1	0:12:36	37.153	117.559	0.5	11.03	0.9	202	ADI	1.36	1.58	1.81	1.60		11.7	0.09	14	LAST CHANCE RANGE
1	9:27:20	37.484	117.018	0.7	0.49	0.8	150	ACZ	1.43		1.57	1.61		29.4	0.14	14	SCOTTYS JUNCTION NE
1	17:42:43	37.280	117.495	0.4	-1.51	0.7	119	ACZ	1.39		1.24	1.49		14.4	0.10	11	GOLD POINT SW
2	7:12:50	35.924	114.843	—	0.00••	—	212	ADZ				1.59		7.9	0.03	3	BOULDER CITY
2	9:28:59	37.884	116.025	0.8	1.71	1.7	191	ADZ			1.64	1.84		15.9	0.12	10	REVEILLE PEAK
3	7:33:15	37.072	115.758	0.3	2.86	2.3	108	BCZ	2.27		1.99	2.22	2.6	27.0	0.13	31	PAPOOSE LAKE SE
3	21:39:12	37.273	114.574	1.8	-1.02	1.4	279	BDZ			1.37	1.38		39.7	0.07	9	ELGIN
4	10:22:46	37.691	115.197	0.6	3.76	2.2	130	BBI			1.11	0.98		7.4	0.08	9	FOSSIL PEAK
4	11:50:23	37.799	115.124	1.8	3.20•	—	143	CCZ				1.17		10.4	0.15	9	WHITE RIVER NARROWS
4	16: 0:20	37.864	116.139	0.5	0.00••	0.8	107	ACZ				1.82		21.6	0.14	14	REVEILLE PEAK
5	2:53:19	35.897	116.942	1.9	7.00•	—	267	CDI			1.83	1.91		56.9	0.14	10	WINGATE WASH
5	5: 3:52	37.113	115.161	0.5	2.94	1.0	146	ACZ	1.89		2.16	1.97		6.6	0.12	17	LOWER PAHRANAGAT LAKE
5	6:34: 9	37.857	116.128	0.6	-0.75	0.9	107	BCI				1.56		19.7	0.16	14	REVEILLE PEAK
5	17: 9:42	37.267	115.429	0.7	0.00••	0.9	142	ACZ	1.35		1.50	1.47		24.1	0.09	8	CUTLER RESERVOIR
6	14:40:60	37.856	116.133	1.2	3.22•	—	106	CCA		2.14				20.0	0.19	8	REVEILLE PEAK
6	15: 0:14	37.704	115.203	0.6	5.88	1.0	193	ADI	1.54		1.49	1.32		7.2	0.09	11	FOSSIL PEAK
6	15: 1: 6	37.855	116.136	1.0	0.00••	1.8	106	ACZ				1.80		20.2	0.13	8	REVEILLE PEAK
6	18:26:39	37.849	116.142	0.2	4.42	3.9	104	BCZ				1.37		20.4	0.02	7	REVEILLE PEAK
7	11: 8:18	37.455	116.959	0.3	-0.66	0.6	82	ACZ			1.74	1.75	1.9	30.4	0.13	22	TOLICHA PEAK
7	17:38: 5	37.364	117.198	0.2	-0.51	0.2	84	ABZ				1.37		8.8	0.06	20	SCOTTYS JUNCTION SW
7	19: 1:40	37.365	117.197	0.3	-0.59	0.3	123	ABZ				1.06		8.9	0.06	12	SCOTTYS JUNCTION SW
7	21:27:49	37.864	116.130	0.2	-0.29	0.3	108	ACI	2.05			1.80		20.3	0.06	15	REVEILLE PEAK
7	21:31:45	37.862	116.126	0.3	-0.85	0.5	111	ACZ				1.67		19.9	0.07	9	REVEILLE PEAK
7	21:32:13	37.860	116.132	0.7	-0.13	1.0	112	ACI				1.44		20.2	0.12	7	REVEILLE PEAK
8	7:37:22	37.415	114.717	1.4	5.59	5.2	242	CDZ				1.39		21.3	0.06	7	SLIDY MTN
8	23:33: 3	37.820	115.816	1.1	0.22	1.6	170	BCZ				1.31		13.2	0.18	10	
9	5: 8:22	36.329	115.124	0.5	7.22	0.9	141	BCI			3.45			19.9	0.17	32	VALLEY
9	10:29:41	37.295	117.409	0.4	-1.35	0.9	85	ACZ				1.33		13.4	0.07	8	GOLD POINT SW
9	10:57:25	37.864	116.126	0.4	-0.82	0.8	108	ACZ	1.65			1.94		20.0	0.12	15	REVEILLE PEAK
9	14:13:45	37.864	116.129	0.2	0.30	0.4	108	ACZ	2.51		2.72			20.3	0.08	23	REVEILLE PEAK
9	14:34:39	37.864	116.128	0.2	-1.05	0.3	111	ACZ				1.67		20.2	0.07	14	REVEILLE PEAK
9	19: 4:57	37.846	116.132	0.4	0.98	0.5	112	ACZ				1.57		19.4	0.06	7	REVEILLE PEAK
9	21:11:55	37.859	116.132	0.5	-0.21	1.0	112	ACZ				1.82		20.2	0.10	9	REVEILLE PEAK
9	21:15:24	37.863	116.130	0.3	-0.87	0.5	111	ACZ				1.79	2.1	20.2	0.08	12	REVEILLE PEAK
9	23: 7:50	37.858	116.128	0.7	0.00••	1.1	107	ACZ				1.63		19.8	0.13	10	REVEILLE PEAK
9	23:13:10	37.858	116.134	0.5	0.00••	0.8	112	ACZ				1.83		20.3	0.09	10	REVEILLE PEAK
10	2:39:25	37.039	116.608	0.2	10.89	0.8	61	ABI	1.79			1.84	1.8	15.9	0.07	26	THIRSTY CANYON SE
10	5:15:39	37.863	116.128	0.8	-1.51	1.3	111	ACZ				1.62		20.1	0.08	6	REVEILLE PEAK
10	12:28:53	37.864	116.126	0.2	-0.53	0.3	108	ACZ	1.76			1.95		20.0	0.06	14	REVEILLE PEAK
10	12:50:22	37.863	116.124	0.6	-0.56	1.0	108	ACZ				1.54		19.9	0.07	7	REVEILLE PEAK
10	17:50:15	37.863	116.130	0.5	-0.93	0.6	175	ACZ				1.58		20.3	0.03	6	REVEILLE PEAK
10	19:10:42	37.849	116.142	0.1	0.84	0.2	151	ACZ				1.71		20.3	0.02	7	REVEILLE PEAK
10	23:20:13	37.856	116.133	0.6	0.00••	0.8	106	ACZ				1.34		20.0	0.11	8	REVEILLE PEAK

1989 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)	QQQ 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JAN 11	4:48:54	36.670	116.079	2.3	12.00	1.5	199	BDZ				0.94		10.6	0.20	10	CAMP DESERT ROCK
11	15:25: 6	37.365	115.213	0.7	4.75	7.0	102	CCZ			1.33	1.15		15.0	0.12	8	ALAMO
12	3:48:11	37.862	116.130	0.7	-0.99	1.1	107	ACZ				1.82		20.2	0.14	9	REVEILLE PEAK
12	12:38:42	37.470	115.420	0.4	-0.89	0.7	96	ACZ			1.59	1.61		25.3	0.10	11	CRESCENT RESERVOIR
12	16:24:20	36.654	116.237	0.5	4.21	0.5	248	ADZ			1.81	0.91		9.2	0.04	15	SPECTER RANGE NW
12	22: 3:33	35.722	115.554	5.6	2.13•	——	224	DDI				2.12		66.4	0.20	5	CLARK MTN
13	7:28:26	37.218	115.083	1.4	13.22	0.9	204	BDI			1.27	1.24		10.8	0.02	6	LOWER PAHRANAGAT LAKE
13	9:16:17	37.243	114.831	0.7	10.84	1.4	244	ADI				1.49		26.7	0.04	6	DELAMAR 3 NE
13	9:16:21	37.408	115.052	9.6	0.00••	2.6	96	DBZ				0.85		0.2	2.27	6	ALAMO NE
13	17: 7:10	37.322	114.828	0.8	5.10	4.8	228	BDZ				1.32	1.4	21.9	0.05	7	GREGERSON BASIN
13	21:35:53	37.865	116.128	0.5	0.00••	1.0	113	ACZ				1.65		48.8	0.08	7	REVEILLE PEAK
14	15:27: 5	37.114	117.155	0.2	0.85	0.4	103	ACZ	1.89		1.53	1.65	1.6	18.1	0.11	26	BONNIE CLAIRE SW
14	18:46: 6	37.110	117.159	0.4	4.57	5.0	104	BCZ			1.07	1.33		18.0	0.09	12	BONNIE CLAIRE SW
14	19:18:15	37.258	115.042	0.4	2.83	2.5	152	BCZ	2.35			2.51		16.3	0.11	19	ALAMO SE
14	22:52:43	37.275	114.995	0.5	0.04	0.6	204	ADZ			1.37	1.10		15.5	0.04	7	DELAMAR LAKE
14	23: 6:46	37.288	115.016	0.3	6.16	0.9++	154	ACZ	2.23			2.59	2.7	13.6	0.07	17	ALAMO SE
14	23: 8:58	37.283	115.017	0.5	8.72	0.8	195	ADI	1.58			1.47		14.1	0.06	9	ALAMO SE
14	23:12: 9	37.288	115.025	0.5	8.50	0.9	152	ACI	1.97			1.79		13.4	0.07	13	ALAMO SE
15	3:41: 6	37.252	115.039	0.5	7.31	1.4	200	ADI	2.04		1.76	1.77		16.1	0.08	11	ALAMO SE
15	4:37: 8	37.295	115.030	0.3	10.89	0.3+	188	ADZ	1.34			1.37	1.6	12.5	0.02	6	ALAMO SE
15	5: 1: 7	36.714	116.215	0.3	1.60	1.2	90	ABZ				1.02		6.0	0.12	19	SPECTER RANGE NW
15	6: 5:35	37.256	115.037	0.5	5.40	2.2	171	BCI	2.44			2.21	2.3	16.5	0.11	16	ALAMO SE
15	7:19: 2	36.413	114.833	0.6	-1.90	0.6	183	ADZ				1.85		31.0	0.12	13	DRY LAKE
15	7:27:47	37.285	115.015	0.5	9.07	0.8	195	ADI	1.77			1.25		13.9	0.05	8	ALAMO SE
15	19:38:21	36.754	115.920	0.3	0.84	0.5	155	ACZ				1.03		11.0	0.08	19	FRENCHMAN FLAT
16	8:52:19	37.857	116.130	0.2	0.40	0.4	107	ACZ				1.74		19.9	0.08	17	REVEILLE PEAK
17	10:34:28	37.865	116.129	0.3	-0.67	0.5	108	ACZ	2.40		2.42	2.74	2.4	20.4	0.11	26	REVEILLE PEAK
17	12:10:15	37.862	116.132	0.4	-0.23	0.7	107	ACI	1.97			2.16		20.3	0.12	15	REVEILLE PEAK
17	14:28:10	37.863	116.128	0.3	-0.58	0.5	111	ACZ	1.66			1.78		20.2	0.09	12	REVEILLE PEAK
17	16:41:37	37.163	117.385	0.2	7.75	0.7	118	ACU	1.75			1.58	1.8	18.5	0.07	19	UBEHEBE CRATER
17	16:47:37	37.162	117.388	0.2	8.21	0.8	119	ACI	1.78			1.93	2.0	18.4	0.08	21	UBEHEBE CRATER
17	21:22:18	37.336	114.666	2.0	-1.02	1.7	260	BDZ	2.03		1.80	1.81	1.9	30.6	0.10	8	ELGIN SW
18	0:29:51	37.897	116.124	0.7	-1.39	1.0	115	ACZ		1.73		1.56		22.3	0.13	9	REVEILLE PEAK
18	3:14:43	37.249	115.042	0.6	10.97	1.4	201	ADI			1.40			15.7	0.06	6	LOWER PAHRANAGAT LAKE
18	14:29:39	36.951	116.728	0.2	0.51	0.2	125	ACZ				0.87		19.4	0.05	16	BARE MTN
19	6: 7:31	36.324	115.113	0.4	-0.91	0.8	142	ACZ	1.79			1.70		20.6	0.09	14	VALLEY
19	7:42:55	37.285	114.846	1.2	4.82	9.1	232	CDZ				1.27		22.6	0.05	7	GREGERSON BASIN
19	7:43:27	37.208	116.397	0.9	5.88	1.8	151	ACA		0.98				6.6	0.08	8	SCRUGHAM PEAK
19	23:37:36	37.395	117.228	0.3	0.42	0.5	79	ACZ			1.21	1.27		10.8	0.09	20	STONEWALL PASS
20	3:15:58	37.114	117.160	0.4	6.84	2.4	105	BCI	1.86		1.28	1.58		18.4	0.10	19	BONNIE CLAIRE SW
20	5:20: 7	35.914	114.839	2.2	1.06	3.5	198	BDZ	2.20		2.15	2.25		7.6	0.15	12	BOULDER CITY
20	10: 1: 1	37.115	117.155	0.3	1.69	1.0	103	ACZ	1.87			1.40	2.0	18.2	0.09	22	BONNIE CLAIRE SW
20	13:10:47	36.998	117.550	0.6	2.96	2.4	193	BDZ	1.51			1.74		18.1	0.12	22	DRY MTN
20	21:15:35	37.116	117.155	0.4	-0.68	0.5	91	ACZ			0.47	0.62		18.3	0.10	12	BONNIE CLAIRE SW

1989 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 20	22:26:23	37.748	115.041	0.7	4.21	5.7	130	CCZ				0.91		14.0	0.12	8	HIKO NE
21	4: 8:24	37.740	115.045	0.2	-0.46	0.3	127	ACZ	1.12			0.89		13.7	0.03	8	HIKO NE
21	23:55:38	37.390	117.773	0.9	6.55	3.0	135	BBI			1.76	1.74		12.5	0.19	14	SOLDIER PASS
22	11:39:50	37.883	116.129	0.7	-0.89	1.1	112	BCZ				1.61		21.5	0.17	13	REVEILLE PEAK
22	12:52:14	37.085	115.523	0.3	1.27	2.0	147	BCZ	1.65		1.75	1.66		31.3	0.07	17	SOUTHEASTERN MINE
23	17:52:17	37.396	117.229	0.2	-0.50	0.3	125	ACZ				1.24		10.9	0.06	20	STONEWALL PASS
24	9:31:34	37.633	115.071	0.4	2.14	1.1	109	ACZ				0.74		12.0	0.07	8	HIKO NE
25	17:36:34	36.759	116.537	4.4	22.47	8.7	141	DCI				1.01		6.8	1.72	9	BARE MTN
26	0: 1:28	37.424	114.313	1.0	8.80	1.1	246	BDI	2.77			2.69	2.8	42.6	0.12	17	•••QUAD. NOT LISTED•
26	3:42:41	36.745	116.198	0.2	9.25	0.4	115	ABZ	1.11			0.75		6.7	0.06	17	SPECTER RANGE NW
26	14:19: 1	36.098	114.639	1.5	3.11•	——	231	CDI	2.02			2.11		22.2	0.07	6	HOOVER DAM
26	17:47:52	37.114	117.155	0.3	4.38	3.9	90	BCZ			1.11	1.24		18.2	0.08	15	BONNIE CLAIRE SW
26	17:52:33	37.114	117.154	0.2	0.65	0.3	91	ACZ	1.61		1.21	1.35		18.1	0.08	18	BONNIE CLAIRE SW
26	17:53:15	37.111	117.159	0.4	4.40	5.0	104	BCZ			0.49	0.81		18.1	0.06	8	BONNIE CLAIRE SW
27	22:12:10	37.438	114.095	2.1	9.73	2.5	294	BDI	2.37		1.74	1.65		59.8	0.07	7	•••QUAD. NOT LISTED•
28	1: 2:40	36.887	116.814	0.5	0.20•	——	86	CCA		2.18				19.4	0.10	11	BULLFROG
28	16:47:11	36.766	115.554	0.6	5.85	5.0	146	BCA		1.82				24.2	0.10	11	TIM SPRING
29	5:16:38	37.111	117.911	1.1	-0.06	1.1	257	BDI				1.45		27.1	0.10	10	WAUCOBA SPRING
29	15:21:35	37.048	116.030	0.4	0.89	0.4	186	ADZ				1.05		13.0	0.07	12	YUCCA FLAT
29	18:55:36	36.562	116.619	1.2	7.00	4.5	230	BDZ				0.77		16.9	0.11	12	BIG DUNE
30	9:30:23	37.396	117.230	0.2	-1.00	0.2	125	ACZ			0.93	1.10		10.9	0.08	21	STONEWALL PASS
31	16: 7:17	37.253	116.364	0.2	-0.14	0.3	45	ABZ	2.35		2 11	2.35	2.8	5.6	0.09	37	DEAD HORSE FLAT
31	18:22:50	36.701	116.115	0.2	0.53	0.3	137	ACZ				0.67		14.5	0.06	12	CAMP DESERT ROCK
31	22: 9:16	36.964	115.606	0.4	0.00••	0.7	120	ACZ	1.71			1.83		35.1	0.13	25	QUARTZ PEAK
FEB 1	3:27:34	36.715	115.519	0.9	12.85	3.2	206	BDI			1.34	1.53		44.3	0.15	13	HEAVENS WELL
1	3:28:25	36.733	115.545	0.7	0.00••	1.1	154	ACZ				1.12		24.1	0.12	8	HEAVENS WELL
1	15:33:16	37.530	114.638	1.3	6.24	1.4	296	BDZ				0.77		12.2	0.06	6	CHOKECHERRY MTN
1	16:37: 9	37.457	115.482	0.6	0.00••	1.1	98	BCZ		1.59	1.34	1.50		22.2	0.16	12	CRESCENT RESERVOIR
1	18:44: 8	36.456	114.486	1.0	-1.33	1.0	228	BDZ	1.87			1.99		60.7	0.14	11	•••QUAD. NOT LISTED•
3	17:25:30	36.720	116.137	0.3	1.42	1.0	106	ACZ	1.48			1.20	1.5	12.3	0.10	18	SPECTER RANGE NW
5	8: 9:17	37.131	115.752	1.5	4.70•	——	163	CCZ		1.44				22.6	0.12	10	PAPOOSE LAKE NE
5	10: 8:23	36.918	116.770	1.3	0.99	1.1	293	BDZ		1.24				18.5	0.06	13	BULLFROG
5	15: 1:22	36.814	115.831	0.3	0.36	1.2	167	ACZ		1.54				13.5	0.07	14	FRENCHMAN LAKE SE
5	19:57:46	36.915	116.767	0.1	0.69	0.2	151	ACZ	1.35			0.89		18.1	0.04	19	BULLFROG
5	21: 7:28	37.250	118.343	1.5	1.54	3.5	278	BDI	1.80			2.15		43.2	0.13	13	•••QUAD. NOT LISTED•
5	22:21:28	37.863	116.132	0.4	-0.92	0.7	108	ACZ				1.83		20.5	0.12	13	REVEILLE PEAK
6	0:42:18	37.267	115.094	0.4	9.58	0.8	177	ACI	2.12			1.56		13.7	0.06	11	ALAMO SE
6	9:16:57	37.159	117.637	0.4	9.07	0.7	170	ACI				1.38		8.2	0.10	15	LAST CHANCE RANGE
6	15:23:58	36.869	116.120	0.3	1.94	0.8	109	ABZ	1.29			0.79		4.6	0.11	18	CANE SPRING
6	19:28:52	36.366	114.938	0.6	2.81	5.0	176	BDI				1.63		25.2	0.03	5	DRY LAKE
7	11:29:10	37.504	114.237	1.4	4.99	1.6	283	BDZ	2.37		2.42	2.39		45.7	0.10	10	•••QUAD. NOT LISTED•
7	22:18: 6	36.369	115.817	0.4	-0.24	0.7	124	ACZ	1.72		1.39	1.52		21.3	0.10	19	MT STIRLING
7	22:51:28	37.624	114.310	0.8	19.17	0.7	311	ADI	2.10			1.79		37.8	0.03	6	•••QUAD. NOT LISTED•
8	6:44:49	37.529	118.406	2.3	2.84•	——	312	DOI				1.83		45.6	0.15	9	•••QUAD. NOT LISTED•

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FEB 9	5:15:43	36.866	117.481	0.4	0.90	0.5	182	ADZ	1.52		1.76	1.44		9.6	0.11	21	TIN MTN
9	16:17: 9	36.710	116.453	0.2	7.91	0.6	121	ABZ	1.68			1.23		8.9	0.09	27	LATHROP WELLS NW
9	16:17:34	36.713	116.447	0.1	10.10	0.2	127	ABZ				0.86		8.8	0.01	9	LATHROP WELLS NW
9	16:18:10	36.709	116.454	0.2	7.62	0.7	130	ABZ	1.29			0.76		9.0	0.06	15	LATHROP WELLS NW
9	16:18:46	36.709	116.451	0.2	7.25	0.8	130	ABZ	1.25			0.85	1.4	9.0	0.07	18	LATHROP WELLS NW
9	16:20:17	36.709	116.453	0.2	7.29	0.7+	121	ABZ	1.61			1.12		9.6	0.08	27	LATHROP WELLS NW
9	18:54: 1	38.068	117.686	1.7	5.95	1.6	246	BDI				1.59		40.6	0.18	11	DEVILS GATE
10	2:49: 2	37.519	116.536	0.4	11.71	1.3++	111	ABI	1.79			1.31		22.7	0.10	15	MELLAN
10	14:48:38	37.266	118.107	2.9	11.06	4.4	275	CDI				1.60		25.0	0.17	9	•••QUAD. NOT LISTED•
11	18:14: 0	36.101	114.673	1.0	-1.95	1.6	214	BDZ	2.20			2.32		21.3	0.10	15	HOOVER DAM
12	5:15:51	37.284	115.124	1.9	4.63	5.0	197	BDZ				1.39		6.8	0.14	7	LOWER PAHRANAGAT LAKE
12	13:30:46	37.115	117.155	0.3	1.51	1.1	91	ACZ	1.73			1.16		18.2	0.36	16	BONNIE CLAIRE SW
13	2:12:15	35.793	115.209	1.5	-0.12	0.8	223	BDI	1.81			1.76		43.3	0.12	17	SLOAN
13	17: 3:16	35.807	116.541	3.3	15.19	4.9	266	CDI				1.50		43.6	0.19	16	CONFIDENCE HILLS
13	21:34:51	36.805	116.015	0.2	-0.37	0.4	104	ACZ	1.96			1.58		14.6	0.10	33	CANE SPRING
14	13:43:37	37.237	115.031	1.2	2.71	5.4	209	CDI			0.76	0.94		15.9	0.06	6	LOWER PAHRANAGAT LAKE
14	22: 7:47	37.092	115.261	0.5	6.07	1.5	161	ACI			1.50	1.68	1.4	10.7	0.08	11	DESERT HILLS SE
15	7:34:51	37.229	114.984	0.8	0.95	0.6	222	ADZ			1.06	1.17		19.2	0.07	7	DELAMAR 3 NW
15	11: 8:41	36.784	116.307	0.2	0.80	0.4	62	ABZ	1.43		2.32	1.11		5.3	0.09	27	STRIPED HILLS
16	0:25:56	36.078	115.421	0.2	-1.13	0.3	169	ADZ				1.62		52.9	0.05	10	BLUE DIAMOND
16	4:24: 7	37.183	117.024	0.2	10.09	0.7	100	ACI	1.58			1.06		22.4	0.06	21	BONNIE CLAIRE
17	8:16:32	36.408	117.019	0.5	11.25	9.7	93	BBI	1.96			1.71		7.5	0.16	27	EMIGRANT CANYON
17	16:47:18	37.264	115.097	0.2	9.94	0.4	177	ACI				1.29		13.3	0.03	9	ALAMO SE
18	15: 8:55	37.643	114.613	5.1	0.94	4.1	312	DDI	1.73			1.20		11.7	0.10	7	CHIEF MTN
19	15: 6:20	37.712	114.639	1.8	-0.54	1.6	280	BDZ	1.72			1.46		14.7	0.09	6	CALIENTE NW
19	16:52:36	36.691	115.544	0.6	0.00••	0.9	120	ACZ				1.48		23.8	0.14	9	HEAVENS WELL
20	0:27: 7	37.118	114.900	0.7	14.36	0.8++	160	ACI	2.52		1.9d	2.01		26.2	0.12	17	DELAMAR 3 SW
20	12:33:31	37.118	117.324	0.5	1.72	1.0	148	ACZ				1.28		13.4	0.11	14	UBEHEBE CRATER
21	0:33:37	36.666	115.682	0.2	2.11	1.5	104	ACZ	2.23		2.55			11.9	0.08	27	INDIAN SPRINGS NW
21	1:35:41	36.664	116.383	0.4	0.59	0.2	190	ADZ			0.77	0.69		4.4	0.08	15	LATHROP WELLS NW
21	3: 2:24	36.798	115.930	0.2	0.36	0.3	147	ACZ				1.13		15.5	0.05	18	FRENCHMAN FLAT
21	13:41:37	37.256	118.144	1.8	-0.48	1.4	255	BDI	1.90			1.85		28.2	0.13	17	•••QUAD. NOT LISTED•
21	18:57:27	35.764	116.575	2.7	-1.15	1.6	267	CDZ				1.54		34.5	0.17	10	CONFIDENCE HILLS
23	2:25:28	36.670	115.809	0.4	-1.81	0.9	108	ABZ	1.69		1.81	1.09		2.6	0.10	13	MERCURY NE
23	2:26:17	36.678	115.809	0.7	-0.83	0.7	159	ACZ				1.27		1.7	0.06	10	MERCURY NE
23	4:12: 7	35.862	115.383	0.8	-0.63	0.6	210	ADZ				1.33		54.0	0.08	10	GOODSPRINGS
23	7:12:41	36.671	115.811	1.1	-1.81	1.4	190	BDZ			0.88	0.95		13.5	0.16	14	MERCURY NE
23	9:47:52	35.736	116.568	3.0	2.89	8.4	272	CDZ				1.64		37.1	0.23	11	LEACH LAKE
23	18:22:21	37.257	116.373	0.4	-0.63	0.4	97	ABZ	1.33		1.64	0.90		6.5	0.09	11	DEAD HORSE FLAT
24	3:54: 0	37.261	115.058	2.2	-0.92	1.9	192	BDI	1.20			0.95		15.3	0.11	8	ALAMO SE
24	10: 5:24	36.758	116.271	0.4	2.91	0.3	117	ABZ	1.16			0.78		1.7	0.09	17	JACKASS FLATS
24	16: 8:58	36.758	116.272	0.3	2.70	0.4	73	AAZ				1.19		1.8	0.10	21	JACKASS FLATS
25	13:42:14	37.333	114.846	0.7	2.92	2.5	213	BDI	2.41			2.41	2.8	19.9	0.12	20	GREGERSON BASIN
25	13:46:57	37.345	114.860	0.6	1.97	1.3	215	ADZ				1.55		18.2	0.06	9	GREGERSON BASIN

1989 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)	QUD 12S	MAGNITUDE ESTIMATES Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
FEB 25	15: 4: 0	37.345	114.859	0.5	1.99	1.1	216	ADZ				0.96		18.3	0.06	9	GREGERSON BASIN
25	15:10:55	37.346	114.860	0.5	1.77	1.2	215	ADZ				1.11		18.2	0.06	9	GREGERSON BASIN
25	15:34:34	37.336	114.857	1.0	3.91	9.6	218	CDI	1.64			1.69		18.8	0.15	10	GREGERSON BASIN
25	15:35:13	37.345	114.855	1.6	1.49	4.4	272	BDZ				1.18		18.7	0.05	7	GREGERSON BASIN
25	15:35:44	37.341	114.858	0.6	4.09	5.5	217	CDI	1.81			1.73		18.5	0.06	8	GREGERSON BASIN
25	16:39: 1	37.339	114.858	0.4	2.30	0.9	217	ADZ	1.74			1.73		18.6	0.05	9	GREGERSON BASIN
25	17:18:55	37.336	114.852	0.5	1.88	1.0+	219	ADZ	2.13			2.48	2.7	19.3	0.07	13	GREGERSON BASIN
25	17:31:57	37.344	114.858	0.5	1.84	1.1	216	ADZ				0.88		18.5	0.05	8	GREGERSON BASIN
25	19:42: 8	37.342	114.856	0.5	1.70	1.0	217	ADI				1.35		18.7	0.05	9	GREGERSON BASIN
25	19:59:44	37.340	114.857	0.5	2.04	1.0	217	ADZ				1.03	1.5	18.7	0.05	9	GREGERSON BASIN
25	20:44:43	37.346	114.860	0.5	1.84	1.2	215	ADZ				0.93		18.2	0.05	8	GREGERSON BASIN
25	21: 1: 0	37.344	114.858	0.5	1.96	1.0	216	ADZ			1.45	1.18		18.4	0.05	9	GREGERSON BASIN
26	0:15:30	37.343	114.855	0.5	1.85	1.0	217	ADI	1.58			1.38	1.7	18.7	0.05	9	GREGERSON BASIN
26	7:59:42	35.898	115.388	3.8	0.02	3.1	285	CDA		2.11				73.6	0.14	14	GOODSPRINGS
26	13:57:42	35.926	116.953	1.9	7.20	2.3	267	BDA		1.81				8.8	0.12	8	WINGATE WASH
26	14: 0:19	35.912	116.951	1.1	7.40	1.1	274	BDA		1.58				9.5	0.05	6	WINGATE WASH
26	19:11:44	36.778	116.270	0.2	-0.09	0.2	91	ABZ	1.05	1.11		0.61		3.9	0.06	15	JACKASS FLATS
27	3:47:28	36.970	116.139	0.2	6.32	0.7	96	ABZ				0.61		8.6	0.05	11	MINE MTN
27	16: 5: 7	37.245	115.021	0.4	0.16	0.4	208	ADZ	2.10			1.39		17.0	0.05	13	LOWER PAHRANAGAT LAKE
27	16:34:46	37.236	115.009	0.4	0.98	0.4	214	ADZ			1.40	0.78	1.5	17.5	0.03	7	LOWER PAHRANAGAT LAKE
28	0:26:54	37.233	115.057	1.1	6.58	3.5	225	BDI			1.20	1.47		13.6	0.07	6	LOWER PAHRANAGAT LAKE
28	7:24:34	37.342	114.857	0.4	1.65	1.0	217	ADZ				1.23		18.6	0.03	7	GREGERSON BASIN
28	7:50:27	37.176	117.462	0.4	5.84	2.4	139	BCI			0.89	0.86		17.5	0.10	12	UBEHEBE CRATER
28	16: 7:38	37.001	117.600	0.8	0.68	1.0	183	ADZ			1.05	1.19		22.6	0.12	12	LAST CHANCE RANGE
MAR 1	9:34:17	37.339	114.867	1.0	6.31	1.0	302	BDI				1.34		17.9	0.07	9	GREGERSON BASIN
1	13:18:42	37.259	117.694	0.2	-0.09	0.1	181	ADZ			1.25	1.28		5.2	0.05	21	MAGRUDER MTN
2	1:58: 8	36.894	116.810	0.4	-1.28	1.7	69	BCZ	2.19		2.17		2.7	19.6	0.16	26	BULLFROG
2	10:17: 1	35.907	116.953	0.9	7.59	1.1	207	ADI	2.28			2.31		10.0	0.11	20	WINGATE WASH
2	14:49:48	35.909	116.949	0.6	8.62	0.7	269	ADA						9.5	0.04	7	WINGATE WASH
2	14:50:14	35.911	116.953	1.1	8.08	0.8	269	BDZ	1.94					9.8	0.07	9	WINGATE WASH
2	14:50:17	35.913	116.947	1.6	7.55	2.9	268	BDZ	1.83			1.92		39.3	0.07	6	WINGATE WASH
2	14:54:42	35.883	116.959	1.4	9.63	1.2	268	BDI	2.40			2.64	2.6	12.2	0.16	22	WINGATE WASH
2	14:54:42	35.915	116.945	2.4	9.27	1.3	268	BDA		2.47				8.9	0.05	6	WINGATE WASH
2	23:31:37	37.115	117.157	0.2	0.50	0.4	87	ACZ	2.41		2.17	2.15	2.2	18.3	0.10	32	BONNIE CLAIRE SW
4	14:53:17	37.028	116.916	0.3	-0.11	0.4	109	ACZ	2.40			1.16		11.8	0.06	12	SPRINGDALE
4	23:16:59	37.150	116.215	0.3	3.83	2.1	127	BCZ				0.95		12.0	0.09	13	RAINIER MESA
5	22:31:13	37.014	116.380	0.2	8.30	0.3	73	AAI	1.56			1.21		2.5	0.06	27	TIMBER MTN
5	22:58: 3	37.012	116.385	0.2	7.27	0.4	83	AAZ				0.66		2.6	0.05	18	TIMBER MTN
5	23: 1: 3	36.000	114.822	0.8	-1.95	1.7	153	ACZ	2.13		2.02	2.03		10.6	0.10	14	BOULDER BEACH
6	2:40:56	37.019	116.387	0.3	8.78	0.3	147	ACZ				0.74		1.8	0.05	16	TIMBER MTN
6	2:47:49	37.014	116.384	0.2	7.72	0.3	86	AAZ		1.44		0.84		2.3	0.05	18	TIMBER MTN
6	3:11:25	37.012	116.381	0.2	8.52	0.4	73	AAZ	1.62			1.44		2.7	0.08	33	TIMBER MTN
6	3:27:59	37.015	116.380	0.2	8.00	0.3	73	AAZ	1.47			1.06		2.3	0.05	22	TIMBER MTN
6	3:39:19	37.014	116.381	0.1	8.01	0.2	73	AAZ	1.30	1.39		0.99		2.4	0.04	23	TIMBER MTN

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1989 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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
MAR	6	7:25: 4	37.013	116.384	0.2	8.13	0.3	107	ABZ	1.22			0.83		2.5	0.07	21	TIMBER MTN
	6	18:58:30	37.908	116.137	0.5	-0.67	0.9	116	BCZ				1.60		24.0	0.15	14	REVEILLE PEAK
	6	20: 0:25	37.339	114.846	0.6	0.32	0.7	220	ADZ	1.47			1.44		19.6	0.08	10	GREGERSON BASIN
	7	4:28:34	37.858	114.990	0.8	7.21	1.2	237	ADZ				0.97		7.5	0.07	7	WHEATGRASS SPRING
	7	11: 4:27	37.706	115.011	0.4	6.68	0.9	129	ABI				1.13		8.9	0.06	9	HIKO NE
	7	18: 6: 6	37.906	116.136	0.4	0.35	0.7	116	BCI	1.65			1.96	2.2	23.7	0.15	18	REVEILLE PEAK
	8	6:32:24	37.013	116.380	0.2	8.49	0.3	73	AAZ				1.00		2.6	0.07	21	TIMBER MTN
	8	19: 5:36	37.905	116.141	0.5	-1.03	1.0	115	ACZ				1.89		23.9	0.13	11	REVEILLE PEAK
	9	11:17:52	37.868	116.138	0.5	2.71	7.0	108	CCA		2.32				21.2	0.11	9	REVEILLE PEAK
	10	4:35:44	36.807	116.008	0.2	0.45	0.4	126	ACZ	1.69	1.14		1.47		14.6	0.07	21	CANE SPRING
	10	14:36:41	36.822	116.24[illegible]	0.7	5.42	1.6	135	ABZ	1.26			0.86		7.6	0.13	14	SKULL MTN
	11	1: 4:45	37.140	116.064	0.8	-1.85	0.7	146	ACZ	1.57			1.65		7.8	0.14	12	OAK SPRING
	11	12:21:46	37.879	116.009	0.7	7.14	4.3	116	BCA		2.88				14.8	0.16	13	REVEILLE PEAK
	12	8:53:46	38.394	116.462	1.9	-0.85	1.7+	285	BDZ				2.15		18.0	0.06	10	•••QUAD. NOT LISTED•
	13	4:33: 2	37.112	117.156	0.2	0.07	0.3	90	ACZ	1.76	1.48		1.52		18.0	0.07	24	BONNIE CLAIRE SW
	13	18:50:47	37.926	116.101	1.4	-0.21	1.3	184	BDZ				1.40		23.4	0.11	7	REVEILLE PEAK
	14	1:53: 8	36.494	116.573	0.2	-0.94	0.4	54	ACZ	1.69			1.23		13.8	0.08	23	RYAN
	14	6:34:32	37.260	115.067	1.8	6.58	2.8	189	BDZ			1.12	0.96		14.7	0.07	7	ALAMO SE
	14	18:51:56	36.465	114.493	1.4	-1.13	1.2	240	BDZ				2.08		60.0	0.17	10	•••QUAD. NOT LISTED•
	14	23:17:46	37.241	115.003	0.4	0.20	0.3	236	ADI			1.67	0.89		18.2	0.01	6	LOWER PAHRANAGAT LAKE
	14	23:18:48	37.254	115.036	0.4	4.93	2.0	200	BDZ	2.51			2.22		16.4	0.07	12	ALAMO SE
	14	23:23:18	37.335	115.108	14.1	24.98•	——	191	DOI	1.52	1.07				9.4	0.17	5	ALAMO SE
	15	2:34:42	36.689	116.170	0.2	4.92	1.4	99	ACZ				0.73		10.9	0.08	18	SPECTER RANGE NW
	15	3:44:28	37.250	115.037	0.8	4.51	3.1	202	BDZ	1.81		1.89			16.1	0.04	8	ALAMO SE
	15	5: 6:39	37.244	115.018	6.2	3.82•	——	209	DDZ			1.07	1.06		17.2	0.08	5	LOWER PAHRANAGAT LAKE
	15	5:10: 6	37.246	115.020	0.8	0.79	0.8	208	ADZ			1.48	0.84		17.1	0.07	8	LOWER PAHRANAGAT LAKE
	15	5:10:39	37.254	115.044	0.4	0.88	0.5	198	ADZ	2.14			1.40		15.9	0.05	10	ALAMO SE
	15	5:14:39	37.251	115.024	0.5	-0.83	0.3	205	ADZ			1.54		1.3	17.1	0.04	8	ALAMO SE
	15	5:15:47	37.238	115.003	3.4	4.07•	——	215	CDZ			1.21	1.17		18.0	0.10	6	LOWER PAHRANAGAT LAKE
	15	5:23: 4	37.253	115.023	0.4	0.55	0.5	196	ADZ	2.16			1.92		17.3	0.05	12	ALAMO SE
	15	6:13:22	37.249	115.032	0.6	4.50	2.3	204	BDZ	1.75			1.40		16.4	0.07	11	LOWER PAHRANAGAT LAKE
	15	7:58: 3	37.333	115.259	1.1	0.61	0.7	238	BDZ				1.06		19.3	0.10	7	BADGER SPRING
	15	8:34:39	37.249	115.029	0.6	4.62	1.9	205	ADZ	2.02			1.44		16.7	0.07	11	LOWER PAHRANAGAT LAKE
	15	9:59:21	37.242	115.021	1.7	7.89	3.0	209	BDZ			1.58			16.8	0.08	7	LOWER PAHRANAGAT LAKE
	15	12:56:23	37.249	115.027	1.0	2.90	4.2	205	BDZ	1.90			1.41		16.8	0.08	9	LOWER PAHRANAGAT LAKE
	15	16:37:11	36.914	117.654	0.8	5.94	6.3	199	CDI			1.62	1.73		25.2	0.15	14	DRY MTN
	15	18:20:14	37.244	115.006	0.3	0.42	0.4	212	ADI			1.51			18.1	0.02	7	LOWER PAHRANAGAT LAKE
	15	19: 9:55	37.251	115.021	0.4	-0.89	0.4	206	ADZ	1.49		1.85			17.3	0.03	9	ALAMO SE
	15	19:11:24	37.241	115.005	0.1	0.70	0.1	213	ADZ	1.24		1.59	0.95		18.1	0.01	7	LOWER PAHRANAGAT LAKE
	15	19:44:11	37.266	115.094	4.3	8.62	4.0	178	CCU				1.15		13.6	0.10	6	ALAMO SE
	15	21:44: 0	37.245	115.029	1.3	9.57	1.8	206	BDZ			1.67			16.4	0.08	9	LOWER PAHRANAGAT LAKE
	15	22:22:22	37.250	115.033	0.6	4.33	2.2	203	BDZ	1.92	0.77		1.34		16.4	0.05	9	ALAMO SE
	16	0:35: 7	37.247	115.025	2.5	7.20	2.6	229	BDZ			1.41	0.78		16.8	0.06	7	LOWER PAHRANAGAT LAKE
	16	2: 6:18	37.248	115.017	0.4	-0.52	0.2	231	ADI			1.32	1.34		17.5	0.01	6	LOWER PAHRANAGAT LAKE

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1989 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
MAR 16	4:17:27	37.300	115.178	1.4	8.50	1.0	206	BDZ	1.67		1.37	1.35		14.6	0.11	6	ALAMO
16	4:28:29	37.247	115.026	1.2	4.95	2.6	229	BDI	1.78			1.34		16.7	0.06	9	LOWER PAHRANAGAT LAKE
16	5:13:38	37.255	115.061	2.4	9.47	3.5	193	BDU			1.42	1.42		14.7	0.06	5	ALAMO SE
16	7:56:52	37.299	115.178	11.3	7.00•	——	205	DDI			1.38	1.33		14.5	0.12	6	ALAMO
16	8:13:58	37.252	115.034	1.4	0.16	1.0	202	BDI			1.58			16.4	0.07	7	ALAMO SE
16	8:14:46	37.260	115.062	4.2	11.24	4.0	191	CDU			1.41			15.1	0.12	6	ALAMO SE
16	11:36:59	37.241	115.011	1.1	0 42	0.9	212	BDZ	1.35		1.74	0.95		17.6	0.06	7	LOWER PAHRANAGAT LAKE
16	12: 0: 6	37.254	115.029	0.5	-0.89	0.4	203	ADZ	1.83		1.87	1.21		16.9	0.03	8	ALAMO SE
16	14:34:60	37.254	115.046	2.7	8.70	4.2	198	CDZ	1.91		1.91			15.7	0.09	7	ALAMO SE
16	14:48:24	37.246	115.034	0.8	5.72	1.9	204	ADZ	1.85			1.45		16.1	0.09	12	LOWER PAHRANAGAT LAKE
16	16: 9:55	37.242	115.003	3.0	4.34	11.7	236	CDI				1.26		18.3	0.10	7	LOWER PAHRANAGAT LAKE
16	21: 4:33	37.248	115.028	0.5	-0.06	0.5	205	ADZ			1.68	1.13		16.7	0.03	6	LOWER PAHRANAGAT LAKE
17	1:36:28	37.238	115.008	0.9	1.77	1.7	214	ADZ			1.65	1.04		17.7	0.05	7	LOWER PAHRANAGAT LAKE
17	4: 2:27	37.009	115.978	0.9	2.40	1.4	228	ADZ	1.44			1.19		10.9	0.08	17	PAIUTE RIDGE
17	6: 3:47	37.250	115.031	3.6	4.81•	——	204	CDU			1.32			16.6	0.07	5	ALAMO SE
17	16: 7:33	37.022	116.525	0.2	9.20	0.7	102	ABZ	1.32			1.09		12.4	0.05	20	THIRSTY CANYON SE
17	17:46:40	37.253	115.032	2.2	-0.77	1.3	225	BDZ			1.53			16.7	0.07	6	ALAMO SE
17	17:54:10	37.249	115.024	1.4	8.44	2.0	206	BDI						17.0	0.08	8	LOWER PAHRANAGAT LAKE
17	18:43:55	37.115	117.367	0.3	6.17	1.1	112	ACI	1.51		1.54	1.58		13.0	0.08	20	UBEHEBE CRATER
17	22:25:25	37.242	115.008	0.3	0.14	0.3	212	ADZ			1.38			17.9	0.02	7	LOWER PAHRANAGAT LAKE
18	2: 4:35	37.241	115.009	0.9	6.87	1.5	213	ADZ	1.79			1.34		17.8	0.10	11	LOWER PAHRANAGAT LAKE
18	3:54:15	37.246	115.023	1.1	0.47	0.9	207	BDI	1.53		1.56			16.9	0.08	9	LOWER PAHRANAGAT LAKE
18	5:50:35	37.150	116.067	0.5	-1.12	0.5	125	ABZ				1.55		7.0	0.08	13	OAK SPRING
18	22:25:56	37.240	115.017	1.2	4.03	7.2	211	CDZ			1.40		1.4	17.0	0.05	7	LOWER PAHRANAGAT LAKE
19	0: 1:19	36.983	116.714	0.2	0.60	0.3	87	ACZ	1.52			1.41		18.2	0.06	23	BARE MTN
19	20:28:21	37.341	116.793	0.2	6.33	1.1	106	ACZ	1.84		1.76	1.60		14.6	0.05	24	TOLICHA PEAK
21	12:38:40	37.074	116.228	0.3	7.76	0.6	114	ABZ				0.99		4.1	0.08	16	TIPPIPAH SPRING
21	23: 7:39	37.115	117.362	0.3	0.13	0.4	111	ACZ	1.78			1.78		13.0	0.09	23	UBEHEBE CRATER
22	12:20:21	37.106	115.193	0.7	2.16	0.8	194	ADZ			1.48	1.41		7.0	0.07	9	LOWER PAHRANAGAT LAKE
22	17:40: 7	36.497	114.400	2.5	-1.02	1.7	283	CDZ				2.06		68.1	0.10	8	•••QUAD. NOT LISTED•
22	18:29:60	35.952	115.221	1.5	0.00••	1.8	187	BDZ				2.03		42.2	0.13	11	SLOAN
23	6:31:34	37.440	114.508	2.8	-1.54	2.2	291	CDZ		1.71	1.71	1.74		27.5	0.06	9	ELIGN NE
23	21:39:59	37.343	116.795	0.2	0.50	0.3	106	ACZ	1.53		1.46	1.42		14.8	0.07	22	TOLICHA PEAK
24	1:12:14	36.486	116.932	0.3	6.63	1.6	64	ACI	1.61			1.70		18.3	0.08	25	FURNACE CREEK
24	6:54: 7	37.162	117.386	0.2	8.16	0.7	118	ACI	1.77			1.80	2.2	18.4	0.08	27	UBEHEBE CRATER
24	6:57:52	37.162	117.382	0.3	7.23	1.0	118	ACZ		0.73	0.86	0.90		18.4	0.07	12	UBEHEBE CRATER
24	6:57:52	37.056	117.475	4.0	19.71	3.1	198	CDZ		0.71		1.00		13.1	0.27	8	UBEHEBE CRATER
24	10: 5:16	37.163	117.384	0.2	7.24	0.9	119	ACI			0.89	0.90		18.5	0.07	14	UBEHEBE CRATER
24	10:12:15	37.162	117.383	0.2	6.91	0.6	131	ACI			1.00	1.01		18.4	0.04	14	UBEHEBE CRATER
24	23:44:15	37.506	114.632	1.2	-1.02	0.8	293	BDZ	1.73		1.61	1.47		14.5	0.03	8	CHOKECHERRY MTN
25	4: 8:55	37.260	115.048	0.6	2.29	1.0	195	ADU	1.68			1.63		16.0	0.08	11	ALAMO SE
25	6:14:27	37.243	115.000	1.3	0.73	0.9	214	BDU	1.19		1.60	1.17		18.5	0.17	8	LOWER PAHRANAGAT LAKE
25	8:36:25	37.245	115.004	0.5	-0.04	0.5	212	ADU	1.39		1.74	1.21		18.3	0.06	10	LOWER PAHRANAGAT LAKE
25	10:49: 3	37.070	116.219	0.3	6.68	0.8	85	AAU	1.40			0.87		3.8	0.08	15	TIPPIPAH SPRING

1989 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
MAR 26	2:59:56	37.116	117.159	0.3	5.98	2.4	98	BCU			1.08	1.49		18.5	0.10	17	BONNIE CLAIRE SW
26	5: 5:16	37.160	117.384	0.2	6.47	1.1	120	ACU				0.88		18.1	0.05	10	UBEHEBE CRATER
26	17:43:21	37.280	117.699	0.8	-1.27	0.8	158	ACA		1.97				7.0	0.10	8	MAGRUDER MTN
26	22: 2:18	37.075	116.227	0.5	6.21	0.6	114	ABU				0.80		4.2	0.06	11	TIPPIPAH SPRING
26	23: 3:22	37.241	115.016	2.3	6.55	6.0	211	CDU			1.36	0.99		17.2	0.06	6	LOWER PAHRANAGAT LAKE
28	2: 0:38	37.053	116.050	0.3	11.07	0.9	141	ACU				0.84		16.0	0.06	14	YUCCA FLAT
28	5:16:31	37.129	117.154	0.4	6.20	2.6	94	BCI			1.34	1.30		19.4	0.14	20	BONNIE CLAIRE NW
28	12: 5:19	36.650	116.453	0.3	13.67	0.8	175	ACU	1.06			0.82		10.1	0.05	11	LATHROP WELLS NW
28	12:12:41	37.162	117.384	0.3	7.98	1.1	119	ACU				0.71		18.4	0.07	10	UBEHEBE CRATER
28	12:18:12	37.163	117.334	0.2	8.33	0.9	118	ACU			0.94	0.77		18.5	0.06	12	UBEHEBE CRATER
28	12:41:19	37.161	117.387	0.4	8.50	1.0+	167	ACU			0.69			19.3	0.06	9	UBEHEBE CRATER
28	12:41:32	37.163	117.382	0.3	7.80	0.9	117	ACU				0.80		18.5	0.07	13	UBEHEBE CRATER
28	16: 7:18	37.163	117.384	0.2	7.46	0.7	118	ACU			1.30	1.16		18.6	0.06	15	UBEHEBE CRATER
28	17:59:36	35.923	114.829	5.0	4.23•	——	199	CDI	2.05			1.97		6.6	0.04	8	BOULDER CITY
29	5:53:22	37.692	115.051	0.3	0.17	0.5	114	ACU				0.95		11.0	0.07	10	HIKO NE
29	5:55:16	37.690	115.052	0.2	0.50	0.4	113	ACU				0.88		11.0	0.06	10	HIKO NE
29	18:18:26	37.116	117.849	0.5	7.38	1.8	245	ADI			1.54	1.69		22.2	0.04	9	WAUCOBA SPRING
29	23:16:40	37.162	117.384	0.2	7.27	0.5	118	ACU			1.37	1.52		18.4	0.06	15	UBEHEBE CRATER
29	23:19:59	37.165	117.382	0.3	7.01	0.7	176	ACU			1.53	1.52		18.7	0.04	10	UBEHEBE CRATER
30	19: 2:22	37.419	115.637	0.6	9.10	2.2	109	BCU				1.57		20.7	0.14	12	BALD MTN
31	2:29:25	37.043	115.049	0.7	7.72	1.3	273	ADU			1.77			18.6	0.06	9	LOWER PAHRANAGAT LAKE SE
31	22:42:36	37.876	116.022	0.0	6.20	0.1	115	ADU				1.26		14.9	0.00	5	REVEILLE PEAK
APR 1	17:21:10	37.064	115.745	0.3	-0.82	0.5	111	ACZ				1.23		28.5	0.06	10	FALLOUT HILLS SW
1	23:34:31	37.689	115.053	0.2	0.66	0.4	112	ACZ	1.37			1.28		11.0	0.05	9	HIKO NE
2	2: 1:43	37.698	115.051	0.3	0.93	0.4	207	ADI				1.02		11.3	0.05	9	HIKO NE
3	0:58:17	37.279	115.117	0.8	13.14	1.3	184	ADI			0.35	1.11		13.8	0.08	7	ALAMO SE
3	8:59:59	37.008	116.034	0.5	-0.31	0.8	146	ACZ				0.68		8.6	0.09	12	YUCCA FLAT
3	19:48: 6	37.105	115.737	0.3	-0.55	0.4	152	ACZ	1.81		1.51	1.46		25.6	0.08	15	FALLOUT HILLS SW
4	13:20: 6	37.657	114.492	4.4	2.12•	——	304	CDI	1.83			1.41		22.4	0.10	8	•••QUAD. NOT LISTED•
4	13:20:10	37.645	114.740	3.2	0.00••	5.5	226	DDZ	1.83			0.98		4.4	1.01	8	CALIENTE NW
4	18:35:39	38.186	116.073	0.5	2.75	2.4	199	BDZ	1.89	1.92		2.02		32.3	0.06	10	ECHO CANYON
5	11:12:40	36.713	116.046	0.3	2.74	0.6	131	ABZ				0.85		9.6	0.08	17	CAMP DESERT ROCK
6	1:27:49	36.576	115.906	0.2	12.84	0.5	102	ABI	1.63	1.38	.36	1.48		10.6	0.08	20	MERCURY SW
6	9:45:44	37.869	115.715	0.4	-0.17	0.6	144	ACZ				1.65		16.5	0.08	10	WORTHINGTON MTNS
6	16:10: 5	36.001	114.742	0.8	1.56	1.6	198	ADI	2.39					8.9	0.07	14	HOOVER DAM
6	22:30:45	37.863	116.131	0.6	0.00••	1.0	108	ACZ				1.83		20.3	0.14	14	REVEILLE PEAK
7	0: 3: 6	36.890	116.813	0.4	0.87	10.5	55	CCZ	1.99		1.95			19.6	0.13	25	BULLFROG
7	9:54:25	37.161	117.386	0.2	6.48	0.9	118	ACI			0.84	0.97		18.3	0.06	18	UBEHEBE CRATER
7	16:42:18	37.448	117.895	0.6	9.70	0.6	172	ACZ				1.12		2.7	0.03	6	SOLDIER PASS
7	21:38:35	36.807	116.083	0.3	6.98	1.1	107	ABI	1.34	1.38		1.08		9.3	0.08	17	CANE SPRING
7	23:55: 2	36.896	116.811	0.3	-1.42	8.2	84	CCZ	2.02		1.81			19.8	0.13	25	BULLFROG
8	7: 1:56	37.260	116.375	0.4	-0.84	0.4	96	ABZ			1.72	1.03		6.8	0.09	13	SILENT BUTTE
9	11:45:20	37.261	116.510	0.9	7.23	3.1	128	BBZ				1.58		12.0	0.12	11	TRAIL RIDGE
9	11:52·33	37.327	115.446	0.2	1.22	1.5	144	ACZ	1.74		1.54	1.46		28.9	0.03	10	CUTLER RESERVOIR

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1989 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)	QQQ 12S	MAGNITUDE ESTIMATES Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
APR 9	16:29:45	36.995	116.293	0.3	4.58	0.9†	58	ABI	1.93			1.81	2.0	7.3	0.09	27	TOPOPAH SPRING
9	16:31:15	36.998	116.295	0.2	4.61	0.7	117	ABI				0.92		7.3	0.06	15	TOPOPAH SPRING
9	16:57:35	37.329	115.444	0.2	2.70	2.4	143	BCZ	1.68		2.07	1.92		29.0	0.05	11	CUTLER RESERVOIR
10	3:28: 4	37.181	115.010	0.9	9.11	1.2	206	ADI	1.72			1.75		15.8	0.08	11	LOWER PAHRANAGAT LAKE
10	9: 5:57	37.736	114.530	7.2	4.06•	——	296	DDI				1.32		23.3	0.29	6	CHIEF MTN
10	9:30:60	36.725	115.976	0.4	-0.92	e.4	120	ABZ				0.79		7.3	0.08	12	MERCURY
10	13:11:30	37.162	117.383	0.2	7.23	0.9++	119	ACI				0.74		18.4	0.07	14	UBEHEBE CRATER
10	13:12:11	37.163	117.383	0.2	7.26	0.9++	118	ACI			0.95	0.81		18.5	0.05	11	UBEHEBE CRATER
10	13:21:44	37.163	117.383	0.1	7.14	0.6	118	ACI			0.96	0.78		18.5	0.05	17	UBEHEBE CRATER
10	13:28: 0	37.162	117.383	0.2	7.12	0.9	118	ACI			1.08	0.95		18.4	0.07	18	UBEHEBE CRATER
11	3: 5: 5	37.715	115.207	0.4	3.79	1.2	141	ACZ				0.95		7.5	0.06	9	FOSSIL PEAK
11	23:57:53	36.805	115.907	0.3	-1.18	0.6	134	ACI	1.92			1.34		15.1	0.11	23	FRENCHMAN FLAT
12	1:32:25	36.998	116.298	0.3	3.60	1.5	116	ABZ				0.76		7.6	0.05	13	TOPOPAH SPRING
12	4:11:48	36.812	115.830	0.8	2.74	2.2	168	BCZ				1.26		13.2	0.13	15	FRENCHMAN LAKE SE
12	17:49:40	36.713	115.639	0.6	1.50	0.4	330	ADI				1.44		15.5	0.01	5	INDIAN SPRINGS NW
12	20:24:55	37.215	117.294	0.2	8.32	0.4+	81	ABI	2.55		2.99			10.1	0.10	48	UBEHEBE CRATER
12	20:37:26	37.217	117.293	0.2	8.66	0.5	81	ABI			1.75	2.06		9.8	0.08	30	UBEHEBE CRATER
12	20:56:33	37.214	117.296	0.2	8.65	0.4	82	ABZ	1.95		1.88			10.2	0.07	21	UBEHEBE CRATER
12	20:59:59	37.220	117.296	0.3	9.05	0.4	81	APZ	1.65			1.28		9.6	0.10	25	UBEHEBE CRATER
13	3:21:29	37.434	116.664	0.2	-0.87•	——	142	CCZ				1.29		16.0	0.07	15	BLACK MTN NW
13	14: 8:58	36.841	116.265	0.3	10.16	0.4	107	ABZ		1.09		0.90		5.2	0.07	16	JACKASS FLATS
13	18:12:56	36.056	115.405	0.5	3.30•	——	172	CCI	2.08		2.06	2.10		33.6	0.11	14	BLUE DIAMOND
13	19:31:58	37.242	117.603	0.5	5.89	0.6	134	ABZ			0.68	0.86		4.0	0.06	9	LAST CHANCE RANGE
14	20:49: 6	36.913	116.190	0.2	6.28	0.5	94	ABZ				0.82		6.8	0.05	16	MINE MTN
15	2:44:15	37.339	115.068	0.3	6.76	0.7	165	ACI	1.84	1.51		1.57		7.7	0.06	13	ALAMO SE
15	21:17: 8	36.802	116.090	0.3	0.35	0.5	90	ABI	1.69		1.09	1.49		9.1	0.12	27	CANE SPRING
16	5:45:52	37.110	117.159	0.4	6.52	2.2	104	BCI			0.77	1.08		18.0	0.06	9	BONNIE CLAIRE SW
17	13:32:39	37.519	115.296	1.0	4.41	11.9	121	CCI			1.29	1.21		17.8	0.19	10	MT IRISH
17	19:39:20	37.307	117.751	0.8	-1.34	1.1	180	BDZ	1.53		1.43	1.80		12.5	0.19	16	SOLDIER PASS
18	11: 4:34	37.193	117.419	0.1	-0.13	0.3	119	ACZ				0.99		18.7	0.05	16	UBEHEBE CRATER
18	19:48:52	37.062	116.951	0.2	0.82	0.4	45	ACZ	1.83		1.70	1.83		11.6	0.09	31	SPRINGDALE
19	9: 1:20	37.062	116.951	0.2	0.43	0.3	93	ACI				1.38		11.7	0.08	23	SPRINGDALE
19	9:26: 1	37.163	117.384	0.2	7.08	0.4	119	ACZ			1.09	0.93		18.5	0.06	17	UBEHEBE CRATER
19	11: 0: 0	37.629	115.077	0.4	4.60	3.0	113	BCZ	1.70		1.49	1.23		12.7	0.10	9	HIKO NE
19	13:21:58	37.576	117.746	0.2	0.28	0.4	121	ACZ	1.22			1.59		16.2	0.09	17	LIDA WASH
19	22:39:29	37.257	115.012	0.5	3.95	2.4	139	BCI			3.59			17.0	0.22	43	ALAMO SE
19	22:47:39	37.250	115.045	1.3	2.78	3.5	200	BDZ			1.04	0.90		15.5	0.09	7	ALAMO SE
19	23: 0:29	37.247	115.023	0.3	7.17	0.5	207	ADZ	1.58					17.0	0.04	10	LOWER PAHRANAGAT LAKE
19	23:15: 7	37.248	115.016	2.0	-0.88	1.3	208	BDZ			1.57	1.02	1.5	17.6	0.11	7	LOWER PAHRANAGAT LAKE
19	23:37:26	37.256	115.036	1.9	-0.33	0.8	223	BDZ						16.5	0.05	6	ALAMO SE
19	23:48:36	37.242	115.002	5.2	5.02•	——	214	DDI	1.28		1.65	1.04		18.3	0.11	7	LOWER PAHRANAGAT LAKE
19	23:55:26	37.256	115.032	0.8	-0.92	0.6	224	ADZ			1.63	0.99		16.8	0.05	7	ALAMO SE
20	0:33:45	37.299	115.174	12.7	7.00•	——	203	DDI	1.26		1.68	1.05		14.5	0.13	6	ALAMO
20	4:23:49	37.236	114.992	0.7	0.67	0.7	202	ADZ	2.03			1.69		18.9	0.10	9	DELAMAR 3 NW

