UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

DATA REPORT FOR THE 1983 U.S. GEOLOGICAL SURVEY EAST-CENTRAL OREGON SEISMIC REFRACTION EXPERIMENT

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INTRODUCTION

In October of 1983, the U.S. Geological Survey conducted a long-range seismic refraction survey across east-central Oregon . A single east-west profile as recorded from the eastern High Cascades across Newberry Crater to the eastern High Lava Plains. The purpose of the investigation was to determine the sub-volcanic crustal and upper mantle velocity structure of Newberry Volcano and the surrounding region. East-central Oregon is of great geologic interest, as it includes the arc-to-back-arc transition zone between two major geologic provinces; the actively extending Basin and Range and the volcanic Cascade mountains. Furthermore, this area marks the southernmost terminus of the Columbia Plateau, the third largest continental flood basalt province on Earth, and an area in which similiar data has been acquired (Cotton and Catchings, 1988).

Included in this report are record sections (Figures 4- 12), lists of shot times, recorder and shotpoint locations (Table 1), data files and a tape grade scale (Appendix A & Appendix B). The data from this experiment have been archived at the National Oceanic and Atmospheric Adminstration (N.O.A.A.). Tapes may be obtained at the

National Geophysical Data Center
National Oceanic and Atmospheric Adminstration
325 Broadway
Boulder, CO., 80303

Appendix C contains a description of the tape formats. An interpretation of the data has been published in a report by Catchings and Mooney (1988).

DESCRIPTION OF SURVEY

The 1983 east-central Oregon profile consisted of a 180-km-long transect which originated in the High Cascades roughly 30 km west of Newberry Volcano and trended east across the High Lava Plains (Figure 1). The transect was recorded in two deployments: the Newberry deployment (the western half of the profile) which extended from Wickiup Dam, Oregon to Riley, Oregon and the Brothers Fault Zone deployment (the eastern half of the profile) which extended from the Riley, Oregon to Harney, Oregon. Each deployment consisted of 120 seismic cassette recorders (SCR), but the field parameters varied significantly for each deployment. Five seperate shotpoints, spaced approximately 15 km apart(1, 2, 3, 4, 5, and the offset shotpoint #6), were situated along the 60-km long-Newberry deployment. SCR's were spaced at approximately 0.5 km intervals. These parameters were used in order to provide higher resolution of the subsurface beneath the Newberry Volcano. Three shotpoints, spaced approximately 60 km apart (shotpoints 1, 5, and 6), were recorded along the Brothers Fault Zone deployment with SCR's spaced at approximately 1.3 km intervals. These parameters for the Brothers Fault Zone deployment were utilized in order to provide deeper, large-scale crustal data.

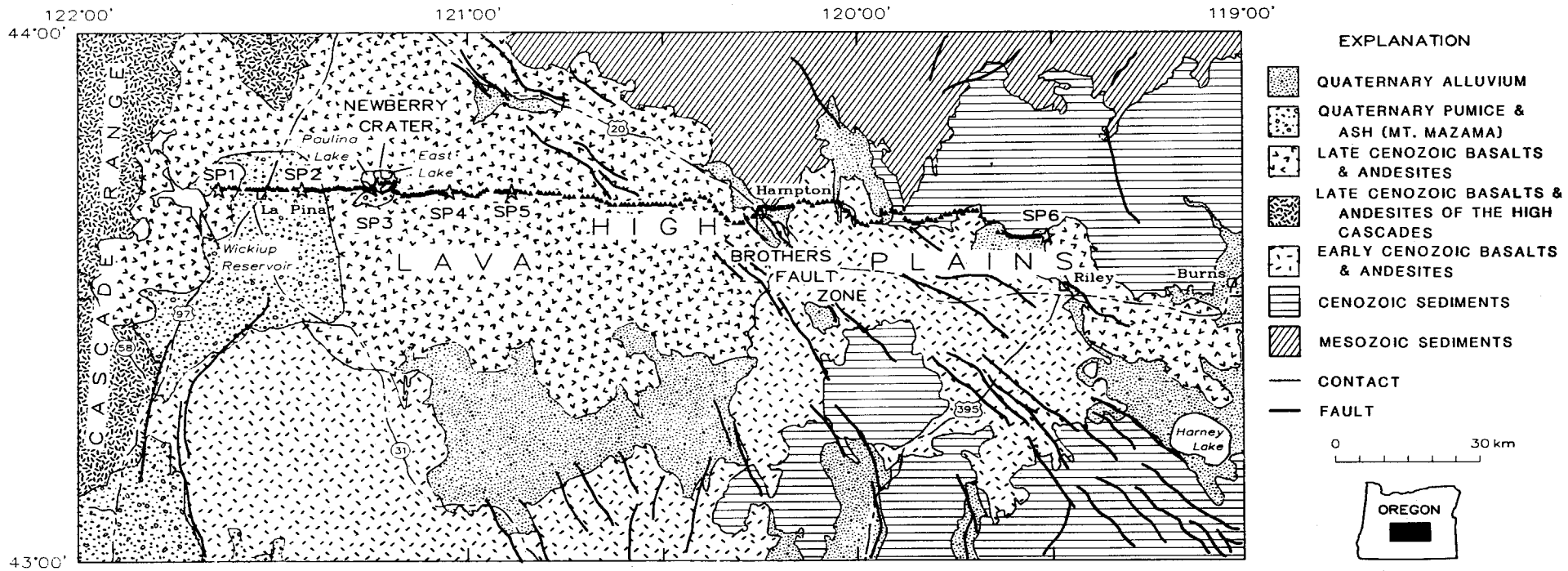

Figure 1: Geologic/ Location map of the 1983 east–central Oregon seismic refraction transect.

Sources were generated from a total of ten (See Table 1) 900-to 2000-kg explosions located at six different shotpoints . Explosions were detonated in 20-cm diameter drillholes ranging in depth from 40 to 60 meters. The drillholes were loaded with ammonium nitrate explosives, boosters, and detonation cord and tamped with approximately 20 meters of gravel. Explosions were detonated with an automated shooting system described by Healy et al. (1982). A signal from a reference chronometer triggered the shooting system by igniting an electrical blasting cap. The cap break, and two time-code signals, WWVB and IRIG E, were recorded on paper strip charts from which origin times were subsequently determined. Assuming explosions and cap break were instantaneous, shot times were maintained to within an accuracy of $\pm$ 2 milliseconds.

Recorder locations, shotpoint locations, and elevations, were determined from USGS orthophotos (1:24000) and topographic maps (1:24000 and 1:62500) and are estimated to be accurate to within 20 meters. Locations were checked using Brunton compass readings, precision odometers, and vehicle odometers.

Information pertaining to shot location and reference time can be found in Table 1 .

INSTRUMENTATION AND DATA REDUCTION

Seismic Recorders

The USGS seismic cassette recorders consist of an analog cassette tape recorder and a vertical-component, 2-Hz geophone (Figure 2). The seismic signal recieved by the geophone is diverted through three parrell amplifiers, each with an adjustable gain setting (0 to 104 db). The three amplified seismic signals, a constant reference frequency (FSK), and an internally generated time code (IRIG E) are recorded as a multiplexed signal in analog form on a 30-minute cassette tape. Each recorder contains a time code generator and memory circuitry which allows pre-programming of ten seperate time windows.

Prior to the recording of seismic data, a micro-processor within each recorder performs a geophone release test, an amplification step test, and then records a calibration sequence consisting of 10-Hz sine waves with amplitudes of 1, 10 , 100, and 1000 microvolts. The system measures velocity with a frequency response that peaks at 6 Hz and sharply rolls off beyond 20 Hz, avoiding 60 Hz contamination (Figure 3). The tests are recorded on cassette tapes and can be referenced during processing to evaluate the performance quality of the seismic recording system.

Data Reduction

Information pertaining to the perfomance of each SCR was recorded on field data sheets (Appendix B). Chronometer corrections were determine for each record assuming a linear drift rate. Twenty seconds of seismic data were then converted from analog to digital format at a sampling rate of 2 milliseconds. Digitization began at :

$$T = \text{SHOT TIME} - 2 \text{ SECONDS} + X / 6.0 \text{ km/s}$$

where X is the distance in kilometers from the shotpoint to the recorder in question. Following the digitization process, each trace was evaluated and assigned a tape grade (Appendix A).

Seismic record sections (Figures 4-12) are plotted with all traces normalized to a common amplitude and with a standard reduction velocity of 6.0 km/s. Sections are presented using variable area shading at 65 % pulse width.

ACKNOWLEDGEMENTS

We wish to express our appreciation to U. S. Geological Survey's Geothermal Program for providing funding for the acquisition of these data. The efforts of Walter Mooney and the U.S. Geological Survey's seismic refraction field crew, Bob Colburn, Coyn Criley, Ed Criley, Phil Dawson, Wendy Grant, Ron Kaderabik, Will Kohler, Nan Scott-McGregor, Pat Meador, Janice Murphy, Thomas Reed, John Van Shack, Moses Smith, Vicki Sutton, and Al Walter are greatly appreciated.

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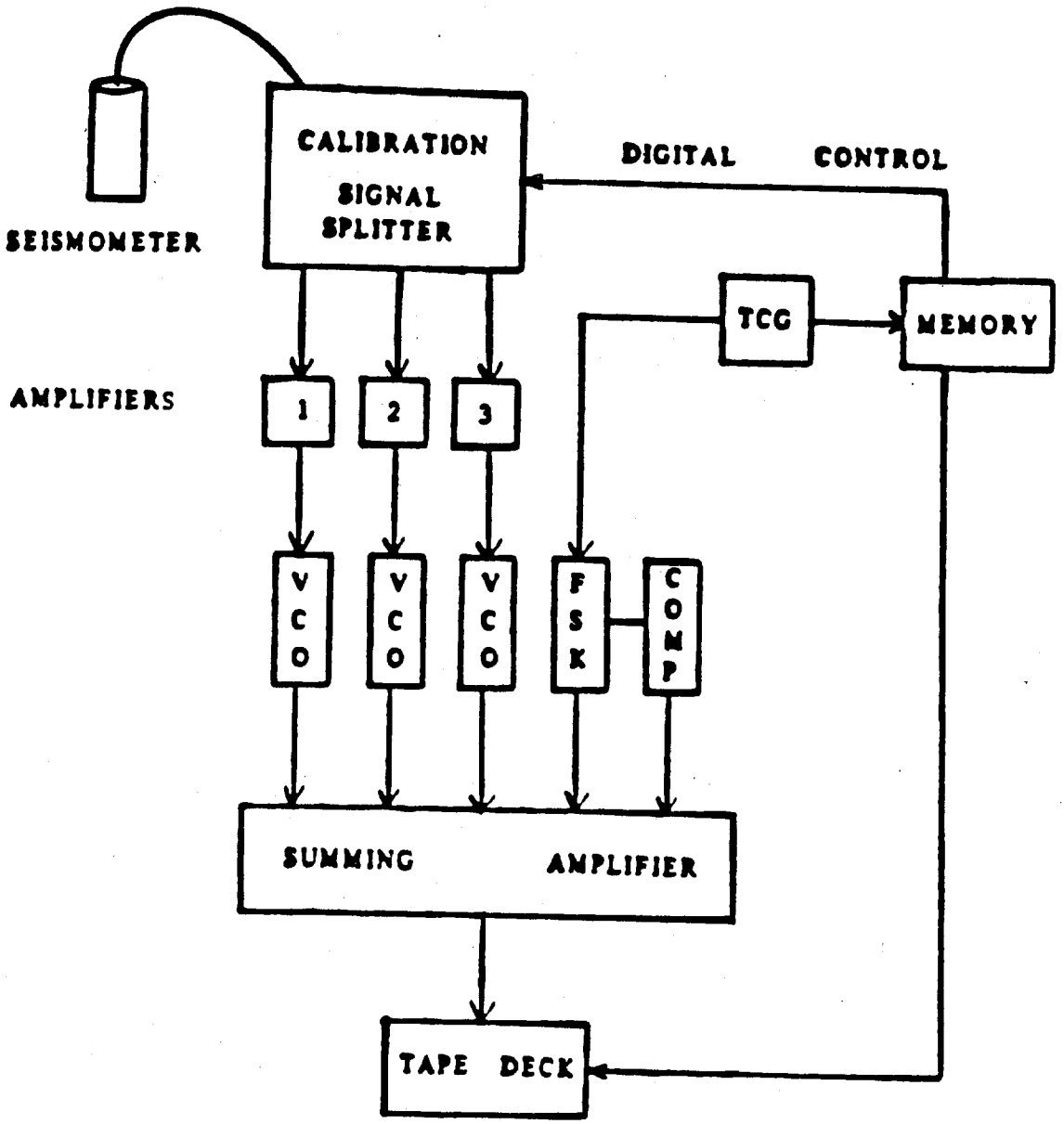


Figure 2. Schematic diagram of USGS seismic cassette recorders (from Healy et al., 1982, Figure 13).

