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COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS

RECORD No. 1962/167

AMADEUS BASIN
(SOUTHERN MARGIN)
SEISMIC SURVEY,
NORTHERN TERRITORY 1961

by

F. J. MOSS

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ILLUSTRATIONS

SUMMARY

The Bureau of Mineral Resources Seismic Party No. 2 conducted a survey from 15th May to 25th August 1961 in the Amadeus Basin. Reflection and refraction traverses were shot at intervals, along or near the Alice Springs/Port Augusta railway line, from Polhill in the north to Finke in the south.

In broad terms the object of the survey was to obtain across the Amadeus Basin a north-south seismic cross-section that would aid in investigating the stratigraphic cross-section and structural relations especially on the southern margin of the Basin.

Access and drilling problems caused the progress of the survey to be slow.

The statistics of the operation are included in three appendices.

During the course of the seismic survey, the Bureau also made gravity surveys covering the area; gravity-meter readings were made along all seismic traverses.

FIGS 1 and 2

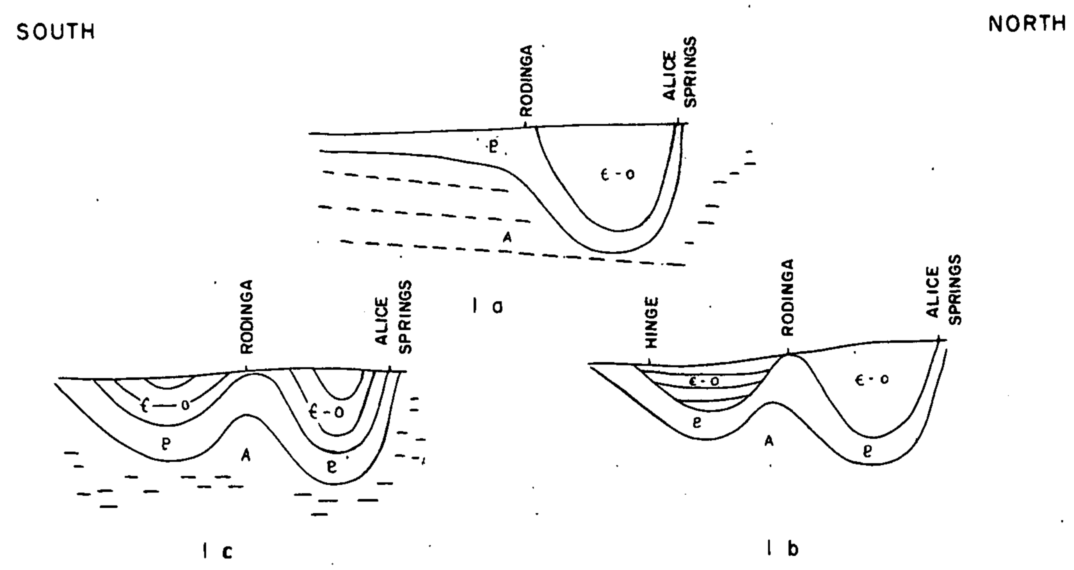
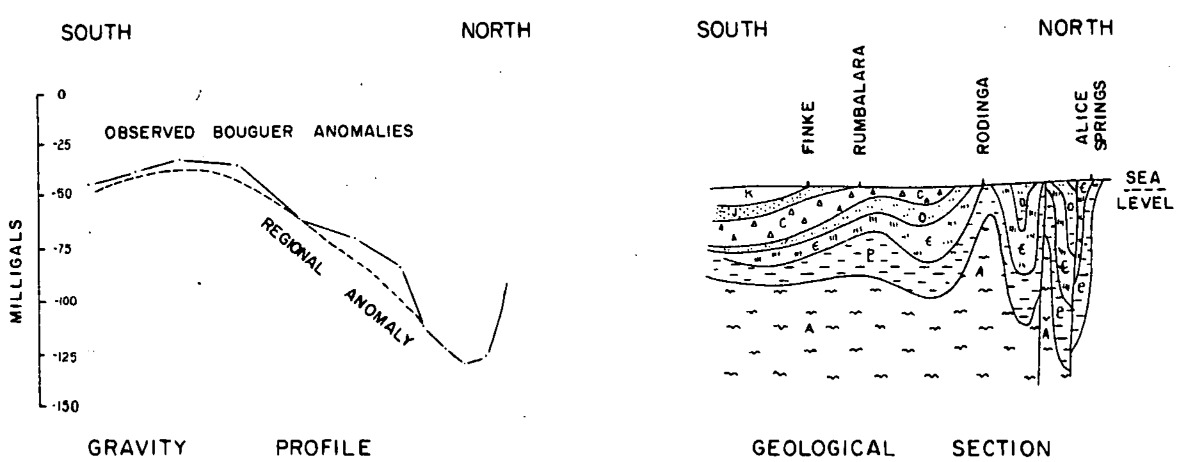


FIGURE 1 AMADEUS BASIN

North - south geological cross-sections



AFTER MARSHALL AND NARAIN

FIGURE 2 ALICE SPRINGS

Finke gravity profile and geological cross-section

TO ACCOMPANY RECORD No 1962/167

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS G53/B3-18

1. GEOLOGY

The geology of the Amadeus Basin has been investigated and reported on in the last 30 years by many geologists including Chewings (1931 and 1935), Voisey (1938), and Browne (1947). More recently Quinlan (1959) and Trumpy, Guillemot, and Tissot (1960) published reports on the geology of the Basin. Trumpy et al . (op. cit.) of the Institut Francais du Petrole prepared a review of the Amadeus Basin geology after consultation with geologists of Frome-Broken Hill Company, and a study of that company's unpublished reports as well as other available geological literature on the area.

The regional geological map (after Quinlan) is shown on Plate 1.

The Amadeus Basin, containing a sequence of extensively-faulted and folded Proterozoic and Palaeozoic sediments, in places overlain by Upper Permian to Recent sediments, is generally thought to lie between the Archaean Arunta Complex, which crops out north of the Macdonnell Ranges, and the Archaean outcrops that occur along the Northern Territory/South Australia border.

The nature of the southern boundary of the Basin is not obvious from known surface geology. At the time of the survey, the possibilities shown in Figure 1 had been postulated. Figure 1(a) summarises an early interpretation by geologists of Frome-Broken Hill Company that Proterozoic basement is shallow south of Rodinga. Figures 1b and 1c present another interpretation, based on the discovery of Ordovician fossils in outcrops at Mount Charlotte, south of Rodinga. Also,limestone analagous to Jay Creek Limestone (Cambrian) occurs in the geological cross-section at Mount Charlotte and dips south.

This interpretation, if accepted, leads to the possibility of substantial Cambro-Ordovician sediments, and these in turn could exist in either trough facies (Fig. 1b)or shelf facies (Fig.1c).

The seismic survey was intended to solve problems posed by these interpretations.

The stratigraphy of the Amadeus Basin, based mainly on lithology, is given by Quinlan (1959):

Era	Period	Formation	Lithology
QUATERNARY			Aeolian sand
TERTIARY			Laterites and 'Grey Billy' profiles *etc.*
MESOZOIC	JURASSIC	De Souza Sandstone	'Deep Alluvium'. Sandstone, glacial deposits, conglomerate, silty sandstone.
UPPER PALAEOZOIC	PERMIAN	'Finke Series'	
	PERMIAN?	'Pertnjara Formation	Conglomerate, calcareous sandstone
	-	Unconformity -	
	DEVONIAN	Mareenie Sandstone	Quartz sandstone
LOWER PALAEOZOIC	ORDOVICIAN	'Larapinta Group	Greywacke, limestone, and shale
	CAMBRIAN	'Pertaoorrta Group	Shale, sandstone, and quartz
UPPER PROTEROZOIC	-	'Pertatataka Formation	Conglomerate
		Disconformity -	
		Bitter Springs Limestone	Interbedded dolomite, limestone, and shale
		Heavitree Quartzite	Sandstone and silicified sandstone
ARCHAEAN		Arunta Complex	Granite, gneiss, schist, *etc.*

Tectonic movements in the Amadeus Basin commenced in the Ordovician period and continued during the Devonian period into the Upper Palaeozoic era. Large east-west anticlines were formed parallel to the northern boundary of the Basin. Proterozoic rocks are exposed within a large number of these anticlines. Trumpy *et al.* (1960) conclude that less-deeply eroded anticlines are evident mainly in the western part of the Basin (north of Lake Amadeus) and that they possibly exist also under the conglomerate covering the large Hermannsburg Syncline. Brunnschweiler (1957) states that 'Among the many anticlinal structures, there are at least a dozen which warrant closer inspection because they appear to be closed in Ordovician rocks and would trap oil that may have originated in the fossiliferous shale and limestone sequences of the Middle and Upper Cambrian which are known to contain numerous bituminous horizons'.

2. PREVIOUS GEOPHYSICAL SURVEYS

Gravity

Gravity surveys were made in the Amadeus Basin by the University of Sydney in 1954 (Marshall and Narain, 1954), by the Bureau of Mineral Resources from 1957 to 1961, and by Consolidated Zinc Corporation in 1958. Gravity surveys subsidised by the Commonwealth Government have been made on leases east of the railway line by Flamingo Petroleum Pty. Ltd.

In the most-recent Bureau gravity work in the area, helicopters were used (Langron, 1962a). Preliminary Bouguer-anomaly contours from this survey, in the area covered by the seismic traverses, are shown on Plate 2. The gravity values along the railway line are in fair agreement with Marshall and Narain's results. Marshall and Narain's observed Bouguer-anomaly profile, and their interpretation of the geological cross-section along this traverse are shown in Figure 2.

Marshall and Narain have few comments to make on the results from the part of their traverse from Alice Springs to the NT/SA border, except that small residual gravity anomalies are probably due to gentle folding of the basement. Their interpretation suggests that the Proterozoic ridge north of Rodinga is the northern limit of an area containing substantial Cambro-Ordovician deposits.

Langron (1962a) suggests that the gravity work does not show a definite eastern edge to the Basin, but that east of the railway line it indicates a considerable thinning of sediments south of Rodinga.

The results from gravity measurements along the seismic traverses are discussed briefly in Chapter 6 of this Record.

Aeromagnetic

A magnetometer traverse flown by the Bureau of Mineral Resources in 1958 (Jewell, 1960) crossed the region between the Finke River (NT) and Curralulla (SA) and passed close to the seismic lines investigated at Horseshoe Bend, Black Hills, and Lilla Creek.

The results obtained along the northern half of this traverse (Plate 2) are important in an assessment of the known facts regarding the nature of the southern margin of the Amadeus Basin.

The following is a summary of notes on the aeromagnetic profile prepared by J.H. Quilty of the Aeromagnetic Reduction Section of the Bureau's Geophysical Branch. The notes were prepared with the aid of information supplied by the Resident Geologist, Alice Springs, on known surface geology.

Finke River to Curralulla 1958

One broad, low-amplitude anomaly is recorded at position Z. Measurements on this anomaly indicate that the magnetic basement rock is probably not deeper than 6000 ft at this point.

The straight-line magnetic profile in the neighbourhood of Y changing into a series of undulations towards X would suggest a progressively shallowing basement (estimated basement depth 1300 ft below X). Several small anomalies from X to W could be due to dykes, several hundred feet wide, in the basement at depths of 500 to 1500 ft below the ground surface.

No reliable distinction can be made between those anomalies due to lithological changes in the basement and those due to basement topographic features. The geological evidence supplied indicates that dykes are widespread in the basement; the magnetic profile gives evidence to support this geological evidence. Whether these structures are accompanied by topographic effects cannot be resolved from the magnetic data.

The above suggests a very shallow (i.e. 1300 ft) magnetic basement west of Finke, with the basement deepening to 6000 ft (maximum) around latitude 25 degrees where the aeromagnetic traverse meets the Finke River (see Plate 2). As the traverse does not extend north of this point, no estimate can be made of the maximum depth to magnetic basement between Rodinga and latitude 25 degrees.

3. OBJECTS OF THE SURVEY

The principal object was to determine whether the west-extending tongue of Proterozoic rocks north of Rodinga represents:

(a) a basement structural 'high' separating two troughs respectively north and south of Rodinga; or

(b) the northern limit of a shelf area south of Rodinga containing substantial Cambro-Ordovician shelf deposits, or

(c) the northern limit of shallow or outcropping Upper Proterozoic basement (see Fig. 1a)

If (a) above applies, it was planned to seek evidence that would determine whether the basement elevation occurred before, or after, Palaeozoic sedimentation, e.g. evidence of sedimentary abutment, overlap, or truncation.

If (b) above applies, it was planned to seek evidence of:

(a) unconformity that might place the division between Upper Proterozoic and Palaeozoic rock,

(b) marked and extensive variations of velocity (e.g. from refraction depth probes and the observations of persistent strong reflections) that would indicate marked and extensive variations in lithology and so indirectly indicate shelf-type sedimentation,

(c) structural undulation that could help oil accumulation,

(d) the location of the southern hinge-line and the relative tectonic characteristics, and the displacement of the two hinge areas, i.e. north and south of Rodinga.

A further object was to investigate the general nature of the structures below the Pertnjara/Ordovician unconformity near Polhill railway siding in the northern part of the Basin.

4. FIELD WORK

Plate 2 shows the location of the seismic traverses. A summary of the work done is as follows:

North-west of Rodinga

Hugh River Proterozoic outcrops - refraction depth probes.

Bokhara Lower Palaeozoic outcrops - refraction depth probes.

Basin north of Rodinga

Deep Well railway siding - 5½ miles of continuous correlation reflection traversing and refraction depth probe.

Polhill railway siding - 9¼ miles of continuous correlation reflection traversing and refraction depth probe.

Basin south of Rodinga

Mount Charlotte - 3½ miles of continuous correlation reflection traversing and refraction depth probe.

Bundooma railway siding - 2 miles of continuous correlation reflection traversing and refraction depth probe.

Horseshoe Bend Homestead - 2 miles of continuous correlation reflection traversing and refraction depth probe.

Black Hills (extension of Kingston Range) - 4 miles of continuous correlation reflection traversing.

South of Kingston Range

Lilla Creek - refraction depth probe.

Lilla Creek South - refraction depth probe.

5. RESULTS

Hugh River traverses

Refraction traverses A, B, and C were recorded to determine, for future correlation purposes, the seismic velocities in the Upper Proterozoic rocks in the Rodinga area. The velocity in the Arumbera Greywacke at the top of the cross-section was shown to be 15,100 ft/sec, and the velocity in a massive limestone somewhat deeper, believed to be the Bitter Springs Limestone, was 18,900 ft/sec.

Plates showing the time/distance curves and interpretation of results on these traverses have not yet been completed

Bokhara traverses

Refraction traverses D, E, and F were located near the old Bokhara Homestead on Lower Palaeozoic sediments. The velocity in a sandstone identified as of Ordovician age was shown to be 14,400 ft/sec, but the highest velocity recorded in the Cambrian sequence was 10,300 ft/sec.

Plates showing the time/distance curves and interpretation of results on these traverses have not yet been completed.

Polhill, Traverse G

Plates 4 and 5 show variable-area reflection cross-sections along this 9-miles-long traverse.

Reflection quality, which was very good at the southern end of the traverse around Shot-points 129 to 126, deteriorated to the extent that from Shot-point 116 northward, the few alignments recorded are questionable.

The cross-section shows that the axis of the Ooraminna Anticline lies under Shot-point 118. South of this axis the reflections show a strong southerly dip. They are conformable down to about 2 sec(roughly 15,000 ft) at Shot-point 129 At times greater than 2 sec, relatively low-dip reflections of poor quality were recorded. Their positions in the cross-section below the steeply-dipping reflectors are somewhat anomalous. No interpretation of these low-dip reflections is offered at present. North of Shot-point 118, the poor reflections recorded show fairly flat, shallow beds and give little information at depth. This portion of the traverse runs along the strike of the surface outcrops.

Plate 11 shows refraction time/distance curves and their interpretation on this traverse.

Velocities recorded under Shot-point 118 were:

Velocity (ft/sec)	Depth (ft)	Dip
11,900	700	3^{o}N.
19,750	2700	1^{o}S.

The deeper refractor quite probably correlates with a massive Cambrian limestone (Jay Creek Limestone) at Deep Well in which the same velocity was recorded.

Deep Well Traverse G

Plate 6 shows a variable-area reflection cross-section along this $5\frac{1}{2}$-mile-long traverse.

