

SUMMARY OF LOCAL AND
REGIONAL EARTHQUAKES (S-P<30 SEC)
RECORDED AT THE UNIVERSITY OF TEXAS/
NATIONAL AERONAUTICS AND SPACE
ADMINISTRATION (UT/NASA)
SEISMIC ARRAY

by

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Introduction

This report is a summary of the arrival times of regional and local earthquakes and located earthquakes in the Basin and Range province and the adjacent areas of Chihuahua, Mexico from January 1976 to August 1980 at the UT/NASA seismic array. The seismicity of the area and details of the UT/NASA array have been previously described by Dumas (to be published in 1981). Therefore the reader should refer to these for details of the array and the methods used in the hypocenter locations. Also, a listing of all published works derived from the ITT/NASA array data is given in Appendix I.

References

- Dumas, D.B. (to be published). A recent seismic study in west Texas.
- Dumas, D.B. (1980). Seismicity in the Basin and Range province of Texas and Northern Chihuahua, Mexico. *Nev Mexico Geological Society Guidebook 31st Field Conference, Trans-Pecos Region*, 77-81.
- Lee, W.H.K. and J.C. Lahr (1975). HYPO-71 (revised) a computer program for determining hypocenters, magnitudes, and first motion patterns of local earthquakes, U. S. Geol. Surv., Open File Rept., 75-311.
- Muehlberger, W. (1978). The areal extent of Cenozoic faulting in Trans-Pecos Texas, Bureau of Economic Geology, Guidebook 19, A. Walter and C. Henry, Editors, 19-21.

Table 1. Station names, coordinates, elevation, and station corrections.

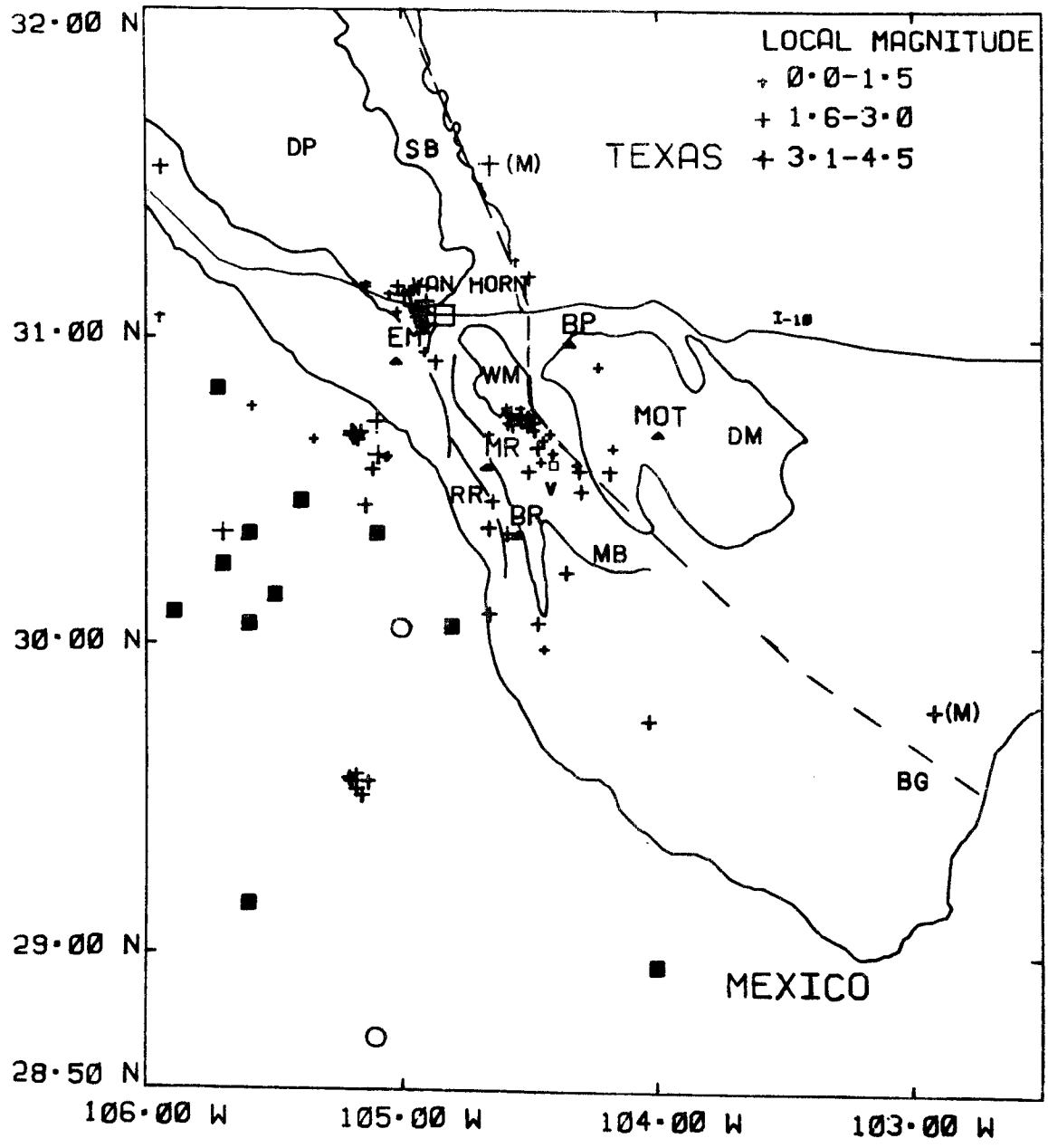
	Station	Lat.	Long.	Elev. (m)
MOT	McDonald Observatory	30.68N	104.01W	2080
BP	Boracho Peak	30.93N	104.39W	1720
EM	Eagle Mountain	30.90N	105.08W	2088
MR	Miller Ranch	30.53N	104.67W	1584
BR	Brite Ranch	30.27N	104.58W	1584
CLN	Carlsbad	32.04N	103.73W	1094
KTX	Kermit	31.53N	103.29W	847
KT4	Kermit	31.91W	103.32W	948

Appendix I

Listing of all published works from the UT/NASA array

- Dumas, D.B. (1978). Seismicity in and around west Texas, Bureau of Economic Geology Guidebook 19, A. Walton and C. Henry, Editors, 22-27.
- Dumas, D.B. (1979). Active seismic focus near Snyder, Texas, Bull. Seis. Soc. Am., 69, 1295-1299.
- Dumas, D.B., H.J. Dorman, and G.V. Latham (1980). A reevaluation of the August 16, 1931 Texas earthquake, Bull. Seis. Soc. Am., 70, 1171-1180.
- Dumas, D.B. (1980). Seismicity in the Basin and Range province of Texas and Northeastern Chihuahua, Mexico, New Mexico Geological Society 31st Field Conference, Trans-Pecos Region, 77-81.
- Dumas, D.B. (to be publish). A recent seismic study in west Texas.

Figure 1. Seismicity map of the Basin and Range province and the adjacent area of Mexico. The stations are indicated by triangles (Δ) and locations and abbreviations are given in Table 1. Crosses (+) indicate epicenters located (Appendix III) by the five-station seismic array. Epicenters located by the USGS are indicated by solid squares (\blacksquare) and open circles (o) indicate epicenters located by the ISC. Abbreviations for structural features are: BG-Black Gap Area, DM-Davis Mountains, DP-Diablo Plateau, MB-Marfa Basin, RR-Rim Rock Fault, SB-Salt Basin Graben, and WM-Wylie Mountains. The dashed line marks Muehlberger's (1979) proposed eastern boundary of Basin and Range faulting. Earthquakes with the same epicenter are indicated by (M). The town of Valentine (V) is indicated by the small open square () \square .



Appendix II

Arrival times for local and regional earthquakes (S-P<30 sec)
recorded at station MOT from January 1976 to August 1980.