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1989 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)	QQQ 12S	MAGNITUDE ESTIMATES Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
APR 20	4:25:39	37.240	115.054	1.7	6.82	3.8	202	BDZ				1.24		14.3	0.05	7	LOWER PAHRANAGAT LAKE
20	4:30:10	37.047	117.327	0.3	9.86	0.4	108	ABI				1.29		5.5	0.07	16	UBEHEBE CRATER
20	5:19:28	37.250	115.019	0.8	0.15	0.4	207	ADZ	1.80			1.30		17.5	0.04	9	ALAMO SE
20	5:22:53	37.257	115.059	9.5	11.60	5.3	193	DOZ			1.75			15.0	0.09	8	ALAMO SE
20	5:36:57	37.240	114.998	1.1	0.07	0.7	215	BDZ			1.43	0.85		18.6	0.09	8	DELAMAR 3 NW
20	5:39:58	37.243	115.011	1.0	0.06	0.9	211	BOZ			0.94	1.03		17.7	0.04	5	LOWER PAHRANAGAT LAKE
20	5:58:29	37.275	115.144	4.5	6.46	2.6	186	CDZ			1.34	1.21		12.4	0.09	8	ALAMO
20	6: 3: 9	37.254	115.044	4.2	11.47	4.6	199	CDI				1.16		15.8	0.13	6	ALAMO SE
20	6:53:48	37.290	115.189	2.6	2.03	2.1	210	CDZ			1.10	1.08		13.5	0.09	6	ALAMO
20	6:55:31	37.244	115.329	4.0	4.04*	—	229	CDZ		1.93	0.84	0.97		16.4	0.07	7	LOWER PAHRANAGAT LAKE
20	7:19:30	37.243	115.020	1.2	7.60	2.4	209	BOZ	1.82			1.39		17.0	0.07	9	LOWER PAHRANAGAT LAKE
20	8:16:46	36.876	116.720	0.2	3.83	4.3	101	BCI	1.55			1.41		12.1	0.08	22	BARE MTN
20	10:12: 1	36.735	116.292	0.3	0.90	0.2	95	ABI				0.67		2.0	0.10	19	STRIPED HILLS
20	18: 3:57	37.263	115.110	3.0	10.71	2.3	172	CCZ			1.51	1.15		12.5	0.07	6	ALAMO SE
20	19:25: 0	37.244	115.006	2.1	7.00	4.5	212	BDI	1.37		1.96	1.24		18.1	0.07	8	LOWER PAHRANAGAT LAKE
20	19:28:11	37.283	115.131	4.8	8.24	5.7	181	DOZ			1.58	1.14		13.6	0.11	6	ALAMO
20	19:32:38	37.288	115.143	4.5	10.73	1.4	188	CDI			1.59	1.26		13.8	0.09	7	ALAMO
20	21:44: 1	37.238	115.015	2.6	4.45*	—	212	CDZ			1.23	1.32		17.1	0.05	6	LOWER PAHRANAGAT LAKE
20	23:21:52	36.321	116.501	0.6	0.80	1.4	95	ABA		1.59				8.8	0.14	11	RYAN
21	17:11:42	37.301	115.189	3.5	7.00	3.8	210	CDI			1.46	0.74		14.6	0.12	6	ALAMO
21	17:16:27	37.248	115.013	0.5	0.02	0.3	209	ADZ			1.41	1.34		17.8	0.04	8	LOWER PAHRANAGAT LAKE
21	18:42:45	37.260	115.062	2.5	9.27	3.3	191	BDZ			1.51			15.0	0.08	8	ALAMO SE
21	20:17: 1	36.930	117.562	0.5	5.11	3.1	186	BDI				1.70		19.7	0.12	18	DRY MTN
21	22:26:35	37.242	114.999	0.7	-0.27	0.9	214	ADI			1.46			18.5	0.06	7	DELAMAR 3 NW
22	8:57:56	37.266	115.065	4.2	9.43	4.5	188	CDZ			1.?0	1.01		15.3	0.16	8	ALAMO SE
23	4:41:33	36.773	115.351	1.0	1.21	4.0	184	BOZ				1.72		46.2	0.17	16	DEAD HORSE RIDGE
23	5:21:38	36.746	115.272	1.8	3.16*	—	296	CDZ				1.65		48.5	0.13	15	WHITE SAGE FLAT
23	5:31:13	37.341	118.155	0.7	8.13	1.1	279	ADI			1.74	1.97		23.9	0.08	14	***QUAD. NOT LISTED*
23	5:32: 6	37.752	117.116	0.7	13.55	1.2	185	ADI				2.05		24.4	0.05	7	MUD LAKE
23	11: 3:28	37.249	115.017	1.6	-0.83	1.1	231	BDZ			1.46	0.71		17.5	0.06	7	LOWER PAHRANAGAT LAKE
23	12:55:44	37.255	115.058	4.1	5.66	7.0	194	CDI			1.51			15.0	0.08	7	ALAMO SE
24	3:49:52	37.094	115.151	0.5	-0.89	0.5	172	ACZ			1.96	1.69		8.9	0.08	12	LOWER PAHRANAGAT LAKE
24	6:38:13	37.285	115.338	2.5	3.94*	—	144	CDI				1.08		18.6	0.09	5	BADGER SPRING
24	15:14:55	36.845	115.924	0.9	9.22	2.2	239	BDZ				1.12		15.1	0.09	7	FRENCHMAN FLAT
24	21:55:45	37.138	117.335	0.2	0.07	0.3	101	ACZ	1.51			1.76	1.5	15.4	0.09	24	UBEHEBE CRATER
25	21:43:23	36.819	116.052	0.4	-0.11	0.5	174	ACZ				0.87		11.1	0.05	13	CANE SPRING
25	22:23:30	36.752	115.540	0.5	11.57	2.4	147	BCI				1.70		25.1	0.09	10	TIM SPRING
25	23:27:14	36.823	116.243	0.4	3.96	1.3	134	ABZ				0.78		7.5	0.10	16	SKULL MTN
26	3: 8:58	37.244	115.030	2.3	5.18	6.5	206	CDI			1.36	0.95		16.3	0.05	6	LOWER PAHRANAGAT LAKE
26	7:39:17	37.093	115.157	0.3	-0.85	0.2	200	ADZ			1.55	1.02		8.8	0.05	11	LOWER PAHRANAGAT LAKE
26	12: 1:59	37.244	115.022	0.6	4.29	4.1	208	BDZ	1.90					16.9	0.09	10	LOWER PAHRANAGAT LAKE
26	13:14:29	37.246	115.019	0.6	0.56	0.4	208	ADZ			1.68	1.01		17.3	0.05	9	LOWER PAHRANAGAT LAKE
26	15:53:35	36.840	116.179	0.2	7.66	0.3	69	AAZ	1.53	1.58		1.07	1.3	1.8	0.07	26	SKULL MTN
26	21: 6:21	37.251	115.025	0.7	0.90	0.7	205	ADZ	1.85			1.30		17.0	0.07	10	ALAMO SE

1989 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 26	21: 8:15	37.244	115.005	1.9	4.17	11.2	212	CDZ			1.44	1.43		18.2	0.08	8	LOWER PAHRANAGAT LAKE
26	21:22:55	37.254	115.027	0.7	-0.52	0.6	203	ADZ			1.55	0.94		17.1	0.08	9	ALAMO SE
26	22: 0:15	37.244	115.026	1.8	0.91	1.0	207	BDZ	1.71			1.28		16.6	0.10	9	LOWER PAHRANAGAT LAKE
26	22: 1:42	37.255	115.039	0.9	-1.02	1.1	200	ADZ	1.49			1.36		16.3	0.05	7	ALAMO SE
27	2:22:24	37.244	115.014	0.9	0.21	0.8	210	ADZ	1.27		1.38	1.29		17.5	0.07	9	LOWER PAHRANAGAT LAKE
27	6:35:18	37.253	115.046	8.1	8.72	10.1	198	DDZ			1.27	1.24		15.7	0.09	5	ALAMO SE
27	11:10:34	37.260	115.051	3.2	11.47	2.8	194	CDI			1.26	1.26		15.7	0.11	8	ALAMO SE
27	16:28:19	37.149	115.266	2.4	-1.02	1.4	164	BDZ				1.58		7.3	0.06	5	DESERT HILLS NE
27	20:33:41	36.527	114.913	0.4	9.65	2.3	175	BCI	2.02			2.33		22.3	0.09	14	ARROW CANYON
27	20:54:19	36.344	114.964	0.8	1.39	2.0	162	ACZ				1.72		25.1	0.06	7	DRY LAKE
27	21:58: 3	36.758	116.251	0.4	2.86	0.4	178	ACZ				0.44		2.5	0.08	10	JACKASS FLATS
28	7:38:10	35.768	116.574	1.5	-1.02	1.2	266	BDZ	2.24			1.74		34.3	0.12	13	CONFIDENCE HILLS
28	12:10:30	37.436	118.202	2.1	2.85	6.9	:86	CDI	1.60	1.78		2.01		26.1	0.09	13	•••QUAD. NOT LISTED•
28	13:31:19	37.872	116.021	0.2	6.07	1.1	114	ACZ				1.43		14.5	0.04	12	REVEILLE PEAK
28	18: 0:13	37.258	115.063	2.4	6.91	3.8	192	BDI			1.31	1.06		14.8	0.06	6	ALAMO SE
28	21:50:34	36.382	114.901	1.3	-1.65	1.5	182	BDI				1.85		27.0	0.09	10	DRY LAKE
29	6:20: 4	36.778	115.995	0.7	1.12	2.5	137	BCZ				1.28		13.4	0.17	17	FRENCHMAN FLAT
29	12:16: 7	36.636	116.254	0.2	4.41	0.9	64	ABI	1.88		2.18	2.10		7.7	0.08	27	STRIPED HILLS
29	13:36:52	37.848	115.482	0.6	11.75	1.6	118	ABI				0.87		17.7	0.08	8	
29	15:33:45	36.637	116.257	0.3	4.75	0.7	122	ABZ	1.44	1.27		0.94		7.4	0.08	24	STRIPED HILLS
29	22:47:47	36,729	115.900	0.4	-0.40	1.3	147	ACZ				1.25		8.9	0.09	12	MERCURY
30	8:29:32	37.365	114.914	1.0	6.89	2.2	198	BDI					1.3	13.0	0.05	7	DELAMAR LAKE
30	8:54:43	36.849	115.969	0.2	0.98	0.3	180	ACI				0.69		12.0	0.04	14	FRENCHMAN FLAT
MAY 1	1:33:23	37.350	115.566	0.2	15.44	1.8	165	ACI				1.56		43.3	0.03	7	GROOM RANGE SE
1	5: 6:49	37.160	116.328	0.3	5.08	0.5	66	ABI	1.51	1.13		1.06		6.0	0.10	24	AMMONIA TANKS
1	11:36:47	36.570	115.975	0.3	3.96	2.0	151	ACZ	1.88		0.72	1.10		10.1	0.06	13	MERCURY SW
2	0:45:49	38.292	116.515	2.5	0.37	2.3	262	CDZ	2.42			2.62		9.5	0.14	13	GEORGES CANYON RIM S
2	9:59:31	37.275	116.139	0.5	-0.91	1.0	75	BCZ	1.68		1.85	1.83	2.0	13.7	0.20	20	QUARTET DOME
2	14:49: 3	35.998	114.733	2.0	-0.55	2.3	204	BDZ	2.26			2.06	2.3	8.7	0.11	12	RINGBOLT RAPIDS
3	0:30: 9	37.255	115.039	4.8	9.47	3.9	222	CDI			1.47	0.77		16.2	0.09	6	ALAMO SE
3	2:50:17	37.623	115.077	0.4	0.69	0.8	114	ACZ		1.09		0.91		12.8	0.07	7	HIKO SE
3	5:49: 0	37.513	115.292	0.3	-0.84	0.6	122	ACZ	1.64		1.65	1.45		18.4	0.08	12	MT IRISH
4	4:13:37	37.252	115.024	5.0	10.85	6.5	204	CDI				0.94		17.2	0.16	6	ALAMO SE
4	12:57:54	35.898	114.824	4.6	11.49	1.4	215	CDI				1.82		6.7	0.13	7	BOULDER CITY
5	7:46:18	35.837	115.892	5.1	2.51•	——	294	DDI				1.95	2.0	39.9	0.15	11	HORSE THIEF SPRINGS
6	4:31:52	37.330	117.687	0.4	0.91	0.6	137	ACZ			1.15	1.28		11.4	0.11	15	MAGRUDER MTN
6	4:49:49	36.830	116.304	0.4	-0.23	0.3	93	ABU				1.05		3.9	0.06	9	JACKASS FLATS
6	8:16:60	37.099	116.045	0.5	-1.70	1.4	112	ACZ				1.29		11.4	0.12	18	YUCCA FLAT
9	12:24:57	35.921	114.841	1.0	-0.71	0.8+	191	BDI	2.19			2.23		7.7	0.05	10	BOULDER CITY
9	20:43:43	37.073	116.526	0.2	5.52	0.7	164	ACZ				1.15		13.1	0.04	17	THIRSTY CANYON SE
9	23:30:29	36.636	116.255	0.3	2.69	0.5	193	ADZ	1.21			0.69		7.6	0.05	11	STRIPED HILLS
9	23:35: 2	36.635	116.248	0.2	2.17	0.3	288	ADZ				0.45		8.3	0.02	8	SPECTER RANGE NW
10	14:12:39	37.289	115.147	10.8	0.01	2.0	190	DDZ			0.79	0.58		13.8	0.17	6	ALAMO
11	2:39:48	37.883	116.017	0.3	1.81	1.6	117	ACZ	1.95				2.4	15.4	0.11	17	REVEILLE PEAK

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MAY 12	17:43:49	37.828	117.551	0.7	0.52	0.8	185	ADZ	1.70		1.91	1.90		20.4	0.12	19	SILVER PEAK
13	2:20:59	37.386	114.533	1.9	0.45	1.5	284	BDZ	1.91		2.28	2.31		30.4	0.06	11	ELIGN NE
14	14:39:28	36.559	116.262	0.3	4.04	3.8	94	BCA		1.78				11.8	0.07	13	LATHROP WELLS SE
15	4:39:30	37.018	116.166	0.9	0.93	0.7	238	ADZ				0.67		6.0	0.09	14	TIPPIPAH SPRING
15	19:14:47	36.024	115.351	0.5	1.63	4.3	177	BDU				2.01		54.9	0.09	12	BLUE DIAMOND SE
16	18: 7: 7	37.108	115.684	0.4	0.00••	0.7	125	ACZ				1.59		26.2	0.05	11	FALLOUT HILLS SW
18	2: 1:19	35.939	114.823	3.1	2.91	8.6	172	CCI				2.06		6.4	0.04	8	BOULDER CITY
18	4:29:29	36.732	115.900	0.3	-0.13	0.5	129	ABZ				1.02		9.0	0.07	13	MERCURY
18	22:26:30	37.406	114.754	0.7	-0.11	0.6	232	ADZ	1.85		1.83	1.77		22.3	0.07	12	DELAMAR
19	0:24:15	36.890	116.813	0.3	-1.13	9.2	85	CCZ	2.02		1.85	2.00		19.6	0.12	20	BULLFROG
19	3:25:22	36.683	116.245	0.2	6.49	0.5	89	ABZ				0.81		7.1	0.06	18	SPECTER RANGE NW
19	6:48:30	36.427	116.558	0.4	-0.16	0.7	68	BBZ				1.37		8.0	0.16	18	RYAN
19	7:15:23	37.286	116.343	0.2	-1.39	0.4	67	ABZ	2.42		2.11	2.30	2.6	8.1	0.07	21	DEAD HORSE FLAT
19	11: 3: 3	37.215	117.293	0.2	8.39	0.4	82	ABZ	1.36			1.53		10.0	0.07	22	UBEHEBE CRATER
19	14:37:44	37.254	115.050	1.0	2.97	4.8	197	BDZ			1.66	1.22		15.4	0.08	7	ALAMO SE
20	11:19:30	37.127	116.393	0.5	9.17	1.0	108	ABZ				0.54		10.2	0.07	14	SCRUGHAM PEAK
20	21:36:36	37.255	115.073	1.5	3.00•	——	189	CDI				1.03		14.0	0.09	5	ALAMO SE
21	19:28: 1	37.813	117.711	1.9	-0.22	1.8	237	BDZ						13.6	0.13	10	SILVER PEAK
21	20: 6:35	36.854	115.947	0.3	6.92	1.5	129	ABI	1.85			1.71	1.8	13.0	0.10	27	FRENCHMAN FLAT
21	23:53:53	36.853	115.947	0.4	9.92	1.4	100	ABA		2.58				13.0	0.11	21	FRENCHMAN FLAT
22	0:22:55	36.843	115.961	0.5	5.63	2.5	89	BCA		1.73				13.0	0.12	16	FRENCHMANFFLAT
22	15:54:46	36.853	115.947	0.3	0.71	0.5	129	ACZ				1.08	1.4	13.0	0.09	20	FRENCHMAN FLAT
23	1:11:38	37.036	116.735	0.3	-0.86	0.5	98	ACI				0.85		12.3	0.11	14	THIRSTY CANYON SW
23	4: 6:33	36.859	115.938	0.1	8.37	0.5	159	ACI	1.74			1.53		13.2	0.03	18	FRENCHMAN FLAT
23	17: 7:21	36.341	114.848	7.3	7.00•	——	227	DOI	1.85			1.87		33.4	1.07	7	DRY LAKE
24	21:21:36	37.507	116.532	0.6	10.51	2.8	116	BCI				1.37		29.2	0.13	13	MELLAN
24	22:49: 5	36.661	115.764	1.4	-1.32	0.5	318	BDZ				0.94		5.5	0.05	5	MERCURY NE
25	14:46:23	37.293	116.430	0.1	1.40	0.4	142	ACI				0.92		12.8	0.03	16	SILENT BUTTE
25	16:28:13	37.394	117.909	6.8	7.00	5.0	231	DOI	1.86			1.79		3.5	1.00	9	SOLDIER PASS
26	3:35:57	37.243	115.008	2.7	0.00••	1.6	235	CDZ	2.22			1.22		18.0	0.10	8	LOWER PAHRANAGAT LAKE
26	3:41:21	37.248	115.013	1.5	-0.46	1.0	221	BOI	1.96			1.58		17.8	0.08	10	LOWER PAHRANAGAT LAKE
26	3:48:15	37.322	115.219	1.7	-1.46	1.4	224	BDZ			.30	0.98		17.3	0.11	6	ALAMO
26	6:28:55	37.341	117.003	0.3	-0.96	0.6	111	ACZ			1.51	1.13		23.0	0.07	13	SCOTTYS JUNCTION
26	6:43:39	37.260	115.044	0.4	-1.23	0.2	219	ADZ			0.68	0.90		16.2	0.01	5	ALAMO SE
26	10:13:38	37.305	115.189	11.7	7.00•	——	211	DOI				1.32		15.1	0.10	5	ALAMO
26	13:37:51	37.422	115.209	0.4	6.88	1.7	83	ACZ	1.62			1.84		14.1	0.07	9	ASH SPRINGS
26	14:37:35	37.420	115.220	0.3	0.81	0.4	106	ACZ			1.42			15.0	0.06	9	ASH SPRINGS
26	14:38:24	37.421	115.209	0.3	7.19	1.7	89	ABZ			1.36			14.1	0.05	8	ASH SPRINGS
26	16:48:14	37.307	117.761	0.4	-1.50	0.5	165	ACZ		1.79		1.66		13.2	0.11	14	SOLDIER PASS
26	19:57:41	37.422	115.209	0.2	3.93	2.6	121	BCZ	1.80			1.71		14.1	0.04	9	ASH SPRINGS
26	20: 3:23	37.421	115.214	0.4	3.93	5.4	84	CCZ				1.41	1.8	14.5	0.08	8	ASH SPRINGS
26	21: 8:33	37.255	118.191	2.3	0.09	1.8	268	BOI				1.90		31.5	0.13	16	•••QUAD. NOT LISTED•
27	0:25:35	36.572	115.210	0.4	12.58	0.6	140	ACI	2.07		1.90	2.08		8.6	0.10	17	HAYFORD PEAK
27	4:21:58	37.228	117.603	0.6	6.45	0.8	140	ACI				1.14		3.9	0.08	11	LAST CHANCE RANGE

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1989 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)	QOO 12S	MAGNITUDE ESTIMATES Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
MAY 27 6:34:44	37.273	115.081	5.6	-1.25	1.2	202	DOZ			1.54	0.95		15.0	0.06	6	ALAMO SE
27 9:50:54	36.718	116.222	0.3	0.67	0.4	95	ABZ	1.45		1.86	1.17	0.8	5.2	0.07	20	SPECTER RANGE NW
28 0:10:51	37.873	116.018	0.3	5.59	1.7	115	ACZ		1.50		1.75		14.5	0.06	11	REVEILLE PEAK
28 13:18:34	36.994	116.298	0.2	2.66	0.4	112	ABZ				0.87		7.3	0.06	18	TOPOPAH SPRING
28 20:15:17	37.239	117.602	0.3	10.86	0.3	178	ACZ				1.20		4.0	0.01	6	LAST CHANCE RANGE
29 8:59:18	36.784	115.633	3.0	0.55	2.4	264	CDA		1.42				18.8	0.15	11	QUARTZ PEAK SW
29 22:17:10	37.055	115.236	0.4	5.11	2.0+	138	BCI	2.43		2.31	2.80		13.3	0.12	25	LOWER PAHRANAGAT LAKE
31 2:52:21	35.909	116.743	1.7	3.26•	—	264	CDI				1.48		31.4	0.16	8	CONFIDENCE HILLS
31 7: 3:18	35.926	116.750	1.0	0.12	0.9	225	ADZ	1.52			1.81	1.8	11.4	0.13	15	WINGATE WASH
JUN 1 7:45:42	37.204	117.573	0.5	4.81	1.6	157	ACI	1.82	1.84		1.80		7.2	0.11	15	LAST CHANCE RANGE
1 11:25:33	36.785	115.650	0.3	0.24	0.6	183	ADZ				1.38		17.5	0.07	15	QUARTZ PEAK SW
1 17:22:47	37.233	114.792	1.5	13.52	3.0	252	BOI			1.51	1.62		29.9	0.09	7	DELAMAR 3 NE
2 4:45:41	36.747	117.420	1.1	7.14	0.6	228	BOZ			1.51	1.20	1.4	6.5	0.09	11	MARBLE CANYON
2 6:45:58	36.907	117.460	0.3	7.35	0.6+	169	ACZ				1.54		12.4	0.09	21	TIN MTN
4 18:46:15	36.446	115.758	0.2	0.10	0.4	93	ACZ	1.68	1.91		1.96		20.7	0.08	24	MT STIRLING
5 20: 2: 7	36.445	115.757	0.3	0.97	1.2	93	ACZ	1.81			1.42		20.6	0.10	21	MT STIRLING
5 22:53: 3	35.919	115.990	0.8	4.45	6.2	234	CDI		1.64		1.71		27.4	0.27	11	HORSE THIEF SPRINGS
6 10:53:12	37.115	115.195	1.8	2.21•	—	206	CDA		2.32				34.9	0.18	12	LOWER PAHRANAGAT LAKE
6 17:53:36	36.218	115.490	5.6	8.21	2.4	289	DOI				1.01		14.3	0.21	7	LA MADRE MTN
6 22:52:37	36.786	116.085	0.4	2.25	0.6	157	ACZ				0.96		10.6	0.07	15	CANE SPRING
7 7:33:48	36.706	116.276	0.3	0.20	0.2	122	ABZ			1.99	0.53		4.1	0.08	17	STRIPED HILLS
7 10:11: 4	36.935	116.760	0.2	0.00••	0.3	140	ACZ				0.23		19.4	0.06	13	BULLFROG
7 14: 3:24	37.151	117.840	0.5	7.33	1.6++	238	ADI			1.14	1.52		19.4	0.08	12	WAUCOBA SPRING
8 12: 6:44	37.232	114.969	1.2	7.25	1.8++	228	BOI	2.56					20.6	0.09	10	DELAMAR 3 NW
8 12: 6:42	38.063	116.885	0.7	5.65	8.6	192	CDI	2.47			2.62		43.7	0.13	19	BLACK BUTTE
8 15:36: 7	37.167	116.587	0.4	7.05	0.7	178	ACI				1.03		12.5	0.09	14	THIRSTY CANYON NE
9 16:47:15	36.379	117.046	0.5	12.17	0.6	126	ABI				1.42	1.3	5.2	0.10	15	EMIGRANT CANYON
10 10:27: 7	36.694	115.745	0.9	-0.29	0.4	212	ADZ	1.66		1.84	1.64		5.8	0.12	20	INDIAN SPRINGS NW
12 1: 6:54	37.866	116.134	1.0	2.57	7.6	159	CCI				1.49		20.8	0.15	7	REVEILLE PEAK
12 1:59:17	36.451	115.745	0.4	8.46	1.5	148	ACZ			1.09	1.31		20.3	0.09	13	CHARLESTON PEAK
12 20:23: 1	37.865	116.138	0.3	1.50	0.7	107	ACZ		1.47		1.55		20.9	0.05	8	REVEILLE PEAK
14 15: 9:17	37.251	115.226	0.4	7.69	1.0	121	ABZ			1.34	1.47		9.8	6.02	7	ALAMO
14 18:56:28	35.964	115.212	1.5	-1.54•	—	184	CDZ	2.11			2.03		41.5	0.14	10	SLOAN
14 19:52: 8	36.912	115.986	0.4	-0.65	0.5	125	ABZ				1.15		6.5	0.07	10	PLUTONIUM VALLEY
15 3:14:15	35.788	116.653	1.6	9.26	8.5	265	CDI				1.16		27.5	0.05	5	CONFIDENCE HILLS
15 16: 5:47	36.172	115.558	2.2	0.00•	—	221	CDZ				1.31		51.4	0.14	6	MOUNTAIN SPRINGS
15 16:22:31	36.798	116.080	0.4	0.12	8.4	197	ADZ				0.66		10.1	0.07	13	CANE SPRING
15 18:47:22	36.765	116.164	0.2	8.07	0.5	125	ABZ				0.62		10.0	0.05	18	SKULL MTN
16 4:29:36	36.802	115.730	2.0	1.80	2.0	264	BDU				1.39		14.0	0.12	7	QUARTZ PEAK SW
16 11:23:29	36.979	115.127	0.7	13.07	1.8	138	BCI	2.27			2.10	2.3	21.7	0.17	21	MULE DEER RIDGE NW
16 12:30:56	36.844	116.269	0.3	10.57	0.4	62	AAZ		0.92		0.71		4.8	0.08	20	JACKASS FLATS
16 14:33:22	37.011	117.920	1.7	0.00••	1.6	245	BOZ		1.46		1.51		34.6	0.14	10	WAUCOBA SPRING
17 7.28:26	38.078	116.906	1.0	3.44•	—	184	CDA		1.84				44.6	0.16	12	BLACK BUTTE
17 23:45:47	37.267	116.165	—	1.32	—	191	ADA		1.21				15.3	0.06	4	QUARTET DOME

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1989 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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JUN 18	5:16: 4	35.741	116.653	1.3	-0.24	1.2	239	BDI	2.32		2.35	2.30		31.4	0.11	15	LEACH LAKE
19	4:36:45	37.057	116.025	0.3	1.81	0.9	110	ACZ				1.04		14.1	0.05	9	YUCCA FLAT
19	13:40:38	36.543	116.269	0.2	0.46	0.3	101	ACZ				1.02		13.0	0.05	20	LATHROP WELLS SE
20	5:58:54	37.393	115.354	4.9	-1.02	5.0	263	CDZ			1.44	0.99	1.5	26.9	0.14	5	HANCOCK SUMMIT
20	10: 1:13	37.211	114.839	0.9	1.74	3.7	225	BDI	2.14			1.99	2.6	28.7	0.12	15	DELAMAR 3 NE
20	14:42: 1	36.201	115.397	0.2	16.51	0.6	145	ACI	1.80			1.95		21.6	0.08	25	LA MADRE MTN
20	20: 2: 7	37.322	116.354	0.8	7.68	1.1	281	ADI				1.06		12.2	0.11	12	DEAD HORSE FLAT
20	20: 3:35	37.283	115.361	0.5	4.20	10.8	149	CCZ				1.12		20.0	0.04	6	BADGER SPRING
21	1:18:46	37.260	115.374	2.8	8.61	3.7	187	CDZ			1.63	0.97		14.3	0.10	7	ALAMO SE
21	1:31:30	37.267	115.094	9.3	11.63	4.0	177	DCZ			1.61	0.92		13.7	0.13	7	ALAMO SE
21	2:18:37	37.728	115.051	0.4	8.74	1.3	121	ABZ				1.01		13.2	0.07	7	HIKO NE
21	5:39:20	37.385	114.367	1.7	15.02	3.8	321	BDI			1.61	1.73		41.0	0.05	6	•••QUAD. NOT LISTED•
22	4: 7:46	37.174	114.894	3.1	14.18	5.7++	253	CDI				1.19		26.1	0.09	7	DELAMAR 3 NW
22	19:38:47	37.018	116.372	0.2	11.08	0.4	77	AAZ	1.88			1.80		2.3	0.07	28	BUCKBOARD MESA
23	4:47:33	35.893	114.788	2.4	3.74•	——	311	CDI				1.99		86.2	0.10	8	BOULDER CITY
23	14:50:29	37.382	115.184	6.0	13.00	4.0	215	DDI			1.47	1.05		12.1	0.11	6	ASH SPRINGS
23	17:45:26	37.333	114.599	0.2	-1.25	0.2	273	ADZ				1.55		32.6	0.01	5	ELGIN
23	20: 9:17	35.911	114.805	1.8	10.19	1.6	221	BDI	2.08			2.04		4.7	0.05	7	BOULDER CITY
24	5:47:56	37.759	118.254	2.4	3.54•	——	314	CDZ	1.95			2.38		40.0	0.06	5	•••QUAD. NOT LISTED•
25	1:57:26	38.024	114.985	2.9	0.26	2.7	235	CDZ				1.44		17.4	0.15	7	SILVER KING MTN SW
25	3:26:10	37.195	117.348	0.3	1.78	0.8	99	ACZ				1.35	1.5	14.1	0.08	13	UBEHEBE CRATER
25	5:45:34	37.135	117.831	0.8	7.28	2.9+	239	BDI	1.69		1.86	1.91		19.7	0.10	12	WAUCOBA SPRING
25	23:23:59	36.727	117.264	0.3	8.72	0.6	116	ABZ				0.67	1.4	9.1	0.04	12	MARBLE CANYON
27	17: 4:58	36.519	114.378	3.3	-1.22	2.2	284	CDI				2.21		70.1	0.12	8	•••QUAD. NOT LISTED•
27	19:25:46	37.717	115.050	0.2	7.36	1.0	119	ABZ				0.78		12.3	0.05	8	HIKO NE
28	0: 3:41	37.146	117.826	1.1	2.62	5.3	212	CDZ				1.16		18.6	0.12	11	WAUCOBA SPRING
28	14:40:55	37.227	117.396	0.7	10.09	0.9	169	ACZ			1.01	1.00		14.8	0.10	8	UBEHEBE CRATER
28	23:15: 9	38.063	116.892	0.5	0.97	0.5	197	ADZ	1.96			2.21	2.2	44.2	0.08	12	BLACK BUTTE
29	1:35:57	36.708	116.252	0.3	1.58	0.9	77	AAZ			2.31	0.86		4.2	0.09	18	STRIPED HILLS
29	7:12: 1	37.245	115.010	2.3	0.00	1.9	211	BDI				0.88		17.8	0.11	6	LOWER PAHRANAGAT LAKE
29	7:22:22	37.245	115.009	1.0	0.58	1.0	211	BDI			1.21	0.78		18.0	0.05	6	LOWER PAHRANAGAT LAKE
29	7:40:30	36.788	115.478	0.5	3.56•	——	159	CCZ				1.30		31.5	0.15	7	DOG BONE LAKE SOUTH
29	22:37:44	36.703	116.290	6.3	7.61	0.4	195	ADZ				0.68		4.6	0.02	11	STRIPED HILLS
JUL 1	18:49:12	37.197	117.371	0.2	-0.15	0.4	105	ACZ		1.29		1.01		15.3	0.07	13	UBEHEBE CRATER
1	19:22:39	36.752	116.285	0.3	8.05	0.5	127	ABZ				0.69		1.6	0.08	14	JACKASS FLATS
1	19:53:38	36.748	116.262	0.5	1.33	0.5	101	ABZ	1.44			1.05		1.1	0.12	17	STRIPED HILLS
2	5:42:31	37.215	115.881	0.5	0.83	0.9	151	ACZ		1.61		1.34		12.2	0.11	12	JANGLE RIDGE
2	19: 2:50	36.504	116.311	0.2	5.79	1.2	120	ACZ	1.61			1.28		15.9	0.06	20	LATHROP WELLS SE
2	22:44:58	37.034	116.998	0.2	2.74	0.6	86	ABZ	1.59	1.17		1.54		6.7	0.08	22	SPRINGDALE
3	3:40:49	37.246	115.027	1.1	4.50	3.6	206	BDI	1.66	1.34		1.36		16.6	0.08	9	LOWER PAHRANAGAT LAKE
3	10:40:48	37.294	115.262	4.5	11.11	5.0+	241	CDI		0.95	1.38	1.18		15.4	0.11	6	BADGER SPRING
4	4:58:33	38.216	116.234	0.5	2.76	3.1	194	BDZ	1.88	1.69		1.67		17.8	0.08	10	TWIN SPRINGS SLOUGH
4	8. 7: 5	37.009	115.959	0.3	5.61	1.3	173	ACI		1.24		3.12		12.0	0.08	22	PAIUTE RIDGE
4	8:24:12	37.013	115.937	0.8	3.56•	——	240	CDZ	2.03	1.20		0.95		39.2	0.06	6	PAIUTE RIDGE

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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)	QQQ 12S	MAGNITUDE ESTIMATES Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JUL	4	8:28:13	37.005	115.968	0.3	4.29	1.9	132	ACZ		1.18		1.12		11.2	0.10	21	PAIUTE RIDGE
	5	13:50:22	37.121	116.354	10.2	-0.47•	—	330	DDA		0.89				10.0	0.21	7	BUCKBOARD MESA
	6	0: 5: 3	37.307	116.365	5.3	6.13	6.1	255	DDU				1.27		10.9	0.11	9	DEAD HORSE FLAT
	8	3:19:48	37.244	114.997	0.7	-1.40	0.6	214	ADZ			0.90	1.08		18.7	0.09	6	DELAMAR 3 NW
	8	8:34:18	37.271	115.083	1.9	0.45	1.3	180	BCI		1.16	1.30	1.26		14.6	0.11	7	ALAMO SE
	8	8:39:40	37.249	115.009	0.5	-0.31	0.4	209	ADI	1.36	0.89		0.89		17.8	0.05	5	LOWER PAHRANAGAT LAKE
	9	3:42:24	37.337	116.363	2.1	9.01	1.4	267	BDI	1.46	1.26	1.52	1.18		14.1	0.08	8	DEAD HORSE FLAT
	11	3:54:29	37.290	116.413	0.5	-0.21	0.6	226	ADZ		1.35		1.16	1.3	11.6	0.06	16	SILENT BUTTE
	11	15:41:35	38.153	117.904	3.4	3.31•	—	318	CDA		1.91				49.4	0.20	8	ROCK HILL
	11	18:46:10	36.705	116.196	0.6	6.30	1.8	140	ACI	0.99	1.05		0.72		8.0	0.11	9	SPECTER RANGE NW
	12	0:30:31	35.934	116.918	0.8	6.95	0.7	288	ADI	1.28	1.38		1.10	1.2	5.6	0.05	7	WINGATE WASH
	12	1:45:34	37.288	116.403	0.3	5.65	1.0	90	ABZ	1.64	1.53		1.29		10.8	0.09	25	SILENT BUTTE
	12	10:38: 6	37.559	115.743	0.7	0.55	1.5	97	BBZ	1.17	1.29		1.24		9.6	0.17	11	TEMPIUTE MTN
	12	22:18:49	38.349	117.325	2.6	2.12	3.4	249	CDI	2.07	2.03		2.35		72.2	0.19	13	SAN ANTONIA RANCH
	13	0:25:58	38.943	116.840	6.5	5.96	3.3+	283	DDI		1.75				139.2	0.16	9	•••QUAD. NOT LISTED•
	14	0:40:18	36.863	117.776	0.6	7.00	4.2	245	BDI	1.28	1.34		1.72		33.8	0.08	13	WAUCOBA WASH
	14	3:37:44	37.048	116.466	0.2	9.27	0.7	100	ABI		1.08		0.80	0.9	7.2	0.05	14	TIMBER MTN
	14	8:35: 6	37.427	116.419	0.2	0.96	0.3	57	ACZ	1.86	1.64		1.65		24.6	0.08	28	SILENT CANYON NW
	15	0:13:49	37.442	115.312	0.5	0.00••	1.0	94	ACZ	1.83	2.04		2.03	1.9	23.5	0.09	12	HANCOCK SUMMIT
	15	9:51:50	37.595	114.740	2.0	4.31	2.0	226	DDA		1.68				1.2	0.51	5	CHOKECHERRY MTN
	16	5:19:53	37.466	117.574	0.4	1.49	1.8	80	ABI		1.63	1.25	1.87		7.2	0.13	16	MAGRUDER MTN
	17	0: 9:45	37.512	115.108	0.3	4.38	2.7	133	BCZ	1.62	1.64		1.49		12.8	0.05	9	HIKO SE
	17	1: 3:29	37.200	117.399	0.2	-0.18	0.3	111	ACZ		1.41	1.21	1.17		16.8	0.03	10	UBEHEBE CRATER
	17	15:56:19	37.252	115.041	0.6	0.39	0.4	200	ADZ	1.75	1.62	1.77	1.26		15.9	0.06	10	ALAMO SE
	18	22:56:26	38.762	117.108	2.2	3.66	1.3	276	BDI		2.21		2.30		120.3	0.07	8	•••QUAD. NOT LISTED•
	19	9:21:11	36.970	117.517	0.5	1.45	1.3	174	ACZ	1.50	1.42	0.92	1.25		15.5	0.10	11	DRY MTN
	19	18:24:16	37.178	117.242	0.2	9.74	0.4	120	ABI		1.11	1.24	1.10		13.7	0.03	7	BONNIE CLAIRE NW
	19	20:28:24	37.290	116.406	1.2	4.58	3.6	174	BCZ		1.39	1.43			11.2	0.15	10	SILENT BUTTE
	20	4: 9:19	36.771	115.816	0.5	6.24	0.9	173	ACA		1.62				8.6	0.08	15	FRENCHMAN LAKE SE
	20	10: 2: 6	36.717	115.931	0.9	6.84	1.4	228	ADA		1.13				6.8	0.10	11	MERCURY
	20	23:39:11	36.852	115.940	0.3	9.74	0.6	195	ADZ		1.40		0.87		13.5	0.05	14	FRENCHMAN FLAT
	20	23:51:55	37.153	117.395	0.3	2.91	2.2	110	BCZ	1.52	1.44		1.19		17.6	0.08	16	UBEHEBE CRATER
	21	0:55: 5	36.442	116.996	0.4	12.16	0.7	117	ABI	1.79	1.55		1.66		10.8	0.10	23	FURNACE CREEK
	21	12:54:30	36.778	116.254	0.3	4.62	1.9	89	ACA		2.23				11.1	0.08	15	JACKASSFFLATS
	21	13:34:30	36.772	116.257	0.6	0.60	0.6	74	BAA		1.26				3.6	0.18	19	JACKASSFFLATS
	21	13:35:11	36.772	116.262	0.7	2.80	1.4	72	AAA		1.22				3.4	0.12	9	JACKASSFFLATS
	21	22:24:41	37.149	117.821	0.5	5.46	2.0	234	BDI	1.59	1.39		1.27		18.1	0.08	13	WAUCOBA SPRING
	21	23: 1:40	36.773	116.248	0.3	1.32	0.9	58	AAZ	2.16	2.12	2.63			4.0	0.11	30	SKULL MTN
	22	11:10:38	37.255	114.991	2.7	10.36	4.5	211	CDI		1.22	1.48	0.97		17.7	0.11	6	DELAMAR LAKE
	22	13: 4:48	37.472	117.260	0.3	0.80	0.4	133	ACZ	1.12	1.46	1.53	1.39		19.0	0.06	10	MOUNT JACKSON
	22	13:27: 3	37.473	117.253	0.2	0.55	0.3	91	ACZ	1.16	1.33	1.55	1.59		19.1	0.05	15	MOUNT JACKSON
	22	13:27:40	37.473	117.254	0.2	0.56	0.4	91	ACZ		1.66	1.60	1.48		19.2	0.05	12	MOUNT JACKSON
	22	14:47:22	37.473	117.253	0.2	0.72	0.4	91	ACZ	1.22	1.62		1.24		19.1	0.05	12	MOUNT JACKSON
	22	20:47:41	37.269	116.374	0.5	5.76	0.7	188	ADZ	1.06	1.32		1.05		7.6	0.08	16	DEAD HORSE FLAT

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1989 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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JUL 23	2:30:38	37.552	116.071	0.8	1.80	6.0	105	CCZ		1.56		1.85		25.4	0.17	11	BELTED PEAK
23	21:50:60	36.546	116.357	0.2	9.79	0.9	96	ABI	1.37	1.36		0.97		11.2	0.06	17	LATHROP WELLS SE
24	15: 2:37	37.294	116.407	2.5	-1.30	1.2	231	CDU				1.16		11.5	0.05	5	SILENT BUTTE
24	16: 0:57	37.253	116.649	0.3	0.26	0.2	112	ABZ	1.36	1.54		0.87		4.4	0.05	11	BLACK MTN SW
24	20: 4:55	37.010	117.539	0.6	8.81	2.6	172	BCI		1.33	0.90	1.34		17.2	0.06	6	LAST CHANCE RANGE
25	12:32:39	37.231	117.603	0.4	7.54	0.5	134	ABZ	1.10	1.32	1.11	1.34		3.8	0.07	13	LAST CHANCE RANGE
26	0:52:31	37.250	115.032	0.9	-0.56	1.0	203	ADZ	1.72	1.51		1.39		16.5	0.07	8	ALAMO SE
27	3:23:15	36.700	116.306	0.6	8.82	0.7	151	ACZ	1.17	1.11		0.59		6.8	0.08	14	STRIPED HILLS
27	4:16:39	37.023	116.379	0.8	10.84	1.4	116	ABZ				0.91		1.5	0.03	6	TIMBER MTN
27	4:16:40	37.017	116.375	0.2	10.62	0.3	72	AAI	1.78	1.18		1.26	1.5	2.2	0.06	25	TIMBER MTN
27	11:46:53	36.650	117.157	0.5	7.32	1.4	98	ABZ	1.13	1.36		1.05		10.8	0.08	13	STOVEPIPE WELLS
27	13:56:50	37.233	116.065	0.5	7.07	0.9	77	AAI		1.41		1.23		5.7	0.12	11	OAK SPRING
29	3:32:55	36.695	116.296	0.2	0.13	0.2	154	ACZ		1.10		0.54		6.8	0.04	11	STRIPED HILLS
29	11: 1:29	37.280	115.307	—	0.00••	—	279	ADZ		1.14		1.20		16.3	0.01	3	BADGER SPRING
29	20:38:39	37.206	117.333	0.3	6.33	0.9	66	ABI	2.12	1.88	2.32	2.35		12.5	0.07	19	UBEHEBE CRATER
29	23:36:31	36.668	116.408	0.4	6.65	0.8	131	ABI	1.35	1.08		1.05		6.6	0.07	13	LATHROP WELLS NW
30	8:10:26	37.191	117.795	0.6	0.68	0.7	196	ADI	1.36	1.56		1.52		13.9	0.09	13	WAUCOBA SPRING
AUG 1	9:15:52	37.828	115.156	1.2	4.15	5.2	199	COZ				1.03		9.7	0.08	7	SEAMAN WASH
3	16:45:24	37.421	116.580	0.4	-0.35	12.0	132	CCA		1.89				15.4	0.09	6	BLACK MTN NE
3	18:44:44	37.262	117.585	0.7	10.42	1.2	157	ACZ		1.27		1.11		6.4	0.08	8	MAGRUDER MTN
3	18:45:17	37.284	117.568	0.3	-1.41	0.3	83	ABZ	1.24	1.53		1.63		9.0	0.04	10	MAGRUDER MTN
3	19:11:47	37.006	115.968	0.3	6.14	0.9	132	ABZ	1.61	1.66		1.56	1.7	11.2	0.10	21	PAIUTE RIDGE
3	21: 8: 2	36.773	116.261	0.4	1.82	0.9	73	AAZ	1.33	1.23		1.33	1.2	3.5	0.11	17	JACKASS FLATS
4	2:12:50	36.772	116.261	0.4	3.74	0.8+	69	AAI	0.87	1.00	0.71	0.96		3.5	0.12	19	JACKASS FLATS
4	4: 5:21	36.777	115.644	0.3	-1.23	0.8	131	ACZ	1.54	1.43	1.20	1.38		17.5	0.08	18	QUARTZ PEAK SW
4	5:50: 5	36.771	116.264	0.4	3.84	0.8	72	AAI	1.22	1.12		0.42		3.2	0.12	15	JACKASS FLATS
4	9:26: 3	36.770	116.258	0.4	2.31	0.7	88	AAZ	1.04	1.04		0.82		3.3	0.11	13	JACKASS FLATS
4	19: 5: 6	37.202	116.724	4.8	7.00•	—	127	DBI				0.70		12.4	0.76	9	THIRSTY CANYON NW
4	23:16:22	37.005	115.958	0.5	0.60	0.7	156	ACZ				0.63		22.2	0.12	12	PAIUTE RIDGE
4	23:51:43	36.776	116.260	0.5	6.24	1.2	116	ABI				0.60		3.9	0.10	12	JACKASS FLATS
5	2:39:10	37.243	115.025	5.2	4.84•	—	208	DOZ	1.56		1.40	1.18		16.6	0.14	6	LOWER PAHRANAGAT LAKE
6	10:10:33	36.769	116.262	0.4	3.69	1.7	118	ABZ		1.10		0.26		3.0	0.08	10	JACKASS FLATS
6	22:26:38	36.775	116.252	0.5	1.48	1.6	76	AAZ				0.63		4.0	0.09	13	JACKASS FLATS
7	3:17: 0	37.275	116.462	2.0	8.29	2.8	300	BOA		1.43				14.0	0.06	8	SILENT BUTTE
7	7:39:51	37.297	116.510	1.9	3.10•	—	346	CDA		1.39				31.1	0.07	7	TRAIL RIDGE
7	7:43:16	37.037	116.389	1.7	2.42	0.5	300	DDA		1.40				0.2	1.31	7	TIMBER MTN
7	8:48:15	37.165	116.394	2.1	2.07	6.6	143	CCA		1.68				8.3	0.19	8	SCRUGHAM PEAK
7	15:22:19	37.311	116.494	0.8	4.95	2.5	225	BOZ				0.56		13.2	0.10	11	SILENT BUTTE
8	15:53: 8	37.262	115.071	2.5	9.02	2.4	187	BOZ			1.44	0.60		14.6	0.04	6	ALAMO SE
9	6:14:14	37.457	114.586	0.8	9.68	1.7	301	ADI			1.38	1.46		21.3	0.03	6	ELIGN NE
10	13:21:49	37.259	115.047	4.0	6.33	8.5	196	CDZ		1.08	1.05	0.96		15.9	0.09	5	ALAMO SE
10	14: 6:33	35.721	117.648	2.1	2.06	4.8	309	BOI				1.82		75.5	0.19	11	RIDGECREST
11	4:32:46	37.150	117.820	0.6	5.87	1.7	210	ADI		1.74	1.57	1.34		17.9	0.09	14	WAUCOBA SPRING
11	5:17: 9	37.303	116.448	0.2	1.33	0.7	139	ACZ	1.82	1.32		1.17	1.3	14.8	0.07	21	SILENT BUTTE

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1989 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)	QCD 12S	MAGNITUDE ESTIMATES Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
AUG 11	5:35:40	37.306	116.450	0.2	0.03	0.3	125	ACZ	1.59	1.42		1.22		15.2	0.05	14	SILENT BUTTE
11	10:41:10	37.672	114.872	—	3.88	—	158	ADI		0.94		0.84		6.1	0.00	4	PAHROC SPRING NE
11	18:21:15	36.489	116.604	0.6	7.59	1.5	184	ADZ		1.21		0.79		15.3	0.06	9	RYAN
11	19:26:45	37.259	115.071	2.1	11.42	1.9	189	BDZ			1.47	0.62		14.4	9.08	7	ALAMO SE
12	5:31: 2	36.449	115.746	0.4	12.63	1.4	175	ACI		1.02		0.75		20.2	0.07	7	CHARLESTON PEAK
12	17: 7: 5	37.942	115.339	0.5	3.13*	—	185	CDZ				1.06		22.7	0.05	7	
13	7:13:35	37.179	117.431	0.2	-0.56	0.2	110	ACZ		1.22	1.15	1.16		20.0	0.05	17	UBEHEBE CRATER
13	8: 4: 8	37.148	117.616	0.5	6.40	1.8++	224	ADI		1.62	1.54	1.30		17.7	0.10	16	WAUCOBA SPRING
14	8:14:22	37.306	114.541	1.2	0.74	1.1++	248	BDZ		1.60		1.52		37.5	0.09	11	ELGIN
15	7:53: 2	37.506	114.583	2.4	13.17	2.9	286	BDI		1.23		1.30		17.6	0.09	6	CALIENTE
16	2:52:23	37.237	114.848	2.3	4.52*	—	243	CDU			1.09	1.30		26.1	0.17	7	DELAMAR 3 NE
16	3:21:28	37.281	117.319	0.5	6.13	0.8	75	AAI		1.29		1.13	1.2	5.9	0.09	11	GOLD POINT
16	3:40:50	35.975	117.303	2.6	2.56	8.0	263	CDU	1.67		1.82	1.70		39.3	0.17	13	TRONA
16	3:44:27	35.984	117.294	1.8	0.68	1.5	260	BDZ	2.00			2.22		38.5	0.10	12	TRONA
16	6:18:50	36.825	116.266	0.5	0.31	0.9	94	ABZ				0.13		6.2	0.13	12	JACKASS FLATS
16	20:22:46	37.487	114.577	0.2	8.73	0.4	305	ADI		1.67		1.73	1.8	19.4	0.01	6	ELIGN NE
17	7: 9:59	36.309	116.776	5.7	7.00*	—	143	DCI				1.15		16.7	0.82	10	FURNACE CREEK
17	9:32:50	36.712	116.435	0.6	7.19	0.8	274	ADZ		0.82		0.52		8.5	0.05	11	LATHROP WELLS NW
17	10:48:33	37.496	114.574	1.2	9.99	2.2	286	BDI		1.43		1.52		19.0	0.07	7	ELIGN NE
18	6:59: 8	37.694	115.050	0.4	0.90	0.8	114	AC7		1.16		1.09		11.1	0.06	7	HIKO NE
18	7:48:49	37.076	116.941	0.3	1.72	0.7	96	ACZ		1.15		1.02		13.4	0.08	17	SPRINGDALE
18	11:11:29	37.496	114.590	0.3	8.30	0.6	280	ADI	2.02		2.24	2.00		17.9	0.03	12	ELIGN NE
18	12:33:31	37.537	115.687	0.8	0.60	1.1	94	BBZ		1.29		1.34		8.1	0.18	10	TEMPIUTE MTN
18	23:48:46	37.882	116.016	0.3	0.85	0.6	117	ACZ	2.18		2.32	2.32		15.3	0.12	21	REVEILLE PEAK
19	0: 0:47	37.878	116.018	0.6	5.06	4.5	116	BCI				1.69		15.0	0.11	9	REVEILLE PEAK
19	18:19:34	37.071	116.007	0.4	-1.79*	—	122	CCI	2.42		2.22			14.2	0.13	23	YUCCA FLAT
19	20:53:47	36.783	115.652	0.3	5.24	2.0	135	BCI	1.71	1.66		1.61		17.3	0.06	14	QUARTZ PEAK SW
19	21: 3:13	37.280	117.356	0.9	9.20	1.6	103	ABZ				1.22	1.3	9.1	0.11	7	GOLD POINT
19	23:12: 1	37.297	116.410	4.2	-1.53	1.6	232	CDI			1.18	0.96		12.0	0.09	6	SILENT BUTTE
20	8:22:28	37.300	115.307	0.4	7.50	3.0	131	BCI			1.61	1.17		18.1	0.05	9	BADGER SPRING
20	17:51:18	37.271	115.100	3.2	8.77	2.6	173	CCU			1.62	0.86		13.8	0.12	7	ALAMO SE
20	19:55:18	36.913	115.672	0.6	-1.83	1.0	162	BCZ	2.01			1.59	1.5	27.2	0.18	15	QUARTZ PEAK NW
20	23:21:43	37.148	117.807	0.5	6.22	0.9	279	ADI		1.42	1.36	1.10		17.1	0.03	8	WAUCOBA SPRING
21	6: 2: 6	37.720	115.020	0.8	0.10	0.9	162	ACZ				1.03		10.6	0.12	8	HIKO NE
21	6:55:52	37.496	114.601	—	7.04	—	301	ADZ				0.96		17.2	0.00	4	ELIGN NE
21	6:56: 2	37.506	114.601	0.5	9.15	1.2	282	ADI		1.55	1.57	1.97	1.8	16.4	0.03	6	CALIENTE
21	7: 2:44	37.499	114.568	2.3	11.37	3.3	288	BOI		1.32		1.34		19.1	0.08	6	ELIGN NE
21	7: 7:33	37.49C	114.574	2.1	10.81	3.2	287	BOI		1.54		1.47		18.7	0.08	6	ELIGN NE
21	15:30: 4	37.204	116.535	0.2	-0.54	0.3	94	ACZ	1.50	1.55		1.11		13.5	0.07	21	THIRSTY CANYON NE
21	16:17:45	37.096	115.958	1.0	30.29	0.8	66	BAZ				1.04		12.6	0.23	17	PAIUTE RIDGE
22	0:16: 5	37.191	117.371	0.2	-0.24	0.3	106	ACZ				1.40		15.8	0.03	11	UBEHEBE CRATER
22	1:52:32	36.765	116.266	0.5	4.28	0.7	80	AAI		1.11		0.49		2.5	0.10	12	JACKASS FLATS
22	9:18: 9	37.497	114.588	0.3	9.13	0.9	304	ADI				1.16		17.9	0.01	5	ELIGN NE
22	15:21:57	36.877	116.241	0.6	2.46	1.1	147	ACZ		1.35		0.74		5.7	0.11	10	MINE MTN