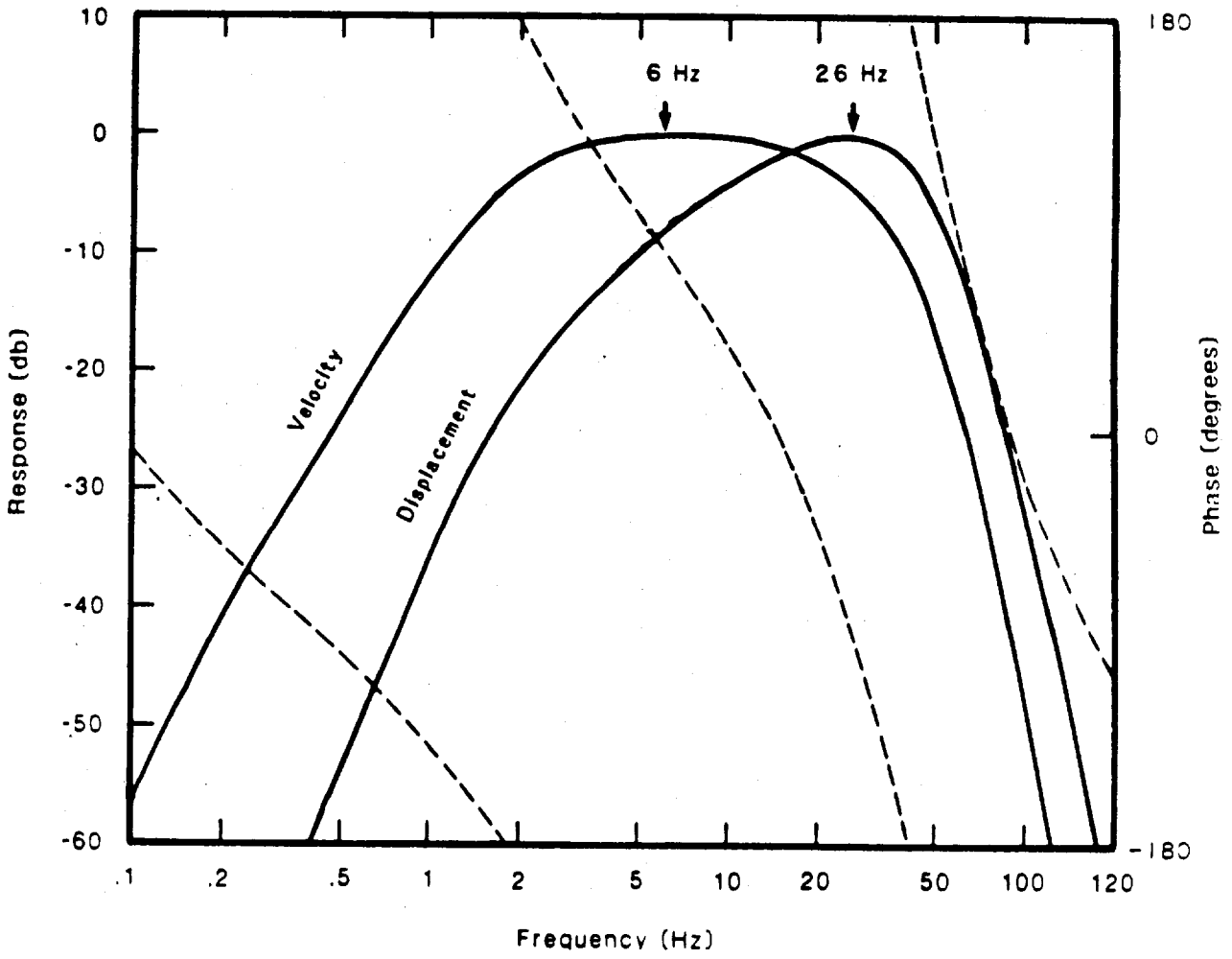


Figure 3. Theoretical transfer-function curves for the USGS short-period seismic refraction system. Solid line: displacement and velocity normalized amplitude; dashed line: phase (displacement). Maximum velocity response is at 6 Hz; maximum displacement response is at 26 Hz (from Dawson and Stauber, 1986, Figure 3).

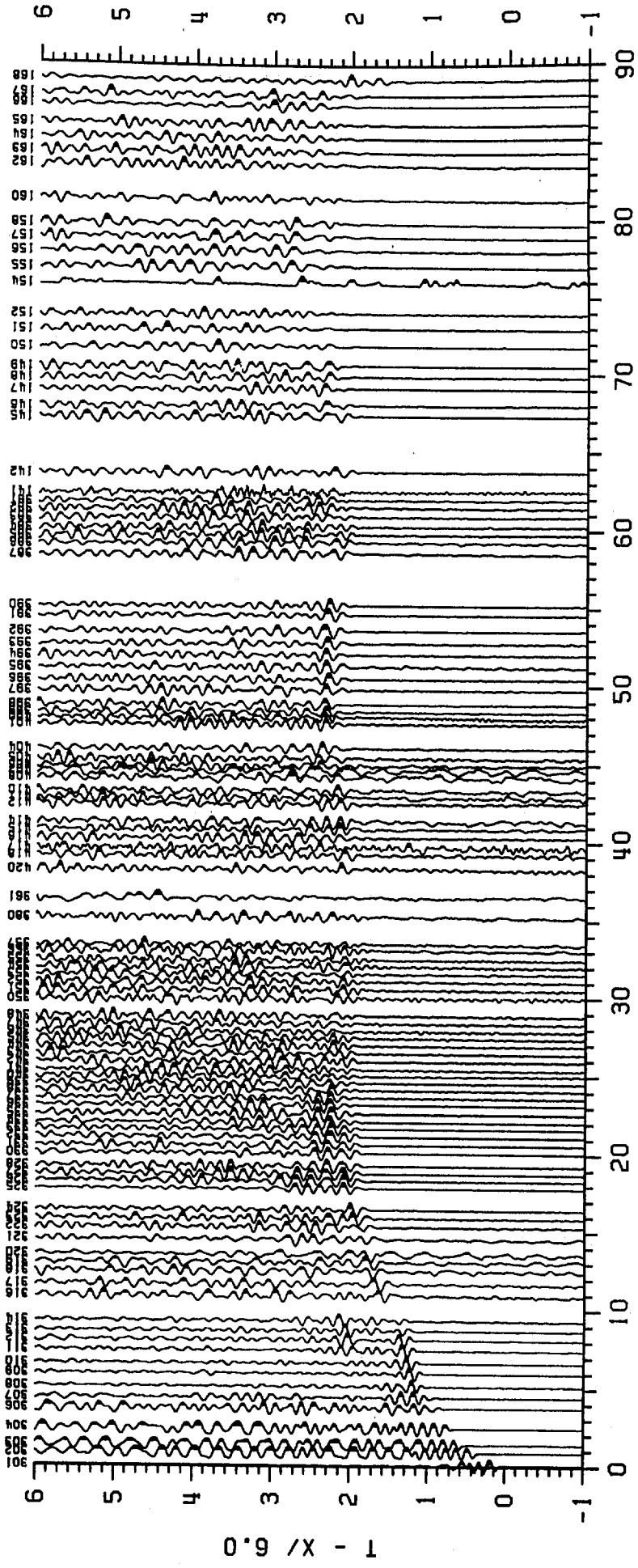
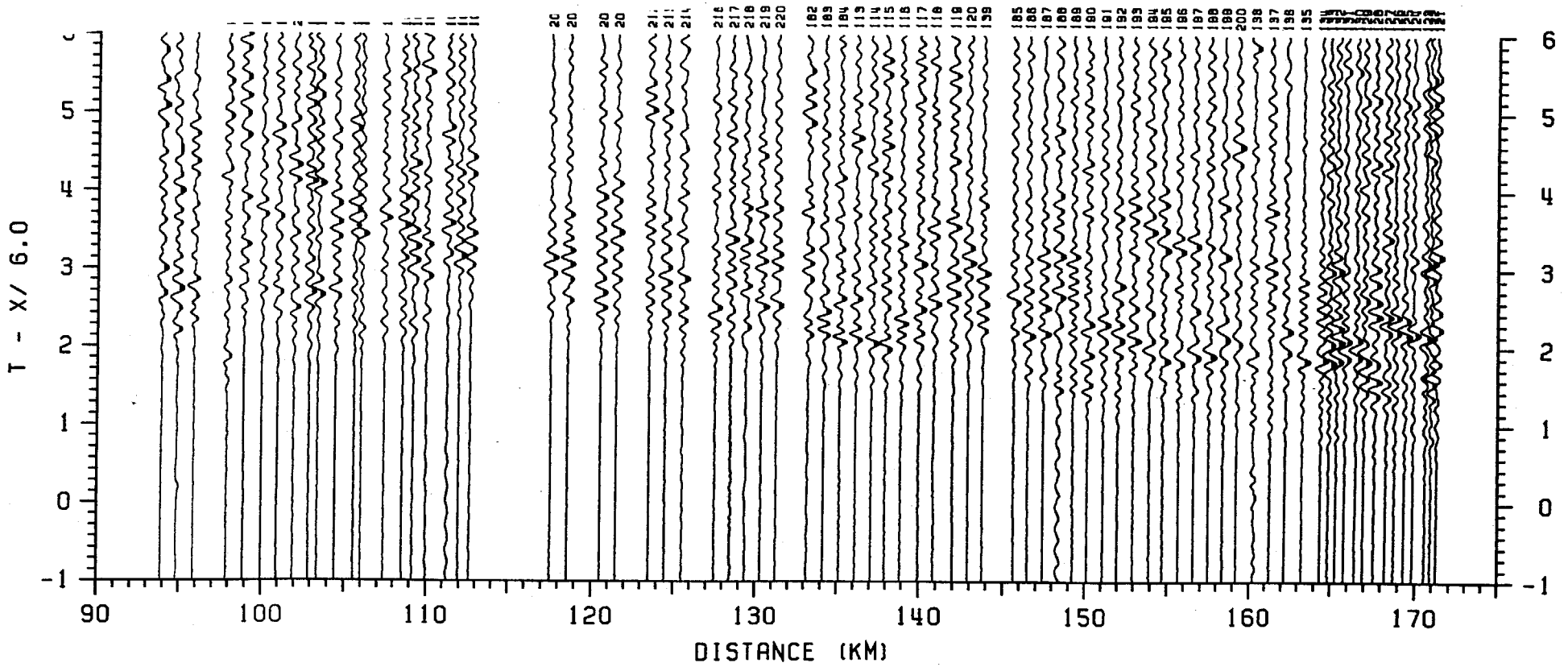


