UNITED STATES DEPARTMENT OF THE INTERIOR

GEOLOGICAL SURVEY

DATA REPORT FOR THE 1984 U.S. GEOLOGICAL SURVEY CENTRAL COLUMBIA PLATEAU SEISMIC REFRACTION EXPERIMENT, WASHINGTON-OREGON

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1988

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INTRODUCTION

In August 1984, the U.S. Geological Survey, in conjunction with the Department of Energy (DOE)/ Rockwell Hanford Operations, conducted a long-range seismic refraction/wide-angle reflection survey across the central Columbia Plateau (CCP).This report catalogs seismic data collected along a NW-SE transect (CCP transect). The CCP transect was centered on the Hanford Site and trended approximately N 50° E, from north-central Oregon to east-central Washington (Figure 1).

The primary objectives of this survey were to evaluate the crustal and upper mantle velocity structure of the CCP and to evaluate the nature of the of the Columbia River Basalt Group (CRBG). An interpretation of the data has been published in a report by Catchings and Mooney (1988). Their analysis provides important constraints on the regional and tectonic evolution of the Columbia Plateau, as well as a information about the local geologic and tectonic setting of the Hanford Site, a proposed high-level nuclear waste respository and the site of existing nuclear facilities.

Included in this report are seismic record sections (Figures 2-15), lists of shot times, recorder and shotpoint locations (Tables 1 & 2), data files, and a tape grade scale (Appendix A). The data have been archived at the National Oceanic and Atmospheric Administration (N.O.A.A.). Tapes may be obtained at the

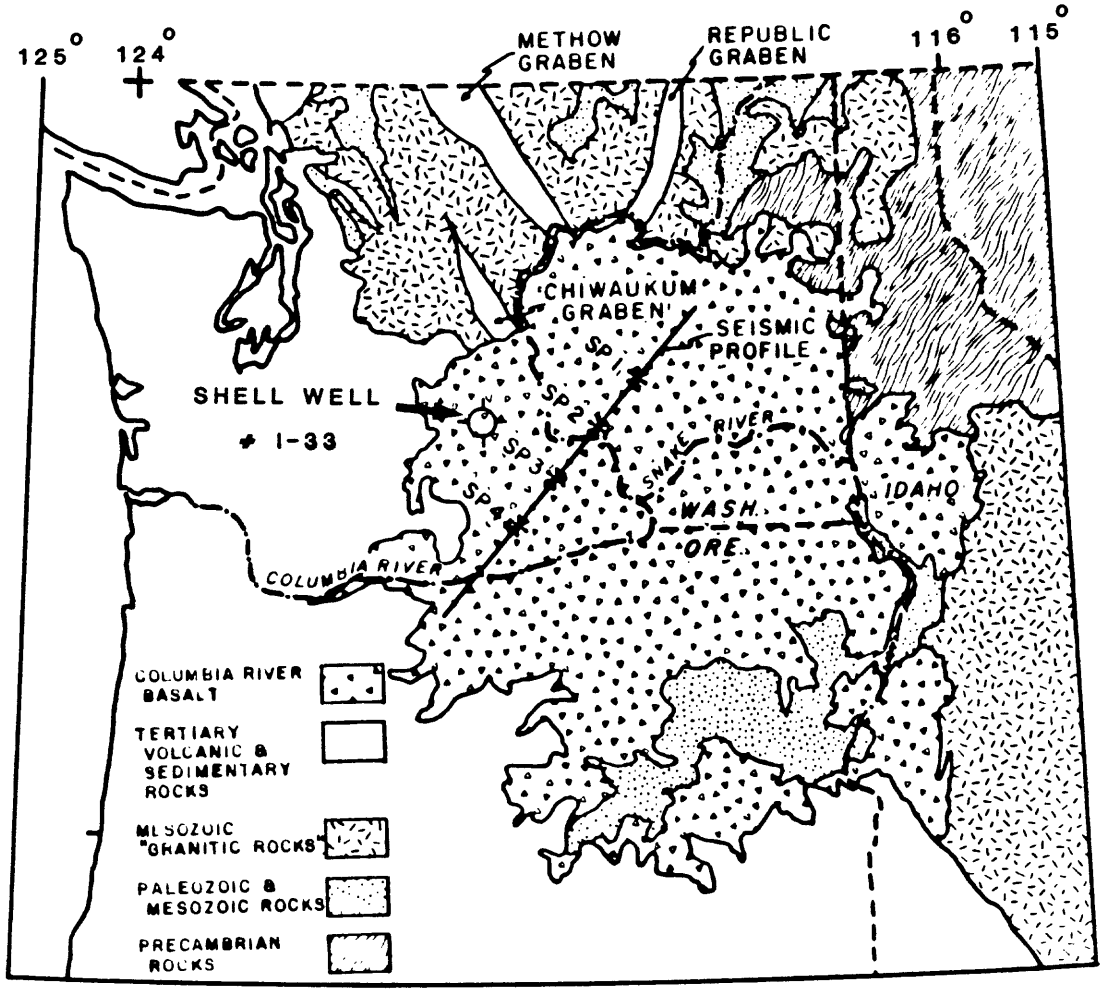
National Geophysical Data Center
National Oceanic and Atmoshperic Administration
325 Broadway
Boulder, CO., 80303

Appendix B contains a description of the tape formats.

DESCRIPTION OF SURVEY

The 1984 CCP transect consisted of a 260-km-long profile, trending roughly N 50° E from approximately 30 km southeast of Wasco, Oregon to northeast of Warden, Washington. The transect was centered on the Hanford Nuclear Site in the Pasco Basin . The transect was recorded in two deployments, which were designated the Wasco line and the Warden line. The Wasco line (the southern half of the profile) extended from southeast of Wasco, Oregon to the Hanford Site. The Warden line (the northern part of the profile) extended from the Hanford Site to northeast of Warden, Washington.

Altogether 240 recordings sites were occupied along the transect by the USGS's portable, FM seismic cassette recorders (SCR's) described by Healy et



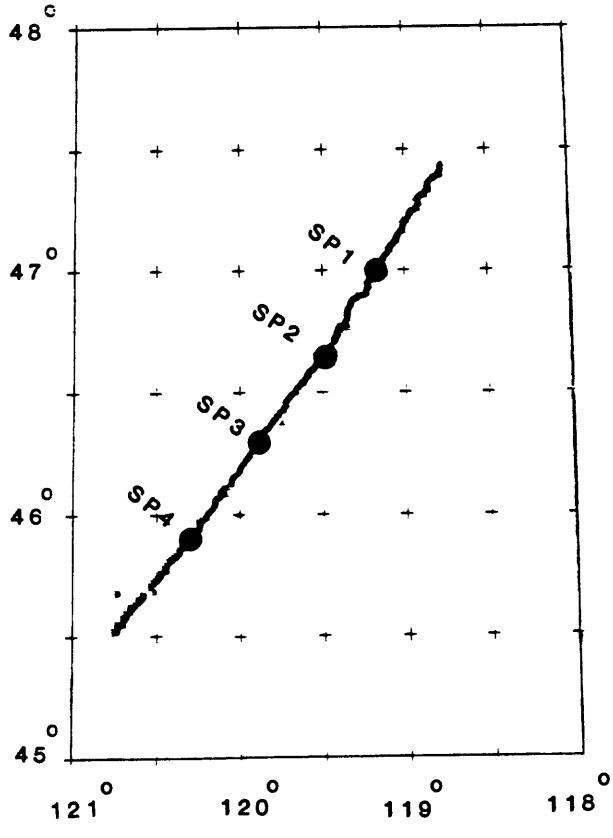


Figure 1: Geologic map and location map of shotpoints and recorders along the 1984 USGS central Columbia Plateau transect.

al., (1982). Average recorder site spacing ranged from 930 meters between the shotpoints to 1300 meters beyond the outermost shotpoints. A split-spread configuration was employed for each shotpoint, whereby seismographs were deployed northeast and southwest of each shotpoint. Sources were generated from a total of eight 900- to 2000-kg explosions located at four seperate shotpoints, spaced approximately 50 km apart (the two outer shot were located 60 km from the ends of the profile). Explosives 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 detonating cord, and tamped with approximately 20 meters of gravel. Explosives were detonated by an automated shooting system described by Healy et al. (1982). A signal from a reference chronometer triggered the shooting system by igniting a 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 explosion and cap break were instantaneous, shot times maintained an accuracy to within $\pm$ 2 milliseconds.

Recorder locations, shotpoint locations, and elevations, were determined from USGS orthophotographs (1:24000) and topographic maps (1:24000 and 1:62500) and are estimated to be accurate to with 10 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 Tables 1 & 2.

INSTRUMENTATION AND DATA REDUCTION

Seismic Recorders

The USGS seismic refraction recording system consists of an analog cassette tape recording system and a vertical-component, 2-Hz geophone (Figure 16). The seismic signal received by the geophone is diverted through three parallel amplifiers, each with an adjustable gain setting (0 to 104 db). The three amplified seismic signals, a constant reference frequency, and a internally generated time code (IRIG E) are recorded as a multiplexed signal in analog form on a 30-minute cassette tape (Figure 16). Each recorder contains a time code generator which allows pre-programming of ten seperate time windows.

Prior to the shot time, a pre-programmed micro-processor within the seismic recorder performs a geophone release test, an amplification step, and a calibration sequence consisting of a sine wave with a frequency of 10 Hz and amplitudes of 1, 10, 100, and 1000 microvolts. The response curve for the system peaks at approximately 20 Hz (Figure 17). The tests are recorded on the cassettes and can be referenced during processing for evaluation of

performance quality of the seismic recorder.

Data Reduction

Information pertaining to the performance of each SCR was recorded on field data sheets (Apendix A) and chronometer corrections were determined for each recorder assuming a linear drift rate. Twenty seconds of the recorded seismic data were converted from analog to digital format at a sampling rate of 2 miliseconds. 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 code (Appendix A). The information was entered into a micro-processor and stored on a floppy disk.

The record sections shown in (Figures 2-15) are plotted with a maximum trace amplitude normalized to a common value. Sections are presented with reducing velocities of 6.0 km/s (with and without variable area shading) and 7.4 km/s.

AKNOWLEDGEMENTS

We would like to thank Walter Mooney and the USGS seismic refraction field crew, Thomas Reed, Vicki Sutton, David James, Ed Criley, Ron Kaderabek, Janice Murphy, Lorraine Hwang, Bob Colburn, Pat Meador, Nan McGregor-Scott, Julie Shemeta, and Wendy Grant, for their technical support. We'd like to thank Ann Tolman, Al Rohay, and the people at Rockwell/Hanford for their assistance in obtaining permits and passes for the field work. We are indebted to J.H. Luetgert and W. Kohler for supplying their seismic processing software and suggestions.

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Barry, K.M., Cavers, D.A., and Kneale, C.W., 1975, Recommended standards for digital tape formats, Geophysics 40, 344-352 p.

Catchings, R.D., and Mooney, W.D., 1988, Crustal structure of the Columbia Plateau: Evidence for continental rifting, Jour. Geophys. Res., 93, 459-474 p.

Healy, J.H., Mooney, W.D., Blank, H.R., Gettings, M.E., Kohler, W.M., Lamson, R.J., and Leone, L.E., 1982, Saudi Arabian seismic deep-refraction profile: Final project report:, U.S. Geological Survey Open File Report USGS-of-02-37, 429 p.

