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A COMPILATION OF DATA FROM THE 1973 LONG VALLEY, CALIFORNIA, SEISMIC-REFRACTION EXPERIMENT

by

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This report is preliminary and has not been edited or reviewed for conformity with Geological Survey standards and nomenclature.

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INTRODUCTION

In May 1973 a seismic-refraction survey was carried out across the Long Valley caldera in Mono County, California, as part of the U.S. Geological Survey's multi-disciplinary investigation of this geothermal resource area (see Muffler, 1976). The principle objective of the seismic-refraction survey was to define the P-wave velocity structure of the upper 5 to 10 km of the crust as a basis for a more complete understanding of the nature and development of what has been identified as the Long Valley resurgent caldron (Smith and Bailey, 1968; Bailey and others, 1976). This report presents the basic data obtained from the survey. An interpretation of these data is presented separately (Hill, 1976).

DESCRIPTION OF THE SURVEY

The survey consisted of two profiles crossing the caldera in roughly north and east directions. Locations of shotpoints and recording units along the two profiles A-A' and B-B' are shown in Figure 1 together with the outline of the caldera floor (Bailey and others, 1975) and 10 milligal gravity contours adapted from Pakiser and others (1960) and Kane and others (1976). The profiles intersect near the center of the caldera in Little Antelope Valley, and the shotpoint ANTELOPE is common to both profiles.

Data were recorded on 10 seismic-refraction units held in fixed positions along a given profile. Individual shots along the profile were fired at half-hour intervals. Recording unit K at the ANTELOPE shotpoint and units I and T at the east edge of the caldera were held in the same locations for all shots along both profiles.

Recording units are the standard 8-channel U.S. Geological Survey seismic-refraction trucks described by Warrick and others (1961). Each unit records the output of six vertical-component seismometers in a linear array 2.5 km long together with WWV and WWVB time signals. Two horizontal-component seismometers

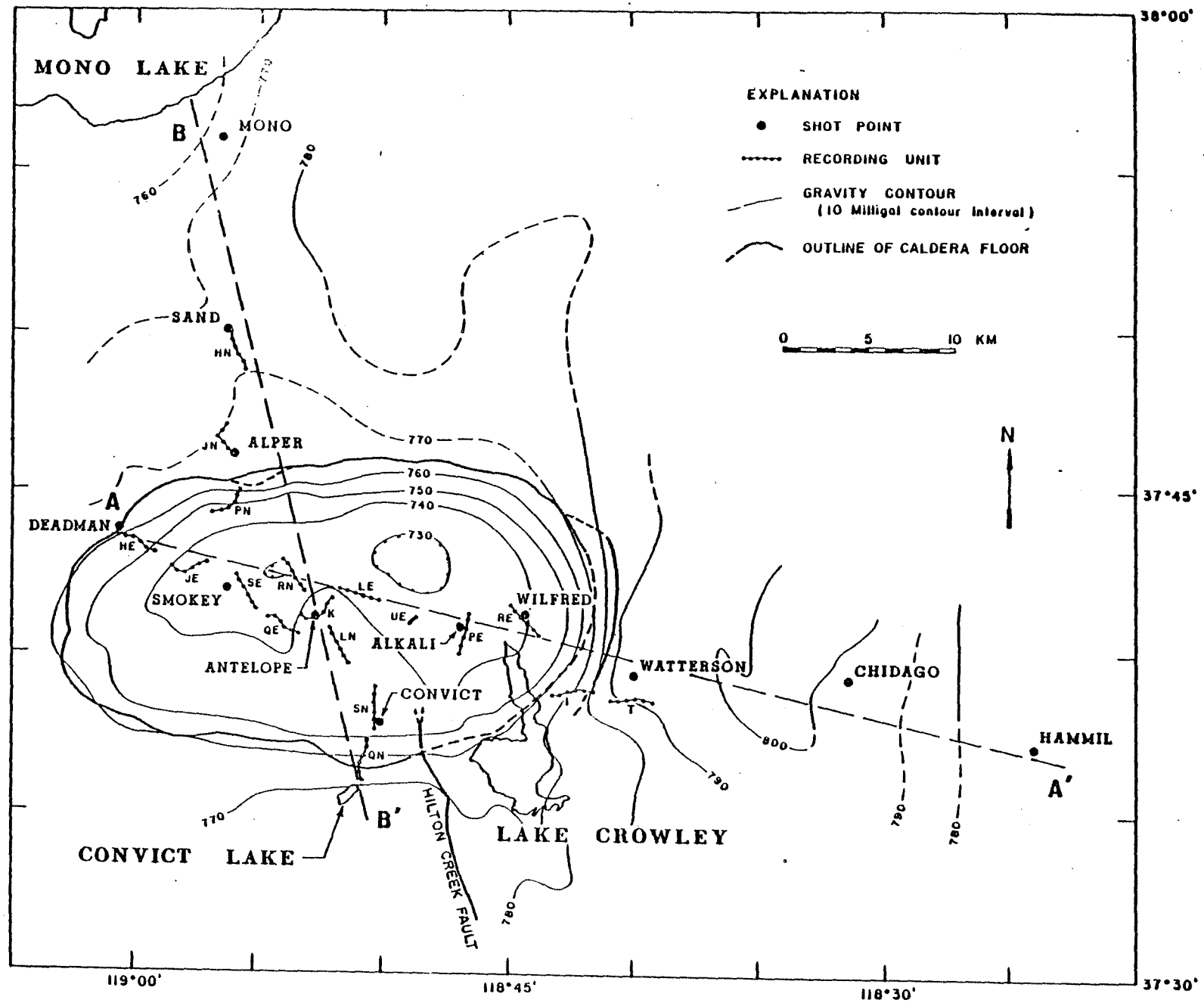

Figure 1. Location map showing shotpoints and recording units with respect to the outline of the caldera floor and 10 milligal gravity contours.

provide a three-component station at one of the vertical component sites in the array.

Shot times were determined to within ± 0.01 sec by recording the cap break and the output of an up-hole seismometer on two of the eight channels in an adjacent seismic-refraction unit or on a special three-channel shotpoint recorder. Because of an equipment malfunction, the shot time at SMOKEY could only be determined to within ± 0.5 second. The shotpoint at HAMMIL proved to be inefficient and did not produce usable first arrivals on any of the recording units.

Locations of shotpoints and recording units were determined using U.S. Geological Survey 15' quadrangle topographic maps. Coordinates were read to the nearest 0.01', and the locations are judged to be accurated to within ± 25 m. The positions of receivers within 2 km of the shotpoints were surveyed with a plane table and alidade; these relative shotpoint-receiver locations are good to within ± 1 m. Elevations of shotpoints and receivers, which were also read from the 115' topographic maps, are judged to be accurate to within ± 10 m.

PRESENTATION OF THE DATA

Shotpoint data (coordinates, elevation, shot time, and charge size) are summarized in Table 1. Coordinates, and elevations of the end points (seismometers 1 and 6) of the recording spreads for profiles A-A' and B-B' are given in Table 2a and 2b respectively. Shotpoint-receiver distances were computed from the coordinates using Richter's (1958) short-distance algorithm in a computer program. More accurate survey distances were substituted where available. These distances, together with traveltimes of the first energy from the shots along each profile are tabulated in Table 3a, b. The corresponding traveltime curves are plotted in Figures 2 and 3. The traveltime data in Table 3 and Figures 2 and 3 do not include elevation correlations.

Appendices I and II are collections of record sections for each of the shotpoints (except HAMMIL) forming profiles A-A' and B-B'. A record section for the HAMMIL shotpoint was not generated because of poor data quality. The record sections are presented in a reduced traveltime format, where the time axis, t, is related to the total traveltime, T,

$$t = T - \Delta/6.0.$$

Here Δ is the absolute value of the shotpoint-receiver distance in km and 6.0 is the reducing velocity in km/sec. The sign convention used on the distance scale is such that negative distances indicate receivers to the west of shotpoints on profile A-A; and north of shotpoints on profile B-B'.

The record sections were computer-generated from magnetic tapes on which the data recorded in analog FM mode by each seismic-refraction unit was digitized at 100 samples per second. No filters or elevation corrections have been applied to the seismograms forming the record sections in the Appendix.

TABLE 1

Profile A-A'

Shot	Lat	Long	Elevation (m)	Time hr min sec	Shot Size (lbs)
				5/30/73	
Hammil	37°36.71'	118°23.92'	1380	22 00 0.32 PDT	3600
Deadman	37°43.61'	119°00.78'	2390	22 30 0.26	1800
Chidago	37°38.93'	118°31.25'	2040	23 00 0.42	3000
Smokey	37°41.72'	118°56.29'	2320	23 30 $\pm$0.5	1200
				5/31/73	
Watterson	37°39.16'	118°38.87'	2280	00 00 0.42	1800
Antelope 2	37°40.91'	118°52.68'	2200	00 30 0.35	600
Wilfred	37°40.85'	118°44.17'	2085	01 00 0.42	600
Alkali	37°40.59'	118°46.94'	2075	01 30 0.64	600

Profile B-B'

Shot	Lat	Long	Elevation (m)	Time hr min sec	Shot Size (lbs)
				5/23/73	
Mono	37°55.86'	118°56.30'	2080	22 00 1.58 PDT	2400
Convict	37°37.58'	118°50.13'	2160	22 30 0.40	1800
Sand	37°49.75'	118°56.17'	2440	23 00 0.72	1200
Antelope 1	37°40.91	118°52.68'	2200	23 30 0.22	1200
				5/24/75	
Alper	37°45.91'	118°56.15'	2205	$00^h00^m0.36$	600

TABLE 2a

Location of Recording Units: Profile A-A'