Reflection quality ranged from fair to poor, with reflections being recorded down to about 2 sec at Shot-point 209 The cross-section shows about 15,000 ft of sediments (including Upper Proterozoic) which dip at about 8 degrees in the northern part of the traverse.

An unconformity probably marking the Lower Palaeozoic/Upper Proterozoic boundary is clearly evident under Shot-points 219 to 222 at about 0.9 to 1.0 sec (5000 to 6000 ft deep).

Owing to structural complexity immediately south of Deep Well, it is impossible to extrapolate reflecting horizons to the surface and so identify them with outcrop.

Plate 12 shows refraction time/distance curves and their interpretation on this traverse. Velocities recorded under Shot-point 219 were :

Velocity (ft/sec)	Depth (ft)	Dip
11,900	800	8°N
19,500	2700	8°N

The deeper refractor is interpreted as the Jay Creek Limestone, a massive Cambrian limestone which crops out at Mount Peachy, 10 miles west of this traverse (Wulff, 1960). The identification was made on the basis of the stratigraphic position at the surface, and of thicknesses measured at Mount Peachy.

Mount Charlotte, Traverse G

Plate 7 shows a variable-area reflection cross-section along this 3½-mile-long traverse.

Fair-quality reflections were recorded along this traverse down to more than 2 sec (roughly 15,000 ft) at Shot-point 416. The cross-section shows a consistent southerly dip. It shows irregularities suggestive of minor faulting in at least two positions. The first is at 1.1 sec under Shot-point 405; the second is at 1 1 sec under Shot-point 411.

Plate 13 shows refraction time/distance curves and their interpretation on this traverse.

Velocities recorded under Shot-point 408 were:

Velocity (ft/sec)	Depth below datum (ft)	Dip
11,900	170	2°S
16,800	1520	4°S
20,800 (recorded as 2nd event)	5800	1°30'S

The identification of the deepest refractor as the Jay Creek Limestone is made on the stratigraphic position at the surface, and on the thickness measured on outcrops at Mount Charlotte.

Bundooma, Traverse G

Plate 8 shows a variable-area reflection cross-section along this 2-mile-long traverse.

Good-quality reflections were recorded down to 1.5 sec (roughly 11,000 ft) using shallow nine-hole patterns. Poor-quality reflections are evident below this depth but they are very difficult to interpret. There is an indication of an anticline of at least 200-ft relief with its axis under Shot-point 512.

Plate 14 shows the refraction time/distance curves and their interpretation on this traverse. It is possible that the 20,000-ft/sec (second event) refractor recorded at about 6000-ft depth is the Jay Creek Limestone. It is identified as such by correlation with the velocity found at Mount Charlotte for a refractor that is almost certainly identified as Jay Creek Limestone.

There is at least 5000 ft of reflecting cross-section below this depth, suggesting that this refractor is neither the high-velocity Bitter Springs Limestone (Proterozoic) nor granite.

Horseshoe Bend, Traverse G

Plate 9 shows the variable-area reflection cross-section along this 2-mile-long traverse.

Good-quality reflections were recorded down to 1 sec (about 6000 ft) and poor reflections were recorded down to 2 sec (about 15,000 ft). The reflecting horizons down to 6000 ft are fairly flat, while the deeper, poorer-quality reflections show a definite strong north dip.

Plate 15 shows refraction time/distance curves and their interpretation on this traverse. A 21,000-ft/sec velocity is recorded as a second event at about 3500 ft (reflection time 0.6 sec). This velocity is interpreted to correlate with the high velocity found at Mount Charlotte and Bundooma, and is most probably the velocity in the Jay Creek Limestone.

Black Hills, Traverse G

Plate 10 shows the variable-area reflection cross-section recorded on this 4-mile-long traverse.

Reflection quality was good for shallow reflectors between Shot-points 652 and 660, reflections being recorded down to about 0.8 sec (about 5000 ft) at Shot-point 652. Reflections down to 0.7 sec at Shot-point 652 generally show north dip, but rather extraordinary reflections from 0.7 sec to 0.8 sec are flat and no satisfactory interpretation has been made of them. It has been suggested that they may be of instrumental origin, but the instruments have not shown similar evidence of malfunctioning at any other time.

An apparent reflection of very poor quality rises to 0.7 sec beneath Shot-point 660 and is probably due to an anticlinal erosional hinge deeper in the geological cross-section.

Lilla Creek, Traverse G

Plate 16 gives refraction time/distance curves and their interpretation along this traverse. Refraction results give a velocity of 18,900 ft/sec at 580-ft depth. This velocity is similar to that recorded for granite at Lilla Creek South and it presumably represents shallow granite basement.

Lilla Creek South, Traverse G

Plate 17 gives the time/distance curves and their interpretation along this refraction traverse.

Refraction probing was done at a bore site to determine the velocity in granite known to be at 500-ft depth. The velocity measured was 19,400 ft/sec.

6. DISCUSSION OF RESULTS

Seismic methods in the Amadeus Basin

The seismic reflection method has been proved applicable to the study of the Basin; i.e. good reflections are obtainable.

The use of the seismic refraction method is limited owing to the high seismic velocity in the Jay Creek Limestone. Penetration to refractors below the Jay Creek Limestone is virtually impossible. The refractors at Bundooma and Horseshoe Bend, in which the velocity is about 20,000 ft/sec, are currently interpreted as Jay Creek Limestone because of the tentative identification of the 20,000-ft/sec refractor with the Jay Creek Limestone at Mount Charlotte. In general, it may be said that the refraction method has little application for the identification of crystalline basement, except in areas where the Jay Creek Limestone is absent.

North-west of Rodinga

The preliminary refraction work at Hugh River and Bokhara did not provide reliable criteria for the identification of refractors. It was found that particular velocities could apply to more than one horizon in the Palaeozoic and Proterozoic sequences in the Basin.

Basin north of Rodinga

Plate 3 shows a geological cross-section, a preliminary Bouguer-anomaly profile, and a composite seismic cross-section across the Amadeus Basin.

The existence of a deep syncline between Polhill and Deep Well is confirmed by the 1961 seismic survey. Seismic results suggest that there could be up to 20,000 ft of sediments in the syncline.

The seismic results, regional gravity, and geology are in agreement at Deep Well, but no well-defined gravity 'high' is associated with the Ooraminna Anticline at Polhill. Langron (1962b) considers that at Polhill a gravity 'high' due to the anticline is obscured by the steepness of the regional gradient.

Basin south of Rodinga (Plate 3)

Seismic evidence confirms a substantial thickness of Palaeozoic and Proterozoic sediments dipping south at Mount Charlotte. It suggests the existence of at least 10,000 ft of these sediments in the southern part of the Basin.

The hingeline of the southern margin of the Amadeus Basin is placed at the Black Hills extension of the Kingston Range.

South of Kingston Range

South of the Black Hills traverse, the Lilla Creek traverse shows probable granite at about 600-ft depth. The amount of work done was not sufficient to determine whether deposition occurred in a trough or on a shelf.

The Bouguer-anomaly profile over the southern trough does not indicate the large depth of sediments confirmed by the seismic survey.

Gravity measurements along seismic traverses

This is the subject of a separate Record by Langron (1962b).

Langron states that 'In general there is not a great deal of similarity between the gravity profiles and the geological seismic cross-sections. It would be unreasonable to expect any simple relation in an area so tectonically disturbed.'

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APPENDIX A

STAFF AND EQUIPMENT

STAFF

Party leader	:	F.J. Moss
Geophysicists	:	D.J. Walker K.F. Fowler (11/8/61 - 25/8/61)
Surveyors:	:	R. Leetham) Dept of the Interior M. Francki)
Clerk	:	E.J. Quinn
Observer	:	G.L. Abbs
Shooter	:	R.J.E. Cherry
Toolpusher	:	J.G. Halls
Drillers	:	J. Chandler R.O. Larter
Mechanics	:	I.D. Pirie H. McPherson

EQUIPMENT

Seismic amplifiers	:	HTL 7000B
Seismic oscillograph	:	Electro-Tech ER 66
Magnetic recorder	:	Electro-Tech DS 7
Geophones	:	Electro-Tech 20 c/s (reflection) TIC 6 c/s (refraction)
Drills	:	Failing 750 (Commer) 2 Careys type H1 (Bedford)
Water tankers	:	4 Bedford 700-gal
Shooting truck	:	Bedford 700-gal

APPENDIX B

TABLE OF OPERATIONS

Sedimentary basin	:	Amadeus Basin, NT	
Survey line	:	Alice Springs to Finke	
Camp sites	:	1. Rodinga (15th May - 17th July)	
		2. Polhill (17th - 31st July)	
		3. Bundooma (31st July - 8th Aug)	
		4. Horseshoe Bend (10th - 25th Aug)	
Survey commenced	:	19th May 1961	
Miles surveyed	:	83½ (approx.)	
Topographic survey control	:	MSL, Port Augusta railway levels	
Explosives used	:	11,400 lb	
No. of detonators used	:	726	
Datum levels for corrections: (above sea level)	:	Polhill	: 1700 ft
		Deep Well	: 1500 ft
		Mount Charlotte	: 1200 ft
		Bundooma	: 1100 ft
		Horseshoe Bend	: 1000 ft
		Black Hills	: 1000 ft
		Lilla Creek	: 900 ft
		Lilla Creek South	: 1000 ft
Source of velocity distribution	:	$t:\Delta t$ analysis	

REFLECTION SHOOTING DATA

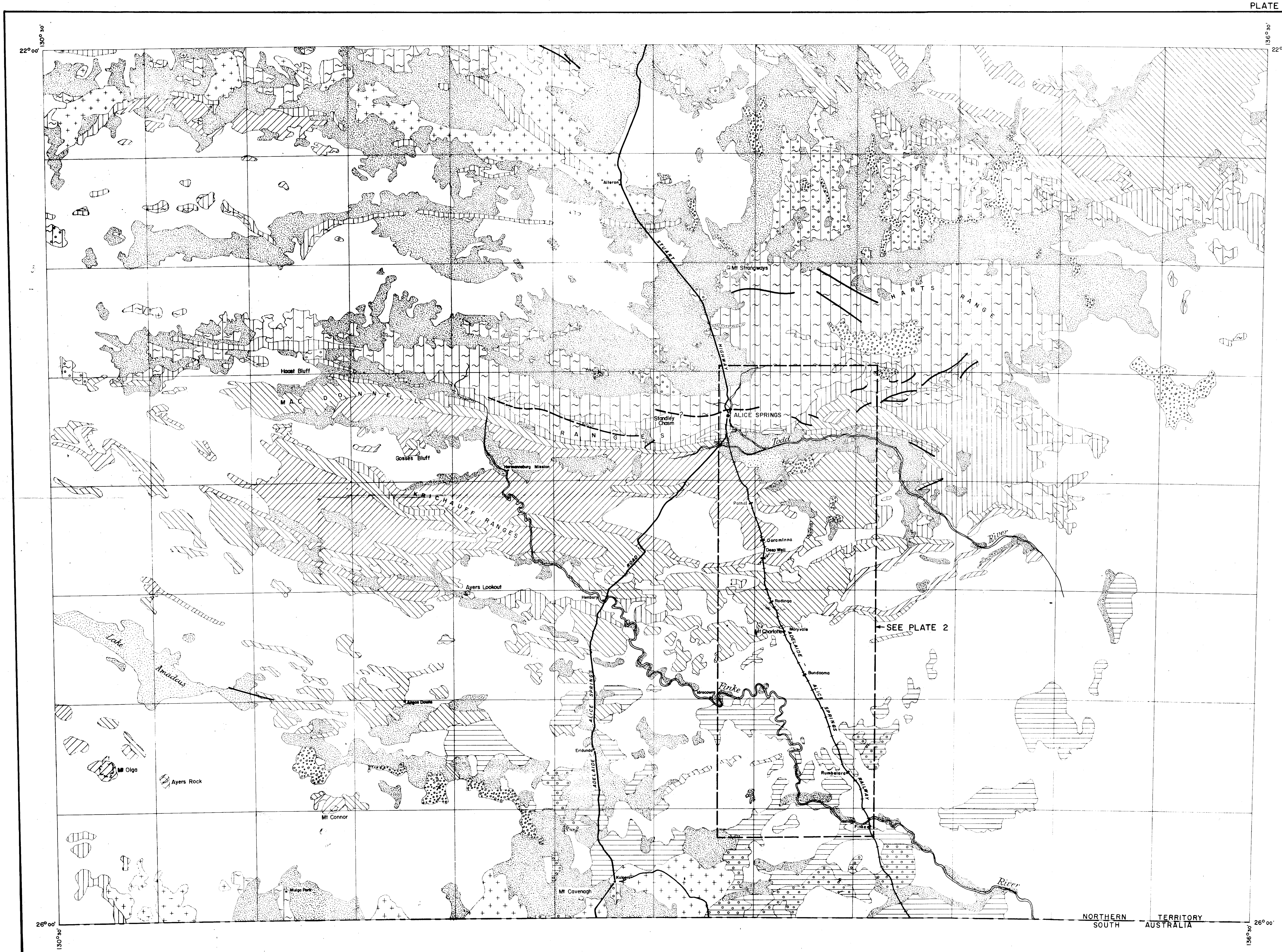
Shot-point interval	:	1320 ft
Geophone group	:	6 geophones per trace at 22-ft intervals
No. of holes shot	:	247 (including 14 nine-hole patterns)
Miles traversed	:	26½
Usual recording filter	:	K18 K75
Usual playback filter	:	K30 K57

APPENDIX C

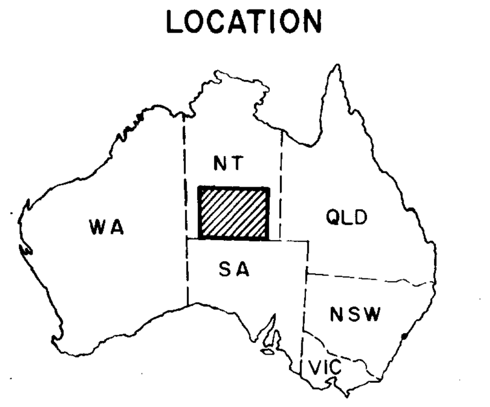
DRILLING STATISTICS

for the period 19th May to 24th August 1961

Drilling rigs	2 Carey, type H1
Total footage drilled	23,053
Total number of holes drilled	400
Average depth of hole	54 ft
Deepest hole drilled	195 ft
Travelling time and rigging up	411 hr
Time lost standing by for recorder	54 hr
Total time lost	100 hr
Drilling time	579 hr
Maintenance time	122 hr
Number of shifts worked	117
Bentonite used	28 bags
Average drilling rate	39 ft/hr



LOCATION



MAP DATA

PROJECTION: LAMBERT CONFORMAL CONIC STANDARD PARALLELS 24°40' AND 27°20'

CONTROL: ASTRONOMICAL FIXATIONS BY THE DIVISION OF NATIONAL MAPPING.

DETAIL: BASE MAP FROM 1:1,000,000 ICAO AERONAUTICAL CHARTS, (3231) LAKE MACKAY, (3232) ALICE SPRINGS, (3343) OODNADATTA (2nd EDITION) AND (3344) PETERMANN RANGES GEOLOGY FROM DRAFT COPY BY BMR GEOLOGICAL BRANCH AT 12 MILES TO 1 INCH APPROXIMATE SCALE PLANIMETRY FROM 1:1,000,000 ICAO CHARTS

RELIABILITY: PLANIMETRIC – SKETCH
GEOLOGICAL – REGIONAL GEOLOGY

AMADEUS BASIN. (SOUTHERN MARGIN) SEISMIC SURVEY, 1961

REGIONAL GEOLOGY

SCALE IN MILES

10 0 10 20 30 40 50 60

LEGEND

	Deep weathering profile (laterite) Superimposed on formations concerned
RECENT AND PLEISTOCENE	Aeolian sands
	Alluvium, wash, red earth soil, calcrete evaporites, clays, terrace gravels.
TERTIARY	Chalcedony, calcareous silt, gypseous clays.
MESOZOIC AND PERMIAN	Undifferentiated sandstones, siltstones, claystones, also silty sandstones, boulder bed, arkose and conglomerate of "Finke Series."
UPPER PALAEOZOIC AND DEVONIAN	Sandstones, conglomerates, shales, "Pertnjara Formation" Mareenie and Dulcie Sandstones
ORDOVICIAN AND CAMBRIAN	Sandstone, limestone, dolomite, shale, quartz, greywacke, (includes members of "Pertaoorrta and Larapinta Groups" and the "Sandover Beds")
PROTEROZOIC	Sandstone, quartzite, shale, limestone, conglomerate, boulder beds.
UNDIFFERENTIATED PRECAMBRIAN	Gneiss, schist, amphibolite, granite, granodiorite, basic intrusive pegmatites, dolerite, "Arunta Complex"
	Granite

FIRST EDITION, MARCH 1960.