FIGURE 4:RECORD SECTION FROM THE 1983 EAST-CENTRAL OREGON SEISMIC SURVEY



SHOTPOINT 1B, SHOTS 3 & 10

FIGURE 5 : RECORD SECTION FROM THE 1983 EAST-CENTRAL OREGON SEISMIC SURVEY

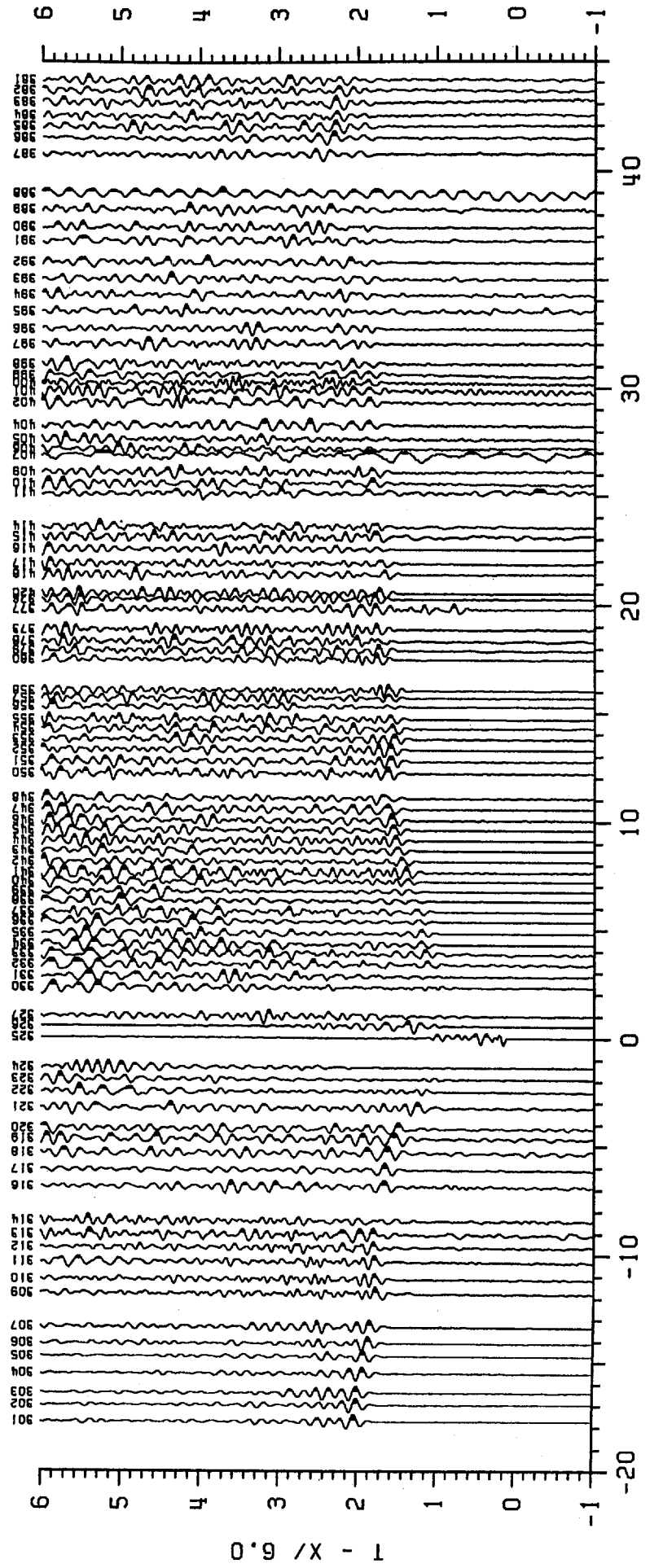


FIGURE 6 :RECORD SECTION FROM THE 1983 EAST-CENTRAL OREGON SEISMIC SURVEY

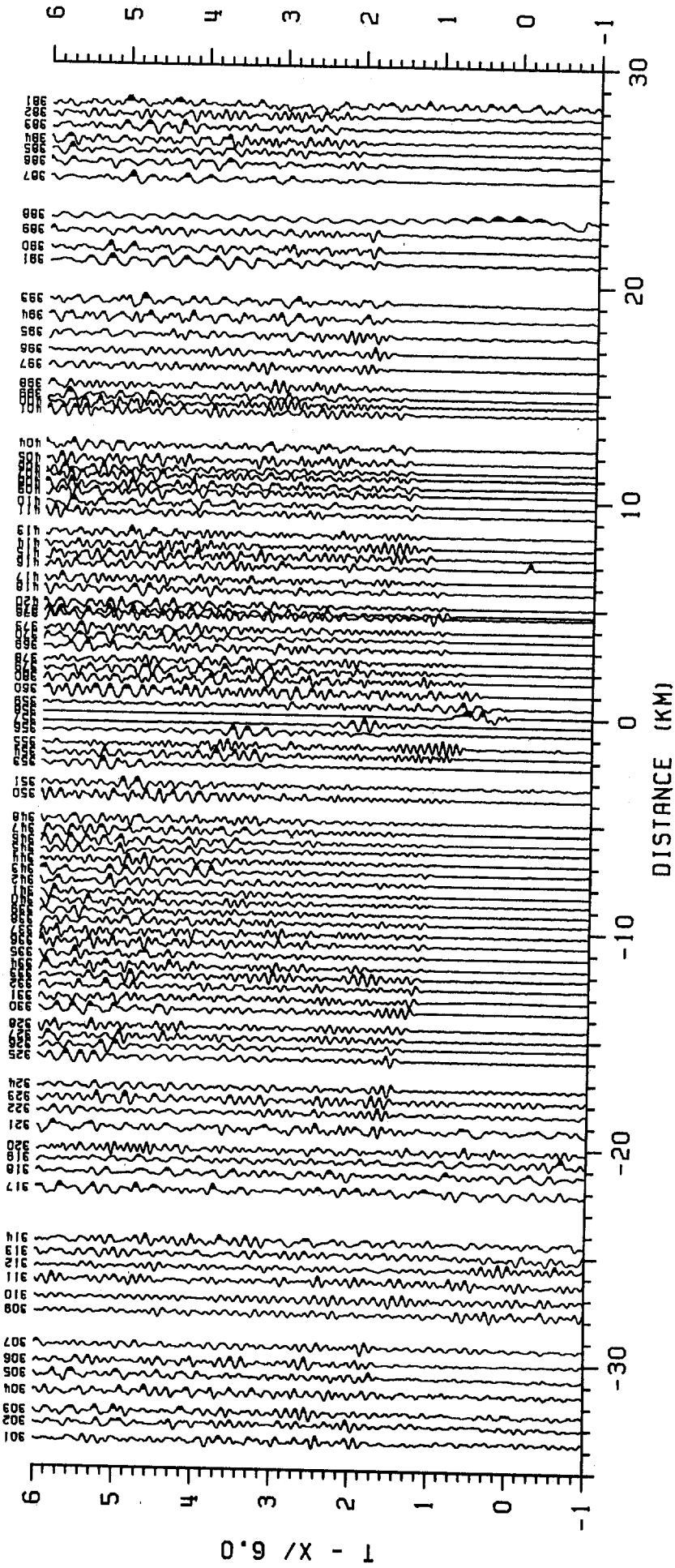


FIGURE 7 : RECORD SECTION FROM THE 1983 EAST-CENTRAL OREGON SEISMIC SURVEY

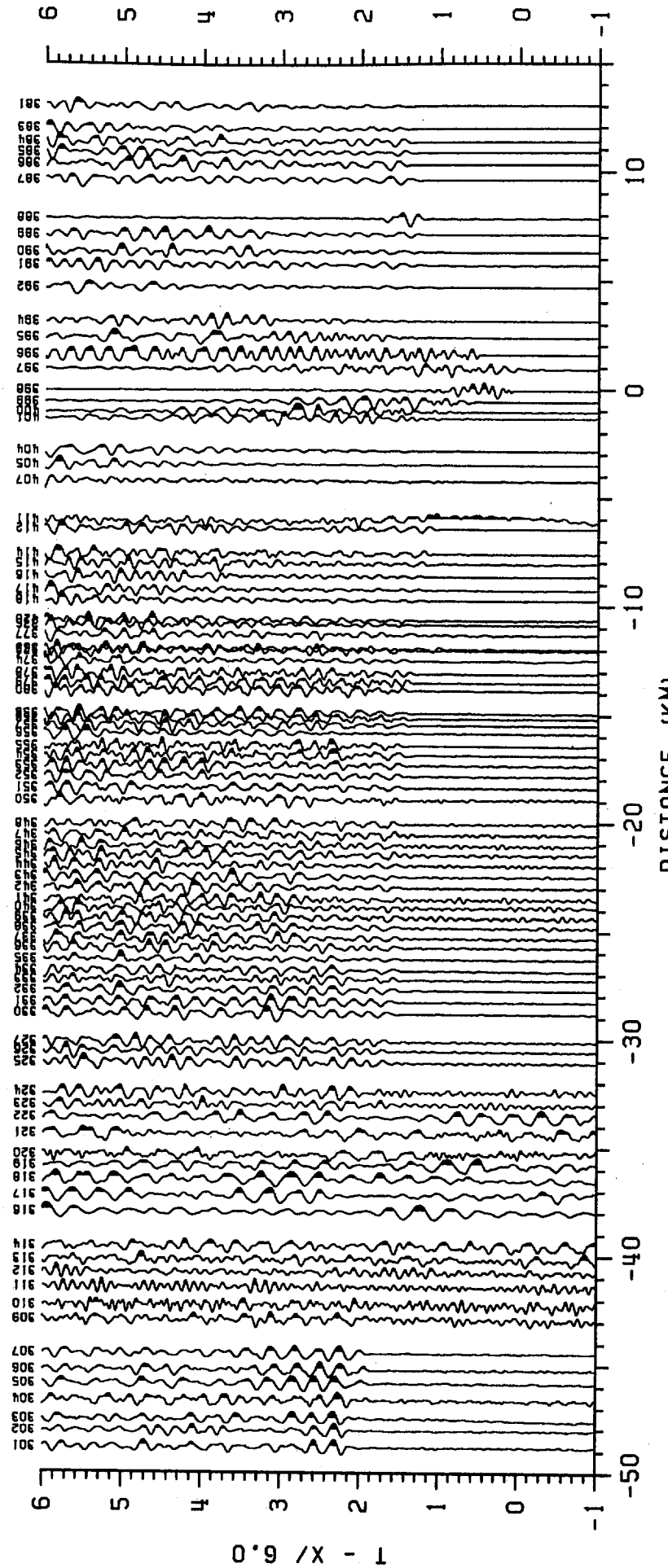


FIGURE 8: RECORD SECTION FROM THE 1983 EAST-CENTRAL OREGON SEISMIC SURVEY

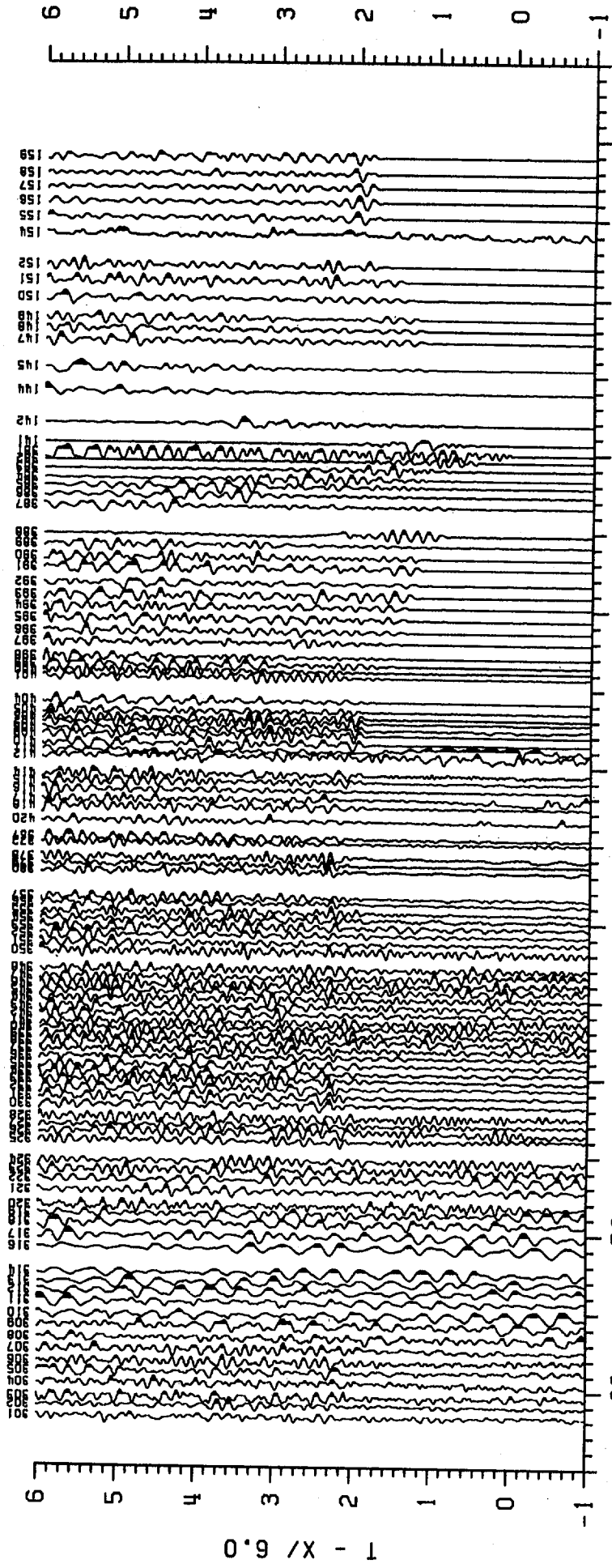


FIGURE 9 :RECORD SECTION FROM THE 1983 EAST-CENTRAL OREGON SEISMIC SURVEY

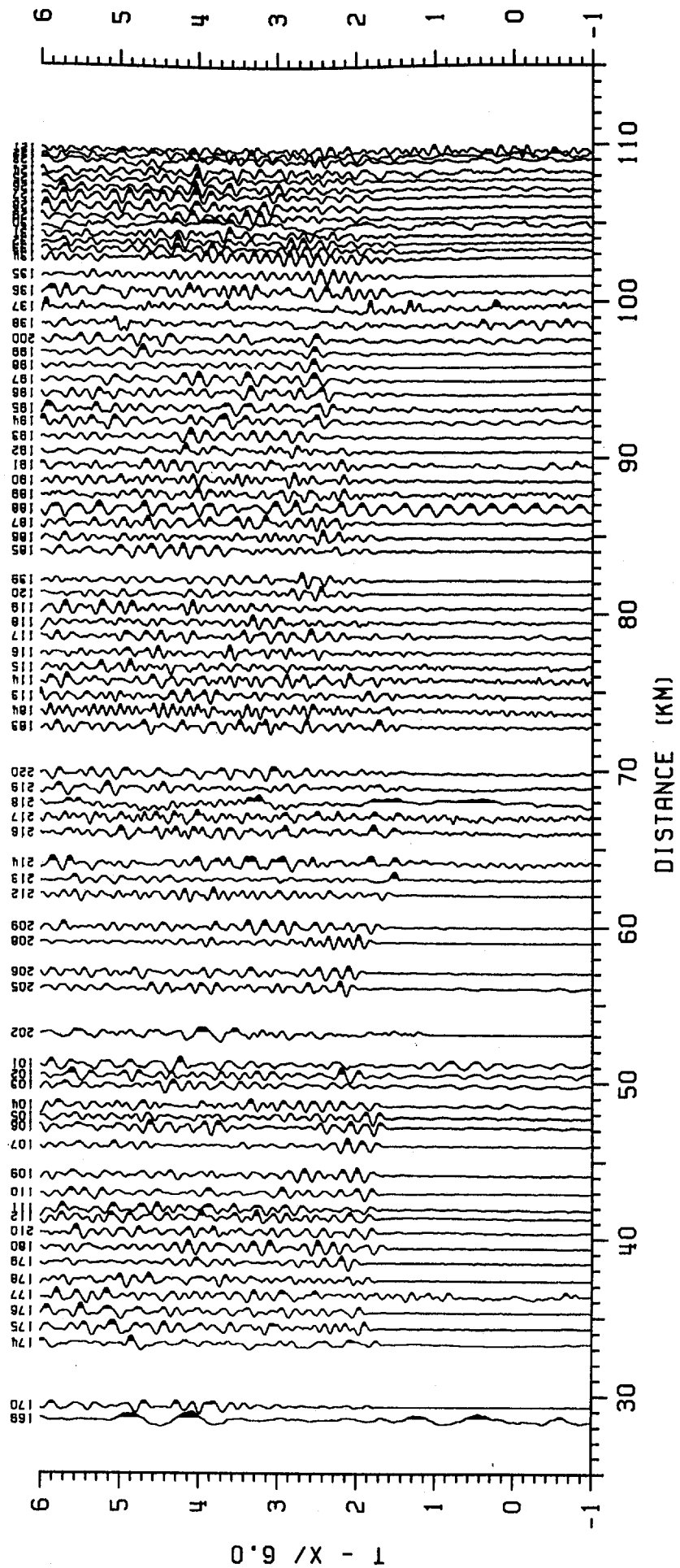


FIGURE 10: RECORD SECTION FROM THE 1983 EAST-CENTRAL OREGON SEISMIC SURVEY

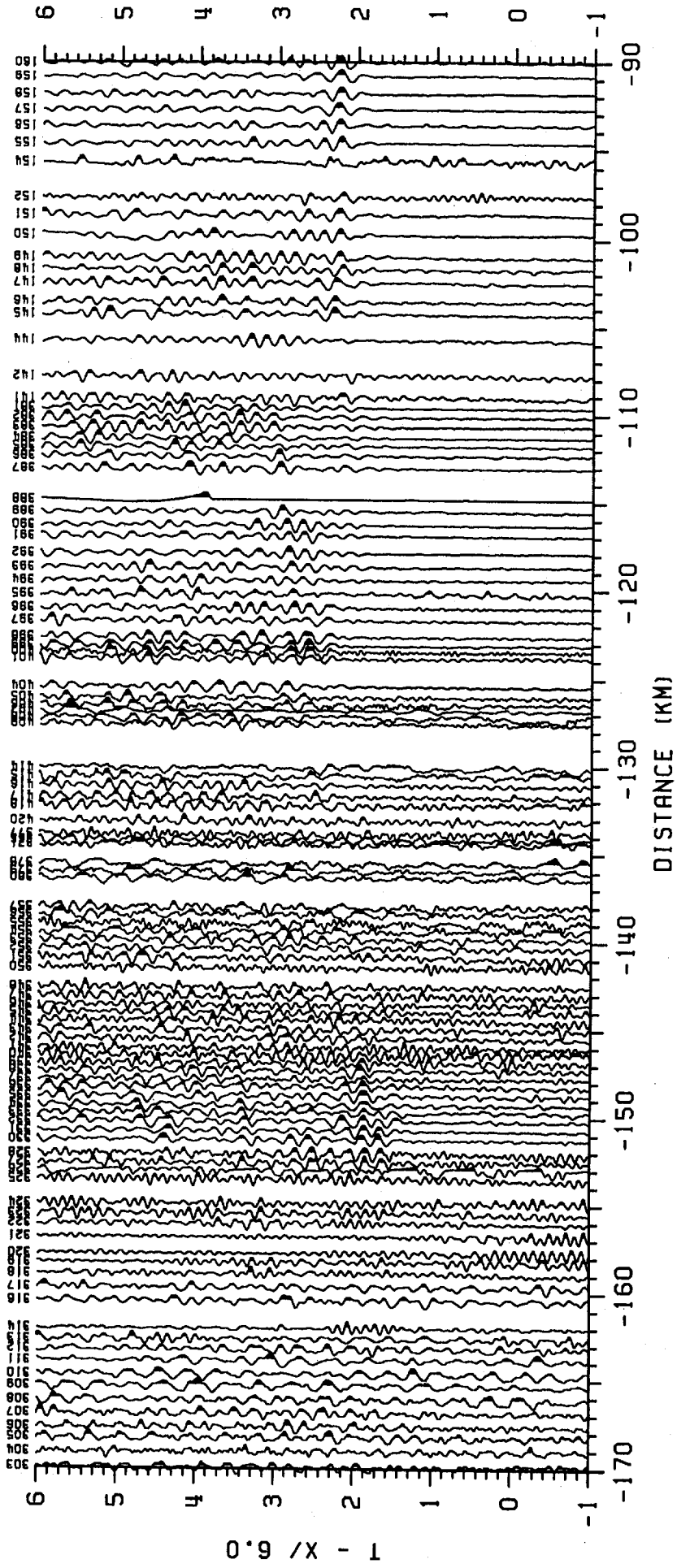


FIGURE 11 :RECORD SECTION FROM THE 1983 EAST-CENTRAL OREGON SEISMIC SURVEY

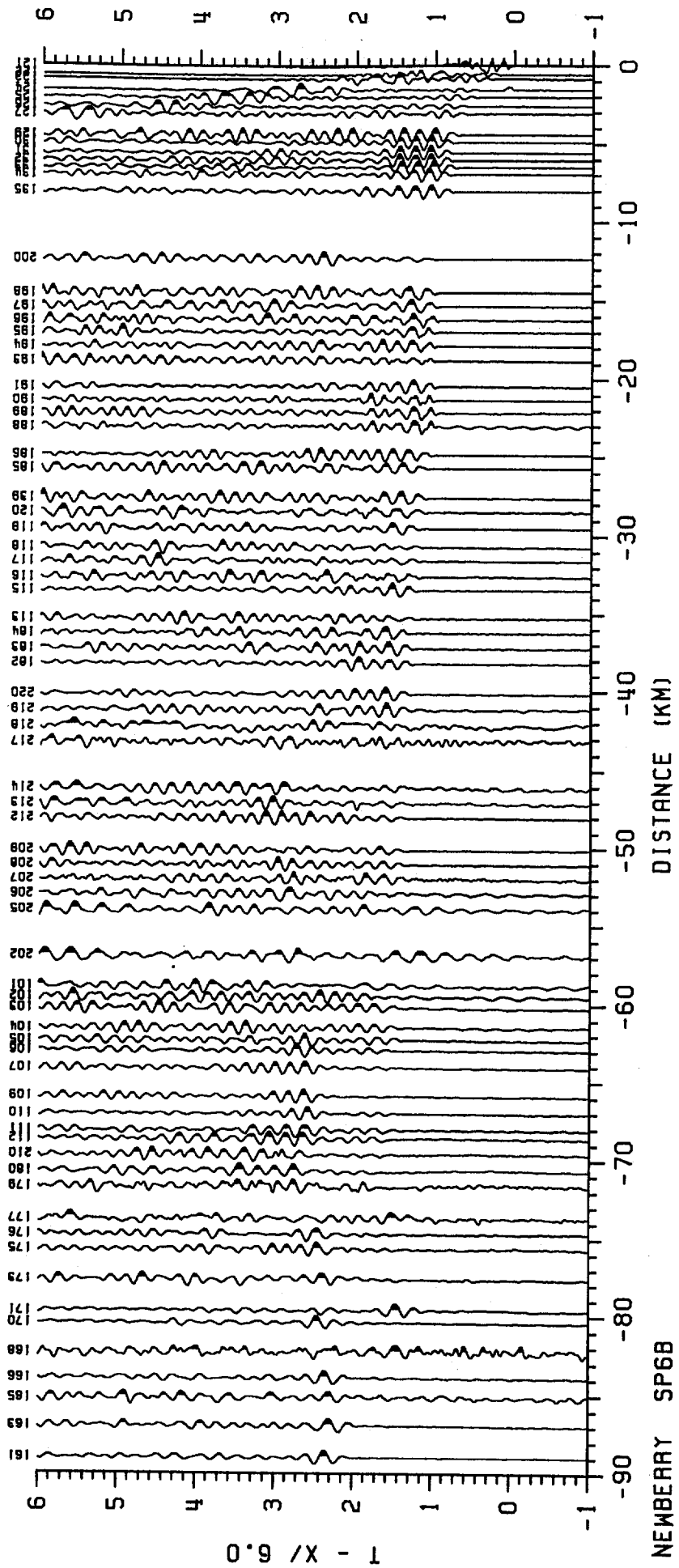


FIGURE 12 : RECORD SECTION FROM THE 1983 EAST-CENTRAL OREGON SEISMIC SURVEY

MASTER SHOT LIST (SHOT LOCATIONS AND TIMES)

EAST-CENTRAL OREGON 1983

SHOT	SHOTPOINT	DATE	LATITUDE	LONGITUDE	SHOT TIME DAY HR MN SEC
1	6	OCT., 11, 1983	43 36.9633	119 31.2602	284 06 00 00.007
2	5	OCT., 11, 1983	43 41.7366	120 52.7705	284 06 15 00.012
3	1	OCT., 11, 1983	43 42.0076	121 38.8120	284 06 30 00.009
4	3	OCT., 14, 1983	43 42.6363	121 13.7009	287 05 30 00.012
5	7	OCT., 14, 1983	43 39.2523	118 51.3602	287 05 45 00.006
6	4	OCT., 14, 1983	43 41.8559	121 02.4408	287 06 00 00.009
7	2	OCT., 14, 1983	43 42.0996	121 25.5936	287 06 59 59.903
8	5	OCT., 14, 1983	43 41.7366	120 52.7705	287 07 30 00.009
9	6	OCT., 14, 1983	43 36.9633	119 31.2602	287 07 45 00.007
10	1	OCT., 14, 1983	43 42.0076	121 38.8120	287 08 29 59.902

Table 1: Master Shot List. Contains shot number, shotpoint number, date (calendar, Julian), latitude/longitude (degree ,minute, and seconds), and shot time (GMT).

APPENDIX A

TAPE GRADE CODES

A performance status number is assigned to each field tape as it is digitized. These numbers appear in the last column of the field data file.

