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CENTRAL AUSTRALIA REFRACTION SURVEY, 1985:

OPERATIONAL REPORT

by

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ABSTRACT

This is a record of a BMR refraction profile undertaken in 1985 across the Arunta Block in Central Australia. Also included in this record are details of the recording of two expanding spreads in the Papunya Road area and a small scale refraction survey near Milton Park. A noise survey was also conducted to determine the position for a new seismic array near Alice Springs.

The Arunta Block refraction survey used 10 BMR shots to make seismic recordings at 131 sites along an East-West line from Papunya to Jinka (approximately 400km). This Record describes the field work and equipment used, and tabulates the station and shot data.

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TABLES

FIGURES

1. INTRODUCTION

In September 1985 BMR undertook a deep seismic refraction study of the Arunta block in central Australia. This study was part of a wider investigation of the central Australia region aimed at determining the origin and evolution of the central Australian basins from their present structure. This investigation included a continuous North-South 6-fold CDP reflection profiling line from Napperby to Mt Conner which crossed the refraction line near the furthest west refraction shot (Fig 1). The major objective of the refraction survey was to compare the crustal structure of the Arunta Block with the Amadeus Basin to the South. This information is crucial to the understanding of the evolution of central Australia and to the testing of the various evolutionary models which have been proposed. It was not possible to complete the Amadeus Basin refraction line in 1985 and this may be undertaken in 1987. The velocities obtained for the crust and upper mantle will also be used for the interpretation of near-vertical incidence seismic reflection profiles. The refraction study was along an east-west line of approximately 400 km length. The line was divided up into 131 stations with an interval generally of 2.5 km. Ten explosions at 5 shot sites were recorded by 33 portable seismographs. The position of the line in relation to major geological divisions is shown in Fig 1.

A tomographic recording experiment was conducted in conjunction with two expanding spread surveys near Narwietooma (Fig 1). Sixteen recorders were deployed along a line orthogonal to each expanding spread and recorded the shots detonated on the orthogonal line. Refraction recorders were also deployed along the reflection line near Milton Park and recorded the normal reflection shots in a small scale refraction experiment.

After the refraction survey , a background noise survey was undertaken to obtain data which will enable comparisons between noise levels at the current Alice Springs seismic array site on the outskirts of Alice Springs, and a proposed new site on Bond Springs station further north.

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2. SEISMIC SURVEY PLANNING AND DESIGN

2.1 Refraction Survey

The recording traverse was located on the Arunta Block, between the Ngalia Basin and the Amadeus Basin along the major gravity high. The exact location of the traverse took advantage of existing roads trending east-west, from Papunya in the west to Jinka in the east. Thus the western section of the line followed the Papunya Road and the eastern section followed the Plenty Highway. This left an 80km section between the two roads across the Burt Plain. This section proved to be the only one with difficult access; a route was chosen along the boundary fence between Aileron and Amburla stations. One hundred and thirty one recording stations were located along the traverse. The first five and last five stations were separated by 10km and the rest by 2.5 km. The coverage this provided is shown in Fig 2. The shots were positioned every 75 km starting from station 6, the last shot being at station 126.

3. SEISMIC RECORDING OPERATIONS

3.1 Arunta Block Refraction Recording

Details of the recording stations are given in Table 1(a). The recording operations commenced from the eastern end. Four survey personnel each with a vehicle carried a total of 33 portable seismographs. The survey operations are shown in Fig 2. and the details summarized in Table 3. The seismographs were programmed to operate between 07.00 and 18.00 each day. Some sets were left at the same station for up to nine days so it was important to position them well off the road out of sight. Vegetation cover is mainly Mulga scrub so in most cases it was only neccessary to walk in about 50m to hide the set. The seismographs along the Burt Plain were left with extra batteries because of the difficult access for servicing.

The Burt Plain was crossed four times in an easterly direction. As the track was overgrown by shrubs, progress was slow and the vehicular-compressed trees precluded driving west against the lie of the scrub. After six punctures during the first crossing the remaining crossings passed without incident.

Shots 6 to 10 were also recorded by the BMR reflection spread which was located near Tylers Pass. Clocks were synchronized by radio and the observer on the seismic spread commenced recording after a suitable delay beyond the shot time.

All ten shots were recorded by a Flinders University team conducting a wide angle reflection experiment. Using six digital event detectors and Ranger seismometers they recorded along a 10km line running parallel to the Plenty Highway west of shot D. They used 500m station intervals and occupied 21 stations.

3.2 MILTON PARK SMALL SCALE REFRACTION EXPERIMENT

A small scale refraction experiment with a multiplicity of shots rather than a multiplicity of receivers was undertaken near the northern end of the Milton Park Reflection line. The objective of the work was to obtain reliable estimates of seismic velocities to depths of about a kilometre. Two groups of four instruments were deployed in which the average spacing of the instruments of each group was 0.9 km and the gap between the closest stations of the seperate groups was 14.8 km. Reflection shots detonated at intervals of 0.33 km were recorded as the routine reflection survey passed from a few kilometres south of the most southerly group of refraction instruments to a few kilometres north of the most northerly group. The location of the refraction recorders are listed in Table 1b; they were chosen not to coincide with shot points.