UNIT	LAT	LONG	ELEV(M)
HE 1	37 42.91	118 59.30	2365
HE 2	37 43.03	118 59.60	2365
HE 3	37 43.24	118 59.85	2365
HE 4	37 43.32	119 0.20	2369
HE 5	37 43.40	119 0.50	2389
HE 6	37 43.49	119 0.80	2389
IE 1	37 38.55	118 41.51	2170
IE 2	37 38.52	118 41.85	2145
IE 3	37 38.59	118 42.19	2145
IE 4	37 38.61	118 42.55	2133
IE 5	37 38.61	118 42.81	2121
IE 6	37 38.43	118 43.15	2097
JE 1	37 42.52	118 57.30	2316
JE 2	37 42.42	118 57.63	2316
JE 3	37 42.25	118 57.88	2340
JE 4	37 42.27	118 58.18	2340
JE 5	37 42.34	118 58.48	2365
JE 6	37 42.55	118 58.66	2365
KE 1	37 41.30	118 52.05	2218
KE 2	37 41.38	118 52.25	2218
KE 3	37 40.36	118 52.30	2218
KE 4	37 40.78	118 52.62	2194
KE 5	37 40.87	118 52.96	2218
KE 6	37 40.90	118 53.05	2243
LE 1	37 41.00	118 50.37	2157
LE 2	37 41.13	118 50.68	2164
LE 3	37 41.20	118 50.96	2170
LE 4	37 41.23	118 51.28	2194
LE 5	37 41.21	118 51.64	2218
LE 6	37 41.05	118 51.81	2218
PE 1	37 41.06	118 46.27	2084
PE 2	37 40.82	118 46.43	2084
PE 3	37 40.59	118 46.60	2097
PE 4	37 40.33	118 46.75	2097
PE 5	37 40.05	118 46.87	2097
PE 6	37 39.80	118 46.95	2097
QE 1	37 40.37	118 53.35	2316
QE 2	37 40.46	118 53.70	2328
QE 3	37 40.51	118 54.01	2340
QE 4	37 40.65	118 54.21	2365
QE 5	37 40.90	118 54.34	2365
QE 6	37 40.87	118 54.66	2414

TABLE 2a Cont'd

UNIT	LAT	LONG	ELEV(M)
RE 1	37 40.27	118 43.85	2090
RE 2	37 40.54	118 44.07	2084
RE 3	37 40.73	118 44.34	2084
RE 4	37 40.94	118 44.55	2084
RE 5	37 41.12	118 44.80	2084
RE 6	37 41.42	118 45.08	2084
SE 1	37 41.12	118 55.18	2438
SE 2	37 41.35	118 55.35	2438
SE 3	37 41.60	118 55.47	2438
SE 4	37 41.83	118 55.60	2414
SE 5	37 42.08	118 55.73	2414
SE 6	37 42.28	118 55.85	2365
TE 1	37 38.23	118 39.26	2304
TE 2	37 38.26	118 39.53	2267
TE 3	37 38.36	118 39.84	2243
TE 4	37 38.42	118 40.18	2231
TE 5	37 38.34	118 40.45	2188
TE 6	37 38.34	118 40.75	2188

TABLE 2b

Location of Recording Units: Profile B-B'

UNIT	LAT	LONG	ELEV(M)
HN 1	37 49.74	118 56.08	2438
HN 2	37 49.43	118 56.05	2450
HN 3	37 49.15	118 55.96	2462
HN 4	37 48.92	118 55.78	2471
HN 5	37 48.69	118 55.86	2487
HN 6	37 48.46	118 56.04	2474
IN 1	37 38.55	118 41.51	2170
IN 2	37 38.52	118 41.85	2145
IN 3	37 38.59	118 42.19	2145
IN 4	37 38.61	118 42.55	2133
IN 5	37 38.51	118 42.81	2121
IN 6	37 38.43	118 43.15	2097
JN 1	37 46.72	118 56.48	2365
JN 2	37 46.52	118 56.55	2340
JN 3	37 46.51	118 56.78	2316
JN 4	37 46.36	118 56.55	2267
JN 5	37 46.16	118 56.34	2243
JN 6	37 45.92	118 56.18	2218
KN 1	37 41.24	118 52.14	2218
KN 2	37 41.02	118 52.25	2218
KN 3	37 40.85	118 52.41	2218
KN 4	37 40.82	118 52.69	2194
KN 5	37 40.90	118 53.03	2218
KN 6	37 42.00	118 53.08	2243
LN 1	37 40.48	118 52.05	2267
LN 2	37 40.23	118 51.88	2292
LN 3	37 40.00	118 51.72	2292
LN 4	37 39.74	118 51.65	2267
LN 5	37 39.49	118 51.58	2267
LN 6	37 39.31	118 51.32	2194
PN 1	37 44.94	118 55.85	2218
PN 2	37 44.71	118 55.95	2267
PN 3	37 44.46	118 56.00	2292
PN 4	37 44.35	118 56.25	2316
PN 5	37 44.31	118 56.63	2340
PN 6	37 44.15	118 56.88	2316
QN 1	37 37.27	118 50.40	2170
QN 2	37 37.05	118 50.53	2194
QN 3	37 36.81	118 50.70	2218
QN 4	37 36.64	118 50.90	2267
QN 5	37 36.40	118 50.90	2292
QN 6	37 36.15	118 51.05	2301

TABLE 2b, Cont'd

UNIT	LAT	LONG	ELEV(M)
RN 1	37 42.62	118 54.05	2316
RN 2	37 42.52	118 53.84	2316
RN 3	37 42.25	118 53.72	2316
RN 4	37 42.02	118 53.54	2292
RN 5	37 41.86	118 53.35	2267
RN 6	37 41.71	118 53.12	2243
SN 1	37 38.70	118 50.40	2157
SN 2	37 38.40	118 50.40	2170
SN 3	37 38.13	118 50.35	2170
SN 4	37 37.93	118 50.30	2157
SN 5	37 37.65	118 50.25	2157
SN 6	37 37.40	118 50.29	2157
TN 1	37 38.23	118 39.26	2304
TN 2	37 38.26	118 39.55	2267
TN 3	37 38.36	118 39.84	2243
TN 4	37 38.42	118 40.18	2231
TN 5	37 39.34	118 40.45	2188
TN 6	37 38.34	118 40.75	2188

TABLE 3a

Distances and Traveltimes: Profile A-A'

DEACMAN

UNIT	DISTANCE (KM)	TRAVEL TIME (SEC)
HE 6	0.22	0.16
HE 5	0.56	0.37
HE 4	1.01	0.53
HE 3	1.53	0.68
HE 1	2.53	1.05
JE 6	3.68	2.05
JE 5	4.11	2.26
JE 4	4.54	2.36
JE 3	4.95	2.54
JE 2	5.12	2.67
JE 1	5.50	2.87
SE 6	7.65	2.25
SE 5	7.94	2.28
SE 4	8.29	2.33
SE 3	8.64	2.36
SE 2	9.01	2.40
SE 1	9.43	2.45
QE 6	10.30	2.71
QE 5	10.71	2.77
QE 4	11.10	2.79
QE 3	11.48	2.89
QE 2	11.93	2.95
QE 1	12.46	2.99
KE 6	12.22	2.96
KE 5	12.52	2.97
KE 4	13.02	3.01
KE 3	13.48	3.08
KE 2	13.36	3.12
KE 1	13.45	3.20
LE 6	14.01	3.24
LE 5	14.15	3.28
LE 4	14.64	3.55
LE 3	15.10	3.45
LE 2	15.54	3.54
LE 1	16.04	3.62
PE 6	21.52	4.70
PE 4	21.50	4.76
PE 3	21.58	4.81
PE 2	21.71	4.87
PE 1	21.84	4.95
RE 1	23.43	5.29
RE 2	23.93	5.36
RE 3	24.36	5.40
RE 4	24.74	5.43
RE 5	25.21	5.49
RE 6	25.64	5.55
IE 6	27.63	5.75
IE 4	28.35	5.81
IE 3	28.66	5.82
IE 2	29.38	5.86
IE 1	29.84	5.92
TE 6	31.02	5.99
TE 5	31.44	6.09
TE 4	31.77	6.17
TE 3	32.28	6.22
TE 2	32.74	6.43
TE 1	33.16	6.39

SMOKEY

UNIT	DISTANCE (KM)	TRAVEL TIME (SEC)
HE 6	-7.39	2.27
HE 4	-6.47	2.16
HE 3	-5.94	2.15
HE 2	-5.48	2.08
HE 1	-4.94	2.03
JE 6	-3.81	1.69
JE 5	-3.42	1.58
JE 4	-2.97	1.50
JE 3	-2.54	1.40
JE 2	-2.36	1.30
JE 1	-2.10	1.25
SE 3	1.23	0.40
SE 2	1.54	0.28
QE 6	2.84	1.25
QE 5	3.24	1.34
QE 4	3.64	1.42
QE 3	4.03	1.51
QE 2	4.46	1.63
QE 1	4.99	1.73
KE 6	4.80	1.70
KE 5	5.10	1.75
KE 4	5.60	1.79
KE 3	6.10	1.83
LE 6	6.70	2.06
LE 5	6.90	2.14
LE 4	7.42	2.26
LE 3	7.89	2.35
LE 2	8.32	2.44
LE 1	8.80	2.51

TABLE 3a, Cont'd

ANTELOPE 2

UNIT	DISTANCE (KM)	TRAVEL TIME (SEC)
HE 6	-12.85	2.98
HE 5	-12.39	2.98
HE 4	-11.92	2.97
HE 3	-11.39	2.94
HE 2	-10.94	2.87
HE 1	-10.41	2.72
JE 6	-9.30	2.57
JE 5	-8.93	2.49
JE 4	-8.47	2.43
JE 3	-8.04	2.26
JE 2	-7.79	2.24
JE 1	-7.42	2.19
SE 6	-5.31	1.76
SE 5	-4.98	1.73
SE 4	-4.62	1.62
SE 3	-4.30	1.47
SE 2	-4.01	1.41
SE 1	-3.70	1.41
QE 6	-2.94	1.17
QE 5	-2.44	1.04
QE 4	-2.30	0.93
EQ 3	-2.09	0.85
QE 2	-1.72	0.72
QE 1	-1.40	0.60
KE 6	-0.75	0.37
KE 5	-0.45	0.26
KE 4	-0.28	0.17
KE 3	0.58	0.29
KE 2	0.67	0.39
KE 1	1.12	0.62
LE 6	1.30	0.70
LE 5	1.63	0.82
LE 4	2.14	0.95
LE 3	2.59	1.05
LE 2	2.96	1.15
LE 1	3.40	1.25
PE 6	8.67	2.50
PE 5	8.69	2.51
PE 4	8.78	2.59
PE 3	8.95	2.64
PE 2	9.19	2.70
PE 1	9.43	2.71
RE 1	11.21	3.48
RE 2	11.59	3.41
RE 3	11.95	3.38
RE 4	12.27	3.33
RE 5	12.67	3.31
RE 6	13.04	3.29
IE 6	14.75	3.45
IE 5	15.18	3.50
IE 4	15.43	3.55
IE 3	16.01	3.64
IE 2	16.53	3.67
IE 1	17.00	3.72
TE 6	18.18	3.86
TE 5	18.60	3.94
TE 4	18.95	4.02
TE 3	19.46	4.11
TE 2	19.92	4.22
TE 1	20.35	4.29