0 - GOOD
1 - TAPE DID NOT RUN
2 - TAPE RAN BUT NO SIGNAL
3 - TAPE SKIPPED RECORDING TIME
4 - TAPE RAN FAST FORWARD;NO SIGNAL
5 - TAPE REWOUND AND ERASED
6 - WEAK SIGNAL; CANNOT READ THE TIME CODE; LOW RECORD LEVEL
7 - NOISE, CONTINOUS CALIBRATION OR PERIODIC OFFSETS
8 - NOISE, SINUSOIDAL
9 - NOISE, SPIKE
10 - NOISE, WWVB CROSS-FEED
11 - NOISE, PERIODIC TICKS
12 - NOISE, RANDOM
13 - BAD CLOCKS
14 - OFF FREQUENCY, TAPE SPEED PROBLEM
16 - INCOMPLETE RECORD; RECORDER STOPPED
17 - NOISY OR WEAK TIME CODE
19 - TURNED ON TO EARLY
20 - IN FOR REPAIR; NOT DEPLOYED
21 - GEOPHONE DISCONNECTED OR SHORTED
22 - WRONG UNIT NUMBER
23 - WRONG GAIN SETTING
24 - TURNED ON TOO LATE
25 - BAD GEOPHONE TEST
26 - ONE OR MORE CHANNELS MISSING
27 - NOISY OR WEAK WWVB
28 - INSTRUMENT OR TAPE MISSING
29 - WRONG TIME DURING TURN-ON
30 - DIGITIZED W/O CALIBRATION
31 - AMPLIFIER OUT OF BALANCE
32 - LOCATION NOT ON MAP; WRONG LOCATION

APPENDIX B

FIELD DATA TABLES

Field data include information related to the seismic recorders. Each table contains shot number, shotpoint number and shot time given in julian day, hour, minutes and seconds. Column heading for the table are explained below:

LOC	-location number from the seismic recorder.
DIST	-distance in kilometers from the shotpoint to the recorder.
AZIM	-azimuth from the shotpoint to the recorder(degrees clockwise from north).
Db	-attenuation of preferred recording channel (db).
TAPE GRADE	-number corresponding to the performance of each instrument.

NEWBERRY CRATER

Shot Number 1 Shot Point 6

Shot Time (Julian day, hr, min, sec): 284:06:00:00.007

Loc	Dist (km)	Azim (deg)	Db	Tape Grade	Loc	Dist (km)	Azim (deg)	Db	Tape Grade	Loc	Dist (km)	Azim (deg)	Db	Tape Grade
101	58.82	275.4	12		141	109.08	274.7	12		181	39.22	275.1		
102	59.49	274.6	12		142	107.84	274.8	12		182	38.19	274.3	12	
103	60.18	273.9	12		143	106.95	274.8			183	37.21	273.7	12	
104	61.47	273.4	12		144	105.78	274.8	12		184	36.23	273.2	12	
105	62.28	272.6	12		145	104.29	275.0	12		185	25.70	275.6	12	