3.3 NARWIETOOMA TOMOGRAPHIC RECORDING

Sixteeen instruments were deployed during the recording of the orthogonal expanding spreads located on the Papunya Road and on the main north-south reflection line. Two groups of seven instruments (one group on each half line) were deployed at two kilometre intervals starting at a location about 8.5 km from the mid-point of one expanding spread while the shooting was taking place on the other. The two groups of seven instruments were deployed mid-way between the shot points of the expanding spread to be shot on that line; two additional instruments, one on each expanding spread, were deployed close to the common mid-point. The objective of the experiment was to obtain a three-dimensional image of the velocity field in the area using the expanding spread shot records on both the refraction recorders and the reflection spread.

4. RECORDING EQUIPMENT

The recording equipment has been described by Finlayson and Collins (1980). The following equipment was used on this survey (Table 4);

1) 6 - Precision Instrument 4 channel (PI) FM tape recorders;
2) 15 - Akai, 4 channel FM tape recorders;
3) 12 - Tandberg 4 channel FM tape recorders;
4) 4 - Shot timing sets. Each set consisting of a TAM 5 amplifier, geophone, Hellige Helcosripter He 16 chart recorder and a Labtronics radio receiver to provide VNG time signals.

Details of the deployment of the above recorders on the Arunta refraction profile are given in Fig 2.

5. SHOTS

Details of the shots are given in Table 2. Each shot was drilled in a pattern with a minimum distance of 10m between holes and 100m between shots where there were more than one shot at a location. Holes were drilled to depths of 40 - 55m and each hole was loaded with 150kg of Anzite Blue and two electric detonators. A total of 12 tonnes of explosives were used for the ten shots : four shots of 0.5 tonnes each, four shots of 1.0 tonne, and two shots of 3.0 tonnes each.

The shot details for the Narwietooma tomographic experiment are given in Table 2b. For information on the Milton Park experiment refer to Goleby and Wright (in prep).

6. SURVEYING

Surveyors from the Australian Survey Office (ASO), and members of the BMR recording party, positioned two star pickets at each station, one long picket as a marker and one short one as a permanent survey peg. The sites were positioned with the aid of 1:25000 aerial colour photographs of the Haast Bluff, Glen Helen, Narwietooma, Burt and Amburla 1:100000 sheets. Site positions were approximated using vehicle odometers pending an accurate survey by ASO at a later date. Final ASO latitudes, longitudes and elevations are listed in Table 1.

7. BACKGROUND NOISE SURVEY

The aim of the exercise was to compare noise levels between the existing seismic array site at Alice Springs to a proposed new site on Bond Springs station north east of the town. Four PI recorders were sited at different locations on the proposed site and run continuously for 2.5 days (Table 1d). Two other PI's were sited on the existing array at sites KS and 14. All six seismographs were run continuously at site 14 on the array for one night.

8. ACKNOWLEDGEMENTS

The BMR wishes to thank the station owners who were helpful in allowing us access to their properties in order to site recorders and shots.

9. REFERENCES

FINLAYSON D.M., & COLLINS C.D.N., 1980 - A brief description of BMR portable seismic tape recording systems. Australian Society of Exploration Geophysicists. Bulletin 11, 75 - 77.

GOLEBY,B., & WRIGHT,C.,(in prep)-Central Australian Seismic Survey 1985: Operational Report. BMR Record

TABLE 1a

ARUNTA BLOCK CRUSTAL SURVEY 1985, RECORDING STATION DATA.

Station No.	Set No.	Latitude deg min	Longitude deg min	Elev m	Time on d h m	Time off d h m	Gain db
01	12	23 12.40	131 51.52	605.2	18 15 31	18 16 17	96
02	24	23 13.72	131 57.39	615.2	18 15 05	18 16 37	96
03	13	23 16.59	132 02.59	618.0	18 14 43	18 16 59	96
04	09	23 18.01	132 08.23	617.8	18 14 20	20 15 06	96
05	14	23 16.89	132 14.03	623.2	18 13 54	20	96
06	07	23 16.69	132 20.33	617.4	17 11 56	20	96
07	24	23 16.65	132 21.91	611.4	19 09 18	20	96
08	29	23 17.26	132 23.28	612.9	17 11 36	20 16 13	96
09	12	23 16.52	132 24.60	608.3	19 09 40	20 16 37	96
10	06	23 16.04	132 26.07	604.5	17 11 16	20	96
11	13	23 15.62	132 27.6	597.8	19 10 02	19 10 02	96
12	05	23 15.20	132 29.09	592.1	17 10 57	20 03 00	96
13		NOT INSTALLED					
14	33	23 14.37	132 32.10	593.5	17 12 12	20	96
15	20	23 13.95	132 33.61	592.2	20 13 22	28 25 54	96
16	15	23 13.53	132 35.13	588.9	17 11 51	20	96
17	32	23 13.11	132 36.63	583.9	20 13 03	17 51 00	96
18	26	23 12.49	132 38.07	576.7	17 11 24	20	96
19	30	23 11.52	132 39.22	572.4	20 12 44	21 14 44	96
20	08	23 10.46	132 40.45	567.8	17 11 00	21 14 32	96

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TABLE 1a (continued)