ALKALI

UNIT	DISTANCE (KM)	TRAVEL TIME (SEC)
HE 6	-21.06	4.72
HE 5	-20.60	4.81
HE 4	-20.13	4.76
HE 3	-19.60	4.72
HE 2	-19.17	4.66
HE 1	-18.67	4.60
JE 6	-17.60	4.41
JE 5	-17.27	4.34
JE 4	-16.82	4.28
JE 3	-16.37	4.11
JE 2	-16.07	4.10
JE 1	-15.64	4.06
SE 6	-13.47	3.70
SE 5	-13.21	3.71
SE 4	-12.94	3.52
SE 3	-12.68	3.51
SE 2	-12.44	3.49
SE 1	-12.15	3.48
QE 6	-11.39	3.26
QE 5	-10.89	3.21
QE 4	-10.69	3.07
QE 3	-10.40	3.00
QE 2	-9.94	2.92
QE 1	-9.43	2.80
KE 6	-9.21	2.75
KE 5	-8.92	2.69
KE 4	-8.44	2.56
KE 3	-7.88	2.49
KE 2	-7.89	2.52
KE 1	-7.70	2.49
LE 6	-7.21	2.41
LE 5	-7.00	2.37
LE 4	-6.49	2.43
LE 3	-6.02	2.10
LE 2	-5.57	1.97
LE 1	-5.10	1.89
PE 6	-1.46	0.85
PE 5	-1.00	0.54
PE 4	-0.57	0.36
PE 3	0.50	0.45
PE 2	0.86	0.68
PE 1	1.31	0.96
RE 1	3.14	1.74
RE 2	3.30	1.77
RE 3	3.57	1.89
RE 4	3.83	1.87
RE 5	4.22	1.97
RE 6	4.58	2.04
IE 6	6.86	2.44
IE 5	7.19	2.48
IE 4	7.42	2.56
IE 3	7.91	2.62
IE 2	8.41	2.64
IE 1	8.83	2.70
TE 6	10.01	2.81
TE 5	10.41	2.89
TE 4	10.72	2.96
TE 3	11.23	3.05
TE 2	11.69	3.15
TE 1	12.11	3.25

TABLE 3a, Cont'd

WILFRED

UNIT	DISTANCE (KM)	TRAVEL TIME (SEC)
HE 6	-24.92	5.50
HE 5	-24.46	5.49
HE 4	-24.00	5.48
HE 3	-23.47	5.43
HE 2	-23.05	5.40
HE 1	-22.56	5.38
JE 6	-21.53	5.13
JE 5	-21.21	5.06
JE 4	-20.76	5.00
JE 3	-20.32	4.88
JE 2	-20.00	4.83
JE 1	-19.55	4.81
SE 6	-17.37	4.40
SE 5	-17.15	4.43
SE 4	-16.90	4.28
SE 3	-16.67	4.24
SE 2	-16.46	4.21
SE 1	-16.19	4.19
QE 6	-15.45	4.03
QE 5	-14.95	3.93
QE 4	-14.77	3.84
QE 3	-14.48	3.76
QE 2	-14.03	3.66
QE 1	-13.53	3.58
KE 6	-13.26	3.49
KE 5	-12.98	3.43
KE 4	-12.51	3.32
KE 3	-11.94	3.24
KE 2	-11.92	3.26
KE 1	-11.70	3.23
LE 6	-11.24	3.18
LE 5	-11.00	3.11
LE 4	-10.48	3.05
LE 3	-10.00	3.91
LE 2	-9.58	2.96
LE 1	-9.12	2.89
PE 6	-4.52	2.04
PE 5	-4.24	1.85
PE 4	-3.91	1.78
PE 3	-3.60	1.75
PE 2	-3.32	1.61
PE 1	-3.11	1.52
RE 1	-1.70	0.76
RE 2	-1.05	0.46
RE 3	-0.58	0.20
RE 4	-0.33	0.30
RE 5	0.59	0.60
RE 6	1.17	0.96
IE 6	4.72	1.89
IE 5	4.80	1.86
IE 4	4.78	1.87
IE 2	5.10	1.89
IE 2	5.50	1.90
IE 1	5.78	1.93
TE 6	6.85	2.02
TE 5	7.18	2.10
TE 4	7.39	2.14
TE 3	7.86	2.24
TE 2	8.31	2.34
TE 1	8.70	2.41

WATTERSON

UNIT	DISTANCE (KM)	TRAVEL TIME (SEC)
SE 5	-25.37	5.62
QE 6	-23.46	4.95
QE 5	-22.98	4.83
QE 4	-22.73	4.76
QE 3	-22.40	4.67
QE 2	-21.94	4.56
QE 1	-21.41	4.48
KE 6	-21.31	4.57
KE 5	-21.01	4.50
KE 2	-20.02	4.23
KE 1	-19.85	4.21
LE 5	-19.16	4.07
LE 4	-18.65	4.02
LE 3	-18.17	3.97
LE 2	-17.75	3.93
LE 1	-17.25	3.87
RE 1	-10.04	2.65
RE 2	-9.44	2.49
RE 3	-8.97	2.40
RE 4	-8.55	2.33
RE 5	-8.06	2.27
RE 6	-7.61	2.16
IE 5	-5.92	1.56
IE 4	-5.51	1.46
IE 3	-5.00	1.33
IE 2	-4.54	1.22
IE 1	-4.04	1.09
TE 6	-3.15	0.83
TE 5	-2.78	0.75
TE 4	-2.36	0.68
TE 3	-2.06	0.54

TABLE 3a, Cont'd

CHICAGO

UNIT	DISTANCE (KM)	TRAVEL TIME (SEC)
QE 5	-33.65	6.84
QE 4	-33.62	6.75
QE 3	-33.30	6.63
QE 2	-32.84	6.51
QE 1	-32.31	6.44
KE 6	-32.18	6.64
KE 5	-31.89	6.29
KE 4	-31.40	6.39
KE 3	-30.85	6.12
KE 2	-30.87	6.08
KE 1	-30.68	6.04
LE 6	-30.19	6.02
LE 5	-29.98	5.96
LE 4	-29.46	5.91
LE 3	-28.99	5.88
LE 2	-28.57	5.83
PE 6	-22.65	4.99
PE 4	-22.65	4.91
PE 3	-22.49	4.96
PE 2	-22.30	4.93
IE 6	-17.24	3.53
IE 5	-16.73	3.45
IE 4	-16.34	3.34
IE 3	-15.81	3.25
IE 2	-15.32	3.14
IE 1	-14.82	3.04
TE 6	-13.73	2.84
TE 5	-13.29	2.77
TE 4	-12.88	2.69
TE 3	-12.39	2.63
TE 3	-11.98	2.58
TE 1	-11.57	2.49

TABLE 3b

Distances and Traveltimes: Profile B-B'

MCAC

UNIT	DISTANCE (KM)	TRAVEL TIME (SEC)
HN 1	11.33	2.60
HN 2	11.90	2.67
HN 3	12.42	2.75
HN 4	12.86	2.82
HN 5	13.26	2.91
HN 6	13.70	2.96
JN 1	16.91	3.55
JN 2	17.28	3.62
JN 3	17.31	3.62
JN 4	17.58	3.64
JN 5	17.94	3.67
JN 6	18.39	3.71
PN 1	20.21	4.23
PN 2	20.63	4.28
PN 3	21.09	4.35
PN 5	21.37	4.47
PN 6	21.68	4.57
RN 1	24.71	4.42
RN 2	24.94	5.50
RN 3	25.46	5.49
RN 5	26.92	5.53
KN 1	27.63	5.65
KN 2	27.99	5.64
KN 4	28.44	5.66
KN 5	28.19	5.71
KN 6	28.03	5.74
LN 1	29.13	5.78
LN 2	29.63	5.82
LN 3	30.10	5.89
LN 5	31.07	6.04
LN 6	31.48	6.11
SN 1	32.91	6.46
SN 2	33.44	6.50
SN 3	33.94	6.65

SAAO

UNIT	DISTANCE (KM)	TRAVEL TIME (SEC)
HN 1	0.13	0.08
HN 2	0.62	0.35
HN 3	1.15	0.48
HN 4	1.64	0.56
HN 5	2.01	0.64
HN 6	2.39	0.68
JN 1	5.62	1.45
JN 2	6.00	1.54
JN 3	6.06	1.54
JN 4	6.30	1.56
JN 5	6.65	1.59
JN 6	7.09	1.67
PN 1	8.91	1.98
PN 2	9.33	2.20
PN 3	9.79	2.13
PN 5	10.09	2.38
PN 6	10.41	2.42
RN 1	13.55	3.45
RN 2	13.81	3.44
RN 3	14.33	3.49
RN 4	14.81	3.48
RN 5	15.17	3.53
KN 1	16.74	3.60
KN 2	17.05	3.62
KN 4	17.40	3.73
KN 5	17.11	3.80
KN 6	16.93	3.80
LN 1	18.19	3.78
LN 2	18.71	3.85
LN 3	19.18	3.91
LN 5	20.14	4.04
LN 6	20.58	4.09
SN 1	22.13	4.80
SN 2	22.64	4.60
IN 1	29.89	5.88
IN 2	29.57	5.82
IN 3	29.12	5.82
IN 4	28.72	5.77
IN 5	28.59	5.78
IN 6	28.36	5.76
TN 1	32.73	6.31
TN 2	32.37	6.24
TN 3	31.93	6.18
TN 4	31.48	6.13
TN 5	31.29	6.03
TN 6	30.96	5.99

TABLE 3b, Cont'd

ALPER

UNIT	DISTANCE (KM)	TRAVEL TIME (SEC)
HN 1	-7.09	1.68
HN 2	-6.51	1.57
HN 3	-6.00	1.50
HN 4	-5.60	1.46
HN 6	-4.72	1.30
JN 1	-1.53	0.62
JN 2	-1.27	0.52
JN 3	-1.45	0.53
JN 4	-1.02	0.43
JN 5	-0.54	0.29
JN 6	-0.05	0.03
PN 1	1.85	0.63
PN 2	2.24	0.77
PN 3	2.69	0.90
PN 4	2.89	0.89
PN 5	3.04	1.06
PN 6	3.43	1.14
RN 1	6.82	2.23
RN 2	7.13	2.36
RN 3	7.65	2.36
RN 4	8.15	2.40
RN 5	8.55	2.56
RN 6	8.95	2.55
KN 6	10.22	2.70
KN 5	10.44	2.73
KN 4	10.81	2.77
KN 3	10.94	2.70
KN 2	10.61	2.74
KN 1	10.40	2.73
LN 1	11.71	2.87
LN 2	12.24	2.91
LN 3	12.72	2.98
LN 5	13.64	3.11
LN 6	14.12	3.17
SN 1	15.79	3.53
SN 2	16.26	3.58
SN 3	16.73	3.69
SN 5	17.57	3.75
IN 6	23.59	5.02
IN 5	23.91	5.05
IN 4	24.12	5.07
IN 3	24.58	5.12
IN 2	25.07	5.13
IN 1	25.46	5.15
TN 6	26.62	5.23
TN 5	26.99	5.29
TN 4	27.26	5.31
TN 3	27.74	5.43
TN 2	28.21	5.45
TN 1	28.60	5.43