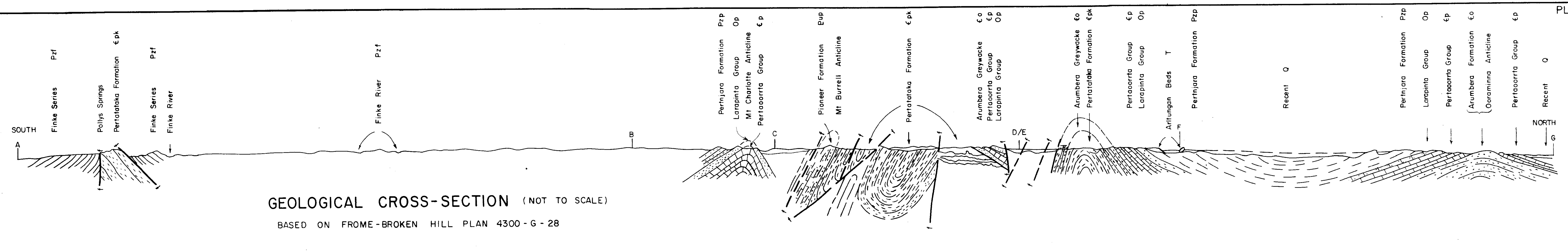
GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS G53 / B 3-1

TO ACCOMPANY RECORD No 1962 / 167

Geophysical Branch, Bureau of Mineral Resources, Geology and Geophysics. G53/B3-2
To Accompany Record No 1962/167

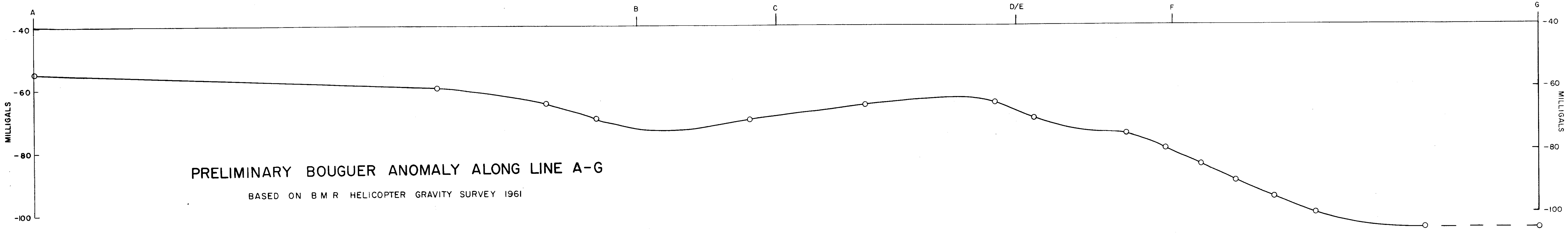
AMADEUS BASIN SEISMIC SURVEY 1961

PLATE 3



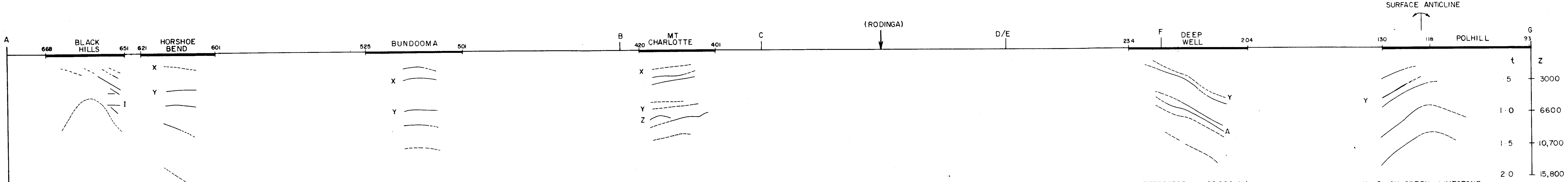
GEOLOGICAL CROSS-SECTION (NOT TO SCALE)

BASED ON FROME-BROKEN HILL PLAN 4300-G-28



PRELIMINARY BOUGUER ANOMALY ALONG LINE A-G

BASED ON BMR HELICOPTER GRAVITY SURVEY 1961



I = ANOMALOUS HIGH AMPLITUDE ALIGNMENT POSSIBLY (?) OF INSTRUMENTAL ORIGIN. No DIP

X = REFRACTOR V = 16,800 ft/sec
Y = REFRACTOR V = 20,000 ft/sec
? JAY CREEK LIMESTONE

X = REFRACTOR V = 16,800 ft/sec
Y = REFRACTOR V = 20,000 ft/sec
? JAY CREEK LIMESTONE

X = REFRACTOR V = 16,800 ft/sec
Z = POSSIBLE DIFFRACTION
Y = REFRACTOR V = 20,000 ft/sec ? JAY CREEK LIMESTONE } ACTUAL DEPTH NOT DETERMINED TO DATE

Y = REFRACTOR V = 20,000 ft/sec
? JAY CREEK LIMESTONE
A = ? ARUMBERA GREYWACKE

Y = ? JAY CREEK LIMESTONE

REFLECTION QUALITY: GOOD / FAIR ———
POOR / DOUBTFUL - - - - -

COMPOSITE SEISMIC CROSS-SECTION - TRAVERSE G

BASED ON BMR SEISMIC SURVEY 1961

GENERALISED CROSS-SECTIONS ACROSS BASIN

SCALE IN MILES
4 0 4 8 12

TO ACCOMPANY RECORD No 1962/167

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS G 53/B3-3

AMADEUS BASIN SEISMIC SURVEY

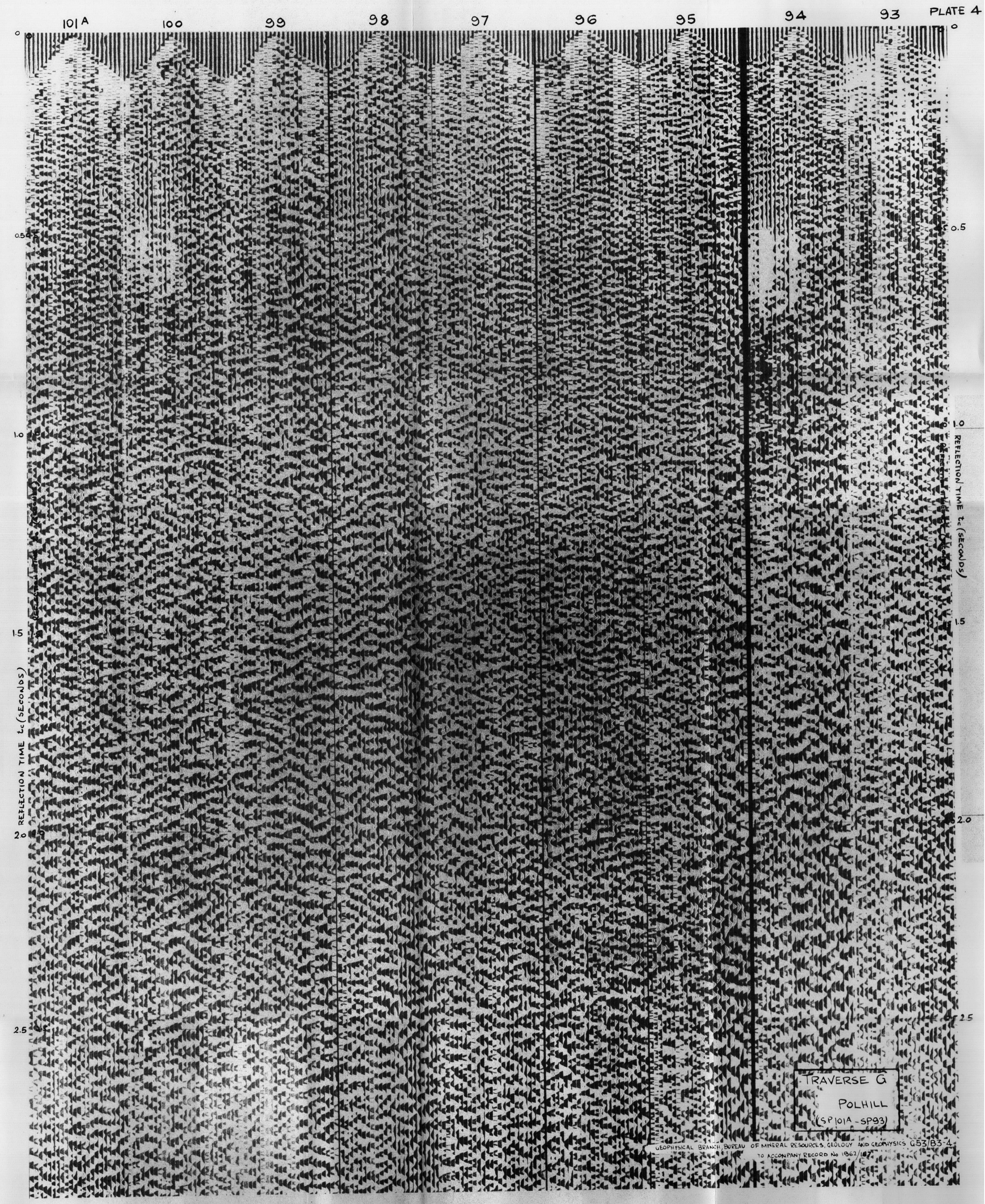


PLATE 4
101A
100
99
98
97
96
95
94
93
0
0.5
1.0
1.5
2.0
2.5
REFLECTION TIME t_c (SECONDS)
TRAVERSE G
POLHILL
(SP101A - SP93)
GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS G53/B3-4
TO ACCOMPANY RECORD No 1962/187

PLATE 5

REFLECTION TIME t (SECONDS)
TRAVERSE G
POLHILL
(SP129 - 102)
GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS G 53/B3-5
TO ACCOMPANY RECORD No 1962/167

PLATE 6

G231
G230
G229
G228
G227
G226
G225
G224
G223
G222
G221
G220
G219
G218
G217
G216
G215
G214
G213
G212
G211
G210
G209
0
0.5
1.0
1.5
2.0
2.5
3.0
REFLECTION TIME t_c (SECONDS)
REFLECTION TIME t_c (SECONDS)
TRAVERSE G
DEEP WELL
GEOPHYSICAL BRANCH BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS G53/B3-6
TO ACCOMPANY RECORD No 1962/167

PLATE 7

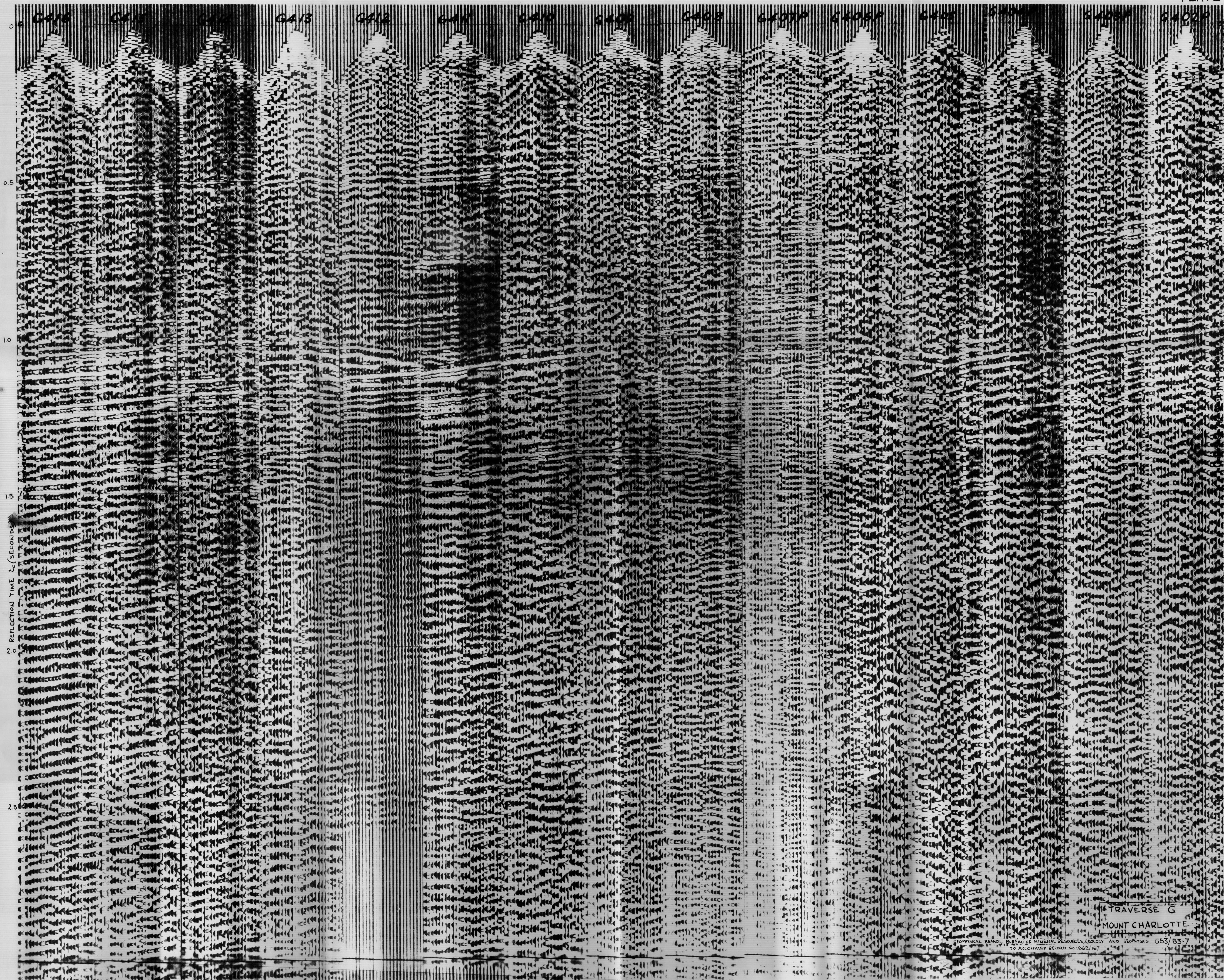

G413
G412
G411
G410
G407P
G406P
G405
G403P
G402P
0
0.5
1.0
1.5
2.0
2.5
REFLECTION TIME t_0 (SECONDS)
TRAVERSE G
MOUNT CHARLOTTE
GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS
TO ACCOMPANY RECORD No 1962/167
G53/B3-7