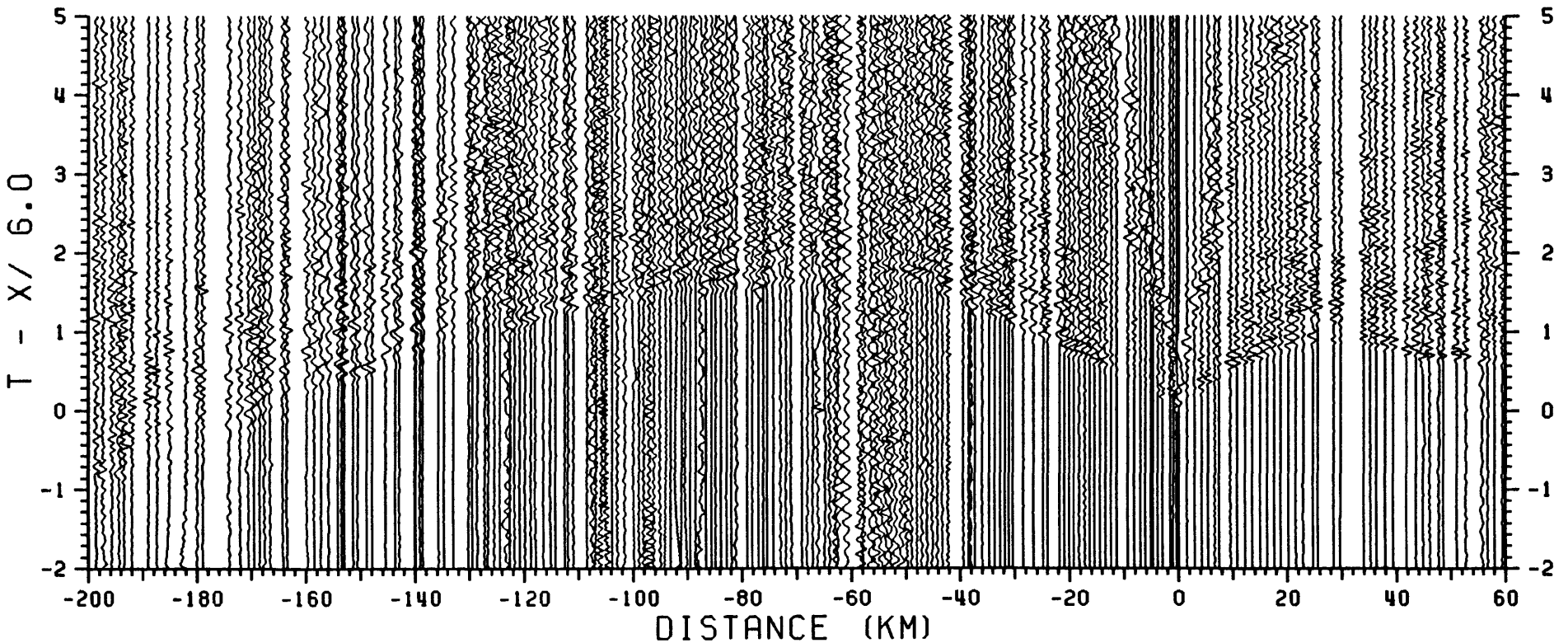


FIGURE 2: RECORD SECTION FROM THE 1984 CENTRAL COLUMBIA PLATEAU SEISMIC SURVEY

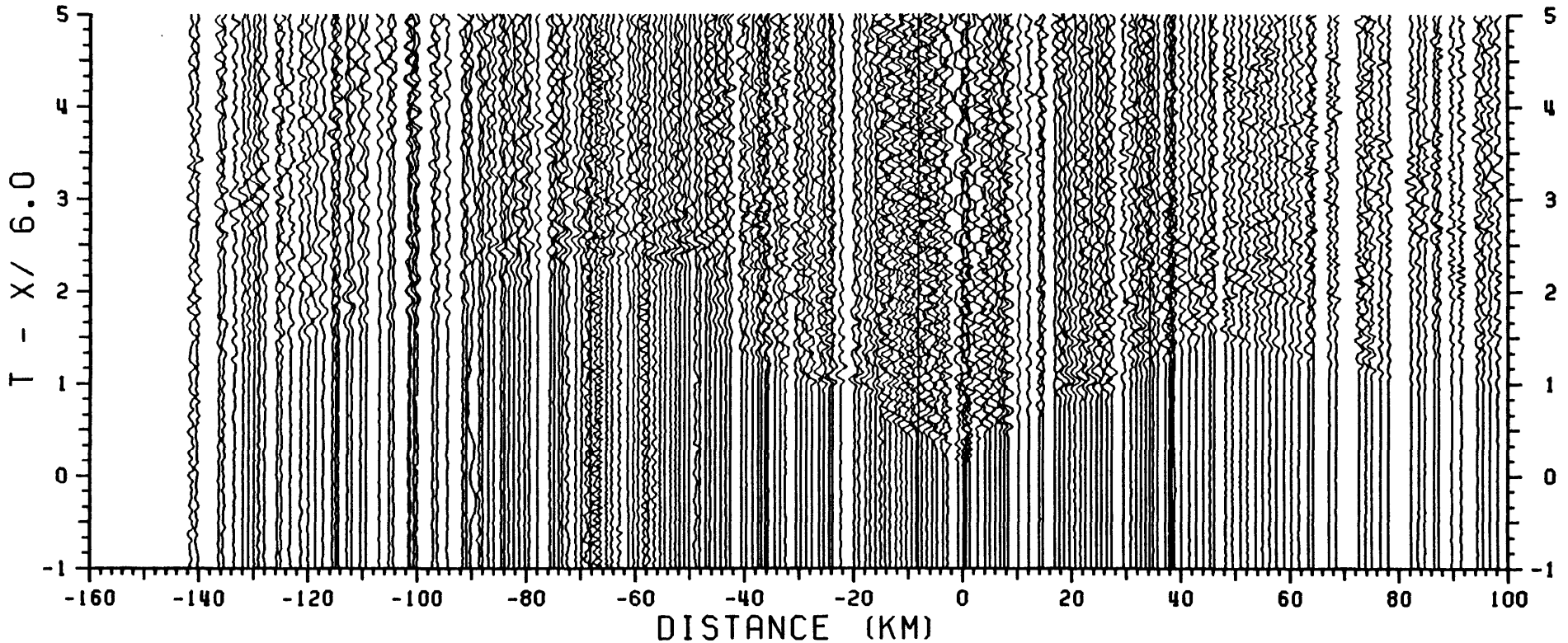
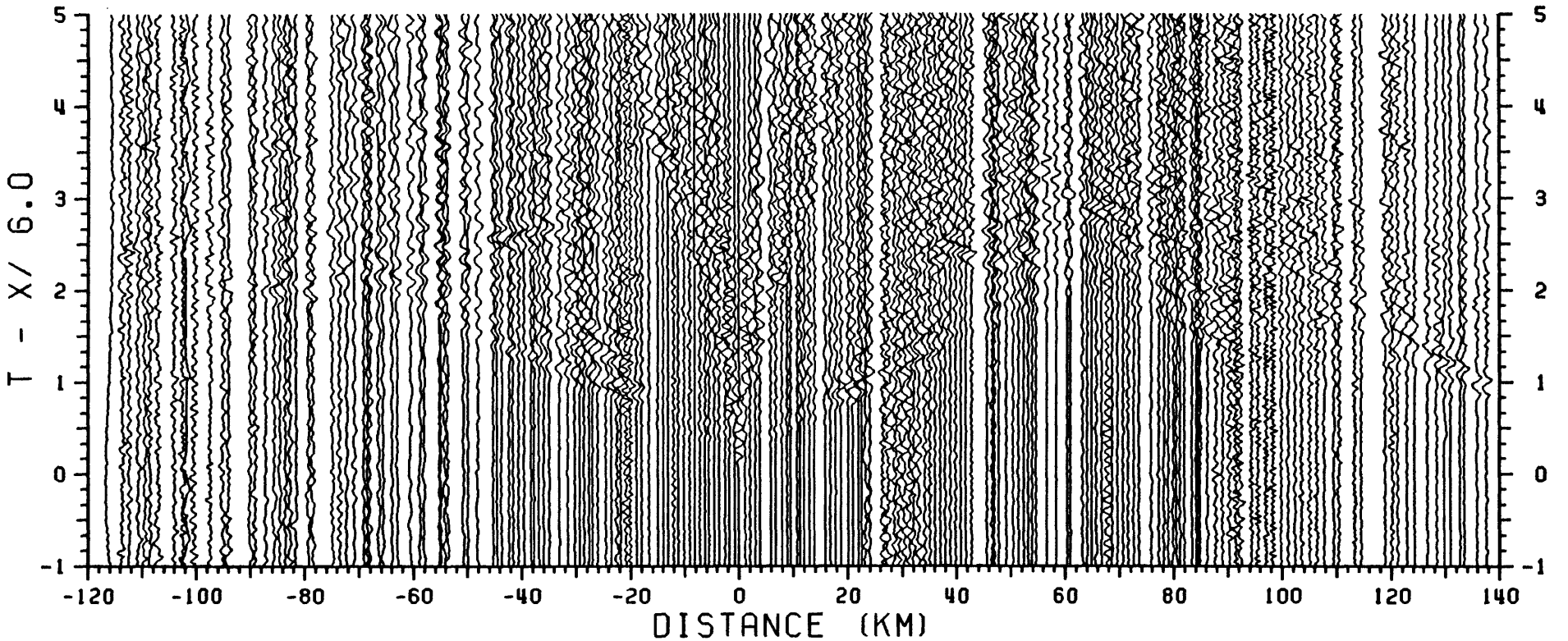
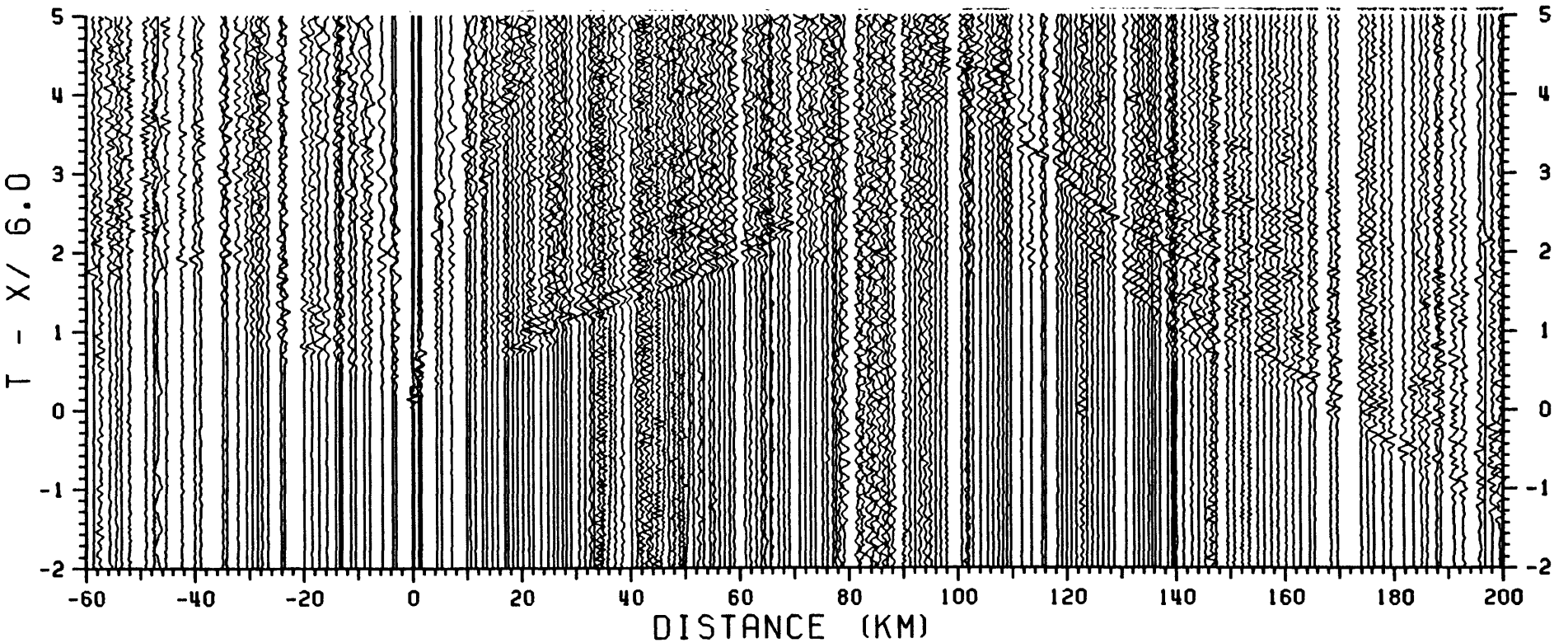


FIGURE 3: RECORD SECTION FROM THE 1984 CENTRAL COLUMBIA PLATEAU SEISMIC SURVEY



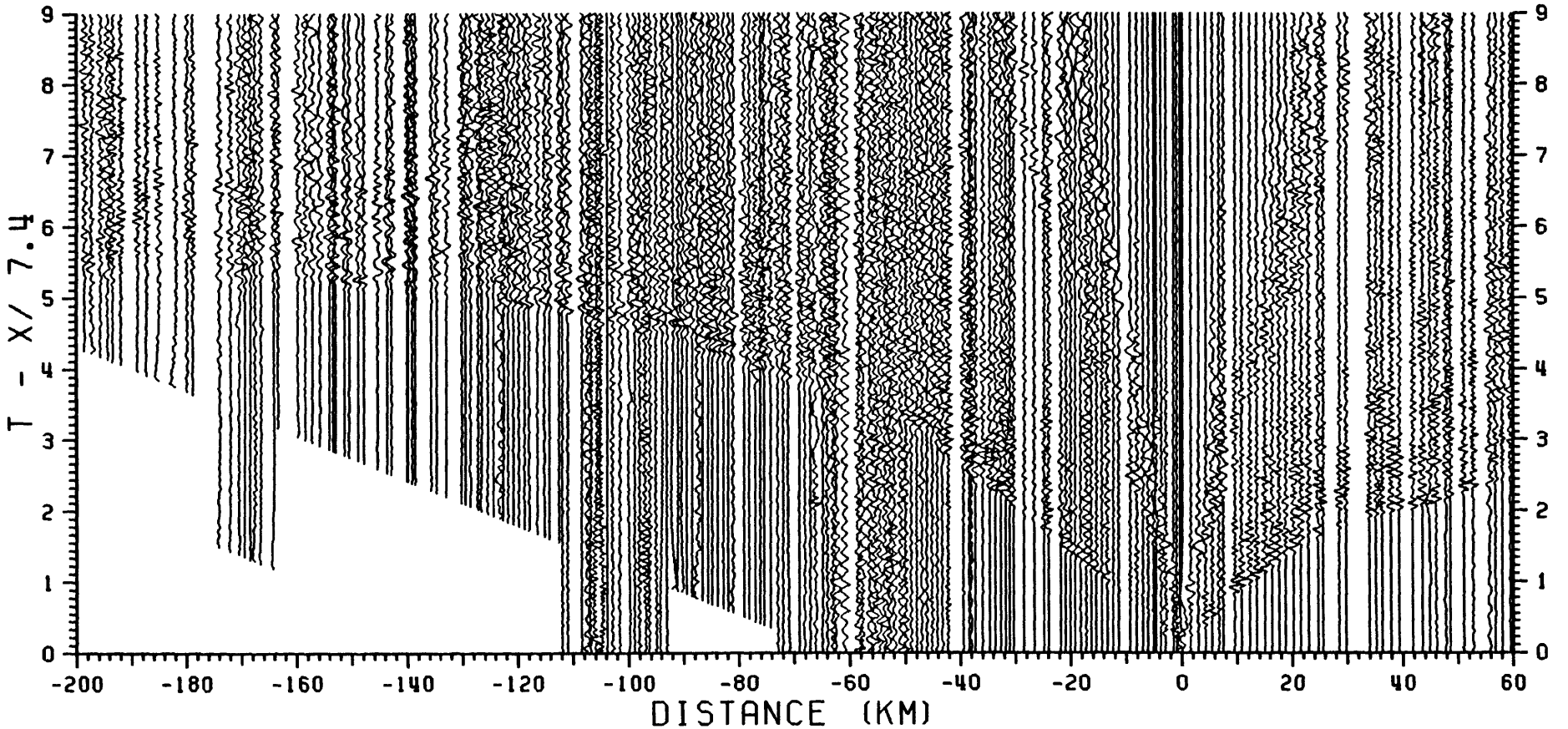
SHOTPOINT 3, SHOTS 2&7

FIGURE 4: RECORD SECTION FROM THE 1984 CENTRAL COLUMBIA PLATEAU SEISMIC SURVEY



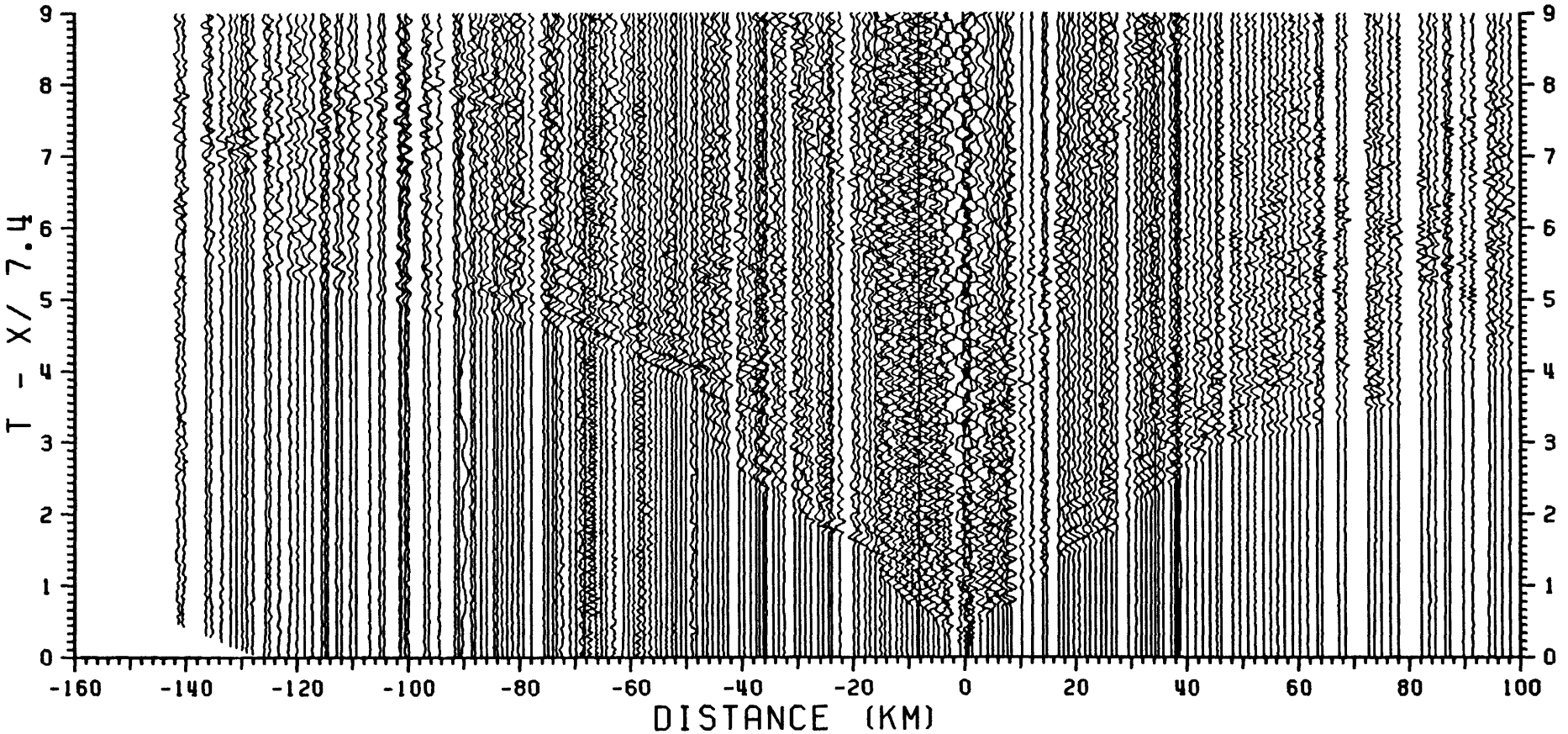
SHOTPOINT 4, SHOTS 3&8

FIGURE 5: RECORD SECTION FROM THE 1984 CENTRAL COLUMBIA PLATEAU SEISMIC SURVEY



SHOTPOINT 1, SHOTS 1&5 (REDUCED VELOCITY 7.4 km/s)

FIGURE 6: RECORD SECTION FROM THE 1984 CENTRAL COLUMBIA PLATEAU SEISMIC SURVEY



SHOTPOINT 2, SHOTS 4&6 (REDUCED VELOCITY 7.4 km/s)