STATION: MCDONALD OBS., TEXAS CODE MOT LAT.30.68N LONG. 104.007W

YR/MO/DA	PHASE	TIME(UT)	PHASE	TIME(UT)	MAG(LOCAL)
76 1 7	EP	333 17.0	S	333 39.0	2.6
76 1 10	EP	150 26.0	S	150 46.0	3.1
76 1 15	EP	2044 23.8	S	2044 46.7	2.6
76 1 21	EP	2311 44.4	S	2312 7.4	2.6
76 1 22	EP	722 23.6	S	722 44.1	2.9
76 1 22	EP	2049 59.0	S	2050 22.3	
76 1 23	IP	1313 44.0	S	1313 56.7	2.2
76 1 25	IP	448 54.1	S	449 14.9	3.9
76 1 28	P	208 30.0	S	208 49.7	2.4
76 2 6	P	19 37.0	S	19 40.5	3.9
76 2 9	P	240 51.0	S	240 59.0	2.2
76 2 14	IP	535 51.1	S	536 14.1	2.4
76 2 17	IP	11 36.3	S	12 1.6	2.7
76 2 18	IP	2333 47.2	S	2334 13.4	2.5
76 2 20	IP	2143 24.3	S	2143 49.6	2.5
76 2 24	IP	2330 45.1	S	2330 10.0	2.5
76 2 29	EP	1914 16.4	S	1914 17.3	
76 3 1	EP	848 31.0			2.5
76 3 8	IP	216 51.7	S	216 54.0	1.9
76 3 9	P	650 6.5			3.5
76 3 12	P	1240 15.3			3.1
76 3 18	EP	1959 43.4	S	2000 2.5	2.6
76 3 18	EP	2253 44.1	S	2254 10.9	3.0
76 3 18	EP	2307 38.1	S	2308 2.5	
76 3 19	EP	350 56.8	S	351 24.4	2.2
76 3 20	EP	1242 39.2	S	1242 49.5	1.9
76 3 27	IP	2240 52.9	S	2241 16.9	2.8
76 3 30	EP	2356 53.6	S	2357 2.2	2.2
76 4 3	EP	2041 8.5	S	2041 19.9	2.8
76 4 9	IP	203 20.7	S	203 22.9	
76 4 12	EP	803 6.5	S	803 30.0	2.3
76 4 21	EP	840 39.1	S	841 3.1	2.4
76 4 23	EP	34 29.8	S	34 54.8	2.4
76 4 23	EP	2327 10.0	S	2327 32.2	2.3
76 4 28	EP	2214 28.8	S	2214 53.7	1.9
76 4 30	EP	1929 1.3	S	1929 21.9	2.5
76 5 3	EP	653 38.1	S	654 9.4	3.0
76 5 3	P	801 6.9	S	801 27.6	1.9
76 5 3	P	1128 8.1	S	1128 29.0	2.0
76 5 5	EP	1549 37.0	S	1549 57.0	2.2
76 5 6	EP	1718 50.0	S	1719 11.0	2.1
76 5 8	EP	1147 8.5	S	1147 29.4	1.8
76 5 11	EP	2305 13.8	S	2305 35.9	2.9
76 5 17	IP	1239 39.8	S	1239 46.2	
76 5 20	EP	2247 26.0	S	2247 35.6	

STATION: MCDONALD OBS., TEXAS CODE MOT LAT.30.68N LONG. 104.007W

YR/MO/DA	PHASE	TIME(UT)	PHASE	TIME(UT)	MAG(LOCAL)
76 5 21	EP	1318 8.6	S	1318 28.9	2.7
76 5 23	P	926 34.8	S	926 53.9	
76 5 23	P	1327 42.7	S	1327 57.5	
76 5 26	P	1153 4.5	S	1153 36.2	
76 6 4	P	2040 5.0	S	2040 31.5	2.8
76 6 7	P	2140 37.2	S	2141 0.1	
76 6 13	P	2205 22.2	S	2205 33.8	1.9
76 6 14	P	2004 36.7	S	2204 59.0	
76 6 14	P	2330 26.0	S	2330 48.2	1.9
76 6 15	P	220 28.1	S	220 49.8	2.8
76 6 15	P	333 17.3	S	333 40.7	
76 6 15	EP	850 49.4	S	851 11.3	2.6
76 6 15	P	1405 47.8	S	1406 9.3	
76 6 29	P	501 16.8	S	501 19.1	
76 6 30	P	2312 28.1	S	2312 59.8	
76 6 15	P	333 17.3	S	333 40.7	
76 7 11	P	1053 31.9	S	1053 38.4	
76 7 14	P	2037 21.7	S	2037 46.1	1.8
76 8 2	P	813 28.7	S	813 50.9	
76 8 5	P	2224 4.5	S	2224 30.6	2.6
76 8 6	P	2100 54.0	S	2101 5.7	
76 8 6	P	2113 9.0	S	2113 32.0	2.5
76 8 10	P	903 46.5	S	904 9.4	2.4
76 8 10	P	913 0.2	S	913 22.8	2.0
76 8 10	P	1015 49.0	S	1015 11.6	2.4
76 8 15	IP	1524 22.8	S	1524 47.0	
76 8 15	IP	1912 25.7	S	1912 43.2	2.8
76 8 16	EP	2101 31.4	S	2101 54.0	
76 8 25	EP	106 8.4	S	106 31.5	
76 8 25	P	115 37.0	S	115 52.0	
76 8 25	P	121 46.0	S	122 9.5	2.2
76 8 25	P	128 17.0	S	128 29.8	2.0
76 8 26	IP	1522 48.3	S	1523 9.6	2.5
76 8 29	IP	1949 45.1	S	1950 3.6	2.4
76 8 30	EP	1151 52.3	S	1152 16.0	1.9
76 8 30	EP	2245 45.0	S	2246 10.5	0.0
76 8 31	IP	1246 46.8	S	1247 9.0	2.4
76 9 3	EP	2325 9.0	S	2325 34.8	
76 9 5	EP	1040 20.0	S	1040 45.0	1.8
76 9 6	EP	652 32.4	S	652 56.0	1.9
76 9 6	P	1232 21.2	S	1232 43.2	
76 9 8	IP	43 23.7	S	43 30.2	1.5
76 9 8	P	57 2.1	S	57 8.0	0.4
76 9 8	IP	118 34.7	S	118 41.2	1.2
76 9 8	P	123 35.6	S	123 42.0	0.6

STATION: MCDONALD OBS., TEXAS CODE MOT LAT.30.60N LONG. 104.007W

YR/MO/DA	PHASE	TIME(UT)	PHASE	TIME(UT)	MAG(LOCAL)
76 9 9	EP	259 52.8	S	300 20.0	
76 9 9	EP	1829 0.2			
76 9 10	EP	2318 24.1	S	2318 50.0	1.9
76 9 17	IP	248 17.9	S	248 40.5	3.0
76 9 17	EP	356 55.9	S	357 16.9	2.0
76 9 17	EP	1536 18.0	S	1536 42.0	1.5
76 9 17	EP	2207 44.0	S	2208 7.9	1.8
76 9 18	EP	2341 23.6	S	2341 40.1	1.4
76 9 19	EP	1023 53.4	S	1024 13.0	1.2
76 9 19	IP	1040 54.3			3.1
76 9 19	IP	1045 2.5	S	1045 8.6	0.9
76 9 30	EP	2228 19.0	S	2228 44.0	1.5
76 10 2	IP	957 1.0	S	957 7.9	1.8
76 10 3	IP	2306 52.7			2.3
76 10 8	EP	1340 47.0	S	1341 10.5	2.0
76 10 9	EP	111 51.9	S	112 13.9	2.2
76 10 12	EP	322 27.5	S	322 34.0	1.0
76 10 13	EP	1326 28.7			
76 10 14	EP	225 24.6			
76 10 14	EP	1103 32.3	S	1103 55.5	2.3
76 10 18	EP	622 40.0	S	622 52.0	1.9
76 10 22	IP	506 44.3	S	507 8.0	3.4
76 10 23	EP	1252 7.5	S	1252 29.8	2.3
76 10 25	EP	27 34.0	S	27 56.7	3.0
76 10 25	EP	1053 1.1	S	1053 23.9	2.1
76 10 26	EP	1045 1.2	S	1045 18.1	2.8
76 11 4	EP	1756 5.1	S	1756 38.5	2.5
76 11 8	EP	2324 39.4	S	2325 5.4	2.5
76 11 5	EP	1805 9.0	S	1805 32.8	2.3
76 11 6	EP	2251 31.0	S	2251 56.7	2.5
76 11 17	EP	2316 20.6	S	2317 5.3	2.5
76 11 25	EP	2225 1.4	S	2225 27.0	2.5
76 11 27	EP	510 26.7	S	510 48.6	2.0
76 12 12	EP	2300 42.1	S	2301 3.0	2.6
76 12 12	EP	2326 24.8	S	2326 47.6	1.9
76 12 15	EP	852 10.8			
76 12 16	EP	2325 23.8	S	2325 49.9	2.3
76 12 17	EP	2133 26.0	S	2133 50.8	
76 12 19	EP	2126 45.8	S	2127 10.1	2.1
76 12 19	EP	2354 54.3	S	2355 17.5	2.4
76 12 19	EP	2357 19.0	S	2357 43.5	2.6
76 12 22	EP	2320 5.0	S	2320 31.3	2.5
76 12 31	EP	2247 16.1	S	2247 41.5	2.5
77 1 6	EP	1459 21.0	S	1459 32.1	2.5