PLATE 8

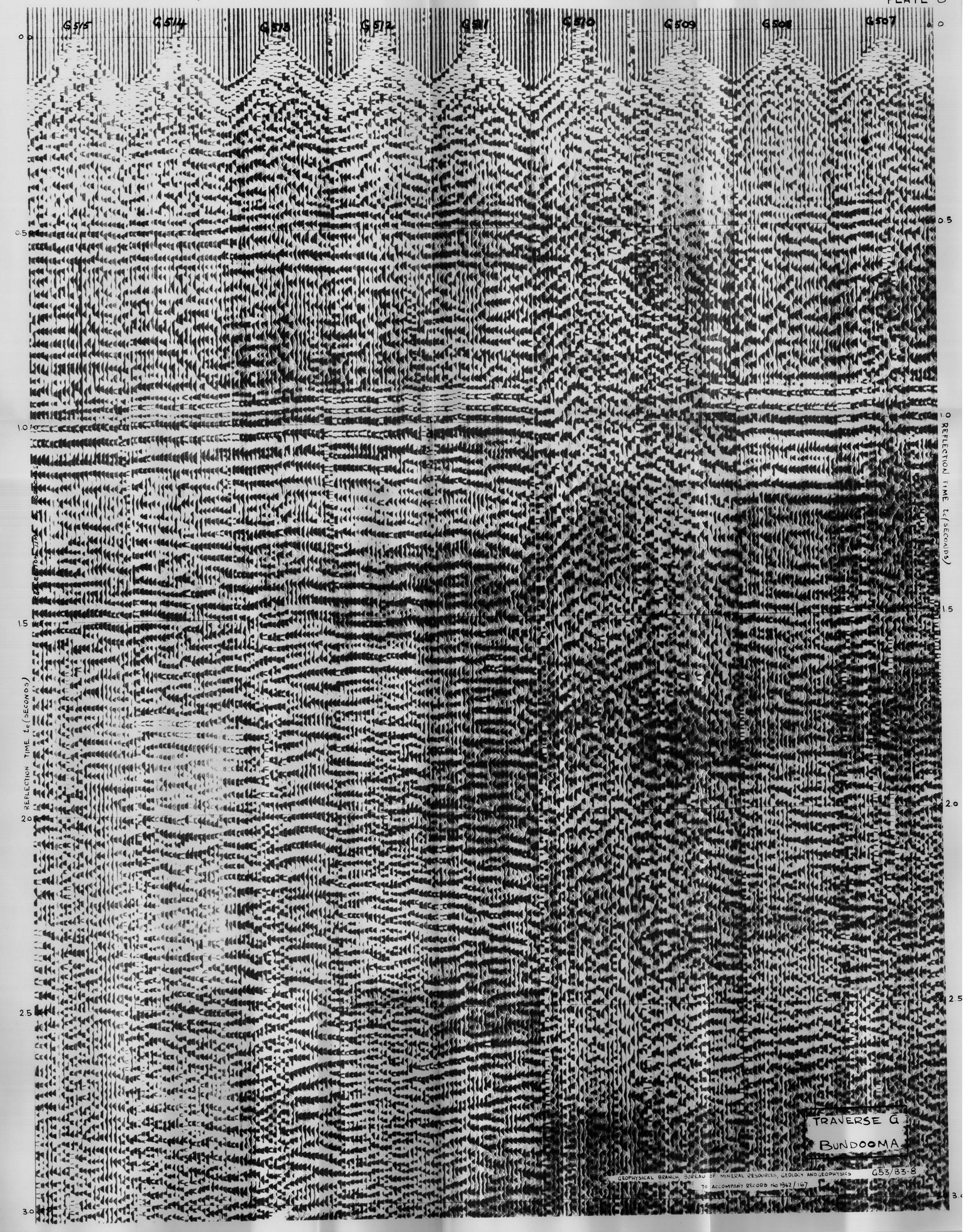

G515
G514
G513
G512
G511
G510
G509
G508
G507
0.0
0.5
1.0
1.5
2.0
2.5
3.0
REFLECTION TIME t_c (SECONDS)
REFLECTION TIME t_c (SECONDS)
TRAVERSE G
BUNDOOMA
GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS
TO ACCOMPANY RECORD No 1962/167
G53/B3-8

PLATE 9

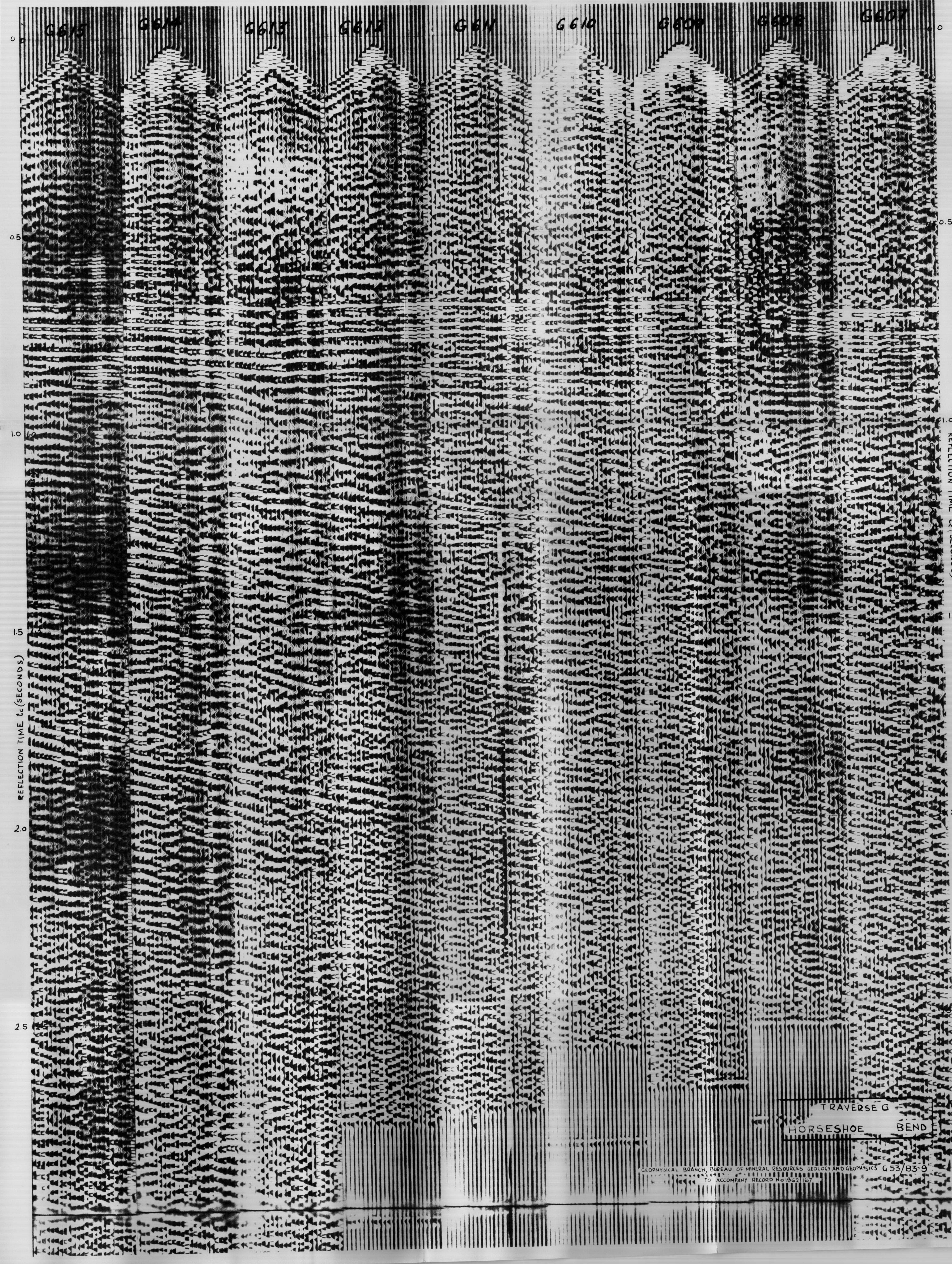
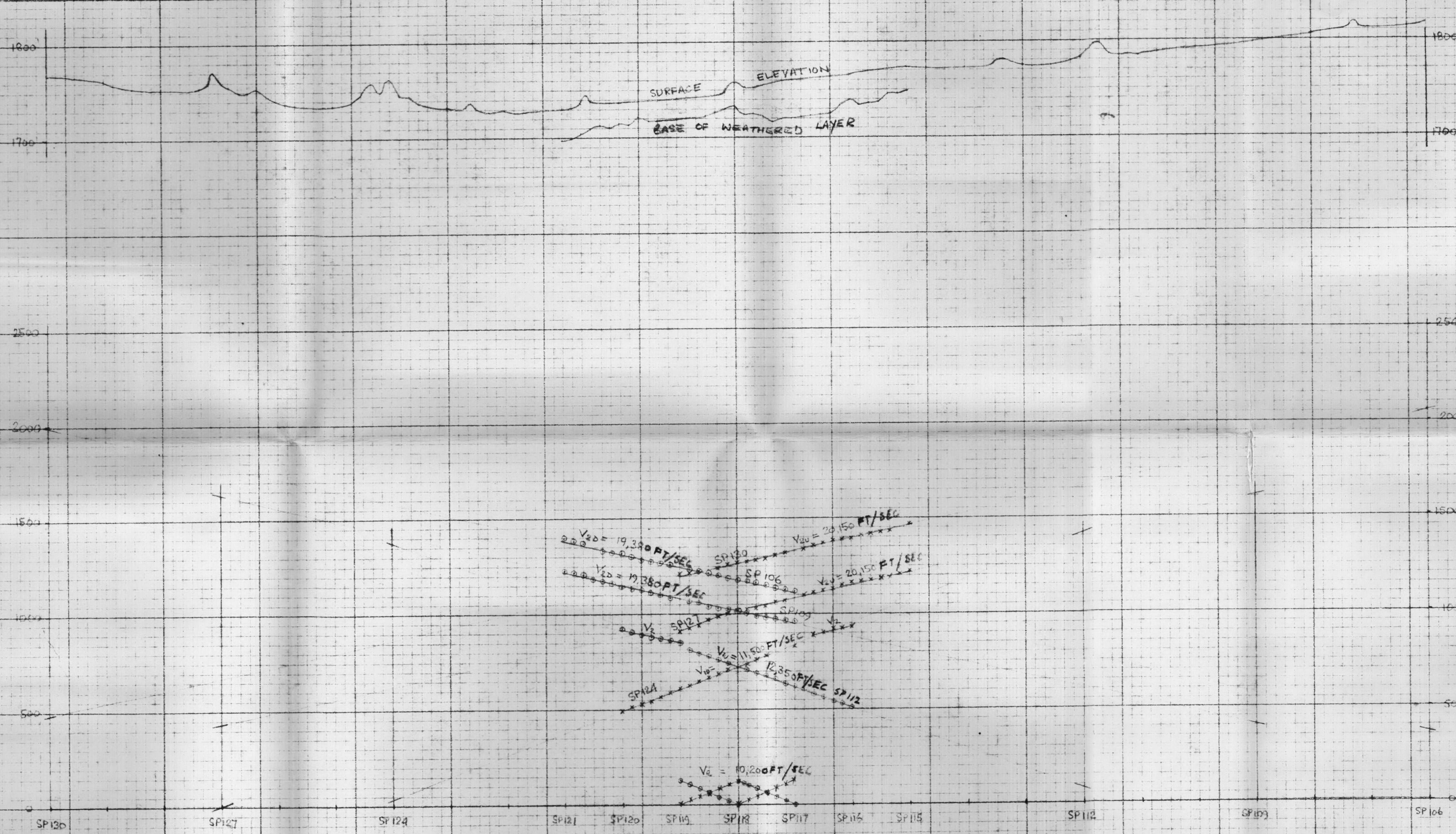

G615
G614
G613
G612
G611
G610
G609
G608
G607
0
0.5
1.0
1.5
2.0
2.5
REFLECTION TIME t_c (SECONDS)
REFLECTION TIME t_c (SECONDS)
TRAVERSE G
HORSESHOE BEND
GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS G53/B3-9
TO ACCOMPANY RECORD No 1962/167

PLATE 10

AMADEUS BASIN 1961



SP124

t_o	506	522	540	560	577	601	622	644	661	681	696	715	–	758	772	797	819	834	855	–	903	918	937	944	952
$E_c + W_c$	-11	-12	-9	-11	-11	-11	-10	-11	-11	-10	-9	-9	–	-13	-13	-14	-18	-18	-18	–	-17	-16	-17	-22	-21
t_c	495	510	531	549	566	590	612	633	650	671	687	706	–	740	759	783	801	816	837	–	886	902	920	922	931

SP120 SP118 SP116

SP127

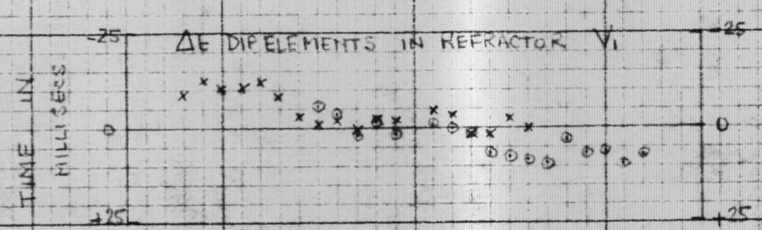
t_o	918	942	957	976	1005	1020	1035	1040	1049	1057	1079	1089	–	1117	1127	1140	1155	1164	1174	1182	1191	1199	1207	1218	1237
$E_c + W_c$	-8	-9	-9	-8	-7	-7	-13	-13	-12	-13	-18	-17	–	-17	-16	-16	-16	-14	-12	-14	-14	-15	-13	-14	-13
t_c	910	933	948	968	998	1013	1022	1027	1037	1044	1061	1072	–	1100	1111	1124	1139	1150	1162	1168	1177	1184	1194	1204	1224

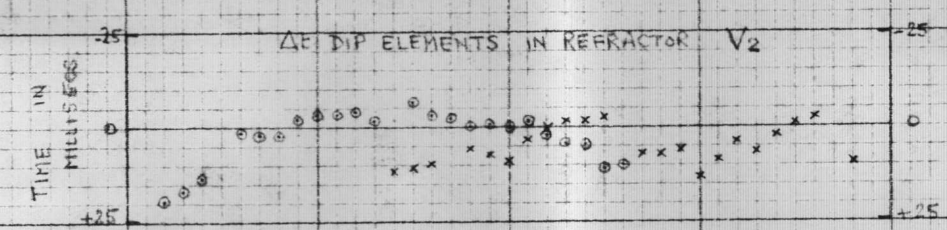
SP119 SP117 SP115

SP130

t_o	1212	1223	1234	–	1251	1264	1281	1286	1293	1304	1320	1329	–	1360	1368	1380	1399	1404	1408	1423	1430	1440	1447	–	1481
$E_c + W_c$	-6	-7	-8	–	-7	-7	-11	-11	-10	-11	-16	-15	–	-15	-14	-14	-14	-12	-10	-12	-12	-13	-11	–	-11
t_c	1206	1216	1226	–	1244	1257	1270	1275	1283	1293	1304	1314	–	1345	1354	1366	1385	1392	1398	1411	1418	1427	1436	–	1470

SP119 SP117 SP115





SP 112

935	915	906	896	883	873	861	822	805	791	769	753	–	718	700	684	674	657	639	620	596	581	562	545	522	t_o
-10	-11	-9	-10	-10	-10	-9	-10	-10	-9	-8	-8	–	-12	-12	-13	-17	-17	-17	-17	-16	-16	-16	-14	-12	$E_c + W_c$
925	904	897	886	873	863	852	812	795	782	761	745	–	706	688	671	657	640	622	603	580	565	546	531	510	t_c

SP120 SP118 SP116

SP 109

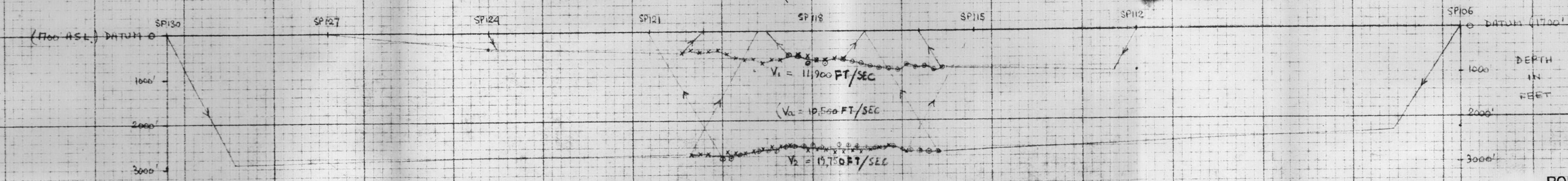
1246	1232	1217	1199	1184	1174	1158	1146	1134	1123	1111	1103	–	1076	1068	1056	1047	1035	1029	1015	1003	999	992	986	979	t_o
-13	-13	-13	-12	-11	-12	-10	-11	-9	-10	-10	-10	–	-11	-11	-10	-10	-10	-14	-14	-13	-15	-19	-18	-18	$E_c + W_c$
1233	1219	1204	1187	1173	1162	1148	1135	1125	1113	1101	1093	–	1065	1057	1046	1037	1025	1015	1001	990	984	973	968	961	t_c

SP121 SP119 SP117

SP 106

1413	1399	1385	–	1349	1339	1326	1312	1298	1287	1275	1267	–	1241	1233	1222	1213	1201	1195	1182	1173	1167	1160	1154	1142	t_o
-14	-14	-14	–	-12	-13	-11	-12	-10	-11	-11	-11	–	-12	-12	-11	-11	-11	-15	-15	-14	-16	-20	-19	-19	$E_c + W_c$
1399	1385	1371	–	1337	1326	1315	1300	1288	1276	1264	1256	–	1229	1221	1211	1202	1190	1180	1167	1159	1151	1140	1135	1123	t_c