FIGURE 7: RECORD SECTION FROM THE 1984 CENTRAL COLUMBIA PLATEAU SEISMIC SURVEY

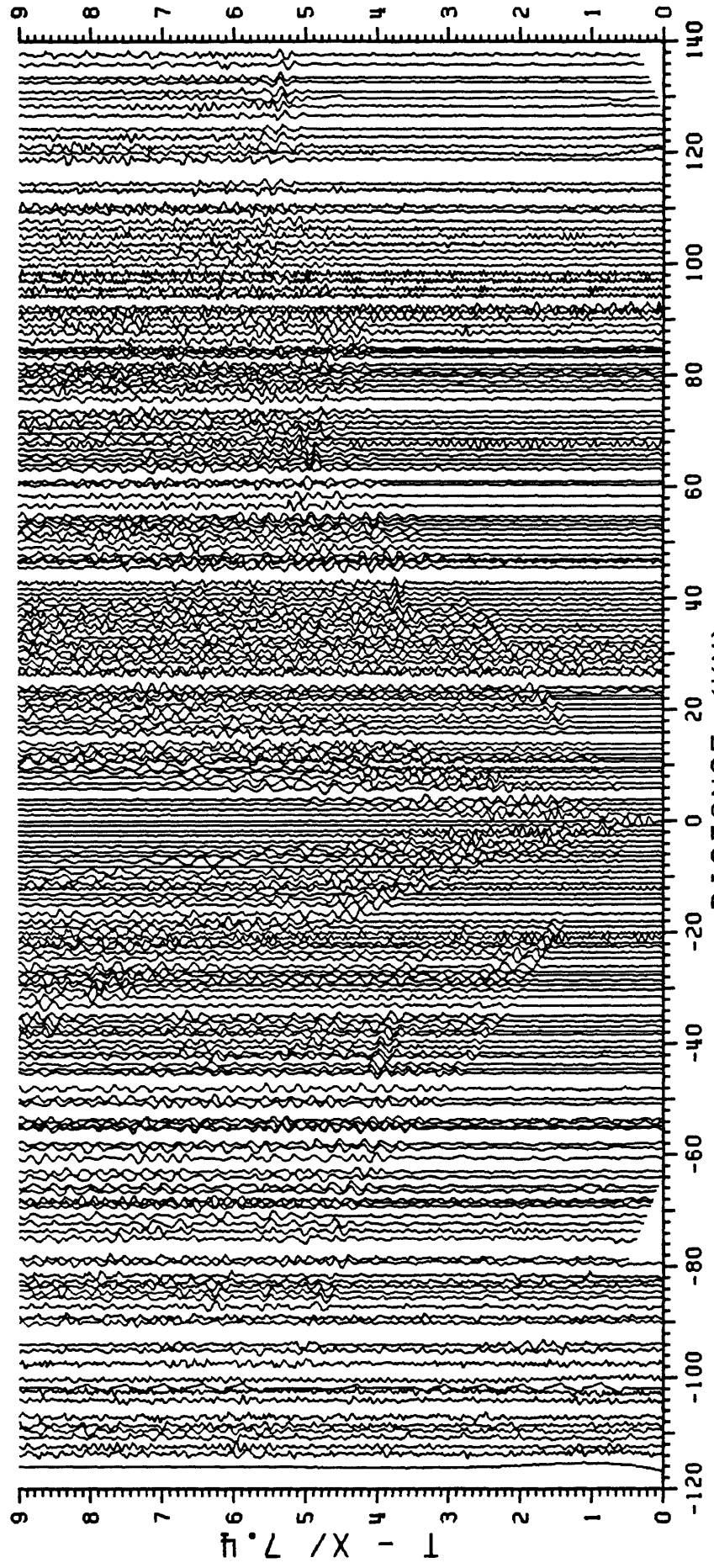
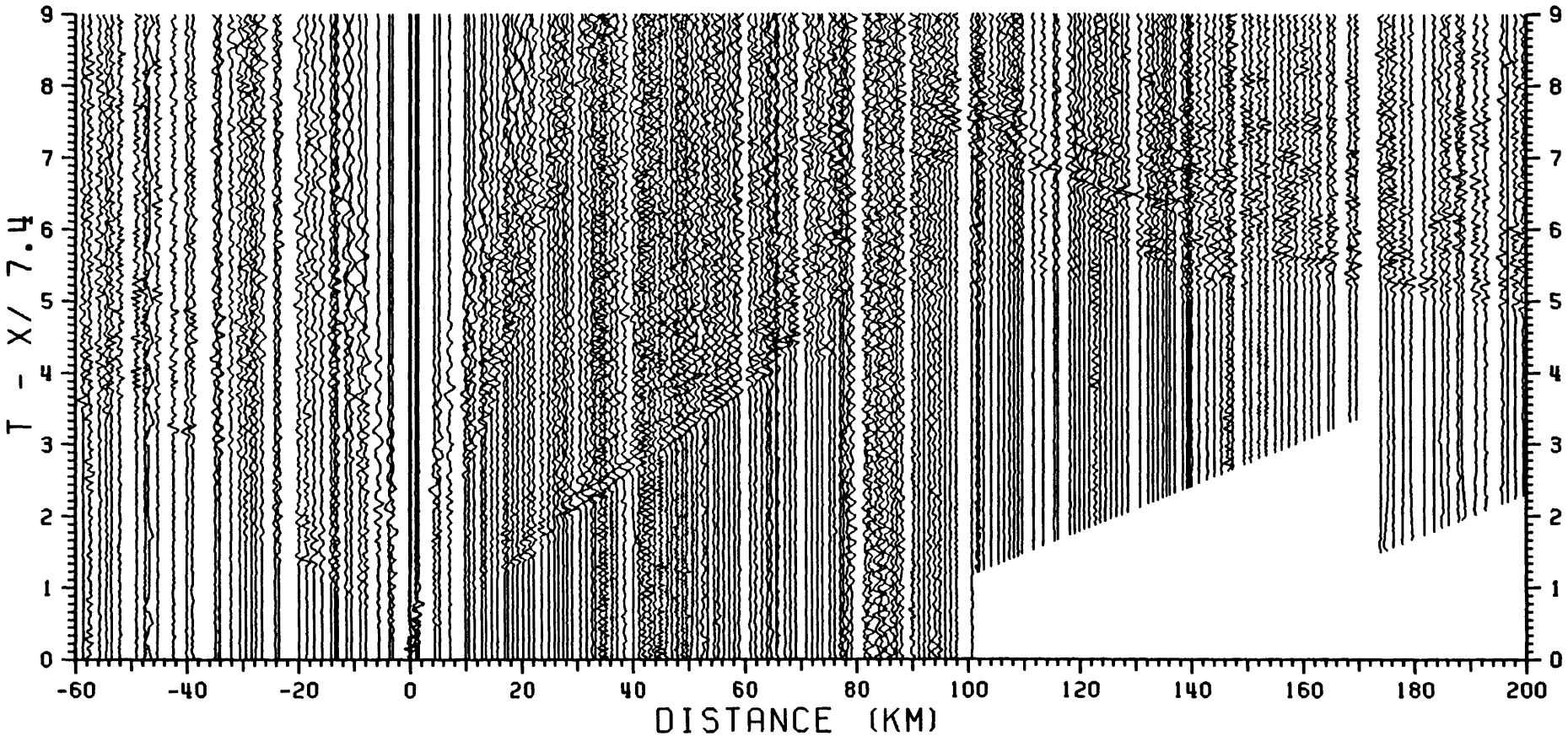
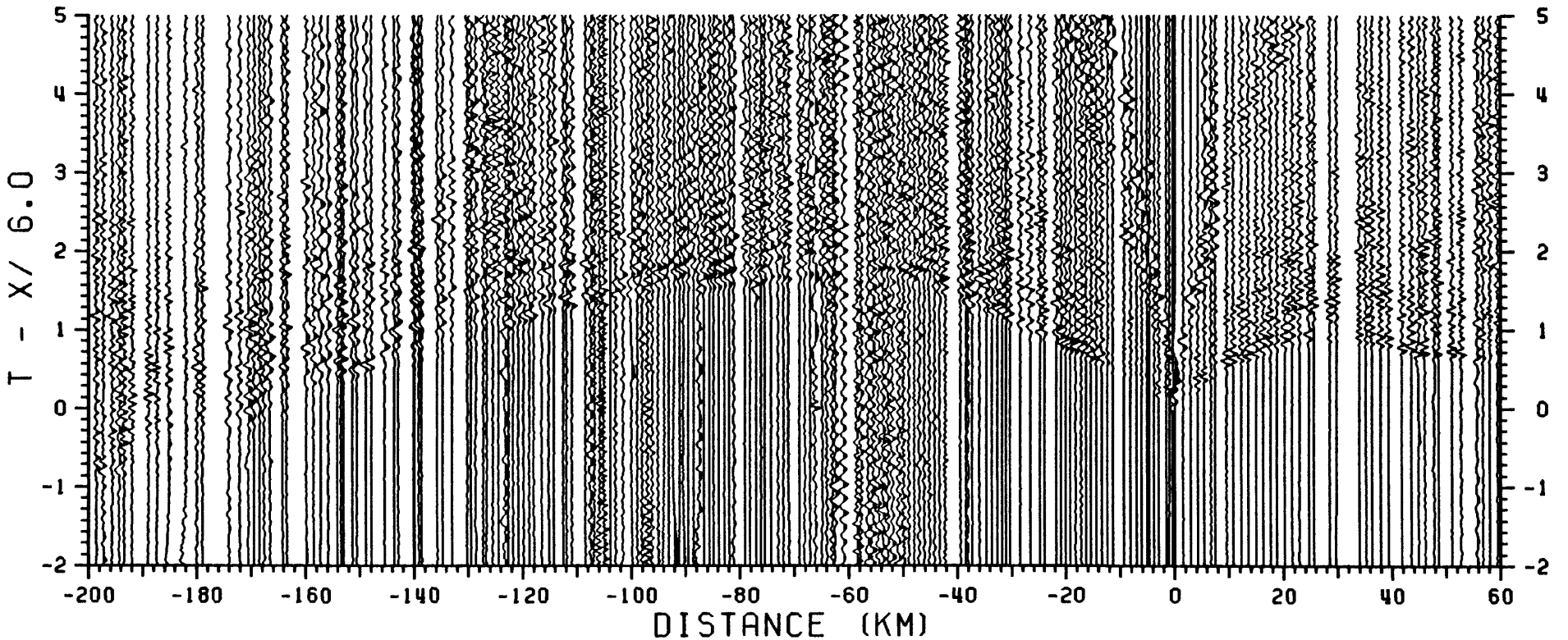


FIGURE 8: RECORD SECTION FROM THE 1984 CENTRAL COLUMBIA PLATEAU SEISMIC SURVEY



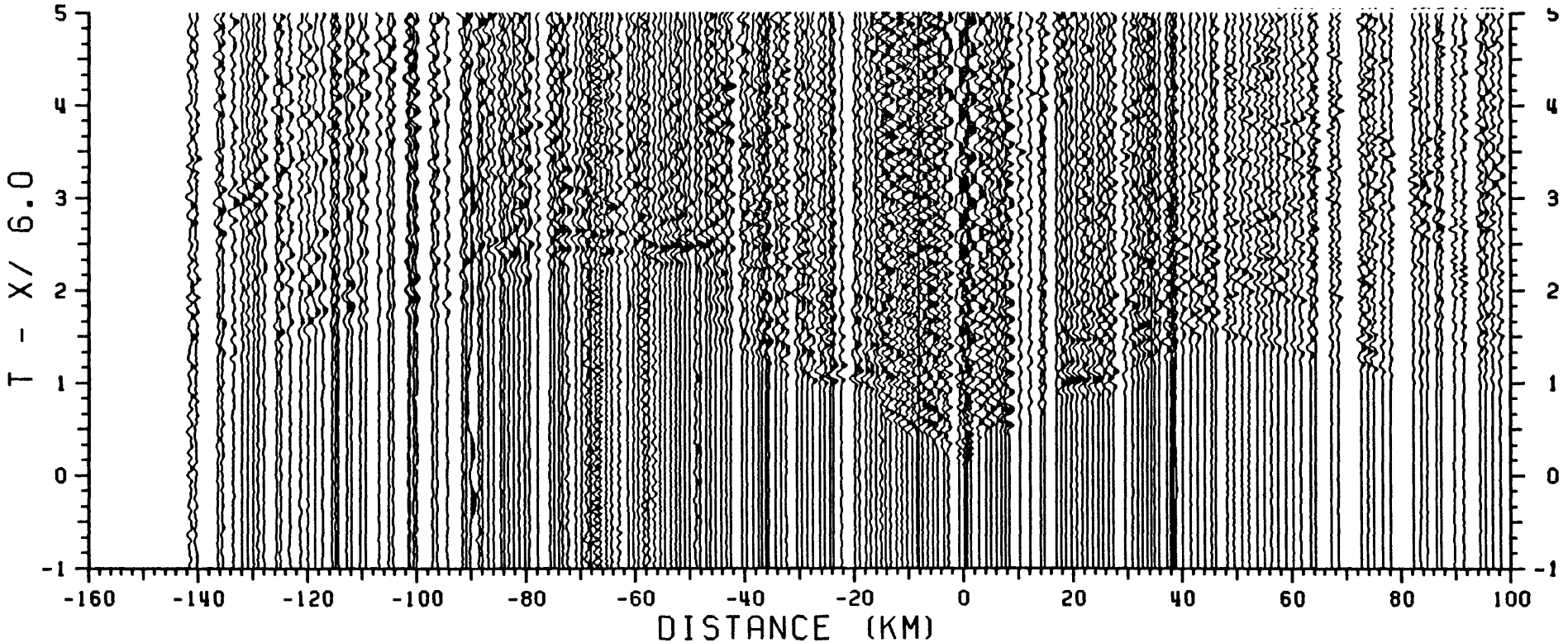
SHOTPOINT 4, SHOTS 3&8 (REDUCED VELOCITY 7.4 km/s)

FIGURE 9: RECORD SECTION FROM THE 1984 CENTRAL COLUMBIA PLATEAU SEISMIC SURVEY



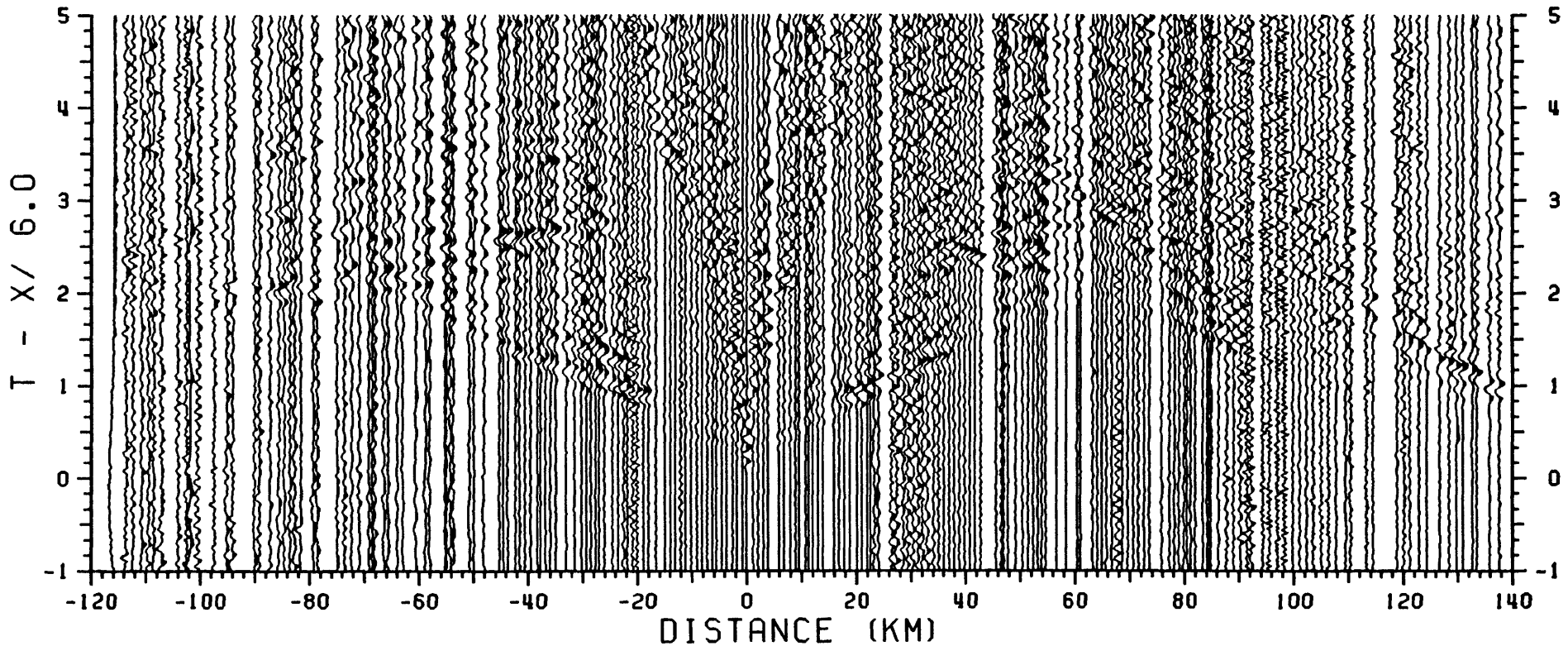
SHOTPOINT 1, SHOTS 1&5 (VARIABLE AREA)

FIGURE 10: RECORD SECTION FROM THE 1984 CENTRAL COLUMBIA PLATEAU SEISMIC SURVEY



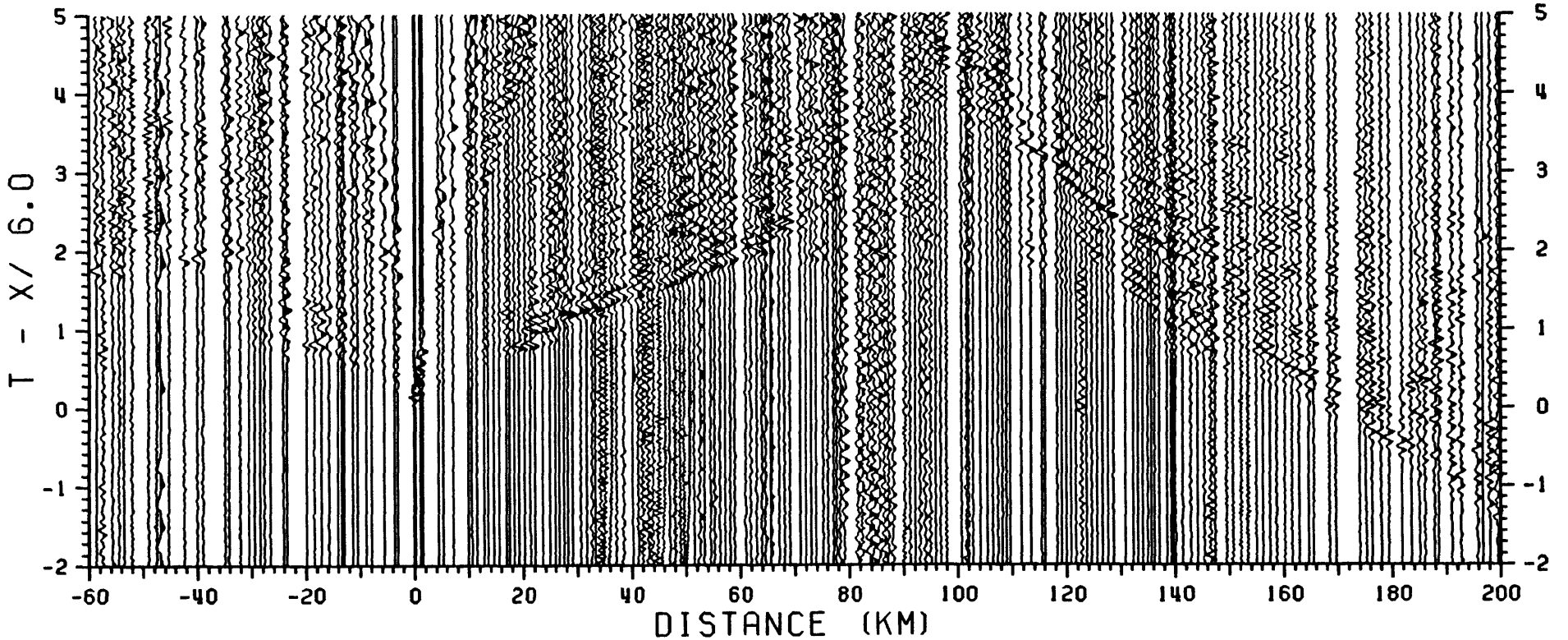
SHOTPOINT 2, SHOTS 4&6 (VARIABLE AREA)

FIGURE 11: RECORD SECTION FROM THE 1984 CENTRAL COLUMBIA PLATEAU SEISMIC SURVEY



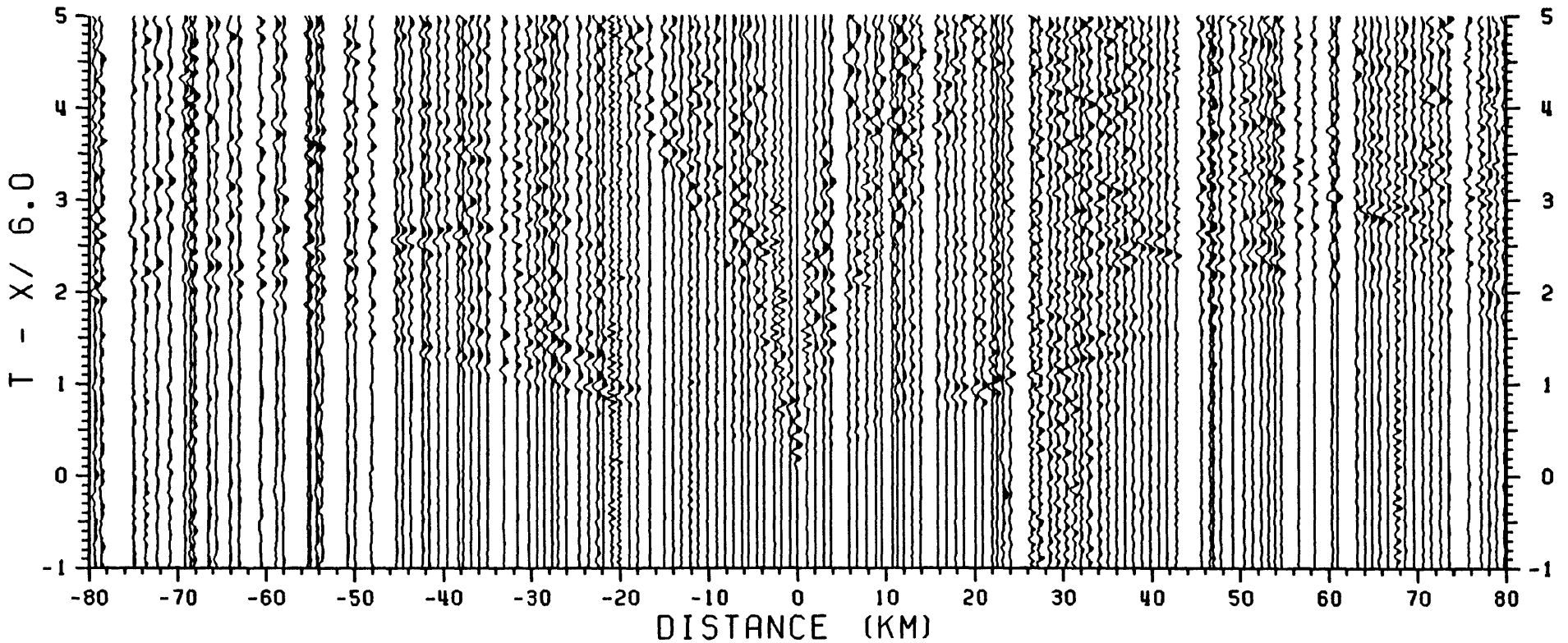
SHOTPOINT 3, SHOTS 2&7 (VARIABLE AREA)