ANTELOPE 1

UNIT	DISTANCE (KM)	TRAVEL TIME (SEC)
HN 1	-17.08	3.61
HN 2	-16.52	3.55
HN 3	-15.99	3.48
HN 4	-15.50	3.39
HN 5	-15.13	3.34
HN 6	-14.81	3.28
JN 1	-12.11	2.89
JN 2	-11.83	2.83
JN 3	-11.98	2.80
JN 4	-11.58	2.74
JN 5	-11.10	2.69
JN 6	-10.60	2.60
PN 1	-8.79	2.34
PN 2	-8.52	2.33
PN 3	-8.18	2.32
RN 1	-3.75	1.33
RN 2	-3.43	1.16
RN 3	-2.91	1.04
RN 4	-2.41	0.89
RN 5	-2.02	0.74
RN 6	-1.62	0.63
KN 1	-1.32	0.51
KN 2	-0.61	0.30
KN 3	0.40	0.22
KN 4	0.01	0.02
KN 6	-0.75	0.37
LN 1	1.22	0.53
LN 2	1.72	0.66
LN 3	2.20	0.77
LN 5	3.08	0.98
LN 6	3.57	1.07
SN 1	5.29	1.56
SN 2	5.73	1.60
SN 3	6.18	1.74
SN 5	7.01	1.91
CN 2	7.81	2.06
CN 3	8.12	2.09
CN 4	8.32	2.12
CN 6	9.13	2.17
IN 6	14.75	3.46
IN 5	15.18	3.49
IN 4	15.49	3.56
IN 3	16.01	3.64
IN 2	16.53	3.68
IN 1	17.00	3.69
TN 6	18.18	3.85
TN 5	18.60	3.93
TN 4	18.95	4.04
TN 2	19.92	4.21
TN 1	20.34	4.25

TABLE 3b, Cont'd

CONVICT

UNIT	DISTANCE (KM)	TRAVEL TIME (SEC)
JN 1	-19.11	4.20
JN 2	-18.84	4.11
JN 3	-18.99	4.11
JN 4	-18.58	4.01
JN 5	-18.10	3.97
JN 6	-17.60	3.97
RN 3	-10.12	2.63
RN 5	-9.62	2.50
RN 2	-8.82	2.28
KN 1	-7.47	1.99
KN 2	-7.18	1.93
KN 3	-6.83	1.94
LN 2	-5.54	1.73
LN 3	-5.05	1.61
LN 5	-4.13	1.44
LN 6	-3.65	1.33
SN 1	-1.57	0.98
SN 3	-1.07	0.56
SN 5	-0.22	0.13
CN 2	1.14	0.72
CN 3	1.65	0.90
CN 4	2.08	1.06
CN 5	2.46	1.11
CN 6	2.97	1.20

Fig 2

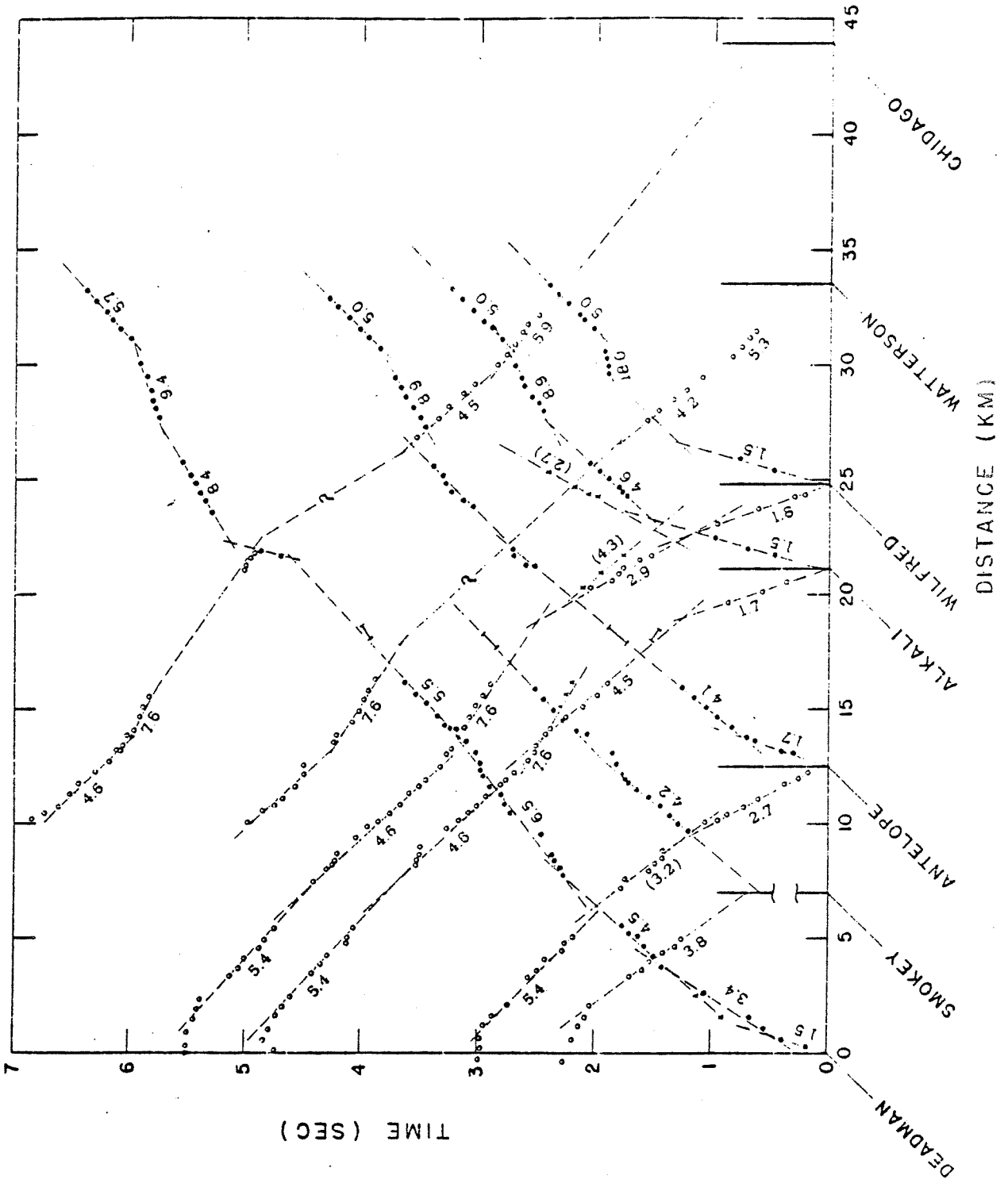

Figure 2. Traveltime curves along profile A-A'. Circles and dots are first arrivals for waves propagating to the left and right respectively. (X) and (+) are later arrivals propagating to the left and right respectively.

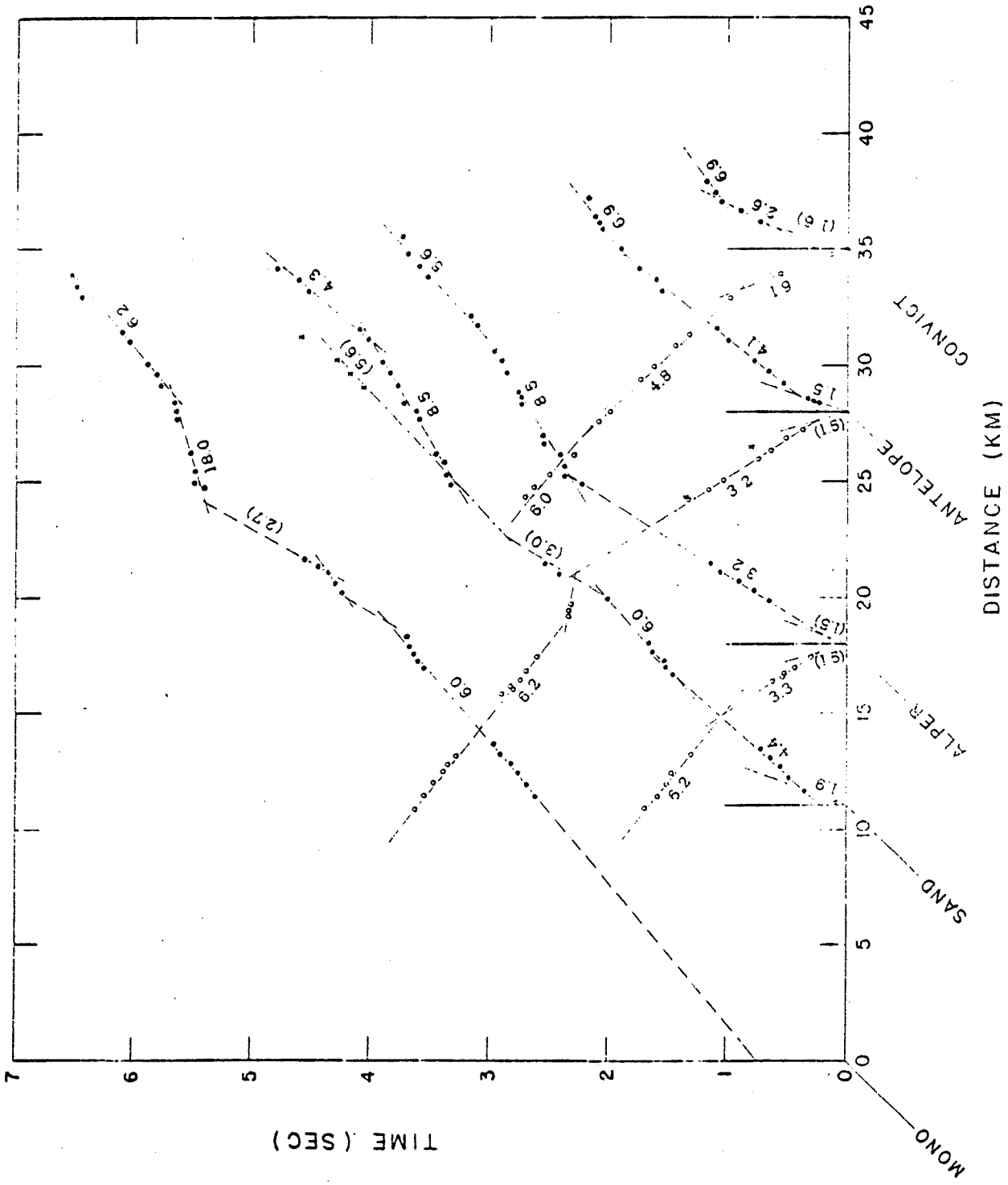

Figure 3. Traveltime curves along profile B-B'. Symbols are same as in Figure 2.