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1989 LOCAL HYPOCENTER SUMMARY - SGB EARTHQUAKES

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AUG 22	15:54:33	38.362	116.497	4.3	6.17•	—	284	CDI		1.99		2.26		69.5	0.15	8	TYBO
22	15:54:44	37.744	116.383	4.2	0.00••	3.1	177	DCZ		1.86		1.42		0.2	4.56	8	QUARTZITE MTN
23	3:40:58	37.007	117.862	0.6	5.03	6.1	196	CDI		1.47	1.74	1.57		25.1	0.11	14	LAST CHANCE RANGE
23	4: 6:31	35.800	116.567	1.7	3.93	2.3	267	BDI				1.48		43.8	0.17	12	CONFIDENCE HILLS
23	4: 6:36	36.113	116.482	4.3	9.76	5.6	209	DDI				1.22		18.8	0.99	12	EAGLE MTN
23	11:50:23	37.142	117.821	0.6	5.65	1.9	211	ADI	1.35	1.65	1.61	1.53		18.5	0.09	17	WAUCOBA SPRING
23	14:51: 5	37.814	115.525	0.1	2.89	0.7	143	ADZ		1.39		1.32		19.5	0.01	5	WORTHINGTON MTNS
23	17:15:39	36.450	117.044	0.6	17.63	1.1	97	ABI	1.85	1.76		1.83		8.1	0.13	21	EMIGRANT CANYON
24	7:55:54	37.346	115.603	0.9	0.21	2.5	164	BCZ				1.49		15.1	0.12	7	GROOM RANGE SE
24	20: 3:45	36.718	116.124	0.4	-1.16	0.8	128	ACZ				0.93		13.5	0.08	11	CAMP DESERT ROCK
25	21:13: 6	37.525	117.223	0.7	0.26	1.2	108	ACZ				0.98		24.2	0.13	8	GOLDFIELD
26	21: 7:47	37.892	118.011	10.5	-1.02	9.8	301	DDZ		1.66		1.55		26.9	0.11	5	•••QUAD. NOT LISTED•
27	6: 4: 1	37.228	116.517	0.3	2.40	0.7	108	ACZ	1.72	1.54		1.53	1.5	13.0	0.07	22	THIRSTY CANYON NE
27	17:22: 1	37.022	116.429	0.2	6.90	0.4	100	ABZ		1.37		0.65		4.0	0.04	17	TIMBER MTN
27	18:47:46	36.873	117.320	0.4	10.80	0.7	95	ABI		1.24		1.24		10.7	0.11	19	TIN MTN
28	6:12:59	36.573	115.631	0.4	0.98	0.6	123	ACZ		2.00		2.02		21.0	0.10	18	INDIAN SPRINGS
28	13:14:34	36.755	115.951	0.3	0.90	0.9	125	ACZ		1.14		1.05		10.5	0.07	13	FRENCHMAN FLAT
28	15:47:59	37.328	117.238	0.3	5.00	0.3	69	AAI		1.44		1.55		3.5	0.08	21	SCOTTYS JUNCTION SW
29	0:24:57	36.756	115.952	0.3	0.30	0.7	125	ACZ		2.03		1.28		10.6	0.07	16	FRENCHMAN FLAT
29	8: 6:57	36.617	117.898	2.7	11.60•	—	292	CDI				1.48		48.8	0.08	5	NEW YORK BUTTE
29	16:29:56	37.288	114.801	0.9	8.96	3.1	240	BDU	1.83		2.02	1.94		25.8	0.08	10	GREGERSON BASIN
29	17:30:12	36.936	116.885	0.5	-1.81	1.7	115	ACU	1.12			1.19		14.3	0.12	13	BULLFROG
30	7:41:51	36.991	115.273	1.6	2.82•	—	196	CDA		2.15				50.2	0.22	17	BURRO BASIN
30	16:37: 9	36.451	114.509	0.9	7.00	0.6	225	ADI	2.16		2.78	2.10		58.6	0.07	10	MUDDY PEAK
30	17:17:11	36.188	116.536	5.2	11.93•	—	168	DCI				0.99		12.1	1.38	6	FUNERAL PEAK
30	18:21:24	37.102	116.162	0.3	5.58	1.3†	140	ACI	1.53			1.21		9.3	0.07	11	TIPPIPAH SPRING
30	20:40:49	37.144	116.180	0.9	2.54	1.7	150	ACZ				0.98		12.6	0.10	9	RAINIER MESA
31	12:43:60	36.564	115.597	1.8	-1.02	1.6	231	BDZ				1.44		23.9	0.13	11	INDIAN SPRINGS SE
31	17:30:55	35.706	118.024	2.4	5.04	2.5	297	BDU				2.77		108.4	0.20	19	•••QUAD. NOT LISTED•
SEP 1	2: 4:14	36.206	115.403	0.4	-1.79	0.5	144	ACZ	1.97	1.84		1.79		20.8	0.12	19	LA MADRE MTN
1	3: 0:34	37.246	115.023	1.5	1.50	2.6	207	BDZ			1.66			17.0	0.07	7	LOWER PAHRANAGAT LAKE
2	4:11: 1	37.248	115.025	1.1	6.37	2.4	206	BDZ	1.71			1.42		16.8	0.05	8	LOWER PAHRANAGAT LAKE
2	4:13:41	37.247	115.018	1.0	4.44	3.8	208	BDZ	1.87			1.54		17.4	0.04	9	LOWER PAHRANAGAT LAKE
2	4:57:34	37.254	115.052	1.7	10.15	1.9	196	BDZ	1.74		1.61			15.3	0.05	6	ALAMO SE
2	4:58: 3	36.701	115.576	2.7	-0.15	2.5	240	CDI				1.44		21.0	0.13	8	HEAVENS WELL
2	5:10:44	37.245	115.029	3.4	5.61•	—	206	CDU			1.83	0.99		16.4	0.07	5	LOWER PAHRANAGAT LAKE
2	5:16:38	37.254	115.040	3.4	6.12	6.9	200	CDU			1.44			16.2	0.08	5	ALAMO SE
2	8:27:20	37.220	114.985	1.5	12.33	2.3	225	BDI				1.27		18.9	0.06	6	DELAMAR 3 NW
3	0:36: 8	36.452	115.846	0.4	0.00••	0.7	95	ACZ		1.36		1.38		23.2	0.09	16	MT STIRLING
3	9:10: 2	36.401	116.329	0.3	7.36	0.9	90	ABI		1.41		1.50		13.2	0.05	11	ASH MEADOWS
3	10: 4:28	37.693	115.139	0.6	1.09	2.4	114	BCZ	1.70		1.89			12.4	0.09	9	FOSSIL PEAK
3	14:57:28	38.665	116.461	2.8	-1.02	2.5	268	CDZ				2.29		48.0	0.10	8	•••QUAD. NOT LISTED•
4	21:20:46	36.032	115.008	9.2	11.95•	—	320	DOI				1.65		61.2	0.22	5	LAS VEGAS SE
5	20:12:27	37.235	114.908	0.3	-0.64	1.2	175	ACI	2.75			2.39		22.9	0.07	16	DELAMAR 3 NW

91051 2989

1989 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)	QQQ 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
SEP 5	22:58:21	37.261	114.973	—	8.34	—	213	ADI				0.95	1.4	17.6	0.02	4	DELAMAR LAKE
6	7:30:25	37.024	115.571	0.0	1.78	4.7	145	BCZ		1.61		1.66		37.7	0.15	13	SOUTHEASTERN MINE
6	18:13:21	37.206	116.447	0.3	8.44	0.6	146	ACZ		1.32		1.14		10.9	0.05	13	SCRUGHAM PEAK
6	18:19:47	37.190	116.455	0.2	0.32	0.4	102	ACZ				1.92		11.9	0.07	15	SCRUGHAM PEAK
6	18:54: 9	37.203	116.442	0.7	10.02	1.3	145	ACI		1.33	1.30	0.99		10.5	0.10	11	SCRUGHAM PEAK
7	5:22:26	37.233	114.928	1.0	-0.68	1.0	230	ADZ	1.70			1.46	1.8	22.1	0.05	7	DELAMAR 3 NW
7	11: 0:40	37.071	116.201	0.3	9.01	0.6	91	ABZ		1.02		0.82		4.4	0.07	14	TIPPIPAH SPRING
8	3:29:18	37.227	114.937	0.5	-0.48	0.5	236	ADI	1.61		1.72	1.29		23.6	0.02	5	DELAMAR 3 NW
8	15:48:39	36.745	116.047	0.6	0.61	0.6	147	ACZ		0.99		0.86		12.1	0.06	9	CAMP DESERT ROCK
8	21: 7: 5	37.511	116.530	0.2	-0.42	0.6	74	ACZ	2.23	2.28	2.19	1.96		23.7	0.08	26	MELLAN
9	0: 1: 9	38.178	116.089	0.4	2.67	2.3	195	BDZ		1.73		1.58		31.1	0.06	9	ECHO CANYON
9	8:34:43	36.747	116.040	0.5	0.96	0.7	188	ADZ				0.52		11.9	0.06	10	CAMP DESERT ROCK
9	13: 5:17	37.271	114.571	1.1	14.45	3.1	280	BDI		1.45		1.40		40.0	0.03	6	ELGIN
9	18: 3:19	36.938	116.757	0.3	0.21	0.4	162	ACZ				0.56		22.3	0.05	10	BULLFROG
9	20:55:52	37.126	117.529	0.5	9.52	1.4	187	ADI		1.04	1.16	1.15		15.7	0.08	9	LAST CHANCE RANGE
9	23:53:43	37.264	114.539	0.9	9.67	2.8++	284	BDI	1.84	1.82		2.04		41.9	0.05	12	ELGIN
10	5:58:11	36.023	114.772	6.8	0.22*	—	224	DDI	1.84			1.79		11.3	0.06	8	BOULDER BEACH
12	3:17:28	37.333	118.263	6.0	2.21*	—	294	DDI		1.91		1.96		33.2	0.16	9	***QUAD. NOT LISTED*
12	12:24:55	37.359	114.867	0.3	5.86	1.3	211	ADI			0.91	1.00		17.1	0.02	7	GREGERSON BASIN
12	22:30:42	36.743	117.586	1.5	5.32	8.4	223	CDI		1.27		1.36		17.5	0.18	10	UBHEBE PEAK
13	3: 5:28	37.246	116.360	0.6	0.15	0.4	178	ACI	1.10			1.00		4.8	0.08	10	AMMONIA TANKS
13	11:53:46	38.440	115.388	1.3	-0.77	7.4	296	DDU	1.91			1.80		53.9	0.13	7	FOREST HOME
14	16: 7: 8	36.648	116.340	0.4	4.38	0.4	104	ABZ				0.89		0.3	0.09	16	STRIPED HILLS
15	9:44: 5	36.454	116.988	0.6	12.89	1.1	73	BAI	1.86	1.44		1.32		12.2	0.16	19	FURNACE CREEK
16	11: 5:32	37.241	115.621	0.4	-1.88	0.6	145	ACZ	1.64	1.76		1.62		16.9	0.08	10	FALLOUT HILLS NE
16	17:12:38	37.191	118.258	2.9	2.97	10.1	285	CDI		2.04		2.06		40.5	0.12	11	***QUAD. NOT LISTED*
16	18:51:43	36.590	117.094	0.3	10.05	1.3++	109	ABI	1.74	1.72		1.83	1.8	17.6	0.11	21	STOVEPIPE WELLS
17	1:26:54	36.424	117.217	0.4	6.36	0.4	199	ADZ				1.40		10.9	0.06	15	EMIGRANT CANYON
17	21:35:27	38.399	116.198	2.2	-1.23*	—	258	CDZ	2.49					27.8	0.13	7	***QUAD. NOT LISTED*
18	1:37: 7	38.379	116.203	0.9	3.24*	—	244	CDI	2.34			2.61		26.1	0.11	15	***QUAD. NOT LISTED*
18	9:17:60	37.176	117.377	0.4	7.56	1.4	113	ACI		1.21		0.96		17.5	0.08	10	UBEHEBE CRATER
18	9:28:14	35.787	117.130	3.5	-1.02	2.8	312	CDZ	1.73	1.77		1.91		30.8	0.04	10	MANLY PEAK
18	19:43: 4	37.010	115.129	4.2	4.00*	—	161	CDU				1.14		18.3	0.11	5	LOWER PAHRANAGAT LAKE
18	22:10:53	35.591	117.606	6.5	5.91	2.3	302	DDI			2.84			78.6	0.15	15	RIDGECREST
19	12:28:10	37.250	117.634	0.5	1.44	0.8	99	ABZ	1.99			2.20	2.2	2.2	0.12	15	MAGRUDER MTN
20	0:42:52	37.285	117.572	0.3	-1.26	0.3	81	ABZ				1.32		8.8	0.07	14	MAGRUDER MTN
21	6:59:58	37.315	115.034	2.6	11.01	2.9	181	CDI	1.94			1.56		10.2	0.08	5	ALAMO SE
21	11:36:44	37.419	114.320	0.5	3.22*	—	330	CDI				1.29		42.4	0.02	5	***QUAD. NOT LISTED*
21	12:15:20	36.621	116.250	0.5	4.53	1.3	156	ACZ				0.71		8.5	0.08	14	LATHROP WELLS SE
21	15:11: 0	37.324	115.201	0.4	0.07	0.6	120	ACZ	1.75		1.82	1.34		16.1	0.06	8	ALAMO
21	21:17: 8	36.996	117.863	1.5	1.02	5.1	229	CDZ				1.35		32.6	0.12	9	WAUCOBA WASH
21	23:30:13	37.149	117.396	0.6	1.68	1.9	127	BCI		1.33	0.63	1.14		17.3	0.17	10	UBEHEBE CRATER
22	5:29:48	36.483	116.307	0.1	8.95	0.7	133	ABI				0.41		17.8	0.01	6	ASH MEADOWS
22	7:12: 4	37.065	116.950	0.1	-0.14	0.2	112	ACZ		1.60	1.21	1.23		11.9	0.03	10	SPRINGDALE

1989 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 22	14:45:18	37.150	117.821	0.7	6.06	2.1	210	BDI		1.59	1.66	1.50		18.0	0.07	11	WAUCOBA SPRING
22	17:43:50	36.478	116.582	0.4	-0.71	1.0	84	ACZ				1.29		13.1	0.10	13	RYAN
23	4: 0:58	37.242	115.014	0.4	0.96	0.4	211	ADZ	1.46			1.26	1.8	17.5	0.03	8	LOWER PAHRANAGAT LAKE
23	10:40:49	37.306	115.378	0.8	-0.56	1.6	77	BCZ	1.79			1.67	2.0	22.8	0.20	12	CUTLER RESERVOIR
23	20:41:25	36.621	116.222	0.2	-0.01	0.4	73	ACZ	1.39			1.11		10.9	0.07	15	SPECTER RANGE SW
23	20:43:11	36.621	116.220	0.5	-0.85	0.8	131	ACZ		1.14		0.65		11.0	0.09	9	SPECTER RANGE SW
24	4:46:44	37.225	117.546	0.3	11.37	0.4	130	ABI		1.20	1.30	1.30	1.5	8.9	0.06	15	LAST CHANCE RANGE
24	6:34:31	37.434	115.322	0.8	1.20	2.9	145	BCZ			1.41	1.16		24.2	0.09	8	HANCOCK SUMMIT
24	10:41:27	37.221	117.548	0.5	11.83	0.7	135	ABI		1.33	0.84	1.00		8.8	0.08	11	LAST CHANCE RANGE
24	12:34:17	37.267	115.189	0.8	11.12	1.4	133	ABI			1.44	1.65		10.9	0.10	8	ALAMO
25	4:27: 3	36.859	116.731	0.3	1.80	1.1	106	ACZ	1.49	1.43		0.85		11.6	0.08	17	BARE MTN
25	10: 0:39	37.224	117.544	0.3	11.30	0.5	131	ABI		1.52	1.66	1.50	1.6	9.2	0.07	16	LAST CHANCE RANGE
26	16:26:19	37.228	117.545	0.3	11.63	0.3	128	ABZ			0.81	1.04		9.0	0.03	7	LAST CHANCE RANGE
27	1:18:34	37.561	115.852	0.4	2.15	1.8	95	ACI				1.32		18.4	0.05	7	WHITE BLOTCH SPRINGS
27	7:15:21	37.019	116.001	0.2	4.10	1.7	159	ACZ				0.85		10.7	0.04	11	YUCCA FLAT
27	7:15:23	37.017	116.006	0.3	0.68	0.4	144	ACZ	1.75			1.27		10.3	0.07	16	YUCCA FLAT
27	7:16: 8	37.016	116.007	0.2	4.55	1.5	123	ACZ	1.97			1.73		10.2	0.09	22	YUCCA FLAT
27	7:16:48	37.017	116.007	0.3	5.84	0.8	123	ABZ				1.40		10.3	0.07	15	YUCCA FLAT
27	7:17:55	37.018	116.001	0.3	5.33	1.2	159	ACZ				0.81		10.6	0.07	14	YUCCA FLAT
27	7:18:23	37.020	116.002	0.2	6.03	0.6	159	ACZ				0.91		10.8	0.04	12	YUCCA FLAT
27	7:21: 3	37.016	116.005	0.3	5.72	0.9	124	ABZ				1.16		10.3	0.08	16	YUCCA FLAT
27	7:23: 8	37.017	116.001	0.3	5.96	0.9	125	ABZ				0.92		10.5	0.08	16	YUCCA FLAT
27	7:23:52	37.018	116.003	0.3	4.62	1.2	124	ACZ				0.91		10.6	0.07	16	YUCCA FLAT
27	7:34:11	37.022	116.002	0.2	5.93	0.7	159	ACI				0.53		11.0	0.04	10	YUCCA FLAT
27	7:34:13	37.019	116.002	0.2	6.22	0.5	179	ACZ				0.88		10.7	0.03	9	YUCCA FLAT
27	7:38:34	37.021	115.996	0.2	5.51	0.6	161	ACZ				0.68		11.1	0.04	12	PAIUTE RIDGE
27	7:38:39	37.015	116.005	0.2	4.96	1.0	124	ACZ	1.75			1.69		10.2	0.08	26	YUCCA FLAT
27	7:57:12	37.016	116.005	0.3	5.64	1.1	124	ABZ				0.88		10.2	0.08	17	YUCCA FLAT
27	7:57:20	37.019	116.004	0.3	6.11	0.8	158	ACZ		1.28		1.29		10.6	0.06	11	YUCCA FLAT
27	16:38:43	36.897	117.479	2.7	-1.42*	—	189	CDA		1.85				12.2	0.13	5	TIN MTN
28	16:39:54	37.178	115.204	—	0.00**	—	148	ADZ			1.20	1.13		1.8	0.00	3	LOWER PAHRANAGAT LAKE
29	8: 0:14	36.891	117.430	0.7	-0.88	0.6	166	ACI				1.45		9.9	0.10	10	TIN MTN
29	8:16:35	37.574	115.849	0.2	4.33	3.1	99	BCI		1.48		1.53		17.8	0.06	11	WHITE BLOTCH SPRINGS
30	2:37:55	37.739	114.967	0.4	1.89	0.6	230	ADZ				1.04		10.1	0.04	7	PAHROC SPRING
30	14:44:53	37.148	117.390	0.3	-1.02	0.5	126	ACZ	1.74	1.92		1.81		17.0	0.08	19	UBEHEBE CRATER
OCT 1	19:40:45	35.927	116.639	1.7	1.26	4.3	218	BDZ				1.19		21.1	0.15	12	CONFIDENCE HILLS
1	20:43:24	37.004	115.972	0.3	5.89	1.2	132	ABZ	1.91	1.67		1.64		10.8	0.10	27	PAIUTE RIDGE
1	21:59:26	37.005	115.973	0.3	6.18	1.0	131	ABZ				1.13		10.9	0.08	18	PAIUTE RIDGE
1	21:59:42	37.007	115.971	0.5	6.01	1.5	153	ACZ				1.36		11.1	0.08	10	PAIUTE RIDGE
2	2:59: 5	37.006	115.967	0.4	6.18	1.4	133	ABZ		0.99		0.81		11.2	0.09	15	PAIUTE RIDGE
2	21:15:59	37.005	115.970	0.3	6.46	1.1	132	ABZ		1.60		1.09		11.0	0.08	16	PAIUTE RIDGE
3	2:31:58	37.876	116.128	0.9	0.00**	1.7	110	BCZ				1.97		21.0	0.17	9	REVEILLE PEAK
3	6:23:21	37.148	118.246	2.5	2.63	8.8	269	CDI	2.46				2.8	43.0	0.13	12	***QUAD. NOT LISTED*
3	9:31:46	37.141	116.289	0.3	2.31	0.7	63	ABZ	1.85		1.62	2.00	2.2	8.7	0.11	26	AMMONIA TANKS

91031 2991

1989 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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
OCT	3	15:56:52	37.295	115.052	0.6	-0.73	0.4	182	ADZ			1.53	0.95		12.4	0.03	6	ALAMO SE
	3	16:19:15	37.138	117.840	0.9	2.44	4.0	216	BDI		1.61	1.43	1.51		20.1	0.12	11	WAUCOBA SPRING
	3	22:49:33	38.188	116.026	0.5	3.50	2.2	203	BDZ	2.05			2.21		36.3	0.06	10	ECHO CANYON
	4	8:47:43	37.574	117.686	0.3	0.99	0.5	97	ACZ				1.38		18.7	0.07	9	LIDA WASH
	4	9:37:58	38.201	116.031	0.3	3.63	1.1	207	ADZ	1.76			2.19	2.1	35.7	0.05	12	ECHO CANYON
	4	16:54:46	38.176	116.031	0.4	2.70	1.9	199	ADZ				1.59		36.1	0.05	9	ECHO CANYON
	5	11:31:22	37.576	117.686	0.3	1.00	0.5	97	ACA		1.53				18.5	0.11	13	LIDA WASH
	5	14: 2:24	36.854	115.939	0.2	8.44	0.5	197	ADZ				1.16		13.5	0.03	13	FRENCHMAN FLAT
	5	20:40:47	38.505	116.351	2.6	4.18•	—	256	CDI				2.87	2.9	84.7	0.16	13	•••QUAD. NOT LISTED•
	6	11:11: 7	37.877	116.026	1.6	8.44	4.8	189	BDA		1.72				15.3	0.22	8	REVEILLE PEAK
	6	11:16:59	37.867	116.023	0.7	9.22	2.0	185	BDA		1.59				14.1	0.14	8	REVEILLE PEAK
	7	16:28:29	37.208	116.300	0.3	2.62	0.3	99	ABI	1.62		1.30	1.63	1.2	2.2	0.08	17	AMMONIA TANKS
	8	12:44:45	37.066	116.212	0.5	5.66	0.8	84	AAI	1.32			1.25	1.0	3.5	0.11	14	TIPPIPAH SPRING
	9	15:21:17	36.766	116.118	0.4	6.71	0.9	131	ABZ				1.14		10.8	0.08	13	CANE SPRING
	9	19:50:47	36.828	116.262	0.3	3.59	1.3	115	ABZ				0.20		6.3	0.05	8	JACKASS FLATS
	9	19:50:48	36.826	116.266	0.3	3.76	1.2++	53	ABI	1.59			1.17		6.1	0.09	19	JACKASS FLATS
	10	15:25:38	37.160	116.603	0.2	2.09	0.5	62	ACZ	1.98		1.79	2.00		11.0	0.06	26	THIRSTY CANYON NE
	10	15:29:22	37.154	116.609	0.4	-0.46	0.4	192	ADZ				0.68		26.2	0.07	12	THIRSTY CANYON NE
	10	16:25:11	37.162	116.612	0.3	6.31	0.9	90	ABZ	1.48	1.61		1.13		10.2	0.06	19	THIRSTY CANYON NE
	10	19:30:41	36.754	116.262	0.4	4.89	0.4	133	ABZ				0.13		1.6	0.07	12	JACKASS FLATS
	10	19:36:34	36.828	116.267	0.3	4.26	0.8	96	ABZ		1.33		1.22		6.0	0.10	17	JACKASS FLATS
	10	19:39:52	36.827	116.262	0.3	0.14	0.3	63	ABZ	2.36		2.76	2.25	2.4	6.3	0.12	30	JACKASS FLATS
	10	20: 0: 9	36.828	116.262	0.3	4.00	1.0	63	ABI	1.65		2 14	1.39		6.3	0.10	16	JACKASS FLATS
	11	0:49:38	36.348	117.436	0.6	1.06	2.1	233	BDZ		1.69		1.45		30.5	0.06	13	PANAMINT BUTTE
	11	14:25:53	36.829	116.269	0.6	3.47	1.6	109	ABZ				0.63		5.7	0.11	9	JACKASS FLATS
	11	15:31:28	36.779	116.199	1.0	7.86	1.1	221	ADZ				0.39		7.7	0.09	7	SKULL MTN
	11	17:15:26	37.160	116.613	0.5	6.96	1.3	175	ACI				0.69		10.1	0.04	7	THIRSTY CANYON NE
	12	0:42:29	35.788	116.548	7.9	0.00•	—	292	DDZ				1.47		82.6	0.16	8	CONFIDENCE HILLS
	12	5:59: 7	36.700	116.289	0.3	4.90	0.9	73	AAA		1.74				4.9	0.09	19	STRIPED HILLS
	12	6:11:55	37.102	117.009	0.5	11.41	4.7	114	BCA		1.59				31.2	0.07	9	BONNIE CLAIRE SE
	12	7:14:47	36.689	115.831	2.8	0.65	2.4	149	CCA		1.50				2.0	0.41	8	MERCURY NE
	12	7:15:58	36.696	115.812	5.3	-1.00	4.0	195	DDA		1.40				0.2	0.24	8	MERCURY NE
	12	7:18:30	36.688	115.827	4.0	-0.65	5.1	157	CCA		1.34				1.7	0.31	7	MERCURY NE
	12	7:29: 2	36.684	115.825	2.2	-1.76	6.1	174	CCA		1.55				1.7	0.12	6	MERCURY NE
	12	16: 8:55	37.503	118.049	0.7	9.52	1.3	271	ADI				1.50		15.3	0.07	8	•••QUAD. NOT LISTED•
	12	18:25:33	36.414	116.980	0.7	14.36	1.1	90	BAI	2.14	1.82		1.65	2.0	11.1	0.15	21	FURNACE CREEK
	13	6:16:39	36.777	115.540	0.7	7.58	6.4	149	CCZ				1.63		25.8	0.17	13	TIM SPRING
	13	10:31:10	36.868	116.728	0.2	4.66	2.0	104	BCI				0.59		12.0	0.06	15	BARE MTN
	13	11:59:16	36.543	118.044	1.7	10.10	0.8	246	BDI			2.47	2.73		64.0	0.17	26	•••QUAD. NOT LISTED•
	14	16:39:46	37.255	115.171	2.5	-1.43	1.8	158	BCZ			1.03	0.82		9.7	0.19	7	ALAMO
	14	21:37:17	35.932	116.795	0.6	6.43	1.4	229	ADZ				1.17		7.5	0.01	5	WINGATE WASH
	15	21:37:26	36.373	117.496	0.9	0.69	0.8	241	ADZ				1.95		35.5	0.11	18	PANAMINT BUTTE
	16	0:26:37	37.005	116.021	0.3	0.82	0.6	151	ACZ				0.91		8.6	0.10	12	YUCCA FLAT
	16	8:35:52	35.876	114.827	—	2.93	—	254	ADI				1.04		8.3	0.03	4	BOULDER CITY

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1989 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)	QQQ 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
OCT 16	10: 6:18	37.140	117.365	0.3	6.80	0.8	119	ACI			1.35	1.26		15.7	0.07	16	UBEHEBE CRATER
17	4: 0:14	37.052	116.123	0.4	-0.72	10.9	110	CBA		2.06				9.6	0.11	14	YUCCAFFLAT
17	11:28:18	36.707	116.041	1.6	2.70	3.5	160	BCA		1.54				8.7	0.13	11	CAMP DESERT ROCK
17	15:59:29	36.877	116.249	A.2	0.45	0.5	104	ABZ	2.09			1.56		6.2	0.08	22	MINE MTN
18	1:55:13	37.221	116.451	0.2	-1.01	0.7	49	ACZ	2.29			2.11		11.3	0.07	26	SCRUGHAM PEAK
18	6:14:18	35.996	116.080	0.7	1.92	1.2	241	ADZ			1.51	1.80		16.1	0.11	13	TECOPA
19	9:48:53	37.201	118.279	0.7	9.96	2.9++	291	BDI				1.81		41.4	0.05	10	•••QUAD. NOT LISTED•
20	1:53:16	37.287	117.375	0.3	-1.67	0.5	115	ACZ				0.94		10.5	0.07	11	GOLD POINT SW
20	6:32: 3	37.089	116.467	0.3	0.96	0.5	139	ACZ				0.37		9.3	0.03	9	TIMBER MTN
20	16:26:58	37.465	117.571	0.4	2.63	0.9	81	ABZ	1.56	2.08		1.94	2.0	6.9	0.12	17	MAGRUDER MTN
20	20:15:38	37.461	117.563	0.3	2.92	0.6	82	ABZ			1.05	1.23		6.1	0.07	9	MAGRUDER MTN
20	20:49:58	37.463	117.565	0.4	2.60	0.9	82	ABZ		1.91	1.60	1.76		6.3	0.12	13	MAGRUDER MTN
20	22: 7:15	37.453	115.654	0.3	5.49	1.7++	91	ACI		1.40		1.51		16.8	0.09	13	BALD MTN
20	22:57:14	37.461	117.561	0.5	4.55	1.3+	82	ABI		1.35		1.14		5.9	0.11	10	MAGRUDER MTN
21	3:10:41	36.880	116.249	0.1	-0.33	0.1	105	ABZ				0.59		6.2	0.04	13	MINE MTN
21	4:18: 1	37.432	114.649	1.0	-1.02	0.8	261	ADZ			1.23	1.23		20.8	0.04	7	SLIDY MTN
21	5:12:22	36.861	115.997	0.5	0.79	0.9	175	ACZ				0.63		9.4	0.08	10	FRENCHMAN FLAT
21	22:54:19	36.828	116.264	0.3	3.87	1.2+	52	ABI	1.71		2.02	1.39		6.1	0.12	23	JACKASS FLATS
21	23:20:40	37.281	117.700	0.3	-0.81	0.3	157	ACZ				1.37		7.2	0.05	10	MAGRUDER MTN
22	1: 2:13	36.765	116.024	0.5	10.16	1.0	160	ACZ				0.82		12.9	0.08	13	CANE SPRING
22	9:36:22	36.762	116.024	0.5	10.70	0.8	158	ACZ				0.67		12.6	0.06	13	CANE SPRING
23	0: 9:58	37.353	116.113	0.6	0.24	1.0	101	ACZ		1.79		1.37		14.4	0.11	8	OAK SPRING BUTTE
23	1:42:36	37.146	117.810	0.6	1.57	1.3+	233	ADI				1.19		17.5	0.09	11	WAUCOBA SPRING
23	7:55:59	36.877	115.989	1.2	A.06	2.1	217	BDZ				0.72		8.5	0.14	8	PLUTONIUM VALLEY
23	11:13:24	36.860	116.005	0.3	-0.72	0.5	172	ACZ				0.81		9.1	0.06	10	CANE SPRING
24	8:23: 4	36.861	116.008	0.6	-0.44	0.9	164	ACZ	1.46			1.07		8.9	0.09	12	CANE SPRING
24	14:39:40	36.637	115.962	0.4	10.93	0.5	71	AAZ				1.05		2.6	0.07	15	MERCURY
24	16:35:58	35.999	117.327	2.3	1.55	6.7	268	CDZ	1.67		1.86	1.87		41.6	0.10	11	TRONA
24	17:48:51	36.784	115.650	0.7	0.72	1.3	183	ADZ	1.82			1.45	1.6	17.5	0.08	10	QUARTZ PEAK SW
25	5:52:59	36.909	116.184	0.2	8.80	0.4	48	AAZ	1.06			1.35		6.2	0.06	19	MINE MTN
25	7: 4:46	36.477	116.570	0.5	2.23	1.9	94	ACZ				1.12		12.2	0.08	10	RYAN
25	14:10:19	37.347	116.370	2.2	6.96	1.9	269	BDI			1.46	0.86		15.4	0.09	8	DEAD HORSE FLAT
26	8:23:39	37.482	114.632	1.2	13.69	1.6	269	BDI			1.24	1.32		16.6	0.01	5	SLIDY MTN
26	10:39:53	37.210	114.983	1.2	8.02	2.9	230	BDI	2.51			1.97		18.7	0.12	10	DELAMAR 3 NW
26	15:37:44	37.864	116.137	9.3	0.74	0.4	107	ACZ	1.03			1.21		20.8	0.03	6	REVEILLE PEAK
27	0:24:40	36.519	116.582	0.2	0.29	0.8	51	ACZ	2.46		2.57			16.5	0.09	33	BIG DUNE
27	1:13:31	36.517	116.584	0.2	6.07	1.3	51	ACI	2.00		2.41	1.98		16.4	0.06	25	BIG DUNE
27	1:27:11	36.366	115.828	0.2	9.58	1.1	125	ACI				1.32		22.2	0.05	13	MT STIRLING
27	2:51:16	36.979	116.106	0.3	1.65	0.9	121	ABZ	1.68			1.23		6.9	0.08	16	YUCCA LAKE
27	12:36:31	36.517	116.586	0.4	7.75	2.0	105	BCA		1.51				16.5	0.12	14	BIG DUNE
27	13:16: 2	36.516	116.589	0.4	5.94	2.7	106	BCA		1.49				16.6	0.08	11	BIG DUNE
27	15:48:22	37.128	117.251	0.3	10.00	1.3	147	ACI				0.88		16.7	0.06	8	UBEHEBE CRATER
27	16: 4:18	37.516	117.205	0.5	-1.29	0.7	154	ACZ			0.81	1.12		24.3	0.10	9	GOLDFIELD
27	19:46:53	37.127	117.251	0.5	7.30	1.9	138	ACI			1.04	1.13	1.4	16.5	0.10	14	UBEHEBE CRATER

1989 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)	QQQ 12S	MAGNITUDE ESTIMATES Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
OCT	28	11:50:33	36.729	115.479	0.5	-1.04	0.8	164	ACZ				1.70		29.9	0.11	11	BLACK HILLS NW
	28	12:25:41	37.031	116.023	1.1	0.71	1.3	180	BCZ				0.96		18.4	0.08	9	YUCCA FLAT
	28	14:38:39	36.873	116.736	0.2	5.63	1.3++	86	ACI	1.88		1.90	1.87		13.0	0.07	26	BARE MTN
	28	16:50:42	36.869	116.741	0.3	4.83	3.1	107	BCZ				1.39		13.0	0.09	18	BARE MTN
	29	9: 8:30	35.924	114.849	1.4	-0.43	2.6	190	BDZ	2.60			2.77		8.5	0.14	15	BOULDER CITY
	29	18:10:20	37.126	117.254	0.2	8.17	0.6	118	ACZ	1.70			2.01		16.4	0.06	14	UBEHEBE CRATER
	29	21:40: 9	37.085	115.388	0.5	0.12	0.9	100	ACZ	2.03		2.01	1.75		20.1	0.09	10	DESERT HILLS SW
	30	0:19:16	37.124	117.259	0.4	8.46	1.3	151	ACZ				0.83		15.9	0.09	11	UBEHEBE CRATER
	30	4:35:29	36.770	116.222	0.4	-0.11	0.4	137	ACI				0.52		5.4	0.08	11	SKULL MTN
	30	17:21:59	37.125	117.253	0.4	9.47	1.2	149	ACI			0.77	1.13		16.3	0.07	11	UBEHEBE CRATER
	30	18: 9:49	36.864	116.743	0.3	3.87	6.9	108	CCZ				0.88		12.8	0.09	13	BARE MTN
	31	5:18:10	36.867	116.740	0.3	4.87	2.9	107	BCZ				0.64		12.8	0.09	17	BARE MTN
	31	5:38:10	37.011	116.296	0.2	6.44	0.5	136	ACZ				1.03		6.6	0.04	15	BUCKBOARD MESA
	31	16:33:60	36.874	116.736	0.2	4.47	1.7++	58	ACI	1.96		1.75	2.03		13.0	0.07	27	BARE MTN
	31	18:56:48	36.940	117.774	1.7	2.53	4.5	244	BDZ			1.23	1.56		34.3	0.10	7	WAUCOBA WASH
NOV	1	2:10:36	37.149	117.811	1.1	5.93	2.2	280	BDI			1.33	1.40		17.3	0.09	10	WAUCOBA SPRING
	2	2:40: 5	37.098	116.246	0.3	6.95	0.6	104	ABU				1.01		6.9	0.09	18	TIPPIPAH SPRING
	2	4:44:16	36.868	116.744	0.2	6.33	1.4	108	ACZ						13.1	0.06	16	BARE MTN
	2	5: 2:15	37.223	117.546	0.3	11.37	0.5	133	ABI			1.13	1.15		8.9	0.06	11	LAST CHANCE RANGE
	3	3:43:58	37.213	116.748	0.1	-0.50	0.2	125	ABZ	1.86	1.84		1.31		7.6	0.04	17	THIRSTY CANYON NW
	3	10:11:40	36.875	116.737	0.5	6.62	1.6	162	ACZ				0.70		13.2	0.10	13	BARE MTN
	3	11:47:12	36.695	116.268	0.5	0.65	0.3	203	ADU				0.42		5.3	0.06	12	STRIPED HILLS
	3	20:52:37	36.874	116.740	0.3	0.58	0.5	106	ACZ	1.78			1.24		13.3	0.08	16	BARE MTN
	4	0:13:59	37.680	115.005	0.3	8.16	0.8	123	ABZ				1.19		6.8	0.05	8	HIKO NE
	4	0:42:31	36.866	116.742	0.3	5.54	2.7	108	BCZ	1.59			0.96		12.9	0.09	16	BARE MTN
	4	10:47:37	37.248	115.028	0.8	0.48	8.6	205	ADI	2.04			1.77		16.6	0.08	13	LOWER PAHRANAGAT LAKE
	4	13: 6: 9	37.288	117.381	0.4	-0.54	0.6	166	ACI				0.95		11.0	0.05	7	GOLD POINT SW
	4	13:13:47	37.825	115.006	0.7	1.45	1.6	177	ACZ	1.62			1.44		8.4	0.08	9	WHITE RIVER NARROWS
	4	13:27:47	37.291	117.382	0.0	-1.27	—	165	ACZ				0.86		11.2	0.00	8	GOLD POINT SW
	4	13:51:17	37.247	115.029	1.1	2.86	2.6	205	BDZ			1.30		1.4	16.5	0.07	8	LOWER PAHRANAGAT LAKE
	4	17:26: 4	37.300	117.367	0.6	7.43	1.6	126	ABZ			0.82	0.63		9.7	0.06	6	GOLD POINT
	4	18:54:21	36.874	115.992	0.7	5.14	1.9	214	ADI				0.68		8.5	0.10	10	FRENCHMAN FLAT
	5	7: 7:48	38.179	116.030	0.2	2.96	1.5	200	ADZ	2.00			2.31	2.3	36.2	0.03	10	ECHO CANYON
	5	7:38:56	36.870	116.751	0.2	4.03	2.9	110	BCZ				0.76		13.7	0.05	14	BULLFROG
	5	7:39:25	36.357	116.476	0.5	-0.96	0.7	96	ABZ				0.86	1.1	4.5	0.10	9	ASH MEADOWS
	5	16:25:12	37.251	115.052	9.8	0.67	7.9	243	DDA		1.72				17.3	0.25	5	ALAMO SE
	6	3:24:44	37.247	115.022	0.7	0.78	0.4	207	ADZ	1.52		1.74	1.25		17.0	0.05	9	LOWER PAHRANAGAT LAKE
	6	8:34:23	38.177	116.031	0.5	1.11	2.9	200	BDZ				1.60		36.1	0.05	8	ECHO CANYON
	6	11:57:39	36.776	115.918	0.7	-0.13	1.0	202	ADZ				1.21		13.2	0.10	11	FRENCHMAN FLAT
	6	13:21:46	37.221	117.545	0.3	11.59	0.6	134	ABI				1.75		9.1	0.06	12	LAST CHANCE RANGE
	6	15: 2:47	36.974	116.112	0.2	0.07	0.3	188	ADI	1.64			1.61	1.3	6.9	0.03	14	YUCCA LAKE
	6	22: 1:14	37.809	115.078	0.9	5.68	2.9	135	BBZ				0.83		8.1	0.12	8	WHITE RIVER NARROWS
	6	22:16:56	37.806	115.084	1.3	4.33	5.7	139	CCI	1.50			1.36		8.6	0.12	8	WHITE RIVER NARROWS
	7	3:28: 6	36.770	116.226	0.5	-0.09	0.5	99	ABI				0.47		5.1	0.08	10	SKULL MTN

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1989 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)	QQQ 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
NOV 7 6: 5:41	36.867	116.742	0.2	4.66	2.5	108	BCZ				0.68		13.0	0.07	18	BARE MTN
7 14:51:47	36.678	116.070	0.2	0.97	0.4	125	ABZ				1.00		9.9	0.04	11	CAMP DESERT ROCK
7 20:49:33	36.392	114.896	1.3	-1.13	1.3	228	BDZ	1.62			1.41		26.8	0.19	7	DRY LAKE
8 14:47:55	37.249	115.028	0.7	0.95	0.4	205	ADZ	1.43		1.55	1.26		16.7	0.06	9	LOWER PAHRANAGAT LAKE
8 14:55:28	37.273	115.096	1.5	10.44	1.2†	174	BCI				0.82		14.2	0.05	6	ALAMO SE
8 16:22:12	36.625	116.250	0.8	4.46	2.2	156	BCZ				0.67		8.4	0.11	11	STRIPED HILLS
8 18:48:51	37.244	115.016	1.1	0.90	0.7	210	BDZ	1.23		1.42	1.35		17.4	0.10	9	LOWER PAHRANAGAT LAKE
8 20:38:46	37.483	116.000	0.6	-0.64	1.1	63	BCZ	2.03			1.76		10.9	0.17	14	WHEELBARROW PEAK NE
8 21:16:45	36.728	115.030	0.2	11.25	0.3†	166	ACZ				1.07		8.0	0.05	14	MERCURY
8 21:17: 1	36.721	115.923	0.6	12.14	0.9	163	ACI				1.02		7.5	0.04	7	MERCURY
8 21:20:19	36.724	115.928	0.4	11.62	0.4	163	ACZ				0.82		7.6	0.05	11	MERCURY
8 21:21: 7	36.730	115.932	0.3	10.27	0.8	167	ACZ				1.21		8.2	0.06	13	MERCURY
8 23:21:49	38.064	115.236	0.7	5.23	5.7	250	CDI	1.70			1.89	2.1	24.9	0.04	6	TIMBER MTN PASS WEST
9 2:43:13	36.629	116.245	0.3	4.23	1.9	134	ABZ			0.74	1.00		8.7	0.08	13	SPECTER RANGE NW
9 5: 6: 7	36.829	116.262	0.2	3.79	0.6+	91	ABI	1.30	1.19		0.87		6.2	0.07	21	JACKASS FLATS
9 5:28:51	36.825	116.261	0.4	2.87	0.4	212	ADI				0.68		6.6	0.04	9	JACKASS FLATS
9 21: 2:35	35.772	117.947	7.9	11.08	3.4	305	DOA		2.56				99.8	0.15	7	LITTLE LAKE
10 4:55:18	37.484	116.000	0.6	-0.33	1.0	63	ACZ	1.70			1.69		13.9	0.15	13	WHEELBARROW PEAK NE
10 11: 0:47	36.773	116.262	0.3	2.37	0.5	72	AAZ	1.15			0.77		3.5	0.09	15	JACKASS FLATS
10 13:58:18	37.027	117.645	0.5	0.91	0.5	187	ADZ				0.93		22.8	0.08	13	LAST CHANCE RANGE
11 12: 3: 0	37.309	114.913	0.5	0.72	0.6	212	ADI			1.04	0.89		16.3	0.02	5	DELAMAR LAKE
11 14:14:18	36.748	116.042	0.5	-1.11	1.0	150	ACZ		1.18		0.96	1.1	12.0	0.11	12	CAMP DESERT ROCK
11 17:12:42	37.304	115.424	0.4	0.30••	1.0	81	ACZ	2.34				2.1	25.8	0.11	13	CUTLER RESERVOIR
11 17:22:57	36.865	116.742	0.3	7.73	1.8+	108	ABI				0.78		12.8	0.09	15	BARE MTN
11 20:36:11	37.252	115.047	0.5	7.18	1.3++	193	ADI	2.30					15.5	0.07	12	ALAMO SE
11 22:16:55	36.731	115.495	1.0	14.45	5.9	150	CCI				1.42		39.1	0.20	9	BLACK HILLS NW
12 0:31:49	37.889	115.751	1.6	1.46	4.3	185	BOI				1.38		17.3	0.10	6	
12 6:50: 4	36.987	116.180	0.3	5.47	0.5	215	ADZ				0.76		7.1	0.03	10	MINE MTN
12 13:19:59	36.735	115.453	1.0	6.42	10.3	218	CDZ				1.36		46.1	0.10	8	BLACK HILLS NW
13 19:16:17	36.780	115.968	0.2	8.77	0.9	129	ABZ	1.63			1.24	1.6	13.2	0.07	18	FRENCHMAN FLAT
13 19:37: 2	37.328	114.865	1.3	17.99	1.9	218	BOZ	1.52		1.55	1.50		18.6	0.14	6	GREGERSON BASIN
14 0:12:18	37.014	117.984	1.9	4.94•	—	246	CDA		1.84				38.6	0.26	12	WAUCOBA SPRING
14 4:44:40	37.310	115.420	1.0	7.00	11.9	142	CCA		1.99				31.3	0.20	12	CUTLER RESERVOIR
14 6: 0:45	37.312	115.428	1.7	0.00••	2.4	158	BCZ			1.74	1.31		26.7	0.15	6	CUTLER RESERVOIR
14 19:33:32	36.786	115.638	0.5	2.10	1.0	186	ADZ	1.94	1.72		1.83		18.5	0.09	15	QUARTZ PEAK SW
14 19:35: 6	37.463	115.417	0.4	10.67	1.6	97	ACZ	1.66		1.69	1.55		26.0	0.09	10	CRESCENT RESERVOIR
15 7:56:13	36.878	115.427	0.8	2.74•	—	120	CCA		2.32				39.8	0.18	14	DOG BONE LAKE NORTH
16 2:38:44	36.800	115.791	1.2	7.42	2.9	213	BOI	1.61			1.45		11.9	0.17	14	FRENCHMAN LAKE SE
16 12:47: 8	36.269	116.806	0.3	6.82	1.2	108	ACZ			1.43	1.52		15.3	0.07	12	FURNACE CREEK
16 21:43: 6	37.306	115.249	1.1	10.84	3.0	114	BBZ			1.00	1.18		16.3	0.22	10	ALAMO
17 1: 7:43	37.228	117.724	0.4	-0.34	0.3	196	ADZ	1.54	1.59		1.51		6.9	0.06	9	LAST CHANCE RANGE
17 1:57:13	37.113	117.036	0.3	0.23	0.4	104	ACZ	1.83	1.20	1.19	1.32		14.5	0.08	19	BONNIE CLAIRE SE
17 14: 0:53	37.851	116.142	0.5	1.65	1.4	105	ACZ				1.56		20.5	0.05	6	REVEILLE PEAK
17 19: 2:21	36.944	116.883	0.6	-1.82	7.9	153	CCU			1.41	1.70		14.2	0.09	13	BULLFROG

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1989 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)	QQQ 12S	MAGNITUDE ESTIMATES Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
NOV 18	0:26:15	37.304	115.251	1.0	3.09•	—	217	CDI				1.33		21.1	0.06	5	BADGER SPRING
18	10:31:26	36.828	116.266	0.3	0.54	0.6	96	ABZ				0.73		6.0	0.08	12	JACKASS FLATS
18	23:38:38	37.111	117.038	0.3	7.84	1.5	103	ABZ			0.97	1.19		14.3	0.10	20	BONNIE CLAIRE SE
18	23:41:35	37.235	114.987	1.5	1.05	2.9	219	BDI				1.05		19.2	0.04	5	DELAMAR 3 NW
18	23:41:58	37.108	117.033	0.3	7.11	0.8	173	ACZ				1.02		14.0	0.06	15	BONNIE CLAIRE SE
19	0: 2: 2	37.114	117.036	0.3	7.36	1.7	104	ABZ				0.95		14.6	0.10	16	BONNIE CLAIRE SE
19	1:48:37	37.113	117.036	0.3	0.39	0.4	104	ACZ	1.85		1.09	1.15		14.6	0.09	21	BONNIE CLAIRE SE
19	2:33: 3	37.113	117.036	0.3	7.41	1.8	104	ABI	1.21	1.29	1.22	1.11		14.6	0.10	18	BONNIE CLAIRE SE
19	7:34:44	37.394	115.213	0.1	5.70	0.3	175	ACI		0.99	1.45	0.77		14.4	0.01	6	ASH SPRINGS
19	16:56:44	36.528	117.879	2.7	2.79•	—	266	CDI	2.65			2.49		52.3	0.14	13	NEW YORK BUTTE
19	17: 9:17	37.113	117.036	0.3	8.06	1.6	104	ABZ		1.44		1.24		14.5	0.11	20	BONNIE CLAIRE SE
19	10:11:26	35.968	114.839	2.3	-0.19•	—	171	CCI				1.99		9.1	0.05	11	BOULDER CITY
19	19:37: 7	37.113	117.036	0.3	7.91	1.7	104	ABI		1.47		1.25		14.6	0.11	21	BONNIE CLAIRE SE
20	3:33:15	37.114	117.037	0.3	8.21	1.5	104	ABZ	1.81			1.61		14.6	0.11	24	BONNIE CLAIRE SE
20	5:22:23	37.120	116.438	0.4	-0.38	0.7	133	ACZ		1.33		0.95		10.5	0.06	10	TIMBER MTN
20	6:17:35	36.760	116.259	0.4	3.71	0.5	97	ABZ				0.40		2.2	0.08	12	JACKASS FLATS
20	18:56:38	37.151	117.357	0.4	4.43	2.5	125	BCZ		1.38	1.14			16.8	0.08	12	UBEHEBE CRATER
20	20:22:48	36.121	117.040	0.5	0.49	0.6	202	ADZ				1.32		23.4	0.08	10	TELESCOPE PEAK
21	6:35: 9	36.861	116.019	1.5	3.56	8.6	156	CCZ	1.00	0.74		0.60		8.5	0.16	7	CANE SPRING
21	18:16:15	36.682	116.034	—	7.00••	—	209	ADU	1.17	0.34		0.86		6.9	0.03	3	CAMP DESERT ROCK
22	0:33:54	36.892	116.811	0.5	-0.92•	—	79	CCA		2.26				19.5	0.12	12	BULLFROG
22	7:39: 9	37.174	115.083	1.5	7.59	2.0	234	BDU	1.56	1.32	2.01			9.3	0.09	7	LOWER PAHRANAGAT LAKE
22	21: 9:40	37.110	117.033	0.5	11.71	1.5++	103	BBI				1.21		14.2	0.16	18	BONNIE CLAIRE SE
23	3:57:41	37.115	117.036	0.3	0.18	0.4++	50	BCZ	2.09	1.81		2.14		14.7	0.19	50	BONNIE CLAIRE SE
23	6:36:32	36.607	115.590	2.0	-1.02	2.1	210	BDZ	1.70	1.50		1.43		21.9	0.27	15	INDIAN SPRINGS SE
23	12:26:51	37.109	117.037	0.5	8.50	2.1	103	BBI	1.47	0.76	1.59	1.14		14.0	0.17	26	BONNIE CLAIRE SE
23	22:48:59	36.030	117.268	3.8	0.84	2.2	250	CDI	1.34	1.17	1.52	1.39		36.8	0.31	17	MATURANGO
24	12:29:10	37.023	116.194	0.6	6.15	1.3++	82	BAI	1.54	1.13		1.66		3.5	0.22	28	TIPPIPAH SPRING
24	21:49: 3	37.183	117.425	0.2	-0.94	0.5	124	ACZ	1.23	1.09	1.28	0.90		19.8	0.08	19	UBEHEBE CRATER
25	2:10:55	36.752	115.973	0.4	8.80	0.8	163	ACZ	1.37	1.17		1.02		10.1	0.10	22	FRENCHMAN FLAT
25	2:29: 7	36.657	116.661	0.6	7.59	1.5	167	ACZ	1.16	1.03		0.72		11.2	0.10	19	BIG DUNE
25	20:22:50	37.112	117.036	0.3	-0.38	0.6	104	ACU	1.37	1.33		0.98		14.4	0.07	15	BONNIE CLAIRE SE
25	20:25:45	37.112	117.034	0.3	0.00••	0.4	104	ACZ			1.18	1.10		14.4	0.09	14	BONNIE CLAIRE SE
25	20:45:52	37.111	117.032	0.3	6.60	1.0	125	ACZ	1.20	1.14	1.34	0.89		14.3	0.08	11	BONNIE CLAIRE SE
27	5:59:40	37.696	115.046	2.6	1.72	11.2	116	CCZ	1.59	1.19		1.40		20.6	0.17	7	HIKO NE
27	14:40:39	37.111	117.034	0.3	7.51	1.3	103	ABZ	1.62	1.25	1.24	1.30		14.3	0.08	15	BONNIE CLAIRE SE
27	17:15:36	37.176	117.504	0.2	0.56	0.4	151	ACZ		1.17	1.45	1.46		14.1	0.06	16	LAST CHANCE RANGE
28	5:23:37	37.114	117.033	0.4	0.68	0.6	86	ACZ	1.70	1.32	1.60	1.39	1.6	14.6	0.15	28	BONNIE CLAIRE SE
28	6:37: 7	37.240	117.323	0.3	6.45	0.7	84	ABZ	1.37	1.26		1.39		8.9	0.08	15	UBEHEBE CRATER
28	13: 6:44	36.337	116.864	0.7	7.81	3.5	106	BCA		1.60				22.1	0.18	14	FURNACE CREEK
28	20:41:51	35.950	115.204	2.0	-1.02	2.9	189	BDZ	2.38					40.6	0.20	11	SLOAN
28	21: 7:31	36.895	115.353	14.1	2.18•	—	351	DOI	1.60	0.90			2.0	33.8	0.94	5	BURRO BASIN
29	1:55: 3	38.605	115.364	1.6	7.00•	—	299	CDI	2.22	1.44	2.45	2.14		72.1	0.17	10	•••QUAD. NOT LISTED•
29	8:10:18	36.869	116.744	0.3	2.69	1.2	108	ACZ	1.30			0.37		13.2	0.11	14	BARE MTN

1989 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
NOV 29	14:12:22	36.859	116.737	0.6	11.04	1.7	108	BBI	1.03			0.45		12.0	0.19	19	BARE MTN
29	16:14:27	37.408	115.052	——	7.00••	——	297	DOI	1.08	0.81		1.38		0.2	1.26	3	ALAMO NE-no convergence
30	1:47: 9	37.511	118.077	1.9	0.72	1.5	262	BOI	1.99	1.92	1.94	2.22	2.0	17.8	0.26	37	•••QUAD. NOT LISTED•
30	2:13:40	37.115	117.034	0.2	5.88	1.9	105	ACZ	1.71	1.50	1.83	1.55		14.7	0.09	21	BONNIE CLAIRE SE
30	19:43:27	36.978	116.109	0.4	0.39	0.7	194	ADZ	1.72			1.24		7.1	0.06	13	YUCCA LAKE
DEC 1	8:23:22	36.909	117.427	1.3	1.15	0.9	224	BOZ			1.45	1.26		12.3	0.04	6	TIN MTN
1	14:46:58	37.347	118.243	1.1	6.02	5.1	288	COI				2.16		31.0	0.20	9	•••QUAD. NOT LISTED•
1	20:49:28	36.019	116.451	0.3	8.77	1.4	194	ADI		1.38		1.27		27.0	0.04	9	EAGLE MTN
1	22:35: 0	37.107	117.037	0.4	-0.44	0.7	90	ACA		1.83				29.1	0.10	16	BONNIE CLAIRE SE
2	1:12:60	36.052	117.767	3.4	2.69•	——	283	CDI	2.29			2.30		70.9	0.13	11	HAIWEE RESERVOIR
2	7:58:45	37.306	115.192	3.4	7.00•	——	212	DOI			0.99	1.16		15.3	0.09	7	ALAMO
2	18:18:35	37.116	117.037	0.3	-0.10	0.4	105	ACZ		1.34		0.95		14.8	0.08	15	BONNIE CLAIRE SE
2	19:15:11	35.550	117.345	1.1	12.83	0.6	304	BDI	2.53					63.1	0.07	14	SEARLES LAKE
2	21:48: 6	37.112	117.037	0.2	6.31	1.2	103	ACZ		1.47		1.27		14.4	0.07	18	BONNIE CLAIRE SE
3	0: 5:59	37.256	115.102	0.9	1.75	1.0	178	ACZ			0.79	0.88		12.3	0.05	7	ALAMO SE
3	7:10:34	37.115	117.034	0.3	7.84	1.3	105	ABZ	1.82		1.13	1.08		14.7	0.09	18	BONNIE CLAIRE SE
3	13:16:54	37.009	116.199	0.2	7.23	0.4	86	AAZ		1.20		1.16	1.3	4.2	0.07	18	TIPPIPAH SPRING
3	15:22:11	37.045	117.682	0.2	10.27	0.5	235	ADI			1.28	1.72		21.0	0.02	8	LAST CHANCE RANGE
3	18: 6:43	36.452	116.956	1.2	5.00••	8.6	81	CCA		1.50				14.6	0.27	9	FURNACE CREEK
3	23:22: 3	36.862	116.734	0.5	5.50	3.2	122	BCA		1.98				12.1	0.11	15	BARE MTN
3	23:23:21	36.859	116.722	0.6	8.36	0.9	310	ADA		1.06				10.9	0.04	8	BARE MTN
4	3:49: 3	37.107	117.039	1.0	7.01	2.6	211	BDA		1.57				13.9	0.09	10	BONNIE CLAIRE SE
4	10:27:45	37.111	117.033	0.3	6.85	1.7	104	ACZ			1.05	0.99		14.3	0.10	17	BONNIE CLAIRE SE
4	12: 1:56	36.884	115.996	0.8	12.85	1.2	192	ADI				0.73		15.7	0.06	11	PLUTONIUM VALLEY
4	15:43: 4	37.229	117.552	——	9.32	——	289	ADZ	1.13		1.06	1.16		27.3	0.00	4	LAST CHANCE RANGE
5	12:30:22	36.866	116.744	0.3	5.09	2.5	108	BCZ				0.54		13.0	0.08	13	BARE MTN
5	12:40:34	37.250	115.050	3.3	3.91•	——	197	CDZ	1.20		1.25	1.08		14.7	0.10	7	ALAMO SE
6	6:18:15	36.209	115.452	0.5	0.60	3.6	148	ACZ		1.34		1.23		17.3	0.07	13	LA MADRE MTN
6	15: 6:41	37.255	116.364	0.4	0.23	0.4	88	ABZ				1.12		5.8	0.11	15	DEAD HORSE FLAT
6	15: 9:12	36.873	116.758	1.0	2.38	1.2	259	BOZ				0.55		14.4	0.08	9	BULLFROG
6	23:46:57	37.274	116.383	0.6	-1.67	0.4	275	ADI				1.38		8.5	0.08	12	SILENT BUTTE
7	1:15:50	38.172	115.947	0.8	-0.61•	——	194	CDI			2.80			37.6	0.14	15	QUINN CANYON RANGE
7	1:36:20	38.143	115.958	0.4	0.74	0.4	196	ADZ		1.69		1.69		36.7	0.06	10	QUINN CANYON RANGE
7	3:37:21	37.108	117.048	0.5	9.92	1.2	144	ACZ				1.20		14.0	0.08	10	BONNIE CLAIRE SE
7	3:56:53	36.875	116.740	0.4	7.30	0.9	232	ADI				0.57		13.3	0.04	10	BARE MTN
7	6:51:16	36.870	115.996	0.7	5.24	1.9	210	ADZ		1.23		1.12		8.6	0.08	9	FRENCHMAN FLAT
8	2:18:32	37.245	114.577	0.3	1.29	1.2	281	ADZ				1.22		42.5	0.01	5	VIGO NE
8	17:42:39	37.255	116.365	0.7	-0.08	0.3	212	ADZ	1.59		1.47	1.08		5.8	0.09	14	DEAD HORSE FLAT
8	23: 5: 7	37.228	116.415	0.6	-0.99	0.6	104	ABA		1.82				8.2	0.09	10	SCRUGHAM PEAK
9	16:10:21	36.885	115.977	0.4	11.96	1.0	151	ACI	1.46			1.18		8.7	0.15	28	PLUTONIUM VALLEY
10	6:32:52	36.530	116.308	0.5	-0.31	0.8	107	BCZ		0.86		1.21		13.1	0.18	17	LATHROP WELLS SE
10	10:11:39	37.233	116.401	0.4	-0.47	0.4	40	BBZ	2.22			2.12		7.2	0.17	37	SCRUGHAM PEAK
10	19:17:43	36.782	115.656	1.2	7.22	3.8	134	BCI	1.40	1.33		1.41		16.9	0.22	13	QUARTZ PEAK SW
10	21:15: 1	36.866	116.741	0.4	7.05	2.5	108	BBZ	1.19	0.65		0.80		12.8	0.14	17	BARE MTN