STATION: MCDONALD OBS., TEXAS CODE MOT LAT.30.68N LONG. 104.007W

YR/MO/DA	PHASE	TIME(UT)	PHASE	TIME(UT)	MAG(LOCAL)
77 1 7	EP	1920 48.0	S	1921 16.8	2.1
77 1 29	IP	940 52.7	S	940 59.0	2.5
77 2 2	EP	618 42.4	S	618 53.0	2.0
77 2 4	IP	748 26.3	S	748 32.7	2.6
77 2 4	IP	1622 40.4	S	1622 45.6	2.0
77 2 10	EP	233 21.2	S	233 45.0	2.2
77 2 11	EP	2223 2.0	S	2223 22.4	2.2
77 3 15	IP	2321 40.8	S	2322 4.3	2.5
77 3 17	EP	514 44.0	S	515 7.0	2.0
77 3 19	EP	2128 11.5	S	2128 30.0	2.1
77 3 20	EP	754 40.0	S	755 2.1	2.6
77 3 21	IP	1645 18.2	S	1645 25.7	2.2
77 3 21	IP	1906 28.7	S	1906 58.1	
77 3 23	EP	1103 23.9	S	1103 44.9	2.2
77 3 23	EP	2324 54.1	S	2325 18.2	2.4
77 3 25	IP	2 15.0	S	2 44.6	2.2
77 3 31	IP	516 53.0	S	516 13.8	2.3
77 3 31	IP	546 11.2	S	546 34.1	
77 4 7	IP	546 11.3	S	546 33.0	3.0
77 4 12	EP	2135 57.8			1.8
77 4 12	EP	2318 51.0			2.6
77 4 16	EP	644 43.0	S	644 58.0	2.0
77 4 16	EP	1726 6.9	S	1727 27.6	2.3
77 4 17	EP	2147 41.0	S	2148 0.5	2.3
77 4 18	EP	1023 45.0			2.3
77 4 20	EP	1012 54.0	S	1013 10.0	1.9
77 4 23	EP	151 26.6	S	151 46.4	2.1
77 4 24	IP	915 44.0	S	916 10.0	2.2
77 4 25	IP	1013 23.0	S	1013 46.8	2.4
77 4 26	IP	903 33.5	S	903 41.6	3.2
77 4 28	EP	1106 34.1	S	1106 57.0	
77 4 28	EP	1255 9.1	S	1255 31.0	2.4
77 4 28	EP	1256 11.0	S	1256 33.1	2.7
77 4 28	EP	1256 50.9	S	1257 14.0	2.2
77 4 28	EP	1523 7.0	S	1523 29.8	2.6
77 4 29	EP	310 11.7	S	310 33.4	
77 5 3	IP	2317 27.0	S	2317 38.6	1.7
77 5 5	IP	2115 44.0	S	2116 13.3	2.2
77 5 6	IP	2012 46.0	S	2013 15.0	2.4
77 5 7	IP	2056 56.7	S	2057 2.5	2.0
77 5 9	IP	452 15.2	S	452 19.2	1.5
77 5 19	EP	1056 47.0	S	1056 58.8	2.0
77 5 22	EP	1630 46.0	S	1636 56.5	1.9

STATION: MCDONALD OBS., TEXAS CODE MOT LAT.30.68N LONG. 104.007W

YR/MO/DA	PHASE	TIME(UT)	PHASE	TIME(UT)	MAG(LOCAL)
77 6 6	EP	2324 5.6	S	2324 35.1	
77 6 8	EP	1054 38.0	S	1054 51.0	
77 7 8	EP	1606 0.0			2.5
77 7 9	EP	1607 15.0	S	1607 25.0	1.9
77 7 11	IP	1232 23.9	S	1232 45.7	
77 7 11	IP	1330 18.0	S	1330 40.0	
77 7 11	EP	1719 55.2	S	1720 14.2	2.0
77 7 11	EP	2015 48.9			1.4
77 7 12	EP	1914 44.1			1.5
77 7 14	EP	221 22.0			
77 7 16	P	1719 55.2	S	1720 14.0	2.0
77 7 16	P	1748 2.0			1.9
77 7 19	P	2377 14.5			
77 7 20	EP	342 36.1			1.8
77 7 21	P	2304 30.0			
77 7 28	EP	1217 37.0			1.8
77 7 28	EP	2335 1.0			1.5
77 7 30	EP	1617 35.0			1.7
77 7 30	EP	2315 0.0			2.3
77 8 1	EP	1644 9.7			1.8
77 8 3	EP	1622 5.0			1.2
77 8 4	EP	1928 8.0			1.7
77 8 6	EP	2044 19.4			2.0
77 8 9	P	1607 15.0			1.9
77 8 21	EP	301 13.0			3.3
77 8 22	EP	1229 0.0			2.2
77 8 20	EP	229 1.4			2.6
77 10 3	EP	2152 23.0	S	2152 50.0	2.2
77 10 4	EP	435 2.1	S	435 19.2	1.7
77 10 4	EP	630 37.0			1.9
77 10 12	EP	2207 7.0			1.8
77 10 14	EP	1709 47.6	S	1710 14.3	2.3
77 10 16	IP	2125 12.4	S	2125 35.3	2.5
77 10 18	IP	648 33.6	S	648 44.6	2.0
77 10 19	EP	2107 41.0			2.0
77 10 20	EP	639 44.3	S	640 5.7	2.4
77 10 20	EP	1102 23.0	S	1102 46.5	2.0
77 10 20	IP	2058 13.0	S	2058 40.1	2.3
77 10 21	EP	1505 51.8	S	1506 12.1	2.7
77 10 22	EP	2228 53.1	S	2228 57.8	2.6
77 10 24	IP	2250 33.5	S	2250 52.8	2.3
77 10 25	EP	103 0.8	S	103 23.0	2.0
77 10 26	EP	2105 10.0	S	2105 34.0	
77 10 27	EP	1016 44.5	S	1017 16.2	2.7
77 10 27	EP	1024 51.0	S	1025 14.2	2.4

STATION: MCDONALD OBS., TEXAS CODE MOT LAT.30.68N LONG. 104.007W

YR/MO/DA	PHASE	TIME(UT)	PHASE	TIME(UT)	MAG(LOCAL)
77 10 27	EP	1036 13.0	S	1036 27.0	2.4
77 10 27	EP	2150 17.7			
77 10 27	IP	2243 4.0	S	2243 31.4	2.3
77 10 28	EP	2241 24.1	S	2241 41.4	2.1
77 10 29	IP	49 17.8			1.9
77 10 29	EP	219 9.0	S	219 31.5	2.5
77 10 29	EP	1946 0.0			
77 10 31	EP	2312 13.4	S	2312 36.7	2.5
77 11 1	EP	708 28.1	S	708 50.7	1.9
77 11 1	EP	716 35.0	S	716 57.2	2.0
77 11 1	EP	2244 34.4	S	2245 1.4	2.2
77 11 2	IP	2206 13.0			1.8
77 11 3	EP	638 14.3	S	638 38.0	2.2
77 11 3	EP	1000 42.3	S	1001 4.1	2.2
77 11 3	EP	1511 8.8	S	1511 31.2	1.9
77 11 3	EP	2323 10.5	S	2323 35.2	2.2
77 11 4	EP	147 48.3			
77 11 4	EP	149 6.0			2.2
77 11 5	EP	1228 14.1			1.9
77 11 7	EP	2024 15.3	S	2024 38.5	1.9
77 11 11	EP	2315 5.4	S	2315 32.0	2.2
77 11 13	EP	1030 28.2			
77 11 14	IP	721 33.8	S	721 50.9	2.0
77 11 14	IP	726 48.7			3.1
77 11 14	IP	746 16.0	S	746 32.4	2.1
77 11 14	EP	2334 1.5			
77 11 15	EP	1224 53.6			2.6
77 11 15	EP	2324 44.5			2.2
77 11 16	EP	1325 39.3			2.1
77 11 16	EP	2330 20.4	S	2330 32.8	1.7
77 11 17	EP	753 0.5	S	753 23.1	1.9
77 11 18	EP	2253 55.0			2.2
77 11 22	EP	2202 7.0			2.0
77 11 22	EP	2325 57.7	S	2326 25.0	
77 11 23	EP	652 55.8	S	653 19.4	1.8
77 11 23	EP	1514 54.8	S	1515 3.4	
77 11 23	EP	1924 8.7	S	1924 31.8	2.6
77 11 23	EP	2133 6.8	S	2133 33.7	2.1
77 11 25	EP	1754 39.9			1.8
77 11 28	IP	141 47.3			3.3
77 11 28	IP	301 7.4	S	301 23.3	1.9
77 11 30	EP	1032 20.0	S	1032 31.1	1.8
77 12 5	EP	2340 41.8			2.2
77 12 6	EP	828 18.0	S	828 40.0	1.9