106	62.92	272.5	12		146	103.60	274.9	12		186	24.87	276.6	12	
107	64.08	272.5	12		147	102.52	274.9	12		187	23.97	278.4		
108	65.46	272.8			148	101.77	275.0	12		188	23.04	277.8	12	
109	65.89	273.3	12		149	101.05	274.9	12		189	22.15	277.9	12	
110	67.01	274.1	12		150	99.79	275.1	12		190	21.31	280.0	30	
111	68.06	274.5	12		151	98.61	274.7	12		191	20.45	282.4	30	
112	68.61	275.2	12		152	97.64	274.7	12		192	19.58	283.0		
113	35.25	274.5	12		153	96.66	274.8			193	18.79	285.5	30	
114	34.27	274.5			154	95.69	274.8	12		194	17.87	286.3	30	
115	33.42	274.6	12		155	94.64	274.9	12		195	16.98	285.7	30	
116	32.57	278.3	12		156	93.64	274.9	12		196	16.22	288.7	30	
117	31.56	279.2	12		157	92.72	274.7	12		197	15.34	289.7	30	
118	30.68	279.4	12		158	91.83	274.5	12		198	14.48	290.9	30	
119	29.50	279.0	12		159	90.80	274.2	12		199	13.33	287.3	30	
120	28.49	276.8	12		160	90.01	274.1	12		200	12.34	285.2	30	
121	0.01	340.7	88		161	88.98	274.1	12		201	57.88	276.2		
122	0.56	223.3	88		162	87.79	274.2	12		202	56.89	276.0	30	
123	0.84	241.0	88		163	86.94	274.2	12		203	55.92	276.1		
124	1.53	253.7	88		164	86.05	274.3	12		204	54.93	276.2		
125	2.01	256.9	66		165	85.13	274.3	12		205	53.96	276.3	12	
126	2.59	259.6	66		166	83.91	274.4	12		206	52.94	276.5	12	
127	3.08	260.8	66		167	83.22	274.4	12		207	51.98	277.1	12	
128	3.77	262.1			168	82.27	274.5	12		208	51.05	277.7	12	
129	4.40	263.2	30		169	81.26	274.5	12		209	50.13	278.3	12	
130	4.88	264.0	48		170	80.41	274.6	12		210	69.62	276.0	12	
131	5.52	265.3	48		171	79.63	274.7	12		211	49.01	278.0		
132	6.02	265.7			172	78.80	274.7			212	48.02	277.4	12	
133	6.46	267.8			173	77.63	274.8	12		213	47.09	278.1	12	
134	6.94	269.6			174	76.67	274.7	12		214	46.09	278.6	12	
135	8.03	272.7			175	75.66	275.0	12		215	45.17	278.9		
136	9.09	272.5			176	74.68	275.8	12		216	44.15	279.2		
137	10.25	285.8			177	73.68	275.9	12		217	43.18	279.2	12	
138	11.22	282.5			178	72.63	275.5			218	42.19	278.4	12	
139	27.58	276.0	12		179	71.64	276.7	12		219	41.17	277.3	12	
140	26.63	275.3			180	70.65	276.5	12		220	40.16	276.3	12	