Station No.	Set No.	Latitude deg min	Longitude deg min	Elev m	Time on d h m	Time off d h m	Gain db
21	01	23 09.61	132 41.44	569.8	20 12 00	20 14 38	96
22	04	23 08.70	132 42.52	568.7	17 10 50	20 14 55	96
23	31	23 07.82	132 43.65	567.8	20 11 37	20 15 0	96
24	03	23 07.48	132 44.94	569.8	17 10 38	20 15 22	96
25	11	23 07.73	132 46.39	572.7	20 11 11	20 15 40	96
26	21	23 07.90	132 47.79	578.8	17 10 28	20 15 58	96
27	22	23 06.85	132 49.20	580.3	20 10 34	21 11 10	96
28	25	23 04.85	132 49.86	576.6	17 10 07	21 11 28	96
29	16	23 04.97	132 51.61	579.1	20 10 53	21 11 46	96
30	27	23 05.02	132 53.35	580.9	17 09 53	21 12 10	96
31	19	23 04.81	132 55.04	582.5	20 11 25	21 12 26	96
32	10	23 04.63	132 56.70	583.7	17 09 40	21 12 48	96
33	18	23 04.49	132 58.39	584.6	20 11 59	21 12 30	96
34	23	23 02.92	132 58.39	582.3	17 09 24	21 12 41	96
35	02	23 01.34	132 58.39	581.0	20 12 20	21 12 15	96
36	17	23 01.20	132 59.97	582.4	14 10 29	21 11 48	96
37	07	23 01.20	133 01.32	no	14 10 07	16 09 08	96
38	20	23 01.22	133 03.08	elev.'s	13 09 09	19 13 40	96
39	05	23 01.20	133 04.60	for	13 09 42	16 09 35	96
40	16	23 01.20	133 06.15	Burt	13 10 20	19 14 08	96
41	29	23 01.22	133 07.70	Plain	13 10 58	16 10 24	96

TABLE 1a (continued)

Station No.	Set No.	Latitude deg min	Longitude deg min	Elev m	Time on d h m	Time off d h m	Gain db
42	22	23 01.22	133 09.25		13 11 31	19 14 44	96
43	06	23 01.20	133 10.80		13 12 21	16 10 59	96
44	28	23 01.22	133 12.33		13 13 32	19 15 06	96
45	26	23 01.20	133 13.88		13 14 02	16 11 27	96
46	32	23 01.20	133 15.43		13 14 35	19 15 30	96
47	15	23 01.22	133 16.98		13 15 31	16 11 58	96
48	11	23 01.20	133 18.53		13 16 03	19 16 01	96
49	33	23 01.20	133 20.05		13 16 33	16 13 14	96
50	31	23 01.22	133 21.60		13 17 09	19 14 46	96
51	08	23 01.20	133 23.15		13 17 35	16 10 46	96
52	01	23 01.22	133 24.73		13 18 29	19 15 15	96
53	04	23 01.20	133 26.28		12 11 32	16 11 30	96
54	18	23 01.22	133 27.87		12 11 12	19 14 48	96
55	21	23 01.20	133 29.45		12 10 38	14 15 18	96
56	19	23 01.22	133 31.00		12 10 11	19 14 21	96
57	03	23 01.22	133 32.85		12 10 49	14 14 48	96
58	02	23 01.20	133 34.13		12 10 26	19 13 58	96
59	25	23 01.20	133 35.70	656.0	12 09 19	14 14 19	96
60	30	23 01.20	133 37.28	662.2	12 09 46	19 01 17	96
61	23	23 01.20	133 38.85	666.0	12 09 22	14 14 00	96
62	14	23 01.20	133 40.42	669.0	09 10 23	18 09 43	96

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TABLE 1a (continued)

Station No.	Set No.	Latitude deg min	Longitude deg min	Elev m	Time on d h m	Time off d h m	Gain db
63	10	23 01.21	133 42.00	674.0	11 14 50	14 13 38	96
64	24	23 01.21	133 43.58	678.0	09 09 53	18 09 29	96
65	27	23 00.41	133 44.25	674.0	11 15 15	14 13 05	96
66	12	22 59.23	133 44.71	670.0	09 09 35	18 08 45	96
67	15	22 58.54	133 45.92	666.0	10 13 28	11 14 33	96
68	13	22 58.32	133 47.37	670.0	09 10 55	18 08 58	96
69	10	22 58.09	133 48.88	672.0	10 13 06	11 14 10	96
70	09	22 58.32	133 50.35	677.0	09 11 13	18 09 12	96
71	11	22 58.57	133 51.81	685.0	10 12 47	11 14 05	96
72	27	22 58.64	133 53.38	693.0	06 11 50	11 13 45	96
73	02	22 58.66	133 54.91	699.0	10 12 23	11 13 46	96
74	23	22 58.85	133 56.28	700.0	06 12 05	11 13 31	96
75	04	22 59.19	133 57.80	697.0	10 12 05	11 13 17	96
76	30	22 58.83	133 59.16	684.2	06 11 13	11 13 02	96
77	07	22 58.34	134 00.67	678.0	10 11 15	10 16 26	96
78	25	22 58.12	134 02.17	669.0	06 10 37	11 11 55	96
79	03	22 57.98	134 03.73	659.0	10 10 49	11 11 41	96
80	29	22 57.93	134 05.26	659.0	06 10 15	11 16 03	96
81	17	22 57.74	134 06.77	658.0	10 12 17	11 15 49	96
82	22	22 57.71	134 08.31	652.0	06 09 53	11 15 34	96
83	16	22 57.80	134 09.87	661.0	10 11 58	11 15 17	96