FIGURE 12: RECORD SECTION FROM THE 1984 CENTRAL COLUMBIA PLATEAU SEISMIC SURVEY



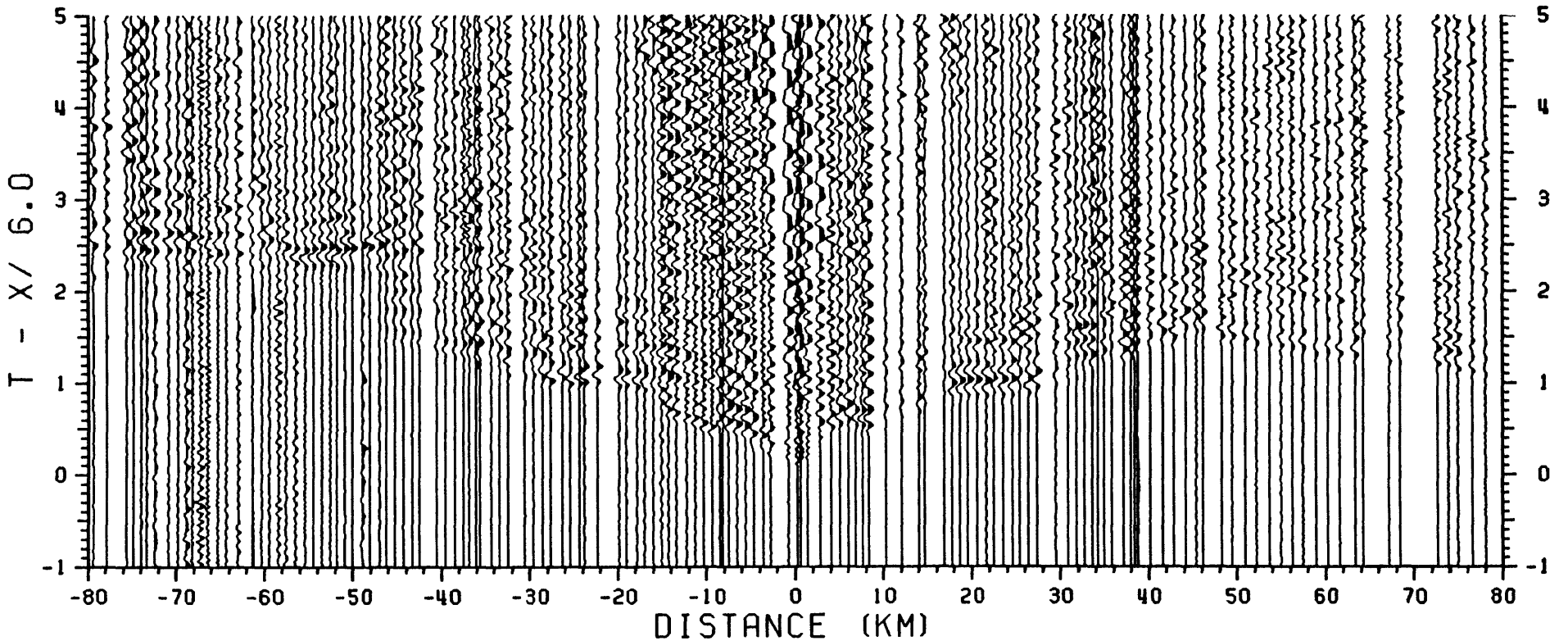
SHOTPOINT 4, SHOTS 3&8 (VARIABLE AREA)

FIGURE 13: RECORD SECTION FROM THE 1984 CENTRAL COLUMBIA PLATEAU SEISMIC SURVEY



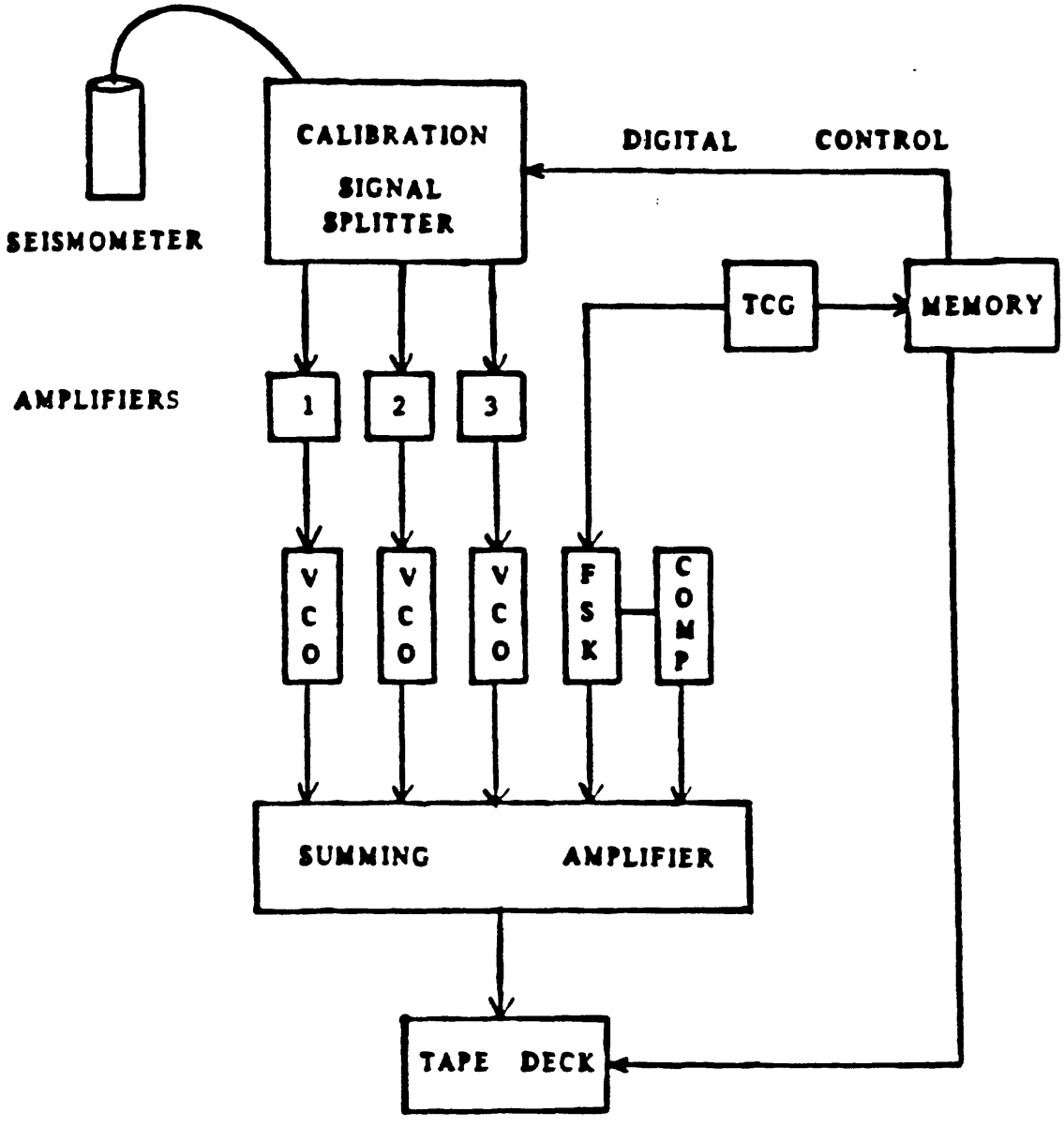
SHOTPOINT 2, SHOTS 4&6 (UPPER CRUSTAL VARIABLE AREA)

FIGURE 14: RECORD SECTION FROM THE 1984 CENTRAL COLUMBIA PLATEAU SEISMIC SURVEY



SHOTPOINT 3, SHOTS 2&7 (UPPER CRUSTAL VARIABLE AREA)

FIGURE 15: RECORD SECTION FROM THE 1984 CENTRAL COLUMBIA PLATEAU SEISMIC SURVEY



COMP = TAPE SPEED TONE GENERATOR
FSK = FREQUENCY SHIFT KEYING
TCG = TIME CODE GENERATOR
VCO = VOLTAGE-CONTROLLED OSCILLATOR

Figure 16: Schematic diagram of seismic recorders.

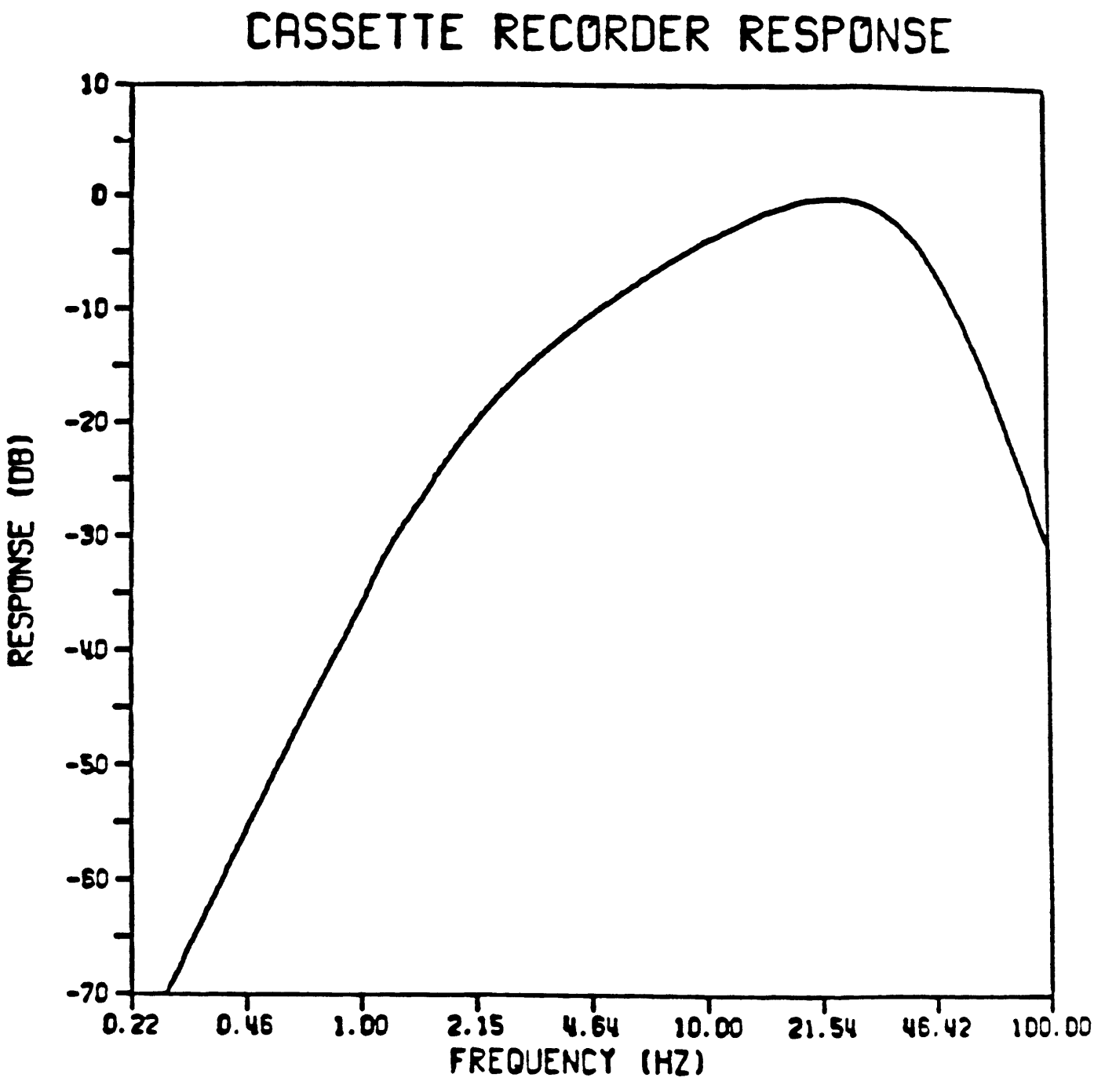


Figure 17: System Response Curve for cassette recording units with 2-Hz seismometers.

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

MASTER SHOT LIST (SHOT LOCATIONS AND TIMES)

HANFORD 1984

SHOT	SHOTPOINT	DATE	LATITUDE (East)	LONGITUDE (North)	SHOT TIME DAY HR MN SEC
1	1	AUG., 19, 1984	46 58.2372	119 11.7467	232 10 59 59.989
2	3	AUG., 19, 1984	46 20.8768	119 50.2982	232 11 04 00.011
3	4	AUG., 19, 1984	45 56.4471	120 14.7771	232 11 06 00.016
4	2	AUG., 19, 1984	46 40.5734	119 27.9662	232 11 32 00.010
5	1	AUG., 23, 1984	46 58.2372	119 11.7467	236 09 00 00.014
6	2	AUG., 23, 1984	46 40.5734	119 27.9662	236 09 02 00.012
7	3	AUG., 23, 1984	46 20.8768	119 50.2982	236 09 04 00.015
8	4	AUG., 23, 1984	45 56.4471	120 14.7771	236 09 06 00.012

TABLE 2

Seismic Recorder Locations

Table 2 contains a listing of the seismic recorder locations. Included are location numbers of the seismic recorder sites, the latitude and longitude in degrees, minutes, and seconds, and the elevation of the seismic recorder site in feet.

U.S.G.S. SEISMIC STATION LOCATIONS

HANFORD 1984

LOCATION NUMBER	LATITUDE (DEG,MIN,SEC)	LONGITUDE (DEG,MIN,SEC)	ELEV	NOTES
1	45 31 9.0	120 44 54.4	2060	
2	45 31 17.0	120 43 41.8	2045	
3	45 32 3.6	120 43 41.8	900	
4	45 32 53.3	120 43 39.8	1725	
5	45 32 51.2	120 41 28.3	1680	
6	45 33 44.6	120 41 36.0	1485	
7	45 34 20.9	120 41 32.6	1485	
8	45 34 45.1	120 40 24.7	1485	
9	45 35 30.5	120 40 43.0	1475	
10	45 36 3.1	120 38 59.4	1440	
11	45 37 9.6	120 39 2.9	1400	
12	45 37 3.1	120 38 2.6	1450	
13	45 37 40.9	120 37 15.9	1520	
14	45 38 22.9	120 36 6.3	1340	
15	45 38 57.1	120 35 58.0	1335	
16	45 39 8.9	120 35 0.7	1150	
17	45 39 50.5	120 34 38.4	1080	
18	45 40 16.1	120 34 10.9	1060	
19	45 40 45.6	120 43 37.6	290	
20	45 41 7.9	120 30 33.5	150	
21	45 42 20.7	120 31 51.2	380	
22	45 43 8.9	120 30 49.5	400	
23	45 43 46.0	120 29 57.0	1000	
24	45 44 4.8	120 29 15.0	1000	
25	45 44 30.7	120 28 44.5	1200	
26	45 45 4.7	120 28 44.9	1288	
27	45 45 29.5	120 28 8.7	1363	
28	45 46 3.4	120 26 12.2	520	
29	45 46 47.6	120 26 40.5	540	
30	45 47 32.0	120 25 56.4	2180	
31	45 48 20.1	120 24 56.7	2240	
32	45 48 49.7	120 24 9.2	2400	
33	45 49 21.9	120 23 28.1	2605	
34	45 49 47.9	120 22 29.9	2500	
35	45 50 33.2	120 21 44.7	2200	
36	45 51 6.4	120 21 23.7	2050	
37	45 51 49.1	120 20 40.7	2260	
38	45 52 0.2	120 19 56.7	2250	
39	45 52 49.0	120 19 24.7	2320	
40	45 53 2.4	120 18 31.0	2410	
41	45 53 44.9	120 18 28.2	2500	
42	45 54 30.0	120 18 11.4	2550	
43	45 55 2.3	120 16 53.6	2630	
44	45 55 34.6	120 16 56.0	2660	
45	45 56 4.8	120 16 56.3	2680	
46	45 56 29.0	120 14 43.3	2700	
47	45 57 11.9	120 14 25.8	2700	
48	45 57 40.7	120 14 24.9	2760	
49	45 58 10.0	120 14 24.3	2780	
50	45 58 30.0	120 13 9.4	2730	

U.S.G.S. SEISMIC STATION LOCATIONS

HANFORD 1984

LOCATION NUMBER	LATITUDE (DEG,MIN,SEC)	LONGITUDE (DEG,MIN,SEC)	ELEV	NOTES
51	45 58 55.5	120 12 54.5	2700	
52	45 59 13.9	120 11 54.7	2680	
53	45 59 40.4	120 11 54.6	2680	
54	46 0 7.4	120 11 54.3	2700	
55	46 0 25.1	120 11 4.6	2660	
56	46 0 53.2	120 10 37.3	2620	
57	46 1 10.7	120 10 18.3	2640	
58	46 1 35.1	120 9 56.3	2600	
59	46 2 4.6	120 9 4.8	2640	
60	46 2 27.7	120 8 58.9	2620	
61	46 3 0.3	120 8 38.0	2660	
62	46 3 41.2	120 8 39.0	2720	
63	46 4 2.1	120 7 39.6	2660	
64	46 4 13.9	120 7 16.0	2620	
65	46 4 40.8	120 7 1.5	2520	
66	46 5 10.5	120 6 47.0	2380	
67	46 5 49.7	120 6 47.0	2120	
68	46 6 14.1	120 6 13.5	2020	
69	46 6 28.2	120 5 35.2	1960	
70	46 4 60.0	120 5 0.0	1900	
71	46 6 48.0	120 4 13.8	1900	
72	46 7 17.2	120 3 30.6	2060	
73	46 7 38.2	120 2 55.7	1850	
74	46 8 5.7	120 2 48.0	1450	
75	46 8 36.1	120 2 38.0	1200	
76	46 9 1.3	120 2 37.8	1050	
77	46 9 23.1	120 2 5.4	960	
78	46 9 51.6	120 1 3.6	870	
79	46 10 15.9	120 0 26.9	840	
80	46 10 42.2	119 59 58.3	807	
81	46 11 6.5	119 59 56.4	770	
82	46 11 37.9	119 59 44.3	750	
83	46 12 0.6	119 59 21.3	729	
84	46 12 28.8	119 58 50.4	700	
85	46 12 53.3	119 58 23.7	700	
86	46 13 26.8	119 57 41.7	680	
87	46 13 46.8	119 57 23.8	660	
88	46 14 12.2	119 57 2.5	680	
89	46 14 33.9	119 56 25.6	750	
90	46 15 4.3	119 56 15.5	825	
91	46 15 30.7	119 55 46.3	800	
92	46 15 55.6	119 55 29.2	750	
93	46 16 22.0	119 54 54.4	780	
94	46 16 44.9	119 54 15.6	780	
95	46 17 14.8	119 54 1.7	839	
96	46 17 41.3	119 53 36.7	903	
97	46 18 4.6	119 53 6.7	900	
98	46 18 21.1	119 52 40.6	960	
99	46 17 38.9	119 52 21.8	1200	
100	46 19 23.2	119 52 19.6	1250	