NEWBERRY CRATER

Shot Number 2 Shot Point 5

Shot Time (Julian day, hr, min, sec): 284:06:15:00.012

Loc	Dist (km)	Azim (deg)	Db	Tape Grade
101	51.13	93.7	12	
102	50.46	94.6	12	
103	49.78	95.5	12	
104	48.51	96.1	12	
105	47.77	97.2	12	
106	47.14	97.4	12	
107	45.99	97.6	12	
108	44.58	97.2		
109	44.11	96.6	12	
110	42.95	95.5	12	
111	41.89	94.7	12	
112	41.34	93.6	12	
113	74.70	94.7	12	
114	75.68	94.6	12	
115	76.53	94.6	12	
116	77.46	93.1	12	
117	78.51	92.8	12	
118	79.39	92.8	12	
119	80.33	93.0	12	
120	81.25	93.8	12	
121	109.64	94.6	30	
122	109.30	94.8	12	
123	108.95	94.9	12	
124	108.22	94.9	12	
125	107.74	94.9	12	
126	107.16	95.0	30	
127	106.67	95.0	12	
128	105.99	95.0	12	
129	105.35	95.1	12	
130	104.87	95.1	12	
131	104.22	95.1	12	
132	103.72	95.1	12	
133	103.26	95.0	12	
134	102.75	94.9	12	
135	101.64	94.8	12	
136	100.59	94.8	12	
137	99.62	93.5	12	
138	98.56	93.7	12	
139	82.14	94.1	12	
140	83.08	94.4		
141	0.60	73.7	88	
142	1.84	83.3	68	
143	2.72	86.7		
144	3.88	90.4	48	
145	5.41	87.0	48	
146	6.09	89.4		
147	7.16	90.5	48	
148	7.92	89.4	30	
149	8.63	90.6	30	
150	9.91	89.7	30	
151	11.07	94.1	30	
152	12.03	93.9	30	
153	13.02	93.6		
154	13.99	93.3	30	
155	15.05	93.1	30	
156	16.06	93.1	30	
157	16.97	94.2	30	
158	17.86	95.4	30	
159	18.91	96.5	30	
160	19.71	97.1	30	
161	20.75	96.8	12	
162	21.93	96.4		
163	22.78	96.2	12	
164	23.67	95.9	12	
165	24.59	95.6	12	
166	25.81	95.3	12	
167	26.50	95.1	12	
168	27.45	95.0	12	
169	28.46	94.8	12	
170	29.31	94.6	12	
171	30.31	94.5	12	
172	31.15	94.4		
173	32.32	94.2	12	
174	33.28	94.4	12	
175	34.29	93.7	12	
176	35.31	92.0	12	
177	36.31	92.0	12	
178	37.33	92.9	12	
179	38.42	90.8	12	
180	39.38	91.2	12	
181	70.73	94.4		
182	71.76	94.8	12	
183	72.75	95.1	12	
184	73.74	95.3	12	
185	84.01	94.3	12	
186	84.85	94.0	12	
187	85.79	93.6	12	
188	86.70	93.8	12	
189	87.59	93.8	12	
190	88.49	93.3	12	
191	89.45	92.8	12	
192	90.35	92.8	12	
193	91.28	92.4	12	
194	92.24	92.4	12	
195	93.05	92.6	12	
196	94.00	92.2	12	
197	94.93	92.2	12	
198	95.83	92.2	12	
199	96.69	92.9	12	
200	97.55	93.3	12	
201	52.10	92.9		
202	53.08	93.1	12	
203	54.06	93.1		
204	55.05	93.1		
205	56.02	93.0	12	
206	57.05	92.8	12	
207	58.03	92.4		
208	59.01	92.0	12	
209	59.98	91.5	12	
210	40.37	92.2	12	
211	61.06	91.9		
212	62.01	92.4	12	
213	62.99	92.0	12	
214	64.03	91.7	12	
215	64.97	91.6		
216	66.00	91.6	12	
217	66.96	91.7	12	
218	67.89	92.2	12	
219	68.84	93.0	12	
220	69.81	93.7	12	

NEWBERRY CRATER

Shot Number 3 Shot Point 1

Shot Time (Julian day, hr, min, sec): 284:06:30:00.009

Loc	Dist (km)	Azim (deg)	Db	Tape Grade
101	112.65	91.9	12	
102	111.95	92.3	12	
103	111.25	92.7	12	
104	109.96	93.0	12	
105	109.17	93.4	12	
106	108.53	93.4	12	
107	107.37	93.5	12	
108	105.99	93.3	12	
109	105.55	93.0	12	
110	104.44	92.5	12	
111	103.41	92.2	12	
112	102.89	91.7	12	
113	136.11	92.8	12	
114	137.09	92.8	12	
115	137.94	92.8	12	
116	138.91	91.9	12	
117	139.97	91.7	12	
118	140.85	91.8	12	
119	142.00	91.9	12	
120	142.89	92.4	12	
121	171.26	93.1	12	
122	170.91	93.3	12	
123	170.56	93.3	12	
124	169.83	93.3	12	
125	169.34	93.3	12	
126	168.76	93.3	30	
127	168.27	93.3	12	
128	167.59	93.4	12	
129	166.95	93.4	12	
130	166.47	93.4	12	
131	165.82	93.4	12	
132	165.32	93.4	12	
133	164.86	93.3	12	
134	164.36	93.3	12	
135	163.25	93.1	12	
136	162.20	93.2	12	
137	161.28	92.3	12	
138	160.21	92.5	12	
139	143.78	92.6	12	
140	144.71	92.7		
141	62.43	90.3	30	
142	63.69	90.3	12	
143	64.58	90.3		
144	65.74	90.5		
145	67.26	90.2	12	
146	67.95	90.4	12	
147	69.02	90.5	12	
148	69.79	90.3	12	
149	70.49	90.5	12	
150	71.78	90.4	12	
151	72.91	91.0	12	
152	73.88	91.0	12	
153	74.87	91.0		
154	75.84	91.0	12	
155	76.90	91.0	12	
156	77.91	91.0	12	
157	78.81	91.3	12	
158	79.68	91.6	12	
159	80.47	91.9	12	
160	81.26	92.1	12	
161	82.30	92.0	12	
162	83.48	92.0	12	
163	84.33	92.0	12	
164	85.23	92.0	12	
165	86.15	91.9	12	
166	87.37	91.9	12	
167	88.06	91.9	12	
168	89.02	91.9	12	
169	90.02	91.8	12	
170	90.88	91.8	12	
171	91.88	91.8	12	
172	92.71	91.8	12	
173	93.88	91.7	12	
174	94.83	91.8	12	
175	95.86	91.6	12	
176	96.89	91.0	12	
177	97.89	91.0	12	
178	98.90	91.4	12	
179	100.00	90.6	12	
180	100.96	90.8	12	
181	132.17	92.5		
182	133.18	92.8	12	
183	134.15	93.0	12	
184	135.14	93.1	12	
185	145.65	92.7	12	
186	146.49	92.5	12	
187	147.45	92.3	12	
188	148.35	92.4	12	
189	149.24	92.4	12	
190	150.15	92.1	12	
191	151.13	91.9	12	
192	152.02	91.9	12	
193	152.97	91.6	12	
194	153.92	91.6	12	
195	154.73	91.8	12	
196	155.69	91.5	12	
197	156.61	91.5	12	
198	157.52	91.5	12	
199	158.37	91.9	12	
200	159.22	92.2	12	
201	113.63	91.6		
202	114.60	91.7		
203	115.58	91.7		
204	116.56	91.7		
205	117.53	91.7	12	
206	118.56	91.6	12	
207	119.55	91.4		
208	120.53	91.2	12	
209	121.50	91.0	12	
210	101.94	91.2	12	
211	122.58	91.2		
212	123.51	91.4	12	
213	124.49	91.3	12	
214	125.53	91.1	12	
215	126.47	91.0		
216	127.50	91.0	12	
217	128.46	91.1	12	
218	129.38	91.4	12	
219	130.32	91.8	12	
220	131.27	92.2	12	

NEWBERRY CRATER
Shot Number 4 Shot Point 3
Shot Time (Julian day, hr, min, sec): 287:05:30:00.012

Loc	Dist (km)	Azim (deg)	Db	Tape Grade
301	33.72	268.1		
302	32.95	268.5		
303	32.40	268.5		
304	31.48	269.6		
305	30.71	269.0		
306	30.08	269.2		
307	29.34	268.5		
308	28.61	268.5		
309	27.79	268.4		
310	27.13	268.3		
311	26.31	268.3		
312	25.65	268.2		
313	25.06	268.3		
314	24.43	268.3		
315	23.57	269.1		
316	22.85	268.4		
317	22.09	267.8	12	
318	21.29	268.9	12	
319	20.70	267.7	12	
320	20.20	267.6	30	
321	19.24	267.5	12	
322	18.47	267.5	12	
323	17.88	267.9	12	
324	17.32	267.6	12	
325	15.98	266.5	12	
326	15.45	266.5	30	
327	15.01	266.2	30	
328	14.51	266.5	30	
329	14.01	267.3		
330	13.70	266.5	30	
331	13.18	266.1	30	
332	12.64	265.5	30	
333	12.17	264.2	30	
334	11.71	265.4	30	
335	11.18	265.8	30	
336	10.64	265.4	30	
337	10.18	266.2	30	
338	9.67	267.1	30	
339	9.24	266.1	30	
340	8.78	266.6	30	
341	8.36	268.5	30	
342	7.85	265.9	30	
343	7.36	266.0	30	
344	6.88	263.3	48	
345	6.39	263.8	30	
346	5.95	264.6	30	
347	5.44	264.9	30	
348	4.94	263.8	30	
349	4.43	265.6		
350	3.80	265.9	30	
351	3.25	263.9	68	
352	2.78	255.8		
353	2.32	251.8	68	
354	1.84	249.3	68	
355	1.40	246.5	88	
356	0.78	242.3	88	
357	0.38	233.5	88	
358	0.04	77.8	88	
359	0.45	46.3	88	
360	1.02	49.8	30	
361	3.84	40.7	30	
362	3.67	49.0	30	
363	3.41	54.2	30	
364	3.43	65.9	48	
365	3.60	73.7	48	
366	3.66	80.7	48	
367	3.48	88.6	48	
368	3.24	95.9	48	
369	3.04	99.7	48	
370	3.51	108.3	48	
371	3.69	118.5	48	
372	3.78	124.4	48	
373	3.91	134.0	48	
374	4.34	140.2		
375	4.70	142.5	48	
376	4.55	110.1	48	
377	4.05	109.6	48	
378	2.43	68.9	48	
379	2.02	65.0	68	
380	1.59	63.6	88	
381	28.20	93.3		
382	27.69	93.0		
383	27.14	92.9		
384	26.52	93.0		
385	26.03	93.1		
386	25.48	92.5		
387	24.77	92.9		
388	22.98	92.2		
389	22.28	93.2		
390	21.50	94.7		
391	20.91	96.3	12	
392	19.90	96.3		
393	19.11	96.4	12	
394	18.35	95.6	12	
395	17.55	93.8	12	
396	16.77	94.4	12	
397	16.07	94.3	12	
398	15.16	95.6	12	
399	14.68	96.5	12	
400	14.33	97.7	12	
401	13.95	97.6	12	
402	13.42	97.2		
403	12.91	95.9		
404	12.35	96.2	12	
405	11.71	96.6	30	
406	11.26	97.0	30	
407	10.97	97.6	30	
408	10.57	98.7	12	
409	10.25	99.8	30	
410	9.73	101.3	30	
411	9.31	102.0	30	
412	8.93	103.1		
413	8.36	104.0	30	
414	7.80	104.5	30	
415	7.35	105.4	30	
416	6.90	108.9	48	
417	6.22	109.0	30	
418	5.74	109.6	48	
419	5.44	114.2		
420	5.06	116.9	48	

NEWBERRY CRATER
Shot Number 5 Shot Point 7
Shot Time (Julian day, hr, min, sec): 287:05:45:00.006