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TABLE 1a (continued)

Station No.	Set No.	Latitude deg min	Longitude deg min	Elev m	Time on d h m	Time off d h m	Gain db
84	06	22 57.96	134 11.30	652.5	06 13 10	11 15 06	96
85	28	22 58.09	134 12.72	651.0	10 11 10	11 14 28	96
86	05	22 58.00	134 14.18	645.0	06 12 43	11 14 03	96
87	21	22 57.71	134 15.57	645.0	10 10 45	11 13 19	96
88	01	22 57.60	134 17.05	639.0	06 11 47	11 13 08	96
89	18	22 57.41	134 18.78	632.0	10 10 17	11 12 51	96
90	33	22 58.47	134 19.58	640.0	06 11 25	11 12 27	96
91	31	23 00.06	134 20.98	643.0	10 09 30	11 12 13	96
92	08	23 00.06	134 22.42	648.0	06 11 03	11 11 56	96
93	19	23 00.06	134 23.77	652.0	10 13 25	11 11 41	96
94	32	23 00.07	134 25.35	650.0	06 10 45	11 11 04	96
95	20	23 00.25	134 26.76	646.0	10 09 05	10 15 54	96
96	26	23 00.72	134 28.25	645.0	05 08 23	11 11 22	96
97	33	23 01.25	134 29.83	653.0	04 17 17	05 16 47	96
98	19	23 01.62	134 31.30	653.0	04 16 54	09 13 25	96
99	30	23 01.86	134 32.72	635.0	04 17 05	05 16 30	96
100	28	23 02.08	134 34.14	631.0	04 16 25	09 13 44	96
101	32	23 02.13	134 35.54	621.0	04 16 56	05 16 14	96
102	16	23 02.14	134 37.00	612.0	04 16 45	09 13 59	96
103	27	23 01.79	134 38.45	601.0	04 16 35	05 16 00	96
104	17	23 00.93	134 40.09	590.0	04 16 25	09 14 18	96

TABLE 1a (continued)

Station No.	Set No.	Latitude deg min	Longitude deg min	Elev m	Time on d h m	Time off d h m	Gain db
105	29	23 00.54	134 41.49	587.0	04 16 14	05 15 34	96
106	21	22 59.50	134 43.46	576.0	04 15 45	09 14 36	96
107	23	22 59.61	134 44.86	580.0	04 15 28	05 15 10	96
108	18	22 59.94	134 46.22	580.0	04 15 16	09 14 53	96
109	22	22 59.97	134 47.63	574.0	04 14 39	05 14 52	96
110	31	22 59.79	134 49.02	567.0	04 14 25	09 15 27	96
111	25	22 59.57	134 50.43	563.0	04 14 12	05 14 35	96
112	20	22 59.28	134 51.80	558.0	04 13 59	09 15 42	96
113	08	22 59.06	134 53.22	558.0	04 09 58	06 09 37	96
114	03	22 58.84	134 54.62	561.0	04 10 25	09 16 30	96
115	01	22 58.48	134 55.99	559.0	04 10 14	05 10 40	96
116	04	22 58.02	134 57.31	555.0	04 11 10	09 15 02	96
117	06	22 57.37	134 59.00	540.0	04 11 38	05 10 19	96
118	07	22 56.86	135 00.33	533.1	04 13 32	09 14 45	96
119	05	22 56.41	135 02.13	530.0	04 13 00	05 09 51	96
120	02	22 56.19	135 03.55	527.0	04 12 35	09 14 31	95
121	09	22 55.96	135 05.52	519.0	04 15 17	05 14 51	96
122	11	22 55.68	135 06.89	520.0	04 14 40	09 14 15	96
123	24	22 55.32	135 08.27	517.0	04 14 14	05 15 04	96
124	10	22 54.95	135 09.64	512.0	04 13 46	09 14 03	96
125	13	22 55.32	135 10.91	509.0	04 12 52	05 15 19	96

TABLE 1a (continued)

Station No.	Set No.	Latitude deg min	Longitude deg min	Elev m	Time on d h m	Time off d h m	Gain db
126	15	22 55.94	135 12.49	502.0	04 12 30	09 13 45	96
127	12	22 55.84	135 17.84	479.0	04 11 53	07 16 16	96
128	14	22 54.88	135 23.46	450.0	04 11 08	07 15 50	96
129	09	22 54.78	135 29.09	426.0	05 16 50	07 15 27	96
130	24	22 56.73	135 34.35	415.0	05 16 32	07 14 59	96
131	13	22 57.19	135 40.02	405.0	05 16 09	07 14 34	96

TABLE 1b

MILTON PARK SMALL SCALE REFRACTION EXPERIMENT, RECORDING STATION DATA.