U.S.G.S. SEISMIC STATION LOCATIONS

HANFORD 1984

LOCATION NUMBER	LATITUDE (DEG,MIN,SEC)	LONGITUDE (DEG,MIN,SEC)	ELEV	NOTES
101	46 19 40.4	119 51 24.5	1300	
102	46 20 4.7	119 51 9.8	1300	
103	46 20 43.1	119 50 55.4	1400	
105	46 20 54.9	119 50 19.2	1510	
106	46 21 17.9	119 49 47.3	1655	
107	46 21 41.7	119 49 19.7	1810	
108	46 22 7.8	119 48 54.1	1960	
109	46 22 31.1	119 48 35.8	2070	
110	46 22 58.4	119 48 11.1	2180	
111	46 23 21.1	119 47 36.2	2370	
112	46 23 43.5	119 47 6.4	2490	
113	46 24 12.8	119 46 37.6	2645	
114	46 24 29.9	119 45 53.9	2720	
115	46 24 55.6	119 45 53.0	2770	
116	46 22 30.4	119 44 39.0	2900	
117	46 25 44.7	119 44 11.1	2360	
118	46 26 18.3	119 44 3.0	1900	
119	46 26 35.8	119 43 22.5	1730	
120	46 27 4.0	119 42 51.6	1480	
121	46 27 46.9	119 43 12.4	1180	
122	46 28 17.2	119 42 49.8	1120	
123	46 28 42.0	119 42 19.1	900	
124	46 29 4.6	119 41 51.4	805	
125	46 29 32.4	119 41 1.1	680	
126	46 29 45.8	119 40 20.6	635	
127	46 30 1.0	119 39 26.9	610	
128	46 30 25.3	119 39 28.6	640	
129	46 30 51.6	119 39 26.3	630	
130	46 31 7.8	119 38 55.5	620	
131	46 31 50.3	119 38 2.7	610	
132	46 32 14.2	119 37 50.9	660	
133	46 33 25.4	119 36 21.4	730	
134	46 33 46.7	119 35 46.8	725	
135	46 34 2.3	119 35 2.7	700	
136	46 34 40.7	119 35 15.3	620	
137	46 34 57.5	119 34 40.3	560	
138	46 35 21.7	119 33 55.4	555	
139	46 35 43.5	119 33 24.0	560	
140	46 36 9.4	119 32 58.7	460	
141	46 36 41.2	119 32 45.8	440	
142	46 37 6.5	119 32 22.8	550	
143	46 37 27.1	119 31 47.6	520	
144	46 37 50.0	119 31 16.7	520	
145	46 38 12.9	119 30 46.4	510	
146	46 38 34.5	119 30 16.4	455	
147	46 39 4.0	119 29 49.5	460	
148	46 39 21.5	119 29 16.5	470	
149	46 39 42.1	119 28 39.9	470	
150	46 40 11.1	119 28 18.6	480	
151	46 40 32.4	119 28 5.3	491	

U.S.G.S. SEISMIC STATION LOCATIONS

HANFORD 1984

LOCATION NUMBER	LATITUDE (DEG,MIN,SEC)	LONGITUDE (DEG,MIN,SEC)	ELEV	NOTES
152	46 40 0.0	119 25 23.0	550	
153	46 42 56.8	119 25 28.0	575	
154	46 43 26.7	119 25 20.6	600	
155	46 43 55.1	119 24 57.2	650	
156	46 44 17.5	119 24 25.3	710	
157	46 45 1.6	119 24 26.9	720	
158	46 45 8.1	119 23 30.2	780	
159	46 45 59.3	119 24 1.5		
160	46 45 54.0	119 22 31.8		
161	46 45 44.5	119 20 50.5		
162	46 46 19.9	119 20 54.0	1220	
163	46 47 12.6	119 21 47.0	1740	
164	46 47 44.9	119 21 11.6	1060	
165	46 48 9.8	119 20 43.6	670	
166	46 48 44.6	119 20 43.5	640	
167	46 49 17.4	119 20 43.2	650	
168	46 49 50.8	119 20 43.4	660	
169	46 50 24.3	119 20 33.9	650	
170	46 50 53.6	119 20 7.9	640	
171	46 51 16.7	119 19 44.9	680	
172	46 51 47.3	119 19 27.2	710	
173	46 52 23.4	119 19 19.8	760	
174	46 52 39.5	119 18 37.4	760	
175	46 52 52.0	119 17 35.4	780	
176	46 53 19.9	119 17 16.8	830	
177	46 53 27.4	119 16 2.3	880	
178	46 53 41.5	119 15 0.0	859	
179	46 54 1.7	119 13 45.7	840	
180	46 54 39.8	119 13 46.9	857	
181	46 55 11.7	119 13 44.0	850	
182	46 55 38.9	119 13 23.2	870	
183	46 55 46.6	119 12 47.5	1040	
184	46 56 22.9	119 13 7.7	1025	
185	46 57 0.1	119 13 17.4	990	
186	46 57 23.8	119 12 10.1	1040	
187	46 57 39.6	119 11 36.1	1119	
188	46 58 3.4	119 11 55.9	1138	
189	46 58 13.8	119 11 44.6	1136	
190	46 59 2.2	119 11 34.9	450	
191	46 59 22.5	119 10 13.1	1132	
192	46 59 50.6	119 9 12.6	1134	
193	47 0 49.0	119 9 45.8	1132	
194	47 1 15.4	119 8 59.2	1130	
195	47 1 42.6	119 8 53.5	1150	
196	47 2 34.1	119 7 45.1	1155	
197	47 3 11.2	119 7 25.4	1180	
198	47 3 46.6	119 6 34.8	1160	
199	47 4 19.0	119 5 57.9	1200	
200	47 4 55.1	119 5 6.9	1220	
201	47 5 44.3	119 5 9.5	1260	

U.S.G.S. SEISMIC STATION LOCATIONS

HANFORD 1984

LOCATION NUMBER	LATITUDE (DEG,MIN,SEC)	LONGITUDE (DEG,MIN,SEC)	ELEV	NOTES
202	47 6 16.5	119 4 31.9	1300	
203	47 6 46.9	119 3 53.1	1370	
204	47 7 9.4	119 2 36.4	1390	
205	47 8 0.8	119 2 35.8	1370	
206	47 8 42.9	119 2 13.4	1380	
207	47 9 34.6	119 0 23.4	1380	
208	47 9 26.3	119 1 19.9	1325	
209	47 10 26.5	119 0 22.6	1370	
210	47 11 19.8	118 59 58.5	1478	
211	47 12 5.2	118 59 57.6	1480	
212	47 12 11.1	118 59 3.9	1500	
213	47 12 58.7	118 58 24.9	1500	
214	47 13 52.4	118 57 47.3	1520	
215	47 14 29.0	118 57 26.8	1325	
216	47 14 41.3	118 56 18.3	1320	
217	47 15 8.4	118 54 56.9	1320	
218	47 16 3.7	118 54 52.6	1300	
219	47 16 33.2	118 54 14.8	1600	
220	47 17 37.0	118 54 52.0	1550	
221	47 18 18.0	118 53 55.2	1390	
222	47 18 29.0	118 52 18.6	1400	
223	47 19 13.0	118 52 16.6	1410	
224	47 19 38.2	118 50 44.8	1420	
225	47 20 10.5	118 50 44.7	1400	
226	47 20 55.6	118 50 54.6	1450	
227	47 21 43.7	118 50 44.8	1420	
228	47 22 21.5	118 49 39.1	1700	
229	47 22 49.0	118 48 44.8	1770	
230	47 23 17.9	118 47 25.8	1870	
231	47 23 31.0	118 46 25.8	1920	
232	47 24 27.1	118 46 40.8	1980	
233	47 25 10.6	118 46 17.8	2010	
234	47 25 54.9	118 46 16.4	1500	
500	45 56 25.9	120 14 54.4	1600	
501	45 56 58.4	120 14 42.2	1800	
502	46 40 36.4	119 27 50.0	1850	
503	46 40 45.5	119 27 41.8	1570	
504	46 41 4.8	119 27 12.3	1870	
505	46 41 35.1	119 26 24.7	1960	
506	46 42 4.5	119 25 41.1	2100	
507	45 50 51.8	120 21 29.6	2100	
508	46 59 46.0	119 9 20.2	1080	
509	46 25 29.8	119 44 15.0	2120	
510	46 32 52.6	119 36 26.7	720	
511	46 32 15.6	119 36 48.7	680	
512	46 41 35.7	119 26 24.7	680	
513	46 42 4.5	119 25 41.1	680	
514	46 42 35.8	119 25 24.3	680	
515	46 43 7.6	119 25 8.1	680	
516	46 43 36.6	119 24 60.0	680	

U.S.G.S. SEISMIC STATION LOCATIONS

HANFORD 1984

LOCATION NUMBER	LATITUDE (DEG,MIN,SEC)	LONGITUDE (DEG,MIN,SEC)	ELEV	NOTES
517	46 44 0.2	119 24 47.6	680	
518	46 41 5.8	119 27 13.5	380	
519	46 40 47.0	119 27 41.8	380	
520	46 40 37.4	119 27 49.2	400	
600	46 0 0.0	120 0 0.0	420	
1001	46 58 14.2	119 11 44.8	1300	
1002	46 40 34.4	119 27 58.0	420	
1003	46 20 52.6	119 50 17.9	1000	
1004	45 56 26.8	120 14 46.6	700	

APPENDIX A

TAPE GRADE CODE

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

DKDAT DATA FILE

DKDAT data file is organized by team-shots, and listed in the order that they were fired (Shot Number). A team-shot is twenty recordings for each shot accomplished by each of six teams. Header information for each team-shot includes team numbers, shot numbers, shotpoint numbers, and shot times. Information formatted in columns includes station location number (LOC), distance from the shot (DIST; in km), azimuths (AZIM; in degrees from North), unit numbers (UNIT), chronometer corrections (CHRON; in milliseconds; these subtracted from chronometer readings during digitization), channel digitized and gain settings of the three channels (C1, C2, C3), and tape codes.

TAPE GRADE CODES

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

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 1 Shot point1001 Team 1
Shot time: 232:10:59:59.989

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	37	151.464	216.1	1	17	2	30	12	48	0
2	36	153.075	216.1	2	25	2	30	12	48	0
3	35	154.176	216.0	3	11	2	30	12	48	0
4	34	155.881	216.0	4	-92	2	30	12	48	0
5	33	157.262	216.2	5	17	2	30	12	48	0
6	32	158.585	216.3	6	10	2	30	12	48	0
7	31	159.923	216.4	7	-28	2	30	12	48	0
8	30	161.884	216.4	8	12		30	12	48	29
9	29	163.553	216.4	9	57	2	30	12	48	0
10	28	164.311	216.0	10	-31	2	30	12	48	0
11	27	166.621	216.5	11	-27		30	12	48	0
12	26	167.698	216.5	12	7		30	12	48	12
13	25	168.550	216.3	13	20		30	12	48	0
14	24	169.582	216.4	14	27		30	12	48	0
15	23	170.581	216.5	15	-91		30	12	48	0
16				16	-11		30	12	48	21
17	21	174.162	216.7	17	30		30	12	48	0
18	22	172.176	216.6	18	0		30	12	48	0
19	117	73.032	214.7	19	11		30	12	48	0
20	118	72.080	215.0	20	-33		30	12	48	6

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 1 Shot point1001 Team 2
Shot time: 232:10:59:59.989

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	54	132.248	215.6	21	7		30	12	48	28
2	53	132.936	215.4	22	-2	2	30	12	48	0
3	52	133.609	215.2	23	6		30	12	48	1
4	51	134.807	215.5	24	-17	3	30	12	48	0
5	50	135.636	215.4	25	-5	2	30	12	48	0
6	49	137.066	215.8	26	-9		30	12	48	1
7	48	137.814	215.6	27	17		30	12	68	1
8	47	138.552	215.4	28	-146	2	30	12	68	0
9	501	139.097	215.4	29	14	2	30	12	68	0
10	46	139.855	215.2	30	-8	2	30	12	88	0
11	45	142.109	215.9	31	13		30	12	68	6
12	500	140.071	215.2	32	-9	2	30	12	88	0
13	44	142.867	215.7	33	36	2	30	12	48	0
14	43	143.651	215.5	34	-6	2	30	12	48	0
15	42	145.431	215.8	35	-46	2	30	12	48	0
16	41	146.778	215.6	36	0		30	12	48	1
17	40	147.887	215.3	37	42	2	30	12	48	0
18	39	148.887	215.6	38	-11	2	30	12	48	0
19	38	150.520	215.5	39	-8	2	30	12	48	0
20	507	153.395	215.6	40	-3	2	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 1 Shot point1001 Team 3
Shot time: 232:10:59:59.989

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	96	92.112	215.4	41	-6	2	30	12	48	0/12
2	97	91.155	215.4	42	5	2	30	12	48	0/12
3	98	90.416	215.3	43	-22	1	30	12	48	0/12
4	99	91.262	214.6	44	44	2	30	12	48	0/12
5	100	88.590	215.7	45	3	2	30	12	48	0
6	102	86.686	215.4	46	0	2	30	12	68	0
7	101	87.479	215.3	47	44	2	30	12	68	0
8	103	85.539	215.7	48	-16	2	30	12	88	0
9	105	84.796	215.4	49	6	2	30	12	88	0
10	106	83.824	215.3	50	-15	2	30	12	88	0
11	107	82.886	215.3	51	1	2	30	12	68	0
12	108	81.911	215.3	52	5	2	30	12	68	0
13	109	81.099	215.4	53	4	3	30	12	48	0
14	110	80.107	215.4	54	-17		30	12	48	1
15	111	79.171	215.3	55	-7	2	30	12	48	0
16	112	78.239	215.2	56	6	2	30	12	48	0
17	113	77.146	215.2	57	-7	2	30	12	48	0
18	114	76.179	214.9	58	12	2	30	12	48	0
19	115	75.518	215.2	59	-6	2	30	12	48	0
20	116	78.379	212.4	60	-8	2	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 1 Shot point1001 Team 4
Shot time: 232:10:59:59.989

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	20	174.891	215.3	61	11		30	12	48	6
2	19	185.572	219.4	62	--		30	12	48	20
3	18	178.851	216.2	63	10	2	30	12	48	12
4	17	179.889	216.2	64	16	2	30	12	48	0
5	16	181.214	216.1	65	--		30	12	48	20
6	15	182.233	216.4	66	-4		30	12	48	2
7	14	183.196	216.2	67	-28		30	12	48	2
8	13	185.126	216.3	68	-13	2	30	12	48	12
9	12	186.661	216.4	69	4		30	12	48	7/10
10	11	187.265	216.7	70	58	2	30	12	48	12
11	10	188.883	216.4	71	-9	2	30	12	48	12
12	9	191.011	216.7	72	--		30	12	48	1
13	8	191.915	216.4	73	-9	2	30	12	48	12
14	7	193.380	216.6	74	0	2	30	12	48	2
15	6	194.331	216.4	75	13	2	30	12	48	2
16	5	195.578	216.1	76	24	2	30	12	48	2
17	4	197.186	216.8	77	2	2	30	12	48	12
18	3	198.454	216.5	78	3	2	30	12	48	0
19	2	199.623	216.3	79	34		30	12	48	1
20	1	200.741	216.6	80	13		30	12	48	7

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 1 Shot point1001 Team 5
Shot time: 232:10:59:59.989

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	95	93.088	215.4	81	-19	2	30	12	48	0
2	94	94.014	215.2	82	-11	2	30	12	48	10
3	93	95.069	215.4	83	18	2	30	12	48	10
4	92	96.162	215.5	84	15	2	30	12	48	10
5	91	97.003	215.4	85	-30	1	30	12	48	0
6	90	98.029	215.4	86	1	2	30	12	48	10
7	89	98.921	215.2	87	-195	2	30	12	48	10
8	88	99.923	215.3	88	23	2	30	12	48	10
9	87	100.775	215.3	89	11		30	12	48	1
10	86	101.552	215.3	90	14	2	30	12	48	10
11	85	102.913	215.3	91	5	1	30	12	48	0
12	84	103.861	215.4	92	6	3	30	12	48	10
13	83	104.952	215.4	93	5	1	30	12	48	10
14	82	105.809	215.4	94	21	1	30	12	48	10
15	81	106.779	215.2	95	29	2	30	12	48	10
16	80	107.393	215.0	96	-34	2	30	12	48	10
17	79	108.408	215.0	97	8	2	30	12	48	10
18	78	109.473	215.1	98	-13	3	30	12	48	10
19	77	110.951	215.4	99	12	2	30	12	48	0
20	76	111.899	215.5	100	11	2	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 1 Shot point1001 Team 6
Shot time: 232:10:59:59.989

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	75	112.558	215.3	101	31	1	12	30	48	0
2	74	113.501	215.1	102	20	1	12	30	48	0
3	73	114.234	214.9	103	19	2	12	30	48	0
4	72	115.185	215.0	104	7	1	12	30	48	0
5	71	116.452	215.1	105	18	1	12	30	48	0
6	70	119.762	214.6	106	--		12	30	48	13
7	69	117.953	215.7	107	-17	2	12	30	48	0
8	68	118.783	215.9	108	-6	2	12	30	48	0
9	67	119.812	215.9	109	0	2	12	30	48	0
10	66	120.801	215.6	110	23	2	12	30	48	0
11	65	121.729	215.5	111	13	2	12	30	48	0
12	64	122.588	215.4	112	27	2	12	30	48	0
13	63	123.177	215.5	113	-12	3	12	30	48	0
14	62	124.439	215.8	114	-3	2	12	30	48	0
15	61	125.457	215.4	115	0	2	12	30	48	0
16	60	126.541	215.3	116	39	2	12	30	48	0
17	59	127.198	215.2	117	-47	2	12	30	48	0
18	58	128.578	215.4	118	-14	2	12	30	48	0
19	57	129.464	215.3	119	3	2	12	30	48	0
20	56	130.140	215.3	120	0	2	12	30	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 2 Shot point1003 Team 1
Shot time: 232:11: 4: 0.011