STATION: MCDONALD OBS., TEXAS CODE MOT LAT.30.68N LONG. 104.007W

YR/MO/DA	PHASE	TIME(UT)	PHASE	TIME(UT)	MAG(LOCAL)
77 12 6	EP	1015 53.0	S	1016 15.4	1.8
77 12 7	EP	1755 9.7	S	1755 32.8	2.0
77 12 12	EP	1346 0.9	S	1346 7.1	1.9
77 12 12	EP	1603 31.0	S	1603 54.0	1.4
77 12 13	EP	2347 18.2	S	2347 43.0	1.9
78 1 14	EP	844 4.0	S	844 20.0	1.8
78 1 15	EP	2224 3.5			2.0
78 1 15	EP	2239 15.2			2.5
78 1 15	EP	2315 34.9	S	2315 57.5	2.3
78 1 16	EP	258 54.6	S	259 16.6	1.9
78 1 17	EP	123 13.4	S	123 28.8	1.8
78 1 17	EP	2017 50.2			2.1
78 1 18	EP	853 40.5	S	853 56.2	2.1
78 1 19	EP	343 10.9	S	343 36.8	2.2
78 1 21	IP	117 13.0			3.2
78 1 21	EP	121 10.0	S	121 19.0	1.5
78 1 21	EP	606 33.2	S	606 56.0	2.0
78 1 24	EP	1426 33.1			2.1
78 1 27	EP	1933 58.1			3.2
78 1 28	IP	117 23.2			1.5
78 2 1	EP	36 1.5			1.8
78 2 1	EP	1917 20.0			2.0
78 2 1	EP	2344 18.1	S	2344 31.5	2.2
78 2 2	EP	230 1.2	S	230 22.7	2.0
78 2 3	EP	2324 53.1	S	1802 7.8	1.7
78 2 4	EP	1551 9.6	S	1551 25.4	2.7
78 2 5	EP	1046 46.2			2.6
78 2 5	IP	1420 9.0			1.7
78 2 14	P	1756 1.5			1.7
78 2 14	EP	1950 27.0			2.7
78 2 14	P	2103 58.7			2.0
78 2 16	EP	131 27.8			3.6
78 2 18	P	1422 29.6			2.5
78 2 18	P	1429 41.9			2.0
78 2 18	EP	1504 36.0			1.8
78 2 18	EP	1529 58.9			1.8
78 2 18	EP	1620 59.1			1.8
78 2 18	EP	1644 26.6			1.8
78 2 18	P	1730 30.1			2.9
78 2 18	EP	1754 32.2			2.3
78 2 18	EP	1845 37.7			2.1
78 2 18	EP	1858 59.5	S	1859 3.2	1.5
78 2 18	P	2159 58.2			2.5
78 2 19	EP	120 35.6	S	120 42.9	1.5

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YR/MO/DA	PHASE	TIME(UT)	PHASE	TIME(UT)	MAG(LOCAL)
78 2 19	EP	145 18.0	S	145 34.6	1.5
78 2 19	EP	253 18.3			1.9
77 2 19	EP	704 40.8			1.9
78 2 19	EP	253 18.3			1.9
78 2 19	P	1212 21.6			2.9
78 2 19	EP	1222 36.1			1.7
78 2 19	EP	1531 54.4	S	1532 0.5	1.7
78 2 19	EP	1816 10.0	S	1016 34.5	2.1
78 2 19	EP	1818 19.4	S	1818 42.0	2.4
78 2 19	EP	2216 52.0			1.5
78 2 20	EP	253 18.3			1.9
78 2 20	P	2050 52.7			2.5
78 2 21	P	2257 0.7			
78 3 2	EP	858 22.2			2.5
78 3 4	EP	1938 28.0			1.9
78 3 5	EP	1248 49.9			1.5
78 3 5	EP	1420 29.6	S	1420 56.3	2.3
78 3 6	EP	16 41.8			1.4
78 3 6	EP	2347 17.8			2.3
78 3 8	EP	1355 47.2			2.5
78 3 8	EP	2130 33.0			
78 3 9	EP	536 48.5			1.5
78 3 9	EP	2301 32.8			2.4
78 3 12	EP	7 59.2			2.6
78 3 13	EP	2301 59.0			2.4
78 3 14	EP	301 2.0			2.3
78 3 14	EP	1520 56.0			2.4
78 3 14	EP	1739 34.3			1.7
78 3 16	EP	1751 59.9			2.4
78 3 16	EP	1844 8.9			1.5
78 3 16	EP	1935 45.8			2.7
78 3 14	EP	306 46.6			2.5
78 3 17	EP	2116 29.0			2.2
78 3 19	EP	1049 17.1			2.5
78 3 20	EP	14 19.6			1.7
78 3 22	EP	2003 49.0	S	2004 17.1	2.5
78 3 25	EP	755 19.2			2.2
78 3 31	EP	5 57.5			1.9
78 3 31	EP	2101 53.0			1.8
78 3 31	EP	2355 23.5			2.0
78 3 31	EP	2222 18.5			
78 4 1	EP	2335 10.5	S	2335 29.2	1.8
78 4 4	EP	424 2.9	S	424 30.0	2.3

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YR/MO/DA	PHASE	TIME(UT)	PHASE	TIME(UT)	MAG(LOCAL)
78 4 4	EP	1335 51.0	S	1336 12.0	1.9
78 4 4	EP	2313 1.5	S	2313 21.0	1.8
78 4 6	EP	913 43.9	S	913 55.9	2.0
78 4 6	EP	1959 26.0	S	1959 46.0	1.9
78 4 7	P	58 18.1	S	58 48.0	2.6
78 4 7	EP	1250 15.1	S	1205 35.1	2.2
78 4 12	EP	2305 10.8			1.9
78 4 13	EP	820 29.0	S	820 31.9	1.0
78 4 16	EP	1101 3.6	S	1101 25.8	2.2
78 4 16	IP	1534 26.2	S	1534 29.5	1.4
78 4 26	EP	1158 20.0	S	1158 42.0	2.2
78 5 1	EP	1007 7.1	S	1007 25.6	1.8
78 5 3	P	2336 30.1			3.9
78 5 5	EP	1812 3.0	S	1812 23.0	2.1
78 5 8	IP	2125 22.6	S	2125 49.9	2.5
78 5 9	EP	2121 15.1	S	2121 43.5	2.3
78 5 11	IP	2214 21.0	S	2214 49.9	2.5
78 5 17	EP	1837 59.0			3.0
78 5 17	EP	2304 52.0	S	2305 15.0	2.5
78 5 18	EP	2110 33.3	S	2110 51.0	1.9
78 5 24	EP	523 34.2	S	523 46.0	1.8
78 5 25	IP	1929 34.0	S	1930 3.0	2.3
78 5 25	EP	2359 58.8	S	2359 11.3	1.8
78 5 27	EP	2008 20.6			1.4
78 5 28	EP	446 33.0			1.4
78 5 28	EP	1237 9.0			2.0
78 5 28	EP	1253 28.0			2.2
78 5 29	EP	1908 35.5	S	1908 56.2	2.0
78 5 30	EP	1150 22.4			1.5
78 5 30	EP	1319 0.0			2.2
78 6 3	IP	1140 32.1			2.4
78 6 6	EP	1459 56.3	S	1500 17.9	2.2
78 6 6	EP	2050 12.4			2.2
78 6 7	EP	154 54.4	S	155 15.2	2.5
78 6 7	EP	653 14.3	S	653 36.4	2.2
78 6 9	EP	454 28.0			1.9
78 6 9	EP	459 29.9			1.9
78 6 13	EP	347 6.2	S	347 27.1	2.0
78 6 14	EP	1905 40.8	S	1906 1.0	2.7
78 6 19	EP	1441 38.8			1.8
78 6 22	EP	955 36.8	S	955 58.2	1.8
78 6 27	EP	2317 27.1			2.4
78 6 28	IP	403 45.1			2.6