Peg* No	Stn No	Set No	Latitude deg	Latitude min	Longitude deg	Longitude min	Time on d	Time on h	Time on m	Time off d	Time off h	Time off m	Gain db	Location with ref to peg
2422	01	04	**				12	11	26	15	09	48	96	4m E
2446	02	03					12	11	45	15	09	30	96	4m E
2466	03	02					12	12	28	15	10	35	96	3m E 2m S
2404	04	05					12	10	54	15	10	06	96	4m E
2822	05	07					12	13	57	15	12	37	96	4m E 2m N
2842	06	08					12	14	22	15	12	23	96	6m E 1.5m S
2866	07	06					12	14	48	15	12	06	96	3m E
2886	08	01					12	15	15	15	11	50	96	3m E

* Pegs are 41.66m apart

** Refer to Goleby & Wright (in prep) for station coordinates.

TABLE 1c

NARWIETOOMA TOMOGRAPHIC RECORDING EXPERIMENT

RECORDING STATION DATA , NORTH - SOUTH LINE.

Peg* no.	Stn No.	Set No	Coordinates Easting	Northing	Time on d h m	Time off d h m	Gain db
7411	01	08	215608.1	7409824.6	15 15 03	21 13 44	96
7434	02	07	216952.5	7411181.5	15 15 30	22 14 30	96
7457	03	01	218191.3	7412622.0	15 15 54	21 14 43	96
7480	04	06	218991.0	7414361.0	15 16 20	21 14 58	96
7503	05	05	220254.1	7415782.0	15 16 45	21 15 17	96
7526	06	04	221841.8	7416863.0	15 17 05	21 15 33	96
7549	07	02	223429.5	7417944.0	15 17 28	21 15 52	96
7655	08	11	230241.5	7423407.0	16 08 12	21 16 23	96
7755	09	24	230260.9	7423233.6	16 08 59	22 08 12	96
7778	10	10	235639.0	7432178.5	16 08 21	22 08 29	96
7801	11	09	236893.8	7433613.0	16 08 31	22 08 38	96
7824	12	13	237974.9	7435160.0	16 08 44	22 08 51	96
7847	13	12	238822.0	7436876.5	16 08 55	22 09 04	96
7870	14	15	239674.1	7438590.0	16 09 08	22 09 15	96
7893	15	14	240063.9	7440469.1	16 09 18	22 09 27	96

* (Pegs are 83.33m apart)

TABLE 1c (CONTINUED)

EAST - WEST LINE

Peg No.	Stn No.	Set No	Coordinates Eastings	Northings	Time on d h m	Time off d h m	Gain db
2967	16	02	210889.9	7420901.6	22 09 08	29 08 50	96
2990	17	04	212462.8	7421995.0	22 09 27	29 09 13	96
3013	18	05	214280.8	7422420.0	22 09 58	29 09 31	96
3036	19	01	216196.3	7422512.0	22 10 30	29 09 57	96
3059	20	08	218111.3	7422610.5	22 10 45	29 10 25	96
3082	21	06	220026.1	7422714.0	22 11 05	29 10 53	96
3105	22	07	221940.8	7422817.5	26 08 50	29 11 12	96
3311	23	14	238118.5	7424716.5	22 10 57	29 16 15	96
3334	24	15	239943.4	7425303.0	22 11 31	29 15 50	96
3357	25	12	241770.1	7425889.0	21 11 57	29 15 29	96
3380	26	13	243596.8	7426475.5	22 12 13	29 15 00	96
3403	27	10	245423.5	7427062.0	22 13 26	30 14 36	96
3426	28	24	247250.2	7427648.5	22 13 47	29 14 10	96
3449	29	09	249076.0	7428217.0	22 14 02	29 13 42	96
3205	30	03	230265.6	7423274.5	16 08 31	21 13 02	96

TABLE 1d

BACKGROUND NOISE SURVEY, ALICE SPRINGS 1985.

Site	Set No.	Latitude deg	Latitude min	Longitude deg	Longitude min	Time on d h m	Time off d h m	Gain db
1	19	23	34.50	133	57.10	23 09 36	26 08 37	96
2	17	23	32.55	134	00.01	23 11 34	26 09 23	96
3	21	23	29.85	134	03.85	23 12 47	26 10 08	96
4	18	23	26.50	134	05.20	23 13 52	26 10 54	96
KS	16	23	40.15	133	54.05	23 17 12	26 15 34	96
14	16	23	39.15	133	54.25	26 16 06	27 07 18	96
14	17	"		"		26 14 15	27 07 24	96
14	18	"		"		26 14 23	27 07 22	96
14	19	"		"		26 13 32	27 07 17	96
14	20	"		"		23 16 36	27 09 25	96
14	21	"		"		26 14 12	27 07 23	96

TABLE 2a

ARUNTA CRUSTAL SURVEY 1985, SHOT INFORMATION.