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	37	66.562	216.0	1	17	2	30	12	48	0
2	36	68.173	216.0	2	25	2	30	12	48	0
3	35	69.271	215.8	3	11	2	30	12	48	0
4	34	70.976	215.8	4	-92	2	30	12	48	0
5	33	72.362	216.2	5	17	2	30	12	48	0
6	32	73.688	216.3	6	10	2	30	12	48	0
7	31	75.030	216.5	7	-28	2	30	12	48	0
8	30	76.993	216.7	8	12		30	12	48	29
9	29	78.661	216.6	9	57	2	30	12	48	0
10	28	79.406	215.7	10	-31	2	30	12	48	0
11	27	81.664	216.7	11	-27	2	30	12	48	12
12	26	82.744	216.8	12	7	2	30	12	48	12
13	25	83.587	216.4	13	20	2	30	12	48	0
14	24	84.619	216.4	14	27	2	30	12	48	0
15	23	85.622	216.7	15	-91	2	30	12	48	0
16				16	-11		30	12	48	21
17	21	89.205	216.9	17	30	2	30	12	48	0
18	22	87.218	216.8	18	0	2	30	12	48	0
19	117	11.948	41.0	19	11	1	30	12	48	0
20	118	12.856	38.5	20	-33	1	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 2 Shot point1003 Team 2
Shot time: 232:11: 4: 0.011

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	54	47.450	215.9	21	7		30	12	48	28
2	53	48.134	215.3	22	-2	2	30	12	48	0
3	52	48.806	214.8	23	6		30	12	48	1
4	51	50.008	215.6	24	-17	2	30	12	48	0
5	50	50.836	215.4	25	-5	2	30	12	48	0
6	49	52.279	216.4	26	-9		30	12	48	1
7	48	53.021	215.8	27	17		30	12	68	1
8	47	53.755	215.3	28	-146	2	30	12	68	0
9	501	54.300	215.4	29	14	2	30	12	68	0
10	46	55.057	214.8	30	-8	2	30	12	88	0
11	45	57.334	216.8	31	13		30	12	68	6
12	500	55.273	215.0	32	-9	2	30	12	88	0
13	44	58.082	216.2	33	36	2	30	12	48	0
14	43	58.860	215.6	34	-6	2	30	12	48	0
15	42	60.651	216.3	35	-46	2	30	12	48	0
16	41	61.991	215.8	36	0		30	12	48	1
17	40	63.095	215.2	37	42	2	30	12	48	0
18	39	64.102	215.8	38	-11	2	30	12	48	0
19	38	65.733	215.5	39	-8	2	30	12	48	0
20	507	68.615	215.9	40	-3	2	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 2 Shot point1003 Team 3
Shot time: 232:11: 4: 0.011

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	96	7.279	215.8	41	-6	1	30	12	48	0/12
2	97	6.321	214.8	42	5	3	30	12	48	0
3	98	5.584	213.1	43	-22	1	30	12	48	0
4	99	6.541	203.9	44	44	3	30	12	48	0
5	100	3.793	223.3	45	3	3	30	12	48	0
6	102	1.850	216.9	46	0	3	30	12	68	0
7	101	2.645	212.6	47	44	2	30	12	68	0
8	103	0.853	250.0	48	-16	3	30	12	88	0
9	105	0.078	338.2	49	6	3	30	12	88	0
10	106	1.019	39.9	50	-15	3	30	12	88	0
11	107	1.960	39.4	51	1	3	30	12	68	0
12	108	2.934	37.6	52	5	3	30	12	68	0
13	109	3.743	35.7	53	5	3	30	12	48	0
14	110	4.736	34.9	54	-17		30	12	48	1
15	111	5.742	37.0	55	-7	1	30	12	48	0
16	112	6.679	37.8	56	6	1	30	12	48	0
17	113	7.770	37.3	57	-7	1	30	12	48	0
18	114	8.767	40.1	58	12	1	30	12	48	0
19	115	9.398	37.0	59	-6	1	30	12	48	0
20	116	7.848	67.4	60	-8	1	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 2 Shot point1003 Team 4
Shot time: 232:11: 4: 0.011

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	20	90.053	215.2	61	11	2	30	12	48	0/ 9
2	19	101.178	222.8	62	--		30	12	48	20
3	18	94.042	217.0	63	10	2	30	12	48	0
4	17	95.079	217.0	64	16	2	30	12	48	0
5	16	96.398	216.8	65	--		30	12	48	20
6	15	97.431	217.2	66	-4	2	30	12	48	0
7	14	98.386	216.9	67	-28		30	12	48	29
8	13	100.323	217.2	68	-13	2	30	12	48	0
9	12	101.860	217.2	69	4	3	30	12	48	7
10	11	102.489	217.9	70	58	2	30	12	48	0
11	10	104.081	217.1	71	-9	2	30	12	48	0
12	9	106.233	217.8	72	--		30	12	48	1
13	8	107.113	217.2	73	-9	2	30	12	48	0
14	7	108.593	217.5	74	0	2	30	12	48	0
15	6	109.533	217.2	75	13	2	30	12	48	0
16	5	110.762	216.6	76	24	2	30	12	48	0
17	4	112.412	217.8	77	2	2	30	12	48	0/12
18	3	113.662	217.4	78	3	2	30	12	48	0
19	2	114.816	216.9	79	35		30	12	48	1
20	1	115.953	217.5	80	13	2	30	12	48	0/12

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 2 Shot point1003 Team 5
Shot time: 232:11: 4: 0.011

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	95	8.256	215.4	81	-19	3	30	12	48	0
2	94	9.185	213.6	82	-11	1	30	12	48	0
3	93	10.238	215.3	83	18	1	30	12	48	10
4	92	11.333	216.0	84	15	1	30	12	48	0
5	91	12.173	215.3	85	-30	1	30	12	48	10
6	90	13.200	215.4	86	1	1	30	12	48	0
7	89	14.095	213.9	87	-195	1	30	12	48	0
8	88	15.095	215.0	88	23	1	30	12	48	0
9	87	15.948	214.9	89	12		30	12	48	
10	86	16.726	214.6	90	14	1	30	12	48	0
11	85	18.088	215.1	91	5	1	30	12	48	0
12	84	19.037	215.2	92	6	2	30	12	48	0
13	83	20.129	215.3	93	5	1	30	12	48	0
14	82	20.986	215.3	94	21	1	30	12	48	10
15	81	21.957	214.5	95	29	1	30	12	48	10
16	80	22.577	213.4	96	-34	2	30	12	48	0
17	79	23.592	213.6	97	8	2	30	12	48	0
18	78	24.654	214.1	98	-13	1	30	12	48	10
19	77	26.133	215.4	99	12	2	30	12	48	0
20	76	27.084	215.8	100	11	1	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 2 Shot point1003 Team 6
Shot time: 232:11: 4: 0.011

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	75	27.740	214.9	101	31	2	12	30	48	0
2	74	28.684	214.4	102	20	2	12	30	48	0
3	73	29.423	213.5	103	19	2	12	30	48	0
4	72	30.371	214.0	104	7	2	12	30	48	0
5	71	31.637	214.5	105	18	2	12	30	48	0
6	70	34.966	212.7	106	--		12	30	48	13
7	69	33.147	216.4	107	-17	2	12	30	48	0
8	68	33.988	217.1	108	-6		12	30	48	1
9	67	35.021	217.2	109	0	2	12	30	48	0
10	66	35.995	216.1	110	23	2	12	30	48	0
11	65	36.921	215.6	111	13	2	12	30	48	0
12	64	37.778	215.3	112	27	2	12	30	48	0
13	63	38.369	215.6	113	-12	2	12	30	48	0
14	62	39.642	216.5	114	-3	2	12	30	48	0
15	61	40.651	215.5	115	0	2	12	30	48	0
16	60	41.734	215.2	116	39	2	12	30	48	12
17	59	42.390	214.8	117	-47	2	12	30	48	0
18	58	43.773	215.3	118	-14	2	12	30	48	0
19	57	44.659	215.2	119	3	2	12	30	48	0
20	56	45.336	215.2	120	0	2	12	30	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 3 Shot point1004 Team 1
Shot time: 232:11: 6: 0.016

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	37	11.479	221.7	1	17	1	30	12	48	0
2	36	13.081	220.9	2	25	1	30	12	48	0
3	35	14.159	219.5	3	11	1	30	12	48	0
4	34	15.858	219.0	4	-93	1	30	12	48	0
5	33	17.279	220.6	5	17	1	30	12	48	0
6	32	18.611	220.7	6	10	1	30	12	48	0
7	31	19.972	221.2	7	-28	2	30	12	48	0
8	30	21.941	221.2	8	12		30	12	48	29
9	29	23.601	220.7	9	57	2	30	12	48	0
10	28	24.274	217.5	10	-31	2	30	12	48	0
11	27	26.671	220.5	11	-27	2	30	12	48	0
12	26	27.761	220.7	12	7	2	30	12	48	0/12
13	25	28.563	219.3	13	20	2	30	12	48	0
14	24	29.598	219.3	14	27	2	30	12	48	0
15	23	30.623	219.9	15	-91	2	30	12	48	0
16				16	-11		30	12	48	21
17	21	34.228	220.3	17	30	2	30	12	48	0
18	22	32.232	220.2	18	0	2	30	12	48	0
19	117	67.048	36.0	19	11	2	30	12	48	0
20	118	67.989	35.6	20	-33	2	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 3 Shot point1004 Team 2
Shot time: 232:11: 6: 0.016

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	54	7.755	28.6	21	7		30	12	48	28
2	53	7.030	31.8	22	-2	1	30	12	48	0
3	52	6.348	35.7	23	6		30	12	48	1
4	51	5.187	27.8	24	-17	3	30	12	48	0
5	50	4.342	28.8	25	-5	3	30	12	48	0
6	49	3.223	8.6	26	-9		30	12	48	1
7	48	2.327	11.6	27	17		30	12	68	1
8	47	1.463	17.9	28	-146	3	30	12	68	0
9	501	0.979	5.6	29	14	3	30	12	68	0
10	46	0.098	46.7	30	-8	3	30	12	88	0
11	45	2.876	256.3	31	13		30	12	68	6
12	500	0.170	260.3	32	-9	3	30	12	88	0
13	44	3.220	240.0	33	36	3	30	12	48	0
14	43	3.780	226.4	34	-6	3	30	12	48	0
15	42	5.699	230.7	35	-46	3	30	12	48	0
16	41	6.914	223.7	36	0		30	12	48	1
17	40	7.950	217.5	37	42	1	30	12	48	0
18	39	9.007	221.7	38	-11	1	30	12	48	0
19	38	10.606	219.1	39	-8	1	30	12	48	0
20	507	13.509	220.0	40	-4	1	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 3 Shot point1004 Team 3
Shot time: 232:11: 6: 0.016

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	96	47.875	34.7	41	-6	2	30	12	48	12
2	97	48.832	34.9	42	5	2	30	12	48	12
3	98	49.572	35.1	43	-22	1	30	12	48	12
4	99	48.750	36.3	44	44	2	30	12	48	12
5	100	51.403	34.2	45	3	2	30	12	48	0
6	102	53.304	34.8	46	0	2	30	12	68	0
7	101	52.511	35.0	47	44	2	30	12	68	2
8	103	54.456	34.3	48	-16	2	30	12	88	0
9	105	55.196	34.8	49	6	2	30	12	88	0
10	106	56.169	34.9	50	-15	2	30	12	88	0
11	107	57.107	35.0	51	1	2	30	12	68	0
12	108	58.084	35.0	52	5	2	30	12	68	0
13	109	58.896	34.9	53	5	2	30	12	48	0
14	110	59.889	34.9	54	-17		30	12	48	1
15	111	60.892	35.1	55	-7	2	30	12	48	0
16	112	61.825	35.2	56	6	2	30	12	48	32
17	113	62.918	35.2	57	-7	2	30	12	48	0
18	114	63.891	35.6	58	12	2	30	12	48	1
19	115	64.546	35.2	59	-6	2	30	12	48	0
20	116	61.926	38.8	60	-8	2	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 3 Shot point1004 Team 4
Shot time: 232:11: 6: 0.016

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	20	34.971	215.8	61	11	2	30	12	48	0
2	19	47.342	232.1	62	--		30	12	48	20
3	18	39.071	220.1	63	10	2	30	12	48	0
4	17	40.106	219.9	64	16	2	30	12	48	0
5	16	41.404	219.3	65	--		30	12	48	1
6	15	42.479	220.3	66	-4	2	30	12	48	0
7	14	43.405	219.6	67	-28		30	12	48	6
8	13	45.365	220.0	68	-13	2	30	12	48	12
9	12	46.907	220.0	69	4	3	30	12	48	9
10	11	47.606	221.4	70	58	2	30	12	48	0
11	10	49.120	219.7	71	-9	2	30	12	48	0
12	9	51.337	220.9	72	--		30	12	48	1
13	8	52.153	219.6	73	-9	2	30	12	48	0
14	7	53.670	220.3	74	0	2	30	12	48	0
15	6	54.578	219.6	75	14	2	30	12	48	0
16	5	55.760	218.4	76	24	2	30	12	48	0
17	4	57.517	220.6	77	2	2	30	12	48	12
18	3	58.720	219.7	78	3	2	30	12	48	0
19	2	59.838	218.8	79	35		30	12	48	1
20	1	61.022	219.8	80	13	2	30	12	48	12

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 3 Shot point1004 Team 5
Shot time: 232:11: 6: 0.016

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	95	46.897	34.8	81	-19	2	30	12	48	0
2	94	45.971	35.1	82	-11	2	30	12	48	0
3	93	44.915	34.8	83	18	1	30	12	48	10
4	92	43.822	34.6	84	15	2	30	12	48	10
5	91	42.980	34.7	85	-30	1	30	12	48	10
6	90	41.953	34.7	86	1	1	30	12	48	0
7	89	41.061	35.2	87	-196	2	30	12	48	0
8	88	40.058	34.8	88	23	2	30	12	48	0
9	87	39.205	34.9	89	12		30	12	48	1
10	86	38.427	35.0	90	14	2	30	12	48	10
11	85	37.065	34.7	91	5	2	30	12	48	10
12	84	36.116	34.7	92	6	1	30	12	48	10
13	83	35.025	34.6	93	5	1	30	12	48	10
14	82	34.167	34.6	94	21	1	30	12	48	10
15	81	33.197	35.1	95	29	1	30	12	48	10
16	80	32.590	35.9	96	-34	2	30	12	48	10
17	79	31.573	35.8	97	8	1	30	12	48	0
18	78	30.503	35.5	98	-13	1	30	12	48	0
19	77	29.022	34.3	99	12	1	30	12	48	0
20	76	28.076	33.9	100	11	1	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 3 Shot point1004 Team 6
Shot time: 232:11: 6: 0.016

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	75	27.413	34.8	101	31	1	12	30	48	0
2	74	26.471	35.3	102	20	1	12	30	48	0
3	73	25.749	36.4	103	19	1	12	30	48	0
4	72	24.791	35.9	104	7	1	12	30	48	0
5	71	23.518	35.4	105	18	1	12	30	48	0
6	70	20.256	38.5	106	--		12	30	48	13
7	69	22.033	32.6	107	-17	1	12	30	48	0
8	68	21.227	31.3	108	-6	1	12	30	48	0
9	67	20.212	30.7	109	0	1	12	30	48	0
10	66	19.180	32.5	110	23	1	12	30	48	0
11	65	18.241	33.3	111	13	1	12	30	48	0
12	64	17.377	33.9	112	27	1	12	30	48	.0
13	63	16.793	33.2	113	-12	1	12	30	48	0
14	62	15.570	30.5	114	-3	3	12	30	48	0
15	61	14.510	33.1	115	0	3	12	30	48	0
16	60	13.421	33.9	116	39	1	12	30	48	0
17	59	12.763	35.2	117	-47	1	12	30	48	0
18	58	11.385	33.3	118	-14	3	12	30	48	0
19	57	10.497	33.4	119	3	3	12	30	48	0
20	56	9.822	33.1	120	0	3	12	30	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 4 Shot point1002 Team 1
Shot time: 232:11:32: 0.010

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	37	112.795	216.9	1	18	2	30	12	48	0
2	36	114.404	216.8	2	26	2	30	12	48	0
3	35	115.500	216.7	3	11	2	30	12	48	0
4	34	117.202	216.7	4	-94	2	30	12	48	0
5	33	118.592	216.9	5	17	2	30	12	48	0
6	32	119.918	217.0	6	10	2	30	12	48	0
7	31	121.260	217.1	7	-28	2	30	12	48	0
8	30	123.222	217.2	8	12	2	30	12	48	0
9	29	124.889	217.1	9	58	2	30	12	48	0
10	28	125.624	216.6	10	-31	2	30	12	48	0
11	27	127.957	217.2	11	-27	2	30	12	48	0
12	26	129.038	217.2	12	8	2	30	12	48	0/12
13	25	129.877	217.0	13	21	2	30	12	48	0/12
14	24	130.909	217.0	14	28	2	30	12	48	0
15	23	131.915	217.1	15	-92	2	30	12	48	0
16				16	-11		30	12	48	21
17	21	135.500	217.3	17	30	2	30	12	48	0
18	22	133.513	217.2	18	0	2	30	12	48	0/12
19	117	34.417	217.0	19	11	1	30	12	48	0
20	118	33.488	217.9	20	-34	2	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 4 Shot point1002 Team 2
Shot time: 232:11:32: 0.010

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	54	93.697	217.0	21	7		30	12	48	28
2	53	94.373	216.7	22	-2	2	30	12	48	0
3	52	95.035	216.4	23	5		30	12	48	1
4	51	96.250	216.8	24	-17	2	30	12	48	0
5	50	97.074	216.7	25	-6	2	30	12	48	0
6	49	98.527	217.2	26	-9		30	12	48	1
7	48	99.263	216.9	27	17		30	12	68	1
8	47	99.989	216.6	28	-148	2	30	12	68	0
9	501	100.534	216.6	29	14	2	30	12	68	0
10	46	101.282	216.3	30	-8	2	30	12	88	0
11	45	103.580	217.3	31	13		30	12	68	1
12	500	101.500	216.4	32	-9	2	30	12	88	0
13	44	104.324	217.0	33	36	2	30	12	48	0
14	43	105.094	216.7	34	-6	2	30	12	48	0
15	42	106.891	217.1	35	-47	2	30	12	48	0
16	41	108.226	216.8	36	0		30	12	48	1
17	40	109.319	216.4	37	42	2	30	12	48	0
18	39	110.335	216.8	38	-11	2	30	12	48	0
19	38	111.960	216.6	39	-8	2	30	12	48	0
20	507	114.844	216.8	40	-4	2	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 4 Shot point1002 Team 3
Shot time: 232:11:32: 0.010