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YR/MO/DA	PHASE	TIME(UT)	PHASE	TIME(UT)	MAG(LOCAL)
78 6 28	EP	2046 38.0			1.7
78 6 29	EP	2059 17.0	S	2059 30.0	2.9
78 6 30	EP	1759 4.4	S	1759 33.4	2.3
78 7 5	EP	112 28.1	S	112 58.9	1.5
78 7 5	EP	245 36.8	S	245 58.9	2.0
78 7 5	EP	1041 1.1	S	1041 23.5	2.0
78 7 5	EP	2300 13.6	S	2300 41.0	2.0
78 7 6	EP	1109 20.0	S	1109 43.0	1.8
78 7 6	EP	1753 46.0	S	1754 15.5	2.3
78 7 9	EP	2115 14.0	S	2115 35.5	1.8
78 7 10	IP	1554 4.9	S	1554 28.2	2.1
78 7 10	EP	1735 1.5	S	1735 25.0	2.6
78 7 13	EP	438 20.0			0.8
78 7 13	IP	952 48.4	S	952 54.1	1.7
78 7 13	IP	959 12.6	S	959 18.2	1.2
78 7 13	IP	1025 34.0	S	1025 39.5	2.0
78 7 13	EP	1135 55.4	S	1135 58.0	0.4
78 7 13	IP	1210 51.0	S	1210 57.2	1.3
78 7 13	EP	1212 41.0	S	1212 46.2	0.8
78 7 13	IP	1223 59.8	S	1224 4.9	1.3
78 7 13	EP	1328 40.0	S	1328 44.0	0.7
78 7 13	EP	2027 10.1	S	2027 18.2	1.1
78 7 13	EP	2238 31.4			1.8
78 7 14	IP	944 20.0	S	944 25.5	0.3
78 7 14	IP	1006 1.0	S	1006 6.2	0.8
78 7 14	IP	1553 10.0	S	1553 15.0	0.5
78 7 14	EP	1420 34.0	S	1420 39.0	1.6
78 7 17	IP	2215 39.5			1.7
78 7 17	IP	2230 37.5	S	2230 43.0	1.6
78 7 17	EP	2250 43.0	S	2251 11.0	2.2
78 7 17	EP	2256 51.0	S	2256 57.0	1.4
78 7 18	IP	149 32.2	S	149 37.5	2.1
78 7 18	IP	454 3.9	S	454 8.6	1.4
78 7 18	IP	454 43.0	S	454 47.0	0.7
78 7 18	IP	807 49.9	S	807 54.9	1.2
78 7 18	IP	1207 40.2	S	1207 45.7	2.6
78 7 24	EP	2212 44.3	S	2213 3.0	2.0
78 7 25	EP	2357 50.0			1.8
78 7 26	EP	1826 6.8	S	1826 9.0	1.2
78 7 26	EP	1851 14.1	S	1851 34.2	2.0
78 7 26	EP	2033 15.4	S	2033 32.0	2.0
78 7 27	EP	1157 29.7			
78 7 27	EP	1441 43.4	S	1442 2.9	2.0
78 7 28	EP	1801 43.6	S	1802 5.7	2.0
78 7 28	EP	2010 40.8	S	2011 11.8	2.2
78 7 28	EP	2015 9.0	S	2015 37.6	2.0

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YR/MO/DA	PHASE	TIME(UT)	PHASE	TIME(UT)	MAG(LOCAL)
78 7 28	EP	2223 15.8	S	2223 40.3	2.3
78 7 29	EP	1050 43.1	S	1050 52.8	1.8
78 7 29	EP	2054 41.6	S	2055 1.5	2.0
78 8 1	EP	1736 19.2	S	1736 46.5	2.2
78 8 1	EP	2332 40.0	S	2332 6.0	1.8
78 8 2	EP	2234 24.7	S	2234 38.0	2.1
78 8 4	EP	1937 20.0	S	1937 47.0	2.4
78 8 7	EP	2305 5.5			2.0
78 8 8	EP	1221 22.1	S	1221 48.9	2.2
78 8 9	IP	2010 23.8	S	2010 50.8	2.5
78 8 9	IP	2228 3.9	S	2228 31.0	2.4
78 8 10	EP	1218 27.1			1.4
78 8 11	IP	1927 28.9	S	1928 6.5	2.3
78 8 13	EP	914 41.3	S	915 3.8	1.8
78 8 13	EP	927 58.0			1.6
78 8 13	EP	933 0.5	S	933 22.0	2.0
78 8 14	EP	506 9.5	S	506 30.0	2.0
78 8 14	EP	1330 12.1	S	1330 32.2	2.9
78 8 14	EP	2022 3.8	S	2022 31.0	2.5
78 8 14	EP	557 10.0			2.9
78 8 15	EP	1447 18.0	S	1447 38.1	2.7
78 8 21	EP	1038 12.2	S	1038 33.0	1.8
78 8 21	EP	2040 27.2			1.8
78 8 21	IP	2221 6.0	S	2221 33.0	2.5
78 8 21	EP	2339 0.5	S	2339 27.8	2.0
78 8 22	EP	18 4.5	S	18 22.0	2.4
78 8 23	EP	1423 24.1	S	1423 40.8	2.0
78 8 25	EP	2051 46.6			1.7
78 8 28	EP	2033 55.9			1.7
78 8 28	EP	2314 18.7	S	2314 45.2	2.0
78 8 31	EP	1819 47.6			1.7
78 9 2	EP	716 55.4			1.2
78 9 2	EP	2053 25.0			2.0
78 9 4	EP	207 5.5			0.6
78 9 11	EP	924 17.0	S	924 40.0	2.2
78 9 12	EP	1909 45.5	S	1910 25.7	2.5
78 9 13	EP	1833 53.7			1.7
78 9 16	EP	1410 10.0	S	1410 30.9	2.0
78 9 17	EP	1146 44.2	S	1147 4.2	2.0
78 9 17	EP	1149 42.1	S	1150 4.5	2.0
78 9 18	IP	239 38.9	S	239 51.0	1.4
78 9 29	EP	2008 11.1	S	2008 31.0	2.9
78 9 29	EP	2254 56.8	S	2255 16.5	2.0
78 9 30	EP	752 44.8	S	752 48.2	1.1
78 9 30	EP	2332 13.0	S	2332 32.8	2.2

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YR/MO/DA	PHASE	TIME(UT)	PHASE	TIME(UT)	MAG(LOCAL)
78 10 2	EP	935 35.0	S	935 55.2	2.3
78 10 2	EP	959 1.4	S	959 22.0	2.1
78 9 18	EP	1000 54.7			0.6
78 9 18	EP	1011 2.0			0.4
78 9 18	EP	1012 6.0			0.6
78 9 18	IP	1156 58.4			0.7
78 9 18	IP	2017 7.9	S	2017 34.7	2.2
78 9 18	IP	2136 35.3	S	2136 48.0	2.2
78 9 19	EP	1049 37.0			1.7
78 9 19	IP	1935 22.7	S	1935 35.0	2.3
78 9 19	EP	1940 6.9	S	1940 35.7	2.0
78 9 22	EP	15 30.5			0.9
78 9 22	EP	819 46.8	S	820 9.9	2.0
78 9 22	EP	1806 32.1	S	1806 53.0	1.7
78 9 28	IP	1121 25.5	S	1121 27.5	0.4
78 9 29	EP	1759 50.6			2.2
78 9 29	EP	2002 26.0	S	2002 48.0	1.8
78 10 2	EP	1125 37.3	S	1125 57.0	2.9
78 10 2	EP	2236 24.0			1.8
78 10 3	EP	612 44.6	S	613 4.5	2.0
78 10 6	EP	1524 17.1	S	1524 37.0	2.8
78 10 10	EP	951 45.1			
78 10 10	EP	1444 19.0	S	1444 28.6	2.4
78 10 11	EP	2218 16.8	S	2218 44.4	2.0
78 10 17	IP	831 40.0	S	831 42.9	0.7
78 10 20	IP	307 57.3	S	308 18.0	2.5
78 10 20	EP	742 45.0	S	743 7.0	2.0
78 10 20	IP	2153 15.9	S	2153 45.8	2.2
78 10 20	EP	2220 19.2			1.5
78 10 23	EP	2046 44.0	S	2047 6.0	2.4
78 10 26	IP	412 58.9	S	413 21.4	1.8
78 10 26	EP	1758 8.0	S	1758 36.5	2.3
78 10 29	EP	700 12.0	S	700 30.0	1.7
78 10 30	EP	1721 4.9	S	1721 34.0	2.1
78 10 31	EP	2150 18.2	S	2150 41.7	2.0
78 10 31	EP	2243 21.0			1.7
78 11 3	EP	4 38.2	S	5 6.0	1.8
78 11 7	EP	2346 44.5	S	2347 11.4	1.8
78 11 13	EP	2357 29.1	S	2357 53.8	2.0
78 11 15	EP	1502 28.8			0.9
78 11 15	IP	2007 4.0	S	2007 24.0	1.8
78 11 16	EP	346 7.8	S	346 17.0	1.3
78 11 16	EP	2040 0.0	S	2040 20.0	2.0
78 11 18	EP	2128 7.8	S	2128 34.0	1.8
78 11 19	EP	328 7.1	S	328 24.5	1.6