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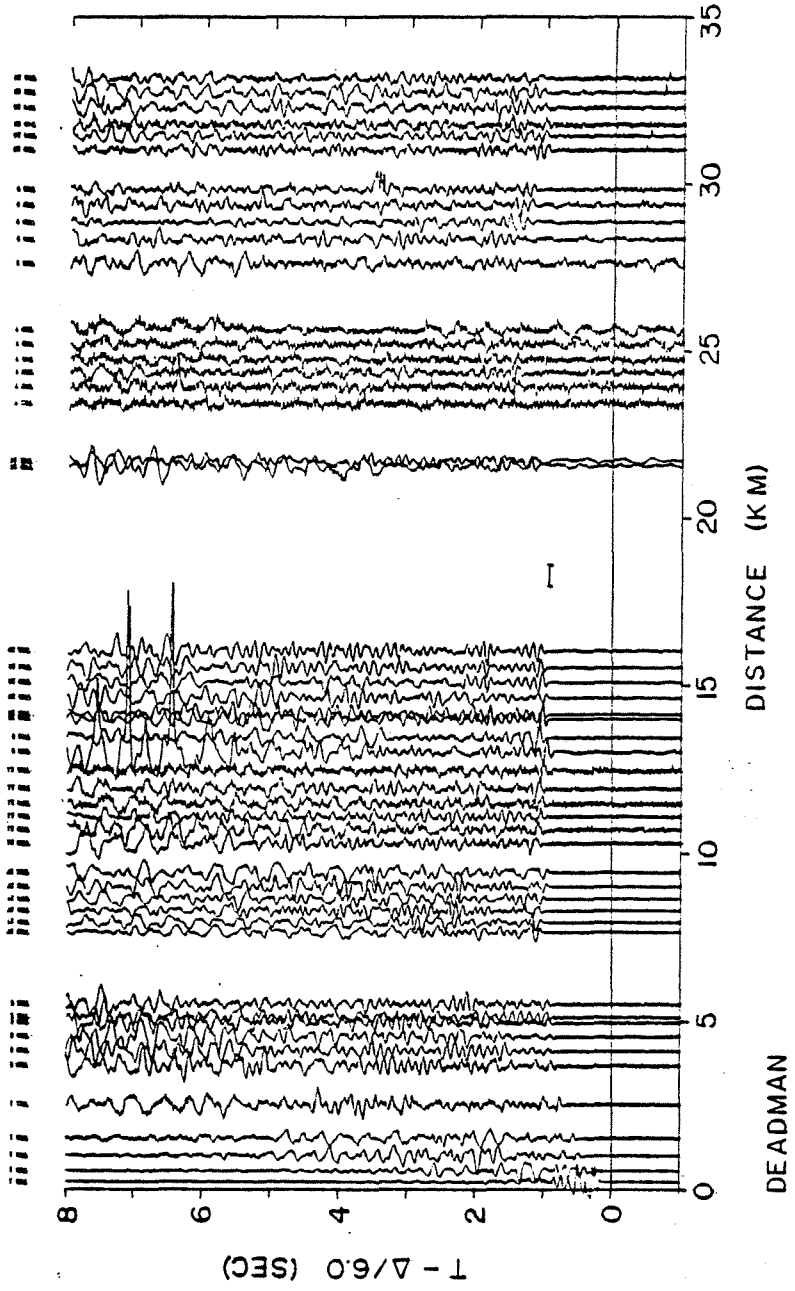
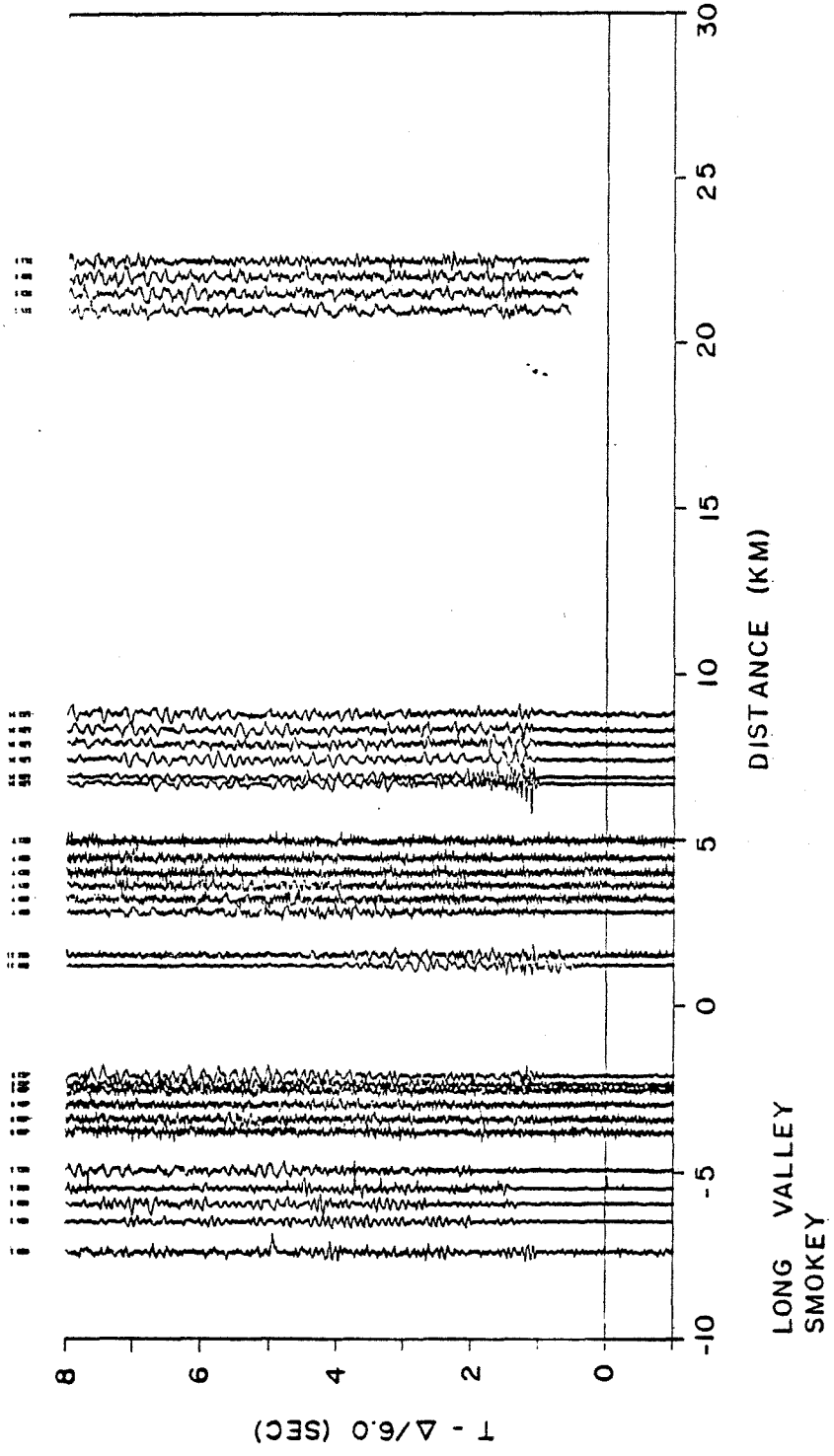
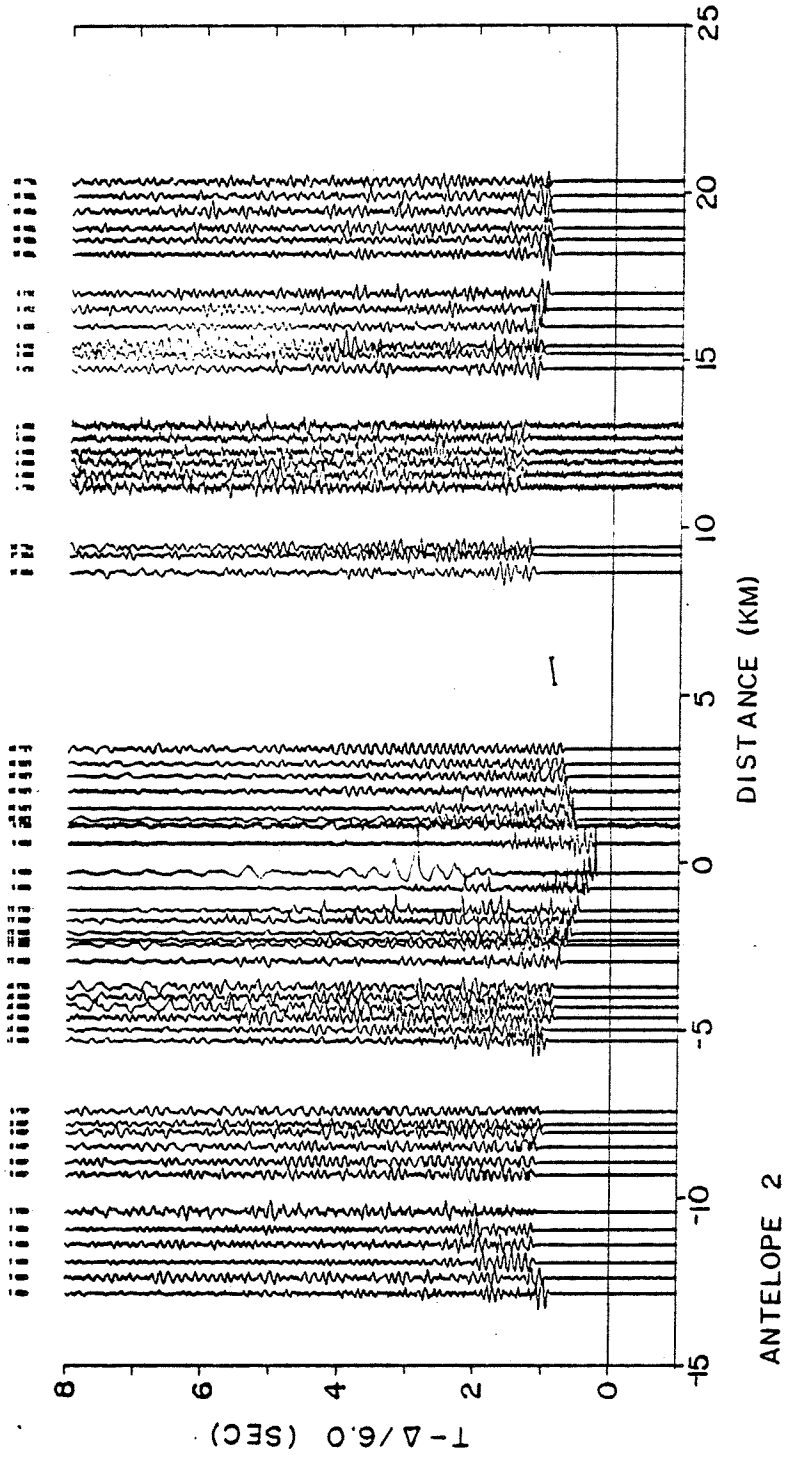
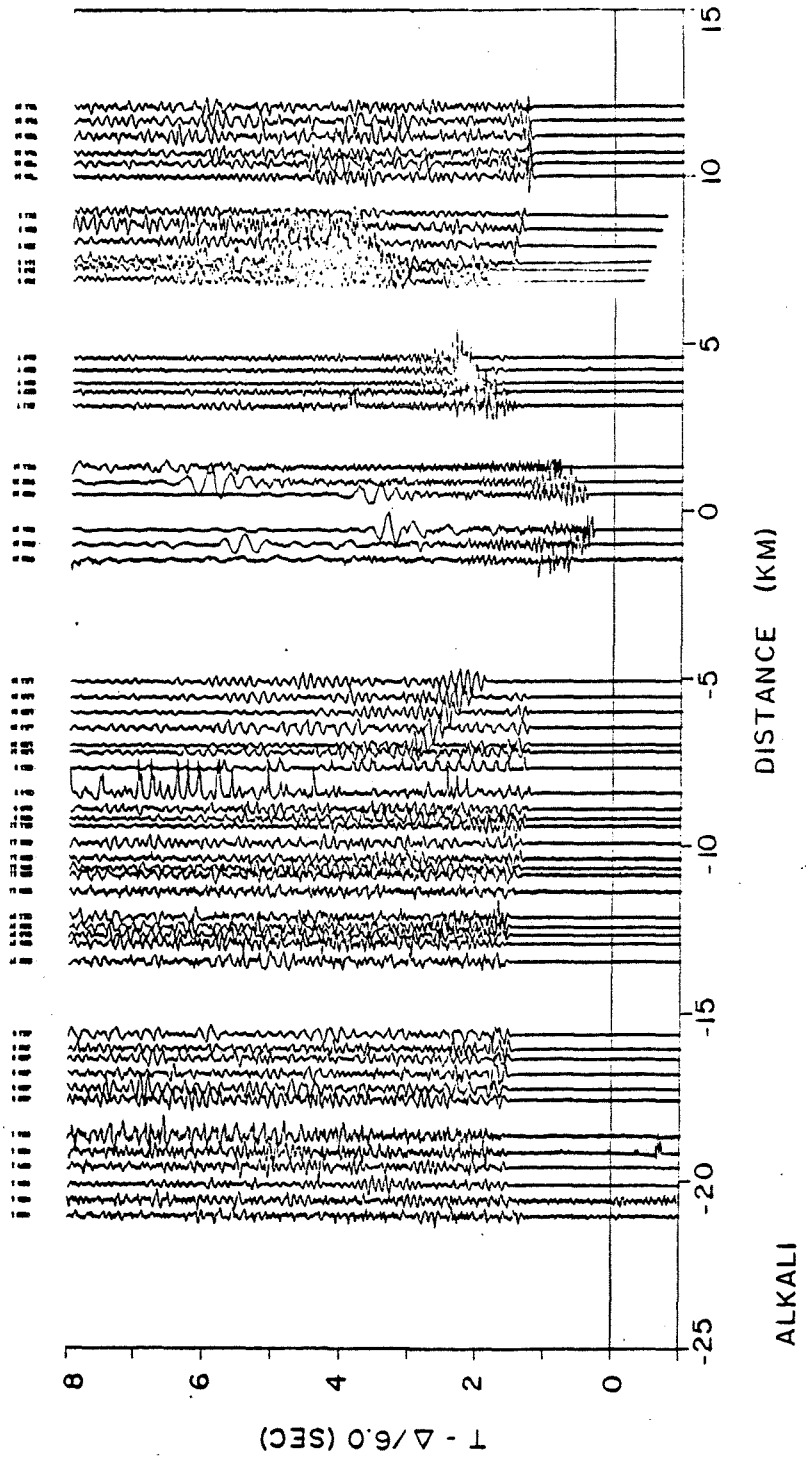
APPENDIX I