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1989 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)	GQD 12S	MAGNITUDE ESTIMATES Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
DEC 11	6:43:32	37.493	117.972	1.4	12.16	1.3	248	BDI	1.39	1.39		1.70	1.6	9.5	0.21	14	SOLDIER PASS
12	8:38:51	37.504	115.152	1.3	6.92	2.9	290	BDA		1.85				22.3	0.07	6	HIKO
12	19:20:43	37.472	115.102	0.9	2.35	2.6	133	CBZ	1.20	0.94	1.16			8.6	0.45	6	ALAMO NE
12	20: 6:39	37.310	115.449	7.8	0.00••	6.1	286	DDZ			1.26	1.01	1.7	28.0	0.33	5	CUTLER RESERVOIR
12	21:48:21	37.137	117.335	0.3	8.88	0.8	153	ACI	1.23	1.02	1.25	1.25		15.3	0.07	12	UBEHEBE CRATER
12	22:15:47	37.137	117.332	0.6	9.00	1.8	106	BBI	0.97		1.34	1.04		15.4	0.20	14	UBEHEBE CRATER
12	23: 3:53	37.272	115.080	0.7	15.57	0.5	180	ADZ				0.85		14.8	0.01	5	ALAMO SE
13	0:42:35	36.885	116.818	0.5	-1.22	1.3	127	ACZ	2.01			1.75		19.6	0.08	12	BULLFROG
13	12: 4:13	37.013	116.217	1.0	4.24	1.0	188	BDI	1.31			0.79		2.9	0.17	19	TIPPIPAH SPRING
14	2:42:18	37.099	117.879	1.5	-0.35	1.7	218	CDI	1.78	1.58	1.88	1.99		25.4	0.31	29	WAUCOBA SPRING
14	5:48:15	37.316	117.320	2.2	0.16	1.8	127	CBZ	0.93		0.82	0.67		5.8	0.35	9	GOLD POINT
14	8:18:10	37.241	114.958	8.0	7.00•	—	256	DDU	0.94			1.18		20.1	0.31	6	DELAMAR 3 NW
14	12:36:58	37.393	115.440	5.0	3.37•	—	190	DDZ	1.74	0.82	1.65			30.2	0.46	7	CRESCENT RESERVOIR
14	23:41:18	35.636	115.546	2.2	-1.13	3.8	221	BDZ				1.52		75.9	0.26	12	CLARK MTN
17	2:27:51	37.855	116.009	0.4	2.46	1.9	111	BCZ	1.68	1.54		1.86		12.4	0.21	23	REVEILLE PEAK
17	18:33:56	36.538	117.831	3.1	0.00••	2.7	230	CDZ	2.19	1.83		2.12		48.2	0.29	23	NEW YORK BUTTE
17	22:29:25	37.144	116.295	1.0	8.32	1.6	172	BCI	1.04	0.86		0.42		8.1	0.25	18	AMMONIA TANKS
18	0:12:26	37.117	117.037	0.3	7.87	1.6	87	ABI	1.42	1.16		1.25		15.0	0.14	27	BONNIE CLAIRE SE
18	18:56: 6	37.347	118.294	3.9	-1.02	3.1	279	CDZ	1.70		1.53	1.69	1.9	35.4	0.24	14	•••QUAD. NOT LISTED•
19	19:28:12	37.363	114.364	3.1	12.27	3.3	268	CDI	1.76	1.48		1.74		42.7	0.23	10	•••QUAD. NOT LISTED•
19	21:41:35	37.410	116.723	1.5	1.78	5.2	144	CCZ				0.76		15.0	0.20	8	BLACK MTN NW
19	23:40:20	35.628	115.572	2.6	2.14•	—	222	CDI						76.4	0.21	8	CLARK MTN
20	6:27:54	36.010	117.752	8.9	0.00••	6.6	297	DDZ	1.94		2.05	1.15		72.4	0.15	10	HAIWEE RESERVOIR
20	14:32:13	37.810	115.536	3.2	1.58•	—	124	DCI	1.22	0.94		1.25		19.7	1.00	9	WORTHINGTON MTNS
21	1: 1:55	35.580	115.539	3.0	3.13•	—	228	CDI						80.3	0.29	13	CLARK MTN
21	3:54:40	36.869	116.738	0.4	7.83	2.2	96	BBI	1.52	1.40		1.39		12.7	0.16	22	BARE MTN
21	6:42: 8	37.269	116.509	0.3	-0.89	11.0	98	CCZ	2.02			1.41		11.9	0.13	10	TRAIL RIDGE
21	8:22:46	38.530	115.364	3.7	-1.23	2.9	241	CDZ	2.41	2.09		2.40		64.1	0.29	19	•••QUAD. NOT LISTED•
21	18:58:29	38.543	115.338	2.1	7.00	8.2†	263	CDI	2.20			2.26		66.2	0.41	22	•••QUAD. NOT LISTED•
21	19:30:40	37.467	116.552	0.4	3.22•	—	105	CCI	1.77			1.30		21.0	0.09	14	BLACK MTN NE
21	19:37:19	37.470	116.560	0.6	0.00••	1.6	107	ACZ	1.49			1.20		21.1	0.14	15	BLACK MTN NE
21	22: 7: 7	36.035	116.963	0.2	1.05	0.7	210	ADZ				1.05		11.7	0.14	5	BENNETTS WELL
22	1:16:26	37.199	116.422	1.3	-1.73	2.0	141	CCI				0.90		8.9	0.42	15	SCRUGHAM PEAK
22	11:34:30	38.528	115.377	3.7	-0.20	2.4	269	CDZ	2.45		2.64	2.22		63.5	0.36	19	•••QUAD. NOT LISTED•
22	21:33:54	36.949	116.888	0.8	1.87	3.7	73	BCZ	1.71			1.63		13.6	0.25	17	BULLFROG
23	0:21:21	36.032	117.908	2.2	4.04	3.6	291	BDI	1.94			1.90		82.9	0.27	17	HAIWEE RESERVOIR
23	1:54:47	38.595	115.344	7.0	0.00•	—	327	DDZ	2.23			1.93	2.5	82.7	0.31	6	•••QUAD. NOT LISTED•
23	3:30:22	38.602	115.342	2.1	3.07•	—	312	CDI	1.90			2.25		72.3	0.18	10	•••QUAD. NOT LISTED•
23	4:34:37	37.525	116.880	—	1.84	—	252	ADZ	2.49			0.92		33.5	0.14	4	CACTUS SPRING
23	17:27:56	36.952	116.649	0.3	10.14	1.1++	102	ABI				0.66		15.1	0.07	15	BARE MTN
24	9:42:15	35.881	116.751	1.7	1.40	6.6	268	CDI	2.57			1.50		34.6	0.16	7	WINGATE WASH
24	9:42:20	36.188	116.672	10.8	0.00••	3.1	100	DCZ	2.57			1.31		0.2	2.35	7	FUNERAL PEAK
24	22:22.11	37.074	116.014	0.8	-1.23•	—	75	CCI	2.43					13.9	0.23	22	YUCCA FLAT
25	3:21:36	35.879	117.711	3.1	10.49	2.1	271	CDZ	2.74					76.8	0.23	30	MOUNTAIN SPRINGS CANYON

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1989 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)	QOD 12S	MAGNITUDE ESTIMATES Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
DEC 25	7:25: 6	37.236	116.406	0.4	-0.52	0.4	48	ABZ	1.99	1.86		1.46		7.7	0.13	26	SCRUGHAM PEAK
25	11:44:29	36.418	118.032	1.1	8.09	0.8	250	BOI	2.55				2.9	70.7	0.21	36	•••QUAD. NOT LISTED•
25	17:22:53	36.647	116.344	0.3	4.40	0.6	66	AAI	1.80	1.09		1.14		0.5	0.10	26	STRIPED HILLS
25	17:45:44	36.911	116.758	0.4	11.01	1.1	150	ACI				0.58		17.3	0.08	17	BULLFROG
26	1:49: 5	37.116	117.032	0.3	4.47	3.9	105	BCZ		0.91		0.74		14.9	0.13	21	BONNIE CLAIRE SE
26	2:21:13	36.643	116.351	0.6	4.65	0.4	169	ACU	1.19	0.38		0.96		1.1	0.12	17	STRIPED HILLS
26	8:47:32	36.905	116.759	0.3	8.48	1.6	105	ABZ		0.43		0.86		16.8	0.10	17	BULLFROG
26	15:11: 6	36.431	117.998	2.9	-1.02	2.0	262	CDZ	1.83		2.16	1.79		68.7	0.20	12	KEELER
27	22: 2:25	36.507	115.077	2.0	3.39	1.9	233	DDA		2.03				7.5	0.52	10	HAYFORD PEAK
28	0:31:34	37.047	114.745	6.8	2.23•	—	288	DOI	1.43			1.30	1.9	41.5	0.28	8	SUNFLOWER MTN
28	0:32:16	37.365	115.446	—	0.80•	—	309	DDZ						31.6	0.10	5	CUTLER RESERVOIR
28	5:28:29	37.283	115.171	5.5	-0.20	2.3	349	DDZ	2.01					17.4	0.10	5	ALAMO
28	8:24:46	37.560	118.482	9.0	0.74	6.7	318	DDU	1.82					53.0	0.28	10	•••QUAD. NOT LISTED•
28	8:24:54	37.539	117.909	5.9	7.00	9.9	206	DDU	1.82					12.6	1.82	10	PIPER PEAK
28	22.22:44	37.420	116.729	4.6	0.67	1.7	243	CDA		1.20				16.2	0.03	5	BLACK MTN NW
28	22:23:17	37.417	116.898	—	7.00••	—	266	ADA		1.07				26.7	0.01	3	TOLICHA PEAK
28	23:31:45	37.332	115.353	0.8	2.97•	—	143	CCA		2.05				28.0	0.16	12	BADGER SPRING
29	1:22:53	37.333	115.350	0.6	11.65	3.0	143	BCA		1.95				27.7	0.10	12	BADGER SPRING
29	1:50:26	36.050	117.896	2.2	7.00	4.9	274	BDA		2.27				81.0	0.21	11	HAIWEE RESERVOIR
29	6:48:18	36.069	117.875	5.0	8.02	3.7	272	CDA		2.54				78.4	0.15	8	HAIWEE RESERVOIR
30	22:57:15	36.967	115.995	0.3	8.61	0.5	126	ABZ	1.24			1.05		6.6	0.08	15	PLUTONIUM VALLEY
31	10:40:57	38.481	115.372	3.7	-1.23	2.5	265	CDI	2.17		2.47	2.19		58.7	0.30	14	FOREST HOME

Appendix B

Chemical explosion location data for the years 1987, 1988, and 1989

The southern Great Basin of Nevada is seismically active from both natural and man-made sources. Chemical explosion seismic data acquired by the SGBSN have been scaled to provide information on the accuracy of the crustal models and the validity of the location algorithm used by the SGBSN. These data should also be helpful in future research such as tomographic inversion of P-arrivals to determine crustal structure.

Employees from 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, Colorado. Blasting at Ladd Mountain, Nev. (Bullfrog Hills quadrangle), approximately daily (weekdays, 4 PM to 5 PM).

(2) Chemstar, Inc., Las Vegas, Nevada. Blasting at two limestone quarries, one in the Dry Lake, Nevada, quadrangle, and one in the Sloan, Nevada, quadrangle.

(3) Cyprus Tonopah Mining, Tonopah, Nevada. Blasting in the San Antonia Mountains (San Antonia Ranch quadrangle), usually in the AM.

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

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

(6) U. S. Geological Survey, Menlo Park, California. Chemical explosions during January, 1988, in Amargosa Desert, Nevada, for seismic reflection feasibility survey See Brocher and others, Table 3 (1990), for shot information.

A number of other organizations are also known to be engaged in blasting in the southern Great Basin of Nevada, but 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, 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. Far more hypocentral data from chemical explosions than are presented in this Appendix have been detected and archived by the SGBSN, especially for years preceeding 1989. The decision was made in late 1988 to scale arrival time and amplitude data and to include all resulting hypocenters for known and probable blasts into the catalog, but to flag them as blasts (or probable blasts).

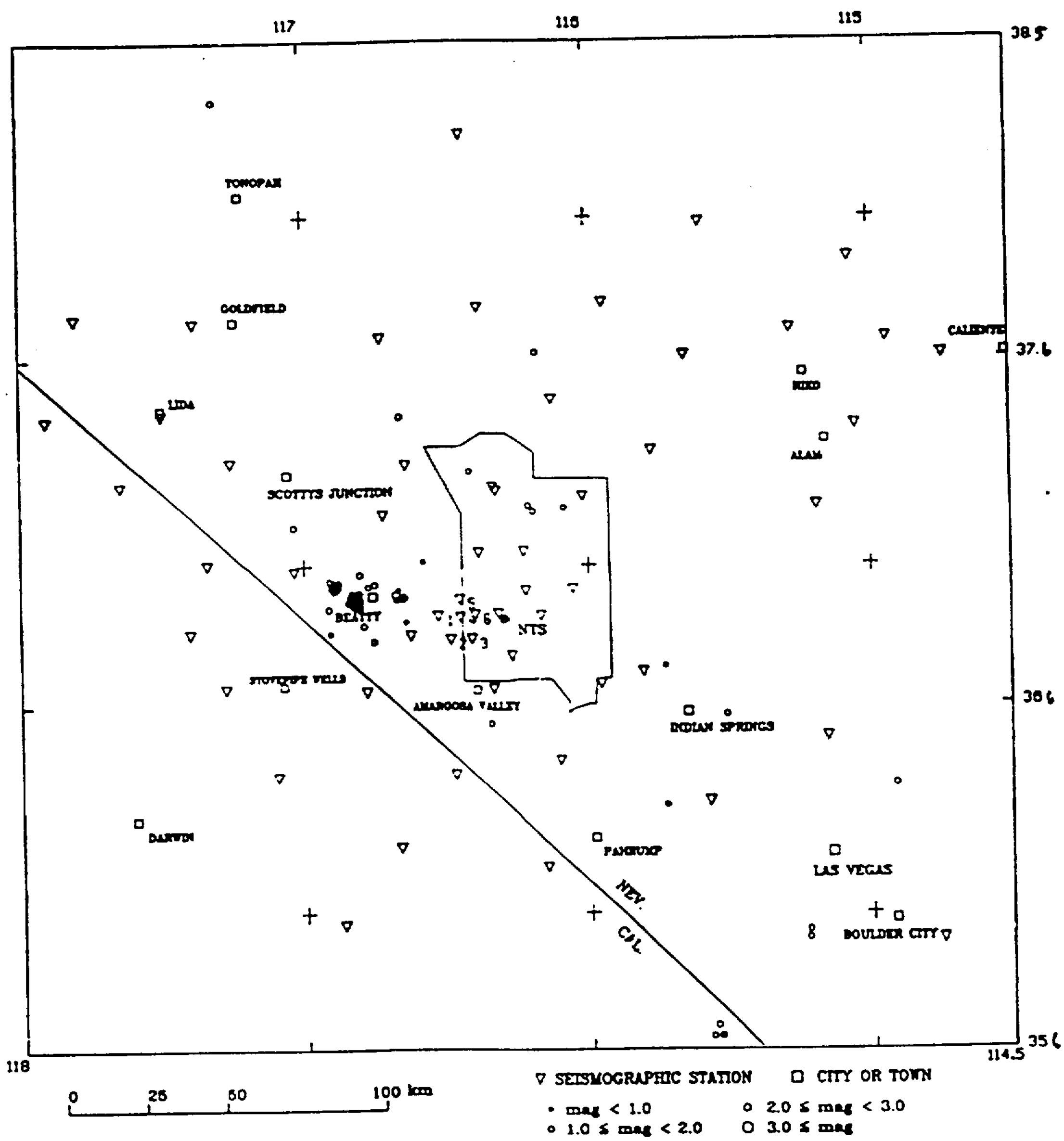

Figure B1. Preliminary epicenter map of blasts and probable blasts in the SGB, 1987 through 1989.

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1987 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)	QOD 12S	MAGNITUDE ESTIMATES Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JAN 10	23:30:19	36.806	116.909	0.9	1.16PB	1.4	324	ADI		1.33		0.92		25.2	0.06	13	BULLFROG z0=12.
OCT 20	0:35:38	36.935	116.890	0.3	-0.28BL	9.7	116	CCA		0.97				13.9	0.09	12	BULLFROG
NOV 8	18:13:57	36.944	116.883	0.4	0.18PB	0.8	113	ACI	1.91	1.48	1.40	1.29		14.2	0.10	14	BULLFROG
16	20:40:35	36.891	116.824	0.4	8.44PB	2.4	150	BCI				0.38		20.5	0.04	11	BULLFROG z0=7
18	0: 3:31	36.939	116.894	0.3	-0.91BL	0.4	116	ACI	1.74		1.41	1.37		13.4	0.10	19	BULLFROG z0=7
19	1: 1:47	36.882	116.814	2.0	-1.23BL	18.3	252	CDI				0.71		19.2	0.06	8	BULLFROG z0=7
23	0:49:29	36.889	116.822	0.2	0.21BL	0.6	126	ACI	1.52	1.22		1.06		20.2	0.05	17	BULLFROG
DEC 19	0:28:40	36.949	116.882	0.5	-1.13BL	0.7	85	BCI	1.48		1.61	1.62		14.1	0.16	19	BULLFROG z0=0
21	22:45:20	36.947	116.885	0.5	-1.10BL	9.7	125	CCI				0.93		13.9	0.08	11	BULLFROG

1988 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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JAN 10	23:15:19	36.888	116.816	0.4	-1.00BL	0.6	111	ACI				0.87		22.1	0.12	17	BULLFROG
12	22: 6:38	36.945	116.886	0.4	-1.00BL	0.7	86	ACI	2.20	1.68	1.98	1.86		14.0	0.11	23	BULLFROG
14	19:17: 4	36.939	116.888	0.3	-1.00BL	0.9	126	ACI				0.96		14.0	0.08	11	BULLFROG
15	18:58:18	36.544	116.338	0.9	-1.00BL	7.4	270	CDI				0.74		11.2	0.03	8	LATHROP WELLS SE
15	19:18:47	36.571	116.374	0.4	-1.00BL	15.5	95	CBI				1.15		8.8	0.09	10	LATHROP WELLS SE
15	19:28:16	36.572	116.372	0.5	-1.00BL	0.9	91	ABI				1.13		8.6	0.12	15	LATHROP WELLS SE
15	19:57:12	36.573	116.342	0.3	-1.00BL	0.5	87	ABI				1.38		8.0	0.08	15	LATHROP WELLS SE
15	20:21:49	36.893	116.814	0.4	-0.91BL	0.9	109	ACI	1.50	1.31		1.00		22.0	0.12	15	BULLFROG
26	18: 7:36	36.944	116.882	0.4	-1.00BL	0.9	113	ACI				0.96	1.4	14.2	0.11	13	BULLFROG
FEB 7	19:24:51	36.894	116.815	0.4	-1.00BL	0.9	109	ACI	2.10			1.47		20.0	0.13	16	BULLFROG
7	19:27:26	36.896	116.014	0.4	-1.00BL	13.3	109	CCI	1.65			0.94		20.0	0.12	12	BULLFROG
11	2:05:11	36.938	116.898	0.4	-1.26BL	0.9	117	ACI	1.48					13.1	0.11	15	BULLFROG
12	22:20: 5	36.897	116.813	0.4	-0.50BL	0.9	109	ACI	1.68			1.44		20.0	0.15	19	BULLFROG
15	21:57:19	36.944	116.886	0.2	-1.00BL	6.7	114	CCI				1.25		13.9	0.09	13	BULLFROG
16	21:33:49	36.882	116.815	0.3	-1.00BL	1.9	111	ACI	1.73			1.43		19.3	0.09	15	BULLFROG
16	21:33:50	36.878	116.804	1.7	20.10BL	2.0	176	BCI		1.78				23.6	0.09	10	BULLFROG
17	0:45:18	36.905	116.812	1.2	-1.58BL	13.0	156	CCI		1.43				20.5	0.09	11	BULLFROG
17	0:45:17	36.910	116.811	0.5	-1.00BL	2.3	154	BCI	1.95			2.07		20.7	0.11	15	BULLFROG
19	21:55:53	36.920	116.806	0.3	-0.25BL	1.1	163	ACI		1.24				25.6	0.04	8	BULLFROG
21	1: 2:39	36.887	116.812	0.4	5.00BL	5.4	81	CCI		2.05				22.5	0.16	15	BULLFROG
24	20:40:23	36.944	116.887	0.2	-1.00BL	7.0	114	CCI				1.39		13.9	0.11	12	BULLFROG
28	21:16:36	36.932	116.890	0.4	-1.00BL	1.3	96	ACI	1.34			1.74		14.0	0.10	15	BULLFROG
MAR 1	0:34: 9	36.880	116.817	0.7	-1.00BL	24.7	112	CCI				0.97		22.5	0.11	8	BULLFROG
2	19:33:32	36.902	116.809	0.6	-1.00BL	8.1	157	CCI				0.95		20.1	0.10	11	BULLFROG
2	22:41:46	36.896	116.813	0.6	-1.00BL	1.5	132	ACI	1.72	1.65		1.66		19.9	0.11	15	BULLFROG
4	23:38: 7	36.934	116.888	0.4	-1.00BL	1.0	116	ACI	1.22	1.78		1.53		14.1	0.12	15	BULLFROG
6	6:58: 3	36.892	116.814	0.4	-1.00BL	11.8	110	CCI	1.65			1.41		19.8	0.13	15	BULLFROG
7	21:33: 3	36.912	116.809	0.4	-1.00BL	10.2	153	CCI				1.20		20.7	0.09	9	BULLFROG
10	20:14:58	36.909	116.815	0.2	-1.00BL	1.1	118	ACI				1.25	1.3	20.8	0.05	13	BULLFROG
14	16: 3:36	36.891	116.823	0.3	10.86BL	1.9	125	ABI	1.52	1.43		0.84		20.5	0.09	16	BULLFROG
15	1:38:23	36.890	116.814	0.3	-0.95BL	0.7	110	ACI				0.82		19.6	0.11	16	BULLFROG
17	20:32:31	36.941	116.894	0.9	-1.10PB	10.9	226	CDI				1.50		27.4	0.09	12	BULLFROG
21	1:50:16	36.888	116.819	0.4	6.48BL	4.2	111	BCI	1.60	1.65		1.28		20.0	0.13	17	BULLFROG
21	22:51:41	36.890	116.814	0.4	-0.85BL	0.8	110	ACI	1.51	1.55		0.83		19.7	0.12	15	BULLFROG
25	1:53:15	36.899	116.814	0.5	-1.30BL	13.0	84	CCI		1.54				20.2	0.15	14	BULLFROG
APR 1	20:15:31	36.925	116.895	0.8	3.08*	—	87	CCI		1.45				14.0	0.17	14	BULLFROG
2	2:19:16	36.885	116.824	0.2	0.13PB	0.5	127	ACI		1.35				20.1	0.04	13	BULLFROG
3	0:44:46	36.897	116.815	0.4	-1.00BL	1.0	121	ACI	1.72			1.50		20.2	0.13	16	BULLFROG
3	21:12: 2	36.892	116.817	0.2	-1.00BL	0.3	123	ACI	1.67	1.55		1.22		20.0	0.08	14	BULLFROG
3	23:11:44	36.890	116.812	0.4	-1.00BL	0.8	109	ACI	1.85	1.59		1.39		19.5	0.13	18	BULLFROG
5	1:47:23	36.889	116.814	0.4	0.56PB	0.9	110	ACI		1.51				19.6	0.11	19	BULLFROG
5	20:33:55	36.886	116.820	0.3	-1.00BL	1.1	128	ACI	1.55	1.30		1.06		19.9	0.05	13	BULLFROG
6	20:21:16	36.899	116.815	0.3	-1.00BL	16.2	121	CCI	1.49	1.57		1.07		20.2	0.11	13	BULLFROG
8	0:26:25	36.891	116.813	0.3	-1.00BL	9.9	110	CCI				0.74		19.6	0.11	13	BULLFROG
8	21:21:44	36.938	116.888	0.3	-1.00BL	12.3	126	CCI	1.40			1.55		13.9	0.04	10	BULLFROG
9	18:25:43	36.900	116.814	0.4	-1.00BL	1.1	126	ACI				0.85		20.3	0.13	14	BULLFROG

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1988 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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
APR 10	15:51: 8	36.907	116.812	0.2	-1.00BL	0.8	118	ACI				0.77		20.6	0.07	12	BULLFROG
10	23:40:18	36.893	116.819	0.4	-1.00BL	1.2	130	ACI	1.56	1.20		0.91		20.2	0.05	9	BULLFROG
11	23:22:45	36.888	116.822	0.3	-1.00BL	0.8	126	ACI				0.68		20.2	0.08	10	BULLFROG
13	0:18:45	36.895	116.815	0.3	-1.00BL	0.9	122	ACI				0.72		20.1	0.12	13	BULLFROG
13	16:37:55	36.892	116.818	0.4	-1.00BL	1.2	110	ACI				0.83		20.1	0.08	13	BULLFROG
16	19:39:46	36.899	116.814	0.4	-1.00BL	1.1	120	ACI	1.42			1.00		20.3	0.09	14	BULLFROG
17	18:36:41	36.889	116.818	0.5	-1.00BL	0.9	129	ACI	1.51	1.29		0.97		19.9	0.10	15	BULLFROG
17	21: 3:20	36.882	116.832	4.2	10.68PB	9.7	184	CDI		0.37				20.6	0.06	6	BULLFROG
17	23:38:11	36.878	116.821	0.9	5.00PB	4.7	168	BCI		0.98				19.5	0.14	8	BULLFROG
18	16:34:10	36.941	116.885	0.4	-0.82BL	1.1	114	ACI	1.68			1.47		14.1	0.10	15	BULLFROG
20	21:52:52	36.882	116.818	0.4	-1.00BL	0.9	126	ACI	1.42	1.41		0.79		19.5	0.08	14	BULLFROG
20	22:49:22	36.935	116.888	0.4	-1.00BL	0.8	116	ACI	1.47		1.84	1.55		14.1	0.11	18	BULLFROG
22	15:26:46	36.891	116.815	0.4	-1.00BL	1.4	79	BCI	1.85	1.64		1.66	1.1	19.8	0.15	21	BULLFROG
22	20:32:37	36.888	116.816	0.4	-1.00BL	18.6	124	CCI				1.00		19.7	0.10	10	BULLFROG
23	17:34:23	37.028	116.110	0.4	0.45PB	0.4	198	ADI		1.53		0.85		10.6	0.10	19	YUCCA FLAT
25	18:51: 5	36.845	116.304	0.5	-1.64BL	0.6	104	ABI				0.24		2.4	0.10	10	JACKASS FLATS
25	20:51: 6	36.851	116.306	0.3	-0.93BL	0.4	78	AAI	1.38			0.74		1.7	0.07	12	JACKASS FLATS
26	0: 1:24	36.852	116.299	0.4	-0.37BL	0.3	80	AAI				0.28		2.0	0.09	11	JACKASS FLATS
26	15: 5:36	36.886	116.816	0.4	-1.00BL	1.3	111	ACI	1.60	1.44		1.05		19.6	0.12	16	BULLFROG
26	21:47:19	36.943	116.883	0.4	-1.00BL	1.3	87	ACI	1.81			1.57		14.2	0.11	17	BULLFROG
27	1:49:55	36.890	116.814	0.3	-1.00BL	9.5	110	CCI		1.53		1.07		19.7	0.11	15	BULLFROG
27	15: 8:49	36.891	116.813	0.4	-1.00BL	1.4	110	ACI	1.61			1.07		19.6	0.13	16	BULLFROG
27	22:24:31	36.885	116.817	0.4	-1.00BL	1.4	128	ACI				0.98		19.6	0.07	10	BULLFROG
28	21:28:38	36.935	116.893	0.3	-1.00BL	12.7	97	CCI	1.56			1.30		13.7	0.13	12	BULLFROG
28	22:24: 6	36.904	116.819	0.4	-0.85BL	12.6	120	CCI				1.24		20.8	0.10	14	BULLFROG
30	1:30: 0	36.377	116.371	0.6	-1.00BL	10.8	198	CDI	0.99	1.45	0.76	0.98		9.6	0.11	12	ASH MEADOWS
30	19:49:49	36.888	116.816	0.5	-1.00BL	1.2	111	ACI	1.50			1.10		19.7	0.14	15	BULLFROG
MAY 2	23:17:33	36.889	116.813	0.5	-1.69BL	0.9	110	ACI				0.87		19.5	0.13	15	BULLFROG
4	18:53:35	36.038	115.043	3.3	-1.00BL	11.5	279	CDI			2.29	2.48		52.9	0.22	18	LAS VEGAS SE
4	18:57:32	36.036	115.033	1.6	-1.00BL	1.5	277	CDI	2.75	2.49	3.21	2.83	2.9	72.0	0.49	20	LAS VEGAS SE
4	22:51:20	36.951	116.883	0.5	3.89BL	6.5	106	CCI	2.26			1.79		14.0	0.13	12	BULLFROG
6	17:38: 5	36.935	116.889	0.5	-1.73PB	1.0	116	ACI	1.42			1.05		14.0	0.10	13	BULLFROG
7	0:19:56	36.886	116.815	0.4	-0.77PB	0.8	128	ACI	1.47			0.83		19.5	0.09	16	BULLFROG
7	17:19:58	36.884	116.816	0.9	8.91PB	3.7	111	BCI				0.65		19.6	0.20	14	BULLFROG
8	15:37:22	36.901	116.813	0.4	-0.59PB	1.4	61	ACI	1.53	1.80		1.86		20.3	0.13	24	BULLFROG
8	19: 9:28	36.902	116.811	0.3	-1.54PB	9.8	107	CCI				1.17		20.2	0.13	14	BULLFROG
9	20: 1:18	36.937	116.886	0.4	-1.09PB	0.9	88	ACI	1.54			1.58		14.2	0.10	18	BULLFROG
10	17:57: 0	36.939	116.884	0.4	-0.43PB	1.2	87	ACI	1.65			1.59		14.3	0.10	17	BULLFROG
11	17:52:16	36.893	116.811	0.5	-1.56PB	1.4	109	ACI	1.54			0.98		19.6	0.12	14	BULLFROG
11	19: 4:50	36.886	116.818	0.6	-0.19PB	1.8	128	ACI				0.96		19.7	0.08	12	BULLFROG
11	22:54:18	36.890	116.817	0.5	-1.02PB	1.3	124	ACI	1.66			1.19		19.9	0.12	15	BULLFROG
12	14:38:41	36.509	116.590	1.0	1.87PB	2.6	169	BCI	1.21			0.93		16.0	0.10	12	BIG DUNE
12	16:11:12	36.939	116.886	0.4	-1.05PB	1.3	87	ACI				1.36		14.1	0.10	17	BULLFROG
16	15:58:33	36.939	116.882	0.4	-1.20PB	1.1	87	ACI				1.65		14.4	0.11	16	BULLFROG

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1988 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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
MAY	20	17:38:54	37.433	116.660	0.2	-1.73PB	9.1	76	CCI	1.53			1.50		15.7	0.08	20	BLACK MTN NW
	20	21:28:36	36.927	116.891	0.5	-1.47PB	1.0	118	ACI				1.19		14.2	0.09	12	BULLFROG
	20	21:31:15	36.932	116.893	0.5	-1.52PB	0.7	117	ACI	2.08	1.24		1.50		13.8	0.12	16	BULLFROG
	21	0:20:35	36.887	116.810	0.4	-1.72BL	3.0	110	BCI	1.58			1.38		19.2	0.13	18	BULLFROG
	24	20: 6:40	36.943	116.882	0.5	1.06PB	1.2	117	ACI				1.27		14.3	0.10	13	BULLFROG
	31	15:34:26	36.932	116.895	0.3	-1.74PB	0.7	131	ACI				1.01		13.0	0.04	10	BULLFROG
AUG	9	18:24:57	36.936	116.886	0.5	-1.10BL	1.0	88	ACI	1.34					14.2	0.12	18	BULLFROG
	27	23:23:36	35.923	115.124	2.2	0.00BL	29.1	192	CDI				1.86	2.1	33.3	0.12	9	SLOAN
SEP	1	22:41:34	36.822	116.683	—	0.00PB	—	288	ADI				0.88		5.8	0.01	3	BARE MTN
	2	23:40:57	36.895	116.810	0.4	-0.39PB	1.3	174	ACI				1.17	1.6	20.4	0.09	14	BULLFROG
	6	23:37:54	36.935	116.892	0.5	0.51PB	1.4	97	ACI	2.12		1.82	1.90		13.8	0.14	21	BULLFROG
	7	0: 8:49	36.892	116.824	0.7	-1.53BL	2.2	130	BCI	1.63			1.57		20.5	0.11	14	BULLFROG
	7	23:52:47	36.896	116.825	0.3	7.72PB	3.6	125	BCI	1.85			0.99		20.9	0.05	13	BULLFROG
	7	23:54:55	36.899	116.822	0.4	11.74PB	2.8	123	BBI				0.80		20.8	0.08	14	BULLFROG
	8	20:17:26	36.883	116.820	1.0	0.00BL	2.6	155	BCI				0.88		19.7	0.11	10	BULLFROG
	8	23:59:31	36.890	116.817	0.4	-1.81PB	1.1	110	ACI	1.42	1.04		0.84		19.9	0.09	13	BULLFROG
	10	18:49:36	36.885	116.818	0.3	-1.63PB	1.8	125	ACI	1.45			0.56		19.7	0.09	15	BULLFROG
	12	17:43:29	36.942	116.894	0.9	1.67PB	3.1	115	BCI	2.22			1.88	2.0	13.4	0.29	17	BULLFROG
	12	23:35:31	36.892	116.829	0.6	13.24PB	3.4	127	BBI				0.92		20.9	0.12	13	BULLFROG
	13	23:41:42	36.890	116.814	0.4	0.83PB	1.7	79	ACI	2.29			1.80		19.7	0.13	21	BULLFROG
	14	0: 4:49	36.899	116.818	0.5	6.05BL	5.4	122	CCI	1.73			1.32		20.5	0.10	16	BULLFROG
	15	0: 7:31	36.894	116.815	0.5	-1.48BL	1.3	110	ACI				1.45	2.0	20.0	0.11	15	BULLFROG
	15	22:19: 2	36.942	116.883	0.3	-1.85BL	0.4	87	ACI				1.54		14.2	0.09	16	BULLFROG
	17	23:40:37	36.903	116.812	0.3	-1.13BL	9.9	168	CCI	1.89	1.33		1.51		20.3	0.06	11	BULLFROG
	19	23:26:27	36.943	116.890	2.4	4.74*	—	164	CCI				1.60		13.6	0.05	10	BULLFROG
	20	0:24:12	36.901	116.810	0.4	-0.82BL	9.9	169	CCI	1.58			1.90	1.6	20.1	0.08	14	BULLFROG
	21	0:40:42	36.794	116.206	0.5	-1.20PB	0.3	140	ACI		1.02		0.81	1.0	7.5	0.10	12	SKULL MTN
	21	1: 9: 0	36.891	116.822	0.5	0.00BL	1.2	177	ACI	1.22			1.44		20.3	0.08	13	BULLFROG
	23	0: 9: 3	36.903	116.813	0.3	-1.18BL	8.7	169	CCI	2.01			1.42	1.3	20.4	0.06	14	BULLFROG
	24	0: 3:14	36.898	116.819	0.5	2.91BL	30.0	122	CCI	1.66			1.57		20.5	0.12	14	BULLFROG
	24	0:50: 9	36.893	116.814	0.5	3.10BL	30.0	110	CCI				0.90		19.8	0.11	12	BULLFROG
	27	23:48:17	36.897	116.815	0.5	-0.54BL	1.3	109	ACI	1.30			1.48	1.8	20.2	0.13	16	BULLFROG
	28	0: 1:32	36.890	116.822	0.5	8.44BL	5.4	126	CCI				1.17		20.3	0.08	13	BULLFROG
	28	23:47:19	36.892	116.824	0.3	-2.00BL	0.7	125	ACI				1.03		20.5	0.06	12	BULLFROG
	29	18:52:31	36.940	116.885	0.5	-0.91BL	1.3	87	ACI	1.48			1.42		14.2	0.11	13	BULLFROG
	30	0: 2: 7	36.901	116.807	0.4	-1.94BL	1.5	83	BCI			1.80		2.0	19.8	0.16	26	BULLFROG
	30	23:54:40	36.890	116.815	0.5	-0.58BL	1.5	110	ACI				1.01		19.7	0,12	13	BULLFROG
OCT	1	0:24:59	36.900	116.815	0.4	-0.80BL	1.4	58	ACI	1.94			1.88		20.3	0.15	25	BULLFROG
	3	16:25:39	36.897	116.824	0.4	7.00PB	3.7	124	BCI				0.83		20.8	0.08	10	BULLFROG
	4	0:34:56	36.890	116.824	0.5	10.42PB	3.1	126	BBI				0.83		20.4	0.07	11	BULLFROG
	5	1:10:31	36.892	116.820	0.3	-1.00BL	11.9	124	CCI				1.78		20.2	0.09	15	BULLFROG
	5	23:51:19	36.896	116.812	0.5	-1.76PB	2.7	109	BCI	1.65			1.18		19.9	0.13	14	BULLFROG
	6	0:21: 2	36.929	116.887	0.6	-0.98PB	1.5	95	ACI				1.42		14.4	0.15	15	BULLFROG
	6	23: 6:58	36.887	116.818	0.8	-1.03PB	11.1	149	CCI				0.74		19.7	0.11	12	BULLFROG
	6	23: 7:30	36.888	116.819	0.3	-1.87PB	1.5	125	ACI				1.28		19.9	0.12	16	BULLFROG

1988 LOCAL HYPOCENTER SUMMARY - SGB CHEMICAL EXPLOSIONS

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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
OCT 7	0: 8:45	36.898	116.813	0.4	-1.11PB	1.4	108	ACI	1.65			1.89		20.0	0.13	19	BULLFROG
8	23:49:60	36.893	116.819	0.4	-1.00BL	1.1	123	ACI		1.80		1.80		20.2	0.12	20	BULLFROG
9	20:20:40	36.885	116.821	0.5	-0.59PB	1.5	127	ACI				0.71		19.9	0.07	10	BULLFROG
10	23:45:17	36.900	116.818	0.4	-1.00BL	15.1	121	CCI				1.20		20.5	0.09	12	BULLFROG
11	17:24: 2	36.946	116.883	0.4	-0.35PB	12.0	106	CCI	2.07	2.16		1.69	1.5	14.1	0.11	16	BULLFROG
12	1:35:50	36.892	116.825	0.7	6.85PB	5.1	130	CCI	1.60	1.65		1.89		20.6	0.09	15	BULLFROG
12	23:52:60	36.895	116.818	0.5	3.23•	—	110	CCI				1.46		20.3	0.14	17	BULLFROG
12	23:56:39	36.901	116.816	0.3	-1.23PB	11.0	109	CCI				0.80		20.5	0.08	10	BULLFROG
14	1: 8:48	36.891	116.82'	0.3	-0.82•	—	125	CCI				1.89		20.2	0.05	17	BULLFROG
14	23:50: 8	36.900	116.830	0.7	15.30PB	4.2	125	BBI				1.03		20.5	0.12	14	BULLFROG
15	0:24:59	36.891	116.815	0.4	0.00BL	1.1	123	ACI				1.31		19.8	0.10	15	BULLFROG
16	0:47:41	36.893	116.817	0.3	-1.00BL	1.1	123	ACI	1.99			1.90	2.0	20.0	0.11	21	BULLFROG
17	17:35:29	36.940	116.884	0.5	-1.87PB	1.0	87	ACI				1.65		14.3	0.10	18	BULLFROG
18	23:42:20	36.898	116.813	0.2	-1.00BL	7.6	109	CCI				1.15		20.1	0.13	16	BULLFROG
21	0:45:39	36.895	116.813	0.3	-1.61PB	9.3	109	CCI	2.07			1.99		19.8	0.13	22	BULLFROG
21	22:58:48	36.939	116.885	0.4	-1.77PB	1.0	87	ACI			1.43	1.42		14.2	0.11	22	BULLFROG
22	0:28:42	36.877	116.821	0.5	-1.93PB	1.4	113	ACI				0.65		19.5	0.11	14	BULLFROG
22	0:50:10	36.896	116.817	0.3	-1.38•	—	122	CCI						20.2	0.09	14	BULLFROG
22	0:50:13	36.897	116.818	0.3	0.07PB	11.1	122	CCI				1.65		20.4	0.08	13	BULLFROG
22	23:49:49	36.882	116.815	0.3	-1.00BL	0.8	111	ACI				2.02	1.9	19.3	0.14	20	BULLFROG
23	16:45: 9	36.885	116.816	0.4	-1.43PB	1.8	111	ACI				0.96		19.5	0.10	14	BULLFROG
25	22:29: 2	36.940	116.883	0.5	-1.98PB	0.9	87	ACI			1.56	1.91		14.3	0.11	15	BULLFROG
26	20:27:54	35.935	115.234	2.2	-0.77‹	—	214	CDI	2.57			2.34		43.2	0.13	8	SLOAN
26	23:50:33	36.899	116.812	0.3	-1.00BL	7.2	78	CCI	1.92			1.87		20.1	0.15	29	BULLFROG
27	23:40:36	36.889	116.817	0.3	-1.00BL	9.6	124	CCI	1.80			2.15		19.8	0.11	19	BULLFROG
27	23:53:10	36.943	116.903	0.8	10.92PB	3.1	128	BBI						12.5	0.04	7	BULLFROG
28	17: 5:56	36.888	116.835	0.4	12.19PB	2.4	130	BBI	1.66			1.55		20.6	0.08	14	BULLFROG
29	0:40: 7	36.893	116.830	0.5	9.86PB	3.6	127	BCI	1.60			1.41		20.8	0.10	15	BULLFROG
29	0:53:32	36.900	116.815	0.3	-1.13•	—	120	CCI					1.5	20.4	0.10	12	BULLFROG
29	23:44:19	36.889	116.819	0.3	-1.00BL	1.1	78	ACI				2.03		20.0	0.10	19	BULLFROG
NOV 1	0:48:59	36.891	116.816	0.3	-1.00BL	11.6	123	CCI	1.40			1.45		19.9	0.10	17	BULLFROG
1	23:50:57	36.937	116.886	0.4	-1.24PB	6.6	88	ACI				2.11		14.2	0.10	20	BULLFROG
2	16:33: 8	36.896	116.814	0.4	3.06•	—	109	CCI				0.99		20.0	0.08	13	BULLFROG
3	0:42:18	36.899	116.817	0.4	-1.00BL	14.9	121	CCI				1.87	2.0	20.5	0.14	16	BULLFROG
3	22:38:23	36.939	116.890	0.4	-1.50PB	1.1	126	ACI				1.64		13.8	0.11	15	BULLFROG
3	22:39:16	36.942	116.881	0.7	-1.48PB	1.9	113	ACI				1.55		14.4	0.06	6	BULLFROG
4	0:42:48	36.895	116.819	0.4	-1.00BL	1.2	123	ACI				1.80		20.4	0.13	18	BULLFROG
5	0:45:22	36.899	116.812	0.4	-1.00BL	1.4	108	ACI				1.60		20.1	0.14	18	BULLFROG
5	19:27:49	36.888	116.825	0.6	9.87PB	4.9	127	BCI				0.93		20.4	0.09	12	BULLFROG
8	18:37:18	36.939	116.884	0.5	-0.27PB	1.4	87	ACI				1.59	2.0	14.3	0.11	16	BULLFROG
8	19:17:16	36.889	116.819	0.3	-1.00BL	13.6	125	CCI				1.02		20.0	0.08	14	BULLFROG
9	1: 1:52	36.884	116.827	1.0	0.60•	—	128	CCI				1.77	1.7	20.4	0.13	14	BULLFROG
11	0:48:59	36.897	116.821	0.8	6.68PB	9.6	123	CCI				1.63		20.6	0.11	12	BULLFROG
11	0:48:60	36.896	116.813	0.3	-1.23PB	7.8	109	CCI				1.67		19.9	0.13	16	BULLFROG

1988 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
NOV 11 15:50:52	36.902	116.809	0.5	2.55*	—	157	CCI				1.37		20.0	0.11	12	BULLFROG
11 23: 0:36	36.936	116.889	0.5	-1.00BL	2.7	68	BCI	1.77		1.95	1.92		14.0	0.15	21	BULLFROG
15 0:45:55	36.911	116.811	2.1	3.14*	—	161	CCI				0.81		20.8	0.09	8	BULLFROG
16 0:32:52	36.895	116.819	0.6	8.21PB	5.5	123	CCI				0.90		20.4	0.09	13	BULLFROG
16 19:25:19	36.893	116.819	0.6	7.00PB	8.0	124	CCI			1.83	1.69		20.3	0.08	10	BULLFROG
17 0:38: 8	36.890	116.823	0.4	-1.00BL	1.1	126	ACI	1.24			1.73		20.4	0.12	17	BULLFROG
17 0:57:47	36.900	116.815	0.7	0.00BL	1.8	108	ACI				1.65		20.3	0.13	11	BULLFROG
17 23: 5:21	36.933	116.892	0.7	-0.56PB	1.6	117	ACI				1.36		13.9	0.11	10	BULLFROG
18 0:43:26	36.893	116.817	0.8	-1.00BL	11.8	174	CCI				1.57	2.0	20.0	0.07	10	BULLFROG
18 0:47:46	36.893	116.817	1.6	2.88*	—	162	CCI				0.51		20.0	0.10	7	BULLFROG
19 0:37:50	36.887	116.817	0.6	-0.20*	—	128	CCI				1.62	1.8	19.8	0.09	12	BULLFROG
20 1: 8:53	36.897	116.819	0.6	8.70PB	5.6	122	CCI				0.84		20.4	0.06	12	BULLFROG
20 17:51:60	36.894	116.816	0.4	-1.00BL	1.1	122	ACI				1.59	1.7	20.0	0.09	14	BULLFROG
21 0:46:40	36.891	116.824	0.6	7.85PB	5.9	126	CCI				0.72		20.4	0.06	12	BULLFROG
21 20:17:56	36.893	116.817	0.4	-1.00BL	1.2	123	ACI				1.27		20.1	0.10	12	BULLFROG
22 0:33:23	36.904	116.815	0.3	-1.00BL	0.7	119	ACI				1.64		20.6	0.09	16	BULLFROG
23 0:36:46	36.897	116.810	0.3	-1.00BL	9.6	105	CCI				1.44		19.7	0.13	13	BULLFROG
23 22:22:59	36.955	116.911	0.4	-1.04PB	10.4	113	CCI				1.46		11.5	0.07	9	BULLFROG
24 0:46: 5	36.896	116.812	0.4	-1.00BL	10.6	109	CCI	1.36			1.62		19.9	0.13	13	BULLFROG
25 0:34: 8	36.897	116.819	0.3	-1.00BL	0.7	123	ACI	1.86			1.45	1.5	20.5	0.11	15	BULLFROG
26 19:11:46	36.891	116.818	0.2	-1.00BL	9.0	124	CCI				1.57		20.0	0.06	12	BULLFROG
27 0:38:44	36.898	116.814	0.4	-1.00BL	10.7	133	CCI				1.72		20.1	0.05	11	BULLFROG
28 19:12:27	36.893	116.813	0.8	0.30PB	1.8	152	ACI				0.71		19.7	0.09	10	BULLFROG
29 0:39:45	36.885	116.815	0.6	-1.00BL	12.7	128	CCI				1.85		19.5	0.11	15	BULLFROG
30 0:46:46	36.893	116.817	0.4	3.00PB	5.5	123	CCI				1.68		20.0	0.12	16	BULLFROG
DEC 1 0:38: 9	36.897	116.816	0.3	-1.00BL	10.2	122	CCI	1.63			1.84		20.2	0.10	18	BULLFROG
2 0:38: 5	36.895	116.815	0.3	-1.00BL	8.6	110	CCI				1.80	1.9	20.0	0.14	21	BULLFROG
3 0:35:20	36.898	116.815	0.3	-1.00BL	9.3	109	CCI				1.90	1.9	20.2	0.13	20	BULLFROG
5 0:38: 4	36.895	116.815	0.4	-1.00BL	16.7	122	CCI				1.43		20.0	0.10	12	BULLFROG
5 20:13:32	36.899	116.816	0.3	-1.00BL	8.8	109	CCI				2.03		20.4	0.14	22	BULLFROG
7 0:40:22	36.897	116.814	0.4	-1.00BL	14.7	121	CCI				1.72		20.1	0.09	14	BULLFROG
8 0:42: 4	36.905	116.805	0.3	-1.00BL	7.6	155	CCI				1.97	1.7	19.9	0.11	14	BULLFROG
8 18:52: 0	36.899	116.842	0.2	-1.00BL	5.1	146	CCI				1.65		22.3	0.05	12	BULLFROG
8 22:27: 0	36.975	116.804	1.3	-1.00BL	19.8	203	CDI				1.39		20.3	0.43	8	BULLFROG
9 0:32:17	36.897	116.811	1.7	-1.00BL	3.8	166	BCI				1.49	1.8	19.9	0.10	10	BULLFROG
9 15:15: 0	37.166	116.083	0.6	-1.34PB	0.7	148	ACI	1.72			1.64		6.9	0.07	10	OAK SPRING
11 0:41:48	36.893	116.826	0.8	-1.00BL	9.1	256	CDI				1.27		20.7	0.04	10	BULLFROG
11 20: 9:27	36.901	116.833	0.9	-1.00BL	11.2	208	CDI				1.59		21.7	0.07	14	BULLFROG
13 0:39:14	36.894	116.807	0.5	-1.00BL	12.9	138	CCI				2.10		19.4	0.15	11	BULLFROG
14 0:42:34	36.900	116.827	0.6	-1.00BL	1.1	206	ADI				1.58		21.2	0.08	14	BULLFROG
16 0:32:36	36.894	116.816	0.5	-1.00BL	1.4	110	ACI				1.60		20.0	0.12	16	BULLFROG
17 0:36:41	36.889	116.816	0.3	-1.00BL	1.0	124	ACI	1.72			1.94		19.8	0.10	19	BULLFROG
19 22:46:32	36.897	116.813	0.4	-1.00BL	12.7	109	CCI				0.65		20.0	0.11	10	BULLFROG
20 0:36:44	36.894	116.809	0.3	-1.00BL	9.5	108	CCI				1.66	1.6	19.5	0.15	15	BULLFROG

1988 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
DEC 20	17:34:15	36.941	116.885	0.6	-1.72*	——	114	CCI				1.28		14.1	0.10	8	BULLFROG
20	21:30:44	35.923	115.220	1.6	17.20PB	2.3	195	BDI	1.72			1.44		41.9	0.18	10	SLOAN
21	0:38:49	36.891	116.815	0.5	-1.00BL	11.0	130	CCI	1.51			1.59	1.3	19.8	0.11	14	BULLFROG
21	18:40:39	36.898	116.813	0.3	-1.00BL	8.5	108	CCI				2.01		20.1	0.14	18	BULLFROG
23	0:30:21	36.893	116.812	0.3	-1.00BL	9.6	109	CCI				1.95		19.7	0.13	15	BULLFROG
23	22:28:52	36.940	116.886	0.4	-1.96PB	9.4	87	CCI				1.34		14.1	0.09	15	BULLFROG
24	0:35:54	36.903	116.815	0.3	-1.00BL	10.4	169	CCI				1.41		20.6	0.10	15	BULLFROG
27	0:47:11	36.893	116.815	0.4	-1.00BL	13.7	122	CCI				1.70		19.9	0.09	14	BULLFROG
29	0:36:43	36.898	116.814	0.3	-1.00BL	7.4	79	CCI				1.90		20.1	0.14	29	BULLFROG
29	23:19:53	36.945	116.886	0.5	-1.00BL	1.2	113	ACI			1.66	1.76		13.9	0.11	14	BULLFROG
30	0:31:57	36.901	116.816	0.4	-1.00BL	10.6	170	CCI				1.99	1.7	20.5	0.10	15	BULLFROG
31	0:42: 1	36.902	116.811	0.4	-1.00BL	17.1	142	CCI				1.95		20.2	0.07	14	BULLFROG

1989 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)	QQQ 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JAN	1	0:46:43	36.894	116.814	0.4	-1.00BL	10.3	174	CCI				1.62		19.9	0.10	16	BULLFROG
	2	0:33:25	36.901	116.816	0.3	-1.00BL	11.5	143	CCI	1.91			2.16	2.2	20.4	0.10	16	BULLFROG
	4	0:46: 2	36.895	116.814	0.3	-1.00BL	9.1	80	CCI				2.13		19.9	0.14	21	BULLFROG
	6	0:31:53	36.894	116.810	0.2	-1.00BL	6.7	108	CCI	1.85			1.84		19.6	0.13	12	BULLFROG
	7	0:43: 2	36.892	116.820	0.3	-1.00BL	9.8	79	CCI				2.02	2.0	20.2	0.12	19	BULLFROG
	8	0:35:10	36.893	116.812	0.2	-1.00BL	7.3	109	CCI				1.95		19.6	0.15	20	BULLFROG
	10	17:16:10	36.938	116.888	1.2	-1.69•	—	166	CCI				1.33		14.0	0.10	7	BULLFROG
	11	0:48:50	36.897	116.815	0.2	-1.00BL	6.6	109	CCI				2.17		21.7	0.14	16	BULLFROG
	13	18:54: 7	36.940	116.886	0.4	-1.00BL	10.2	114	CCI				1.72		14.1	0.10	13	BULLFROG
	14	1:14:27	36.891	116.815	0.4	-1.00BL	10.8	57	CCI	2.04			1.91		19.8	0.13	20	BULLFROG
	15	0:39:42	36.900	116.816	0.3	-1.00BL	11.3	143	CCI				2.02		20.4	0.09	18	BULLFROG
	17	0:41:48	36.892	116.816	0.4	-1.00BL	11.2	175	CCI				1.79		19.9	0.10	15	BULLFROG
	18	0:14: 3	36.938	116.884	0.4	-1.00BL	12.4	114	CCI				1.41		14.3	0.12	13	BULLFROG
	19	0:45:45	36.897	116.815	0.3	-1.00BL	11.3	121	CCI				1.65		20.1	0.09	15	BULLFROG
	19	22:39:54	36.941	116.882	0.4	-1.00BL	9.8	87	CCI	1.75			1.64		14.4	0.09	16	BULLFROG
	21	0:47:41	36.898	116.815	0.4	-1.00BL	2.6	47	BCI				2.00		20.2	0.14	26	BULLFROG
	23	22:23:30	36.941	116.887	0.4	-1.00BL	13.6	114	CCI	1.65			1.54		14.0	0.15	11	BULLFROG
	25	0:41:52	36.894	116.817	0.3	-1.00BL	9.2	79	CCI	1.99		2.05	2.27	2.1	20.1	0.13	28	BULLFROG
	26	0:43:45	36.890	116.812	0.4	-1.00BL	10.5	78	CCI			1.70	2.26	1.7	19.5	0.17	17	BULLFROG
	26	18: 6:41	36.827	116.791	—	-1.56PB	—	332	ADI				1.22		15.0	0.04	4	BULLFROG
	28	1: 2:38	36.891	116.813	0.3	-1.00BL	10.0	78	CCI						19.7	0.12	17	BULLFROG
	29	1: 9:53	36.893	116.816	0.3	-1.00BL	9.5	110	CCI				1.59		20.0	0.17	18	BULLFROG
	28	1: 0:40	36.892	116.812	0.3	-1.00BL	11.8	60	CCI		2.35				19.6	0.14	30	BULLFROG
	30	0:47:49	36.894	116.814	0.3	-1.00BL	10.5	62	CCI				2.08		19.9	0.14	27	BULLFROG
FEB	2	0:49:49	36.889	116.815	0.6	-1.00BL	3.7	110	BCI				2.01	1.7	19.7	0.16	14	BULLFROG
	3	0:35:51	35.583	115.569	10.9	-1.00BL	30.0	266	DCI				1.15		80.3	0.05	6	MESQUITE VALLEY
	3	0:42:40	36.898	116.816	0.4	-1.00BL	10.3	79	CCI				1.98		20.3	0.15	19	BULLFROG
	4	0:59:39	36.899	116.810	0.3	-1.00BL	9.1	108	CCI	1.82		1.63		2.5	19.9	0.13	16	BULLFROG
	8	0:52:40	36.898	116.814	0.3	-1.00BL	10.0	144	CCI			1.58	1.84		20.2	0.09	19	BULLFROG
	9	0:43:40	36.893	116.816	0.3	-1.00BL	9.9	110	CCI	1.92			2.14		20.0	0.12	18	BULLFROG
	9	22:47:23	36.943	116.887	0.5	-1.00BL	1.3	114	ACI				1.28		13.9	0.10	11	BULLFROG
	11	1: 4:53	36.897	116.814	0.3	-1.00BL	9.5	109	CCI				2.09		20.1	0.13	20	BULLFROG
	12	0:56:43	36.896	116.816	0.4	-1.00BL	1.2	110	ACI	1.77			1.77		20.2	0.13	25	BULLFROG
	14	1:25: 6	36.897	116.817	0.3	-1.00BL	10.1	58	CCI			2.07	2.27		20.3	0.15	28	BULLFROG
	14	22:26:18	36.935	116.886	0.3	-1.00BL	9.7	115	CCI	2.41		1.51	1.72		14.2	0.12	17	BULLFROG
	15	0:37:46	35.584	115.576	0.9	-1.00BL	30.0	241	CDI				1.76		79.7	0.04	7	CLARK MTN
	16	0:58:11	36.893	116.813	0.4	-1.00BL	10.9	62	CCI			1.61	2.01		19.7	0.13	22	BULLFROG
	16	18:13:23	36.938	116.891	0.7	-1.00BL	21.9	116	CCI	1.79			1.40		13.7	0.14	13	BULLFROG
	18	1: 1:39	36.897	116.812	0.3	-1.00BL	8.6	79	CCI	1.90		1.68	2.17	2.4	19.9	0.13	23	BULLFROG
	19	0:57:37	36.895	116.812	0.3	-1.00BL	9.7	57	CCI	2.03		1.95	1.96		19.8	0.13	24	BULLFROG
	21	1: 2:38	36.893	116.813	0.3	-1.00BL	11.2	122	CCI	1.94		1.87			19.8	0.08	16	BULLFROG
	23	1: 0: 7	36.894	116.816	0.2	-1.00BL	6.6	110	CCI			2.10			20.0	0.13	21	BULLFROG
	23	22:26: 3	36.935	116.886	0.6	-1.78PB	12.0	144	CDI				1.46		14.2	0.09	5	BULLFROG
	24	0:57: 4	36.894	116.812	0.4	-1.00BL	1.5	109	ACI	1.59		1.48	1.96		19.7	0.14	22	BULLFROG