SP121 SP119 SP117



HORIZONTAL 0 2200' 4400'
SCALE
VERTICAL 0 2000' 4000'
VELOCITIES EXPRESSED IN FT/SEC

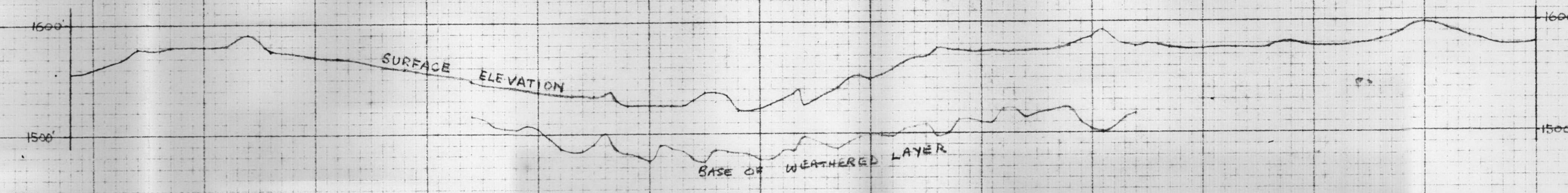
POLHILL
TRAVERSE G
TIME/DISTANCE CURVES AND INTERPRETATION

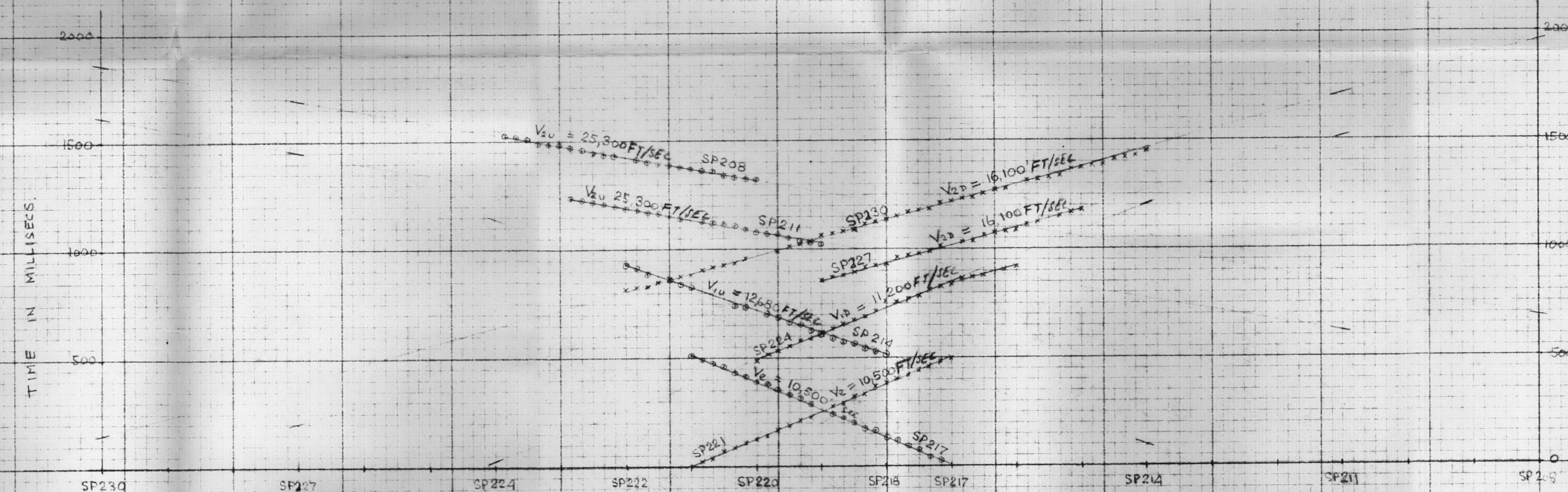
TO ACCOMPANY RECORD No 1962/167

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS G53/B3-11

AMADEUS BASIN N.T. POLHILL

PLATE 12





SP224

t_o	507	528	549	571	598	611	625	651	669	694	717	734	–	773	794	815	834	855	875	893	895	908	–	932	943	t_o
W_c+E_c	-15	-15	-17	-19	-17	-19	-12	-14	-17	-21	-22	-21	–	-21	-23	-24	-25	-24	-31	-29	-25	-25	-27	-26	-21	E_c+W_c
t_c	492	513	532	552	581	592	613	637	652	673	695	713	–	752	771	791	809	831	844	864	870	883	–	902	922	t_c

SP220 SP218 SP216

SP227

t_o	866	884	899	918	935	945	957	977	991	1003	1018	1038	–	1071	1073	1084	1095	1109	1117	1134	1149	–	1174	1185	1202	t_o
W_c+E_c	-11	-13	-15	-19	-20	-20	-18	-20	-22	-22	-23	-23	–	-28	-24	-24	-26	-25	-20	-21	-23	–	-22	-22	-22	E_c+W_c
t_c	855	871	884	899	915	925	939	957	969	981	995	1015	–	1043	1049	1060	1069	1084	1097	1113	1126	–	1152	1163	1180	t_c

SP219 SP217 SP215

SP230

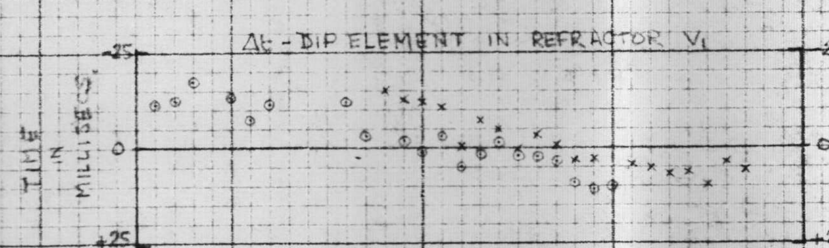
t_o	829	838	847	866	877	887	897	917	936	950	964	972	–	–	1009	1019	1037	1058	1068	1084	1099	1113	1132	1144	1155	t_o
W_c+E_c	-13	-13	-13	-13	-15	-11	-12	-13	-16	-20	-17	-16	–	–	-13	-15	-13	-17	-10	-12	-14	-18	-19	-19	-17	E_c+W_c
t_c	816	825	834	853	862	876	885	904	920	930	947	956	–	–	996	999	1024	1039	1058	1072	1085	1095	1113	1125	1138	t_c

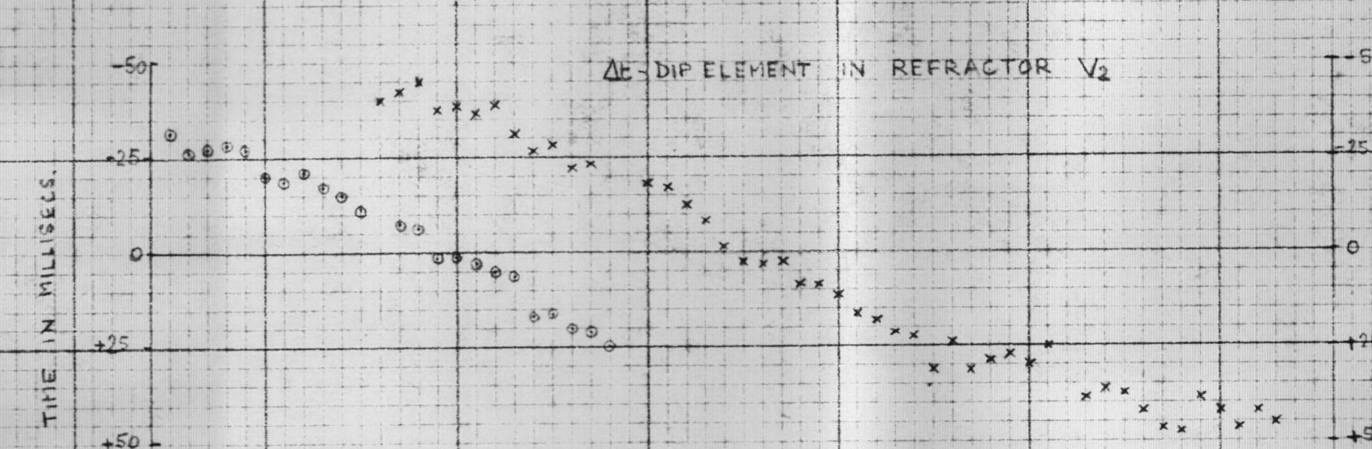
SP222 SP220 SP218

SP230

t_o	1153	1171	1186	1201	1214	1234	1245	1262	1267	1276	1292	1298	–	1330	1341	1353	1368	1384	1396	1408	1424	1442	1445	1455	1473	t_o
W_c+E_c	-18	-20	-22	-22	-23	-23	-30	-28	-24	-24	-26	-25	–	-21	-23	-23	-22	-22	-22	-30	-32	-35	-31	-26	-23	E_c+W_c
t_c	1135	1151	1164	1179	1191	1211	1215	1234	1243	1252	1266	1273	–	1309	1318	1330	1346	1362	1374	1378	1392	1407	1414	1429	1450	t_c

SP218 SP216 SP214





SP 214

t_o	947	930	906	–	876	857	836	–	–	–	767	756	–	717	703	682	670	650	622	608	593	580	566	550	530	t_o
E_c+W_c	-15	-18	-17	–	-20	-14	-15	–	–	–	-21	-20	–	-16	-18	-20	-18	-20	-13	-15	-18	-22	-21	-22	-21	W_c+E_c
t_c	932	912	889	–	856	843	821	–	–	–	746	736	–	701	685	662	652	630	609	593	575	558	545	528	509	t_c

SP222 SP220 SP218

SP 211

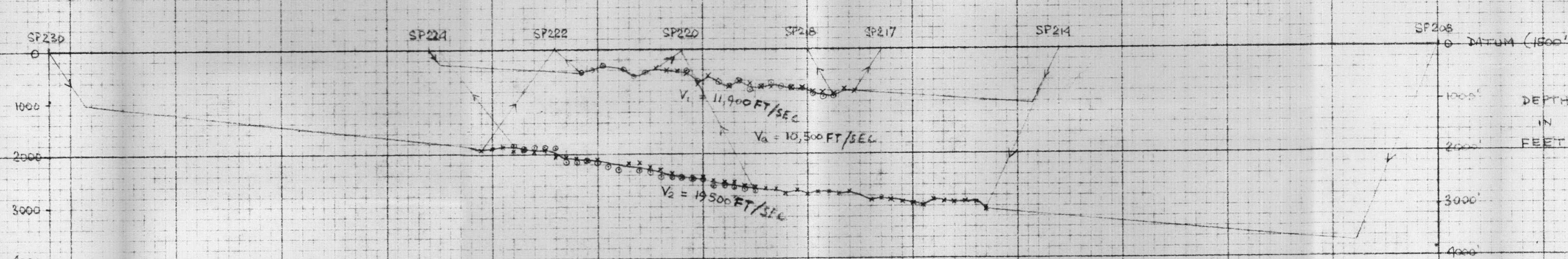
t_o	–	1257	1247	1237	1225	1217	1207	1197	1185	1177	1169	1162	–	1149	1140	1137	1127	1117	1100	1189	1080	1069	1057	1048	1030	t_o
E_c+W_c	–	-17	-19	-19	-18	-17	-16	-16	-16	-16	-18	-14	–	-16	-19	-23	-20	-19	-16	-16	-16	-18	-16	-20	-13	W_c+E_c
t_c	–	1240	1228	1218	1207	1200	1191	1181	1169	1161	1151	1147	–	1133	1121	1114	1107	1098	1084	1073	1064	1051	1041	1028	1017	t_c

SP223 SP221 SP219

SP 208

t_o	–	1540	1534	1521	1509	1496	1495	1485	1473	1466	1456	1448	–	1428	1418	1414	1404	1391	1383	1373	1376	1368	1358	1346	1336	t_o
E_c+W_c	–	-17	-18	-17	-17	-15	-16	-18	-20	-20	-19	-18	–	-17	-17	-17	-19	-15	-16	-17	-20	-24	-21	-20	-17	W_c+E_c
t_c	–	1523	1516	1504	1492	1481	1479	1467	1453	1446	1437	1430	–	1411	1401	1397	1385	1376	1367	1356	1356	1344	1337	1326	1319	t_c

SP224 SP222 SP220



DEEP WELL

TRAVERSE G

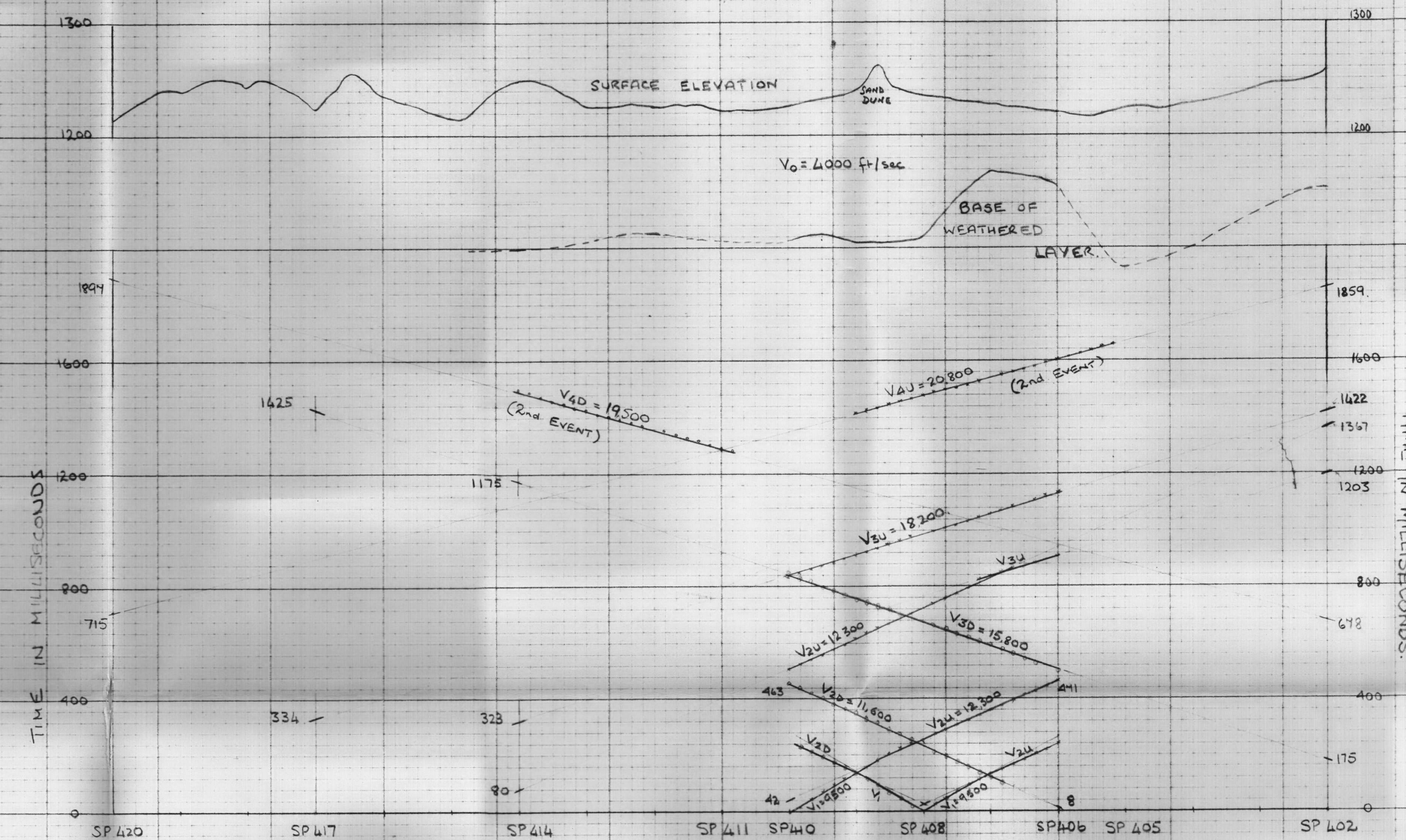
TIME DISTANCE CURVES AND INTERPRETATION

HORIZONTAL SCALE 0 2200' 4400'
VERTICAL 0 2000' 4000'

VELOCITIES EXPRESSED IN FT/SEC

TO ACCOMPANY RECORD No 1962/167

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS G53/B3-12



SP 410

t_o	231	248	263	–	297	311	325	337	356	370	388	406	427	443	460	478	t_o
W_c+E_c	-25	-22	-22	-20	-20	-16	-15	-13	-11	-9	-9	-9	-9	-9	-9	-8	W_c+E_c
t_c	206	226	241	–	277	295	310	324	345	361	379	397	418	434	451	470	t_c