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	96	53.617	217.7	41	-6	1	30	12	48	12
2	97	52.656	217.7	42	5	2	30	12	48	12
3	98	51.910	217.5	43	-22	2	30	12	48	12
4	99	52.713	216.3	44	45	1	30	12	48	0
5	100	50.119	218.5	45	3	1	30	12	48	0
6	102	48.192	218.0	46	0	1	30	12	68	0
7	101	48.976	217.8	47	45	2	30	12	68	2
8	103	47.068	218.6	48	-16	2	30	12	88	0
9	105	46.303	218.1	49	6	2	30	12	88	0
10	106	45.323	218.0	50	-15	2	30	12	88	0
11	107	44.383	218.0	51	1	2	30	12	68	0
12	108	43.409	218.1	52	5	2	30	12	68	0
13	109	42.603	218.3	53	5	2	30	12	48	0
14	110	41.614	218.4	54	-17		30	12	48	1
15	111	40.601	218.2	55	-8	2	30	12	48	0
16	112	39.664	218.1	56	7	2	30	12	48	0
17	113	38.573	218.2	57	-7	2	30	12	48	0
18	114	37.583	217.6	58	12	2	30	12	48	0
19	115	36.946	218.3	59	-6	2	30	12	48	0
20	116	39.694	212.5	60	-8	2	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 4 Shot point1002 Team 4
Shot time: 232:11:32: 0.010

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	20	136.323	216.2	61	12	2	30	12	48	0
2	19	147.345	221.3	62	--		30	12	48	20
3	18	140.338	217.4	63	10	2	30	12	48	0
4	17	141.375	217.3	64	16	2	30	12	48	0
5	16	142.693	217.2	65	--		30	12	48	20
6	15	143.728	217.5	66	-4		30	12	48	3
7	14	144.681	217.3	67	-28		30	12	48	3
8	13	146.620	217.4	68	-13		30	12	48	3
9	12	148.158	217.5	69	4		30	12	48	3
10	11	148.787	217.9	70	59		30	12	48	3
11	10	150.377	217.4	71	-9		30	12	48	3
12	9	152.531	217.9	72	--		30	12	48	3
13	8	153.410	217.4	73	-9		30	12	48	3
14	7	154.891	217.7	74	0		30	12	48	3
15	6	155.830	217.5	75	14		30	12	48	3
16	5	157.055	217.1	76	24		30	12	48	3
17	4	158.710	217.9	77	2		30	12	48	3
18	3	159.960	217.6	78	4		30	12	48	3
19	2	161.112	217.2	79	35		30	12	48	3
20	1	162.251	217.6	80	13		30	12	48	3

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 4 Shot point1002 Team 5
Shot time: 232:11:32: 0.010

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	95	54.592	217.7	81	-19	2	30	12	48	0
2	94	55.506	217.3	82	-11	1	30	12	48	10
3	93	56.572	217.6	83	18	2	30	12	48	10
4	92	57.671	217.7	84	15	2	30	12	48	10
5	91	58.506	217.5	85	-31	1	30	12	48	10
6	90	59.533	217.5	86	1	1	30	12	48	10
7	89	60.412	217.1	87	-199	1	30	12	48	0
8	88	61.423	217.3	88	24	2	30	12	48	10
9	87	62.274	217.2	89	12		30	12	48	1
10	86	63.049	217.1	90	15	2	30	12	48	10
11	85	64.415	217.2	91	5	2	30	12	48	10
12	84	65.365	217.2	92	6	2	30	12	48	10
13	83	66.457	217.2	93	5	1	30	12	48	10
14	82	67.314	217.2	94	21	1	30	12	48	10
15	81	68.274	216.9	95	29	2	30	12	48	10
16	80	68.874	216.5	96	-35	2	30	12	48	10
17	79	69.891	216.5	97	8	2	30	12	48	10
18	78	70.963	216.7	98	-13	1	30	12	48	0
19	77	72.461	217.1	99	12	3	30	12	48	0
20	76	73.415	217.2	100	12	2	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 4 Shot point1002 Team 6
Shot time: 232:11:32: 0.010

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	75	74.060	216.9	101	31	3	12	30	48	0
2	74	74.995	216.7	102	21	2	12	30	48	0
3	73	75.714	216.3	103	19	2	12	30	48	0
4	72	76.673	216.5	104	7	2	12	30	48	0
5	71	77.948	216.6	105	18	2	12	30	48	0
6	70	81.163	215.8	106	--		12	30	48	13
7	69	79.484	217.4	107	-17	2	12	30	48	0
8	68	80.255	217.6	108	-6	2	12	30	48	0
9	67	81.288	217.7	109	0	2	12	30	48	6
10	66	82.254	217.2	110	24	2	12	30	48	0
11	65	83.175	217.0	111	13	2	12	30	48	0
12	64	84.027	216.8	112	27	2	12	30	48	0
13	63	84.621	216.9	113	-12	2	12	30	48	0
14	62	85.902	217.4	114	-3	2	12	30	48	0
15	61	86.899	216.8	115	0	2	12	30	48	0
16	60	87.977	216.7	116	40	2	12	30	48	6
17	59	88.626	216.5	117	-48	2	12	30	48	6
18	58	90.015	216.7	118	-14	2	12	30	48	6
19	57	90.900	216.7	119	3	2	12	30	48	0
20	56	91.576	216.7	120	0	2	12	30	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 5 Shot point1001 Team 1
Shot time: 236: 9: 0: 0.014

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	134	54.679	214.0	1	12	2	30	12	48	12
2	133	55.635	214.3	2	6	1	30	12	48	12
3	510	56.539	213.8	3	9	1	30	12	48	12
4	511	57.752	213.6	4	-86	1	30	12	48	12
5	132	58.528	214.6	5	12	1	30	12	48	12
6	131	59.278	214.4	6	-10		30	12	48	1
7	130	60.996	214.6	7	-21	1	30	12	48	12
8	129	61.780	214.8	8	-37		30	12	48	12
9	128	62.479	214.4	9	44	2	30	12	48	12
10	127	63.079	214.0	10	-25	2	30	12	48	12
11	126	64.111	214.6	11	5	2	30	12	48	12
12	125	64.942	215.0	12	-24	2	30	12	48	0
13	124	66.261	215.4	13	19	2	30	12	48	0
14	123	67.172	215.4	14	25	2	30	12	48	0
15	122	68.176	215.5	15	-83	2	30	12	48	0
16	121	69.167	215.4	16	3	2	30	12	48	0
17	120	70.052	214.5	17	21		30	12	48	29
18	119	71.144	214.5	18	-2	2	30	12	48	12
19	117	73.033	214.5	19	46	2	30	12	48	12
20	118	72.080	214.8	20	-8	2	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 5 Shot point1001 Team 2
Shot time: 236: 9: 0: 0.014

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	508	4.167	47.1	21	2	3	30	12	48	0
2	193	5.399	27.8	22	11	3	30	12	48	12
3	194	6.598	32.0	23	17	3	30	12	48	12
4	195	7.382	29.4	24	-2	3	30	12	48	12
5	196	9.490	32.3	25	-3	3	30	12	48	12
6	197	10.682	30.9	26	6	3	30	12	48	0
7	198	12.173	32.5	27	9	3	30	12	48	0
8	199	13.439	33.0	28	-3	3	30	12	48	12
9	200	14.937	34.0	29	10	1	30	12	48	0
10	201	16.212	31.0	30	5	1	30	12	48	12
11	202	17.475	31.5	31	8	1	30	12	48	0
12	203	18.702	32.2	32	4	1	30	12	48	12
13	204	20.177	35.0	33	34	1	30	12	48	0
14	205	21.502	32.6	34	8	1	30	12	48	12
15	206	22.853	31.8	35	-29	1	30	12	48	0
16	207	25.459	34.4	36	-4	1	30	12	48	0
17	208	24.590	32.4	37	-192	1	30	12	48	12
18	209	26.805	32.5	38	3		30	12	48	24
19	210	28.470	31.6	39	6	1	30	12	48	12
20	211	29.682	30.2	40	6	1	30	12	48	12

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 5 Shot point1001 Team 3
Shot time: 236: 9: 0: 0.014

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	512	36.034	211.2	41	-16	1	30	12	48	0
2	513	34.796	210.6	42	0	1	30	12	48	0
3	514	33.783	210.9	43	-27	2	30	12	48	0
4	515	32.764	211.3	44	7	2	30	12	48	0
5	516	31.912	211.9	45	4	2	30	12	48	2
6	517	31.153	212.2	46	-4	1	30	12	48	0
7	518	37.363	211.8	47	-11	2	30	12	48	0
8	156	30.449	211.9	48	-12	1	30	12	88	0
9	158	28.505	211.6	49	4	1	30	12	48	0
10	160	26.651	210.9	50	0	1	30	12	48	0
11	162	24.936	207.8	51	5	1	30	12	48	1
12	163	24.085	212.0	52	18	1	30	12	48	0
13	164	22.839	211.7	53	5		30	12	48	1
14	165	21.874	211.4	54	-15	1	30	12	48	0
15	166	20.963	213.0	55	0	1	30	12	48	0
16	167	20.116	214.5	56	3	1	30	12	48	0
17	168	19.278	216.3	57	-8	1	30	12	48	0
18	169	18.329	217.7	58	9	1	30	12	48	0
19	170	17.277	218.0	59	-5	1	30	12	48	0
20	171	16.416	218.2	60	-7	3	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 5 Shot point1001 Team 4
Shot time: 236: 9: 0: 0.014

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	509	73.459	214.3	61	12		30	12	48	21
2	519	38.174	212.1	62	9	2	30	12	48	0
3	520	38.507	212.1	63	11	2	30	12	48	0
4	151	38.822	212.4	64	14		30	12	48	1
5	150	39.527	212.2	65	-21	2	30	12	48	0/12
6	149	40.526	212.1	66	-2		30	12	48	21
7	148	41.481	212.5	67	--		30	12	48	21/17
8	147	42.313	212.9	68	-14	2	30	12	48	0/12
9	146	43.389	212.9	69	-5	2	30	12	48	0/12
10	145	44.297	213.1	70	19	2	30	12	48	0/12
11	144	45.240	213.3	71	-14	3	30	12	48	0/12
12	143	46.191	213.5	72	12	2	30	12	48	0/12
13	142	47.137	213.9	73	-7	2	30	12	48	0/12
14	141	48.058	213.8	74	1	2	30	12	48	0/12
15	140	49.028	213.4	75	13	2	30	12	48	0/12
16	139	49.992	213.5	76	28	2	30	12	48	0/12
17	138	50.923	213.7	77	0	2	30	12	48	0/12
18	137	52.074	214.1	78	3	2	30	12	48	0/12
19	136	52.921	214.4	79	31		30	12	48	17
20	135	53.759	213.5	80	14	2	30	12	48	0/12

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 5 Shot point1001 Team 5
Shot time: 236: 9: 0: 0.014

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	214	33.930	31.4	81	-16	1	30	12	48	0
2	215	35.120	31.0	82	-11	1	30	12	48	10
3	216	36.205	32.7	83	16	1	30	12	48	0
4	217	37.847	34.2	84	12		30	12	48	1
5	218	39.320	32.9	85	-32	1	30	12	48	0
6	219	40.518	33.1	86	0		30	12	48	1
7	220	41.773	30.7	87	2	2	30	12	48	0
8	222	44.846	33.2	88	21	2	30	12	48	0
9	221	43.474	31.2	89	11	1	30	12	48	0
10	223	46.009	32.3	90	12	2	30	12	48	0
11	224	47.717	33.8	91	5	2	30	12	48	0
12	225	48.548	33.1	92	6	2	30	12	48	0
13	226	49.606	32.1	93	2		30	12	48	1
14	227	50.979	31.4	94	19	2	30	12	48	0
15	228	52.697	32.0	95	25	2	30	12	48	0
16	229	54.025	32.5	96	-24		30	12	48	1
17	230	55.678	33.5	97	8	2	30	12	48	0
18	231	56.718	34.3	98	5		30	12	48	1
19	232	57.982	33.1	99	15	2	30	12	48	0
20	233	59.372	32.8	100	11	2	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 5 Shot point1001 Team 6
Shot time: 236: 9: 0: 0.014

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	172	15.445	219.3	101	17	1	30	12	48	0
2	173	14.493	221.6	102	8	1	30	12	48	0
3	174	13.530	220.2	103	15	3	30	12	48	0
4	175	12.410	216.7	104	-5	1	30	12	48	0
5	176	11.485	217.7	105	15	1	30	12	48	0
6	177	10.398	211.6	106	--		30	12	48	1
7	178	9.380	206.1	107	-19	1	30	12	48	0
8	179	8.207	198.2	108	-6	3	30	12	48	0
9	180	7.108	201.3	109	1	3	30	12	48	0
10	181	6.176	204.1	110	20	3	30	12	48	0
11	182	5.230	203.5	111	6	3	30	12	48	0
12	183	4.747	196.2	112	-24	3	30	12	48	0
13	184	3.858	207.0	113	-10	3	30	12	48	0
14	185	3.013	220.5	114	-3	1	30	12	48	0
15	186	1.647	199.0	115	2	3	30	12	68	0
16	187	1.086	170.2	116	37	3	30	12	68	0
17	188	0.408	215.2	117	-135	3	30	12	88	0
18	189	0.013	158.6	118	-12	3	30	12	88	0
19	190	1.495	8.0	119	1	3	30	12	88	0
20	191	2.862	42.6	120	1	3	30	12	68	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 6 Shot point1002 Team 1
Shot time: 236: 9: 2: 0.012

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	134	16.062	218.4	1	12	3	30	12	48	12
2	133	17.035	219.0	2	6	3	30	12	48	12
3	510	17.903	217.2	3	9	3	30	12	48	12
4	511	19.100	216.3	4	-86	3	30	12	48	12
5	132	19.946	219.2	5	12	3	30	12	48	12
6	131	20.677	218.5	6	-10		30	12	48	1
7	130	22.405	218.7	7	-21	3	30	12	48	12
8	129	23.206	219.2	8	-37		30	12	48	1
9	128	23.873	218.0	9	44	3	30	12	48	12
10	127	24.446	216.9	10	-25	1	30	12	48	12
11	126	25.516	218.3	11	5	1	30	12	48	12
12	125	26.378	219.2	12	-24	1	30	12	48	0
13	124	27.724	219.8	13	19	1	30	12	48	0
14	123	28.638	219.8	14	25	1	30	12	48	0
15	122	29.646	219.8	15	-83	1	30	12	48	0
16	121	30.626	219.5	16	3	1	30	12	48	0
17	120	31.438	217.3	17	21		30	12	48	1
18	119	32.531	217.3	18	-2	1	30	12	48	0
19	117	34.417	217.0	19	46	1	30	12	48	0
20	118	33.488	217.9	20	-8	1	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 6 Shot point1002 Team 2
Shot time: 236: 9: 2: 0.012

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	508	42.727	33.7	21	2	1	30	12	48	0
2	193	44.070	31.7	22	11	1	30	12	48	12
3	194	45.284	32.2	23	17	3	30	12	48	12
4	195	46.059	31.8	24	-2	1	30	12	48	0
5	196	48.176	32.2	25	-3	1	30	12	48	0
6	197	49.365	31.9	26	6	1	30	12	48	0
7	198	50.858	32.3	27	9	1	30	12	48	0
8	199	52.123	32.4	28	-3	1	30	12	48	0
9	200	53.618	32.7	29	10	2	30	12	48	0
10	201	54.894	31.9	30	5	1	30	12	48	0
11	202	56.159	32.0	31	8	1	30	12	48	0
12	203	57.387	32.2	32	4	1	30	12	48	0
13	204	58.848	33.2	33	34	1	30	12	48	0
14	205	60.187	32.4	34	8	2	30	12	48	12
15	206	61.538	32.1	35	-29	1	30	12	48	0
16	207	64.135	33.1	36	-4	2	30	12	48	0
17	208	63.275	32.3	37	-192	2	30	12	48	12
18	209	65.490	32.3	38	3		30	12	48	24
19	210	67.153	31.9	39	6	1	30	12	48	12
20	211	68.355	31.3	40	6	1	30	12	48	12

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 6 Shot point1002 Team 3
Shot time: 236: 9: 2: 0.012

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	512	2.741	46.3	41	-16	3	30	12	48	0
2	513	4.025	46.3	42	0	3	30	12	48	0
3	514	4.971	41.1	43	-27	3	30	12	48	0
4	515	5.950	37.3	44	7	3	30	12	48	0
5	516	6.777	33.9	45	4	3	30	12	48	0
6	517	7.533	32.5	46	-4	3	30	12	48	0
7	518	1.354	44.3	47	-11	3	30	12	48	0
8	156	8.238	33.3	48	-12	1	30	12	88	0
9	158	10.187	33.9	49	4	3	30	12	48	0
10	160	12.057	35.1	50	0	3	30	12	48	0
11	162	13.961	40.2	51	5	3	30	12	48	0
12	163	14.602	32.6	52	18	3	30	12	48	0
13	164	15.849	33.0	53	5		30	12	48	1
14	165	16.817	33.3	54	-15	3	30	12	48	0
15	166	17.726	31.4	55	0	1	30	12	48	0
16	167	18.602	29.7	56	3	1	30	12	48	0
17	168	19.500	28.2	57	-8	1	30	12	48	0
18	169	20.509	27.4	58	9	3	30	12	48	0
19	170	21.566	27.5	59	-5	3	30	12	48	0
20	171	22.424	27.8	60	-7	3	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 6 Shot point1002 Team 4
Shot time: 236: 9: 2: 0.012

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	509	34.834	216.7	61	12	1	30	12	48	0
2	519	0.518	41.6	62	9	1	30	12	48	0
3	520	0.210	63.4	63	11	1	30	12	48	0/12
4	151	0.168	248.3	64	14		30	12	48	1
5	150	0.841	211.4	65	-21	1	30	12	48	0
6	149	1.844	208.9	66	-2		30	12	48	21
7	148	2.803	216.6	67	--		30	12	48	1
8	147	3.662	220.4	68	-14	1	30	12	48	0
9	146	4.729	218.5	69	-5	1	30	12	48	0
10	145	5.650	219.3	70	19	1	30	12	48	0
11	144	6.605	219.8	71	-14	1	30	12	48	0
12	143	7.568	220.2	72	12	1	30	12	48	0
13	142	8.541	221.3	73	-7	1	30	12	48	0
14	141	9.451	220.4	74	1	1	30	12	48	0
15	140	10.386	218.0	75	13	1	30	12	48	0
16	139	11.348	217.7	76	29	1	30	12	48	0
17	138	12.291	218.2	77	0	1	30	12	48	0
18	137	13.471	219.4	78	3	1	30	12	48	0
19	136	14.347	220.4	79	31	1	30	12	48	0
20	135	15.109	216.7	80	14	1	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 6 Shot point1002 Team 5
Shot time: 236: 9: 2: 0.012