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1989 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)	QQQ 12S	MAGNITUDE ESTIMATES Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
FEB 26	1: 2:32	36.894	116.815	0.7	-1.00BL	2.8	74	BCA		2.27				21.9	0.15	10	BULLFROG
27	1: 7:52	36.895	116.813	0.4	-1.00BL	1.3	109	ACI	1.73			2.01		19.9	0.13	24	BULLFROG
27	18: 7:35	36.939	116.881	0.3	-1.86PB	11.5	100	CCI				1.45		14.6	0.10	13	BULLFROG
MAR 1	18:16:28	36.942	116.884	0.4	-1.00BL	0.9	114	ACI				1.36		14.1	0.12	17	BULLFROG
3	1:28:42	36.891	116.814	0.4	-1.00BL	1.2	110	ACI	2.05		1.82	2.08		19.8	0.13	20	BULLFROG
4	0:57:36	36.891	116.814	0.4	-1.00BL	1.7	78	ACI	1.85		2.07		2.0	19.7	0.13	20	BULLFROG
5	1:56:37	36.893	116.815	0.4	-1.00BL	1.5	57	ACI			1.79	1.97		20.0	0.14	28	BULLFROG
7	1: 8:11	36.899	116.81u	0.4	-1.00BL	1.3	108	ACI	1.69			1.94		19.9	0.13	20	BULLFROG
8	0:57:36	36.894	116.812	0.4	-1.00BL	1.5	79	ACI	2.06		1.99	2.11		19.8	0.14	24	BULLFROG
9	1: 5: 6	36.892	116.815	0.4	-1.00BL	1.6	79	ACI	1.83		1.56	1.91		19.9	0.14	20	BULLFROG
9	18:32:22	36.946	116.885	5.2	-1.70PB	8.4	179	DCI				1.18		13.9	0.14	6	BULLFROG
10	1:15:42	36.892	116.813	0.3	-1.00BL	8.4	109	CCI	2.10		1.74	2.12		19.6	0.14	21	BULLFROG
10	21: 9:43	36.838	116.646	0.8	-1.91PB	0.6	220	ADI				0.63		4.9	0.08	7	BARE MTN
14	1:38:36	36.893	116.813	0.3	-1.00BL	1.6	57	ACI	2.12		2.04			19.8	0.14	32	BULLFROG
15	0:58:32	36.893	116.817	0.4	-1.00BL	11.2	123	CCI	1.85			2.01		20.0	0.12	17	BULLFROG
15	22:20:42	36.942	116.887	0.5	-1.88PB	8.6	148	CCI				1.64		13.9	0.11	12	BULLFROG
16	0:57: 3	36.894	116.813	0.3	-1.00BL	13.6	122	CCI			1.58	1.95		19.9	0.11	17	BULLFROG
17	0:58:57	36.889	116.810	0.4	-1.00BL	1.3	78	ACI			1.93			19.3	0.13	22	BULLFROG
18	22:22:51	36.940	116.887	0.4	-1.00BL	8.9	88	CCI				1.39	1.6	14.0	0.10	19	BULLFROG
19	0:57:20	36.894	116.813	0.5	-1.00BL	1.7	79	BCI	2.39		1.89			19.9	0.16	23	BULLFROG
20	22:37:13	36.940	116.891	0.7	-1.00BL	14.3	166	CCI	1.40	1.23		1.04	1.4	13.7	0.06	7	BULLFROG
21	1:37: 4	36.891	116.813	0.3	-1.00BL	7.9	110	CCI	2.46		2.[illegible]4	2.29		19.6	0.13	27	BULLFROG
21	18:31:38	36.944	116.885	0.4	-1.00BL	10.1	102	CCI				1.32		14.0	0.11	11	BULLFROG
22	1:13:36	36.894	116.812	0.4	-1.00BL	1.3	109	ACI	1.92		1.75			19.7	0.14	21	BULLFROG
23	1: 4:41	36.891	116.813	0.4	-1.00BL	1.5	62	ACI	1.88		1.78	1.90		19.6	0.12	26	BULLFROG
23	18:39: 9	36.940	116.882	0.4	-1.00BL	14.1	87	CCI	1.60			1.44		26.9	0.09	14	BULLFROG
24	0:58:39	36.893	116.815	0.4	-1.00BL	1.6	57	ACI	1.84		1.88	1.80	2.1	19.9	0.14	25	BULLFROG
24	22:24:35	36.944	116.885	0.4	-1.00BL	8.6	87	CCI				1.44		14.0	0.08	13	BULLFROG
25	1:11:56	36.896	116.812	0.5	-1.00BL	3.3	80	BCU	1.64		1.58	1.87		19.8	0.16	19	BULLFROG
26	0:47:57	36.893	116.815	0.4	-1.00BL	12.2	57	CCU	1.83		1.76	1.92		19.9	0.13	20	BULLFROG
29	0:56:14	36.895	116.819	0.3	-1.00BL	10.9	123	CCU	1.77			1.54	1.9	20.3	0.10	17	BULLFROG
30	1: 3:37	36.893	116.811	0.3	-1.00BL	8.7	79	CCU	2.00		1.88			19.6	0.13	24	BULLFROG
31	0:59:35	36.895	116.813	0.3	-1.00BL	9.3	57	CCU	2.02		1.86	2.06		19.9	0.14	24	BULLFROG
APR 1	0:58: 2	36.892	116.815	0.3	-1.00BL	6.3	57	CCI	2.19		2.06			19.8	0.12	32	BULLFROG
3	24: 0: 3	36.895	116.812	0.3	-1.00BL	8.8	57	CCI	2.05		1.51	1.86		19.8	0.14	23	BULLFROG
4	20:51:40	37.274	116.416	2.1	8.37PB	3.9	214	BOI				1.36		10.5	0.05	7	SILENT BUTTE
4	21:44:15	36.942	116.885	0.4	-1.00BL	11.1	114	CCI	1.61			1.31		14.1	0.10	11	BULLFROG
6	0: 1: 2	36.894	116.812	0.3	-1.00BL	8.1	79	CCI			1.99			19.7	0.14	23	BULLFROG
8	21: 1: 0	36.939	116.885	0.3	-1.00BL	9.7	114	CCI				1.56		14.2	0.13	12	BULLFROG
11	0: 3:12	36.893	116.811	0.3	-1.00BL	9.8	109	CCI	1.95		1.82			19.6	0.15	20	BULLFROG
12	17: 6: 9	36.945	116.882	0.6	-1.00BL	12.4	152	CCI				1.18	1.5	14.2	0.10	8	BULLFROG
13	0: 4: 5	36.895	116.814	0.4	-1.00BL	10.7	57	CCI			1.88			20.0	0.14	23	BULLFROG
14	0: 4: 4	36.895	116.813	0.3	-1.00BL	9.4	79	CCI	1.97		1.77	1.87		19.9	0.15	23	BULLFROG
15	0:31: 2	36.895	116.814	0.3	-1.00BL	10.2	57	CCI	1.90		1.85			20.0	0.15	23	BULLFROG

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1989 LOCAL HYPOCENTER SUMMARY - SGB CHEMICAL EXPLOSIONS

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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
APR 15	17:44: 4	36.945	116.883	0.4	-1.00BL	10.2	86	CCI				1.28		14.1	0.11	15	BULLFROG
18	0: 9:19	36.892	116.815	0.4	-1.00BL	5.7	62	CCI			2.05			19.8	0.14	25	BULLFROG
18	21:27:25	36.937	116.884	0.4	-1.00BL	0.8	88	ACI	1.60		1.59	1.51		14.4	0.10	18	BULLFROG
18	23:59:18	36.889	116.813	0.4	-1.00BL	10.6	62	CCI	1.99		1.83			19.5	0.12	20	BULLFROG
20	0:48:41	36.890	116.813	0.3	-1.00BL	9.8	56	CCI	2.23		2.04			19.6	0.13	26	BULLFROG
21	17:39:10	36.941	116.889	0.5	-1.00BL	1.2	104	ACI				0.89		13.7	0.11	12	BULLFROG
22	0:31:20	36.892	116.815	0.3	-1.00BL	9.9	79	CCI			2.08			19.8	0.14	19	BULLFROG
24	22:45:37	36.937	116.880	0.5	-1.00BL	15.3	99	CCI				1.36		14.7	0.09	8	BULLFROG
25	0:18: 8	36.892	116.817	0.5	-1.00BL	1.3	123	ACI	1.80			1.56	1.6	20.0	0.12	14	BULLFROG
26	0: 1:49	36.895	116.816	0.4	-1.00BL	2.8	62	BCI			1.74			20.1	0.14	24	BULLFROG
27	0:51:33	36.892	116.815	0.3	-1.00BL	10.2	57	CCI			2.41			19.8	0.13	29	BULLFROG
28	17:27: 2	36.938	116.888	0.5	-1.00BL	2.1	88	BCI	1.41			1.44		14.0	0.12	15	BULLFROG
29	0: 1:20	36.894	116.810	0.2	-1.00BL	7.0	109	CCI	1.90		1.78		2.5	19.6	0.13	20	BULLFROG
MAY 2	1: 8: 8	36.891	116.813	0.3	-1.00BL	9.8	55	CCI			2.01			19.7	0.12	24	BULLFROG
3	0: 4: 6	36.891	116.813	0.3	-1.00BL	10.2	110	CCI			1.67	2.52		19.6	0.13	18	BULLFROG
4	1: 4:30	36.889	116.812	0.3	-1.00BL	10.1	110	CCI	1.87		1.90	1.99		19.4	0.13	18	BULLFROG
4	22:40:47	36.938	116.888	0.5	-1.00BL	12.2	88	CCI				0.87		14.0	0.14	15	BULLFROG
5	23:44:29	36.893	116.812	0.3	-1.00BL	9.4	79	CCI			2.06			19.7	0.14	22	BULLFROG
8	23:58:35	36.891	116.813	0.4	-1.00BL	1.7	79	ACI	1.70		1.82	2.39		19.7	0.15	22	BULLFROG
10	0:29:43	36.895	116.811	0.3	-1.00BL	7.7	80	CCI	2.06		1.95			19.7	0.14	18	BULLFROG
10	17:17: 6	36.939	116.892	0.6	-1.00BL	1.5	88	BCI				1.46	1.7	13.6	0.15	14	BULLFROG
11	0:39:16	36.895	116.815	0.3	-1.00BL	9.4	109	CCI				1.54		20.0	0.12	13	BULLFROG
12	0: 9:21	36.894	116.813	0.3	-1.00BL	8.2	79	CCI			1.79			19.8	0.13	27	BULLFROG
12	23:50:28	36.892	116.813	0.3	-1.00BL	8.5	109	CCI			1.61			19.7	0.12	20	BULLFROG
13	1: 9:38	36.942	116.882	0.5	-1.00BL	13.1	113	CCI				1.24		14.3	0.11	11	BULLFROG
16	0: 0:24	36.896	116.814	0.4	-1.00BL	10.7	57	CCI			1.54	1.87		20.0	0.14	21	BULLFROG
16	17: 5:21	36.941	116.881	0.5	-1.00BL	11.9	87	CCI				1.33		14.5	0.10	13	BULLFROG
17	0:14:14	36.892	116.814	0.4	-1.00BL	1.6	79	ACI	1.78		1.83			19.7	0.14	20	BULLFROG
17	23:54:13	36.938	116.884	0.4	-1.00BL	15.3	101	CCI				1.05		14.3	0.12	12	BULLFROG
18	0:15:23	36.892	116.813	0.4	-1.00BL	1.3	109	ACI	1.88		1.59	2.16		19.7	0.13	19	BULLFROG
20	0: 8:48	36.891	116.815	0.4	-1.00BL	1.6	79	BCI	1.78		1.85	2.50		19.7	0.15	24	BULLFROG
23	0: 3:26	36.893	116.809	0.3	-1.00BL	10.0	108	CCI				1.83		19.5	0.14	14	BULLFROG
23	17:46:25	36.946	116.881	0.7	-1.00BL	16.7	125	CCI				1.23		14.2	0.19	12	BULLFROG
23	21:30:18	36.947	116.882	0.7	-1.00BL	14.2	152	CCI				1.01		14.2	0.09	7	BULLFROG
24	0:42:24	36.894	116.815	0.3	-1.00BL	10.2	110	CCI			1.76			19.9	0.13	18	BULLFROG
25	0:18:33	36.892	116.814	0.3	-1.00BL	9.9	79	CCI			1.70	1.83		19.8	0.13	21	BULLFROG
26	0: 0:25	36.894	116.813	0.3	-1.00BL	9.9	79	CCI			1.70			19.8	0.15	21	BULLFROG
26	0: 3: 5	36.939	116.887	0.4	-1.00BL	11.0	115	CCI				1.11		14.1	0.11	16	BULLFROG
27	0: 3:33	36.895	116.813	0.3	-1.00BL	9.1	79	CCI	1.79		1.68	2.13		19.9	0.14	21	BULLFROG
27	22:46:11	36.946	116.883	0.6	-1.00BL	1.3	86	ACI			1.39	1.16		14.1	0.11	12	BULLFROG
28	1:10:13	36.892	116.811	0.2	-1.00BL	7.8	109	CCI	1.60		1.52	1.72		19.5	0.13	18	BULLFROG
30	21:22:33	36.946	116.882	0.5	-1.00BL	14.7	103	CCI				0.80		14.2	0.12	14	BULLFROG
31	0:39:23	36.892	116.811	0.2	-1.00BL	7.2	109	CCI			1.45			19.5	0.13	19	BULLFROG
31	21:26:42	36.947	116.880	0.5	-1.00BL	1.2	112	ACI				1.39		14.4	0.08	9	BULLFROG

1989 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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JUN	1	0:36:27	36.895	116.811	0.3	-1.00BL	9.4	57	CCI	1.78		1.93			19.7	0.14	24	BULLFROG
	1	23:54:26	36.893	116.812	0.3	-1.00BL	8.5	109	CCI	1.65		1.56	2.12		19.7	0.12	18	BULLFROG
	3	0:28:30	36.894	116.814	0.3	-1.00BL	10.1	79	CCI	1.88		1.77	2.08	2.6	19.9	0.17	22	BULLFROG
	4	17:22: 0	36.945	116.888	0.6	-1.00BL	1.5	114	BCI	1.38			1.14		13.7	0.19	11	BULLFROG
	6	0: 6:22	36.893	116.809	0.4	-1.00BL	1.7	79	ACI			1.51			19.5	0.12	19	BULLFROG
	7	0: 4:19	36.891	116.817	0.3	-1.00BL	8.8	110	CCI	2.02		1.86			19.9	0.14	22	BULLFROG
	7	17: 1:43	36.944	116.806	0.4	-1.00BL	6.5	153	CCI				0.82		13.9	0.10	12	BULLFROG
	7	21:45: 1	37.173	116.?09	1.9	-1.11PB	2.7	131	BCI				1.13		11.2	0.12	8	RAINIER MESA
	8	0: 1:34	36.888	116.815	0.4	-1.00BL	1.3	110	ACI			1.29	1.88		19.6	0.13	19	BULLFROG
	8	17: 5:54	36.942	116.886	0.5	-1.00BL	15.3	114	CCI				0.92		14.0	0.11	11	BULLFROG
	10	0: 2:28	36.895	116.813	0.2	-1.00BL	6.8	109	CCI			1.92			19.9	0.14	21	BULLFROG
	12	22: 7:38	36.936	116.885	1.0	-1.00BL	1.4	156	BCI			1.00	1.02		14.3	0.17	9	BULLFROG
	13	0: 6:27	36.893	116.813	0.3	-1.00BL	9.4	109	CCI	1.44			1.62		19.7	0.13	17	BULLFROG
	14	0:47:18	36.895	116.815	0.3	-1.00BL	8.7	79	CCI	2.08		1.81	2.29		20.1	0.16	25	BULLFROG
	14	17:28:46	36.943	116.891	0.6	-1.00BL	16.2	128	DCI				1.15		20.1	0.09	9	BULLFROG
	14	21: 2:18	37.615	116.177	0.2	-0.97PB	6.5	105	CCI				1.84		15.3	0.17	8	BELTED PEAK
	14	21:24: 3	36.949	116.882	0.4	-1.00BL	8.4	151	CCI				0.96		14.1	0.09	11	BULLFROG
	16	0: 3:21	36.896	116.815	0.4	-1.00BL	1.5	79	BCI			1.61	2.01		20.1	0.15	23	BULLFROG
	20	17: 7:29	36.943	116.884	0.7	-1.00BL	12.9	153	CCI				1.29		14.1	0.16	10	BULLFROG
	20	23:58:20	36.893	116.812	0.2	-1.00BL	7.7	109	CCI			1.92			19.7	0.13	20	BULLFROG
	22	0: 6: 1	36.902	116.811	0.4	-1.00BL	17.1	142	CCI						20.2	0.07	14	BULLFROG
	22	17: 7:57	36.932	116.892	0.5	-1.00BL	10.1	158	CCI				1.26		13.9	0.15	7	BULLFROG
	23	0:10:21	36.891	116.812	0.3	-1.00BL	7.7	79	CCI	1.77		1.65	1.90		19.5	0.16	21	BULLFROG
	23	20: 7:60	37.011	116.581	0.5	2.92•	——	122	CCI	1.53			0.82		16.9	0.10	11	THIRSTY CANYON SE
	24	0:13:50	36.890	116.811	0.3	-1.00BL	?.0	79	CCI	2.02		1.89	2.41		19.4	0.14	21	BULLFROG
	27	21:33:37	36.947	116.884	0.6	-1.90BL	?1.7	152	CCI				1.13		14.0	0.09	8	BULLFROG
	28	0: 1:17	36.895	116.810	0.3	-1.00BL	9.7	108	CCI	1.80		1.65	2.41		19.7	0.12	15	BULLFROG
	29	0: 0:17	36.892	116.813	0.3	-1.00BL	8.8	109	CCI	1.96		1.74	2.17		19.7	0.13	18	BULLFROG
	29	23:59:59	36.893	116.813	0.2	-1.00BL	7.4	109	CCI			1.77	2.56		19.8	0.10	13	BULLFROG
	30	17: 9:51	36.935	116.888	0.8	-1.00BL	11.7	164	CCI				1.16		14.1	0.09	7	BULLFROG
JUL	7	23:43:21	36.894	116.813	0.3	-1.00BL	8.6	57	CCI	2.32	2.18				19.8	0.13	25	BULLFROG
	8	22:54:52	35.589	115.572	2.2	3.50•	——	226	CDI		1.56		1.98		70.6	0.13	9	CLARK MTN
	10	22:24:25	38.334	117.307	0.2	-1.02PB	1.0	246	ADI		1.77		1.67		70.7	0.02	6	SAN ANTONIA RANCH
	10	22:47: 4	35.529	115.604	9.1	5.07•	——	263	DDI		1.37		1.68		82.9	0.12	6	CLARK MTN
	11	23: 1:42	35.642	115.573	1.7	0.00BL	30.0	220	CDI		1.39		1.43		75.2	0.07	6	CLARK MTN
	12	12:35:32	36.896	116.811	0.5	-1.00BL	3.0	108	BCI	2.02	2.16				19.8	0.15	14	BULLFROG
	12	22:37:31	35.643	115.543	6.9	0.00BL	30.0	220	DDI		1.64		1.81		75.2	0.33	6	CLARK MTN
	12	23:51:47	36.895	116.816	0.4	-1.00BL	10.7	110	CCI	2.11	2.09		1.88	1.7	20.1	0.14	17	BULLFROG
	17	23:56:14	36.889	116.813	0.5	-1.46BL	13.8	85	CCA		2.13				19.5	0.10	11	BULLFROG
	18	17:57:38	36.936	116.890	0.8	-1.00BL	15.3	156	CCI	1.97	1.39		1.41		13.9	0.10	8	BULLFROG
	18	23:48: 8	36.888	116.814	0.5	-1.00BL	1.5	110	ACI	1.98	2.00		2.06		19.5	0.15	19	BULLFROG
	20	0:48: 3	36.894	116.816	0.3	-1.00BL	9.1	85	CCI	2.14	2.33	1.96	2.09		20.0	0.12	20	BULLFROG
	22	0:19:53	36.892	116.816	0.3	-1.00BL	9.2	110	CCI	1.87	2.06		1.65		19.9	0.13	16	BULLFROG
	22	12:43:24	36.891	116.817	0.3	-1.00BL	9.7	124	CCI	2.32	2.16		2.05		20.0	0.11	19	BULLFROG

1989 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)	QQQ 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
JUL	25	12:47: 4	36.891	116.812	0.4	-1.00BL	1.4	109	ACI	1.66	2.13	1.59	1.77		19.6	0.14	19	BULLFROG
	26	23:46: 6	36.889	116.816	0.3	-1.00BL	1.1	93	ACI	2.45	2.24	1.75			19.8	0.11	19	BULLFROG
	26	0:13: 8	36.904	116.811	0.5	-1.00BL	1.8	107	BCI		2.23		1.99		20.3	0.16	18	BULLFROG
	27	22:39:10	35.593	115.568	2.9	0.00BL	30.0	240	CDI		1.43		1.80		79.5	0.10	6	CLARK MTN
	27	23:56: 8	36.896	116.823	0.3	-1.00BL	8.9	111	CCI	1.89	2.12		1.71		20.7	0.13	15	BULLFROG
	29	0: 2:24	36.894	116.811	0.3	-1.00BL	9.0	79	CCI	1.94	2.01		1.75		19.7	0.13	16	BULLFROG
AUG	1	12:47: 8	36.894	116.810	0.4	-1.00BL	1.6	109	ACI	1.85	2.08		1.95		19.6	0.12	19	BULLFROG
	2	0: 8:34	36.892	116.815	0.4	-1.00BL	1.4	110	ACI	1.90	2.33	2.04	1.91	2.5	19.8	0.13	18	BULLFROG
	3	0: 0:13	36.896	116.809	0.3	-1.00BL	7.6	108	CCI	1.66			2.08		19.6	0.13	16	BULLFROG
	3	23:46:25	36.895	116.82[illegible]	0.4	-1.00BL	13.3	124	CCI	1.94	1.95		1.77		20.5	0.11	15	BULLFROG
	4	17: 6:50	36.951	116.891	0.4	-1.00BL	13.7	109	CCI				1.06		13.3	0.10	11	BULLFROG
	5	0:36: 3	36.893	116.812	0.3	-1.00BL	1.4	57	ACI			1.81	1.88		19.7	0.13	25	BULLFROG
	8	0: 3:13	36.894	116.808	0.4	-1.00BL	1.6	108	ACI			1.70	1.89		19.5	0.14	20	BULLFROG
	9	0: 7:12	36.896	116.810	0.3	-1.00BL	7.4	108	CCI	1.94		1.93			19.7	0.13	18	BULLFROG
	9	23:58: 1	36.892	116.813	0.4	-1.00BL	1.5	79	ACI	1.70		1.52	2.03		19.6	0.14	21	BULLFROG
	11	20:18:32	36.908	116.838	0.5	-1.00BL	8.4	159	CCI		1.39		0.69		19.4	0.11	11	BULLFROG
	11	23:44:17	36.901	116.814	0.4	-1.00BL	1.5	78	ACI			1.86	1.58		20.3	0.14	19	BULLFROG
	12	17: 2:49	36.939	116.888	0.4	-1.00BL	14.3	115	CCI	1.61			1.12		13.9	0.12	13	BULLFROG
	12	23:50:21	36.895	116.815	0.3	-1.00BL	8.1	109	CCI				1.55	1.6	20.1	0.12	16	BULLFROG
	14	23:52: 6	36.901	116.813	0.4	-1.00BL	12.2	78	CCI	1.81		1.44	1.98	2.5	20.2	0.17	18	BULLFROG
	15	19:14:58	36.918	116.832	1.4	-1.00BL	11.2	162	CCI		1.04		1.00		19.4	0.10	7	BULLFROG
	15	23:56:30	36.889	116.813	0.4	-1.00BL	2.5	85	BCI			1.81	1.38		19.5	0.13	17	BULLFROG
	17	0: 1:59	36.892	116.815	0.4	-1.00BL	1.5	85	ACI	1.91		1.80	2.24	1.9	19.8	0.13	22	BULLFROG
	17	21: 9:15	36.939	116.881	1.0	-1.006L	27.3	102	CCI				1.37		14.6	0.12	7	BULLFROG
	17	23:59:13	36.894	116.816	0.4	-1.00BL	1.7	57	ACI	2.08		1.98	2.09		20.1	0.14	24	BULLFROG
	18	23: 3: 5	36.906	116.660	0.5	-1.00BL	30.0	181	CDI		1.54		1.52		12.5	0.05	9	BARE MTN
	18	23:56:21	36.893	116.812	0.3	-1.00BL	8.4	79	CCI	1.65		1.80	1.98		19.6	0.13	19	BULLFROG
	19	19:18:10	36.909	116.836	0.3	-1.00DL	7.6	159	CCI				1.36		19.5	0.10	11	BULLFROG
	21	23:52:15	36.898	116.815	0.4	-1.00BL	1.6	79	ACI	1.77		1.54	1.86		20.1	0.14	21	BULLFROG
	22	23:59: 4	36.895	116.810	0.3	-1.00BL	8.9	78	CCI	1.71		1.60	2.25	1.8	19.6	0.13	18	BULLFROG
	24	0: 4: 6	36.896	116.816	0.3	-1.00BL	9.8	109	CCI			1.80	2.07		20.1	0.14	18	BULLFROG
	24	19: 1:10	36.905	116.648	0.3	-1.00BL	0.6	159	ACI				1.67		11.9	0.07	14	BARE MTN
	25	23:44:15	36.895	116.817	0.3	-1.00BL	10.2	79	CCI	1.83		1.76	1.87		20.2	0.13	20	BULLFROG
	27	0:22:19	36.943	116.885	0.3	-1.00BL	10.6	69	CCI				1.44	1.8	14.1	0.10	17	BULLFROG
	28	23:50:19	36.894	116.813	0.4	-1.00BL	10.5	57	CCI	2.01		1.76	2.18		19.9	0.13	22	BULLFROG
	29	21:59:14	36.913	116.835	0.4	-1.00BL	9.3	157	CCI				1.03		19.4	0.09	9	BULLFROG
	30	0: 0:19	36.896	116.815	0.3	-1.00BL	8.4	85	CCI			1.99	1.80		20.1	0.12	21	BULLFROG
	30	23:58:19	36.893	116.811	0.3	-1.00BL	8.4	85	CCI	1.82		1.66	1.99		19.6	0.14	22	BULLFROG
	31	17:16: 2	36.937	116.889	0.4	-1.00BL	2.0	88	BCI			1.63	1.45	1.5	13.9	0.11	18	BULLFROG
	31	21:15:53	36.907	116.839	0.3	-1.00BL	9.8	112	CCI				1.20		19.4	0.10	12	BULLFROG
SEP	1	0:22:59	36.897	116.815	0.3	-1.00BL	9.0	109	CCI	1.97		1.64	1.97	2.0	20.1	0.14	22	BULLFROG
	1	22:34:23	36.908	116.649	1.3	-1.00BL	1.2	252	BDI		1.42		0.95		12.1	0.08	7	BARE MTN
	1	23:49:13	36.898	116.809	0.3	-1.00BL	8.9	108	CCI				1.82	2.6	19.8	0.14	17	BULLFROG
	2	23:52:15	36.895	116.812	0.3	-1.00BL	8.7	109	CCI	1.56			1.90	1.9	19.8	0.14	15	BULLFROG

1989 LOCAL HYPOCENTER SUMMARY - SGB CHEMICAL EXPLOSIONS

DATE (UTC)	TIME (UTC)	LATITUDE (DEG. N)	LONGITUDE (DEG. W)	STAND ERROR H(KM)	DEPTH (KM)	STAND ERROR Z(KM)	AZI GAP (DEG)	QQQ 12S	MAGNITUDE ESTIMATES Mca	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
SEP 3	0:38:52	36.892	116.845	0.4	-1.00BL	9.9	116	CCI				1.38		19.6	0.09	12	BULLFROG
3	16:57:11	36.938	116.888	0.4	-0.80BL	8.0	167	CCI				0.82		14.0	0.06	11	BULLFROG
5	23:14:18	36.905	116.837	0.7	-1.00BL	1.8	160	ACI		1.56		1.19		19.6	0.09	10	BULLFROG
6	0:25:22	36.902	116.812	0.3	-1.00BL	8.6	108	CCI			1.71	2.25		20.2	0.13	21	BULLFROG
6	21:10:54	36.940	116.884	0.4	-1.00BL	9.9	87	CCI				1.43		14.3	0.09	13	BULLFROG
8	0: 5:19	36.898	116.813	0.3	-1.00BL	9.0	79	CCI			1.56	2.11		20.1	0.14	23	BULLFROG
8	16:15:24	36.906	116.827	0.5	-1.00BL	1.5	160	ACI				1.21		19.6	0.10	12	BULLFROG
8	21: 8:39	36.908	116.832	0.7	-1.00BL	14.2	158	CCI				0.96		19.9	0.11	6	BULLFROG
9	0: 7:52	36.900	116.812	0.3	-1.00BL	9.2	108	CCI				1.85		21.8	0.13	16	BULLFROG
10	0:53:18	36.906	116.837	0.5	-1.00BL	9.5	160	CCI				1.11		19.6	0.10	14	BULLFROG
10	23:53:18	36.890	116.812	0.3	-1.00BL	8.5	79	CCI		1.97		1.76		19.5	0.13	23	BULLFROG
12	0: 7:57	36.897	116.813	0.2	-1.00BL	7.0	109	CCI	1.94		2.06	1.89	2.6	20.0	0.13	21	BULLFROG
13	0:12:58	36.890	116.814	0.4	-1.00BL	1.5	79	ACI	1.94		1.77	2.00		19.7	0.15	24	BULLFROG
13	23:53:57	36.895	116.816	0.3	-1.00BL	10.1	57	CCI	2.72		2.24			20.1	0.13	23	BULLFROG
15	0:12:57	36.892	116.811	0.3	-1.00BL	8.4	79	CCI			1.70	1.73	2.1	19.5	0.13	22	BULLFROG
15	15:34:55	36.572	115.513	1.3	-1.13•	—	90	CCI				1.24		28.8	0.21	8	INDIAN SPRINGS SE
15	19:10:21	35.928	115.227	0.9	-1.56PB	1.2	194	ADI	1.98			1.96		42.6	0.10	7	SLOAN
15	19:17:59	35.950	115.225	1.3	-1.02PB	1.8	189	BDI				1.90		42.5	0.10	8	SLOAN
15	21:30: 4	36.940	116.885	0.5	-1.00BL	14.7	87	CCI	1.94	1.52		1.41		14.2	0.10	13	BULLFROG
16	0:20:33	36.893	116.811	0.3	-1.00BL	8.2	85	CCI			1.70	1.97		19.6	0.12	22	BULLFROG
18	17:24:22	36.942	116.885	0.4	-1.00DL	9.8	87	CCI				1.56		14.1	0.09	13	BULLFROG
19	0: 9:28	36.892	116.810	0.3	-1.00BL	9.6	79	CCI			1.60	2.12		19.5	0.14	19	BULLFROG
20	0: 3:56	36.896	116.817	0.3	-1.00BL	7.7	110	CCI			1.17	1.85	1.6	20.2	0.12	18	BULLFROG
20	17:17:28	36.368	114.918	1.3	2.52•	—	179	CCI		1.69		1.84		26.5	0.11	7	DRY LAKE
21	0: 4: 2	36.893	116.814	0.3	-1.00BL	8.3	109	CCI		2.10	1.50	1.96		19.8	0.13	22	BULLFROG
21	23:52:32	36.893	116.818	0.3	-1.00BL	9.8	110	CCI				1.66		20.1	0.13	17	BULLFROG
23	0:44:56	36.894	116.814	0.3	-1.00BL	9.0	109	CCI	1.71		1.47	1.94		19.9	0.15	21	BULLFROG
23	18:40:17	36.917	116.829	0.6	4.23•	—	198	CDI		1.55				31.3	0.04	6	BULLFROG
26	0:24:56	36.895	116.814	0.4	-1.00BL	10.6	57	CCI	1.82		1.72	1.77		20.0	0.14	24	BULLFROG
27	0: 4: 4	36.896	116.809	0.3	-1.00BL	8.9	108	CCI	1.82		1.58			19.6	0.12	15	BULLFROG
27	23:57:20	36.899	116.809	0.3	-1.00BL	8.8	81	CCI			1.19	2.28		19.9	0.13	15	BULLFROG
28	21:20:52	36.875	116.913	3.4	17.88PB	6.5	181	CDI	1.46			1.08		27.0	0.18	9	BULLFROG
29	0:14: 5	36.892	116.810	0.3	-1.00BL	8.4	79	CCI	1.73		1.47	2.00		19.5	0.14	20	BULLFROG
29	21:20:13	36.948	116.882	0.3	-1.00BL	6.6	151	CCI				1.11		14.2	0.10	8	BULLFROG
30	0:14:15	36.894	116.810	0.4	-1.00BL	1.5	56	ACI			1.60	1.66		19.6	0.14	22	BULLFROG
OCT 3	0:47: 1	36.893	116.811	0.2	-1.00BL	6.6	79	CCI	1.88		1.71	1.94		19.6	0.14	18	BULLFROG
3	23:57:58	36.894	116.815	0.4	-1.00BL	1.6	79	ACI	2.16		1.97			19.9	0.15	27	BULLFROG
5	0: 9: 3	36.891	116.813	0.4	-1.00BL	1.5	79	ACI			1.76	2.11		19.7	0.14	23	BULLFROG
5	21:53:38	37.155	116.193	0.5	0.47PB	1.4	81	ACI	1.91			1.11		13.4	0.12	16	RAINIER MESA
6	0: 9:10	36.893	116.810	0.3	-1.00BL	8.8	56	CCI	1.59		1.58	1.63		19.6	0.13	24	BULLFROG
7	0: 2: 5	36.896	116.808	0.5	-1.00BL	10.0	80	CCA		2.35				19.5	0.12	14	BULLFROG
7	23:37:36	36.891	116.822	0.4	-1.00BL	12.7	125	CCI			1.55	1.99		20.3	0.10	18	BULLFROG
7	23:52: 4	36.942	116.880	0.4	-1.00BL	9.1	86	CCI		1.80		1.13		14.5	0.10	13	BULLFROG
12	1: 3:52	36.892	116.815	0.4	-1.90BL	1.4	57	ACI	2.11		2.11	2.03		19.9	0.13	26	BULLFROG

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1989 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 12	1: 4:52	36.898	116.809	0.3	-1.00BL	8.7	108	CCI	1.91		1.73	2.59	1.9	19.8	0.14	14	BULLFROG
12	23:51:33	36.897	116.814	0.3	-1.00BL	9.2	57	CCI	1.99		1.83	1.90		20.1	0.13	22	BULLFROG
14	18:58:52	36.890	116.812	0.3	-1.00BL	9.1	56	CCI	1.96		1.91	2.44		19.5	0.13	23	BULLFROG
17	0:31:52	36.891	116.811	0.4	-1.00BL	1.3	85	ACI			1.68	1.73		19.5	0.13	22	BULLFROG
17	21:12:32	36.943	116.884	0.3	-1.00BL	10.2	101	CCI				1.30		14.1	0.12	17	BULLFROG
18	23:53: 1	36.894	116.819	0.3	-1.00BL	2.3	57	BCI			1.86	2.03	2.3	20.2	0.14	25	BULLFROG
19	23:56:27	36.893	116.809	0.4	-1.00BL	1.6	108	ACI			1.67	1.78		19.4	0.14	21	BULLFROG
20	18:43:26	36.844	115.289	0.8	-1.68PB	0.7	157	ACI				0.39		3.3	0.10	8	JACKASS FLATS
20	23:50:52	36.894	116.815	0.4	-1.00BL	10.3	79	CCI	1.88		1.73			19.9	0.13	19	BULLFROG
21	0: 2:38	36.840	116.301	0.6	-1.71PB	0.4	223	ADI				1.11		2.9	0.07	8	JACKASS FLATS
23	21:40:34	36.948	116.878	0.7	-1.00BL	20.6	106	CCI	1.99				1.2	14.5	0.13	11	BULLFROG
23	23:52:59	36.891	116.812	0.4	-1.00BL	12.0	109	CCI	1.54			1.81		19.5	0.15	12	BULLFROG
24	22:35:56	36.944	116.752	0.9	-1.00BL	21.7	229	CDI				1.58		19.8	0.12	6	BULLFROG
24	23:57:10	36.894	116.817	0.3	0.00BL	9.8	80	CCI	2.09		1.91	2.20		20.1	0.14	21	BULLFROG
25	23:48:59	36.899	116.807	0.2	-1.00BL	7.9	80	CCI	1.70		1.75	1.92		19.7	0.12	19	BULLFROG
26	23:51:54	36.895	116.814	0.4	-1.00BL	1.6	85	ACI	2.17		1.90			20.0	0.14	22	BULLFROG
27	23:56:51	36.898	116.816	0.3	-1.00BL	9.6	79	CCI	1.80		1.90	2.16		20.2	0.14	23	BULLFROG
30	23:14:43	36.942	116.882	0.5	-1.00BL	10.7	87	CCI	1.62			1.12		14.3	0.10	14	BULLFROG
31	0:48:38	36.896	116.815	0.3	-1.00BL	9.9	109	CCI				1.71		20.0	0.12	18	BULLFROG
NOV 1	0:43:42	36.894	116.811	0.4	-1.00BL	1.4	109	ACI	1.58		1.68	1.81		19.7	0.14	20	BULLFROG
1	23:32:47	36.928	116.670	2.1	2.86PB	—	227	CDI				0.60		14.8	0.12	8	BARE MTN
2	0:42:32	36.895	116.818	0.3	-1.00BL	9.3	110	CCI			1.70	2.47		20.3	0.14	20	BULLFROG
3	0:16:33	36.938	116.775	0.6	-1.00BL	12.5	101	DCI				1.19	1.9	20.5	0.75	13	BULLFROG
3	20:28:13	36.901	116.676	1.5	7.32PB	2.2	261	BDI				1.33		12.4	0.08	10	BARE MTN
4	0:46:32	36.898	116.813	0.3	-1.00BL	8.7	79	CCI	1.91		1.78	2.47		20.0	0.13	21	BULLFROG
7	0:43:32	36.894	116.820	0.4	-1.00RL	13.4	124	CCI				1.89		20.3	0.11	18	BULLFROG
8	0:16:24	36.934	116.885	0.4	-1.00BL	1.5	115	ACI	1.51			1.26		14.4	0.12	16	BULLFROG
8	0:45:44	36.893	116.814	0.4	-1.00BL	11.1	62	CCI	2.11		1.87			19.8	0.14	22	BULLFROG
8	23:45:48	36.904	116.655	0.4	-1.00BL	16.0	78	CCI		1.99	1.34	1.63		12.1	0.11	14	BARE MTN
9	0:11:31	36.936	116.884	0.4	-1.00BL	11.4	115	CCI				1.35		14.4	0.13	12	BULLFROG
9	0:46:43	36.895	116.818	0.3	-1.00BL	11.4	80	CCI				2.00		20.2	0.11	20	BULLFROG
10	0: 2: 9	36.546	116.347	—	-1.00BL	—	132	ADI				1.13		11.0	0.02	4	LATHROP WELLS SE
10	0:37:15	36.894	116.817	0.4	-1.00BL	10.5	57	CCI			1.83			20.1	0.13	23	BULLFROG
11	0:31:52	36.895	116.815	0.3	-1.00BL	10.4	62	CCI	1.94		1.56	2.51	2.0	21.9	0.13	20	BULLFROG
13	23: 7:49	36.938	116.884	0.3	-1.00BL	9.9	68	CCI			1.74	1.64		14.3	0.12	18	BULLFROG
14	0:42:54	36.894	116.815	0.5	-1.53BL	15.5	80	CCA		2.31				20.0	0.14	12	BULLFROG
15	0:36:35	36.895	116.820	0.3	-1.00BL	2.3	80	DCI	1.82		1.85	1.94		20.4	0.11	22	BULLFROG
15	23:36:16	36.902	116.657	0.3	-1.00BL	8.1	84	CCI			1.60	1.63		12.0	0.07	18	BARE MTN
16	0:36: 5	36.898	116.817	0.4	-1.00BL	11.6	91	CCI				1.97		20.4	0.14	20	BULLFROG
16	19:14:58	36.943	116.883	0.7	-1.00BL	21.2	113	CCI				0.97		14.2	0.12	9	BULLFROG
17	0:50:38	36.897	116.807	0.6	-1.00BL	16.6	170	CCI	1.78		1.69	2.26		19.5	0.07	7	BULLFROG
18	0:45:39	36.895	116.812	0.3	-1.00BL	8.6	109	CCI			1.61	2.08		19.8	0.13	21	BULLFROG
20	23:31:53	36.904	116.656	0.3	-1.00BL	10.7	83	CCI			1.59	1.79		12.2	0.08	14	BARE MTN
20	23:43:52	36.939	116.886	0.4	-1.00BL	10.4	88	CCI	1.87			1.61	1.4	14.1	0.11	18	BULLFROG
21	1: 3:33	36.895	116.816	0.3	-1.00BL	7.9	54	CCI	2.17	1.94			2.5	20.1	0.12	28	BULLFROG

1989 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 Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
NOV 27	20:18:32	36.946	116.885	0.5	-1.00BL	9.4	171	CCI				1.63		13.9	0.08	7	BULLFROG
28	0:28:31	36.906	116.653	0.4	-1.00BL	13.5	83	CCI			1.36			12.3	0.08	13	BARE MTN
28	0:43:21	36.899	116.810	0.4	-1.00BL	12.3	108	CCI	1.75			1.70	1.8	19.9	0.13	14	BULLFROG
28	23:36:18	36.712	115.731	1.0	-1.15PB	0.5	246	BDI				0.90		7.4	0.06	6	INDIAN SPRINGS NW
29	0:57:39	36.899	116.815	0.4	-1.00BL	1.5	121	ACI				1.84		20.3	0.11	14	BULLFROG
29	15:14:49	37.113	117.035	0.4	7.96PB	1.6	104	ABI	1.20	1.29		1.29		14.5	0.12	22	BONNIE CLAIRE SE
30	0:22:52	36.944	116.886	0.3	-1.00BL	11.5	69	CCI	2.06					13.9	0.13	23	BULLFROG
30	0:45: 5	36.898	116.811	0.6	-1.00BL	19.1	108	CCI	1.89					19.9	0.12	8	BULLFROG
30	19:17:37	36.890	116.814	0.3	-1.00BL	1.1	123	ACI	1.71		1.27	2.38		19.7	0.11	19	BULLFROG
30	23:14:56	36.311	115.728	1.7	-0.98PB	——	157	CDI				1.40		12.7	0.19	5	CHARLESTON PEAK
30	23:34:53	36.905	116.655	0.5	-1.00BL	15.7	79	CCI						12.3	0.12	15	BARE MTN
DEC 2	0:31:34	36.898	116.812	0.4	-1.00BL	1.6	108	ACI	2.03		1.81	1.89		20.0	0.14	23	BULLFROG
4	0:35:36	36.898	116.811	0.9	-1.00BL	19.6	155	CCA		2.26				19.9	0.15	11	BULLFROG
4	21:15:48	36.939	116.883	0.4	-1.00BL	10.6	87	CCI				1.54		14.3	0.10	16	BULLFROG
5	0:37:34	36.896	116.811	0.3	-1.00BL	8.9	108	CCI	1.70					19.8	0.12	15	BULLFROG
6	0:16:47	36.939	116.885	0.5	-1.00BL	11.5	87	CCI				1.48		14.2	0.10	15	BULLFROG
6	0:40:34	36.895	116.820	0.3	-1.00BL	11.3	123	CCI			1.68	2.13		20.4	0.11	18	BULLFROG
7	0:42:34	36.894	116.807	0.3	-1.00BL	8.5	108	CCI			1.64		1.9	19.4	0.13	16	BULLFROG
9	0:48:37	36.891	116.821	0.3	-1.00BL	12.7	125	CCI	1.62		1.46	1.74		20.2	0.11	19	BULLFROG
11	23:20:23	36.938	116.889	0.3	-1.00BL	1.5	126	ACI	2.11			1.34		13.9	0.13	13	BULLFROG
11	23:29:29	36.908	116.653	0.4	-1.00BL	1.6	78	BCI						12.4	0.23	18	BARE MTN
11	23:36:59	36.937	116.891	0.3	-1.00BL	1.8	127	ACI	2.11				1.4	13.7	0.10	10	BULLFROG
12	0:33:36	36.897	116.819	0.3	-1.00BL	2.2	60	BCI	2.04					20.5	0.10	23	BULLFROG
13	23:51:25	35.674	115.555	3.9	0.00BL	30.0	244	DDU		1.17		1.60		71.8	0.26	5	CLARK MTN
14	22:11: 3	36.896	116.841	0.6	-1.00BL	1.3	115	BCU	1.63	1.15		0.90		19.8	0.17	17	BULLFROG
15	0:40: 3	36.893	116.837	0.9	-1.00BL	1.4	144	BCI		1.83				21.5	0.21	17	BULLFROG
16	0:44:34	36.896	116.885	0.7	-1.00BL	1.3	79	BCI	2.09	1.71		1.80		19.3	0.28	15	BULLFROG
16	23:27:35	36.945	116.885	0.5	-1.00BL	1.1	105	BCI	1.66	1.37		1.55		14.0	0.18	18	BULLFROG
17	23:45: 8	36.902	116.827	0.6	-1.00BL	0.9	111	BCI	1.38	1.06		1.08		20.6	0.19	18	BULLFROG
19	0:50:26	36.894	116.817	0.3	-1.00BL	1.8	57	ACI	1.90					20.1	0.12	22	BULLFROG
19	21:13:36	36.894	116.803	0.6	-1.00BL	1.4	83	BCI	1.55			1.68		19.0	0.21	19	BULLFROG
20	22:44:42	36.899	116.829	0.6	-1.54PB	2.0	80	BCI	1.52			1.13		20.6	0.17	17	BULLFROG
21	0:40:55	36.892	116.812	0.3	-1.00BL	1.7	77	ACI	2.03	1.89		2.00		19.7	0.13	28	BULLFROG
21	23:36:26	36.909	116.653	0.6	-1.00BL	1.2	78	BCI	1.30			1.44		12.5	0.15	16	BARE MTN
21	23:36:50	36.892	116.811	0.5	-1.00BL	1.2	78	ACI	1.54	1.70		1.83		19.5	0.15	18	BULLFROG
22	23: 5:43	36.913	116.680	2.6	-1.00BL	30.0	226	CDI	2.01					13.7	0.12	7	BARE MTN
23	0:32:51	36.894	116.811	0.5	-1.00BL	14.1	81	CCI				1.84		19.7	0.13	11	BULLFROG
23	21:38:26	36.903	116.828	0.3	-1.69PB	0.6	111	ACI	1.14			1.00		20.4	0.11	16	BULLFROG
26	20:22:52	36.886	116.819	0.4	-1.00BL	0.7	112	ACI	1.60			1.35	1.1	19.8	0.15	21	BULLFROG
28	0:54: 3	36.894	116.814	0.4	-1.00BL	1.3	47	BCI	2.29		2.22			19.9	0.15	29	BULLFROG
28	1:50:59	36.943	116.887	0.4	-1.00BL	1.0	69	ACI			1.52	1.57		13.8	0.14	25	BULLFROG
29	0:34:36	36.892	116.818	0.6	-1.02BL	17.2	79	CCA		2.29				20.1	0.14	11	BULLFROG
30	0:35:36	36.887	116.814	0.6	-1.03BL	18.8	81	CCA		2.19				19.4	0.09	8	BULLFROG

Appendix C

Nuclear device tests and low-frequency shallow seismicity in the SGB, 1987 through 1989

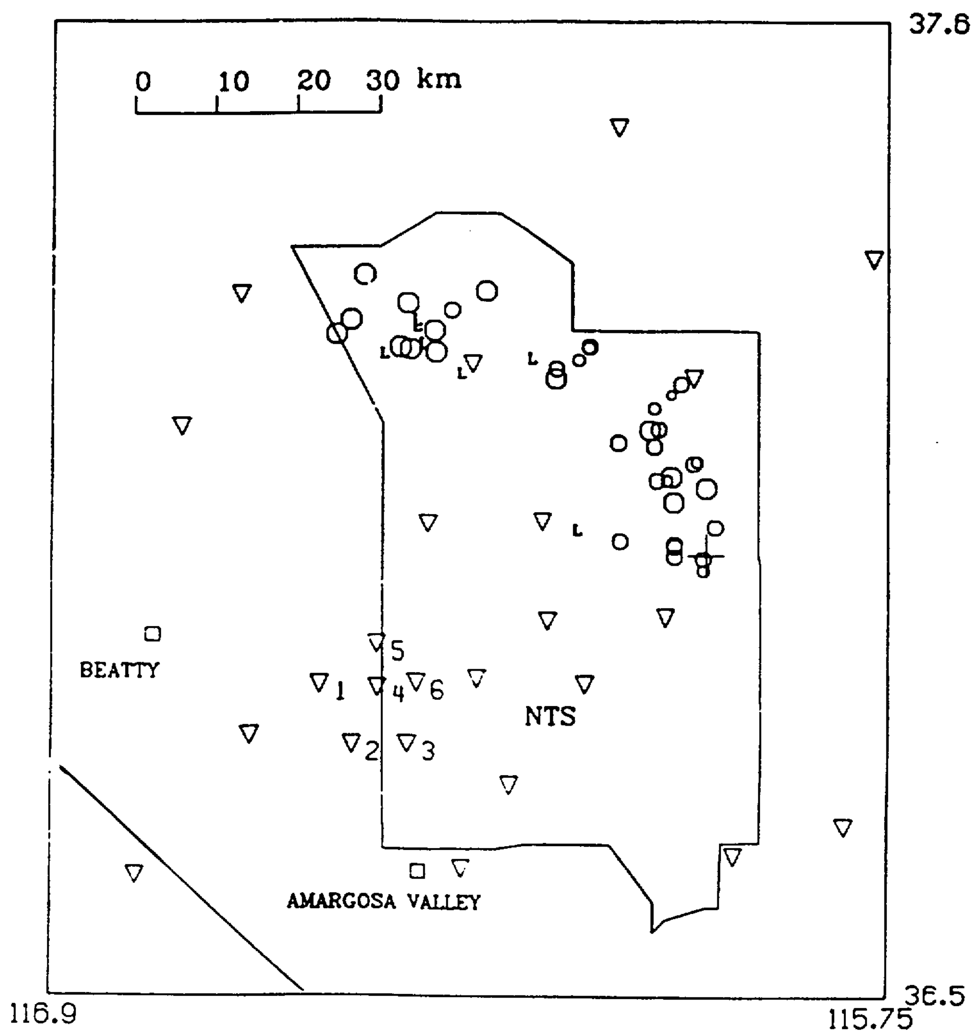
Hypocenter data for announced Nevada Test Site nuclear device tests occurring in 1987, 1988, and 1989 are listed in Table C1 and corresponding epicenters are shown in map view in Figure C1. Hypocenter parameters are listed as they are reported to the National Earthquake Information Center (NEIC) by the Department of Energy. Magnitude estimates are provided by Berkeley Seismographic Laboratory or by the NEIC. SGBSN stations generally record nuclear detonation ground motions well beyond their dynamic range; thus, only initial P-wave arrival times can be reliably scaled from SGBSN seismograms of nuclear tests.

When observed travel times (OT_i) are compared with theoretical values (TT_i, corresponding to source to station rays computed from the standard velocity model used to locate SGB earthquakes, shown in Appendix E), the resulting residuals or "delays" ($D_i = OT_i - TT_i$) provide insight into the P-wave velocity structure of shallow crust. Figures C2, C3, and C4 are contour maps of percent velocity variation from the standard model, as implied by the delays observed for tests "Alamo," "Disko Elm," and "Kawich," respectively. The contour levels are interpolations/extrapolations onto the entire SGB of $\Delta V(\%) = -100 D_i / OT_i$, $i = 1, 55$, where D_i is the ith delay (sec), for SGBSN station recordings of primary waves from a given nuclear device test. The reader is cautioned that the mapped patterns of velocity variation result from "heavy-handed" interpolation and extrapolation from a very limited station data base. Station coverage within the Nevada Test Site and at Yucca Mountain is many times better than elsewhere in the southern Great Basin with the consequence that patterns in the variation of shallow crustal velocity in the immediate vicinity of NTS are more reliable than those away from NTS.

Relatively high levels of ultra-shallow seismicity are regularly recorded by SGBSN stations for periods ranging from hours to days following NTS nuclear device tests. The seismicity listed in Appendix C consists of such events, which have characteristically lower-frequency seismic P coda and S coda than the vast majority of earthquakes in the SGB, and are designated "LFEs." Most of the LFEs can be associated 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. The heightened level of post-test LFE seismicity often continues for days, with no single event having clearly greater magnitude, as determined from SGBSN seismograms, than many others in its vicinity. Data from the majority of these LFEs are archived onto magnetic tapes without being analysed by SGBSN staff. An unexamined assumption about the nature of these low-frequency northern NTS events is that *all* of them are ultra-shallow aftershocks resulting from anomalous local conditions generated during nuclear device tests.

Apart from the LFE seismicity, it is possibly true that the natural seismicity rate in the SGB also increases for several days following some NTS tests, especially if the time interval between NTS tests is several months. That NTS tests might trigger earthquakes for several days at distances on the order of 50 to 100 km is a hypothesis that the current catalog should be able to address. This topic is an area of current research.

A few low-frequency events that do not locate at NTS are included in Appendix C, because their seismic coda appears more similar to post-test, collapse-like seismicity than to earthquake coda. Many of these are undoubtedly blasts in unconsolidated alluvium or intensely fractured tuff. The verification that other explanations of these phenomena are invalid is left to future investigation.



▽ SEISMOGRAPHIC STATION □ CITY OR TOWN

∘ mag < 3.0 ○ 4.0 ≦ mag < 5.0

○ 3.0 ≦ mag < 4.0 ○ 5.0 ≦ mag

Figure C1. Map of announced NTS nuclear device detonation epicenters for the period 1987 through 1989 (test epicenters are octogons), and of epicenters of a small subset of the low-coda frequency activity (aftershocks?, collapses?) that followed those UNEs (designated by "L" symbols).

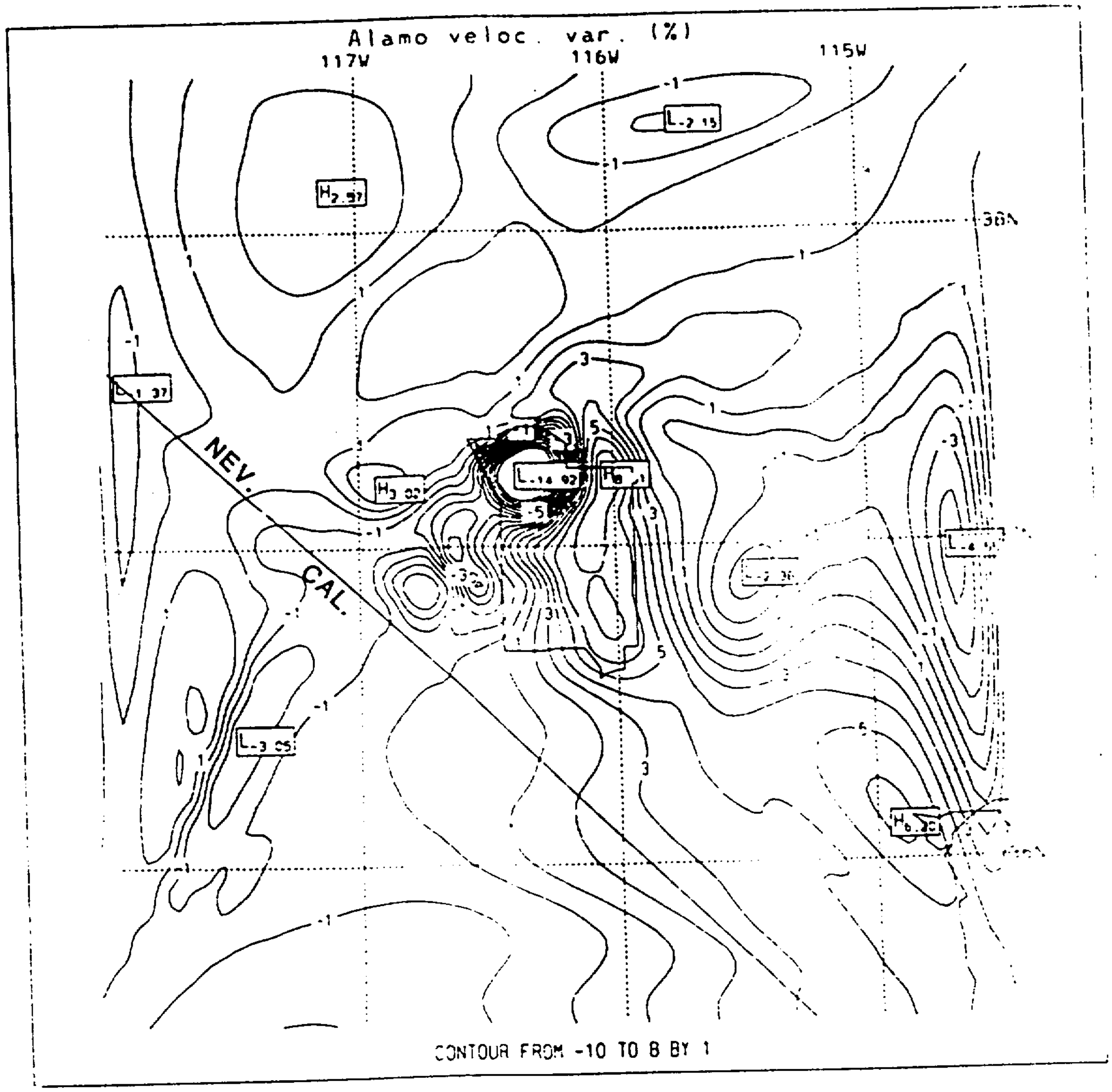


Figure C2. Contour map of percent P-wave horizontal velocity variation, ΔV, from velocities obtained from the standard model shown in Figure F1(a) for arrival time delays from the test "Alamo," detonated on July 7, 1988, 15:05:30.07 UTC, in the Silent Canyon Caldera. ΔVs from stations nearest the four corners of the map have been inserted at the map corners to suppress the formation of spurious contours near the edges of the map. (Interpolation of the ΔVs computed at SGBSN station locations to a 42 × 42 grid over the entire SGB is performed using the International Mathematical and Statistical Library routine "IQHSCV.")

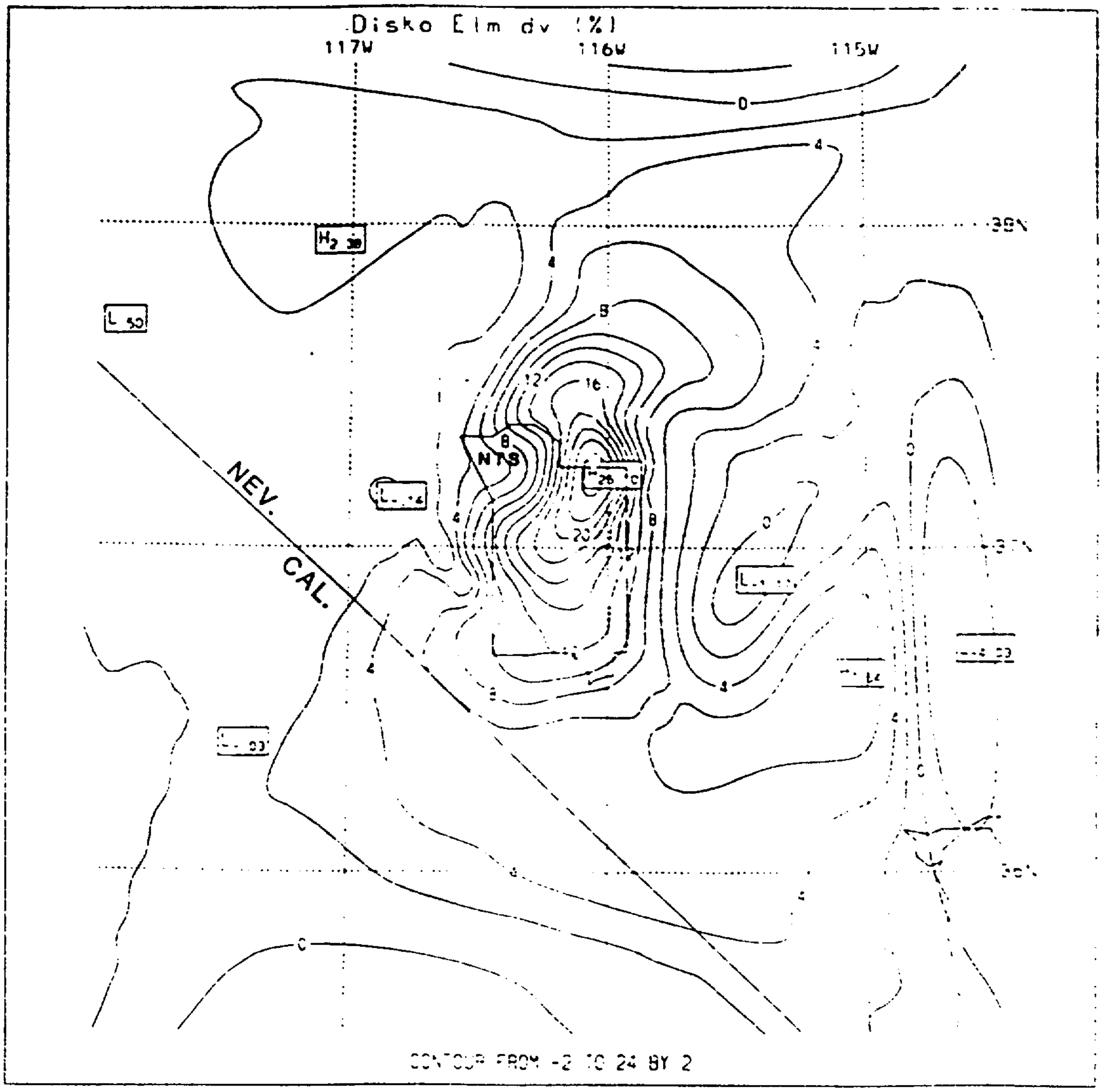


Figure C3. Contour map of percent P-wave velocity variation from the standard model shown in Figure F1(a) for SGBSN station data from the tunnel test "Disko Elm," detonated on September 14, 1989, 15:00:00.10 UTC, at Rainier Mesa. The same data reduction was performed as in Figure C2.