410 408 406

t_o	536	554	569	585	602	621	641	665	691	702	?	733	–	766	780	794	815	t_o
W_c+E_c	-25	-25	-25	-25	-26	-27	-28	-29	-36	-31	-28	-28	-26	-26	-22	-21	-19	W_c+E_c
t_c	511	529	544	560	576	594	613	636	655	671	?	705	–	740	758	773	796	t_c

SP 414

SP 414

t_o	840	852	862	846	883	900	911	926	t_o
W_c+E_c	-15	-14	-14	-14	-14	-14	-14	-13	W_c+E_c
t_c	825	838	848	862	869	886	894	911	t_c

410 408 406

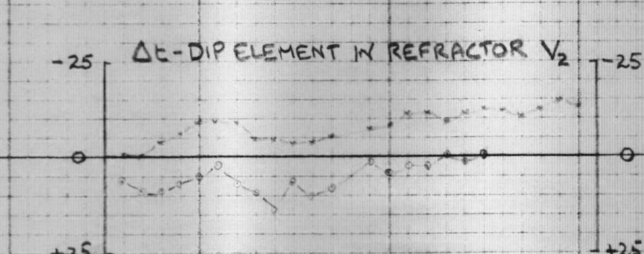
t_o	856	873	892	903	915	928	943	959	977	984	993	1007	–	1029	1038	1047	1052	1068	1079	1089	1104	?	1128	1139	1151	t_o
W_c+E_c	-26	-26	-26	-27	-27	-29	-30	-31	-39	-33	-30	-29	-28	-27	-24	-23	-20	-18	-17	-17	-17	-17	-17	-17	-16	W_c+E_c
t_c	830	844	866	876	888	899	913	928	938	951	963	978	–	1002	1014	1024	1032	1050	1062	1072	1087	?	1111	1122	1135	t_c

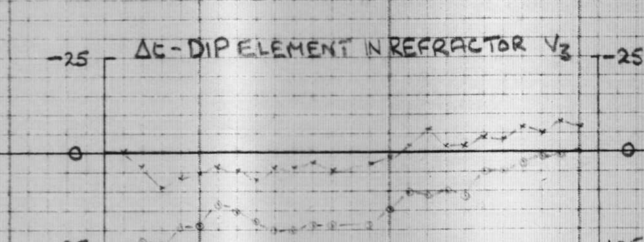
SP 417

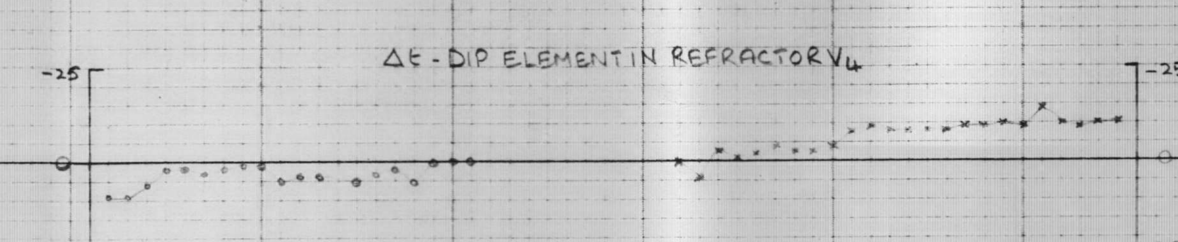
SP 420

t_o	1436	1453	1462	1471	1479	1488	1498	1508	1515	1521	1529	1539	–	1558	1569	1580	1590	1601	1613	1621	1637	1652	1666	1677	1697	t_o
W_c+E_c	-21	-23	-28	-24	-22	-22	-20	-19	-16	-15	-13	-11	-9	-8	-8	-9	-8	-9	-9	11	12	-15	-19	-20	-22	W_c+E_c
t_c	1415	1430	1434	1447	1457	1466	1478	1489	1499	1506	1516	1528	–	1550	1561	1571	1582	1592	1604	1610	1625	1637	1647	1657	1675	t_c

409 401 405







SP 406

t_o	495	469	450	430	410	390	377	362	354	325	306	286	–	240	221	199	179	156	134	114	t_o
W_c+E_c	-25	-25	-25	-25	-26	-27	-28	-29	-36	-31	-28	-28	-26	-26	-22	-21	-19	-17	-15	-15	W_c+E_c
t_c	460	444	425	405	384	363	349	333	318	294	278	258	–	214	199	178	160	139	122	102	t_c

410 408 406

t_o	?	256	238	218	199	180	164	145					–					128	145	163	181	198	218	235	254	t_o
W_c+E_c	-24	-24	-24	-24	-25	-26	-27	-28										-16	-14	-14	-14	-14	-14	-14	-13	W_c+E_c
t_c	?	232	214	194	174	154	137	117					–					112	131	149	167	184	204	221	241	t_c

SP 408

SP 402

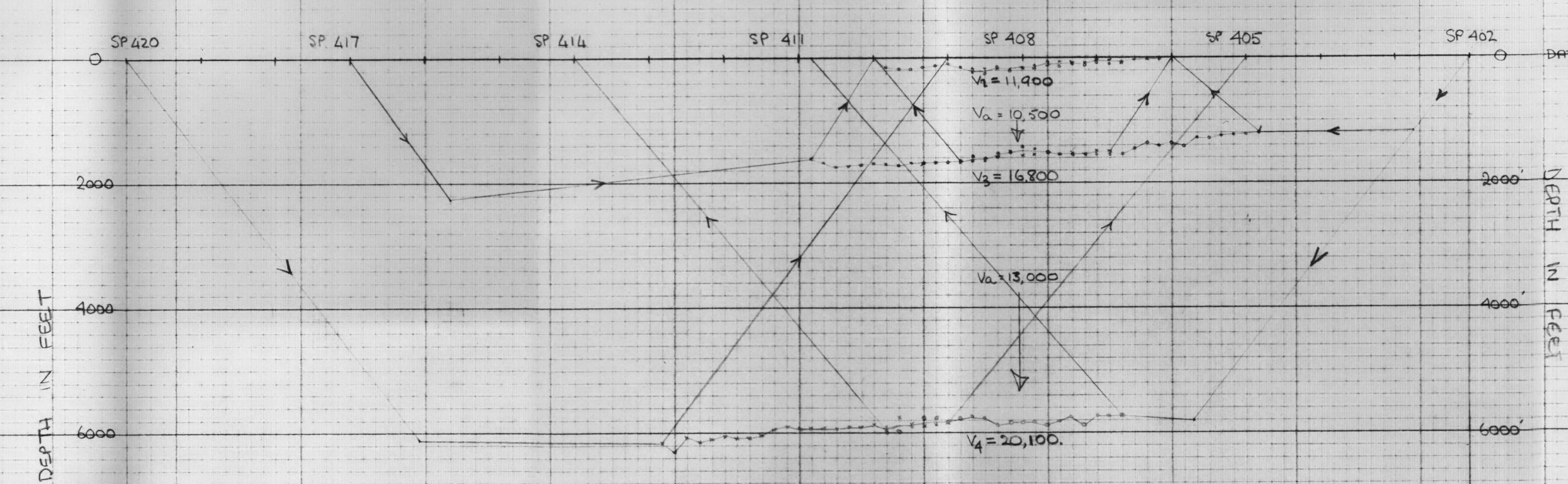
t_o	862	847	835	818	805	788	779	769	766	748	730	?	–	688	668	650	635	619	606	586	573	568	544		515	t_o
W_c+E_c	-20	-20	-20	-21	-21	-23	-24	-25	-33	-27	-24	-23	-22	-21	-18	-17	-14	-12	-11	-11	-11	-11	-11	-11	-10	W_c+E_c
t_c	842	827	815	797	784	765	755	744	733	721	706	?	–	667	650	633	621	607	595	575	562	547	533		505	t_c

410 408 406

SP 402

t_o	1524	1512	1497	1482	1470	1458	1446	1434	1422	1415	1404	1392	–	1369	1357	1345	1338	1321	1310	1299	t_o
W_c+E_c	-24	-23	-22	-22	-21	-19	-19	-19	-18	-18	-19	-18	-16	-16	-17	-17	-18	-17	-17	-17	W_c+E_c
t_c	1500	1489	1475	1460	1449	1439	1427	1415	1404	1397	1385	1374	–	1353	1340	1328	1320	1304	1293	1282	t_c

414 412 413



HORIZONTAL 0 2200 4400

SCALE

VERTICAL 0 2000 4000

VELOCITIES EXPRESSED IN FT/SEC

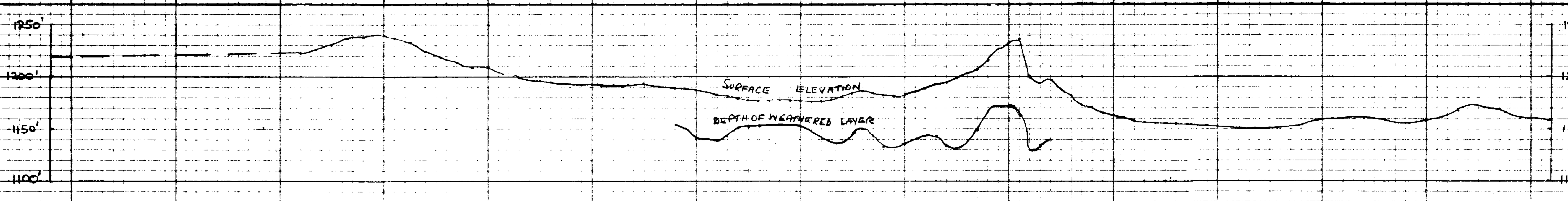
MT CHARLOTTE

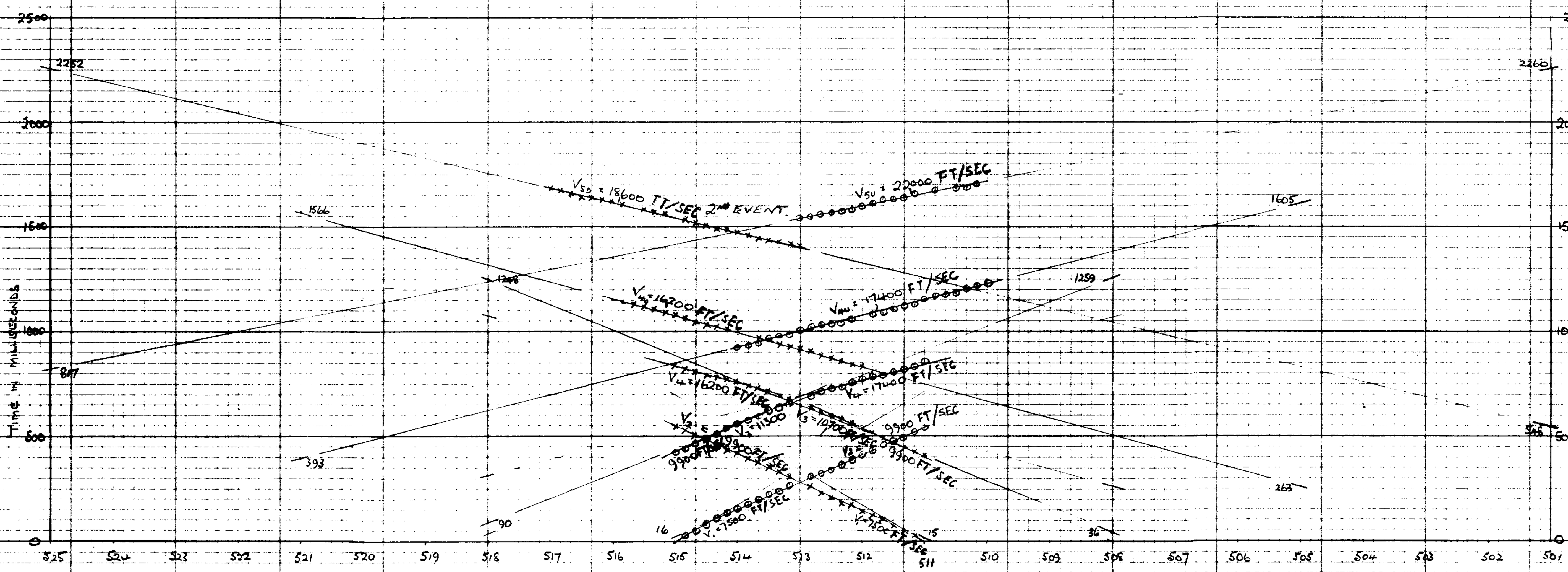
TRAVERSE G

TIME / DISTANCE CURVES AND INTERPRETATION

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS G53/B3-13

TO ACCOMPANY RECORD No 1962 / 167



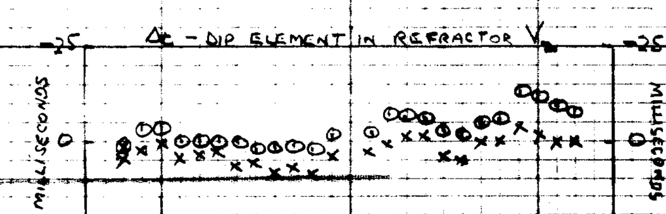


	SP513																			SP511
t_o	149	169	191	214	236	259	278	–	321	341	366	389	414	437	456	479	497	519	541	566
$W_c + E_c$	-18	-16	-14	-14	-15	-15	-15	–	-15	-17	-19	-20	-19	-19	-19	-21	-24	-21	-20	-21
t_c	131	153	177	200	221	244	263	–	306	324	347	369	395	418	437	455	478	498	521	545

SP515 : ds = 80/96

SP505						
t_o	444	464	488	511	533	553
$W_c + E_c$	-21	-23	-25	-23	-23	-21
t_c	423	441	463	488	510	532

SP518 : ds = 50/94



SP515													SP513								
567	544	523	502	479	454	434	409	389	366	346	319	–	273	251	229	208	190	168	141	t_o
-18	-20	-22	-20	-20	-18	-16	-14	-14	-15	-15	-15	–	-15	-17	-19	-20	-19	-19	-19	$W_c + E_c$
549	524	501	482	459	436	418	395	375	351	331	304	–	258	234	210	188	171	149	122	t_c

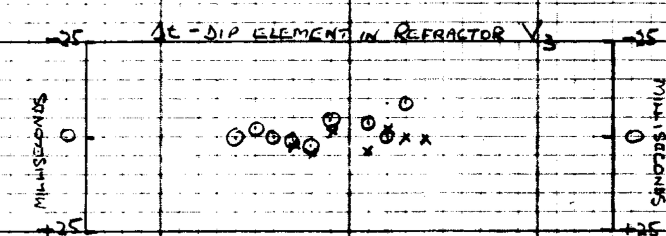
SP511 : ds = 85/100

SP512							SP511	
576	556	530	510	487	465	443	422	t_o
-15	-17	-17	-19	-22	-19	-18	-19	$W_c + E_c$
561	539	513	491	465	446	425	403	t_c

SP508 : ds = 72/101

	SP514						SP513		
t_o	576	593	615	637	660	672	–	713	737	752
$W_c + E_c$	-20	-19	-19	-20	-20	-20	–	-20	-21	-24
t_c	556	574	596	617	640	652	–	693	716	728

SP518 : ds = 50/94

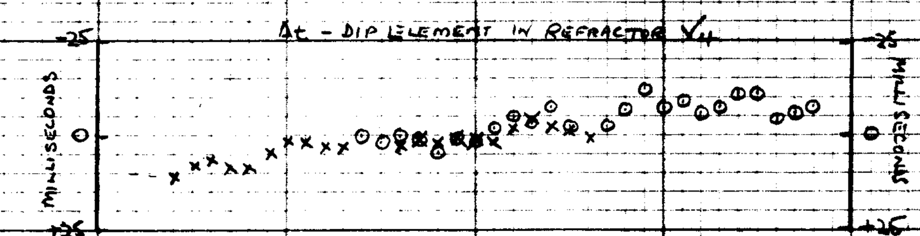


			SP513				
726	710	684	–	649	624	608	590
-14	-14	-14	–	-14	-15	-17	-19
714	696	670	–	635	609	591	571

SP508 : ds = 72/101

	SP514											SP512											SP510
t_o	943	956	967	982	999	1008	1021	1032	1044	1061	1072	1089	–	1112	1125	1136	1151	1161	1179	1192	1205	1226	1243	1251	1259
$W_c + E_c$	-21	-19	-19	-20	-20	-20	-19	-20	-22	-24	-26	-25	–	-25	-27	-30	-27	-25	-27	-28	-32	-38	-37	-34	-30
t_c	922	937	948	962	979	988	1002	1012	1022	1037	1046	1064	–	1087	1098	1106	1124	1136	1152	1164	1173	1188	1206	1217	1229