Loc	Dist (km)	Azim (deg)	Db	Tape Grade
301	224.45	271.3	12	
302	223.69	271.4	12	
303	223.14	271.4	12	
304	222.24	271.5	12	
305	221.47	271.5	12	
306	220.84	271.5	12	
307	220.09	271.4	12	
308	219.36	271.4		
309	218.54	271.4	12	
310	217.89	271.4	12	
311	217.07	271.4	12	
312	216.40	271.4	12	
313	215.82	271.5	12	
314	215.20	271.5	12	
315	214.35	271.6		
316	213.63	271.5		
317	212.86	271.5	12	
318	212.08	271.6	30	
319	211.47	271.5	30	
320	210.97	271.5	30	
321	210.01	271.5	30	
322	209.25	271.5	30	
323	208.66	271.5	12	
324	208.10	271.5	12	
325	206.74	271.5	12	
326	206.22	271.5	12	
327	205.77	271.5	12	
328	205.29	271.5	12	
329	204.80	271.6		
330	204.48	271.5	12	
331	203.96	271.5	12	
332	203.40	271.5	12	
333	202.91	271.4	12	
334	202.49	271.5	12	
335	201.96	271.5	12	
336	201.42	271.5	12	
337	200.97	271.6	12	
338	200.48	271.6	12	
339	200.04	271.6	12	
340	199.59	271.6	12	
341	199.19	271.7	12	
342	198.66	271.6	12	
343	198.17	271.7	12	
344	197.66	271.6	12	
345	197.18	271.6	12	
346	196.75	271.7	12	
347	196.25	271.7	12	
348	195.75	271.7	12	
349	195.26	271.7		
350	194.64	271.8	12	
351	194.07	271.7	12	
352	193.53	271.6	12	
353	193.04	271.6	30	
354	192.57	271.7	68	
355	192.12	271.7	30	
356	191.54	271.8	30	
357	191.16	271.8	12	
358	190.81	271.9	12	
359	190.54	272.0	12	
360	190.09	272.1	12	
361	188.44	272.8	12	
362	188.15	272.6	12	
363	188.15	272.5	12	
364	187.77	272.3	12	
365	187.43	272.2	12	
366	187.27	272.1	12	
367	187.39	271.9	12	
368	187.64	271.8		
369	187.86	271.7	12	
370	187.52	271.6	12	
371	187.60	271.4	12	
372	187.72	271.3	12	
373	188.02	271.1	12	
374	188.05	270.9	12	
375	187.97	270.8	12	
376	186.57	271.4	12	
377	187.03	271.5	12	
378	188.61	272.2	12	
379	189.05	272.2	12	
380	189.45	272.1	12	
381	162.75	271.6	12	
382	163.26	271.7	12	
383	163.81	271.7	12	
384	164.43	271.7	12	
385	164.92	271.7	12	
386	165.45	271.8	12	
387	166.17	271.7	12	
388	167.95	271.8		
389	168.66	271.7		
390	169.46	271.5	12	
391	170.10	271.3	12	
392	171.10	271.4	12	
393	171.89	271.4	12	
394	172.62	271.5	12	
395	173.38	271.7	12	
396	174.16	271.6	12	
397	174.86	271.7	12	
398	175.79	271.6	12	
399	176.29	271.5	12	
400	176.67	271.4	12	
401	177.04	271.4	12	
402	177.56	271.5		
403	178.03	271.6		
404	178.59	271.6	30	
405	179.23	271.6	12	
406	179.69	271.6		
407	179.99	271.5	12	
408	180.42	271.5	12	
409	180.76	271.4	12	
410	181.32	271.4	12	
411	181.75	271.4	12	
412	182.15	271.3	12	
413	182.74	271.3	12	
414	183.30	271.3	12	
415	183.77	271.3	12	
416	184.32	271.2	12	
417	184.96	271.3	12	
418	185.44	271.3	12	
419	185.88	271.2		
420	186.33	271.2	12	

NEWBERRY CRATER
Shot Number 6 Shot Point 4
Shot Time (Julian day, hr, min, sec): 287:06:00:00.009

Loc	Dist (km)	Azim (deg)	Db	Tape Grade
301	48.84	270.4	12	
302	48.08	270.7	12	
303	47.52	270.7	12	
304	46.63	271.5	12	
305	45.85	271.1	12	
306	45.22	271.3	12	
307	44.46	270.9	12	
308	43.73	270.9		
309	42.91	270.9	12	
310	42.25	270.9	30	
311	41.43	270.9	30	
312	40.77	270.9	12	
313	40.18	271.0	12	
314	39.56	271.0	12	
315	38.72	271.6		
316	37.98	271.2	12	
317	37.21	270.9	12	
318	36.43	271.6	12	
319	35.82	271.0	30	
320	35.32	271.0	30	
321	34.36	271.0		
322	33.59	271.1		
323	33.00	271.4		
324	32.44	271.3		
325	31.08	270.9		
326	30.55	271.0		
327	30.11	270.9		
328	29.62	271.1		
329	29.13	271.5		
330	28.82	271.2	12	
331	28.29	271.1	12	
332	27.73	270.9	12	
333	27.24	270.5	12	
334	26.81	271.1	12	
335	26.29	271.3	12	
336	25.74	271.3	12	
337	25.30	271.8	12	
338	24.81	272.2	12	
339	24.36	271.9	12	
340	23.91	272.2	12	
341	23.52	273.0	12	
342	22.98	272.2	12	
343	22.49	272.4	30	
344	21.97	271.7	30	
345	21.49	272.0	30	
346	21.07	272.4	30	
347	20.56	272.7	30	
348	20.06	272.6	30	
349	19.58	273.2		
350	18.96	273.6	30	
351	18.39	273.4	30	
352	17.84	272.5	30	
353	17.35	272.4	30	
354	16.87	272.7	12	
355	16.43	273.1	30	
356	15.86	273.9	30	
357	15.48	274.5	30	
358	15.15	275.5	30	
359	14.91	276.8	30	
360	14.50	278.3	30	
361	13.35	289.1	30	
362	12.94	287.3	30	
363	12.83	285.6	30	
364	12.33	283.3	30	
365	11.92	281.9	48	
366	11.70	280.0	30	
367	11.75	277.5	30	
368	11.96	275.3	30	
369	12.17	274.4	48	
370	11.80	271.7	48	
371	11.89	268.5	48	
372	12.03	266.7	48	
373	12.38	264.1	30	
374	12.50	261.3	30	
375	12.48	259.4	30	
376	10.85	269.4	48	
377	11.31	270.4	48	
378	13.06	280.2	30	
379	13.49	279.8	12	
380	13.87	278.9	12	
381	13.03	90.8	30	
382	12.53	90.1	30	
383	11.98	89.6	30	
384	11.36	89.7	30	
385	10.86	89.8	30	
386	10.34	88.2	30	
387	9.61	88.9	30	
388	7.86	85.8	30	
389	7.12	88.3	30	
390	6.31	92.9	30	
391	5.71	98.4	48	
392	4.71	98.9	48	
393	3.93	99.9		
394	3.16	96.4	68	
395	2.40	83.6	68	
396	1.60	84.2	30	
397	0.93	75.3	88	
398	0.04	234.1	88	
399	0.58	249.0	88	
400	1.05	242.4	88	
401	1.36	253.4	68	
402	1.83	262.5		
403	2.28	273.0		
404	2.85	272.4	68	
405	3.49	271.6	48	
406	3.95	271.2		
407	4.25	269.9	48	
408	4.69	268.0		
409	5.04	266.6		
410	5.61	265.3		
411	6.05	265.3	12	
412	6.45	264.9	48	
413	7.04	265.3		
414	7.59	266.2	48	
415	8.06	266.4	48	
416	8.64	264.8	48	
417	9.26	266.4	48	
418	9.74	267.2	48	
419	10.20	265.6		
420	10.66	265.5	48	

NEWBERRY CRATER
Shot Number 7 Shot Point 2
Shot Time (Julian day, hr, min, sec): 287:06:59:59.903

Loc	Dist (km)	Azim (deg)	Db	Tape Grade	Loc	Dist (km)	Azim (deg)	Db	Tape Grade	Loc	Dist (km)	Azim (deg)	Db	Tape Grade
301	17.73	269.6	30		341	7.66	84.2	12		381	44.14	90.8	12	
302	16.97	270.5	30		342	8.16	87.0	30		382	43.64	90.6	12	
303	16.41	270.5	30		343	8.65	86.8	30		383	43.08	90.5	12	
304	15.52	272.8	30		344	9.15	88.8	30		384	42.46	90.5	12	
305	14.74	271.7	30		345	9.63	88.2	30		385	41.97	90.6	12	
306	14.12	272.3	30		346	10.07	87.5	30		386	41.44	90.2	12	
307	13.35	270.9	30		347	10.58	87.2	30		387	40.72	90.4	12	
308	12.63	271.0			348	11.07	87.6	30		388	38.94	89.8	30	
309	11.80	271.0	30		349	11.58	86.8			389	38.22	90.4	12	
310	11.14	271.0	30		350	12.20	86.6	30		390	37.42	91.2	12	
311	10.32	271.3	30		351	12.76	87.1	30		391	36.78	92.0	12	
312	9.66	271.0	30		352	13.29	88.6	30		392	35.78	91.9	12	
313	9.08	271.6	12		353	13.78	88.9	30		393	34.99	91.8	12	
314	8.45	271.8	12		354	14.26	88.6	12		394	34.25	91.3	12	
315	7.62	274.7			355	14.70	88.3	12		395	33.49	90.3	12	
316	6.88	273.1	30		356	15.30	87.6	30		396	32.70	90.5	12	
317	6.11	271.5	30		357	15.69	87.2	30		397	32.00	90.4	12	
318	5.35	276.3	30		358	16.05	86.4	30		398	31.07	90.9	12	
319	4.71	271.8	30		359	16.35	85.4	12		399	30.57	91.2	12	
320	4.21	272.0	30		360	16.84	84.4	30		400	30.19	91.8	12	
321	3.25	272.7			361	18.89	78.1	12		401	29.82	91.6	12	
322	2.48	274.7			362	19.05	79.7	12		402	29.30	91.4	12	
323	1.92	280.1	68		363	18.98	80.9	12		403	28.83	90.7		
324	1.35	281.8	88		364	19.26	82.9	12		404	28.26	90.7	12	
325	0.03	69.3	88		365	19.54	84.1	30		405	27.62	90.7	12	
326	0.56	83.9	88		366	19.65	85.4	12		406	27.16	90.8	12	
327	1.00	90.0	88		367	19.49	86.8	12		407	26.86	91.0	12	
328	1.50	86.3			368	19.21	88.0	30		408	26.43	91.3		
329	2.01	80.4			369	18.98	88.6	30		409	26.09	91.6	12	
330	2.30	85.8	68		370	19.31	90.3	30		410	25.53	92.1	12	
331	2.83	87.9	68		371	19.24	92.3			411	25.10	92.2	12	
332	3.38	90.0	68		372	19.13	93.4	30		412	24.70	92.4		
333	3.88	93.4	68		373	18.87	95.2	30		413	24.12	92.5		
334	4.30	89.2	30		374	18.90	97.1	30		414	23.55	92.3	12	
335	4.83	88.0	30		375	19.04	98.3	30		415	23.08	92.4	12	
336	5.37	88.6	30		376	20.26	91.6	30		416	22.54	93.2	12	
337	5.83	86.8	30		377	19.80	91.1	30		417	21.89	92.7	30	
338	6.34	85.4	30		378	18.34	84.1	30		418	21.40	92.5	30	
339	6.77	87.0	30		379	17.90	84.1	12		419	20.98	93.4		
340	7.23	86.2	30		380	17.48	84.4	12		420	20.53	93.6	30	