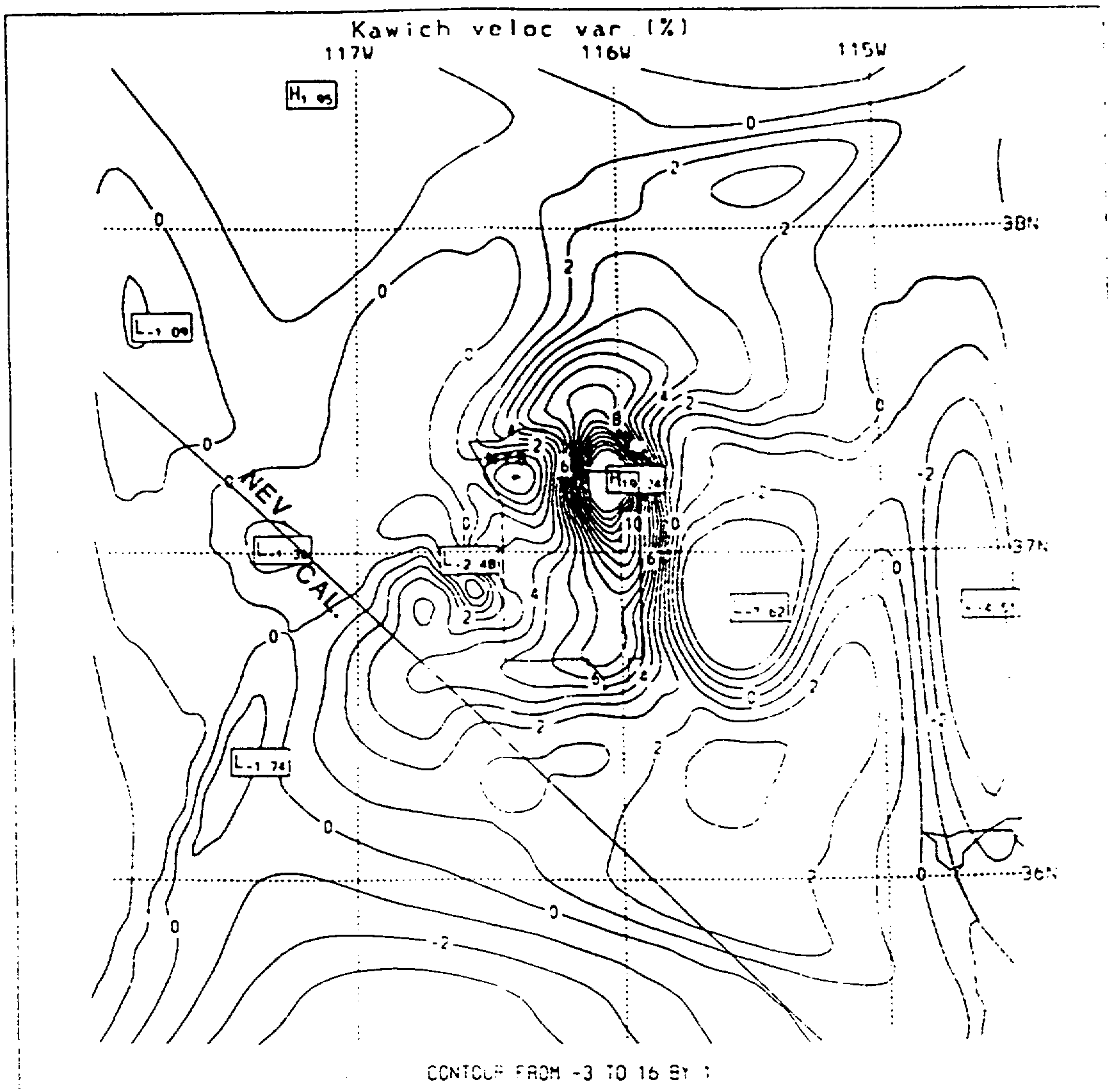


Figure C4. Contour map of percent P-wave velocity variation from the standard model shown in Figure F1(a) for SGBSN station data from the test "Kawich," detonated on February 24, 1989, 16:15:00.08 UTC, at western Yucca Flat. The same data reduction was performed as in Figure C2.

Table C1. Announced NTS Nuclear Device Test Information for 1987, 1988, and 1989

YEARMODA (UTC)	HR	MN	SECND	ML SRC	LATITUDE DEG. N.	LONGITUDE DEG. W.	DEPTH (KM)	DOE TEST NAME
19870203	15	20	00.08	2.2NEIC	37.1811	-116.0484	-1.02	HAZEBROOK
19870211	16	45	00.07	4.2BRK	37.0107	-116.0447	-0.91	TORNERO
19870318	18	28	00.09	4.4BRK	37.2102	-116.2086	-1.85	MIDDLE NOTE
19870418	13	40	00.60	5.3BRK	37.2479	-116.5091	-1.40	DELAMAR
19870422	22	00	00.09	3.9BRK	36.9831	-116.0046	-0.90	PRESIDIO
19870430	13	30	00.09	5.3BRK	37.2330	-116.4231	-1.37	HARDIN
19870618	15	20	0.08	4.1BRK	37.1936	-116.0350	-1.14	BRIE
19870620	16	00	00.09	3.5NEIC	37.2200	-116.1778	-1.74	MISSION GHOST
19870630	16	05	00.10	4.0BRK	36.9986	-116.0431	-0.90	PANCHUELA
19870716	19	00	00.08	4.7BRK	37.1036	-116.0234	-0.81	MIDLAND
19870813	14	00	00.09	5.5BRK	37.0610	-116.0453	-0.64	TAHOKA
19870924	15	00	00.05	5.4BRK	37.2280	-116.3747	-1.47	LOCKNEY
19871023	16	00	00.09	5.0BRK	37.1419	-116.0787	-0.82	BORATE
19871201	16	30	00.09	4.0BRK	36.9964	-116.0045	-0.90	WACO
19871202	16	30	00.084	3.5NEIC	37.2347	-116.1634	-1.45	MISSION CYBAR
19880215	18	10	00.09	5.3BRK	37.3144	-116.4715	-1.43	KERNVILLE
19880407	17	15	00.08	4.0NEIC	37.0132	-116.0443	-1.02	ABILENE
19880513	15	35	0.10	4.9BRK	37.1244	-116.0721	-0.80	SCHELLBOURNE
19880521	22	30	0.14	4.7BRK	37.0325	-115.9873	-0.85	LAREDO
19880602	13	0	0.09	5.3BRK	37.2601	-116.4411	-1.39	COMSTOCK
19880622	14	0	0.08	3.1NEIC	37.1662	-116.0722	-1.14	RHYOLITE-NIGHTENGALE
19880707	15	5	30.07	5.4BRK	37.2524	-116.3767	-1.39	ALAMO
19880817	17	00	0.095	5.4BRK	37.2972	-116.3065	-1.53	KEARSARGE
19880830	18	00	0.09	4.8BRK	37.0859	-116.0685	-0.76	BULLFROG
19881013	14	00	0.09	5.6BRK	37.0890	-116.0493	-0.66	DALHART
19881210	20	30	0.06	5.0BRK	37.1990	-116.2094	-1.86	MISTY ECHO
19890210	20	06	0.06	5.2BRK	37.0768	-116.0065	-0.79	TEXARKANA
19890224	16	15	0.08	4.5BRK	37.1285	-116.1220	-0.97	KAWICH
19890309	14	05	0.10	4.8BRK	37.1428	-116.0669	-0.8	INGOT
19890515	13	10	0.09	4.4BRK	37.0176	-116.1209	-0.96	PALISADE
19890526	18	07	0.02	3.7NEIC	37.0359	-116.0551	-0.86	TULIA
19890622	21	15	0.09	5.2BRK	37.2829	-116.4123	-1.50	CONTACT
19890627	15	30	0.02	4.8BRK	37.2754	-116.3536	-1.4	AMARILLO
19890914	15	00	0.10	4.0BRK	37.2359	-116.1629	-1.6	DISKO ELM
19891031	15	30	0.09	5.3BRK	37.2631	-116.4907	-1.27	HORNITOS
19891115	20	20	0.11	3.4NEIC	37.1065	-116.0134	-1.13	MULESHOE
19891208	15	00	0.09	5.2BRK	37.2311	-116.4094	-1.40	BARNWELL

NOTES: Coordinates of announced tests are supplied to the National Earthquake Information Center, Golden, Colorado (NEIC), by the Department of Energy. These coordinates have been rounded to the nearest 0.0001 degree in Table C1. The ML estimates (local magnitude) are provided by the Berkeley Seismographic Laboratory (BRK) or by the NEIC. Depth is the reported working point depth, relative to sea level (negative z above sea level).

1987 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)	QJD 12S	MAGNITUDE ESTIMATES Mco	Md	MLh	MLv	MLc	DEL-MIN (KM)	RMS RES. (SEC)	#N PH.	U.S.G.S. QUADRANGLE
APR 30 13:39:36	37.225	116.442	0.7	2.60•	—	133	CCI		2.08				47.3	0.09	7	SCRUGHAM PEAK
30 13:40:52	37.245	116.474	3.9	7.00•	—	123	CDI		1.67				50.8	0.30	5	SCRUGHAM PEAK
30 13:57: 9	37.237	116.390	1.0	2.46•	—	130	CCI		2.26				23.0	0.19	11	SCRUGHAM PEAK
30 14: 5:47	37.029	116.177	—	29.02	—	200	ADI		1.53				4.7	0.00	4	TIPPIPAH SPRING
30 14:11:24	37.204	116.338	1.5	24.61	3.8	125	BBI		2.08				28.5	0.17	7	AMMONIA TANKS
30 17:39:52	37.257	116.399	0.4	8.58	0.6	206	ADI	1.71	1.06	2.10	1.22		8.2	0.06	15	SILENT BUTTE
30 18:32:50	37.263	116.399	0.5	9.57	0.6	243	ADI		1.21	1.82	1.06		8.6	0.07	13	SILENT BUTTE
30 21:33:47	37.221	116.242	0.6	9.75	0.4	273	ADI	1.52		1.87	1.35		7.3	0.05	11	RAINIER MESA

1987 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 (UTC)
JANUARY	28 21:34						
FEBRUARY	04 23:58	06 00:27	12 23:00	17 20:26	23 23:13		
MARCH	03 19:55	09 06:16	11 22:46	14 02:33	14 08:46	17 23:33	18 18:53
	23 19:36						
APRIL	06 18:39	09 17:08	10 04:43	10 10:47	14 01:34	14 16:07	15 20:41
	17 12:01	18 14:03	18 14:05	18 14:30	18 17:04	21 08:27	22 23:43
	24 14:43						
MAY	09 07:36	15 18:16	30 08:29				
JUNE	08 12:26	10 16:43	11 12:31	12 08:18	22 18:13	22 22:13	23 00:18
	23 04:12						
JULY	16 17:29	16 19:05	16 19:09	16 19:18	16 19:22	28 05:37	28 06:09
	30 17:02	30 22:27					
AUGUST	22 20:31	24 17:13	30 17:59				
SEPTEMBER	01 09:58	09 00:48	09 16:30	10 04:44	11 03:10	12 10:53	12 11:43
	13 20:37	16 03:46	24 15:09	24 15:16	24 15:46	24 15:54	24 16:28
	24 16:38	24 16:46	27 01:15	27 02:48	27 15:04	28 00:44	
OCTOBER	01 00:33	05 15:53	09 12:53	12 01:19	15 20:03	15 23:56	18 08:29
	23 16:53	23 16:56					
NOVEMBER	19 16:21	29 01:35					
DECEMBER	11 1:29	15 20:39	21 22:45				

1988 SGB LOW-FREQUENCY EVENTS WITHOUT HYPOCENTER DETERMINATIONS

JANUARY	14 21:43	16 21:48					
FEBRUARY	15 21:44	16 00:12	16 01:00	16 01:53	16 03:09	16 04:35	16 05:38
	26 15:42						
MARCH	4 21:00	8 22:47	9 00:40	9 22:48	11 19:59	12 00:10	13 22:18
	29 23:22	30 16:35	30 20:46				
APRIL	1 10:29	7 17:19	7 17:27	7 17:29			
MAY	21 22:35	21 22:55					
JUNE	2 10:31	2 15:05	3 23:23	13 11:22	15 19:40		
JULY	6 23:18	7 15:11	7 15:20	7 16:02	7 16:10	7 17:01	7 17:32
	7 17:37	7 17:44	7 17:52	7 18:05	7 18:15	7 19:08	7 19:11
	7 20:10	7 20:14	7 20:21	7 20:29	7 20:35	7 20:40	7 20:42
	7 20:55	7 21:01	7 21:06	7 21:10	7 21:16	7 21:17	7 21:20
	7 21:25	7 21:27	7 21:33	7 21:41	7 21:45	7 21:49	7 21:52
	7 21:57	7 21:58	7 22:07	7 22:11	7 22:12	7 22:13	7 22:15
	7 22:17	7 22:19	7 22:23	7 22:27	7 22:30	7 22:35	7 22:44
	7 22:47	7 22:49	7 22:51	7 23:04	8 1:07	8 9:37	9 2:18
	11 7:20	11 8:47	11 23:56	13 18:00	14 14:43	18 1:10	18 6:39
	18 18:44	19 21:09	22 0:47	25 20:53	29 15:15	29 21:26	
AUGUST	1 18:52	3 21:17	15 22:23	15 23:08	16 23:28	17 18:14	17 18:20
	17 18:47	17 19:08	17 19:46	17 19:48	17 20:19	17 20:32	17 20:49
	17 21:06	17 21:18	17 21:19	17 21:46	17 21:53	17 22:00	17 22:21
	23 18:06	23 21:02	23 22:51	24 9:20	27 23:38	29 23:41	30 18:16
	30 18:25	30 18:30	30 18:44	30 18:46	30 18:48	30 18:50	30 18:57
	30 19:03	31 23:16					
SEPTEMBER	10 23:43	10 23:45	11 00:40	11 0:55	20 20:43	26 18:34	
OCTOBER	13 14:42	13 15: 8	13 15:15	13 15:19	13 15:28	13 15:50	13 15:52
	13 15:58						
NOVEMBER	9 23:03						
DECEMBER	10 21:11	18 18:40	26 8:56				

1989 SGB LOW-FREQUENCY EVENTS WITHOUT HYPOCENTER DETERMINATIONS

FEBRUARY	10 20:12	10 20:13	10 20:15	10 20:23	24 17:01	24 17:11	24 17:16
JUNE	22 21:20	22 21:23	22 21:26	22 21:29	22 21:32	22 21:36	22 21:38
	22 21:53	22 21:58	22 22:07	22 22:20	22 22:22	22 22:26	22 22:36
	22 22:51	22 22:57	22 23:09	22 23:15	22 23:28	22 23:35	22 23:40
	22 23:48	22 23:52	22 23:54	22 23:59	23 8:53	27 15:49	27 16:24
	27 18:06	28 4:53	28 9:14	28 9:58	28 10:52	28 11:27	28 11:37
	28 14:04	29 4:29					
JULY	1 10:27	1 11:19					
OCTOBER	31 16:47	31 17:05	31 17:07	31 17:11	31 17:16	31 17:27	31 17:38
	31 17:43	31 18:03	31 18:06	31 18:08	31 18:34	31 18:48	31 19:16
	31 19:19	31 19:21	31 19:26	31 19:30	31 20:29	31 20:31	31 20:37
	31 20:50	31 20:52	31 20:58	31 21:07	31 21:14	31 21:20	31 21:28
	31 21:34	31 21:39	31 22:05	31 22:09	31 22:11	31 22:28	31 22:31
	31 22:47	31 22:56	31 23:04	31 23:22	31 23:23	31 23:26	31 23:28
	31 23:30	31 23:43	31 23:49	31 23:59			
NOVEMBER	1 0:12	1 0:23	1 0:26	1 0:36	14 22:32	17 17:50	23 4:33
	24 8:48	24 15:29					
DECEMBER	8 15:07	8 15:10	8 15:13	8 15:16	8 15:18	8 15:27	8 15:31
	8 15:32	8 15:34	8 15:39	8 15:43	8 15:45	8 15:47	8 15:50
	8 15:53	8 16:00	8 16:01	8 16:03	8 16:05	8 16:10	8 16:14
	8 16:21	8 16:38	8 16:48	8 16:56			

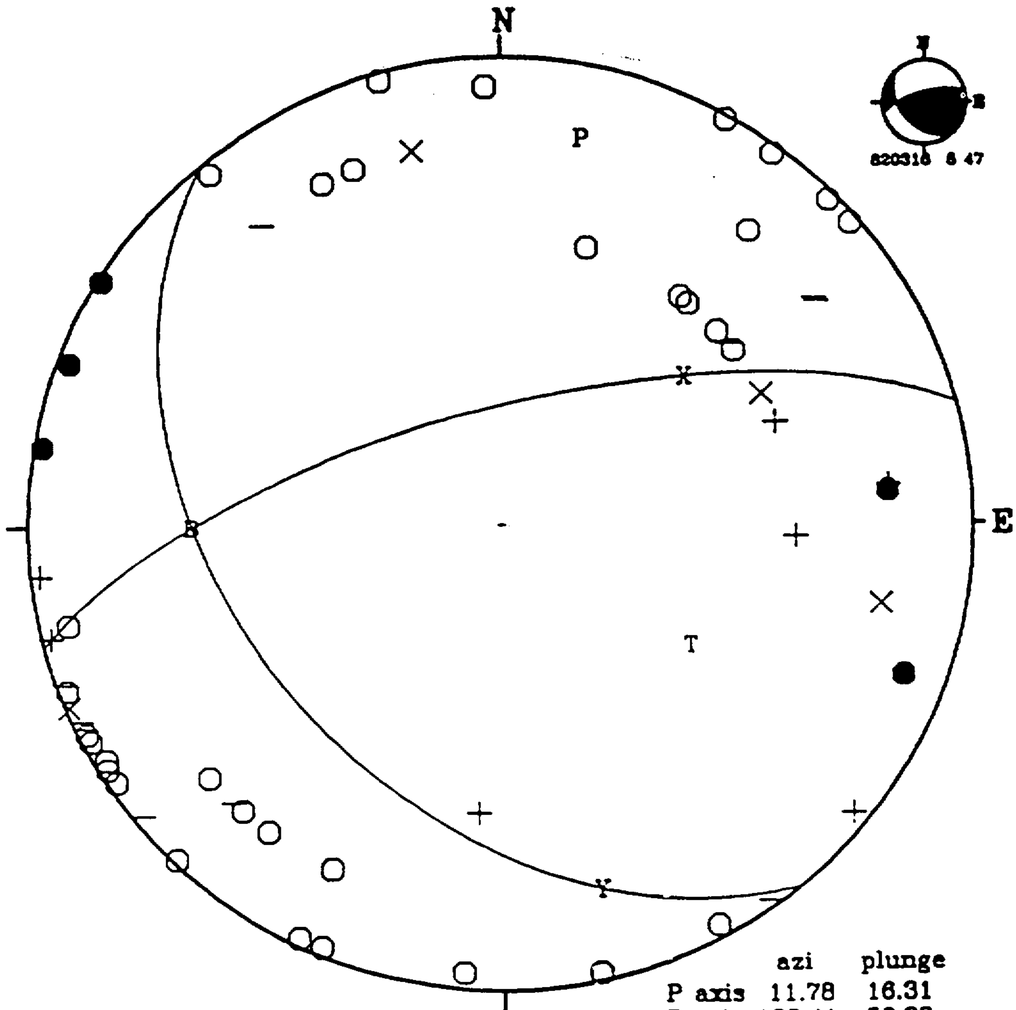
Appendix D

Earthquake focal mechanisms 1982 and 1987 through 1989

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 dilitationals, 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 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 are composited using data from several events that are clustered in time and space. Composite solutions are noted in each figure. Several examples of focal mechanism solutions for relocated hypocenters at substantially different depths-of-focus are presented to indicate the effect these changes have on strike, dip, and rake.

For several mechanisms, the information contained in P-wave polarities was not adequate to effectively constrain the nodal planes. In these instances, first motion P- and SV- amplitude data were gathered at selected stations, indicated by a large square around the polarity symbol. The observed and theoretical $\log_{10}(SV/P)_z$ 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 theoretical values shown in each figure are for the "optimum" solution shown, having the lowest rms error and fewest polarity inconsistencies. If the difference between observed and theoretical values is greater than a specified limit, err_{max}, that station's amplitude data are not used in the solution and an asterisk is placed by its name in the solution table. We always set $err_{max} \leq 0.3$, corresponding to a maximum factor between theoretical and observed amplitude ratios of 2.0.

Kisslinger and others (1981 and 1982) and Rogers and others (1987) 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.



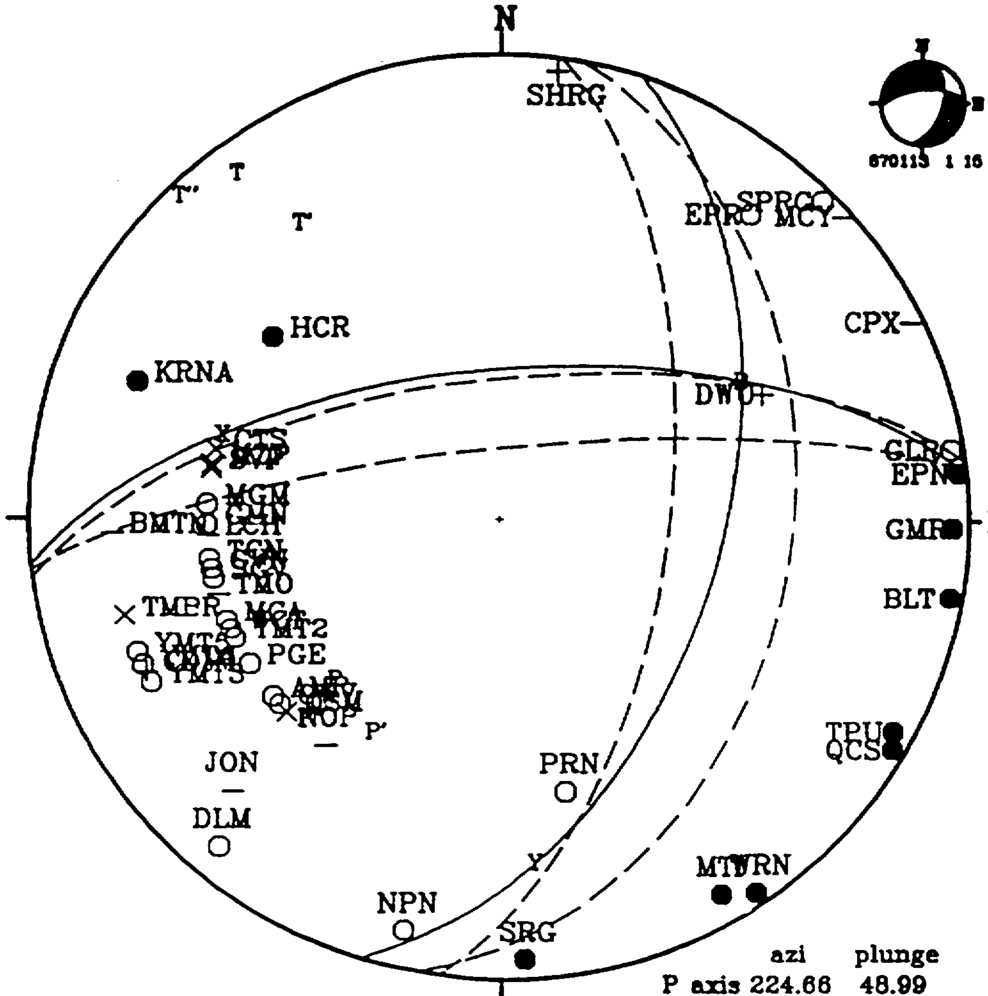
STOVEPIPE WELLS
DATE&TIME: 820316 8 47 0.90
LAT: 36.583 LONG: 117.075
DEPTH, km: 5.21 +/- 0.7 ML: 3.4
DMIN (km)= 19.5

	azi	plunge
P axis	11.78	16.31
T axis	122.41	50.28
B axis	269.94	35.02
X axis	50.93	47.95
Y axis	165.00	20.20

	strike	dip	rake
Soln 1	255.00	69.80	52.30

This earthquake's focal mechanism is constrained by several P-wave arrivals from stations in the southern California seismic network, archived in their CUSP system, event 7461. ML is taken from Pasadena, also reported by Berkeley as ML=3.7.

Figure D1. Oblique reverse-slip focal mechanism solution for an earthquake of March 16, 1982, with epicenter west of the northern end of the Death Valley fault.



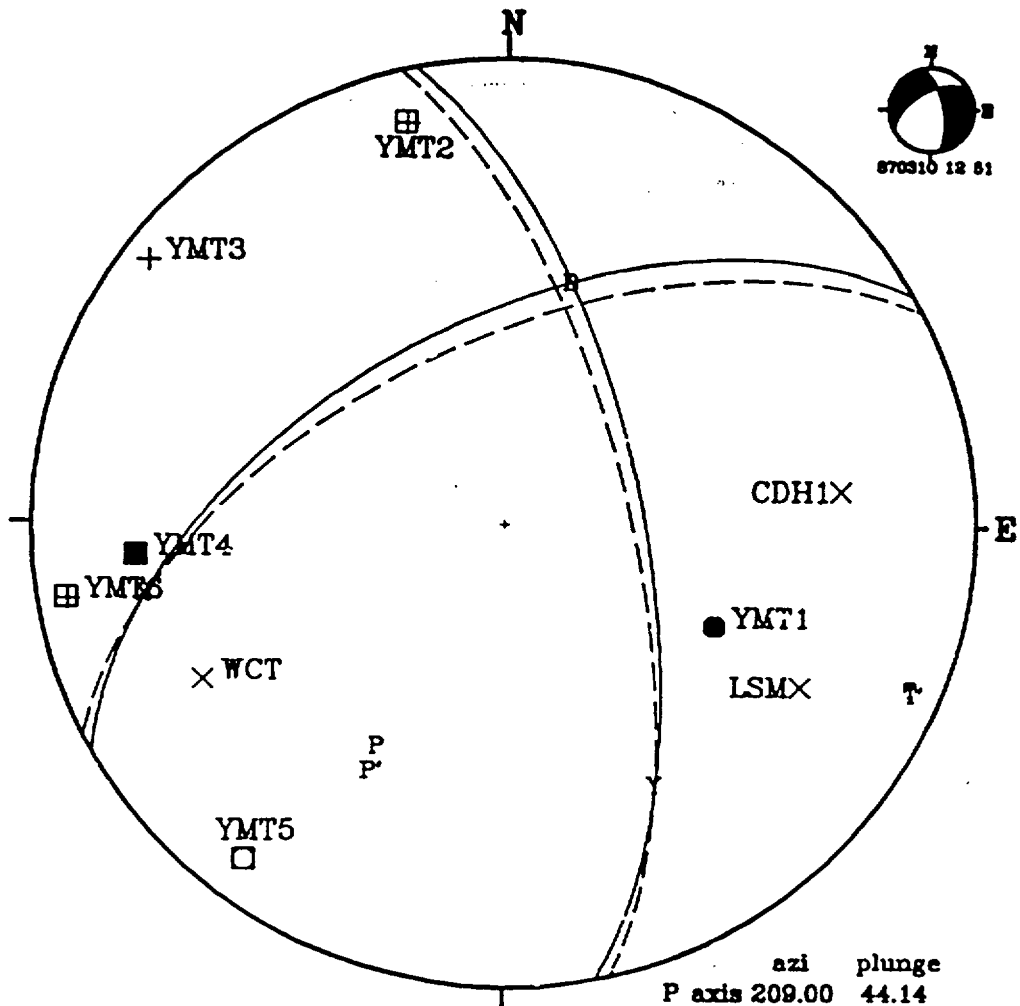
ALAMO SE
DATE&TIME: 870113 1 15 9.05
LAT: 37.327 LONG: 115.028
DEPTH, km: 7.48 +/- 0.4 ML: 3.2
DMIN (km)= 9.1

	azi	plunge
P axis	224.66	48.99
T axis	323.50	7.61
B axis	59.93	39.99
X axis	287.43	38.84
Y axis	174.20	26.10

	strike	dip	rake
Soln 1	264.20	63.90	−44.30
Var 2'	263.70	77.80	−54.10
Var 2"	262.70	65.60	−32.70

This earthquake was felt at Alamo, Nevada. Its focal mechanism is well-constrained by P-wave first motions, including polarity data from station DWU, operated by the Seismograph Stations of the University of Utah, Salt Lake City, Utah. Station CDH1 has the only polarity error for the range of focal mechanisms shown.

Figure D2. Oblique normal-slip focal mechanism solutions for an earthquake of January 13, 1987, in the Pahranagat Shear Zone, that was felt at Alamo, Nevada.



BARE MTN
DATE&TIME: 870310 12 51 2.11
LAT: 36.844 LONG: 116.505
DEPTH, km: 3.13 +/- 0.4 ML: 0.4
DMIN (km)=2.5

	azi	plunge
P axis	209.00	44.14
T axis	112.11	7.05
B axis	15.00	45.00
X axis	258.86	23.93
Y axis	150.28	35.40

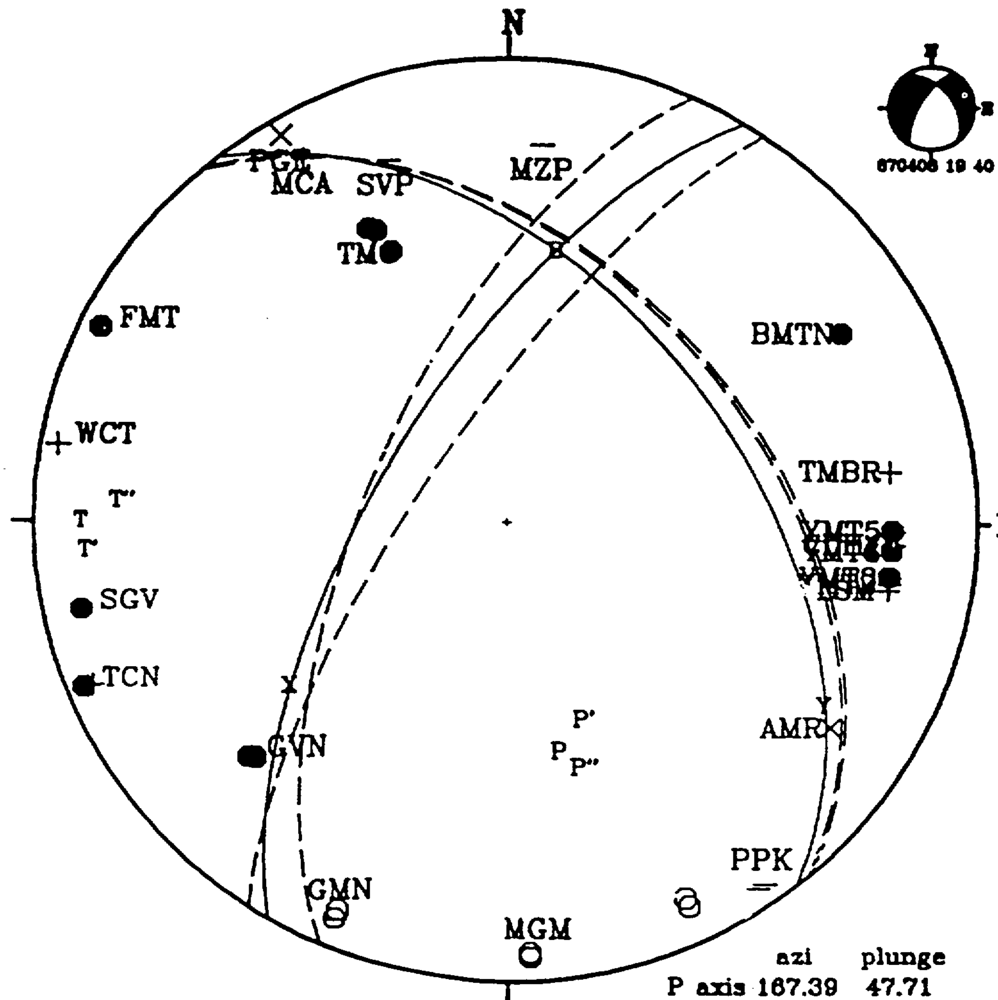
	strike	dip	rake
Soln 1	240.28	54.60	−29.84
Var 2'	242.57	58.23	−25.70

This Yucca Mountain hypocenter was determined from a Yucca Mountain seismic velocity model. The SV-to-P ground amplitude ratios have been corrected for path and surface effects associated with that model, to yield "source zone" amplitude ratios. These are shown below for the solid-line nodal plane solution, along with the theoretical ratios from that solution's radiation pattern (RMS amplitude error =0.100).

Log10(SV/P)z

Observed	Theoretical	Difference	Station
1.3283	1.2788	0.0495	YMT4
0.8076	0.6893	0.1183	YMT2
0.6205	0.6046	0.0159	YMT5
0.6758	0.8296	-0.1538	YMT6

Figure D3. Predominantly strike-slip focal mechanism for a very small earthquake of March 10, 1987, at Yucca Mountain, Nevada, constrained by several SV/P_z amplitude ratios.



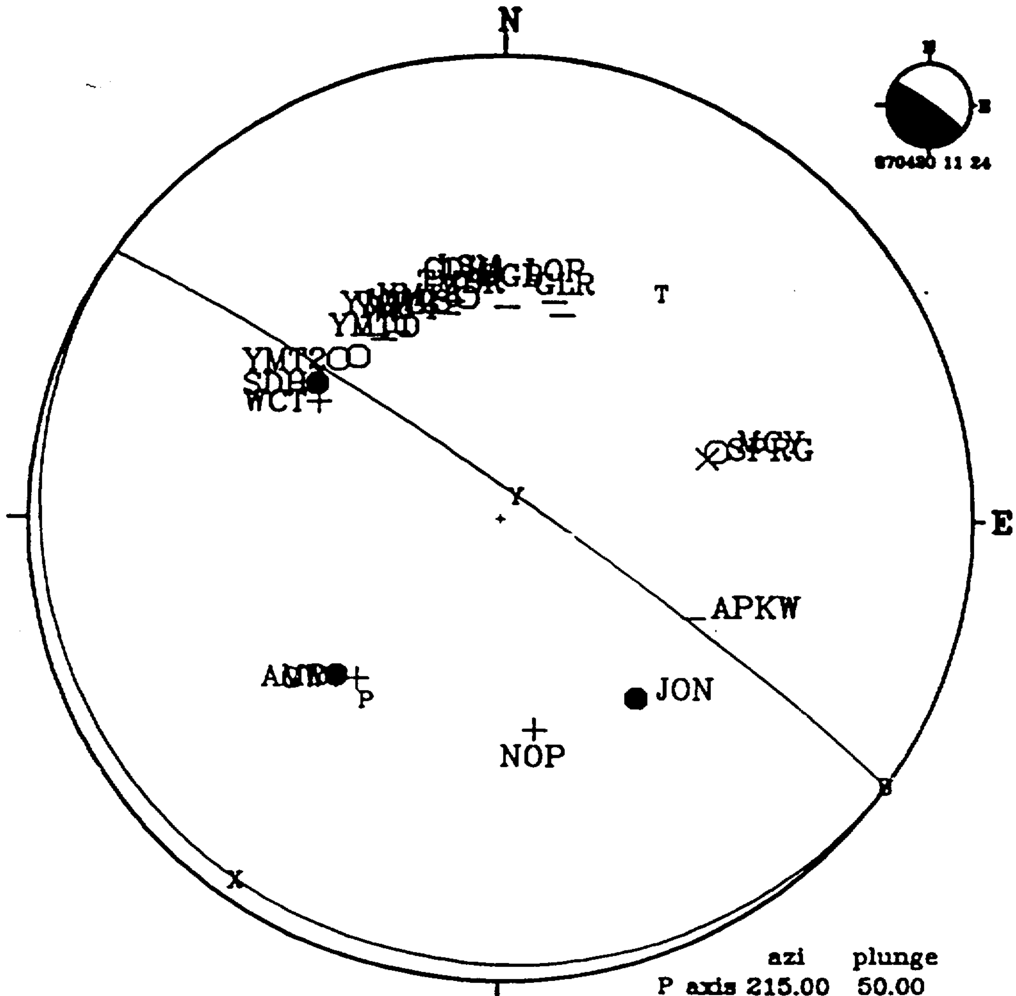
TIN MTN
DATE&TIME: 870408 19 40 19.25
LAT: 36.910 LONG: 117.467
DEPTH, km: 7.84 +/- 0.4 ML: 2.6
DMIN (km)= 12.9
COMPOSITE WITH 870408 20 19 46.43
870408 20 2 38.13

	azi	plunge
P axis	167.39	47.71
T axis	270.26	11.45
B axis	10.05	40.01
X axis	231.95	41.56
Y axis	120.40	22.50

	strike	dip	rake
Soln 1	210.40	67.50	−45.90
Var 2'	203.30	65.80	−51.00
Var 2"	213.20	74.80	−48.20

The range of fault-plane solutions for this composite of three earthquakes from a short-lived swarm in the Grapevine Mountains is narrow when determining raypaths using a SGB velocity model having interfaces at 1, 3, and 15 km below sea level. The counterclockwise rotation of the tension (T) axis from its average direction for SGB microearthquake focal mechanisms should be noted.

Figure D4. A composite, oblique, normal-slip set of focal mechanism solutions for earthquakes of April 8, 1987, in the Grapevine Mountains, California.



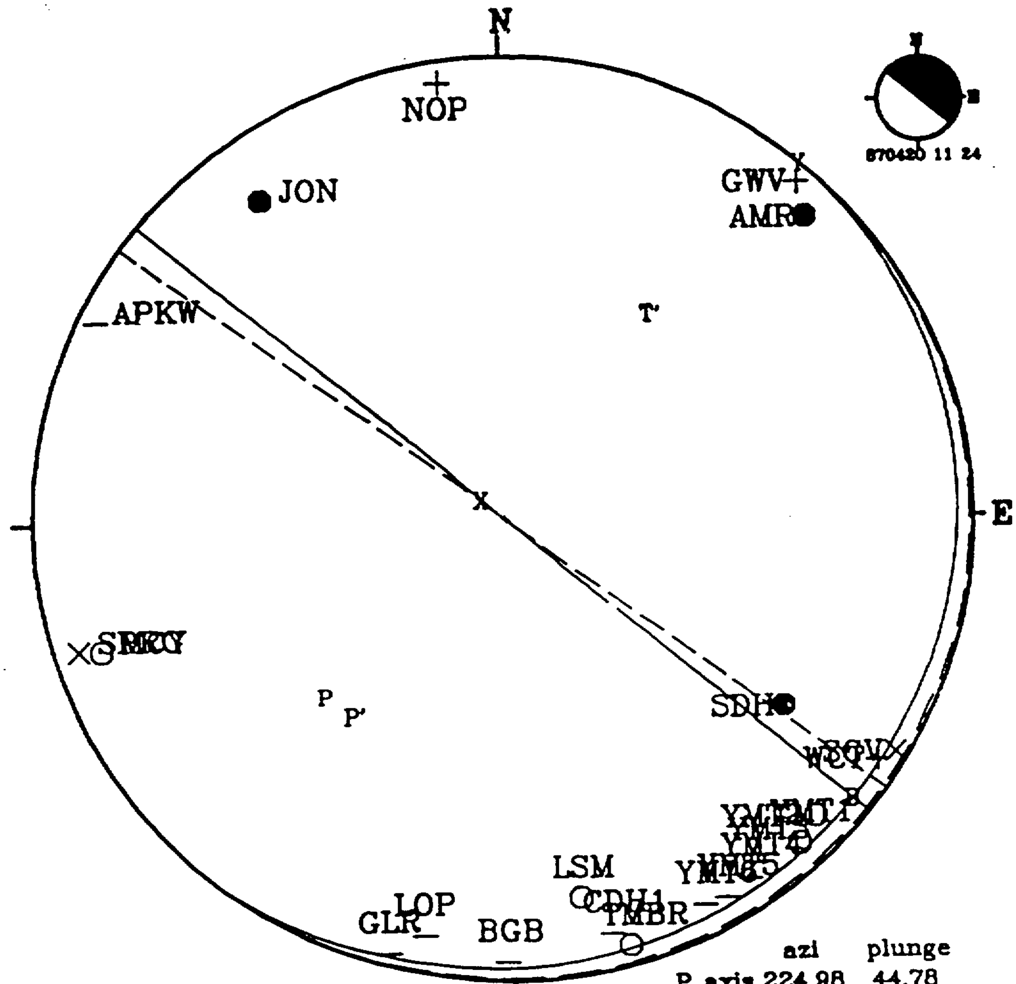
SPECTER RANGE SW
DATE&TIME: 870420 11 24 33.47
LAT: 33.588 LONG: 116.242
DEPTH, km: −1.19 +/− 0.5 ML: 1.9
DMIN (km)= 10.7

	azi	plunge
P axis	215.00	50.00
T axis	35.00	40.00
B axis	125.00	0.00
X axis	215.00	5.00
Y axis	35.00	85.00

	strike	dip	rake
Soln 1	125.00	5.00	−90.00

This focal mechanism indicates that the
SGBSN has recorded microearthquake
P-wave first motions that
are best fit by nodal planes one of which
is sub-horizontal. If the hypocenter is correct.
this earthquake may be evidence for a
seismically actively near-surface detachment
fault.

Figure D5. A normal-slip focal mechanism solution having one sub-horizontal nodal plane for an earthquake of April 20, 1987, in the northern Amargosa Valley, Nevada (Specter Range SW quadrangle). The RMS-minimizing depth of focus is at the earth's surface.



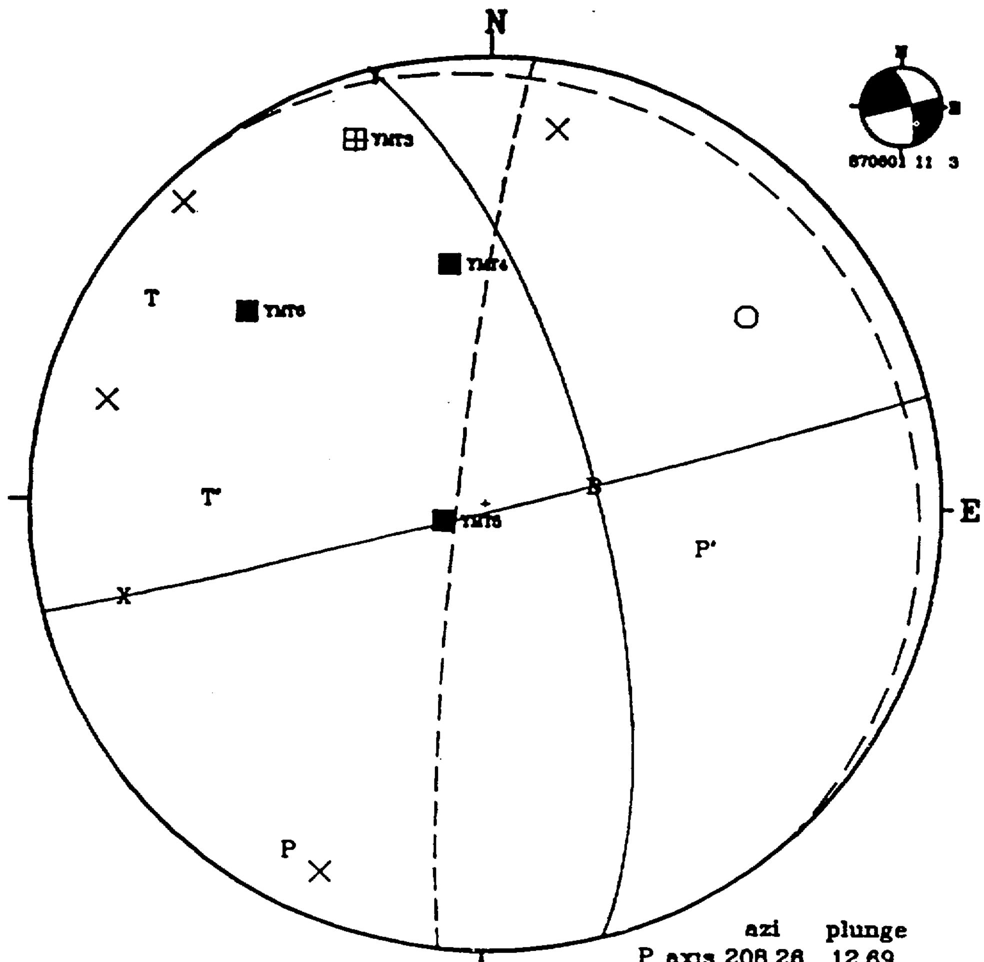
SPECTER RANGE SW
DATE&TIME: 870420 11 24 33.97
LAT: 36.588 LONG: 116.239
DEPTH, km: 6.65 +/- 1.8 ML: 1.8
DMIN (km.)=11.1

	azi	plunge
P axis	224.98	44.78
T axis	35.02	44.78
B axis	130.00	5.00
X axis	310.00	85.00
Y axis	40.00	0.00

	strike	dip	rake
Soln. 1	130.00	90.00	85.00
Var 2'	126.50	90.00	89.00

ALTERNATE HYPOCENTER => ALTERNATE MECHANISM
The Specter Range hypocenter of April 20, 1987,
11:24 UTC had a minimum RMS travel time residual
of 0.10 seconds for the surface-focus solution
previously shown, versus a RMS travel time residual
of 0.14 seconds for this 6.65 km below sea level
solution. Even for a radically different distribution
of P-ray take-off angles for the deeper focus solution,
the possibility of an active detachment fault remains,
albeit with horizontal slip here, versus normal slip
in the previous solution.

Figure D6. A strike-slip focal mechanism solution on a sub-horizontal nodal plane for the same earthquake as in Figure D5, in which the focal depth is changed from surface to 6.65 km below sea level.



TOPOPAH SPRING NW
DATE&TIME: 870601 11 3 34.76
LAT: 36.896 LONG: 116.462
DEPTH, km: 5.94 +/- 0.5 ML: 0.1
DMIN (km)= 0.8

	azi	plunge
P axis	208.28	12.69
T axis	301.76	15.16
B axis	79.99	70.03
X axis	254.68	19.89
Y axis	345.30	1.70

	strike	dip	rake
Soln 1	75.30	88.30	19.90
Var 2'	185.40	85.00	-85.00

Amplitude Ratio Data

Log10(SV/P)z for Normal Slip Solution (dashed)

Observed	Theoretical	Difference	Station
1.7048	1.7863	-0.0815	YMT5
0.4341	0.3706	0.0635	YMT4
0.4805	0.2130	0.2675	YMT6
0.7285	0.9980	-0.2695	YMT3

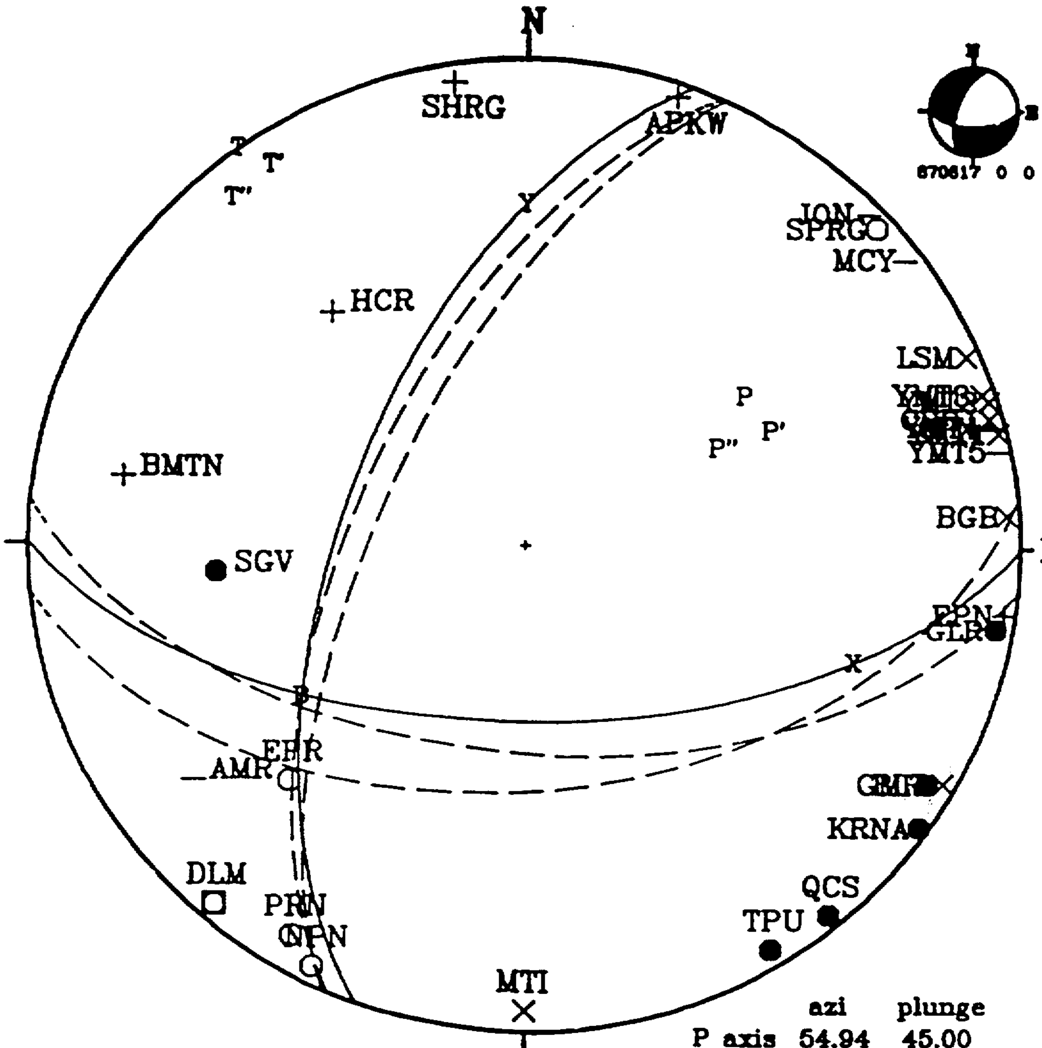
RMS Ratio error for above data is 0.197.

Log10(SV/P)z for Strike Slip Solution (solid)

Observed	Theoretical	Difference	Station
1.7048	1.5349	0.1699	YMT5
0.4341	0.3667	0.0674	YMT4
0.4805	0.1890	0.2915	YMT6
0.7286	0.6206	0.1080	YMT3

Avg RMS error is 0.180

Figure D7. A very different pair of focal mechanism solutions for a very small earthquake of June 1, 1987, at Yucca Mountain, Nevada, both of which are constrained by several SV/P_z amplitude ratios.



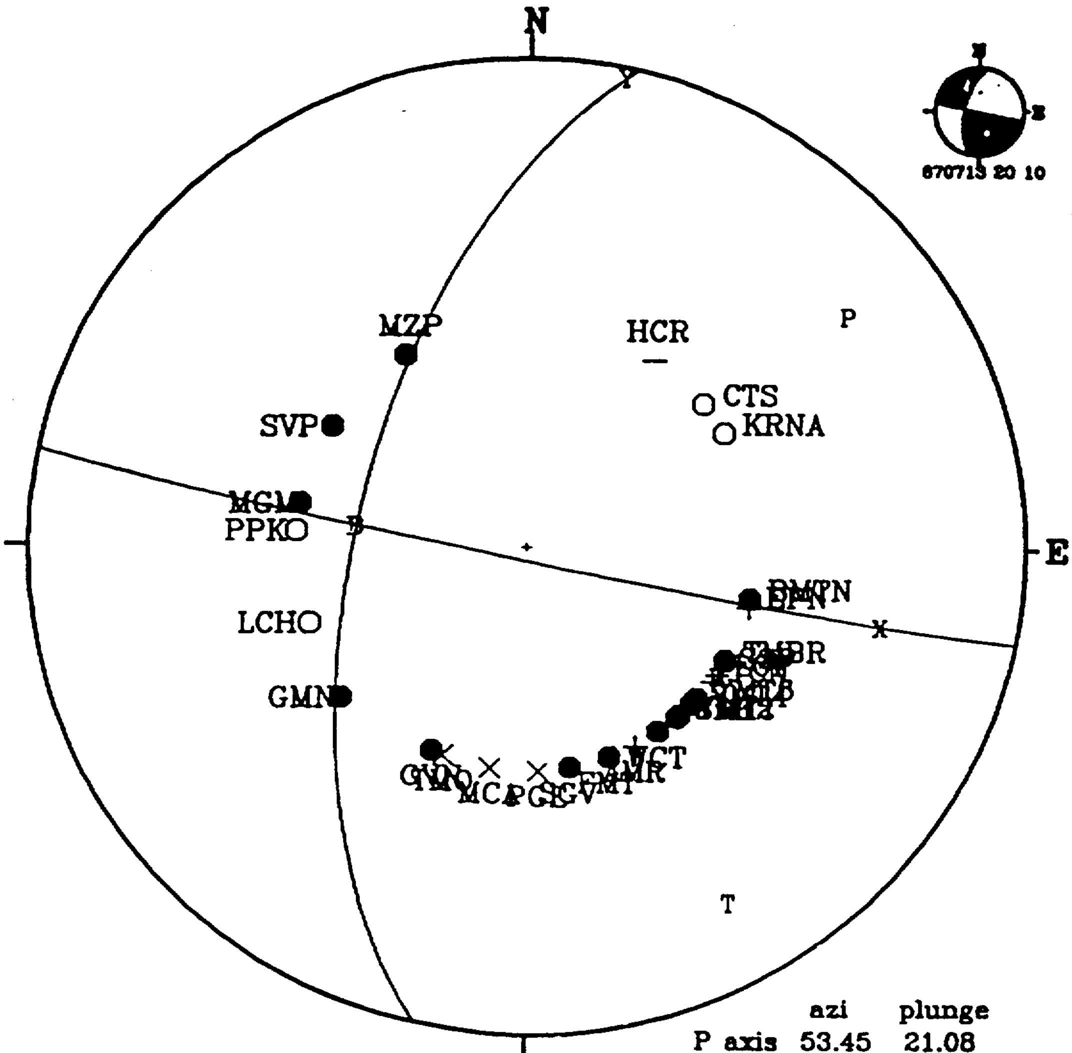
DESERT HILLS SE
DATE&TIME: 870617 0 0 50.69
LAT: 37.097 LONG: 115.273
DEPTH, km: 7.41 +/- 1.3 ML: 3.5
DMIN (km)= 11.0

	azi	plunge
P axis	54.94	45.00
T axis	324.93	0.00
B axis	234.93	45.00
X axis	109.67	30.00
Y axis	0.20	30.00

	strike	dip	rake
Soln 1	90.20	60.00	−35.26
Var 2'	95.28	54.60	−29.84
Var 2"	84.32	47.85	−39.32

This hypocenter is the mainshock of a diffuse series of earthquakes in the Pahranagat Shear Zone. occurring at the southwest terminus of the zone. at the southern end of the Pahranagat Range. Constraint is provided by the SV/P amplitude ratio at station DLM. Other nearby stations all have clipped (overdriven) seismograms for this earthquake. The epicenter falls at the east end of a mapped northeast-trending left-lateral strike-slip fault.

Figure D8. An oblique strike-slip focal mechanism solution for an earthquake of June 17, 1987, 0:00:51, in the Pahranagat Shear Zone.



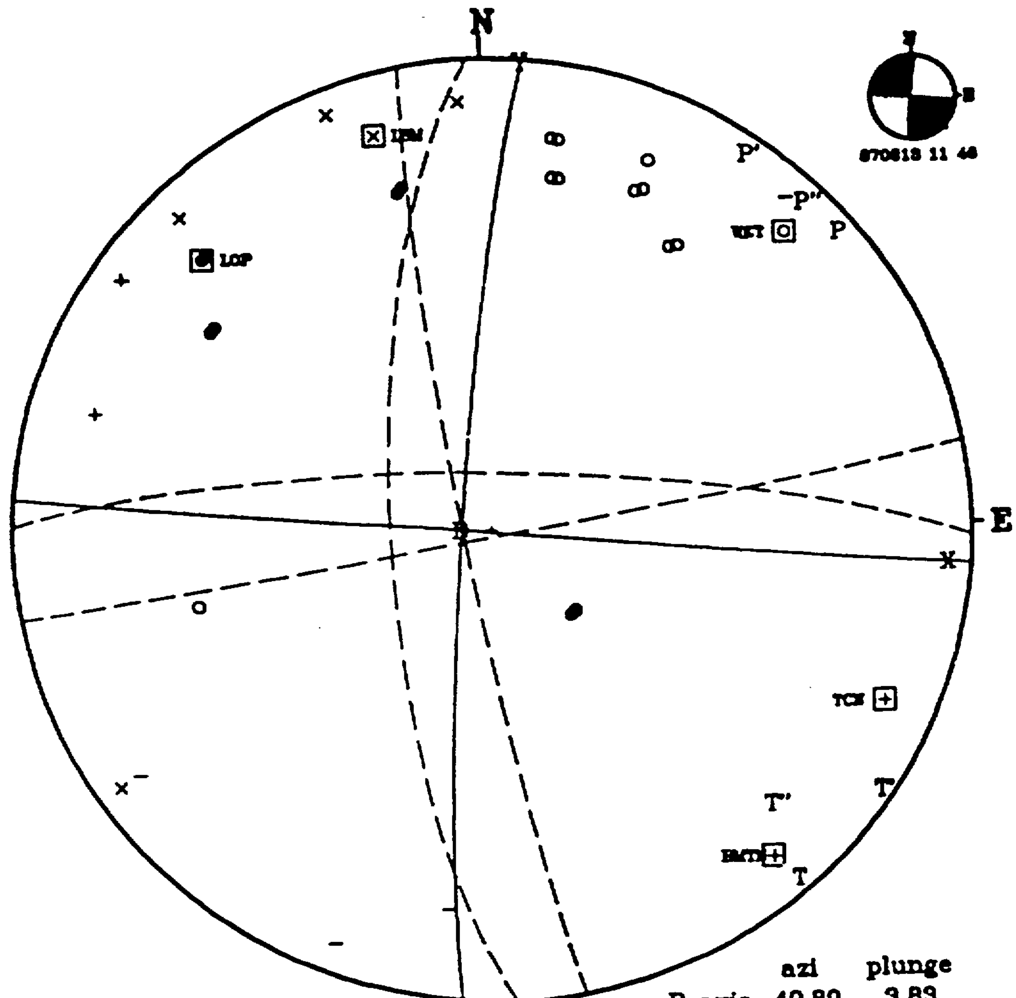
STONEWALL PASS
DATE&TIME: 870713 20 10 15.14
LAT: 37.385 LONG: 117.133
DEPTH, km: −0.07 +/− 0.3 ML: 2.5
DMIN (km)=14.5

	azi	plunge
P axis	53.45	21.08
T axis	150.45	17.55
B axis	276.97	62.01
X axis	102.64	27.87
Y axis	11.40	2.35

	strike	dip	rake
Soln 1	101.40	87.65	−27.90

The earthquake is the mainshock of a series of about 34 recorded earthquakes from February 1987 through August 1987 about 15 km north-northwest of Scottys Junction, Nev. This hypocenter, which has minimum RMS travel time residual at sea level or shallower, was determined using a modified velocity model in which Vp/Vs=1.68, from a Wadati diagram. Also, a Pg interface at 15 km below sea level is present, below which Vp = 6.5 km/sec.