SP521 : ds = 75/100

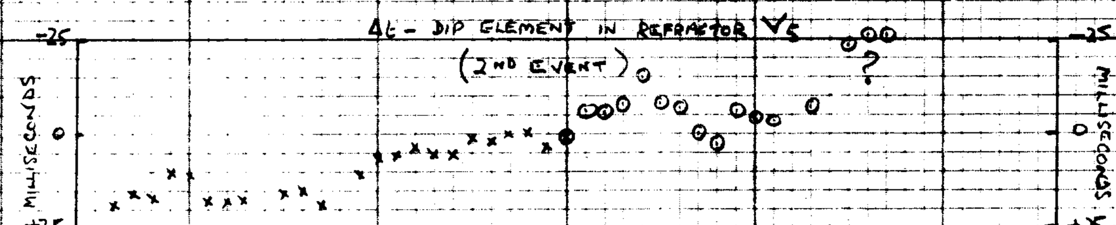


SP516													SP514										SP512		
–	–	1151	1135	1121	1110	1097	1081	1066	1053	1040	1025	–	–	981	967	955	944	926	915	900	887	878	865	852	t_o
-16	-16	-16	-16	-16	-16	-16	-17	-19	-19	-18	-16	–	-11	-11	-12	-12	-12	-11	-12	-14	-16	-18	-17	-16	$W_c + E_c$
–	–	1135	1119	1105	1094	1081	1064	1047	1034	1022	1009	–	–	970	955	943	929	915	903	886	871	860	848	836	t_c

SP505 : ds = 74/101

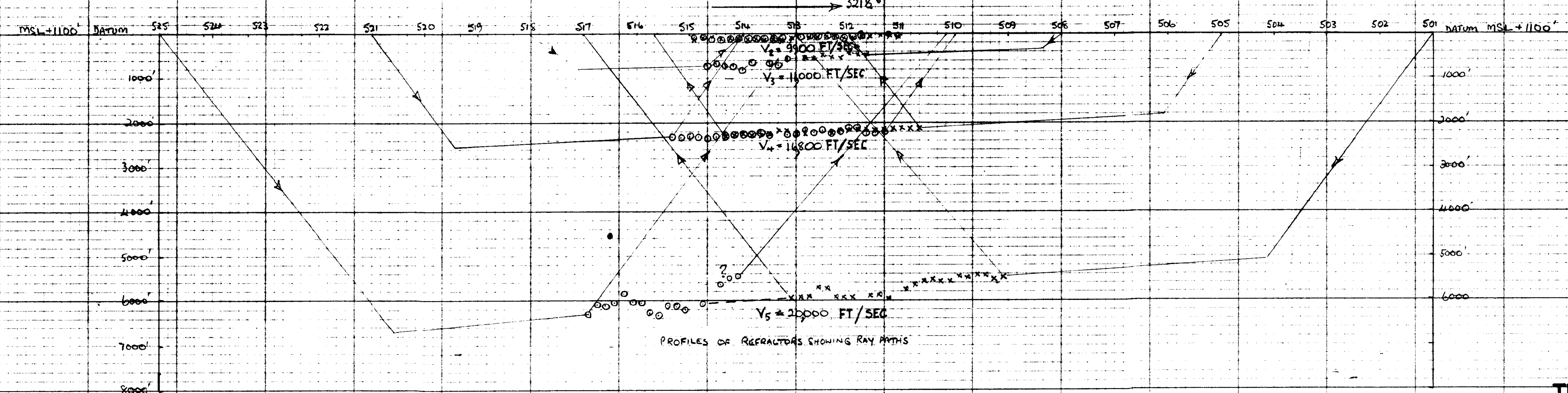
	SP513													SP511		?		
t_o	1562	1566	1580	1592	1597	1614	1626	1643	1660	1665	1675	1685	–	1706	–	1721	1730	1737
$W_c + E_c$	-21	-22	-24	-27	-28	-27	-27	-26	-29	-32	-29	-27	–	-30	-35	-39	-40	-36
t_c	1541	1544	1556	1566	1569	1587	1599	1617	1631	1633	1646	1658	–	1676	–	1682	1690	1701

SP525 : ds = 85/101



SP517													SP515												SP513	
1701	1686	1676	1658	1648	1644	1638	1622	–	1599	1586	1579	–	1549	1536	1523	1509	1499	1485	1469	1459	1447	1436	1429	1414	t_o
-18	-17	-17	-17	-17	-17	-17	-17	-17	-18	-17	-17	–	-17	-19	-18	-17	-16	-13	-13	-13	-14	-14	-14	-13	$W_c + E_c$
1683	1669	1659	1641	1631	1627	1616	1605	–	1581	1569	1562	–	1532	1517	1505	1492	1483	1472	1456	1446	1433	[illegible]	1415	1401	t_c

SP501 : ds = 50/101



HORIZONTAL 0 2200' 4400'

VERTICAL 0 2000' 4000'

VELOCITIES EXPRESSED IN FT/SEC

AMADEUS BASIN
REFRACTION - TRAVERSE G
BUNDOOMA

BUNDOOMA

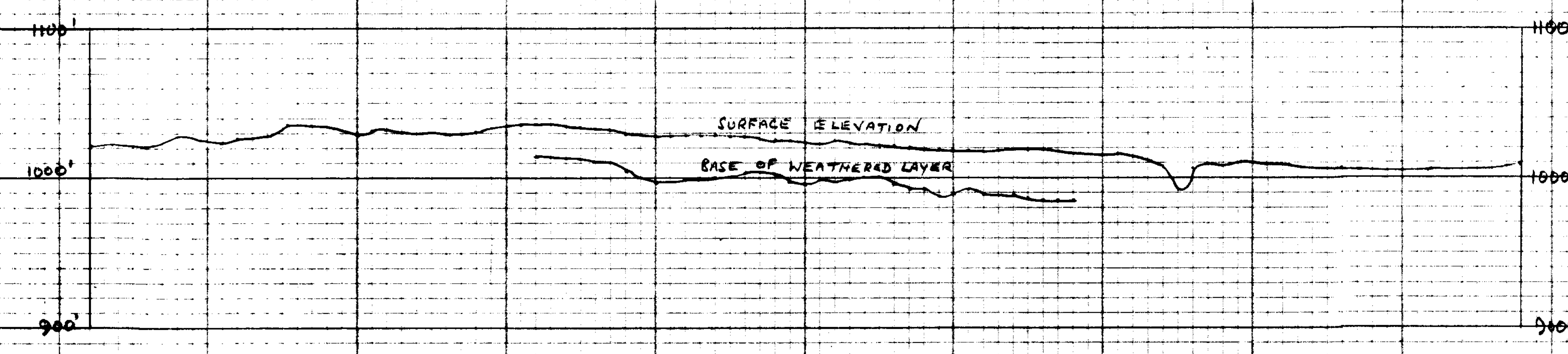
TRAVERSE G

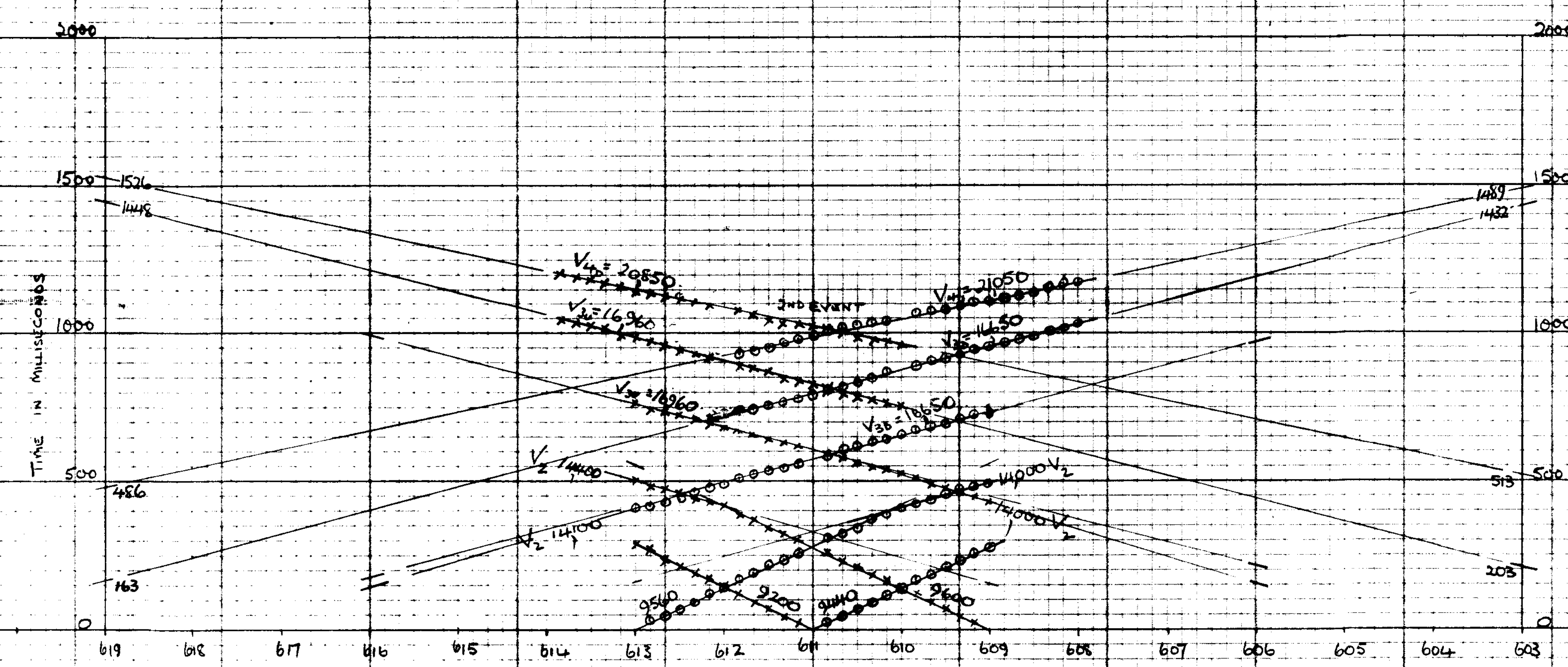
TIME/DISTANCE CURVES AND INTERPRETATION

TO ACCOMPANY RECORD No 1962/167

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS G53/B3-14

PLATE 15



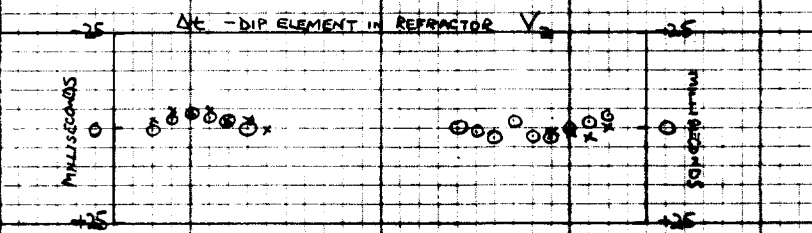


SP613						
t_o	405	420	435	452	468	485
W_c+E_c	-3	-5	-6	-6	-6	-5
t_c	402	415	429	446	462	480

SP 616 : d_s = 82/100

	SP613						SP612
t_o	506	490	476	460	447	430	417
W_c+E_c	-2	-4	-5	-5	-5	-4	-4
t_c	504	486	471	455	442	426	413

SP609 : d_s = 92/99



SP610								SP609	
377	394	412	424	443	460	474	487	503	t_o
-3	-3	-4	-5	-5	-6	-6	-4	-6	W_c+E_c
374	391	408	419	438	454	468	483	497	t_c

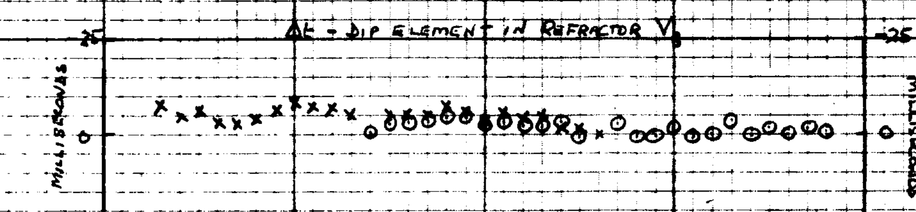
SP613: d_s = 93/100

		SP609		
481	465	450	433	t_o
-5	-5	-3	-5	W_c+E_c
476	460	447	428	t_c

SP606: d_s = 82/100

	SP612												SP610												SP608
t_o	727	737	749	761	774	788	803	815	830	841	853	870	—	893	910	924	934	949	962	972	989	1001	1016	1026	1041
W_c+E_c	-6	-6	-5	-5	-5	-6	-6	-5	-6	-5	-4	-4	—	-5	-5	-6	-5	-4	-5	-6	-6	-7	-7	-6	-6
t_c	721	731	744	756	769	782	797	810	824	836	849	866	—	888	905	918	929	945	957	966	983	994	1009	1020	1035

SP619: d_s = 84/104

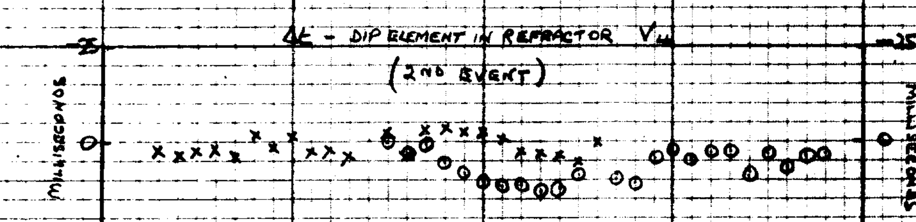


SP614												SP612											SP610	
—	1049	1037	1023	1013	1000	988	973	958	946	933	921	—	895	881	868	853	842	831	815	804	789	778	765	754	t_o
-4	-4	-3	-3	-3	-3	-5	-5	-6	-5	-5	-5		-5	-4	-4	-4	-5	-5	-4	-5	-4	-3	-3	-3	W_c+E_c
—	1045	1034	1020	1010	997	983	968	952	941	926	916		890	877	864	849	837	826	811	799	785	775	762	751	t_c

SP603 : d_s = 73/111

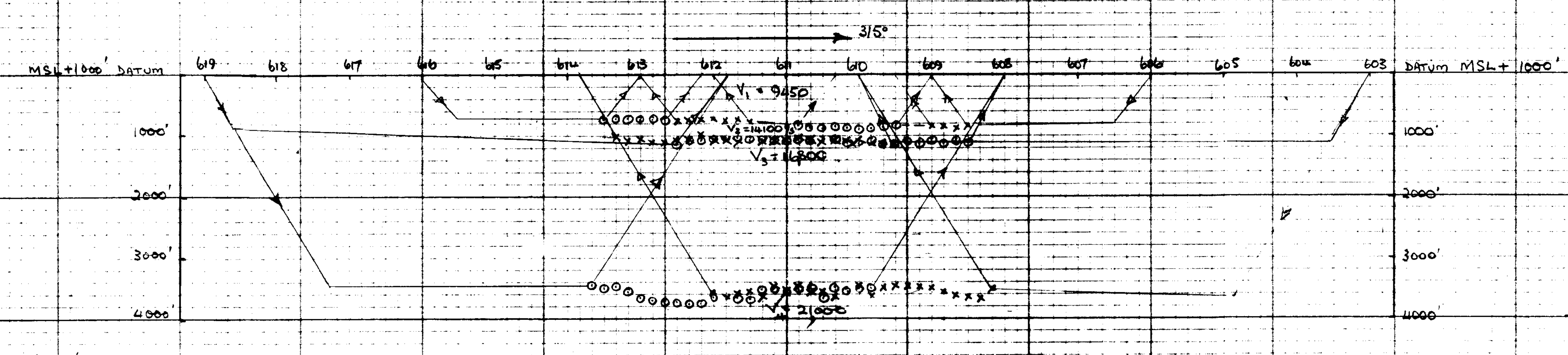
	SP612												SP610												SP608
t_o	—	940	954	962	976	989	1002	1014	1024	1036	1045	1052	—	1075	1086	1092	1100	1112	1122	1133	1148	1155	1169	1176	1186
W_c+E_c	-12	-12	-12	-12	-11	-11	-11	-11	-11	-11	-10	-10	—	-11	-11	-13	-12	-11	-12	-13	-13	-14	-14	-13	-13
t_c	—	928	942	950	965	978	991	1003	1013	1025	1035	1042	—	1064	1075	1079	1088	1101	1110	1120	1135	1141	1155	1163	1173