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YR/MO/DA	PHASE	TIME(UT)	PHASE	TIME(UT)	MAG(LOCAL)
78 11 19	EP	1106 14.5	S	1106 37.7	1.8
78 11 21	IP	2105 47.9			2.8
78 11 22	EP	234 15.2	S	234 27.4	1.7
78 11 22	IP	1438 34.5	S	1439 1.8	2.0
78 11 26	EP	1239 40.6			1.7
78 12 1	EP	744 25.6			2.2
78 12 1	EP	836 30.5			2.1
78 12 4	EP	210 35.1			2.2
78 12 10	EP	132 41.5			2.0
78 12 12	EP	1755 34.9	S	1756 2.0	2.0
78 12 15	EP	2209 7.5	S	2209 32.9	2.0
78 12 17	EP	2349 43.6			1.6
78 12 18	IP	1243 2.4			1.4
78 12 18	IP	1932 43.7	S	1933 11.0	2.0
78 12 18	IP	2110 54.1	S	2111 21.4	2.0
78 12 20	IP	131 32.0			1.1
78 12 31	EP	1712 15.6			1.5
78 12 31	EP	1714 11.5			1.7
79 1 1	EP	952 18.0	S	952 37.0	1.7
79 1 1	EP	956 12.0	S	956 30.0	2.0
79 1 3	IP	2244 28.0	S	2244 31.0	0.6
79 1 3	IP	2256 54.2	S	2256 56.0	0.6
79 1 4	IP	303 30.5	S	303 32.4	0.6
79 1 4	EP	1720 25.9	S	1720 53.5	2.0
79 1 5	EP	2108 12.8	S	2108 40.0	1.9
79 1 6	IP	39 42.2	S	39 45.0	0.8
79 1 8	EP	855 27.0	S	855 42.1	1.8
79 1 9	EP	12 11.6	S	12 26.5	1.8
79 1 11	P	348 49.0	S	348 54.5	1.0
79 1 15	P	36 36.9	S	32 54.1	1.5
79 1 19	IP	908 15.3	S	908 31.2	1.8
79 1 26	EP	2110 1.8	S	2110 28.2	2.1
79 1 27	IP	2137 40.0	S	2138 6.5	1.8
79 1 27	EP	2234 53.0	S	2235 7.7	1.6
79 2 1	EP	2110 19.9	S	2110 41.8	2.0
79 2 1	IP	2156 20.6	S	2156 24.1	1.2
79 2 1	IP	927 13.0	S	927 33.4	2.0
79 2 4	EP	1758 46.0			1.6
79 2 8	IP	2222 25.4	S	2222 42.0	
79 2 5	IP	18 12.6	S	18 14.0	2.5
79 2 9	IP	1751 35.5	S	1752 3.9	2.0
79 2 9	EP	2212 48.2	S	2213 7.2	2.1
79 2 10	IP	52 21.4			0.4
79 2 13	IP	1902 27.0	S	1902 36.0	2.0
79 2 13	EP	2232 0.5	S	2232 18.5	1.7

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YR/MO/DA	PHASE	TIME(UT)	PHASE	TIME(UT)	MAG(LOCAL)
77 8 4	P	2131 10.0			1.0
79 2 15	EP	2240 0.0	S	2240 17.0	2.0
79 2 16	P	2350 49.8	S	2351 3.1	2.0
79 2 18	IP	1017 17.4	S	1017 32.7	2.0
79 2 19	IP	2153 46.8	S	2154 14.0	2.0
79 2 20	EP	2125 35.8	S	2125 44.6	1.5
79 2 21	IP	2249 33.2			2.0
79 2 23	IP	517 25.7	S	517 30.0	0.9
79 2 27	IP	501 57.8	S	501 17.0	2.4
79 3 1	IP	516 20.0	S	516 34.2	1.8
79 3 1	EP	549 18.4			0.4
79 3 1	IP	2216 0.9	S	2216 29.0	2.2
79 3 3	EP	2103 39.9	S	2103 48.0	1.8
79 3 11	2P	1250 59.7	S	1251 4.5	1.8
79 3 11	IP	1937 38.4	S	1937 43.0	1.5
79 3 15	EP	4 2.0			1.8
79 3 15	EP	1247 10.0	S	1247 18.0	1.4
79 3 16	IP	1956 57.0	S	1957 24.5	2.3
79 3 17	P	1949 13.6			1.1
79 3 23	EP	2140 22.6	S	2140 30.5	1.8
79 3 24	P	1455 44.7	S	1455 49.5	1.1
79 3 27	EP	1753 23.4	S	1753 51.0	2.2
79 3 28	IP	551 56.8	S	552 11.0	1.9
79 3 28	EP	1457 28.5			1.2
79 3 28	EP	1505 25.4			2.6
79 3 29	EP	936 7.2			2.5
79 3 29	EP	1352 39.8			1.4
79 3 29	EP	1953 37.2	S	1954 3.5	2.2
79 3 30	EP	341 32.0			0.6
79 3 31	IP	1446 53.8	S	1446 56.2	0.4
79 4 1	EP	1336 58.9	S	1340 1.0	0.7
79 4 1	EP	2025 36.7	S	2025 44.4	2.0
79 4 4	IP	2135 40.0	S	2136 8.0	2.2
79 4 5	EP	1921 23.4	S	1921 52.0	2.2
79 4 8	IP	156 15.9	S	156 29.0	1.9
79 4 10	EP	539 29.1			1.6
79 4 16	IP	2349 57.8	S	2350 26.0	2.1
79 4 17	IP	40 44.9	S	40 53.0	1.8
79 4 18	EP	43 46.0	S	44 9.2	1.8
79 4 18	EP	58 15.9	S	58 43.0	1.8
79 4 24	IP	640 56.2			0.4
79 4 25	IP	20 5.2	S	20 32.3	1.8
79 4 25	IP	1858 15.7			0.5
79 4 28	IP	101 49.9			3.6

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YR/MO/DA	PHASE	TIME(UT)	PHASE	TIME(UT)	MAG(LOCAL)
79 4 28	EP	155 14.6			1.2
79 4 28	IP	1755 25.6	S	1536 45.4	1.6
79 4 28	IP	1814 28.0	S	1814 37.0	1.3
79 4 29	EP	1536 35.2	S	1536 45.4	1.6
79 4 30	IP	2246 4.0	S	2246 8.3	1.3
79 5 2	IP	2333 44.6	S	2334 11.7	1.8
79 5 15	EP	2306 22.1	S	2306 46.0	1.9
79 5 22	EP	21 56.0			1.7
79 5 25	IP	2312 14.6	S	2312 22.3	1.5
79 5 30	EP	0 35.0	S	0 58.9	2.0
79 6 8	EP	5 45.5	S	6 9.0	1.8
79 6 9	EP	129 9.0	S	129 15.3	1.9
79 6 9	IP	1706 28.9	S	1706 30.5	1.3
79 6 10	IP	1047 57.5			1.7
79 6 12	IP	743 29.9	S	743 53.0	2.0
79 6 14	EP	1455 28.3			2.2
79 6 16	EP	2119 53.2	S	2120 16.2	1.8
79 6 17	IP	1626 17.5	S	1626 19.0	0.8
79 6 17	IP	1736 40.2	S	1736 47.1	1.7
79 6 20	IP	1202 10.0	S	1202 11.2	0.6
79 6 21	IP	1032 13.3	S	1032 19.6	1.2
79 6 22	IP	558 26.3	S	558 32.5	1.8
79 6 23	EP	2225 30.6	2	2225 32.2	0.2
79 6 25	IP	1723 41.7	S	1723 44.2	1.1
79 6 28	IP	337 23.7	S	337 34.2	1.5
77 6 28	P	1923 6.4			1.9
79 6 28	IP	2101 14.5	S	2101 32.0	2.1
79 6 30	IP	718 56.0	S	719 18.0	2.0
79 7 1	IP	732 27.0	S	732 51.0	1.6
79 7 10	EP	2132 37.0	S	2132 43.5	0.9
79 7 10	EP	2146 25.5	S	2146 31.8	0.9
79 7 10	EP	2200 32.5	S	2200 38.8	0.9
79 7 10	EP	2209 24.8	S	2209 30.8	0.9
79 7 12	EP	334 57.0	S	335 5.8	0.7
79 7 14	EP	20 57.2	S	21 0.1	0.6
79 7 18	IP	1059 30.5			0.6
79 7 22	EP	27 49.0			0.5
79 7 22	IP	1450 28.5			0.7
79 7 23	IP	2042 0.0			0.7
79 7 24	IP	307 6.2	S	307 12.9	1.7
79 7 25	EP	2106 7.0	S	2106 30.5	1.8
79 7 26	EP	25 52.7	S	26 1.0	1.7
79 7 27	EP	1236 5.6			0.4
79 7 27	EP	1237 47.9			0.6