Shot No.	Location	Time d h m s	Size t	Latitude deg min	Longitude deg min	Elevation m
01	66 (C)	05101009.64	1.0	22 59.23	133 44.71	670.0
02	06 (A)	07125510.03	3.0	23 16.69	132 20.33	617.4
03	126 (E)	09125510.21	1.0	22 55.95	135 12.49	502.0
04	95 (D)	10142008.95	0.5	23 00.25	134 26.76	646.0
05	66 (C)	10154510.01	0.5	22 59.23	133 44.71	670.0
06	66 (C)	14121030.57	0.5	22 59.23	133 44.71	670.0
07	36 (B)	14122543.13	0.5	23 01.20	132 59.97	582.4
08	06 (A)	17143100.47	1.0	23 16.69	132 20.33	617.4
09	126 (E)	18160515.57	3.0	22 55.95	135 12.49	502.0
10	66 (C)	20142420.04	1.0	22 59.23	133 44.71	670.0

TABLE 2B

SHOT INFORMATION, NARWIETOOMA TOMOGRAPHIC EXPERIMENT.

Location (peg No.)	Time d h m s	Size kg	Coordinates Easting	Northing	Elev m.
7445	23102157.08	168	217618.0	7411812.6	658.6
7468	23090258.32	131	218566.2	7413457.2	652.2
7491	22145257.76	102	219540.5	7415096.7	647.2
7514	22150658.58	82	221013.9	7416295.6	642.4
7537	22152503.88	66	222601.7	7417375.0	638.7
7560	no clock	57	224189.5	7418454.4	633.1
7583	23152254.83	45	225777.3	7419533.8	628.2
7606	26112058.24	33	227365.0	7420613.1	624.4
7629	26112957.94	21	228894.1	7421770.8	618.5
7652	27084059.14	12	230128.1	7423179.5	612.7
7675	27085101.49	21	231124.2	7424870.2	608.2
7698	27101159.97	33	232125.2	7426505.3	603.7
7721	27120555.93	45	233129.1	7428138.9	601.3
7744	27140156.26	57	234129.0	7429775.0	594.2
7767	27141454.92	70	235146.4	7431399.9	590.9
7790	28084957.52	98	236251.4	7432958.0	587.1
7801	28142756.76	96	236893.7	7433612.6	584.9
7824	28094300.79	119	237974.6	7435160.9	580.8
7836	28151655.42	131	238414.6	7436059.1	579.1
7859	29082756.20	168	239266.6	7437776.8	575.5

TABLE 2B (continued)

Location (peg No.)	Time d h m s	Size kg	Coordinates Easting	Northing	Elev m
3001	21112056.35	168	213282.0	7422356.3	615.5
3024	21105859.81	131	215196.6	7422469.0	619.1
3047	21092957.47	107	217111.6	7422567.8	622.9
3070	21091957.49	86	219026.7	7422666.6	624.3
3093	20162400.98	70	220941.7	7422765.4	625.1
3116	20161401.61	57	222856.7	7422864.3	625.8
3139	20141500.71	45	224771.7	7422963.1	621.8
3162	20140551.10	33	226686.2	7423070.5	618.8
3185	20111155.98	21	228600.5	7423181.0	616.0
3208	20100955.95	12	230514.9	7423286.1	611.3
3231	18171358.32	21	232133.8	7422364.7	612.1
3254	19165253.79	33	233846.0	7422781.5	610.9
3227	19140259.93	45	235435.6	7423853.8	607.2
3300	19134156.45	57	237245.2	7424435.5	604.6
3323	19103300.17	70	239070.7	7425022.0	601.3
3346	19102057.99	86	240896.1	7425608.3	596.2
3369	16135357.83	107	242722.8	7426190.8	592.1
3392	16134000.81	131	244549.4	7426773.3	591.4
3415	16131654.92	168	246376.0	7427355.8	592.5

TABLE 3.

RECORDING OPERATION DETAILS, ARUNTA CRUSTAL SURVEY 1985

Shot No.	Receiving stations	Station interval (km)
01	96 - 126	2.5
01	127 - 128	10.0
02	72 - 126	2.5
02	127 - 131	10.0
03	126 - 62	5.0
04	66 - 96	2.5
04	62 & 64	5.0
05	66 - 96	2.5
05	62 & 64	5.0
06	36 - 66	2.5
06	68 & 70	5.0
07	36 - 66	2.5
07	68 & 70	5.0
08	06 - 70	5.0
09	06 - 60	5.0
09	01 - 05	10.0
10	06 - 36	2.5
10	04 & 05	10.0

TABLE 4

RECORDING EQUIPMENT

Set Nos	Recorder Type	Seismometer Type	Amplifier Type	Clock	Polarity (see Note)
1 to 15	Akai	Willmore MK.III	TAM 5	NCE 3	Mass down signal down
16 to 21	Precision Instrument	Willmore Mk.II	TAM 5	NCE 3	"
22 to 27	Tandberg	Willmore Mk.II	Geotech	NCE 3	"
28 to 33	Tandberg	Willmore Mk.III	Geotech	NCE 3	"

Note: 1) Mass down applies for an impusive P-wave arrival.

2) Signal down refers to the trace played back from tape through the Siemens analogue chart recorder.