SP619: d_s = 6/7

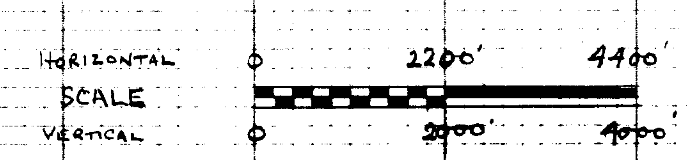


SP614												SP612											SP610	
—	1262	1182	1180	1170	1162	1146	1140	1128	1120	1108	1100	—	1078	1068	1051	1039	1030	1019	1010	1003	993	983	978	958	t_o
-2	-2	-1	-1	-2	-2	-3	-4	-5	-4	-3	-3	—	-3	-3	-3	-2	-2	-2	-2	-2	-2	-1	-1	-2	W_c+E_c
—	1200	1191	1179	1165	1160	1143	1136	1123	1116	1105	1097	—	1070	1065	1046	1037	1028	1017	1008	1001	991	981	972	956	t_c

SP603 : d_s = 73/111



PROFILES OF REFRACTORS SHOWING RAY PATHS



VELOCITIES EXPRESSED IN FT/SEC

"AMADEUS BASIN REFRACTION TRAVERSE G 'HORSESHOE BEND'"

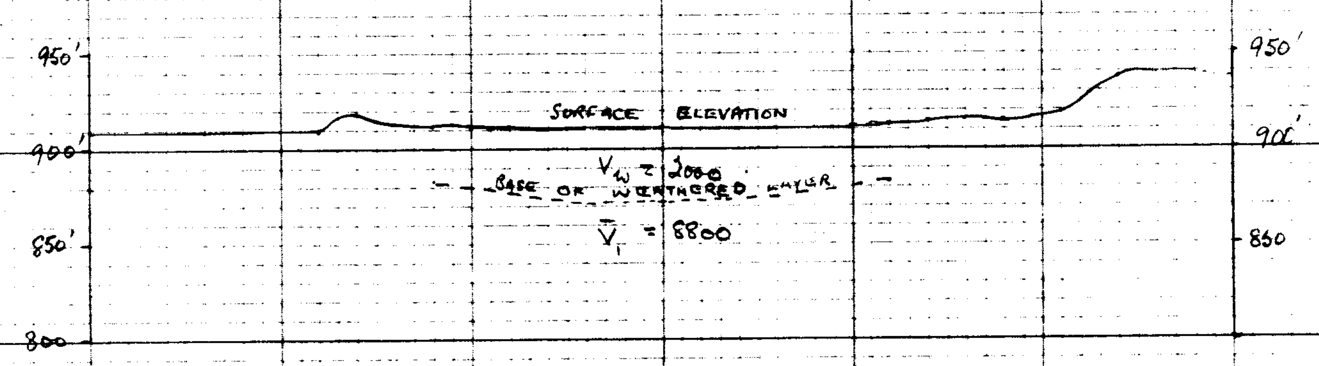
HORSESHOE BEND

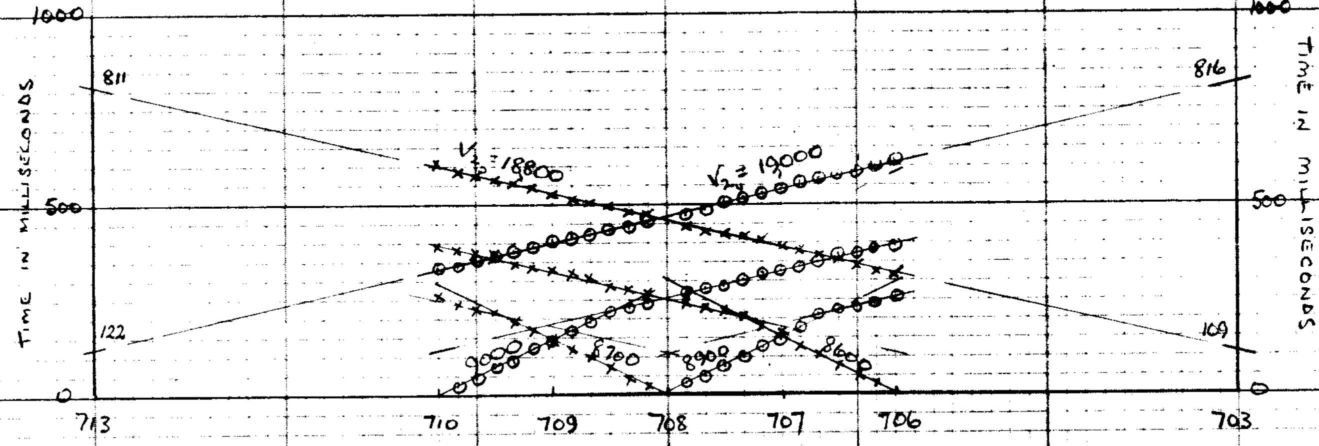
TRAVERSE G

TIME/DISTANCE CURVES AND INTERPRETATION

TO ACCOMPANY RECORD No 1962/187

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS G53/B3-15

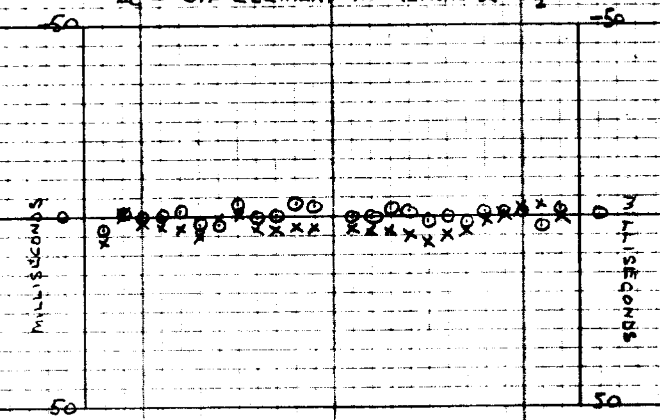




710 708 706

t_o	347	355	367	379	390	404	416	422	437	449	459	470	–	495	506	516	527	541	552	564	574	584	596	611	618
W_c+E_c	14	14	14	14	14	14	14	14	14	14	14	14	–	14	13	13	12	12	12	12	12	11	11	10	10
t_c	333	341	353	365	376	390	402	408	423	435	443	456	–	481	493	503	515	529	540	552	562	573	565	601	608

SP.713: d_s = 33/38



710 708 703

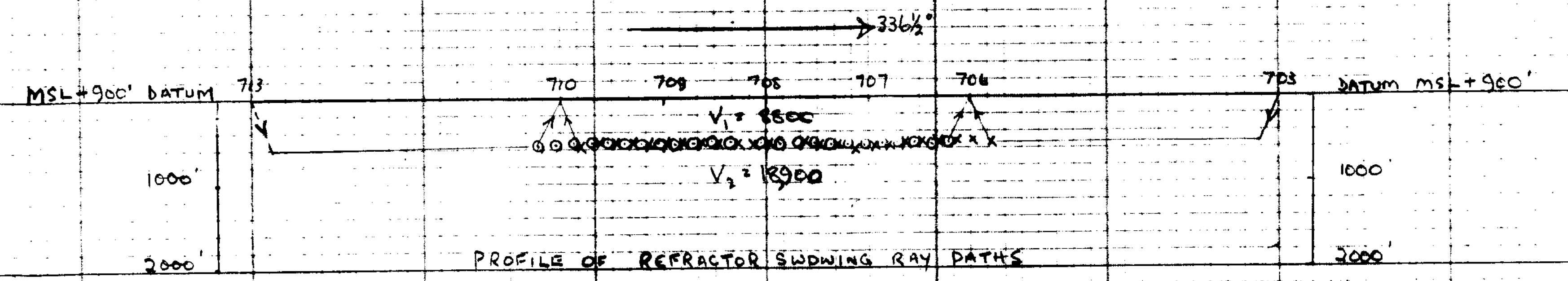
618	599	589	578	568	558	548	530	522	511	498	486	–	463	451	440	428	418	405	392	378	364	351	338	328	t_o
14	14	14	14	14	14	14	14	14	14	14	14	–	14	13	13	12	12	12	12	12	11	11	10	10	W_c+E_c
604	585	575	564	554	544	529	516	508	497	484	472	–	449	438	427	416	406	393	380	366	353	340	328	318	t_c

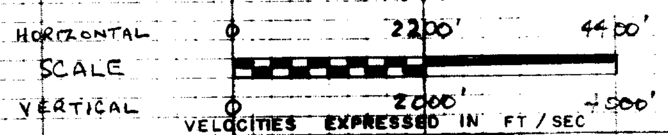
SP703: d_s = 60/65

LILLA CREEK

TRAVERSE G

TIME/DISTANCE CURVES AND INTERPRETATION



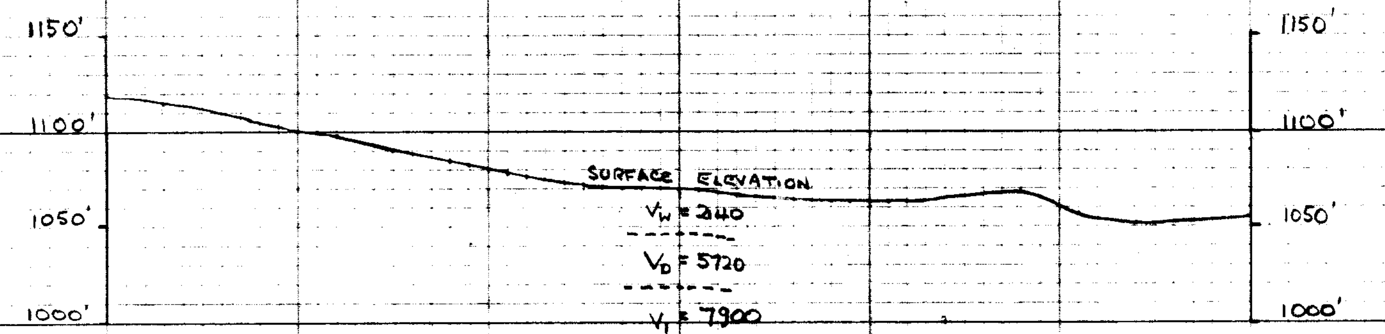


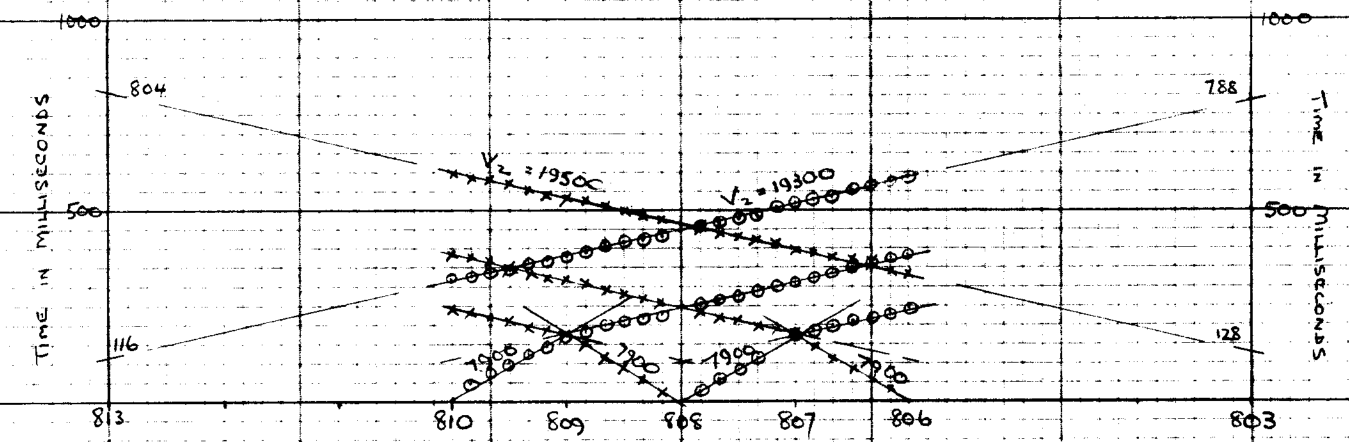
VELOCITIES EXPRESSED IN FT / SEC

TO ACCOMPANY RECORD No 1962 / 167

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS G53/B3-16

REFRACTION TRAVERSE G AMADEUS BASIN

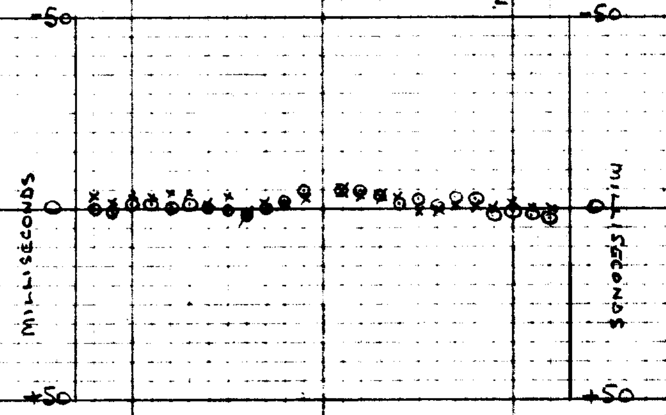




	810												808												806
t_0	334	345	355	366	378	389	400	412	425	434	443	452	–	475	486	499	512	522	535	545	556	572	582	594	606
$W_c + E_c$	23	22	22	22	22	22	21	21	21	21	21	21	–	21	21	21	21	20	20	20	20	20	20	20	20
t_c	311	323	333	344	356	367	379	391	404	413	422	431	–	454	465	478	491	502	515	525	536	552	562	574	586

SP813: ds = 65/78

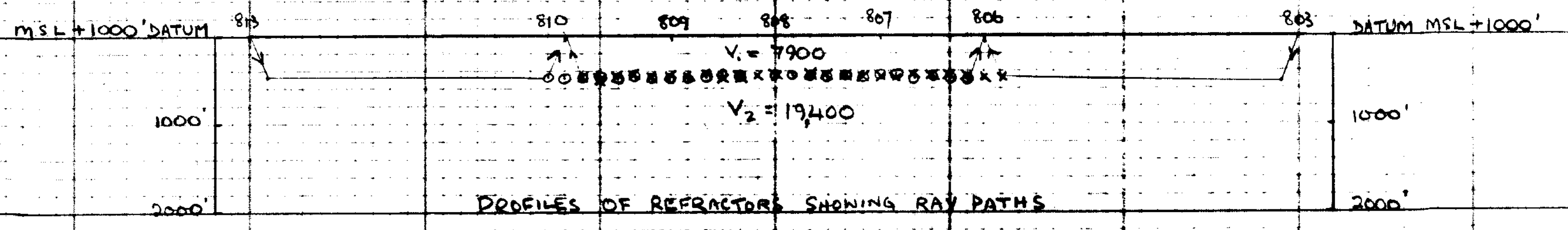
Δt – DIP ELEMENT IN REFRACTOR V_2



810												808												806	
618	608	596	584	572	560	550	537	529	516	505	490	–	467	456	446	436	426	414	402	390	380	368	357	346	t_0
18	17	17	17	17	17	16	16	16	16	16	16	–	16	16	16	16	15	15	15	15	15	15	15	15	$W_c + E_c$
600	591	579	567	555	543	534	521	513	500	489	476	–	451	440	430	420	411	399	387	375	365	353	342	331	t_c

SP803 : ds = 32/45

→ 0°N

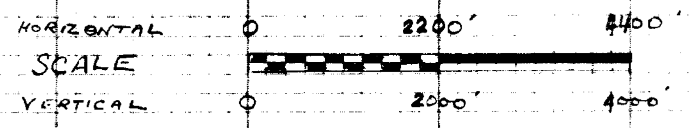


PROFILES OF REFRACTORS SHOWING RAY PATHS

LILLA CREEK SOUTH

TRAVERSE G

TIME/DISTANCE CURVES AND INTERPRETATION



VELOCITIES EXPRESSED IN FT/SEC

GEOPHYSICAL BRANCH, BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS G53/B3-17

AMADEUS BASIN SEISMIC SUR
LILLA CREEK SOUTH 1 REFRACTION TRAVERSE G