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YR/MO/DA	PHASE	TIME(UT)	PHASE	TIME(UT)	MAG(LOCAL)
79 7 27	EP	1256 0.0			1.2
79 7 28	IP	1424 25.2			0.5
79 7 30	IP	1202 32.0	S	1202 44.0	1.2
79 7 31	IP	1741 50.0	S	1741 9.9	2.0
79 8 4	IP	2131 10.0			1.0
79 8 7	EP	1109 26.0	S	1109 20.8	0.6
79 8 9	EP	1250 13.0			1.2
79 8 9	EP	1443 58.6			1.4
79 8 11	EP	2238 6.3	S	2238 17.0	1.3
79 8 14	EP	2022 55.5			1.5
79 8 14	EP	2331 34.0			2.0
79 8 15	EP	2146 37.5	S	2146 58.0	1.7
79 8 16	EP	2256 54.0	S	2257 14.5	1.7
79 8 24	IP	2302 46.7	S	2303 1.7	2.0
79 8 25	IP	122 40.0	S	122 59.5	2.1
79 8 27	EP	1008 9.8	S	1008 25.5	1.5
79 8 27	EP	1118 6.5	S	1118 22.0	1.5
79 8 27	EP	1837 17.1	S	1837 32.2	1.6
79 8 27	EP	2119 5.9	S	2119 13.2	1.4
79 8 28	EP	2346 44.4			1.8
79 9 1	EP	120 41.0			1.9
79 9 2	EP	401 22.1			1.6
79 9 4	EP	1921 51.9	S	1921 59.4	1.4
79 9 5	EP	819 22.0	S	819 44.1	1.8
79 9 6	EP	1206 49.0	S	1207 11.0	2.1
79 9 7	EP	2254 51.0	S	2255 1.0	1.7
79 9 8	EP	2338 11.0	S	2338 17.2	1.3
79 9 11	EP	645 59.8	S	646 21.0	1.9
79 9 11	EP	1141 13.8	S	1141 36.0	1.9
79 9 11	EP	1205 22.8	S	1205 43.5	2.1
79 9 15	EP	215 37.5	S	216 0.5	2.3
79 9 16	EP	1246 22.0			1.2
79 9 19	EP	2259 36.1			1.7
79 9 22	EP	613 57.0	S	614 27.0	2.6
79 9 22	EP	1647 14.9	S	1647 24.1	1.6
79 9 28	EP	2022 51.5	S	2023 8.0	1.4
79 10 4	EP	113 34.0	S	113 47.0	1.6
79 10 7	EP	2142 42.5	S	2142 51.2	1.8
79 10 9	IP	124 51.2			
79 10 16	EP	1701 56.1			
79 10 25	EP	1333 1.1	S	1333 10.5	1.7
79 10 29	IP	1925 10.0			
79 10 30	EP	2306 26.5			1.6
79 10 31	EP	2054 29.5			1.5
79 11 2	EP	1116 22.8			1.5

STATION: MCDONALD OBS., TEXAS CODE MOT LAT.30.68N LONG. 104.007W

YR/MO/DA	PHASE	TIME(UT)	PHASE	TIME(UT)	MAG(LOCAL)
79 11 28	EP	301 41.0	S	302 1.0	2.0
79 12 5	IP	313 52.0	S	313 54.0	0.5
79 12 10	EP	2245 54.0	S	2246 18.5	2.0
79 12 10	IP	2346 28.4	S	2346 37.1	1.8
79 12 13	IP	437 0.1			1.2
79 12 14	EP	1758 17.7	S	1758 36.2	1.9
79 12 21	EP	2338 23.0	S	2338 28.5	1.4
79 12 21	EP	2350 38.0	S	2350 46.0	2.0
79 12 22	IP	615 42.3	S	615 44.2	2.3
79 12 23	EP	1635 54.5	S	1636 0.4	1.5
79 12 31	IP	1205 9.5			2.2
80 1 7	IP	1102 32.2	S	1102 51.0	2.3
80 1 7	IP	1214 51.0	S	1214 20.5	2.2
80 1 7	EP	2003 28.0	S	2003 48.0	2.1
80 1 7	IP	2259 57.0	S	2300 16.5	2.2
80 1 8	EP	2230 6.0			1.6
80 1 9	EP	535 37.0	S	536 5.5	2.9
80 1 9	IP	1241 3.0	S	1241 6.0	1.8
80 1 11	EP	2142 49.0			0.9
80 1 12	IP	38 24.3	S	38 29.2	0.6
80 1 12	IP	1732 59.5			
80 1 13	IP	302 5.0			
80 1 15	EP	1803 7.5			
80 1 21	EP	2331 31.0	S	2331 37.8	1.8
80 1 22	IP	1508 22.0			3.6
80 1 22	IP	2337 18.1	S	2337 39.0	2.9
80 3 7	EP	1357 52.0	S	1358 2.1	1.8
80 3 8	EP	723 49.0	S	724 10.0	1.9
80 3 10	EP	9 28.2	S	9 53.0	2.1
80 3 11	EP	1753 32.4	S	1754 1.0	
80 3 21	EP	835 53.1	S	836 15.0	2.4
80 3 26	IP	330 5.8	S	330 11.1	1.8
80 3 29	EP	2 0.5	S	2 24.6	1.9
80 4 1	EP	1021 31.0	S	1021 50.0	1.7
80 4 6	EP	248 22.6	S	248 41.5	2.9
80 4 6	EP	305 25.4	S	305 44.6	1.7
80 4 6	EP	547 8.9	S	547 26.0	1.6
80 4 6	EP	701 33.1	S	701 52.1	2.5
80 4 8	EP	1521 7.7	S	1521 22.5	1.8
80 4 23	EP	1326 29.2	S	1326 56.5	2.0
80 4 28	EP	445 11.0	S	445 29.0	1.7
80 4 28	EP	1055 27.6	S	1055 49.5	1.9
80 4 28	EP	1105 45.0	S	1106 7.0	1.8
80 4 28	EP	1252 22.0	S	1252 44.0	1.6
80 4 29	IP	155 30.0	S	155 52.0	2.5

STATION: MCDONALD OBS., TEXAS CODE MOT LAT.30.68N LONG. 104.007W

YR/MO/DA	PHASE	TIME(UT)	PHASE	TIME(UT)	MAG(LOCAL)
80 5 25	IP	1143 4.7	S	1143 11.0	1.0
80 5 28	EP	1705 42.0	S	1706 1.0	2.2
80 6 6	EP	2307 35.8	S	2307 48.0	2.0
80 6 16	EP	2351 37.5			
80 6 21	EP	1341 17.0	S	1341 39.0	1.8
80 6 21	EP	2008 22.0	S	2208 44.0	1.7
80 6 22	EP	302 38.3	S	303 0.8	1.9
80 6 22	EP	1210 44.7	S	1211 6.0	1.9
80 6 22	EP	1410 22.5	S	1410 25.0	0.1
80 6 22	EP	2130 23.3	S	2130 45.6	2.5
80 6 23	EP	1109 46.7	S	1110 9.0	1.6
80 6 24	EP	1146 48.0			1.7
80 6 24	EP	2323 30.5			2.0
80 6 25	EP	829 47.4	S	830 9.1	2.0
80 6 27	EP	722 56.1	S	723 18.2	2.4
80 6 27	EP	1140 39.0	S	1140 59.0	3.1
80 6 27	EP	1151 4.5	S	1151 11.2	1.2
80 6 27	EP	1159 51.6			0.7
80 6 27	EP	1204 47.6	S	1204 54.3	1.3
80 6 27	EP	1228 3.6	S	1228 10.0	0.7
80 7 3	EP	353 50.2			0.4
80 7 3	EP	1943 12.4	S	1943 31.3	2.0
80 7 8	EP	2308 18.4	S	2308 38.0	2.0
80 7 8	EP	2329 50.0	S	2330 1.0	1.8
80 7 10	EP	923 21.4	S	923 41.5	2.7
80 7 17	IP	342 1.2			3.8
80 7 17	EP	729 49.0	S	730 10.2	1.7
80 7 17	EP	807 31.1	S	807 51.2	2.6
80 7 17	EP	847 57.8	S	848 20.0	1.7
80 7 17	EP	1524 26.1	S	1524 46.2	1.8
80 7 18	EP	2104 42.4	S	2105 4.5	2.2
80 7 21	EP	941 1.5	S	941 19.0	1.8
80 7 28	IP	1639 26.0	S	1639 31.0	1.6
80 7 29	IP	1211 49.8	S	1212 5.0	1.7
80 7 30	EP	0 39.7	S	0 47.7	0.7
80 8 5	EP	354 12.0	S	354 34.0	2.0

Appendix III

Instrumental locations for earthquakes in the Basin and Range province of Texas and the adjacent area of Mexico. Locations were determined by the use of HYPO-71 (Lee and Lahr, 1975). The column headings are as follows:

Date - Year/month/day

Origin Time - This is universal time (UT) and is given to the nearest tenth of a second.

Lat N - Latitude (North) given to the nearest hundredth of a minute.

Long W - Longitude (West) given to the nearest hundredth of a minute.

Depth - Depth is given in km. (*) indicates depth is constrained to 4 km.

Mag - The magnitudes listed are local magnitudes determined from signal durations and are obtained from the following formula (Dumas, In preparation)

$$m_1 = 2.1 \log t - 2.51$$

MOT, BP, EM, MR, and BR - These are the UT/NASA stations used in the location scheme. The numbers in the columns indicate the number of readings used to locate each event per station. One (1) indicates P-wave arrival only and two (2) indicate both P and S wave arrivals were used.