NEWBERRY CRATER
Shot Number 8 Shot Point 5
Shot Time (Julian day, hr, min, sec): 287:07:30:00.009

Loc	Dist (km)	Azim (deg)	Db	Tape Grade
301	61.83	270.5		
302	61.07	270.8	12	
303	60.52	270.8	12	
304	59.62	271.4	12	
305	58.84	271.1	12	
306	58.22	271.2	12	
307	57.46	270.9	12	
308	56.73	270.9	12	
309	55.91	270.9	12	
310	55.25	270.9	12	
311	54.43	270.9	12	
312	53.76	270.9	12	
313	53.18	271.0	12	
314	52.56	271.0	12	
315	51.71	271.4		
316	50.98	271.2	12	
317	50.21	271.0	12	
318	49.43	271.5	12	
319	48.82	271.0	30	
320	48.31	271.0	30	
321	47.35	271.0	30	
322	46.58	271.1	12	
323	46.00	271.3	12	
324	45.43	271.2	12	
325	44.07	270.9	12	
326	43.55	271.0	30	
327	43.10	270.9	12	
328	42.61	271.0	12	
329	42.12	271.4		
330	41.81	271.2	12	
331	41.28	271.1	12	
332	40.72	270.9	12	
333	40.23	270.6	12	
334	39.81	271.1	12	
335	39.28	271.2	12	
336	38.74	271.2	12	
337	38.29	271.5	12	
338	37.80	271.8	12	
339	37.35	271.6	12	
340	36.90	271.8	12	
341	36.51	272.3	12	
342	35.97	271.8	12	
343	35.48	271.9	12	
344	34.96	271.4	12	
345	34.49	271.6	12	
346	34.06	271.9	12	
347	33.56	272.0	12	
348	33.05	272.0	12	
349	32.57	272.3		
350	31.95	272.5	12	
351	31.38	272.4	12	
352	30.83	271.8	12	
353	30.34	271.8	12	
354	29.86	271.9	12	
355	29.42	272.2	12	
356	28.84	272.6	12	
357	28.46	272.9	12	
358	28.13	273.4	12	
359	27.86	274.1	12	
360	27.43	274.9	12	
361	26.01	280.1	12	
362	25.67	279.1	30	
363	25.61	278.2	30	
364	25.17	277.0	30	
365	24.80	276.2	30	
366	24.61	275.3	12	
367	24.70	274.1	12	
368	24.93	273.1	30	
369	25.15	272.6	30	
370	24.80	271.3	30	
371	24.88	269.8	12	
372	25.01	268.9	30	
373	25.33	267.6	30	
374	25.40	266.2	12	
375	25.35	265.3	12	
376	23.84	270.2	30	
377	24.31	270.7	30	
378	25.97	275.6	12	
379	26.41	275.5	12	
380	26.80	275.1	12	
381	0.05	52.9	12	
382	0.50	292.8	88	
383	1.06	287.0	88	
384	1.66	279.8	68	
385	2.15	277.1	68	
386	2.72	281.8	68	
387	3.41	276.7	68	
388	5.22	278.8	48	
389	5.89	274.2	48	
390	6.69	269.2	30	
391	7.37	265.2	30	
392	8.36	266.5	48	
393	9.14	267.2	30	
394	9.86	269.2	30	
395	10.62	272.6	30	
396	11.41	271.9	30	
397	12.11	272.2	30	
398	13.03	270.9	30	
399	13.54	270.1	30	
400	13.92	268.9	30	
401	14.29	269.3	30	
402	14.81	269.9		
403	15.28	271.3		
404	15.84	271.2	12	
405	16.49	271.1	30	
406	16.94	271.0	30	
407	17.25	270.7	30	
408	17.68	270.2	12	
409	18.02	269.8	12	
410	18.59	269.3	12	
411	19.02	269.2	12	
412	19.42	269.0	12	
413	20.01	269.0		
414	20.57	269.2	12	
415	21.04	269.2	12	
416	21.61	268.5	30	
417	22.24	269.1	30	
418	22.72	269.3	30	
419	23.17	268.6		
420	23.62	268.5	30	

NEWBERRY CRATER

Shot Number 9 Shot Point 6

Shot Time (Julian day, hr, min, sec): 287:07:45:00.007

Loc	Dist (km)	Azim (deg)	Tape Db	Tape Grade
301	171.23	273.1	12	
302	170.49	273.2	12	
303	169.93	273.2	12	
304	169.06	273.5	12	
305	168.27	273.4	12	
306	167.65	273.4	12	
307	166.89	273.3	12	
308	166.16	273.3	12	
309	165.34	273.4	12	
310	164.69	273.4	12	
311	163.87	273.4	12	
312	163.21	273.4	12	
313	162.63	273.4	12	
314	162.01	273.5	12	
315	161.17	273.6		
316	160.44	273.5	12	
317	159.66	273.5	12	
318	158.90	273.6	30	
319	158.28	273.5	30	
320	157.78	273.5	30	
321	156.82	273.5	30	
322	156.06	273.6	30	
323	155.48	273.6	30	
324	154.91	273.6	12	
325	153.55	273.5	12	
326	153.02	273.6	12	
327	152.58	273.6	12	
328	152.10	273.6	12	
329	151.62	273.7		
330	151.30	273.7	12	
331	150.77	273.6	12	
332	150.21	273.6	12	
333	149.71	273.5	12	
334	149.30	273.7	12	
335	148.78	273.7	12	
336	148.24	273.7	12	
337	147.80	273.8	12	
338	147.32	273.9	12	
339	146.87	273.8	12	
340	146.42	273.9	12	
341	146.04	274.0	12	
342	145.49	273.9	12	
343	145.00	273.9	12	
344	144.48	273.8	12	
345	144.01	273.9	12	
346	143.59	274.0	12	
347	143.09	274.0	12	
348	142.59	274.0	12	
349	142.11	274.1		
350	141.49	274.1	12	
351	140.92	274.1	12	
352	140.37	274.0	12	
353	139.88	274.0	12	
354	139.41	274.0	12	
355	138.97	274.1	12	
356	138.40	274.2	12	
357	138.02	274.3	12	
358	137.69	274.4	12	
359	137.43	274.5	12	
360	137.00	274.7	12	
361	135.47	275.7	12	
362	135.16	275.5	12	
363	135.13	275.3	12	
364	134.72	275.1	12	
365	134.36	274.9	12	
366	134.18	274.7	12	
367	134.27	274.5	12	
368	134.50	274.3	12	
369	134.72	274.2	30	
370	134.35	274.0	30	
371	134.39	273.7	30	
372	134.50	273.6	12	
373	134.77	273.3	30	
374	134.78	273.0	12	
375	134.68	272.9	12	
376	133.38	273.8	12	
377	133.85	273.9	12	
378	135.54	274.8	12	
379	135.97	274.8	12	
380	136.36	274.7	12	
381	109.61	274.6	12	
382	110.12	274.7	12	
383	110.68	274.7	12	
384	111.29	274.7	12	
385	111.78	274.7	12	
386	112.33	274.8	12	
387	113.04	274.7	12	
388	114.83	274.8	48	
389	115.52	274.6	12	
390	116.29	274.3	12	
391	116.90	274.0	12	
392	117.91	274.0	12	
393	118.69	274.0	12	
394	119.44	274.2	12	
395	120.23	274.4	12	
396	121.01	274.4	12	
397	121.71	274.4	12	
398	122.62	274.2	12	
399	123.11	274.1	12	
400	123.48	274.0	12	
401	123.85	274.0	12	
402	124.38	274.1		
403	124.86	274.2		
404	125.42	274.2	12	
405	126.07	274.2	12	
406	126.52	274.1	12	
407	126.81	274.1	12	
408	127.24	274.0		
409	127.57	273.9		
410	128.12	273.8		
411	128.55	273.8		
412	128.94	273.8		
413	129.53	273.7		
414	130.09	273.8	12	
415	130.56	273.7	12	
416	131.10	273.6	12	
417	131.75	273.7	12	
418	132.24	273.7	12	
419	132.66	273.6		
420	133.11	273.5	12	

APPENDIX C

Archive Data Tape Format

Archive data tapes are written SEGY standard format (Barry et al,1975). Recording density is 1600 bpi, phase encoded (PE). In order to accomodate seismic refraction data, some minor changes have been made to the tape header fields. A complete list of the header fields is provided in the card image portion of the reel identification header, shown below:

```
C 1 REEL IDENTIFICATION HEADER BYTES:
C 2 3217 -3218 sampling interval (microsecs).
C 3 3221 -3222 number of the sample per trace.
C 4 3225 -3226 data sample format code.
C 5 3255 -3256 measurement system (1 = meters; 2 = feet).
C 6
C 7
C 8 TRACE IDENTIFICATION HEADERS BYTES:
C 9   1 -   4  trace sequence number within reel.
C10   5 -   8  trace sequence number within reels.
C11   9 -  12  station location numbers.
C12  29 -  30  trace ID code (1 = seismic data).
C13  37 -  40  shotpoint- receiver distance (M).
C14  41 -  44  station elevation (M).
C15  45 -  48  shotpoint elevations (M).
C16  49 -  52  source depth (M).
C17  69 -  70  scalar to be applied to all elevations.
C18  71 -  72  scalar to be applied to all coordinates.
C19  73 -  76  shotpoint coordinated -X.
C20  77 -  80  shotpoint coordinates -Y.
C21  81 -  84  receiver coordinates -X.
C22  85 -  88  receiver coordinates -Y.
C23  89 -  90  coordinate units (1 = meters; 2 = seconds of arc).
C24 115 -116  number of samples in this trace.
C25 117 -118  sample interval in microseconds for this trace.
C26 121 -122  instrument attenuation in db.
C27 157 -158  shot time - year.
C28 159 -160  shot time - day of year.
C29 161 -162  shot time - hour of the day( 24 hour clock).
C30 163 -164  shot time - minute of the hour.
C31 165 -166  shot time - second of minute.
C32 167 -168  time basis code (2 = GMT).
C33 181 -182  shot time - milliseconds.
C34 183 -184  shotpoint location number.
C35 185 -186  recording instrument unit number.
```

C36	191 -192	distance weighting exponent (hundredths).
C37	193 -194	shot sequence number (shot number).
C38	195 -196	shot size (kg).
C39	197 -200	shot point - station azimuth (second of arc).
C40	201 -204	time of first point minus shot time (msec).

The data point format is "32 bit floating point", and the appropriate bytes (3225-3226) of the binary reel ID header contain a value of 1. The trace amplitudes have not been adjusted for the instrument gain, but the gain correction factor can be estimated from the instrument attenuation value(att) specified in bytes 121- 122. To correct for gain, the data should be demeaned and then multiplied by:

$$10^{(att/20)}$$

The measurement system (bytes 3225-3226 of the binary reel header) is set to 1, meters.

Shot point and receiver coordinates are in seconds of arc (byte field 89-90). The coordinate scalar multiplier (bytes 71-72) is set to -100, so the coordinates (bytes 73-88) are in hundredths of a second of arc.

Bytes 157-166 and bytes 181-182 refer to the shot detonation time. The time of the first data sample is found by adding the shot detonation time to the time specified in bytes 201-204.

Since there is no weighting of amplitudes with distance for archive tapes, the distance weighting exponent (bytes 191-192) is not used.

Shot sequence number (bytes 193-194) refers to the order in which shots were fired during the field campaign.