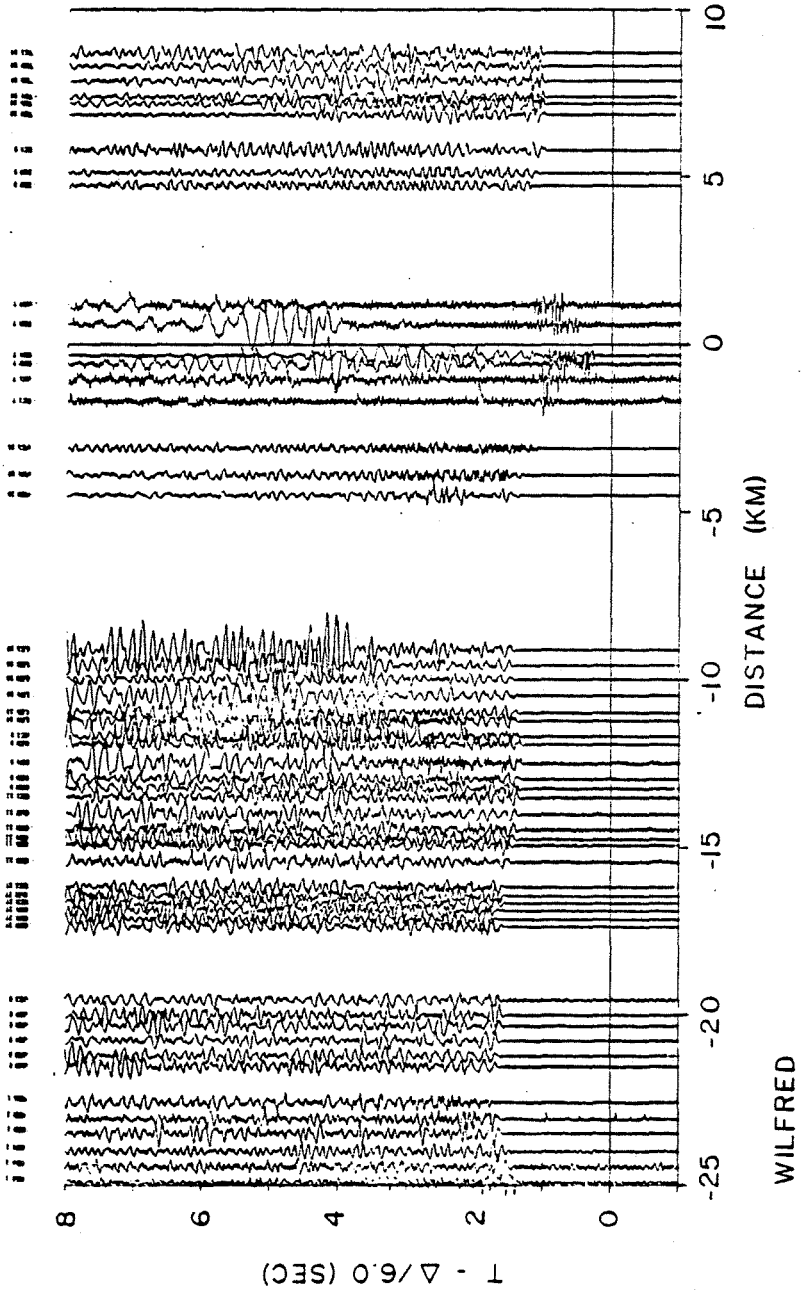
Record Sections for Profile A-A'