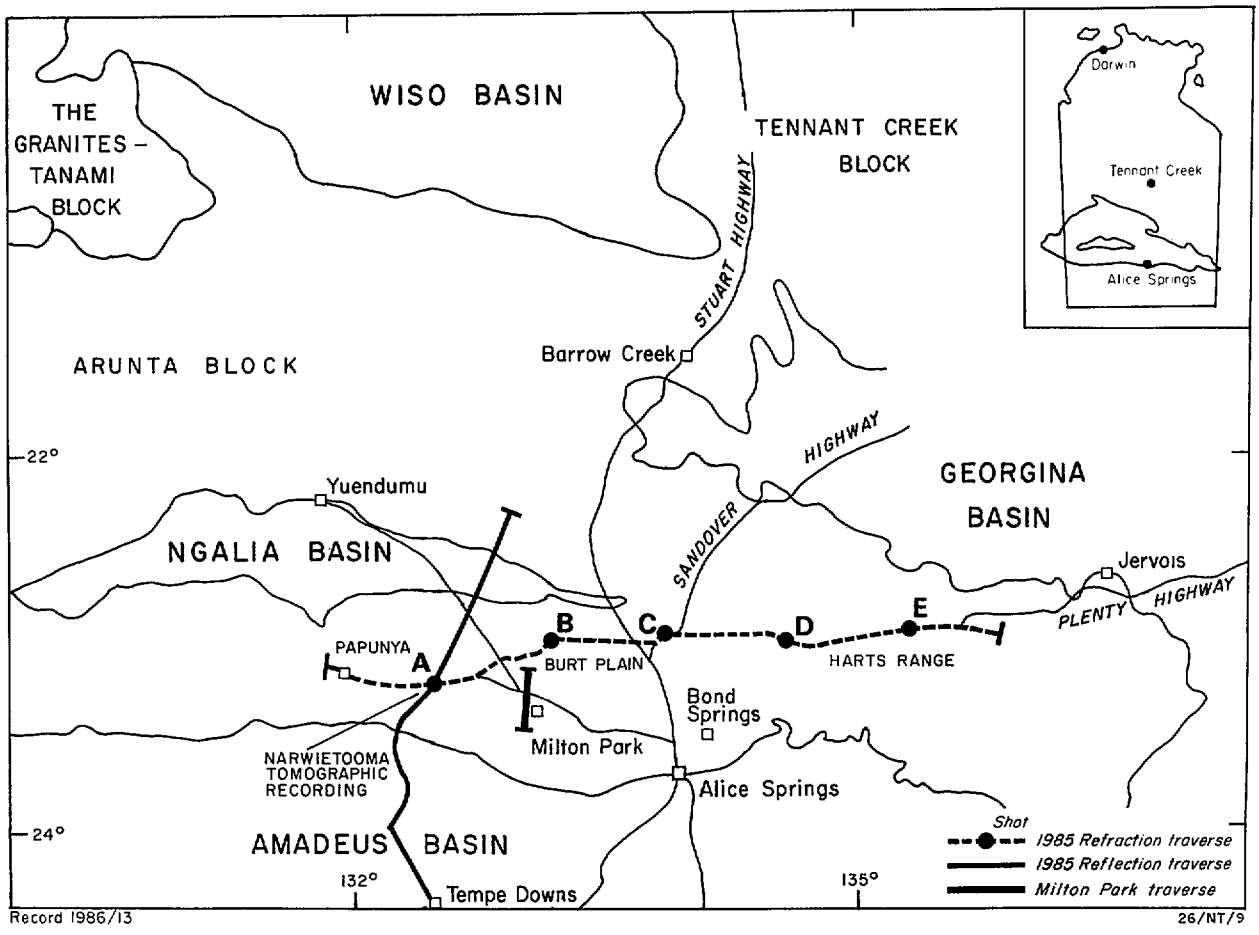
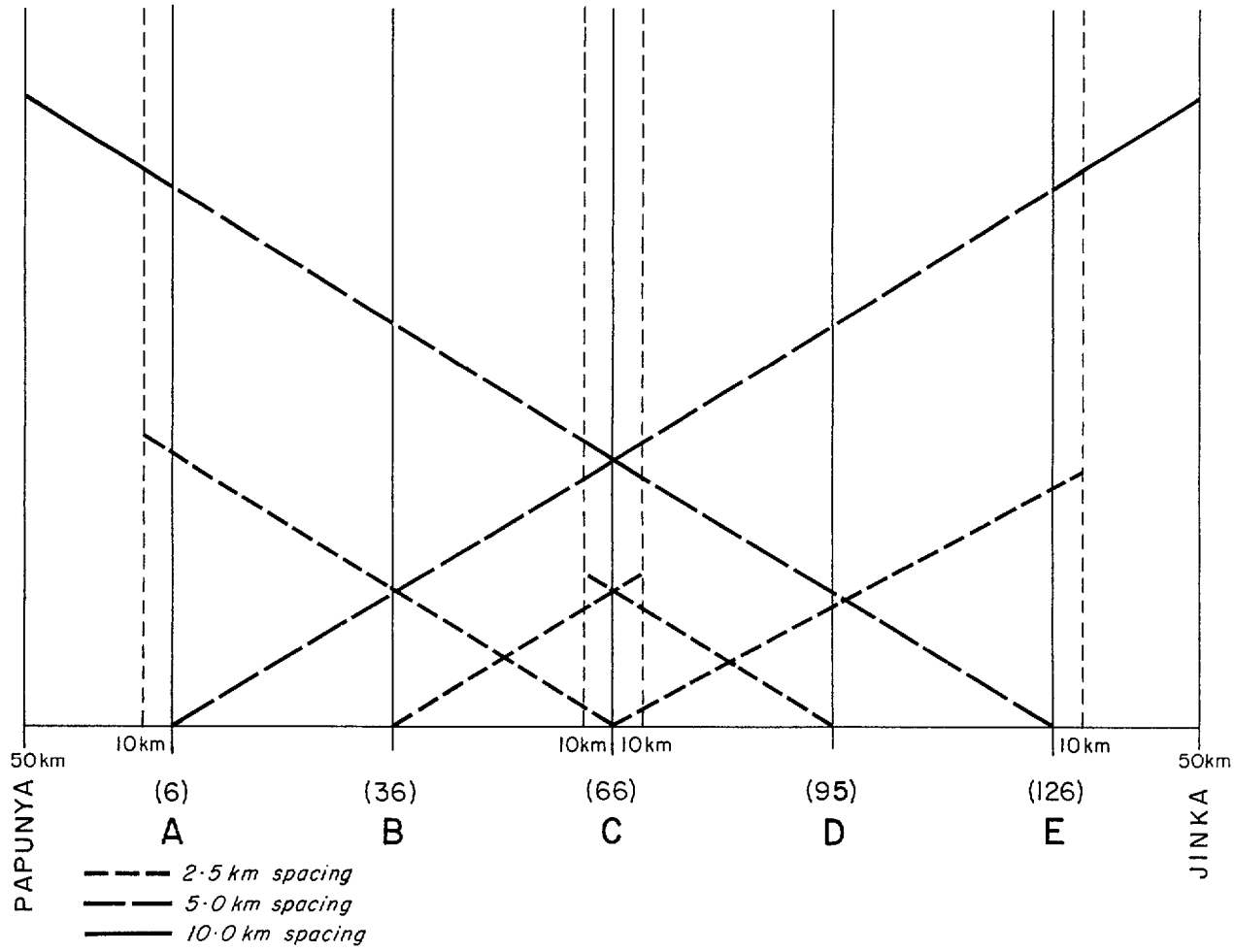