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	214	72.612	31.8	81	-16	1	30	12	48	0
2	215	73.800	31.6	82	-11	1	30	12	48	10
3	216	74.891	32.4	83	16	2	30	12	48	0
4	217	76.524	33.2	84	12	1	30	12	48	0
5	218	78.006	32.5	85	-32	1	30	12	48	0
6	219	79.203	32.7	86	0		30	12	48	1
7	220	80.395	31.4	87	2		30	12	48	1
8	222	83.467	32.8	88	21	2	30	12	48	0
9	221	82.098	31.7	89	11	1	30	12	48	0
10	223	84.633	32.3	90	12	1	30	12	48	0
11	224	86.331	33.1	91	5	2	30	12	48	0
12	225	87.167	32.7	92	6	1	30	12	48	0
13	226	88.228	32.1	93	2		30	12	48	1
14	227	89.599	31.7	94	19	2	30	12	48	0
15	228	91.317	32.1	95	25	2	30	12	48	0
16	229	92.643	32.4	96	-24		30	12	48	1
17	230	94.288	33.0	97	8	2	30	12	48	0
18	231	95.317	33.5	98	5	1	30	12	48	0
19	232	96.593	32.8	99	15	2	30	12	48	0
20	233	97.984	32.6	100	11	2	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 6 Shot point1002 Team 6
Shot time: 236: 9: 2: 0.012

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	172	23.433	27.5	101	17	1	30	12	48	0
2	173	24.498	26.7	102	8	1	30	12	48	0
3	174	25.352	28.0	103	15	3	30	12	48	0
4	175	26.329	30.1	104	-5	1	30	12	48	0
5	176	27.273	29.9	105	15	1	30	12	48	0
6	177	28.288	32.5	106	--		30	12	48	1
7	178	29.377	34.2	107	-20	1	30	12	48	0
8	179	30.793	35.9	108	-6	1	30	12	48	0
9	180	31.738	34.7	109	1	1	30	12	48	0
10	181	32.585	33.8	110	20	1	30	12	48	0
11	182	33.527	33.6	111	6	1	30	12	48	0
12	183	34.150	34.4	112	-24	1	30	12	48	0
13	184	34.846	32.8	113	-10	1	30	12	48	0
14	185	35.706	31.5	114	-3	1	30	12	48	0
15	186	37.084	32.8	115	2	1	30	12	68	0
16	187	37.887	33.3	116	37	1	30	12	68	0
17	188	38.278	32.2	117	-135	1	30	12	88	0
18	189	38.678	32.2	118	-12	1	30	12	88	0
19	190	40.053	31.3	119	1	1	30	12	88	0
20	191	41.505	32.9	120	1	1	30	12	68	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 7 Shot point1003 Team 1
Shot time: 236: 9: 4: 0.015

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	134	30.280	37.9	1	12	2	30	12	48	12
2	133	29.310	37.5	2	6	1	30	12	48	12
3	510	28.443	38.6	3	9	1	30	12	48	12
4	511	27.259	39.3	4	-86	1	30	12	48	12
5	132	26.403	37.1	5	12	1	30	12	48	12
6	131	25.666	37.7	6	-10		30	12	48	1
7	130	23.939	37.5	7	-21	1	30	12	48	12
8	129	23.144	37.0	8	-37	2	30	12	48	31
9	128	22.469	38.1	9	44	1	30	12	48	0
10	127	21.909	39.4	10	-25	1	30	12	48	0
11	126	20.826	37.8	11	5	1	30	12	48	0
12	125	19.975	36.5	12	-24	1	30	12	48	0
13	124	18.649	35.5	13	19	1	30	12	48	0
14	123	17.738	35.2	14	25	1	30	12	48	0
15	122	16.734	34.9	15	-83	1	30	12	48	0
16	121	15.743	35.3	16	3	1	30	12	48	0
17	120	14.915	39.7	17	21		30	12	48	29
18	119	13.823	39.9	18	-2	1	30	12	48	0
19	117	11.948	41.0	19	46	3	30	12	48	0
20	118	12.856	38.5	20	-8	1	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 7 Shot point1003 Team 2
Shot time: 236: 9: 4: 0.015

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	508	88.920	35.9	21	2	2	30	12	48	0
2	193	90.188	34.9	22	11	2	30	12	48	12
3	194	91.420	35.1	23	17	1	30	12	48	12
4	195	92.176	34.9	24	-2	1	30	12	48	12
5	196	94.307	35.1	25	-3	2	30	12	48	12
6	197	95.481	34.9	26	6	2	30	12	48	12
7	198	96.987	35.0	27	9	2	30	12	48	12
8	199	98.255	35.1	28	-3	2	30	12	48	12
9	200	99.759	35.2	29	10	2	30	12	48	0
10	201	100.995	34.7	30	5	2	30	12	48	12
11	202	102.264	34.7	31	8	2	30	12	48	0
12	203	103.499	34.8	32	4	2	30	12	48	12
13	204	104.937	35.3	33	34	2	30	12	48	0
14	205	106.300	34.8	34	8	2	30	12	48	12
15	206	107.635	34.6	35	-29	2	30	12	48	0
16	207	110.271	35.2	36	-4	2	30	12	48	0
17	208	109.380	34.7	37	-192	2	30	12	48	0
18	209	111.592	34.7	38	3		30	12	48	24
19	210	113.233	34.4	39	6	2	30	12	48	12
20	211	114.400	34.0	40	6	2	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 7 Shot point1003 Team 3
Shot time: 236: 9: 4: 0.015

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	512	49.057	38.5	41	-16	2	30	12	48	0
2	513	50.331	38.7	42	0	2	30	12	48	0/12
3	514	51.308	38.3	43	-27	2	30	12	48	0/12
4	515	52.292	38.0	44	7	2	30	12	48	0
5	516	53.103	37.5	45	4	2	30	12	48	0
6	517	53.843	37.3	46	-4	2	30	12	48	0
7	518	47.689	38.2	47	-12	2	30	12	48	0
8	156	54.555	37.3	48	-12	2	30	12	88	0
9	158	56.506	37.3	49	4		30	12	48	29
10	160	58.385	37.4	50	0	2	30	12	48	0
11	162	60.297	38.5	51	5		30	12	48	29
12	163	60.891	36.8	52	18	2	30	12	48	0
13	164	62.142	36.8	53	5		30	12	48	1
14	165	63.113	36.8	54	-15	2	30	12	48	0/12
15	166	63.976	36.2	55	0	2	30	12	48	0
16	167	64.798	35.7	56	3	2	30	12	48	0
17	168	65.634	35.1	57	-8	2	30	12	48	0
18	169	66.596	34.8	58	9	2	30	12	48	0
19	170	67.653	34.7	59	-5	1	30	12	48	0/12
20	171	68.516	34.7	60	-7	2	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 7 Shot point1003 Team 4
Shot time: 236: 9: 4: 0.015

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	509	11.550	42.2	61	12	1	30	12	48	0
2	519	46.860	38.1	62	9	2	30	12	48	0
3	520	46.532	38.2	63	11	2	30	12	48	0
4	151	46.197	37.9	64	14		30	12	48	1
5	150	45.507	38.2	65	-21	2	30	12	48	0
6	149	44.524	38.4	66	-2		30	12	48	21
7	148	43.540	38.2	67	--		30	12	48	21
8	147	42.683	37.9	68	-14	2	30	12	48	0
9	146	41.613	38.0	69	-5	2	30	12	48	0
10	145	40.693	37.9	70	19	2	30	12	48	0
11	144	39.740	37.8	71	-14	1	30	12	48	0
12	143	38.779	37.6	72	12	2	30	12	48	0
13	142	37.817	37.3	73	-7	1	30	12	48	0
14	141	36.900	37.5	74	1	2	30	12	48	0
15	140	35.956	38.1	75	13	1	30	12	48	0
16	139	34.995	38.2	76	29	2	30	12	48	0
17	138	34.051	38.0	77	0	2	30	12	48	0
18	137	32.876	37.5	78	3	2	30	12	48	0
19	136	32.012	37.0	79	31	2	30	12	48	0
20	135	31.240	38.7	80	14	2	30	12	48	12

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 7 Shot point1003 Team 5
Shot time: 236: 9: 4: 0.015

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	214	118.676	34.2	81	-16	2	30	12	48	0
2	215	119.651	34.1	82	-11	2	30	12	48	0
3	216	120.980	34.6	83	16	2	30	12	48	0
4	217	122.645	35.0	84	12	2	30	12	48	10
5	218	124.096	34.6	85	-32	2	30	12	48	10
6	219	125.297	34.7	86	0		30	12	48	1
7	220	126.478	33.8	87	2	2	30	12	48	0
8	222	129.622	34.6	88	21	2	30	12	48	0/ 8
9	221	128.194	34.0	89	11	2	30	12	48	0/12
10	223	130.761	34.3	90	12	2	30	12	48	0/12
11	224	132.499	34.8	91	5	2	30	12	48	0/12
12	225	133.317	34.6	92	6	2	30	12	48	12
13	226	134.344	34.2	93	2		30	12	48	24
14	227	135.690	33.9	94	19	2	30	12	48	0
15	228	137.427	34.1	95	25	2	30	12	48	0/12
16	229	138.771	34.3	96	-24		30	12	48	1
17	230	140.445	34.6	97	8	2	30	12	48	0
18	231	141.498	35.0	98	5	2	30	12	48	0
19	232	142.737	34.5	99	15	2	30	12	48	0
20	233	144.117	34.3	100	11	2	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 7 Shot point1003 Team 6
Shot time: 236: 9: 4: 0.015

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	172	69.505	34.5	101	17	2	30	12	48	0/12
2	173	70.514	34.1	102	8	2	30	12	48	0/12
3	174	71.432	34.5	103	15	2	30	12	48	0/12
4	175	72.502	35.2	104	-5	2	30	12	48	0/12
5	176	73.434	35.0	105	15	2	30	12	48	0/12
6	177	74.541	35.9	106	--		30	12	48	1
7	178	75.674	36.5	107	-20	2	30	12	48	0/12
8	179	77.120	37.2	108	-6	2	30	12	48	0/12
9	180	78.043	36.7	109	1	2	30	12	48	0/12
10	181	78.869	36.3	110	20	2	30	12	48	0/12
11	182	79.805	36.2	111	6	2	30	12	48	0/12
12	183	80.376	36.5	112	-24	2	30	12	48	0/12
13	184	81.028	35.8	113	-10	2	30	12	48	0/12
14	185	81.841	35.2	114	-3	2	30	12	48	0/12
15	186	83.262	35.7	115	2	2	30	12	68	0/12
16	187	84.078	35.9	116	37	2	30	12	68	0/12
17	188	84.431	35.4	117	-135	2	30	12	88	0/12
18	189	84.832	35.4	118	-12	2	30	12	88	0/12
19	190	86.168	34.9	119	1	2	30	12	88	0/12
20	191	87.677	35.6	120	1	2	30	12	68	0/12

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 8 Shot point1004 Team 1
Shot time: 236: 9: 6: 0.012

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	134	85.341	35.9	1	12	1	30	12	48	0
2	133	84.378	35.8	2	6	1	30	12	48	0
3	510	83.493	36.1	3	9	1	30	12	48	0
4	511	82.295	36.3	4	-86	1	30	12	48	12
5	132	81.481	35.6	5	12	1	30	12	48	12
6	131	80.736	35.8	6	-10		30	12	48	1
7	130	79.078	35.7	7	-21	1	30	12	48	12
8	129	78.289	35.5	8	-37	2	30	12	48	26
9	128	77.601	35.8	9	44	2	30	12	48	12
10	127	77.018	36.1	10	-25	2	30	12	48	12
11	126	75.963	35.7	11	5	2	30	12	48	12
12	125	75.124	35.3	12	-24	2	30	12	48	0
13	124	73.802	35.0	13	19	2	30	12	48	0
14	123	72.891	34.9	14	25	2	30	12	48	0
15	122	71.887	34.9	15	-83	2	30	12	48	0
16	121	70.896	34.9	16	3	2	30	12	48	0
17	120	70.029	35.9	17	21		30	12	48	21
18	119	68.936	35.9	18	-2	2	30	12	48	0
19	117	67.048	36.0	19	46	2	30	12	48	0
20	118	67.989	35.6	20	-8	2	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 8 Shot point1004 Team 2
Shot time: 236: 9: 6: 0.012

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	508	144.030	35.5	21	2	2	30	12	48	0
2	193	145.300	34.9	22	11	2	30	12	48	12
3	194	146.533	35.0	23	17	1	30	12	48	12
4	195	147.288	34.9	24	-2	1	30	12	48	12
5	196	149.420	35.0	25	-3	2	30	12	48	12
6	197	150.593	34.9	26	6	2	30	12	48	12
7	198	152.099	35.0	27	9	1	30	12	48	12
8	199	153.367	35.0	28	-3	1	30	12	48	12
9	200	154.871	35.1	29	10	2	30	12	48	0
10	201	156.106	34.7	30	5	2	30	12	48	12
11	202	157.375	34.8	31	8	2	30	12	48	0
12	203	158.610	34.8	32	4	2	30	12	48	12
13	204	160.110	35.2	33	34	2	30	12	48	12
14	205	161.412	34.8	34	8	2	30	12	48	12
15	206	162.745	34.7	35	-29	2	30	12	48	12
16	207	165.384	35.1	36	-4	2	30	12	48	12
17	208	164.490	34.8	37	-193	2	30	12	48	12
18	209	166.702	34.7	38	3		30	12	48	24
19	210	168.341	34.6	39	6	2	30	12	48	12
20	211	169.504	34.3	40	6	2	30	12	48	12

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 8 Shot point1004 Team 3
Shot time: 236: 9: 6: 0.012

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	512	104.077	36.6	41	-16	1	30	12	48	0
2	513	105.343	36.7	42	0	2	30	12	48	0
3	514	106.330	36.5	43	-27	2	30	12	48	0
4	515	107.322	36.4	44	7	2	30	12	48	0
5	516	108.143	36.2	45	4	2	30	12	48	0
6	517	108.887	36.1	46	-4	2	30	12	48	0
7	518	102.718	36.4	47	-12	2	30	12	48	0
8	156	109.597	36.1	48	-12	2	30	12	88	0
9	158	111.547	36.1	49	4	2	30	12	48	0
10	160	113.421	36.2	50	0	2	30	12	48	0
11	162	115.300	36.8	51	5	2	30	12	48	0
12	163	115.939	35.9	52	18	2	30	12	48	0
13	164	117.188	35.9	53	5		30	12	48	1
14	165	118.158	35.9	54	-15	1	30	12	48	0
15	166	119.029	35.6	55	0	2	30	12	48	0
16	167	119.855	35.3	56	3	2	30	12	48	0
17	168	120.693	35.0	57	-8	1	30	12	48	0
18	169	121.655	34.8	58	9	2	30	12	48	0
19	170	122.711	34.8	59	-5	1	30	12	48	0
20	171	123.573	34.8	60	-7	1	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 8 Shot point1004 Team 4
Shot time: 236: 9: 6: 0.012

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	509	66.629	36.1	61	12	2	30	12	48	0
2	519	101.894	36.3	62	9	2	30	12	48	12
3	520	101.565	36.4	63	11	2	30	12	48	0
4	151	101.235	36.3	64	14		30	12	48	1
5	150	100.541	36.4	65	-21	2	30	12	48	0
6	149	99.552	36.5	66	-2		30	12	48	21
7	148	98.578	36.3	67	--		30	12	48	21
8	147	97.729	36.2	68	-14	2	30	12	48	12
9	146	96.656	36.2	69	-5	1	30	12	48	0
10	145	95.740	36.1	70	19	1	30	12	48	0
11	144	94.791	36.1	71	-14	1	30	12	48	12
12	143	93.834	36.0	72	12	2	30	12	48	12
13	142	92.878	35.9	73	-7	1	30	12	48	12
14	141	91.960	35.9	74	1	2	30	12	48	0
15	140	91.006	36.1	75	13	2	30	12	48	7
16	139	90.044	36.2	76	29	2	30	12	48	12
17	138	89.105	36.1	77	0	2	30	12	48	12
18	137	87.940	35.8	78	3	2	30	12	48	12
19	136	87.085	35.6	79	31	2	30	12	48	12
20	135	86.283	36.3	80	14	1	30	12	48	12

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 8 Shot point1004 Team 5
Shot time: 236: 9: 6: 0.012

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	214	173.781	34.4	81	-16	2	30	12	48	0
2	215	174.955	34.3	82	-11	2	30	12	48	0/12
3	216	176.090	34.7	83	16	2	30	12	48	0
4	217	177.756	35.0	84	12	2	30	12	48	0/12
5	218	179.205	34.7	85	-32	2	30	12	48	0/12
6	219	180.407	34.7	86	0		30	12	48	1
7	220	181.577	34.2	87	2	2	30	12	48	0
8	222	184.731	34.7	88	21	2	30	12	48	0
9	221	183.296	34.2	89	11	1	30	12	48	0/12
10	223	185.867	34.5	90	12	2	30	12	48	0
11	224	187.610	34.8	91	5	2	30	12	48	0/12
12	225	188.426	34.7	92	6	2	30	12	48	0/12
13	226	189.448	34.4	93	2		30	12	48	29
14	227	190.789	34.2	94	19	2	30	12	48	0
15	228	192.530	34.3	95	25	2	30	12	48	0
16	229	193.876	34.4	96	-24		30	12	48	29
17	230	195.554	34.7	97	8	2	30	12	48	0
18	231	196.609	34.9	98	5		30	12	48	16
19	232	197.845	34.6	99	15	2	30	12	48	0
20	233	199.223	34.5	100	11	2	30	12	48	0

FIELD DATA TABLE

HANFORD EXPERIMENT NO 27
Shot number 8 Shot point1004 Team 6
Shot time: 236: 9: 6: 0.012

	Loc	Dist(km)	Azim	Unit	Chron	Chan	C1	C2	C3	Tape grade
1	172	124.561	34.7	101	17	2	30	12	48	0
2	173	125.567	34.4	102	8	2	30	12	48	12
3	174	126.486	34.6	103	15	1	30	12	48	0
4	175	127.556	35.0	104	-5	2	30	12	48	0
5	176	128.487	35.0	105	15	2	30	12	48	0
6	177	129.587	35.5	106	--		30	12	48	1
7	178	130.711	35.8	107	-20	2	30	12	48	0
8	179	132.142	36.2	108	-6	2	30	12	48	12
9	180	133.075	35.9	109	1	2	30	12	48	0
10	181	133.906	35.7	110	20	2	30	12	48	12
11	182	134.843	35.6	111	6	2	30	12	48	0
12	183	135.481	35.8	112	-24	2	30	12	48	0
13	184	136.139	35.4	113	-10	2	30	12	48	0
14	185	136.953	35.1	114	-3	2	30	12	48	12
15	186	138.373	35.4	115	2	2	30	12	68	0
16	187	139.189	35.5	116	37	2	30	12	68	0
17	188	139.543	35.2	117	-135	2	30	12	88	0
18	189	139.944	35.2	118	-12	2	30	12	88	12
19	190	141.280	34.9	119	1	2	30	12	88	12
20	191	142.789	35.3	120	1	2	30	12	68	12

APPENDIX B

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 refrr 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.