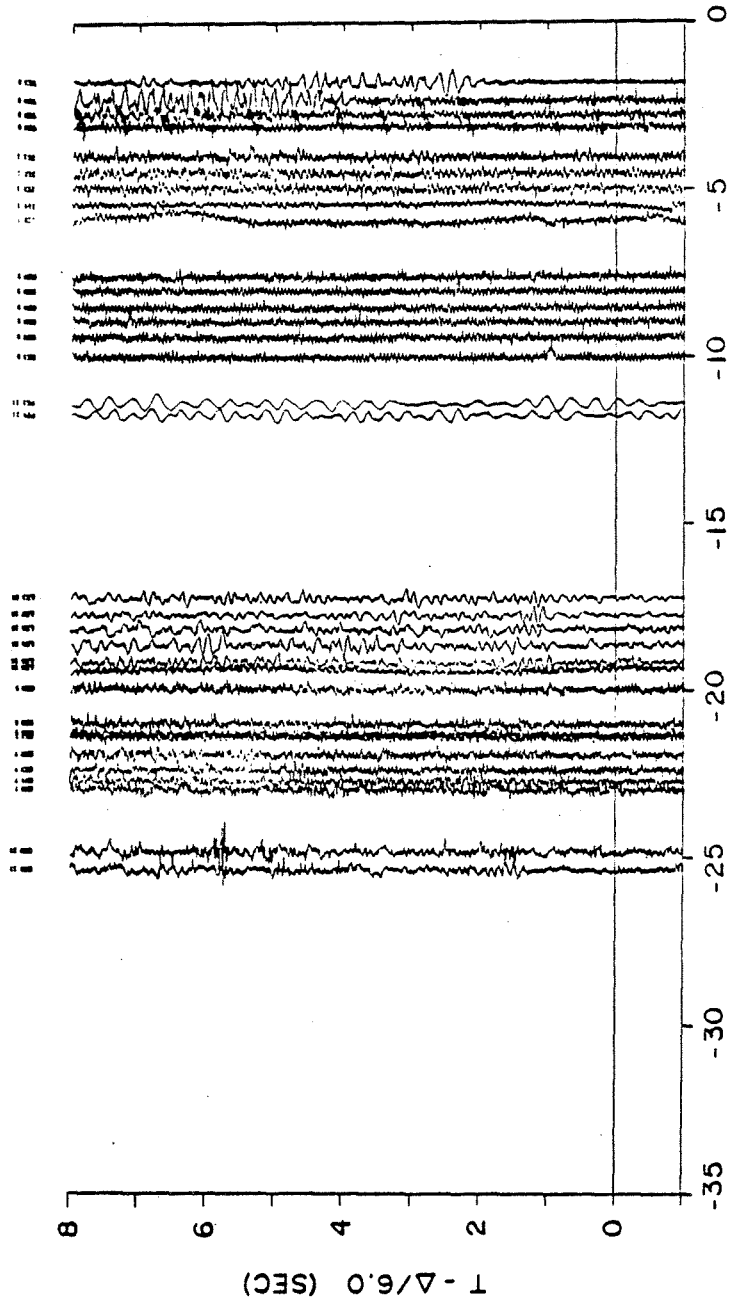

T - Δ/6.0 (SEC)
8
6
4
2
0
DISTANCE (KM)
0
5
10
15
20
25
30
35
DEADMAN

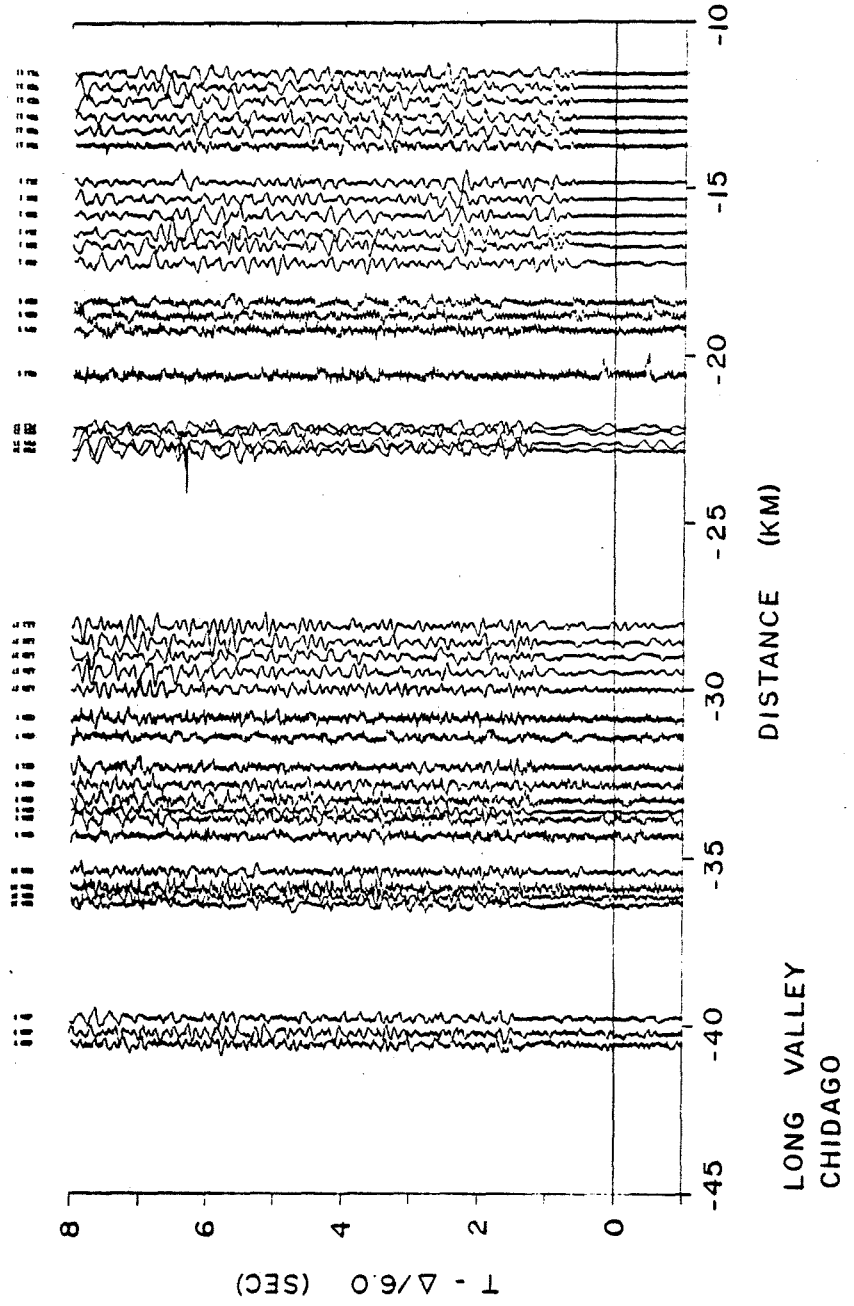

T - Δ/6.0 (SEC)
8
6
4
2
0
-10
-5
0
5
10
15
20
25
30
DISTANCE (KM)
LONG VALLEY
SMOKEY


T-Δ/6.0 (SEC)
8
6
4
2
0
-15
-10
-5
0
5
10
15
20
25
DISTANCE (KM)
ANTELOPE 2


T - Δ/6.0 (SEC)
8
6
4
2
0
DISTANCE (KM)
15
10
5
0
-5
-10
-15
-20
-25
ALKALI

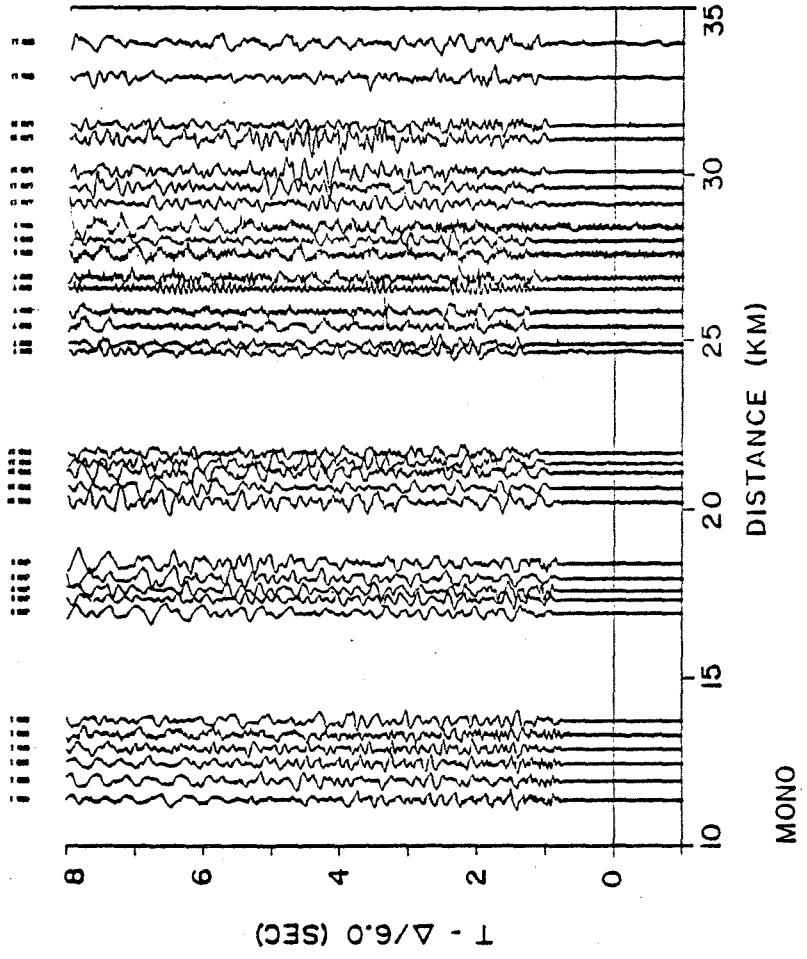


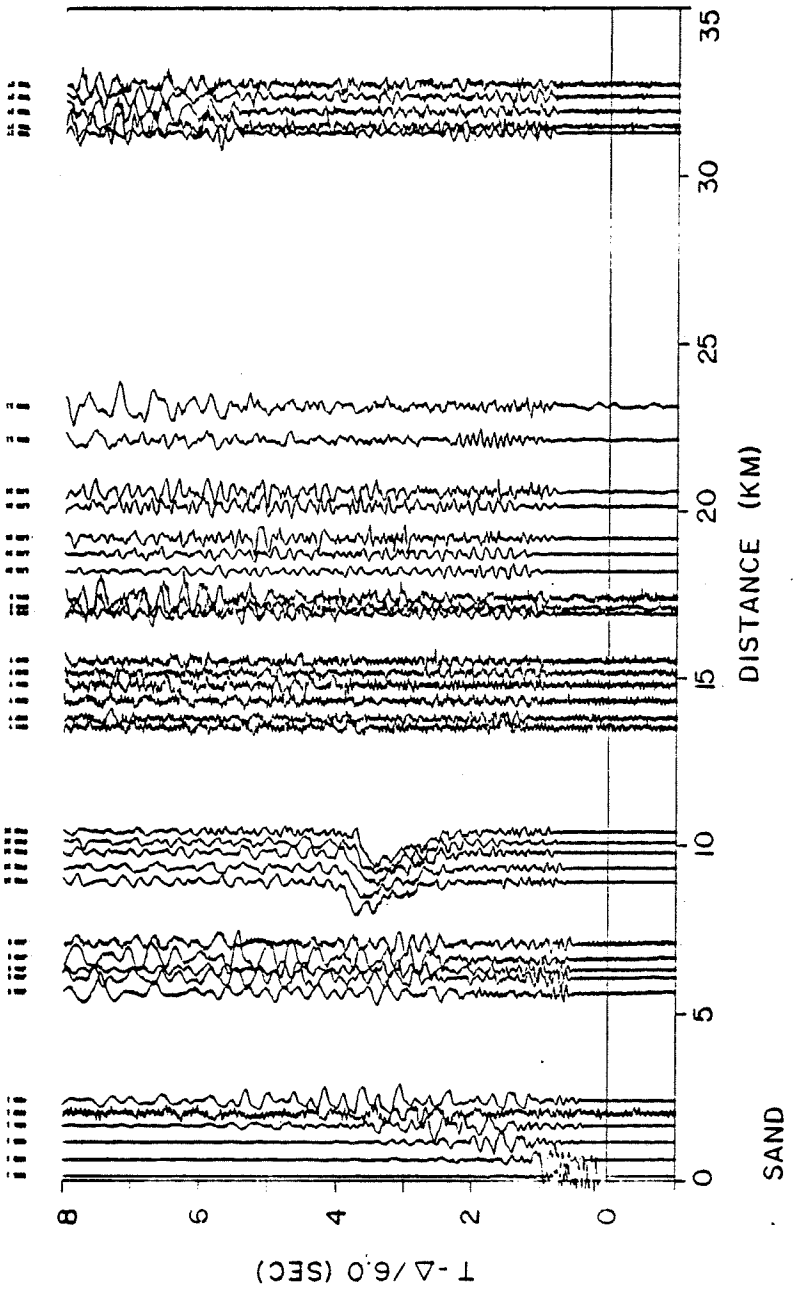

T - Δ/6.0 (SEC)
8
6
4
2
0
DISTANCE (KM)
0
-5
-10
-15
-20
-25
-30
-35
LONG VALLEY
WATTERSON

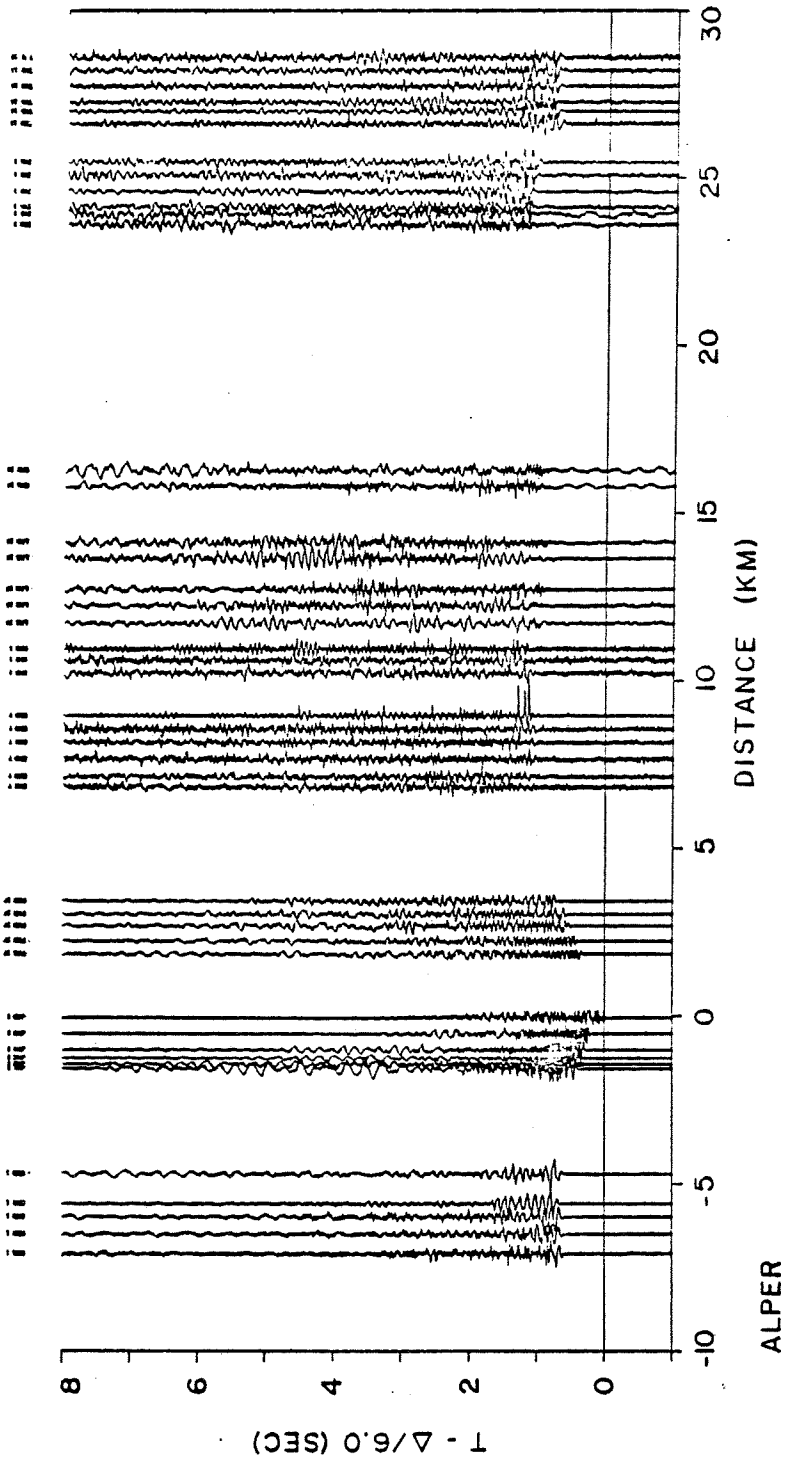