Figure D9. A predominantly strike-slip focal mechanism solution for an earthquake of July 13, 1987, 20:10:15, northwest of Scottys Junction, Nevada.



BUCKBOARD MESA
DATE&TIME: 870813 11 46 9.37
LAT: 37.012 LONG: 116.359
DEPTH, km: 8.99 +/- 0.4 ML: 1.5
COMPOSITE WITH 870814 4 11 59.10

	azi	plunge
P axis	49.89	3.83
T axis	140.11	3.21
B axis	269.94	85.00
X axis	95.02	4.98
Y axis	4.98	0.44

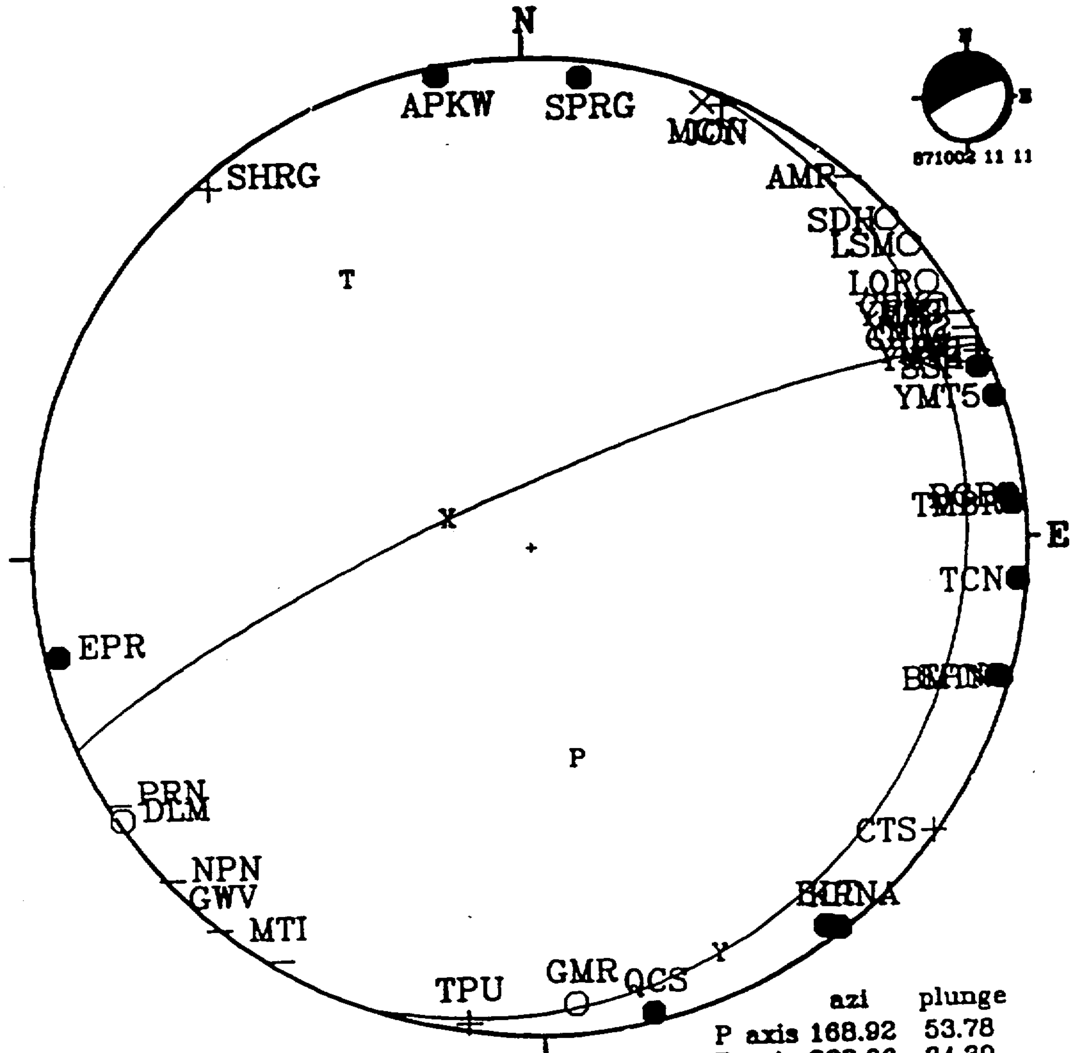
	strike	dip	rake
Soln 1	94.98	89.56	-4.98
Var 2'	79.95	88.71	-4.83
Var 2''	271.51	80.15	17.50

Amplitude ratio data for the first focal mech.
(earthquake of August 14, 1987, 04:11:59 UTC):

Log10(SV/P)z Observed	Theoretical	Difference	Station
0.4904	0.2830	0.2074	LOP
1.2114	0.2894	0.9220	*LSM
-0.0159	-0.1068	0.0909	VCT
-0.0771	-0.0538	-0.0233	TCN
0.0638	-0.1664	0.1782	BMTN

The RMS ratio error for acceptable amplitudes is 0.142

Figure D10. A strike-slip set of focal mechanism solutions for an earthquake of August 13, 1987, 11:46:09 UTC at the southeast edge of the Timber Mountain Caldera, Nevada.



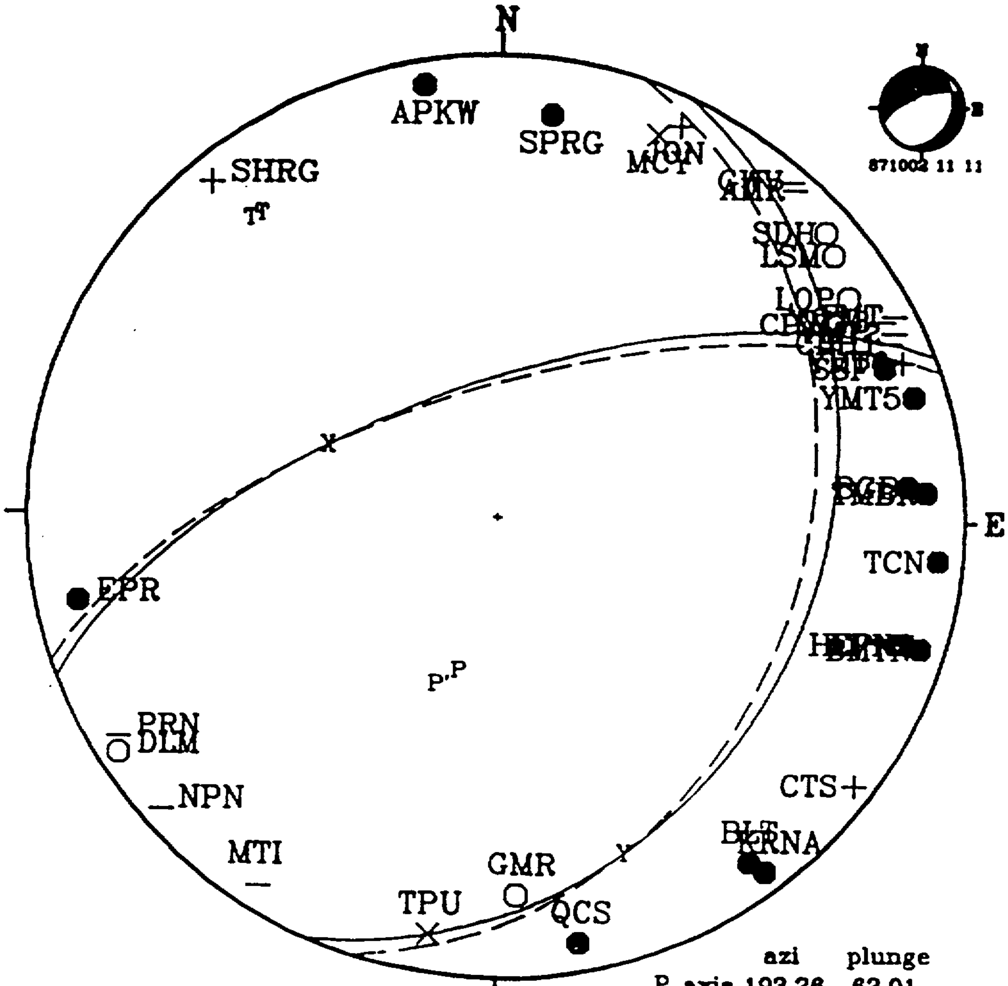
PAPOOSE LAKE SE
DATE&TIME: 871002 11 11 55.21
LAT: 37.072 LONG: 115.753
DEPTH, km: 5.18 +/- 8.5 ML: 3.4
DMIN (km)= 29.1

	azi	plunge
P axis	168.92	53.78
T axis	328.06	34.39
B axis	65.00	10.00
X axis	290.45	75.89
Y axis	156.75	9.85

	strike	dip	rake
Soln 1	246.75	80.15	−79.85

Because the distance between the nearest station (GMR) and the epicenter is 29 km, the depth of focus for this earthquake is very uncertain. The sub-horizontal dip of the southeast-dipping nodal plane is dependent on the correctness of the depth estimate, and, more generally, on the adequacy of the velocity model. If the hypocenter is correct, the focal mechanism is well-constrained, having essentially no alternate nodal plane solutions.

Figure D11. A peculiar normal-slip focal mechanism solution for an earthquake of October 2, 1987, 11:11:55 UTC, at Yucca Flat, Nevada Test Site, in which one nodal plane is sub-horizontal when the depth of focus is assumed to be about 5 km below sea level.



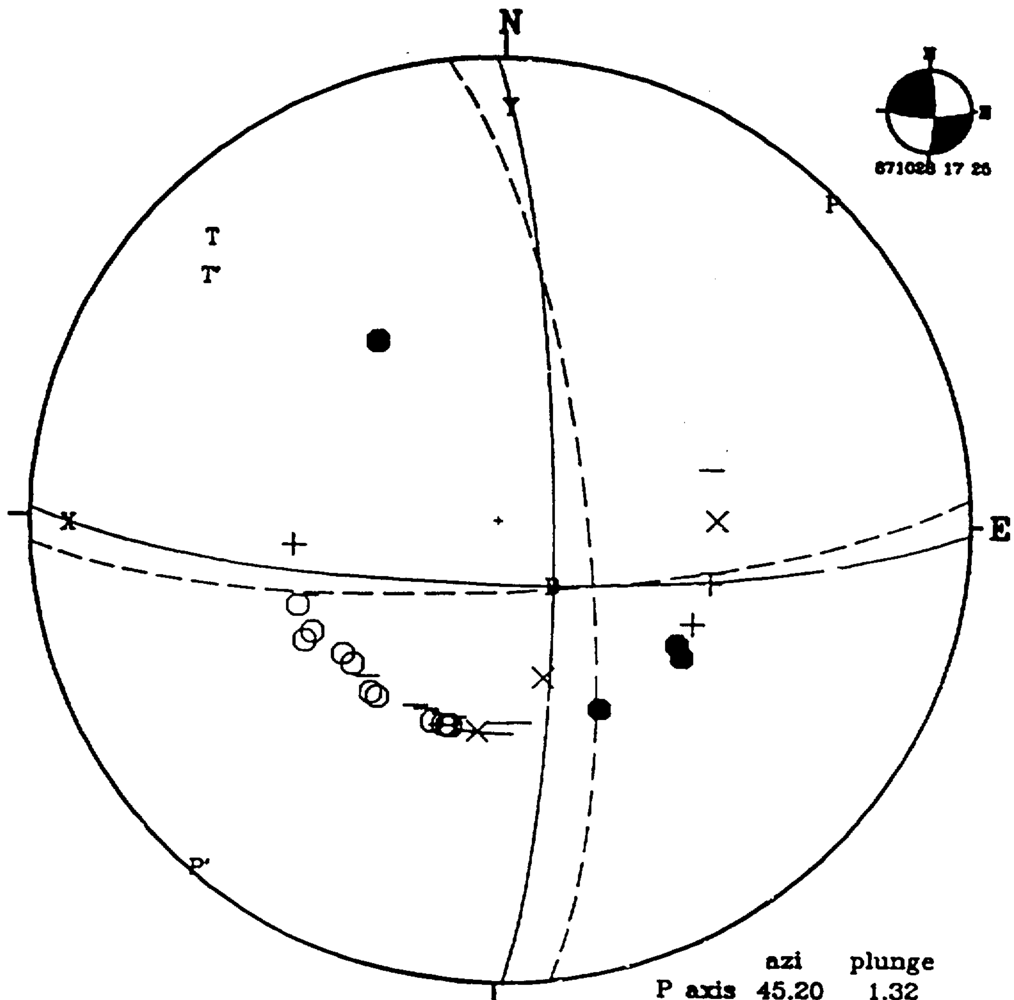
PAPOOSE LAKE SE
DATE&TIME: 871002 11 11 55.10
LAT: 37.074 LONG: 115.752
DEPTH, km: 11.00 +/- 2.7 ML: 3.4
DMIN (km)=27.1

	azi	plunge
P axis	193.26	62.01
T axis	322.94	18.75
B axis	60.04	20.00
X axis	293.78	58.39
Y axis	159.10	23.40

	strike	dip	rake
Soln 1	249.10	66.60	-68.12
Var 2'	251.15	67.50	-62.77

ALTERNATE HYPOCENTER -> ALTERNATE MECHANISM
For this fixed-z solution, the distance between the nearest station (GMR) and the epicenter is 27 km. Assuming an 11 km below sea level depth, more conventional nodal plane solutions are found. The RMS travel time residual for this 11 km hypocenter is 0.20 sec. vs 0.19 sec for the 5.18 km shown previously.

Figure D12. An alternate predominantly normal-slip focal mechanism solution for the same earthquake as in Figure D11, in which the previously shallow-dipping nodal plane now dips at about 30 degrees, when the depth of focus is assumed to be 11 km below sea level.



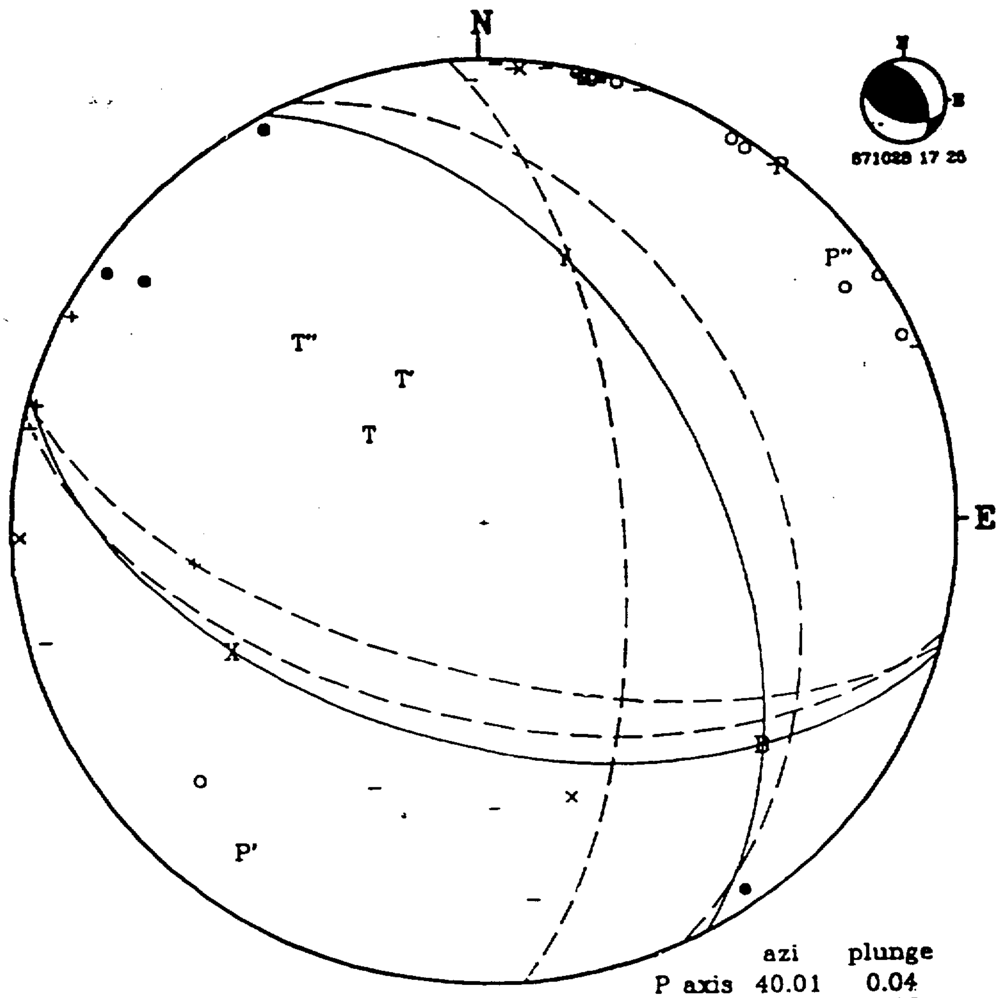
REVEILLE PEAK
DATE&TIME: 871028 17 25 8.57
LAT: 37.870 LONG: 116.132
DEPTH, km: 0.65 +/- 0.5 ML: 2.8
DMIN (km): 20.9

	azi	plunge
P axis	45.20	1.32
T axis	314.85	14.87
B axis	140.15	75.07
X axis	269.06	9.51
Y axis	1.00	11.40

	strike	dip	rake
Soln 1	91.00	78.60	9.70
Var 2'	86.70	77.30	15.60

The velocity model used to obtain this data set has a refractor interface at 12 km below sea level. vp/vs=1.71 (standard value for preliminary determination of hypocenter for SGB earthquakes). The starting depth for iterations was set to z0=0.0 km (at sea level). The RMS travel time residual for this solution is 0.11 sec. not the global minimum.

Figure D13. A strike-slip focal mechanism for an earthquake of October 28, 1987, in the southwest Reveille Range, Nevada, in which the depth of focus is assumed to be 0.65 km below sea level. A velocity discontinuity at 12 km below sea level was used for ray tracing when computing this preliminary hypocenter.



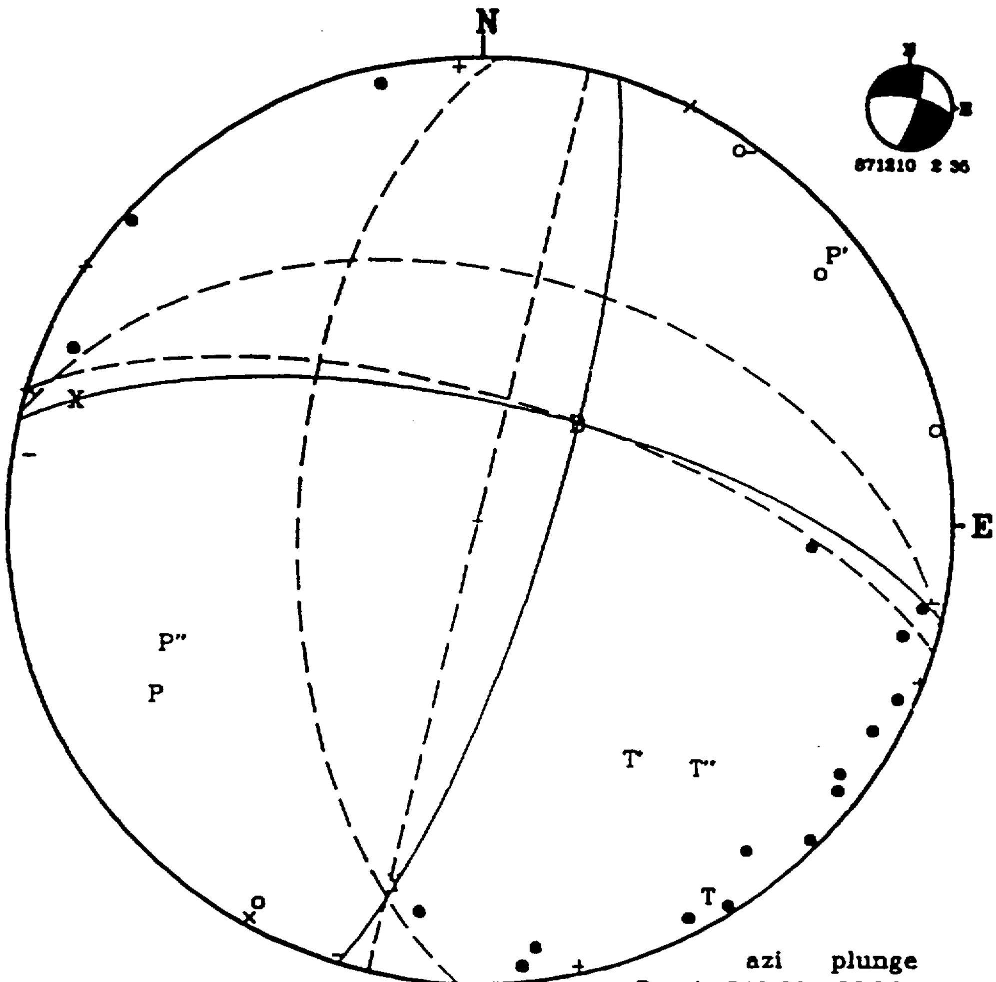
REVEILLE PEAK
DATE&TIME: 871028 17 25 8.75
LAT: 37.869 LONG: 116.131
DEPTH, km: 5.70 +/- 1.8 ML: 2.6

	azi	plunge
P axis	40.01	0.04
T axis	309.92	65.02
B axis	130.03	24.98
X axis	242.89	39.83
Y axis	17.10	39.90

	strike	dip	rake
Soln 1	107.10	50.10	56.60
Var 2'	106.30	63.10	61.70
Var 2"	104.70	54.60	29.80

This focal mechanism comes from
a HYPO71 hypocenter that was obtained
using a velocity model having interfaces
at 1 km. 3 km. 15 km. 24 km. and 33 km
below sea level. The P velocity below the
15 km interface is 6.5 km/sec.
The first two stations have -0.2 and -0.4 sec
P-arrival residuals for this solution.
Minimum source-station distance = 20 km.

Figure D14. An oblique reverse-slip focal mechanism solution for the same earthquake as in Figure D13, in which the depth of focus is assumed to be 5.7 km below sea level. A velocity discontinuity at 15 km below sea level (shifted from the 12 km discontinuity in the model used in Figure D13) was used for ray tracing when computing this preliminary hypocenter.

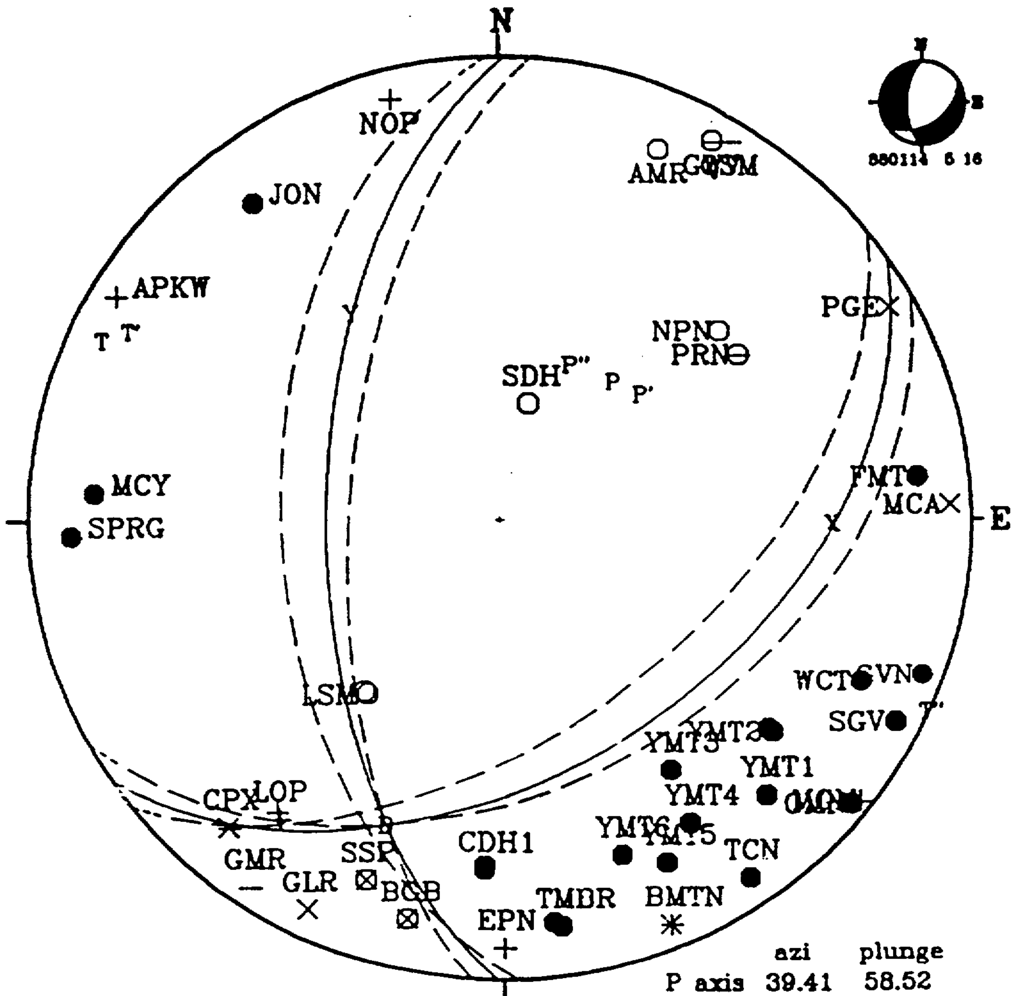


SPECTER RANGE NW
DATE&TIME: 871210 2 35 17.19
LAT: 36.737 LONG: 116.189
DEPTH, km: 4.82 +/- 0.8 ML: 2.2
DMIN (km)= 7.4

	azi	plunge
P axis	240.90	23.70
T axis	148.15	6.02
B axis	44.79	65.46
X axis	286.73	12.12
Y axis	192.00	21.00

	strike	dip	rake
Soln 1	282.00	69.00	−13.00
Var 2'	286.00	68.00	34.00
Var 2"	283.00	45.00	0.00

Figure D15. A set of predominantly strike-slip focal mechanism solutions for an earthquake of December 10, 1987, 2:35:17 UTC, in the Specter Range, southern Nevada Test Site.



STRIPED HILLS
DATE&TIME: 880114 5 16 33.45
LAT: 36.680 LONG: 116.327
DEPTH, km: 10.11 +/- 0.3 ML: 2.3
DMIN (km)=4.1

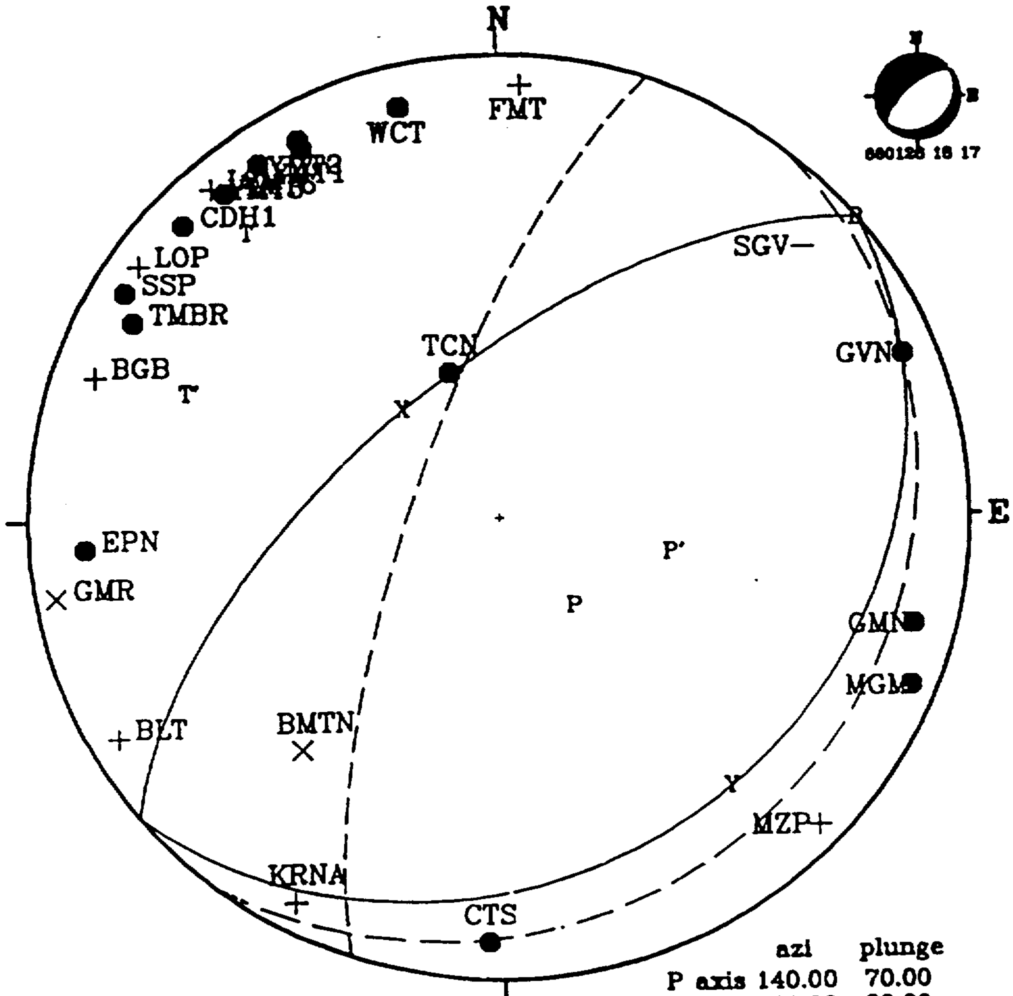
Composite with 880114 07:35

This oblique normal-slip strike-slip composite mechanism is constrained by the mainshock's first motions; other earthquakes' data have been included because of their consistency, rather than by any necessity to add them for constraint.

	azi	plunge
P axis	39.41	58.52
T axis	295.00	8.67
B axis	199.95	30.00
X axis	90.67	29.77
Y axis	325.50	45.20

	strike	dip	rake
Soln 1	55.50	44.80	−44.80
Var 2'	60.90	41.40	−40.90
Var 2"	51.60	52.50	−50.80

Figure D16. A composite oblique normal-slip set of focal mechanism solutions for a pair of earthquakes on January 14, 1988, in the Striped Hills, about 20 km south of Yucca Mountain, Nevada.



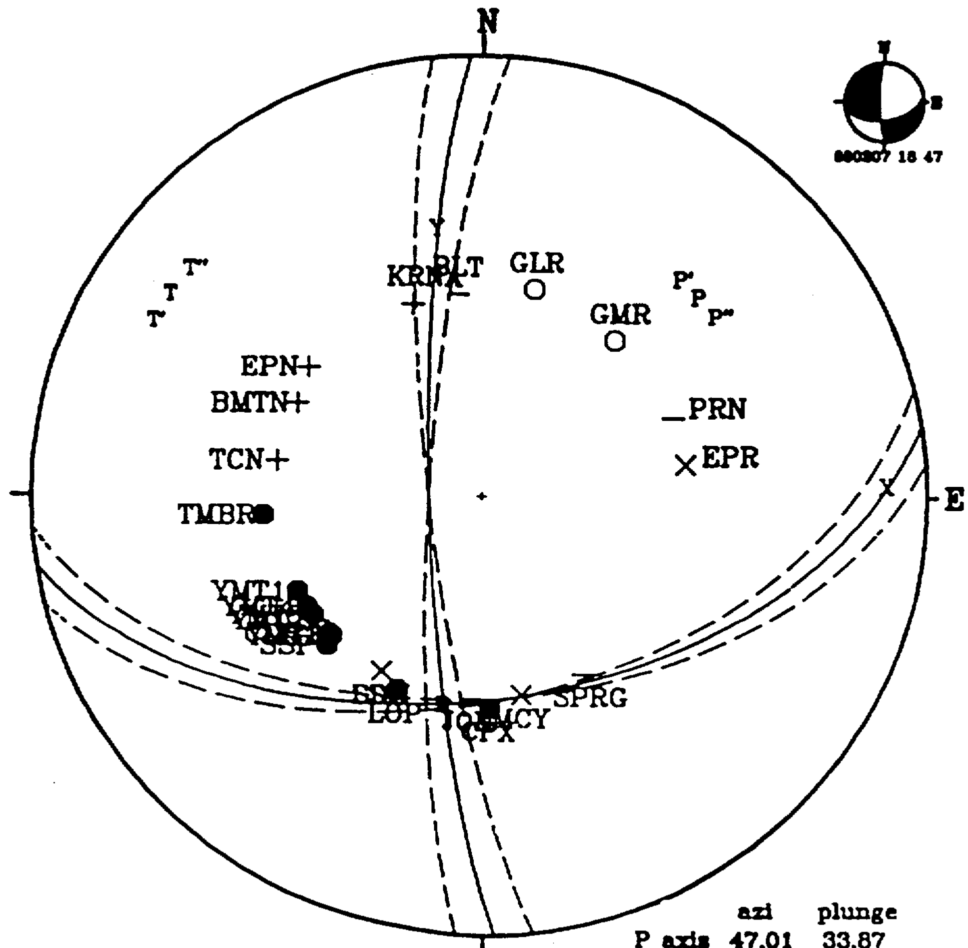
THIRSTY CANYON NW
DATE&TIME: 880126 18 17 21.68
LAT: 37.191 LONG: 116.743
DEPTH, km: 9.89 +/- 0.5 ML: 2.3
DMIN (km)=5.2

	azi	plunge
P axis	140.00	70.00
T axis	320.00	20.00
B axis	50.00	0.00
X axis	320.00	65.00
Y axis	140.00	25.00

	strike	dip	rake
Soln 1	230.00	65.00	−90.00
Var 2'	38.02	15.80	−71.30

Focal mechanism solutions for this hypocenter are fairly well constrained using P-wave polarities alone. Note, the dashed-line solution (Var 2') has a shallow dipping nodal plane (dip = 16 degrees), providing an example of the possibility of seismic slip on a detachment fault.

Figure D17. Predominantly normal-slip focal mechanism solutions for an earthquake of January 26, 1988, 18:17:22 UTC, in the Oasis Valley, Nevada (Thirsty Canyon NW quadrangle), one of which has a shallow-dipping nodal plane.



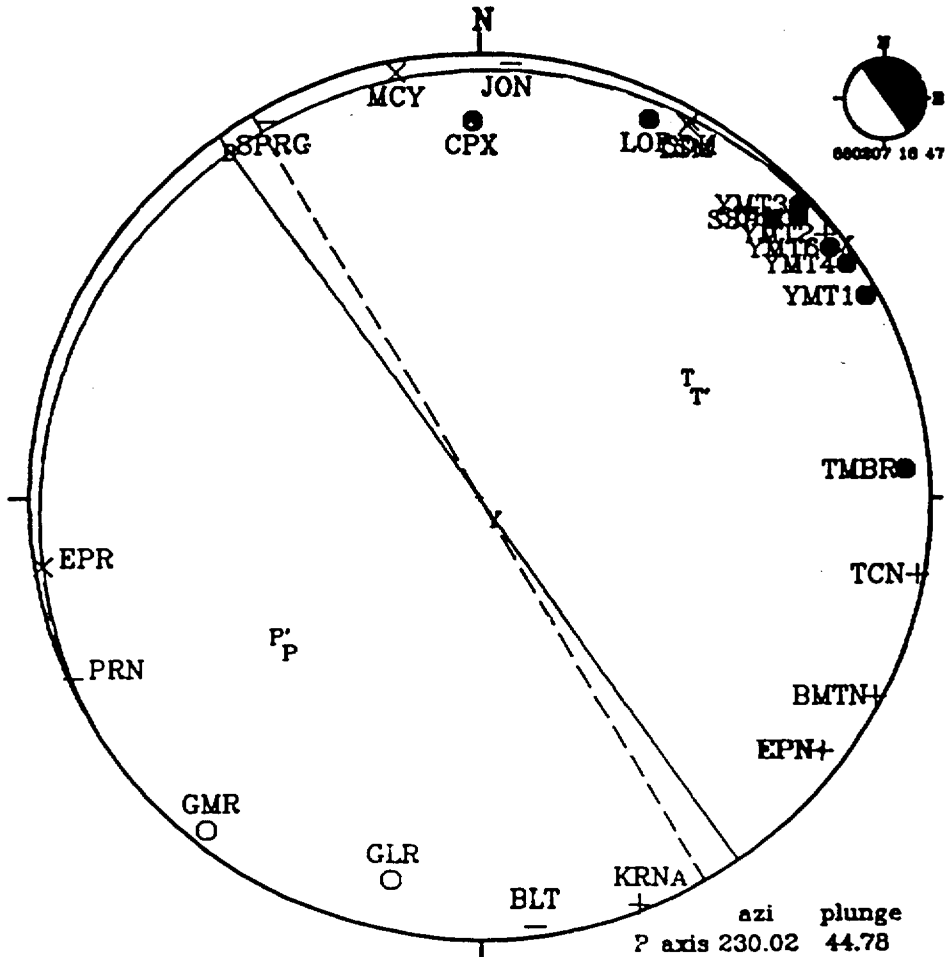
YUCCA FLAT
DATE&TIME: 880207 16 47 41.87
LAT: 37.056 LONG: 116.060
DEPTH, km: −0.21 +/− 0.8 ML: 2.0
DMIN (km)= 13.7

	azi	plunge
P axis	47.01	33.87
T axis	303.85	18.73
B axis	190.04	49.97
X axis	88.41	9.61
Y axis	350.70	38.40

	strike	dip	rake
Soln 1	80.70	51.60	−12.30
Var 2'	75.70	51.60	−12.30
Var 2"	85.70	51.60	−12.30

This ultra-shallow hypocenter, with epicenter about one Km west of the surface trace of Yucca Fault, has well-constrained nodal planes from P-wave polarities.
The RMS travel time residual for this hypocenter is 0.14 seconds, using the standard SGBSN velocity model. The nearest-in-time nuclear device test at Yucca Flat is WACO, December 1, 1987, 16:30 UTC.

Figure D18. Set of strike-slip focal mechanism solutions for an earthquake on February 7, 1988 16:47:42 UTC at Yucca Flat, Nevada Test Site, in which the depth of focus is assumed to be 0.21 km above sea level.



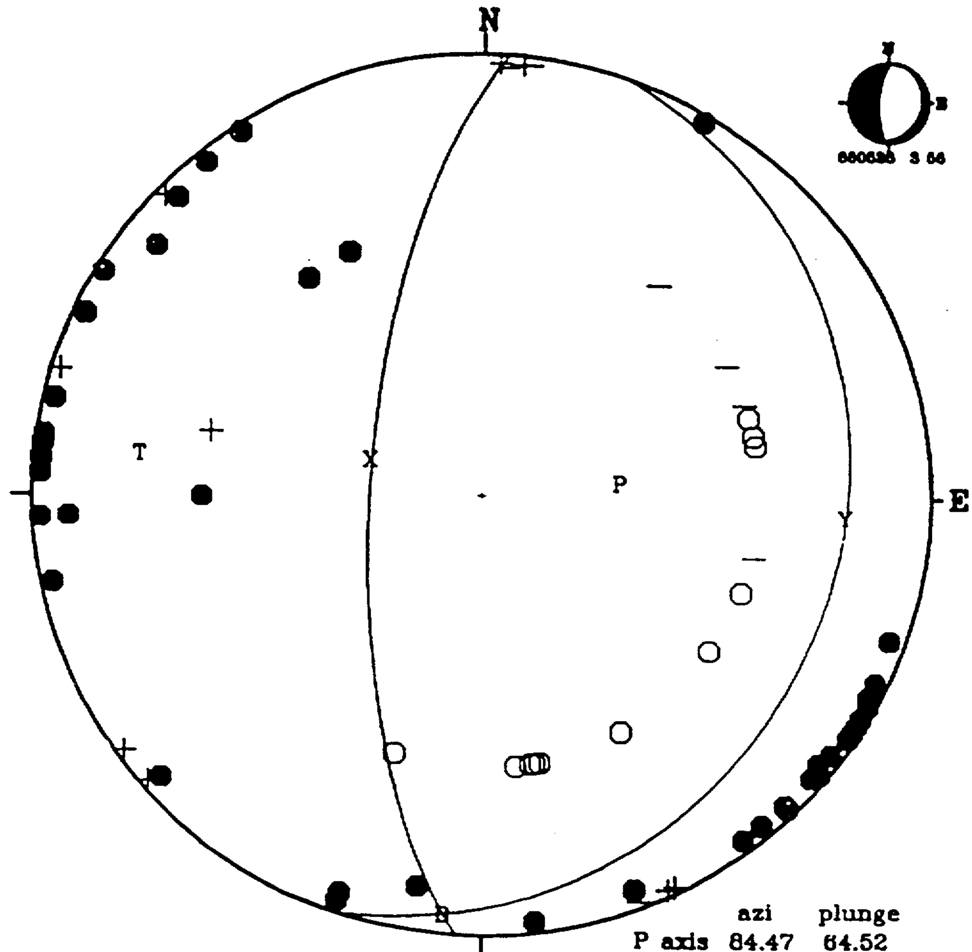
YUCCA FLAT
DATE&TIME: 880207 18 47 42.21
LAT: 37.052 LONG: 116.058
DEPTH, km: 5.03 +/- 2.4 ML: 2.0
DMIN (km)= 13.3

	azi	plunge
P axis	230.02	44.78
T axis	59.98	44.78
B axis	325.00	5.00
X axis	55.00	0.00
Y axis	145.00	85.00

	strike	dip	rake
Soln 1	235.00	5.00	0.00
Var 2'	240.00	5.00	0.00

ALTERNATE HYPOCENTER -> ALTERNATE MECHANISM
This five-km below sea level hypocenter, with
epicenter near the surface trace of Yucca Fault,
has well-constrained nodal planes
from P-wave polarities, with a polarity
error at station KRNA, distance 81 km.
The RMS travel time residual
for this hypocenter is 0.28 seconds,
with poorer fit at both the nearest station,
CPX, and the nearest station with a scaled S
arrival, EPN. However, with these limitations,
the nodal planes now include the possibility of
seismic slip on a detachment surface.

Figure D19. Alternate focal mechanism solutions for the same earthquake as in Figure D18, in which one set of nodal planes dips sub-horizontally. For these solutions, the depth of focus is assumed to be 5.03 km below sea level.



DRY MTN
DATE&TIME: 880526 3 56 49.62
LAT: 36.997 LONG: 117.709
DEPTH, km: 7.00 +/- 1.7 ML: 4.2

	azi	plunge
P axis	84.47	64.52
T axis	277.33	24.92
B axis	185.01	4.98
X axis	288.45	69.43
Y axis	93.20	19.90

	strike	dip	rake
Soln 1	183.20	70.10	−95.30

This solution assumes a refractor at
15 km below sea-level. with veloc of
compressional waves = 6.45 km/sec beneath
the layer boundary. Also. a refractor
at 24 km below which alpha = 7.3 km/sec.
The 15 km refractor was needed to separate
the dilatations from the compressions.

Figure D20. Normal-slip focal mechanism solutions for an earthquake of May 26, 1988, 3:56:50 UTC, in the Fish Lake Valley, California (Dry Mountain quadrangle).

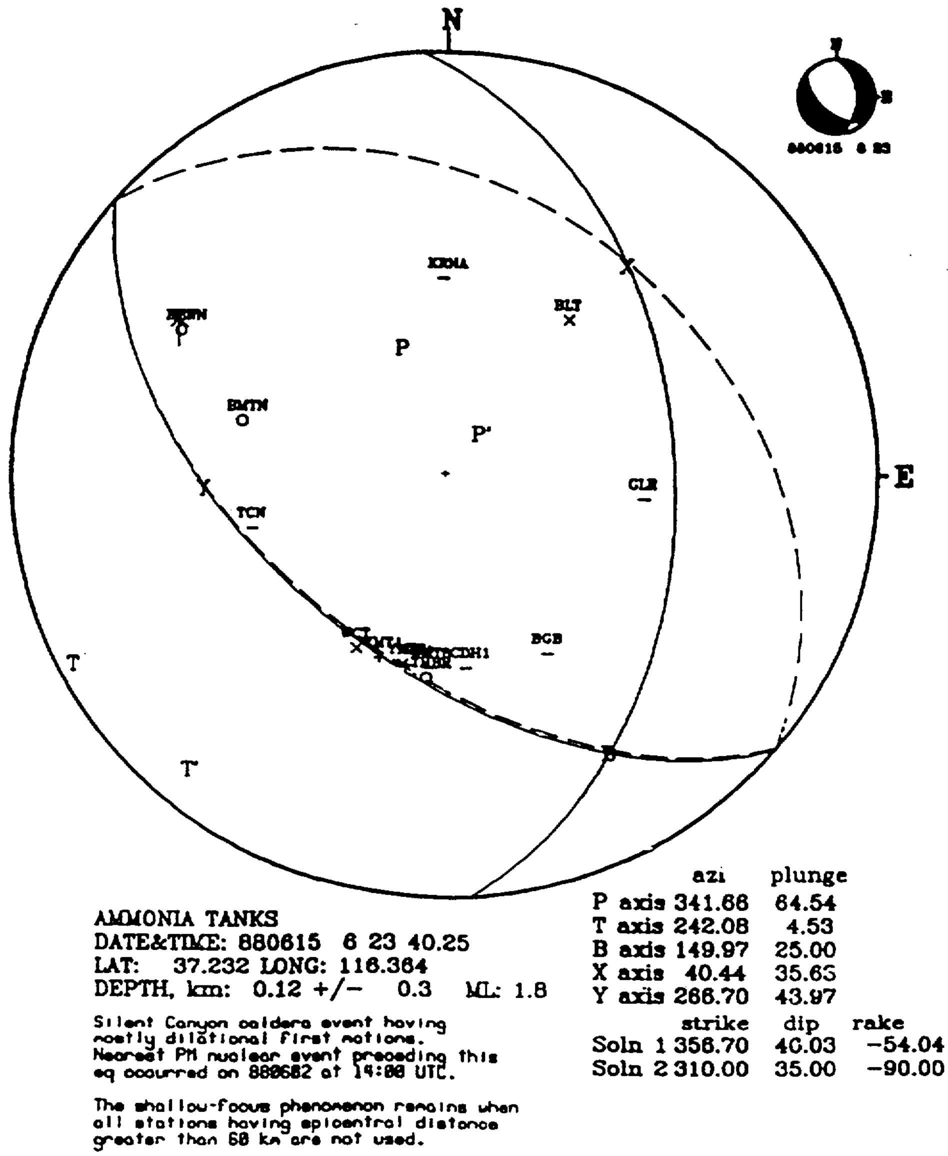
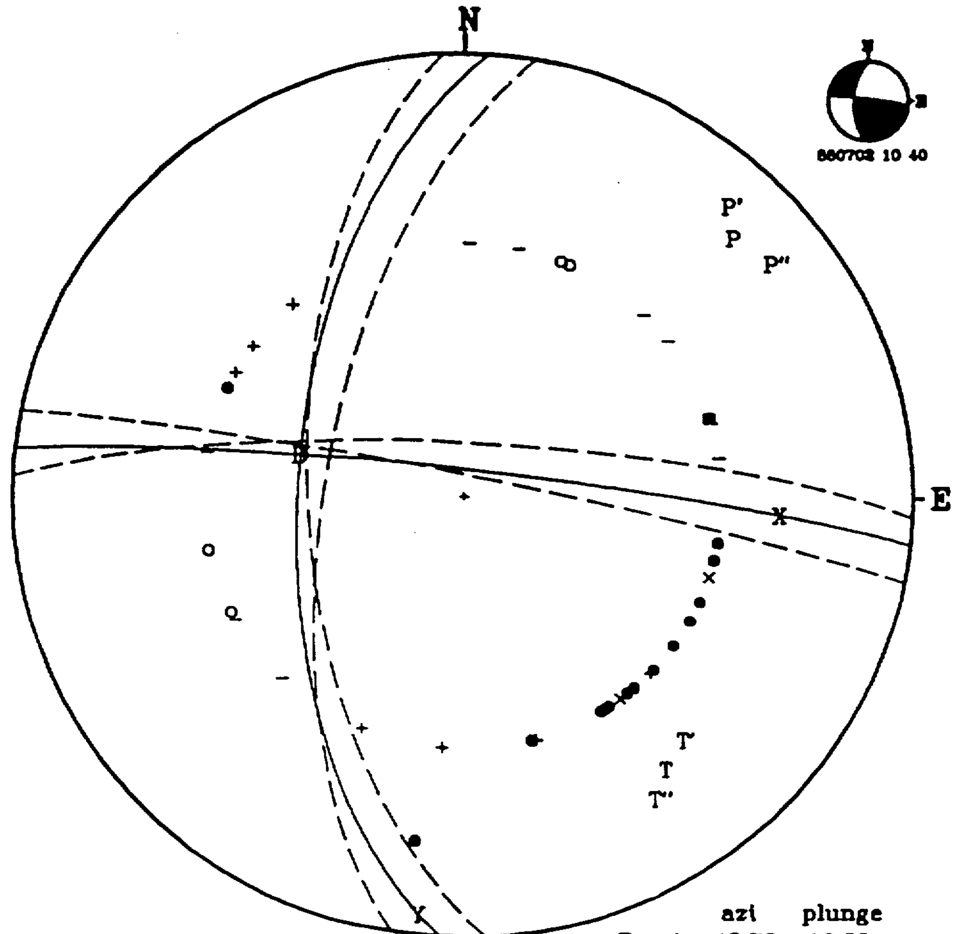


Figure D21. Oblique normal-slip and predominantly normal-slip focal mechanism solutions for an earthquake of June 15, 1988, 6:23:40 UTC, at Silent Canyon Caldera, Nevada Test Site. For this earthquake, all SGBSN stations recorded dilatational P-wave first motions, as if the source were an implosion, a possibility which cannot be ruled out by seismic network data. A Pahute Mesa nuclear device test was detonated on June 2, 1988, about 10 km from the epicenter.



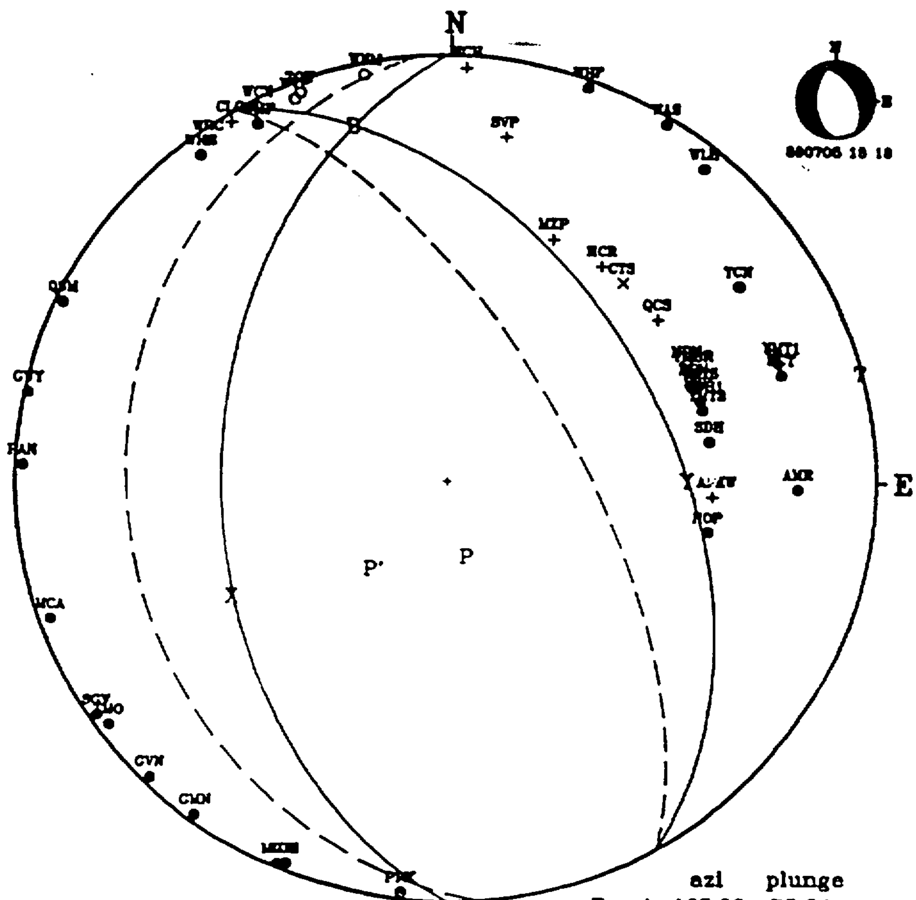
THIRSTY CANYON SW
DATE&TIME: 880702 10 40 13.88
LAT: 37.105 LONG: 116.733
DEPTH, km: 1.72 +/- 0.2 ML: 2.2

Using Hoffmann-Moony Yucca Mountain velocity model - improves the RMS travel time error for this quake, when compared to stnd. SGB model.

	azi	plunge
P axis	45.79	16.89
T axis	143.73	24.45
B axis	284.58	59.62
X axis	93.12	29.87
Y axis	186.00	5.00

	strike	dip	rake
Soln 1	276.00	85.00	30.00
Var 2'	272.50	80.20	28.50
Var 2"	281.00	86.00	25.00

Figure D22. Strike-slip focal mechanism solutions for an Oasis Valley earthquake on July 2, 1988, 10:40:14 UTC, located using the velocity model shown in Figure F1(b). The source-to-station rays shown in this figure come from that hypocenter.



DATE&TIME: 880705 18 18 47.53
LAT: 36.417 LONG: 118.049
DEPTH, km: 6.00 +/− 1.1 ML: 4.4

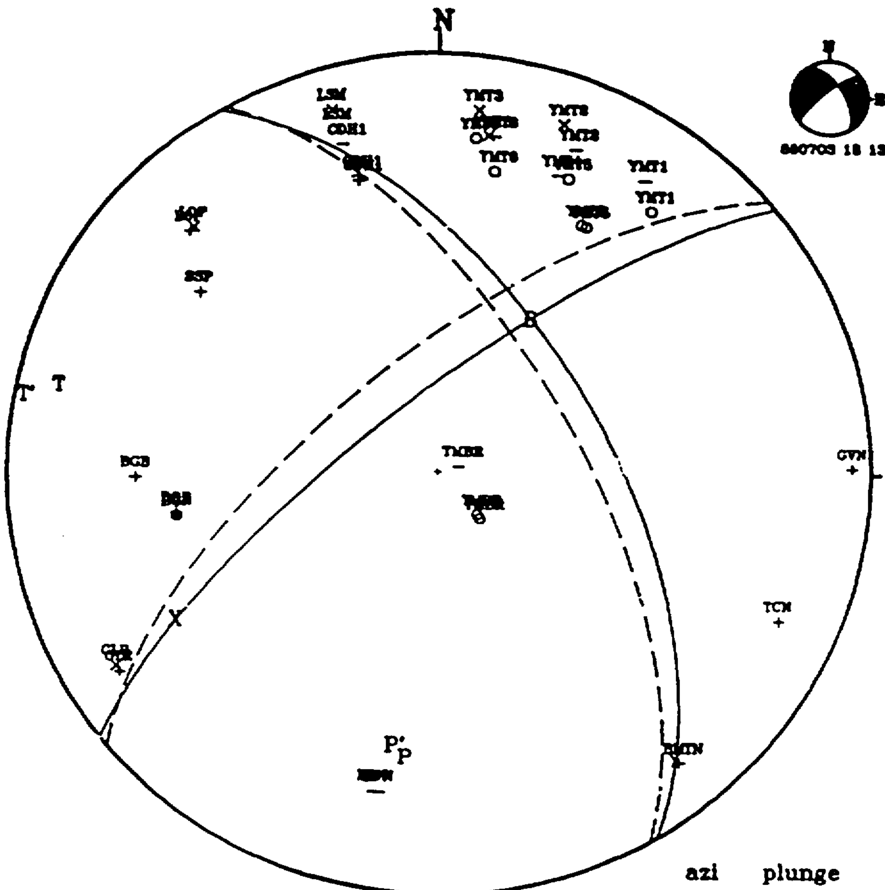
Owens Valley earthquake preliminary mechanisms using southern California network and SGBSN data.

This solution fixes depth of focus at 6 km below sea level; also, a refractor at 15 km below sea-level not usually present in our SGB model is now being used, giving a ring of arrivals at about 78 degrees.

	azi	plunge
P axis	165.06	76.04
T axis	75.03	0.01
B axis	345.02	14.96
X axis	240.56	43.08
Y axis	89.50	43.10

	strike	dip	rake
Soln 1	179.50	46.90	−69.30
Soln 2	175.40	26.80	−67.40

Figure D23. Predominantly normal-slip focal mechanism solutions for a magnitude 4.4 earthquake in the Owens Valley, California, possibly on the Independence Fault, on July 5, 1988, 18:18:48 UTC (fixed-depth hypocenter 6 km below sea level). Additional first motions and arrival times were provided by the Southern California Seismic Network (Pasadena) and by the seismographic laboratory of the University of Nevada (Reno).

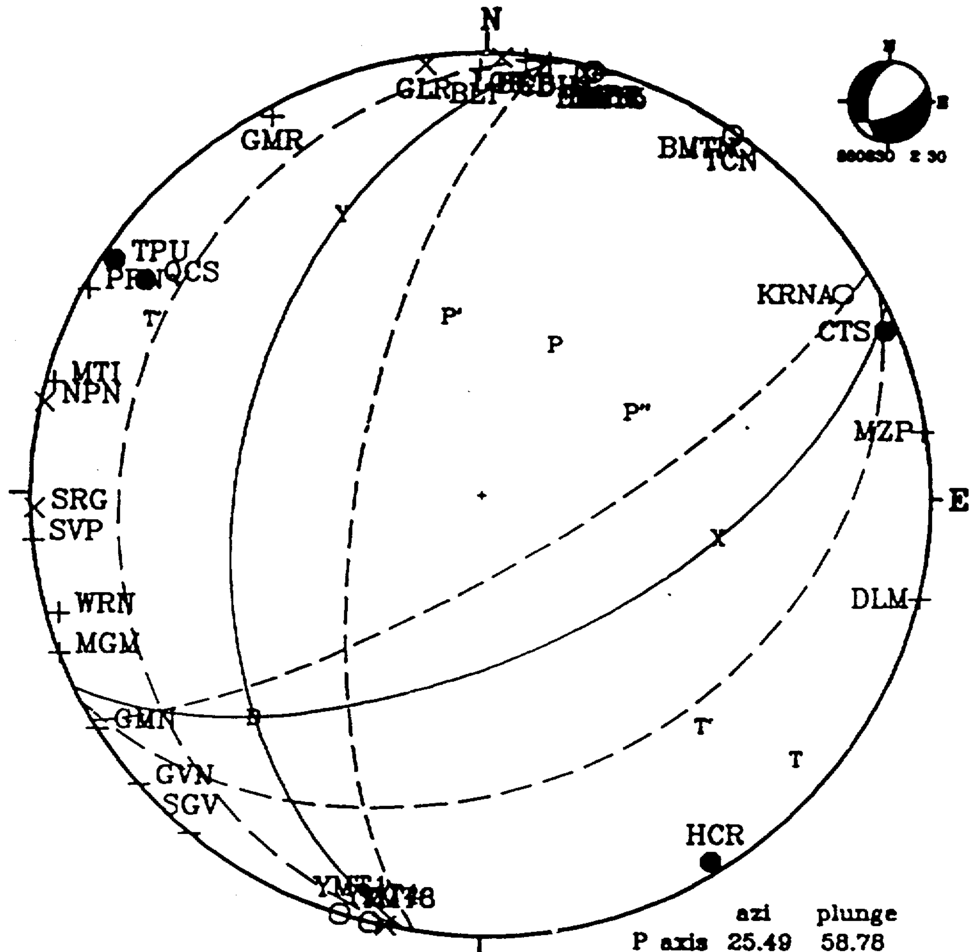


TIMBER MTN
DATE&TIME: 880703 18 13 33.59
LAT: 37.036 LONG: 116.379
DEPTH, km: 8.39 +/- 0.7 ML: 0.5
COMPOSITE WITH 880724 5 39 7.57
880724 6 12 26.71 M_L=1.4

These three events are within 1 km of station TMBR: for the composite mechanism, only four (very similar) solutions from FOCMEC (at 5 degree increments) were obtained.

	azi	plunge	
P axis	186.02	32.59	
T axis	283.39	11.34	
B axis	30.03	55.01	
X axis	239.63	31.33	
Y axis	140.90	14.00	
	strike	dip	rake
Soln 1	230.90	76.00	−32.40
Soln 2	229.50	68.40	−28.20

Figure D24. Oblique strike-slip focal mechanism solutions for a composite Timber Mountain Caldera earthquake series on July 3 and July 24, 1988.