Fig.1 Arunta Block, Central Australia, seismic refraction profiling – G.E.



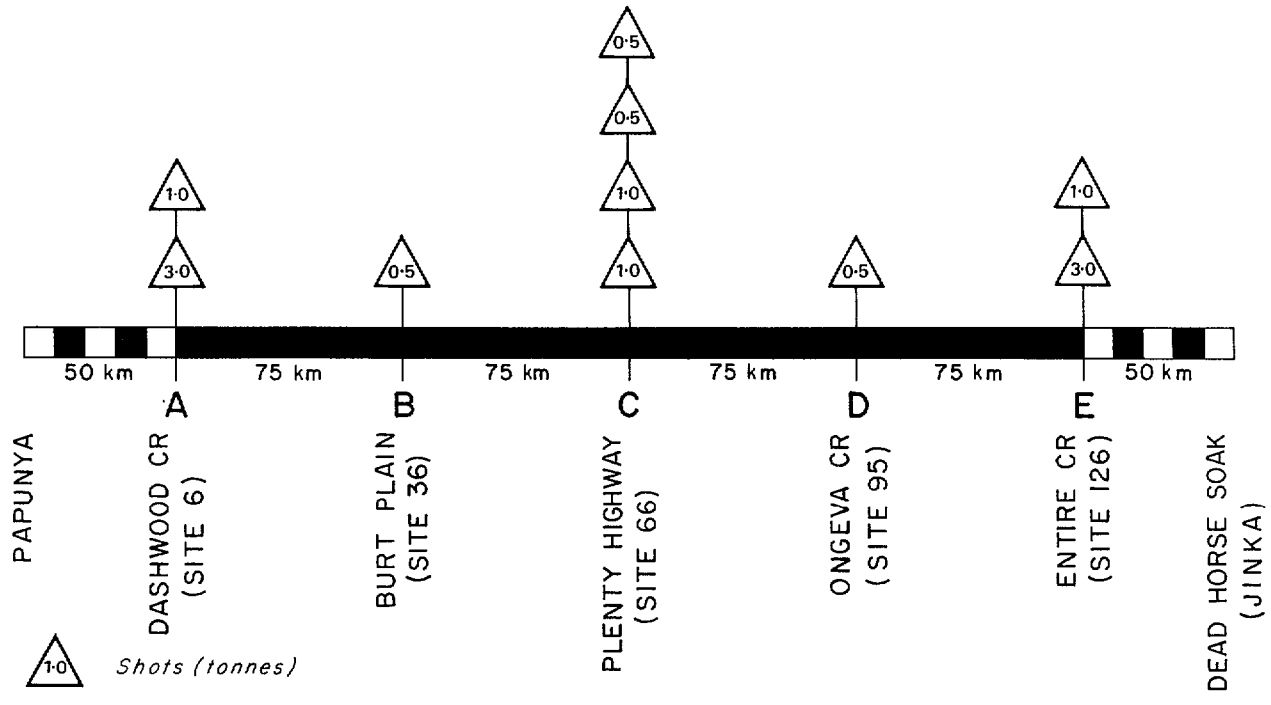


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Fig. 2 Details of recording operations, Arunta Block seismic refraction survey.