-10
-15
-20
-25
-30
-35
-40
-45
DISTANCE (KM)
LONG VALLEY
CHIDAGO
8
6
4
2
0
T - Δ/6.0 (SEC)

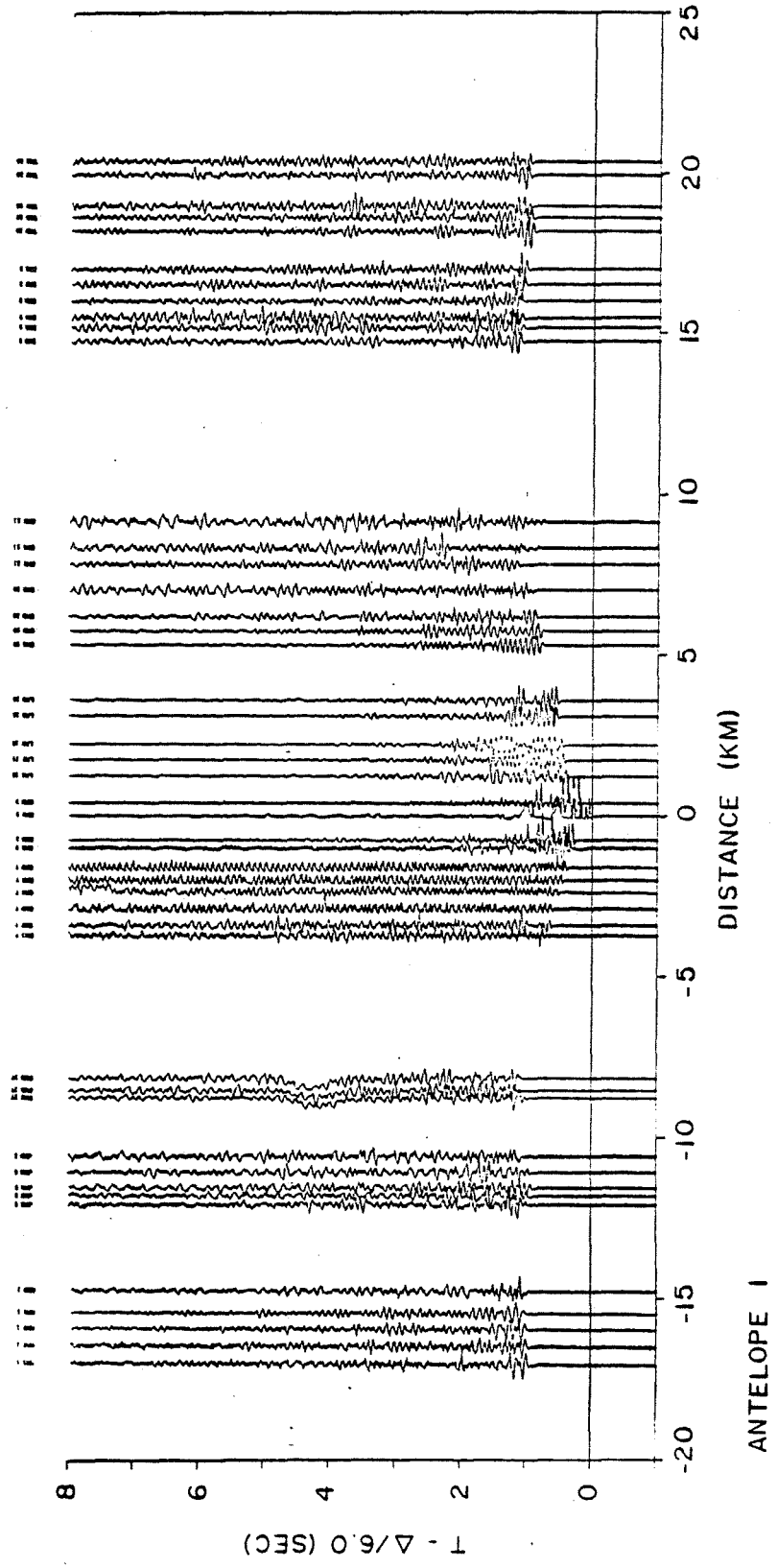
APPENDIX II

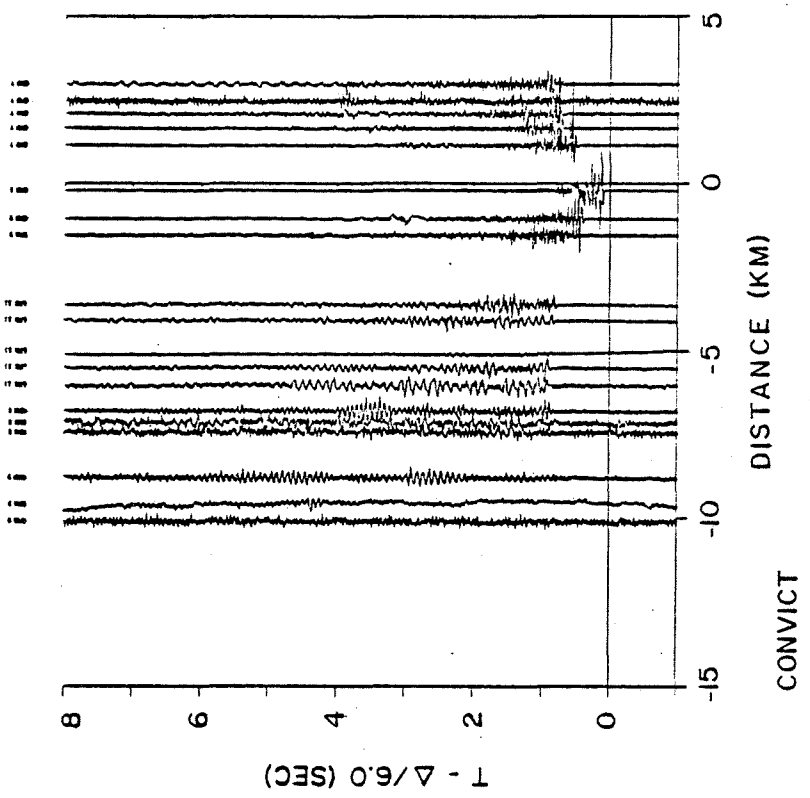
Record Sections for Profile B-B'


T - Δ/6.0 (SEC)
8
6
4
2
0
10
15
20
25
30
35
DISTANCE (KM)
MONO


T-Δ/6.0 (SEC)
8
6
4
2
0
0
5
10
15
20
25
30
35
DISTANCE (KM)
SAND


ALPER
DISTANCE (KM)
30
25
20
15
10
5
0
-5
-10
T - Δ/6.0 (SEC)
8
6
4
2
0


ANTELOPE I
DISTANCE (KM)
25
20
15
10
5
0
-5
-10
-15
-20
8
6
4
2
0
T - Δ/6.0 (SEC)


T - Δ/6.0 (SEC)
8
6
4
2
0
DISTANCE (KM)
5
0
-5
-10
-15
CONVICT