Dmin - Distance to nearest station in km.

Gap - Largest azimuthal separation in degrees between stations.

RMS - Root mean square error of time residuals in sec.

ERR - Estimated standard error of the epicenter in km. If ERH is blank this means ERR cannot be computed because of insufficient data.

ERZ - Estimated standard error of the focal depth. If ERZ is blank this means that ERZ cannot be computed because either the focal depth was fixed in the solution or because of insufficient data.

Q - Quality of the hypocenter solution. This measure is intended to indicate the general reliability of the solution (Lee and Lahr, 1975).

Comments - The three (3) letter code indicate additional station(s) used in the epicenter locations.

DATE	ORIGIN TIME	LAT N	LONG W	DEPTH *	MAG	MOT	BP	EM	MR	BR	DMIN	GAP	RMS	ERH	ERZ	COMMENTS
77/ 7/11	1719 37.6	30-58.80	104-53.80	4.00*	2.0	1	2	2	2	1	20	213	0.37	13.7	15.2	D
77/ 7/11	2015 20.5	31- 4.22	105- 0.64	3.64	1.3	2	1	2	1	1	20	265	0.73	14.9	10.9	D
77/ 7/12	1914 24.1	31- 1.00	105- 1.00	20.45	1.5	2	2	1	0	0	14	254	0.22	7.0	5.3	D
77/ 7/16	1747 31.3	29-44.74	105-33.70	1.44	1.9	2	2	2	1	2	110	321	0.91	14.2	9.7	D
77/ 7/28	1217 17.8	31- 6.00	105- 1.00	4.00*	1.9	2	1	2	1	2	23	274	0.94	21.2	14.3	D
77/ 7/28	2335 43.1	31- 0.27	104-54.55	2.00*	1.8	2	2	2	1	1	20	225	0.21	19.5	19.6	D
77/ 7/30	1617 16.0	31- 1.00	104-54.80	4.00*	1.5	2	2	2	1	1	21	230	1.28	70.3	72.6	D
77/ 8/ 1	1644 51.1	30-58.00	104-55.09	4.00*	1.8	0	2	1	2	2	17	210	1.23	44.0	50.2	D
77/ 8/ 3	1622 47.2	30-53.00	104-54.91	4.00*	1.6	2	2	2	1	1	16	167	1.57	26.2	41.9	D
77/ 8/ 6	2043 59.7	31- 2.15	104-57.85	9.75	2.0	2	2	2	2	1	19	246	0.60	13.6	8.7	D
77/ 8/ 7	1928 48.0	31- 4.58	105- 3.00	13.00	1.5	1	1	2	2	1	20	276	0.51	6.5	19.2	D
77/ 8/ 9	1687 0.3	31- 2.52	104-39.12	4.00*	1.9	2	0	2	2	2	57	301	0.19	12.0	11.5	D
77/ 8/21	301 8.2	30-33.07	105- 5.67	21.56	3.3	1	1	0	1	1	41	270	0.99	24.7	11.2	D
77/10/29	49 11.6	30-30.00	104-11.26	4.00*	1.9	2	2	2	2	2	27	195	0.77	8.8	9.8	D
77/11/ 5	1228 53.7	31- 5.09	104-58.15	8.28	1.9	1	1	1	1	1	23	260	0.75			D
78/ 1/21	117 2.4	31-30.06	104-39.15	2.46	3.2	1	1	1	0	0	68	190	0.03			C
78/ 1/24	1426 22.4	30-41.06	104-35.14	14.98	1.9	2	2	2	2	0	19	115	0.63	4.0	15.1	C
78/ 2/ 5	1419 55.8	31-30.41	104-39.15													C
78/ 2/18	1422 8.0	30-37.15	105-11.66	2.00	2.0	1	1	2	2	0	33	278	0.32	3.4	3.0	D
78/ 2/18	1422 22.1	30-39.43	105- 6.00	1.12	3.6	1	1	1	1	0	27	255	0.04			C
78/ 2/18	1429 20.3	30-37.35	105- 9.72	2.52	2.5	2	2	2	2	0	32	272	0.28	3.0	1.4	D
78/ 2/18	1529 37.0	30-36.00	105-10.82	2.80	1.9	1	1	2	2	0	35	277	0.37	6.7	5.5	D
78/ 2/18	1644 4.7	30-36.85	105-11.46	2.00	1.8	1	1	2	2	0	33	278	0.30	5.8	4.9	D
78/ 2/18	1730 8.5	30-36.84	105-11.49	0.40	2.9	2	2	2	2	0	33	278	0.31	3.2	1.6	D
78/ 2/18	1754 9.8	30-36.74	105-11.45	0.32	2.3	2	2	2	2	0	34	278	0.28	2.9	1.4	D
78/ 2/18	1845 16.5	30-37.45	105-11.92	2.00	2.1	2	2	2	2	0	33	279	0.34	6.8	5.4	D
78/ 2/19	705 18.7	30-36.89	105-11.00	2.00	1.9	2	1	2	2	0	33	277	0.32	10.2	8.9	D
78/ 2/19	1212 0.0	30-36.85	105-11.68	0.69	2.9	2	2	2	2	0	34	279	0.35	3.6	1.7	D
78/ 2/20	252 55.4	30-37.33	105-11.89	2.00	1.9	2	2	2	2	0	33	279	0.32	5.9	4.9	D
78/ 3/20	14 10.6	30-26.00	104-18.00	2.00	1.7	2	1	0	2	0	37	241	0.45	0.2	0.1	D
78/ 4/ 6	913 27.4	30-51.68	104-51.75	4.00*	2.0	2	2	2	2	0	41	287	0.15	7.1	5.3	D
78/ 4/12	2305 0.0	30-39.52	104-29.07	2.27	1.9	1	2	0	2	0	23	145	0.55	0.3	4.8	D
78/ 5/30	1319 31.7	30-39.14	104-33.77	10.70	2.2	2	0	2	2	2	35	117	0.69	3.8		D
78/ 6/ 3	1140 18.2	30-24.23	104-38.63	2.73	2.4	1	1	1	0	1	16	165	0.22	4.0	5.3	C
78/ 6/ 6	2005 0.1	30-18.00	104-35.00	18.94	2.2	1	1	1	0	1	3	150	1.02			D
78/ 7/18		30-30.00	104-33.00													D
78/ 8/28	2033 38.3	31- 1.81	104-56.74	9.26	1.7	1	2	2	1	1	19	240	0.38	11.7	7.4	D
78/ 9/ 2	716 45.3	30-40.46	104-31.85	12.52	1.2	2	2	1	2	1	21	97	0.60	3.6	27.8	C
78/ 9/29	1759 41.4	30-19.10	104-39.41	2.00	2.2	1	1	0	1	1	9	231	0.95			D
78/12/20	131 21.8	30-37.97	104-28.69	6.35	1.0	2	2	0	2	0	22	155	0.52	6.0	6.6	D
79/ 1/11	349 9.9	30-30.44	104-24.62	5.87	1.0	2	2	0	2	0	25	192	0.29	1.9	2.4	C
79/ 1/15	36 35.8	30-35.81	105-21.04	8.26	1.5	2	2	2	1	2	42	282	0.31	9.8	11.3	D
79/ 1/19	907 55.1	30-30.00	105- 7.14	2.40	1.8	2	1	1	2	2	43	249	0.29	3.2	1.8	D
79/ 2/13	1902 13.4	30-10.29	104-21.47	1.80	1.8	2	2	0	2	0	50	292	0.61	7.4	7.2	D
79/ 2/16	2350 32.5	31- 1.96	104-54.00	7.77	2.0	2	2	0	2	0	50	305	0.16	17.4	16.5	D
79/ 3/17	1949 2.4	30-39.54	104-35.02	16.53	1.1	1	1	0	2	2	17	182	0.52	9.5	16.8	D
79/ 3/24	1455 36.5	30-31.07	104-19.92	8.40	1.1	1	1	2	2	2	32	161	0.48	0.9	1.7	C
79/ 3/28	551 35.4	29-41.64	104- 2.21	2.00	1.8	2	2	0	2	1	83	319	0.15	19.5	20.3	D
79/ 3/28	1457 18.5	30-38.76	104-30.22	0.64	1.3	2	2	0	2	2	20	148	0.59	4.2	3.4	D
79/ 3/29	935 40.9	29-35.47	102-55.05	4.00*	2.5	2	2	0	2	2	160	336	0.54			D
79/ 3/29	1352 29.2	30-40.84	104-32.26	9.03	1.3	2	2	0	2	2	21	170	0.54	4.8	3.5	D
79/ 6/ 9	128 59.1	30-39.12	104-30.14	9.38	1.9	2	2	1	0	2	21	149	0.38	3.6	2.8	C

KTX,KT4,CLN

CLN

MOT, BP, CLN

CLN

KTX,KT4