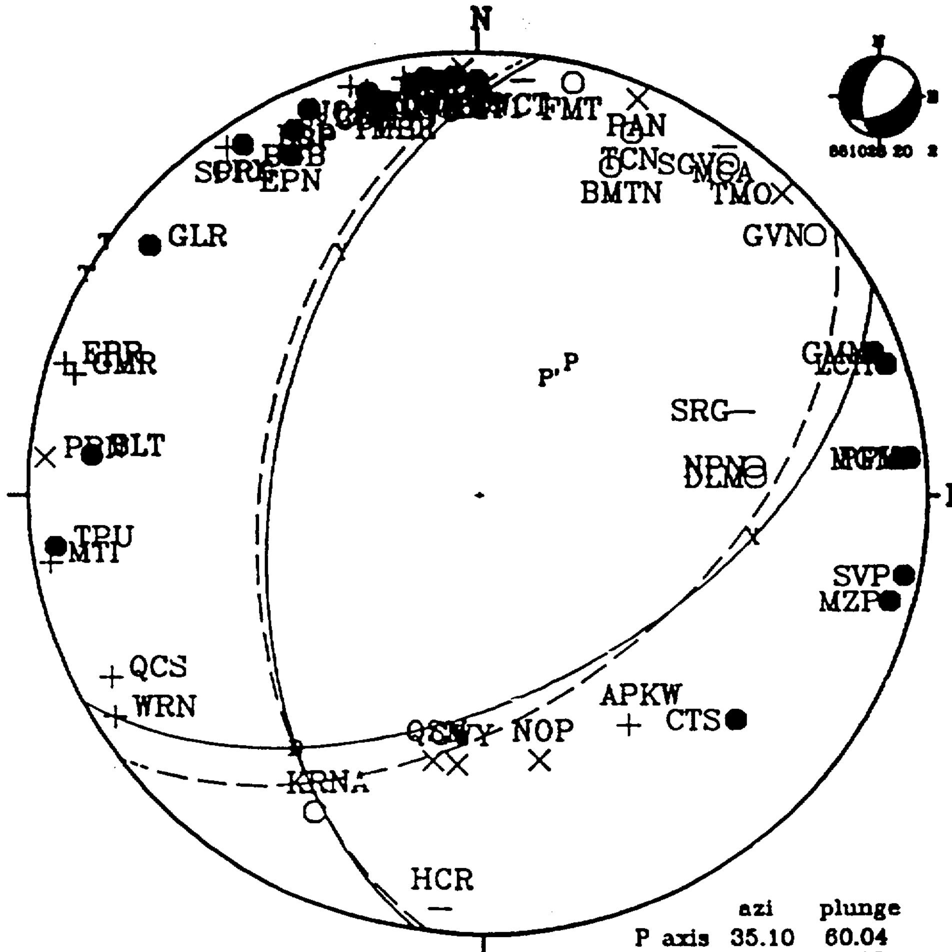
REVEILLE PEAK
DATE&TIME: 880830 2 30 32.92
LAT: 37.855 LONG: 116.132
DEPTH, km: 5.00 +/- 3.8 ML: 2.6
DMIN (km)=19.5

	azi	plunge
P axis	25.49	58.78
T axis	129.79	8.52
B axis	224.70	29.78
X axis	99.53	45.19
Y axis	334.00	30.00

	strike	dip	rake
Soln 1	64.00	60.00	−55.00
Var 2'	59.00	76.00	−74.00
Var 2"	62.00	35.00	−42.00

The hypocenter is derived from a velocity model in which the P-wave velocities in shallow rock are 4.8 km/sec from the earth's surface to 1 km below sea level, 5.8 km/sec to 3 km below sea level, and 6.15 km/sec below the 3 km interface. The higher velocity for ultra-shallow rock, when compared to the standard model, is supported by NTS nuclear device P-arrival residuals at northern SGBSN stations. The depth of focus for this solution was fixed at 5 km below sea level.

Figure D25. Oblique normal-slip focal mechanism solutions for a southwest Reveille Range, Nevada, earthquake of August 30, 1988, 2:30:33 UTC, in which the hypocenter was derived using a velocity model having higher-than-usual velocities for rock at shallow depths.



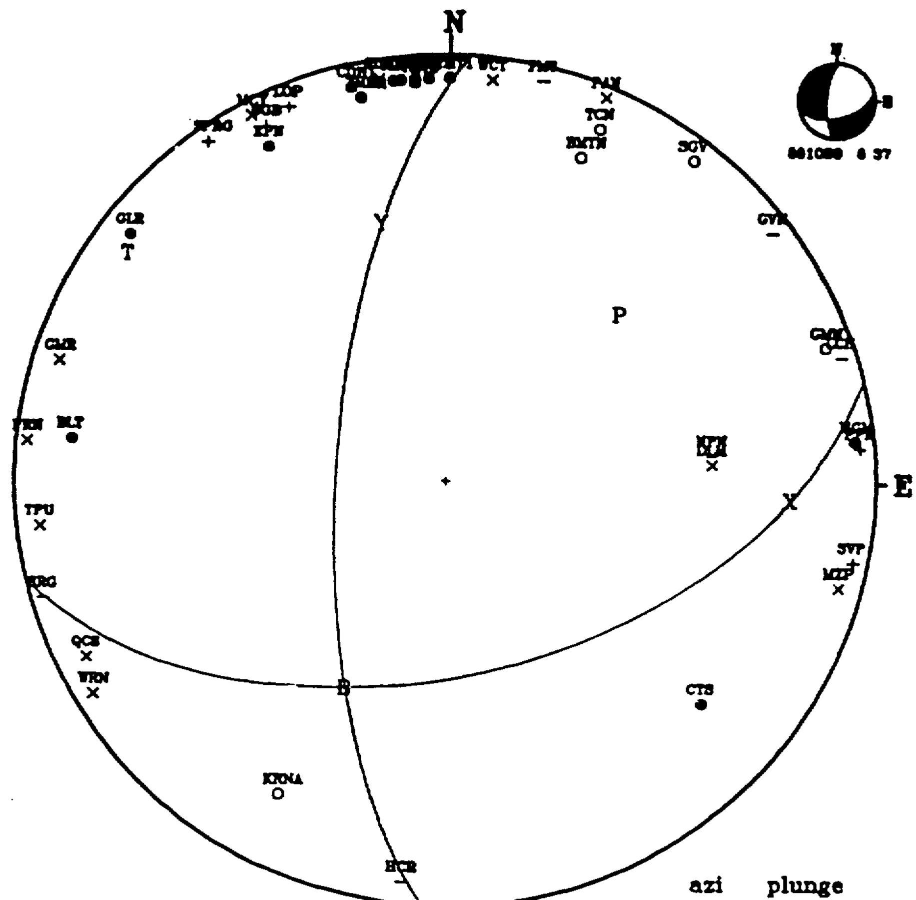
MELLAN
DATE&TIME: 881028 20 2 49.56
LAT: 37.515 LONG: 116.527
DEPTH, km: 10.86 +/- 0.8 ML: 3.1
DMIN (km)= 23.6

	azi	plunge
P axis	35.10	60.04
T axis	305.05	0.02
B axis	215.04	29.96
X axis	98.52	37.76
Y axis	331.60	37.80

	strike	dip	rake
Soln 1	61.60	52.20	−50.80
Var 2'	52.90	50.10	−56.60

This hypocenter is the mainshock of a small series of earthquakes in Cactus Flat, north of Pahute Mesa, that were recorded by the SGBSN from Oct 28, 1988 to Nov 16, 1988. Oblique normal slip to strike slip is indicated on each nodal plane of the focal mechanism.

Figure D26. Oblique normal-slip focal mechanism solutions for a $M_L = 3.1$ earthquake at Cactus Flat, Nevada (Mellan quadrangle) on October 28, 1988, 20:02:50 UTC. That earthquake was the mainshock of a series that lasted nearly one month.



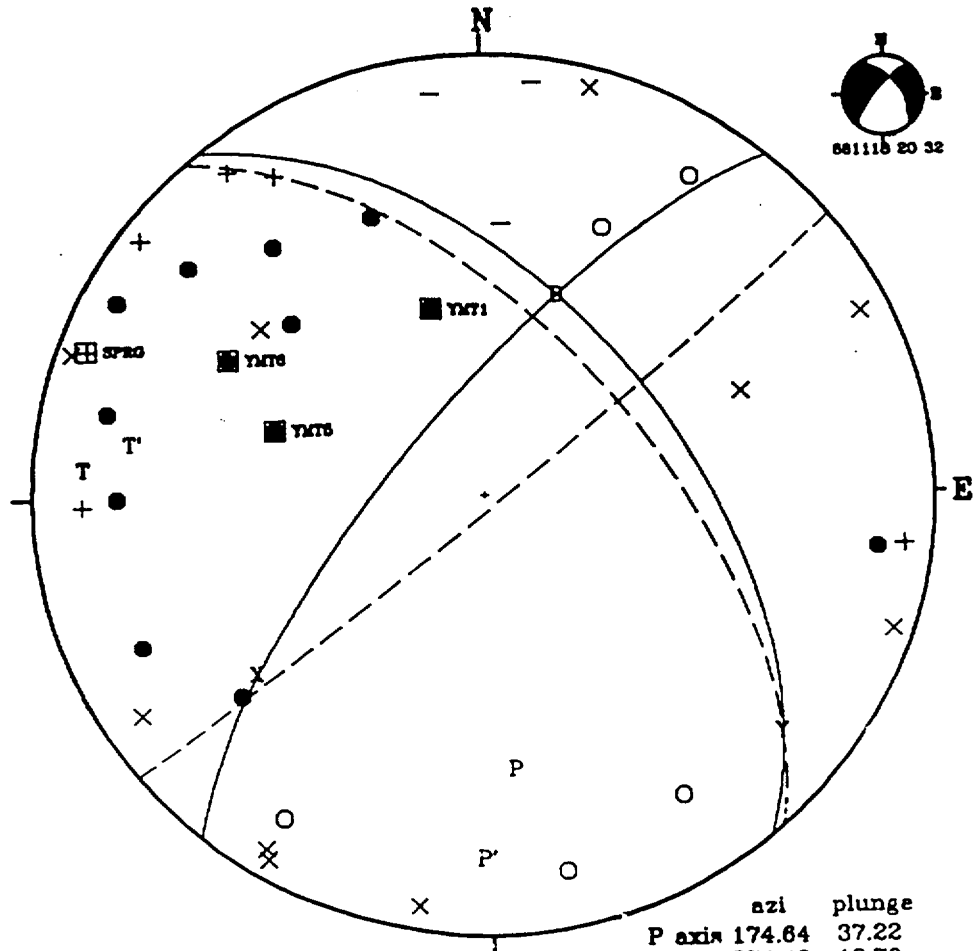
MELLAN
DATE&TIME: 881029 6 37 17.64
LAT: 37.518 LONG: 116.527
DEPTH, km: 10.15 +/- 1.0 ML: 2.3

Suarm area in Gold Flat north of Silent Canyon caldera.

	azi	plunge
P axis	45.78	43.08
T axis	305.73	10.54
B axis	205.01	45.00
X axis	92.80	20.71
Y axis	345.77	37.76

	strike	dip	rake
Soln 1	75.77	52.24	−26.57

Figure D27. Oblique strike-slip & normal-slip focal mechanism solutions for one of the largest aftershocks in the Cactus Flat, Nevada series on October 29, 1988, 6:37:18 UTC.



	azi	plunge
P axis	174.64	37.22
T axis	274.49	12.70
B axis	20.03	49.94
X axis	231.42	35.67
Y axis	129.70	15.80

	strikc	dip	rake
Soln 1	219.70	74.20	−37.30
Var 2'	50.70	87.50	20.90

BARE MTN
DATE&TIME: 881118 20 32 24.74
LAT: 36.925 LONG: 116.553
DEPTH, km: 11.25 +/− 0.4 ML: 2.1
DMIN (km)=8.2

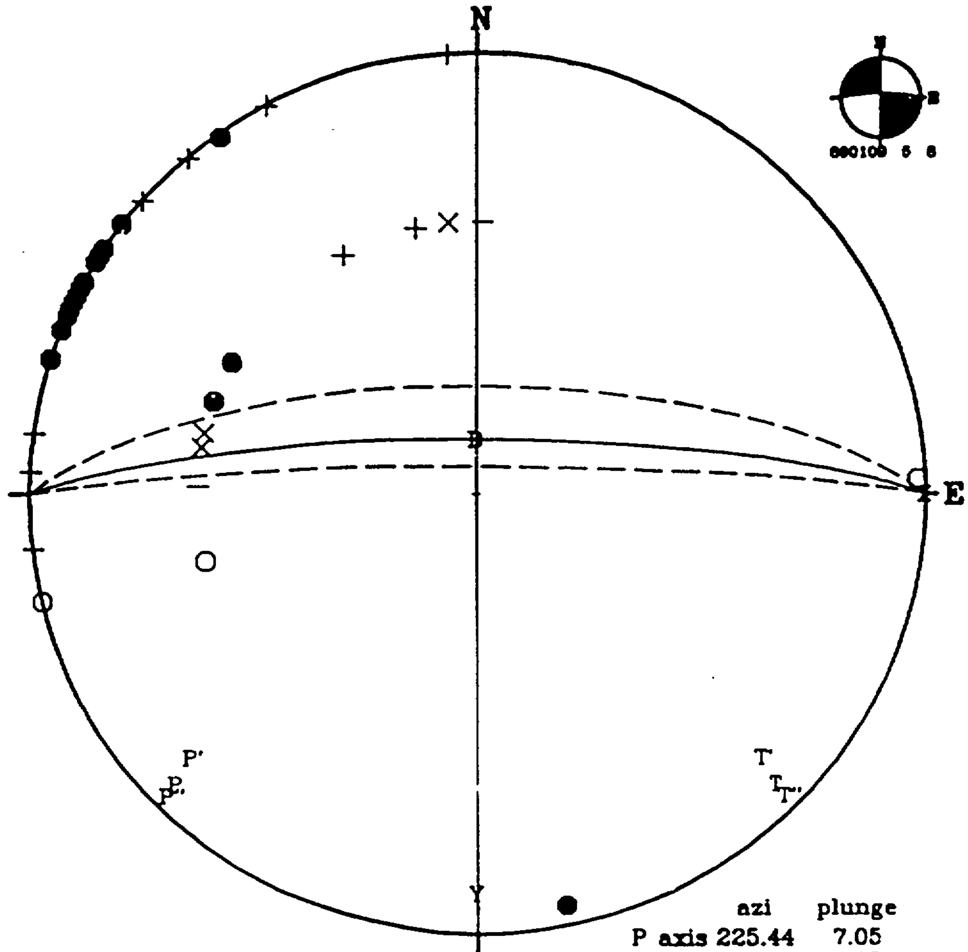
Log10(SV/P)z Solid-line solution

Observed	Theoretical	Difference	Station
0.6354	0.4469	0.1885	YMT1
0.3407	0.7596	-0.4189	•YMT5
3.3779	0.2966	0.0813	YMT6
0.3780	0.2224	0.1556	SPRG

Log10(SV/P)z Dashed-line solution

Observed	Theoretical	Difference	Station
0.6354	0.7095	-0.0741	YMT1
0.3407	0.4432	-0.1025	YMT5
0.3779	-0.2333	0.6112	•YMT6
0.3780	0.3413	0.0367	SPRG

Figure D28. Predominantly strike-slip focal mechanism solutions for the $M_L = 2.1$ mainshock of a short-lived series of microearthquakes at a northwest boundary of Yucca Mountain, Nevada (Bare Mountain quadrangle) on November 18, 1988, 20:32:25 UTC. To provide additional constraint on the focal mechanisms, SV/P_z amplitude ratios were included from a foreshock (the mainshock clipped nearby station seismograms).



VALLEY
DATE&TIME: 890109 5 8 21.84
LAT: 36.330 LONG: 115.112
DEPTH, km: 4.00 +/− 1.2 ML: 3.5
DMIN (km)= 19.9

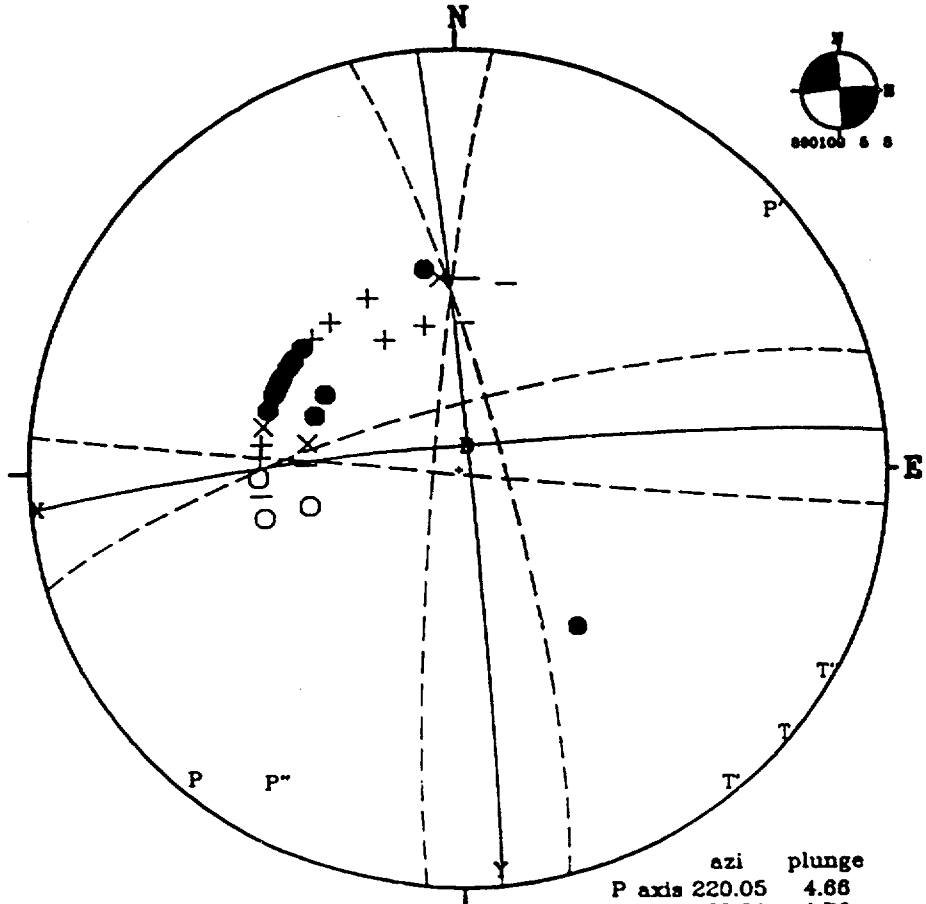
The earthquake for which this focal mechanism solution set was determined has epicenter 10 to 11 miles (16 to 17 km) north of Las Vegas, Nevada. Slight damage at Las Vegas was reported to the NEIC, Golden, Colorado, including one or more instances of cracked window glass.

The fixed-depth hypocenter for which data were used for these focal mechanisms is at the minimum RMS travel time residual using SGBSN P and S arrival time data (RMS=0.17 sec for z=4 km below sea level).

	azi	plunge
P axis	225.44	7.05
T axis	134.56	7.05
B axis	0.00	80.00
X axis	90.00	0.00
Y axis	180.00	10.00

	strike	dip	rake
Soln 1	270.00	80.00	0.00
Var 2'	270.00	70.00	0.00
Var 2''	270.00	85.00	0.00

Figure D29. Strike-slip focal mechanism solutions for a $M_L = 3.5$ earthquake in the southern flank of Gass Peak, Nevada, about 10 miles north of Las Vegas. This earthquake caused slight damage at Las Vegas, Nevada (at least one instance of cracked windows). Focal mechanism solutions are derived from a fixed-depth hypocenter at 4 km below sea level, a minimum RMS-hypocenter.



GASS PEAK SW
DATE&TIME: 890109 5 8 21.46
LAT: 36.330 LONG: 115.125
DEPTH, km: 0.00 +/- 4.0 ML: 3.5
DMIN (km)= 19.8

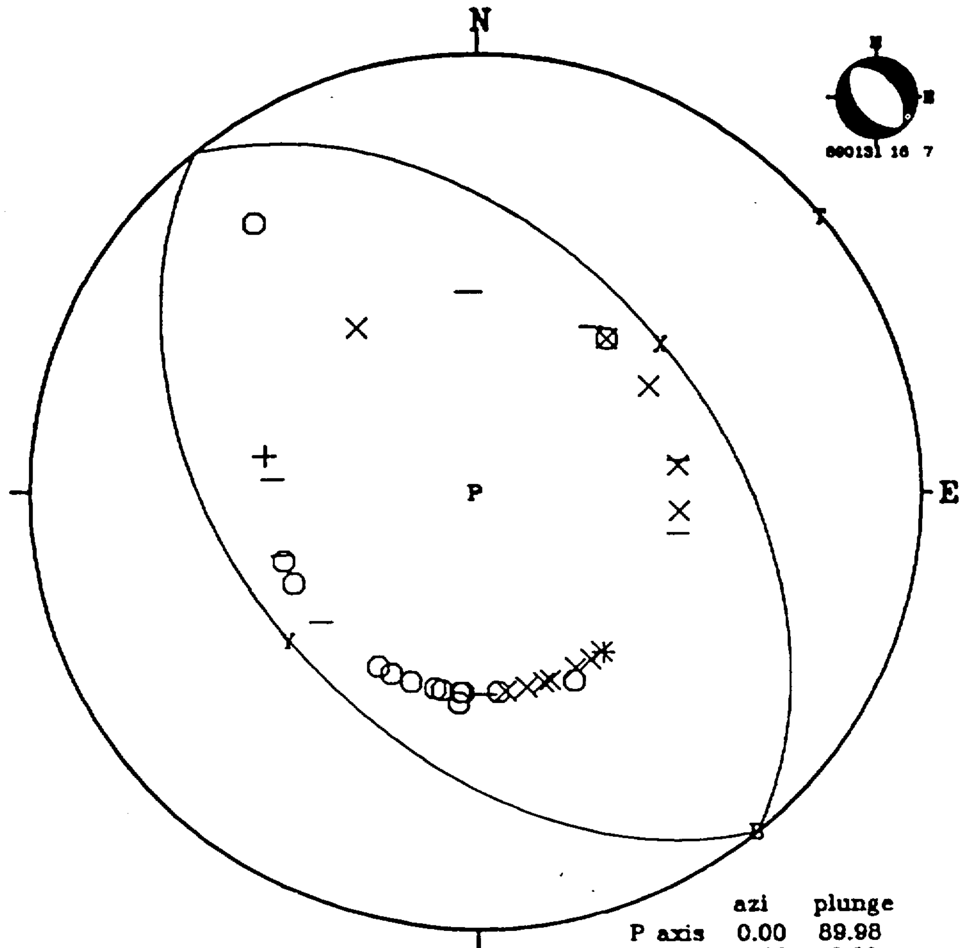
	azi	plunge
P axis	220.05	4.66
T axis	129.91	1.70
B axis	19.95	85.04
X axis	265.06	2.09
Y axis	174.90	4.50

	strike	dip	rake
Soln 1	264.90	85.50	−2.10
Var 2'	95.00	89.10	−4.90
Var 2"	254.10	77.80	−8.70

The earthquake for which this focal mechanism solution set was determined has epicenter 10 to 11 miles (16 to 17 km) north of Las Vegas, Nevada. Slight damage at Las Vegas was reported to the NEIC, Golden, Colorado, including one or more instances of cracked window glass.

The fixed-depth hypocenter for which data were used for these focal mechanisms is not at the minimum RMS travel time residual using SGBSN P and S arrival time data (RMS=0.23 sec for z at sea level).

Figure D30. Alternate, strike-slip focal mechanism solutions for the same earthquake as in Figure D29. Focal mechanism solutions are derived from a fixed-depth hypocenter at sea level, *not* a minimum *RMS*-hypocenter. The uncertainty or range in plausible strike of the nodal planes attains its maximum when computing focal mechanisms from this shallow-focus hypocenter. Initial P waves from this earthquake at all SGBSN stations except SHRG, the nearest station to the epicenter, display parabolic starts, characteristic of refracted arrivals, suggesting a very shallow source, notwithstanding *RMS*.



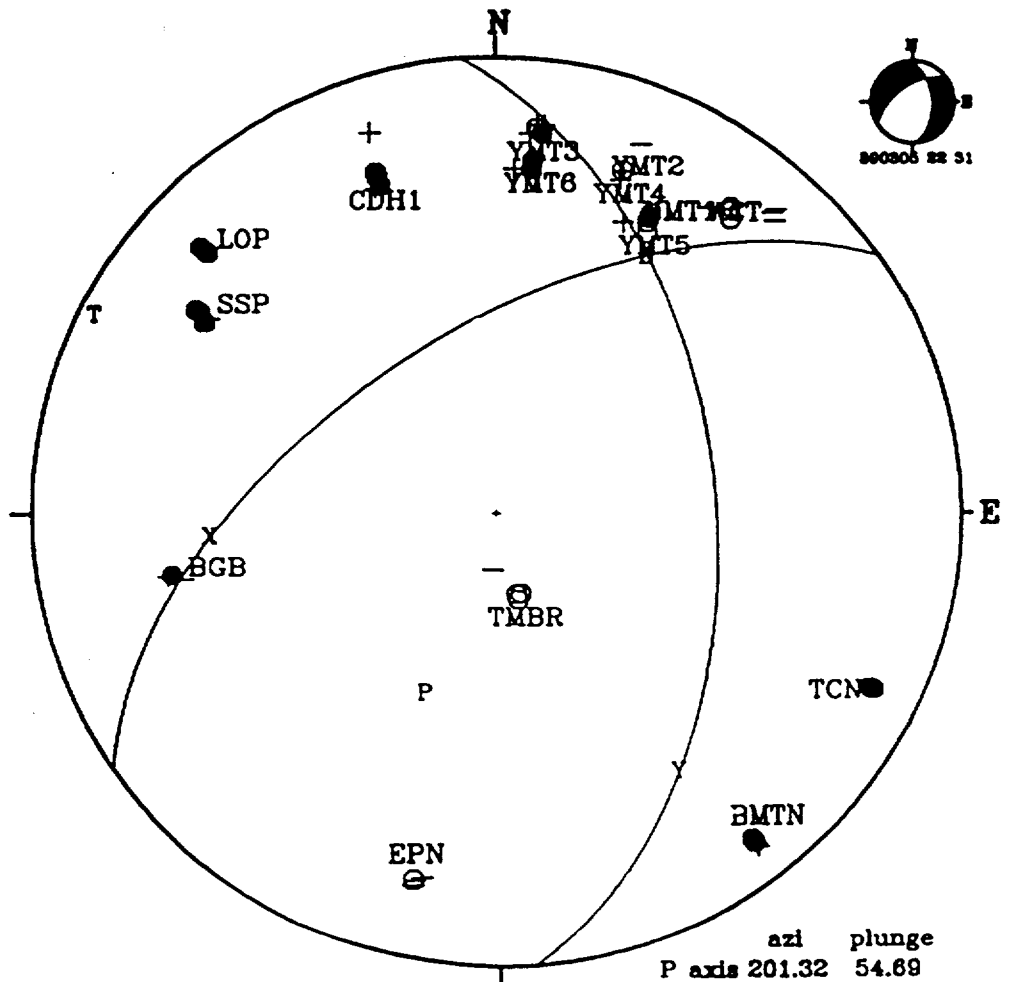
DEAD HORSE FLAT
DATE&TIME: 890131 16 7 17.43
LAT: 37.253 LONG: 116.364
DEPTH, km: 0.00 +/- 0.3 ML: 2.3

	azi	plunge
P axis	0.00	89.98
T axis	51.00	0.00
B axis	141.00	0.00
X axis	51.00	45.00
Y axis	231.00	45.00

	strike	dip	rake
Soln 1	321.00	45.00	-90.00

This Silent Canyon caldera earthquake
is another example of an almost exclusively
dilatational phenomenon, very similar to the
earthquake of June 15, 1988, 06:15 UTC, whose
focal mechanism is also shown in this report.
Many, possibly most, of the earthquakes of the
northern half of the Silent Canyon Caldera (SCC)
have similar waveforms. These are shallow
earthquakes, probably induced by nuclear device
tests at Pahute Mesa. These northern SCC events
should not be considered when using
focal mechanisms to infer properties of
the natural regional tectonic stress field
in shallow SGB crustal rock.

Figure D31. Normal-slip focal mechanism solution for a Silent Canyon Caldera, Nevada Test Site, earthquake on January 31, 1989, 16:07:17 UTC. The consistently dilatational first motions from SGBSN stations for this earthquake suggest that it may be an implosion rather than the double-couple event shown in this figure. The nearest-in-time nuclear device test in the vicinity was the December 10, 1988, detonation of "Misty Echo" at Rainier Mesa.

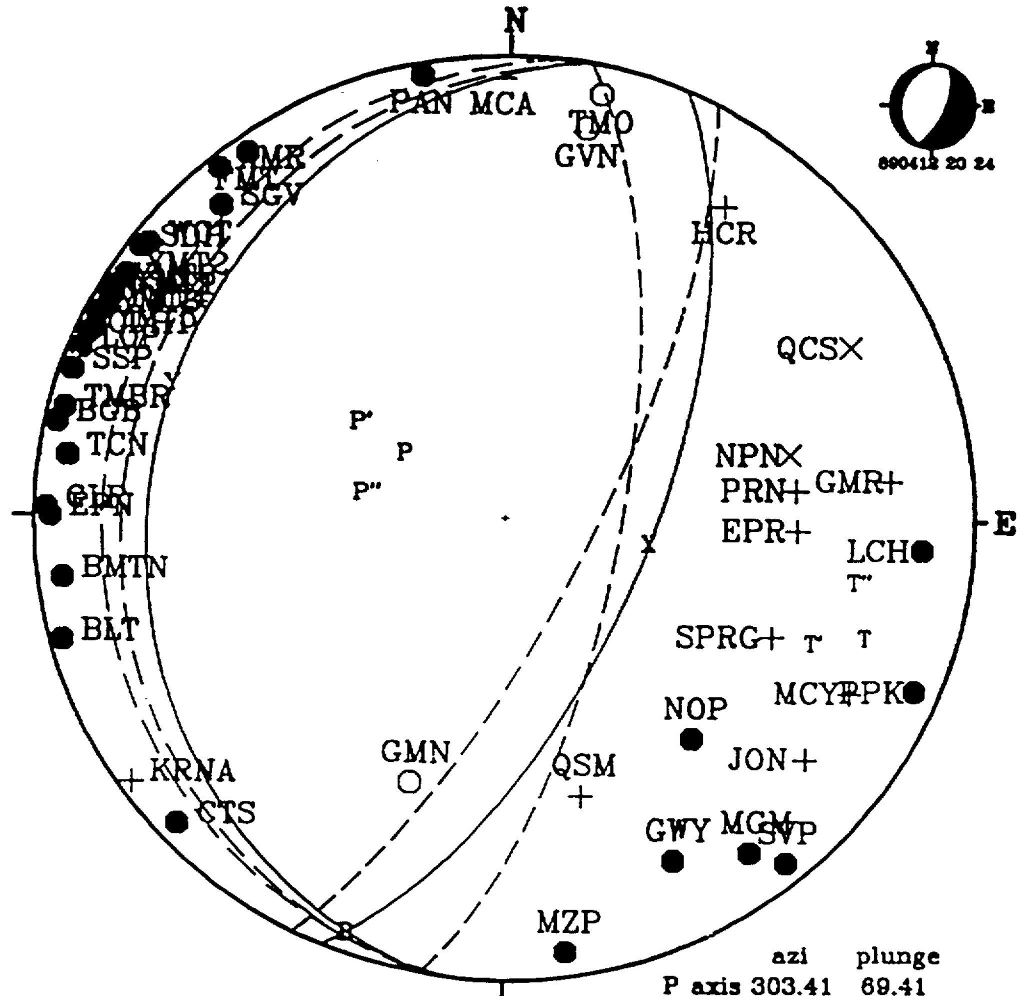


	azi	plunge	
P axis	201.32	54.69	
T axis	297.13	4.10	
B axis	30.00	35.00	
X axis	265.64	38.87	
Y axis	145.70	31.77	
	strike	dip	rake
Soln 1	235.70	58.23	−47.57

TIMBER MTN
DATE&TIME: 890305 22 31 12.90
LAT: 37.014 LONG: 116.381
DEPTH, km: 8.29 +/− 0.3 ML: 1.4
DMIN (km)= 2.5
COMPOSITE WITH 890306 2 40 55.89
890306 3 11 24.57 890306 3 27 59.45
890306 3 39 18.96

This composite focal mechanism includes data from five earthquakes. Of the 63 P-wave polarities used. 5 are inconsistent. The ray parameters for the inconsistent stations. YMT3. YMT4. YMT5. and YMT6. are all very near a nodal plane. however.

Figure D32. Oblique normal-slip focal mechanism solution for a series of Timber Mountain, Nevada Test Site, earthquakes on March 5 and March 6, 1989. The polarity inconsistencies may come from slight variations in the source parameters for the component earthquakes whose data are composited here.



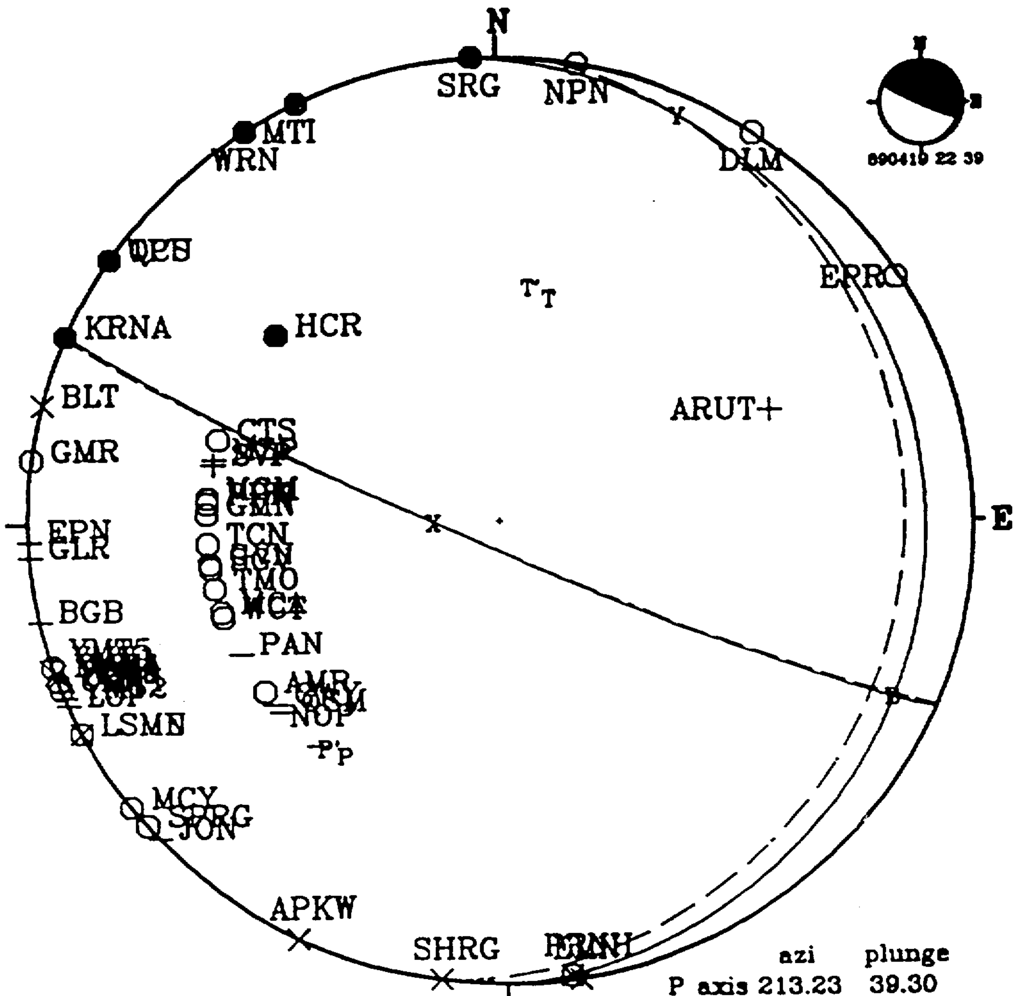
UBEHEBE CRATER
DATE&TIME: 890412 20 24 55.05
LAT: 37.214 LONG: 117.295
DEPTH, km: 7.91 +/- 0.4 ML: 3.0
DMIN (km)=10.2

	azi	plunge
P axis	303.41	69.41
T axis	108.17	19.92
B axis	199.93	4.99
X axis	99.42	64.54
Y axis	292.30	24.90

	strike	dip	rake
Soln 1	22.30	65.10	−84.50
Var 2'	26.30	75.10	−84.80
Var 2"	190.00	20.00	−90.00

This hypocenter is derived from a SG8 velocity model having interfaces at one and three km below sea level. as usual. and an interface at 15 km below sea level. below which vp=6.5 km/sec. For this hypocenter. the range of focal mechanisms consistent with all P-wave polarities is narrow. and includes a 28 degree west-dipping nodal plane on which normal slip occurs. Thus. this hypocenter provides another example of the possibility of seismically detectable slip on a detachment surface. this one in the Grapevine Mountains.

Figure D33. Normal-slip focal mechanism solutions for a Gold Mountain, Nevada (Ubehebe Crater quadrangle) earthquake of April 12, 1989, 20:24:55 UTC. Some of the west-dipping nodal planes have 20± degree dip, but the depth of focus is probably too great to allow the selection of the west-dipping nodal plane as the fault plane due to high confining stress.



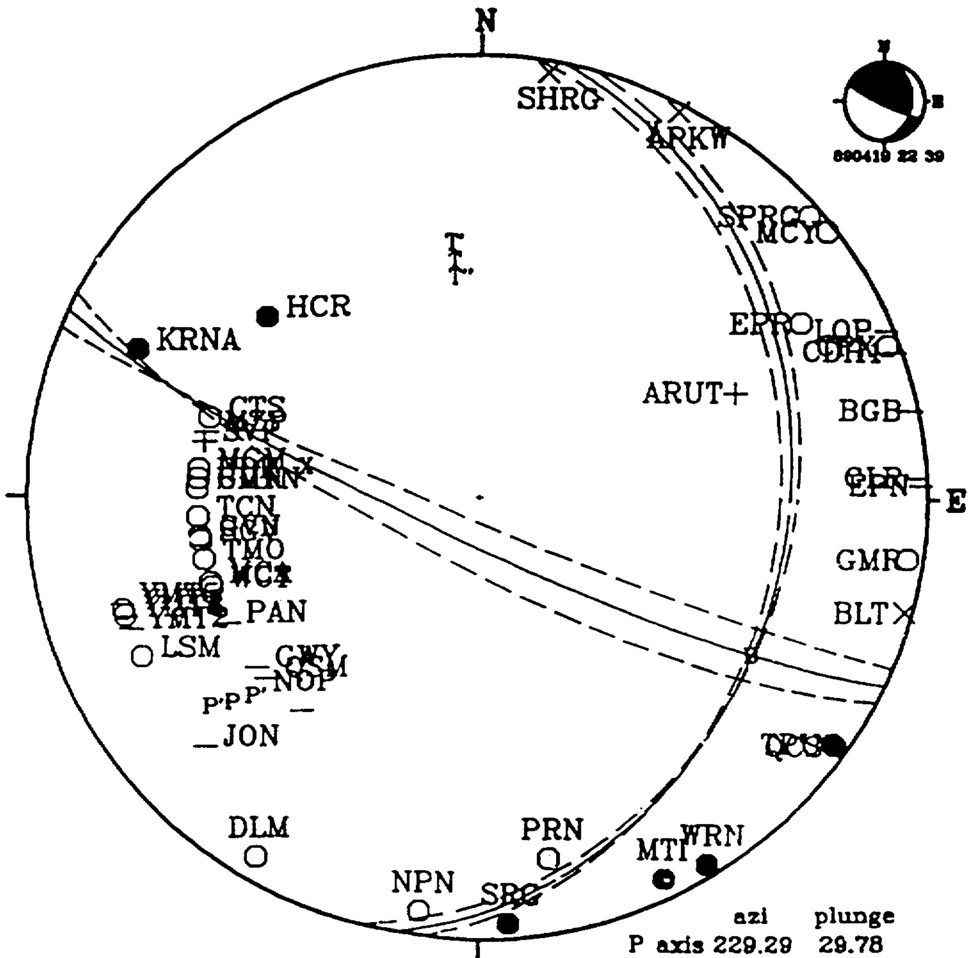
	azi	plunge
P axis	213.23	39.30
T axis	13.32	48.96
B axis	114.96	9.96
X axis	268.25	78.87
Y axis	24.10	4.90

	strike	dip	rake
Soln 1	114.10	85.10	80.00
Var 2'	113.70	85.20	74.95

ALAMO SE
DATE&TIME: 890419 22 39 28.95
LAT: 37.251 LONG: 115.025
DEPTH, km: 3.22 +/- 1.0 ML: 3.6
DMIN (km)=17.0

This earthquake is the mainshock of a long-running series of earthquakes southeast of the town of Alamo, Nevada. This focal mechanism solution is dependent on depth of focus. In particular, the southeast-dipping nodal plane has greater dip for a deeper hypocenter. Station ARUT polarity and arrival time data were supplied by University of Utah's Seismographic Laboratory.

Figure D34. Peculiar reverse-slip or strike-slip focal mechanism solutions for a $M_L = 3.6$ earthquake in the Pahranagat Shear Zone, Nevada (Alamo SE quadrangle), having one sub-horizontal nodal plane. Constraint on the set of focal mechanisms consistent with first-motion data is increased by the inclusion of the data from ARUT, a station operated by the University of Utah Seismographic Laboratory. These solutions assumes a hypocenter depth 3.2 km below sea level. If the modeling assumptions are correct, this is another candidate for seismically active detachment faulting.



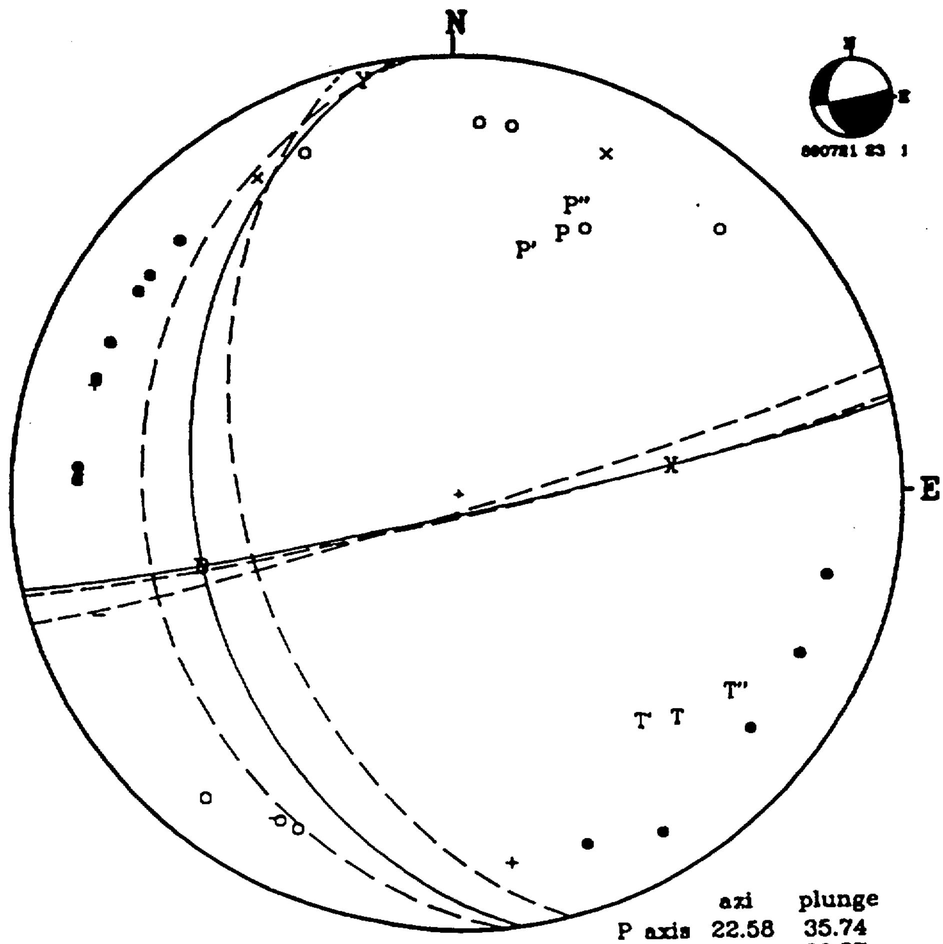
LOWER PAHRANAGAT LAKE
DATE&TIME: 890419 22 39 28.58
LAT: 37.246 LONG: 115.013
DEPTH, km: 7.00 +/- 0.7 ML: 3.6
DMIN (km)= 17.7

	azi	plunge
P axis	229.29	29.78
T axis	354.47	45.19
B axis	120.00	30.00
X axis	280.57	58.53
Y axis	24.96	8.65

	strike	dip	rake
Soln 1	114.96	81.35	59.62
Var 2'	112.50	85.67	59.90
Var 2"	117.40	77.10	59.10

ALTERNATE HYPOCENTER -> ALTERNATE MECHANISM
Using a fixed-depth hypocenter, with depth at seven km below sea level, results in the the southeast-dipping nodal plane having greater dip than the corresponding nodal plane shown in the previous figure for a shallower, free-depth hypocenter. The actual depth is uncertain. Station ARUT polarity and arrival time data were supplied by University of Utah's Seismographic Laboratory.

Figure D35. Oblique reverse-slip focal mechanism solutions for the same Pahranagat Shear Zone earthquake as discussed in Figure D33, where the hypocenter is now fixed at a depth of seven km below sea level. The arrival time data do not provide an well-constrained estimate of the hypocentral depth for this earthquake.



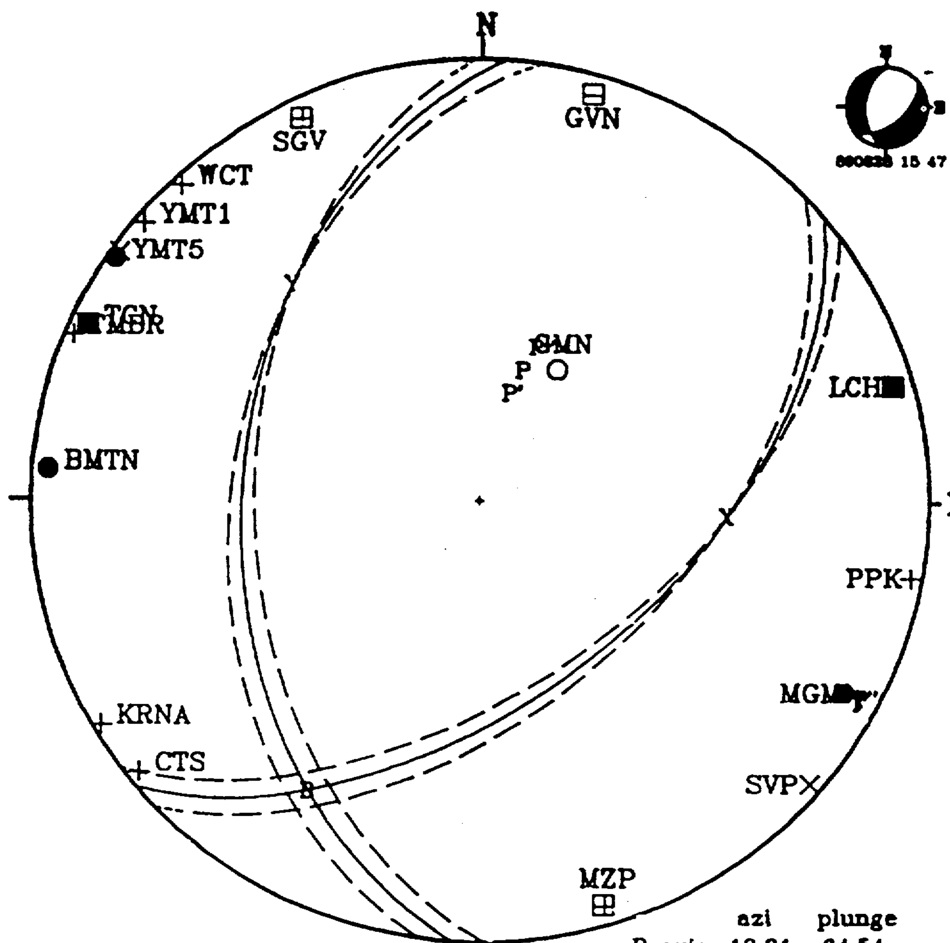
JACKASS FLATS
DATE&TIME: 890721 23 1 39.93
LAT: 36.776 LONG: 116.252
DEPTH, km: 2.75 +/- 0.4 ML: 2.4

	azi	plunge
P axis	22.58	35.74
T axis	136.47	29.37
B axis	254.97	40.29
X axis	82.65	49.45
Y axis	348.20	3.80

	strike	dip	rake
Soln 1	78.20	86.20	−49.60
Var 2'	77.50	85.70	−59.90
Var 2''	73.50	86.80	−39.90

This earthquake is the most northerly of a NNE-trending epicenter group which was recorded in July 1989. The trend goes right under station LSM (Little Skull Mtn).

Figure D36. Oblique normal-slip or strike-skip focal mechanism solutions for an earthquake at Little Skull Mountain, Nevada Test Site, on July 21, 1989, 23:01:40 UTC.



SCOTTYS JUNCTION SW
DATE&TIME: 890828 15 47 58.58
LAT: 37.328 LONG: 117.238
DEPTH, km: 5.74 +/− 0.4 ML: 1.5
DMIN (km)=3.5

	azi	plunge
P axis	18.31	64.54
T axis	117.89	4.53
B axis	210.00	25.00
X axis	93.27	43.97
Y axis	319.53	35.63

	strike	dip	rake
Soln 1	49.53	54.37	−58.67
Var 2'	46.00	52.84	−64.59
Var 2"	52.75	56.17	−53.00

This Gold Mountain earthquake was too small to have sufficient polarity data to constrain the focal mechanism. SV/P amplitude ratio data were gathered to provide additional constraint from direct P & SV waves at five SGBSN stations. The log10(SV/P)z ratios are

Station	OBS.	THEO.	DIFF.
LCH	0.3646	0.5065	-0.1419
GVN	0.8107	1.0365	-0.2258
SGV	0.4666	0.6922	-0.2256
MZP	0.4564	0.4900	-0.0336
TCN	0.1227	0.0976	0.0251

Figure D37. Predominantly normal-slip focal mechanism solutions for a Mt. Dunfee, Nevada (Scottys Junction SW quadrangle) earthquake on August 28, 1989, constrained by SV/P_z amplitude ratios as well as P-wave first motions.

Appendix E

Station codes, locations, 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, 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 the period 1987 through 1989. 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

Figure E1 shows the amplification curves (theoretical frequency response) for typical vertical-component (KIND=3) and horizontal-component (KIND=5) stations on Yucca Mountain, Nevada, with data telemetered to a PDP 11/34 computer in Golden, Colorado, that has 12-bit A-to-D converters with digital gain, 2048 counts per 5 volts input.

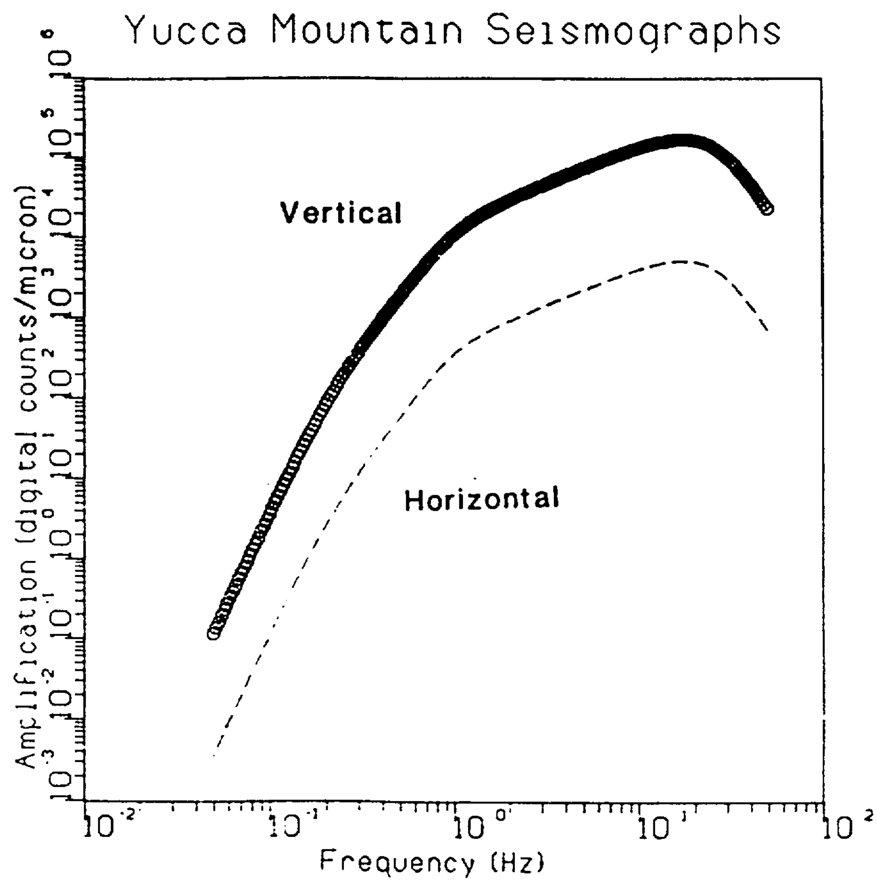


Figure E1. *Upper* curve, magnification (displacement response) for a typical seismographic system on Yucca Mountain, Nevada, with a vertical-component Teledyne-Geotech S13 seismometer and associated electronics (type = 3, amplifier gain = 84 dB), and digital-computer recording. *Lower* curve (dashed), magnification for north-south and east-west component seismographic systems on Yucca Mountain, Nevada, with horizontal-component Mark L4C seismometers and associated electronics (type = 5, amplifier gain = 60 dB), and digital-computer recording.

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-1-30S (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-1-30S 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-present	35 55.31 N	114 45.33 W	846	Ranger SS-1	84	7	•
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 Rng. Nv	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 Chance 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	Nava 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.	72/01/21-80/05/19	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 57.35 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 48.03 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.	82/03/19-87/05/05	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	Tempiute 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 bulky for inclusion in this report, but are available on request.

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).

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               Imax # 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(15)=   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
```

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
   .73000000E+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 this file, a slightly different weighting scheme with respect to distance is invoked than in nvhead.dat, 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.

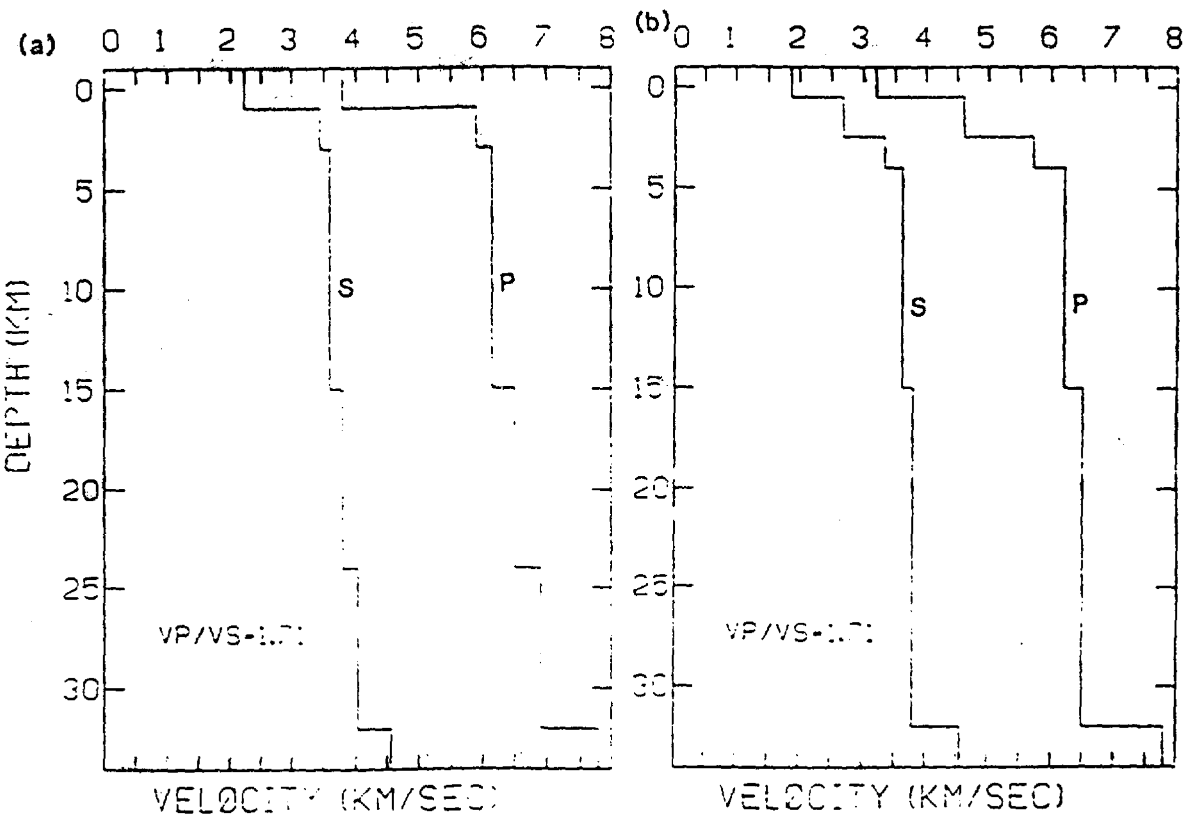


Figure F1. (a) Primary (P) and secondary (S) wave velocities as a function of depth (0.0 = sea level) for the standard model used to locate southern Great Basin earthquakes. The interface at 15 km is optional. (b) P and S wave velocities as a function of depth for the Yucca Mountain region, being an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

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