

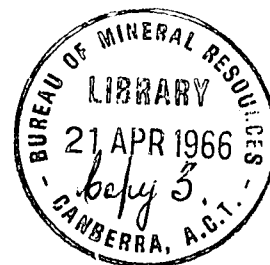
1966/21
Copy 3

COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT
BUREAU OF MINERAL RESOURCES
GEOLOGY AND GEOPHYSICS

RECORDS:

1966/21



NOTES ON SOME UPPER PERMIAN AND LOWER TRIASSIC UNITS OF THE
BOWEN BASIN, QUEENSLAND.

by

A.R.Jensen and M.Arman

The information contained in this report has been obtained by the Department of National Development, as part of the policy of the Commonwealth Government, to assist in the exploration and development of mineral resources. It may not be published in any form or used in a company prospectus without the permission in writing of the Director, Bureau of Mineral Resources, Geology and Geophysics.

NOTES ON SOME UPPER PERMIAN AND LOWER TRIASSIC UNITS
OF THE BOWEN BASIN, QUEENSLAND

by

A.R. Jensen and M. Arman

Records 1966/21

CONTENTS

	<u>Page</u>
SUMMARY	1
INTRODUCTION	1
CRACOW AREA	2
REIDS DOME AREA	3
BLACKWATER AREA	3
NEBO AREA	4
EXMOOR-COLLINSVILLE AREA	5
REFERENCES	5

TABLES

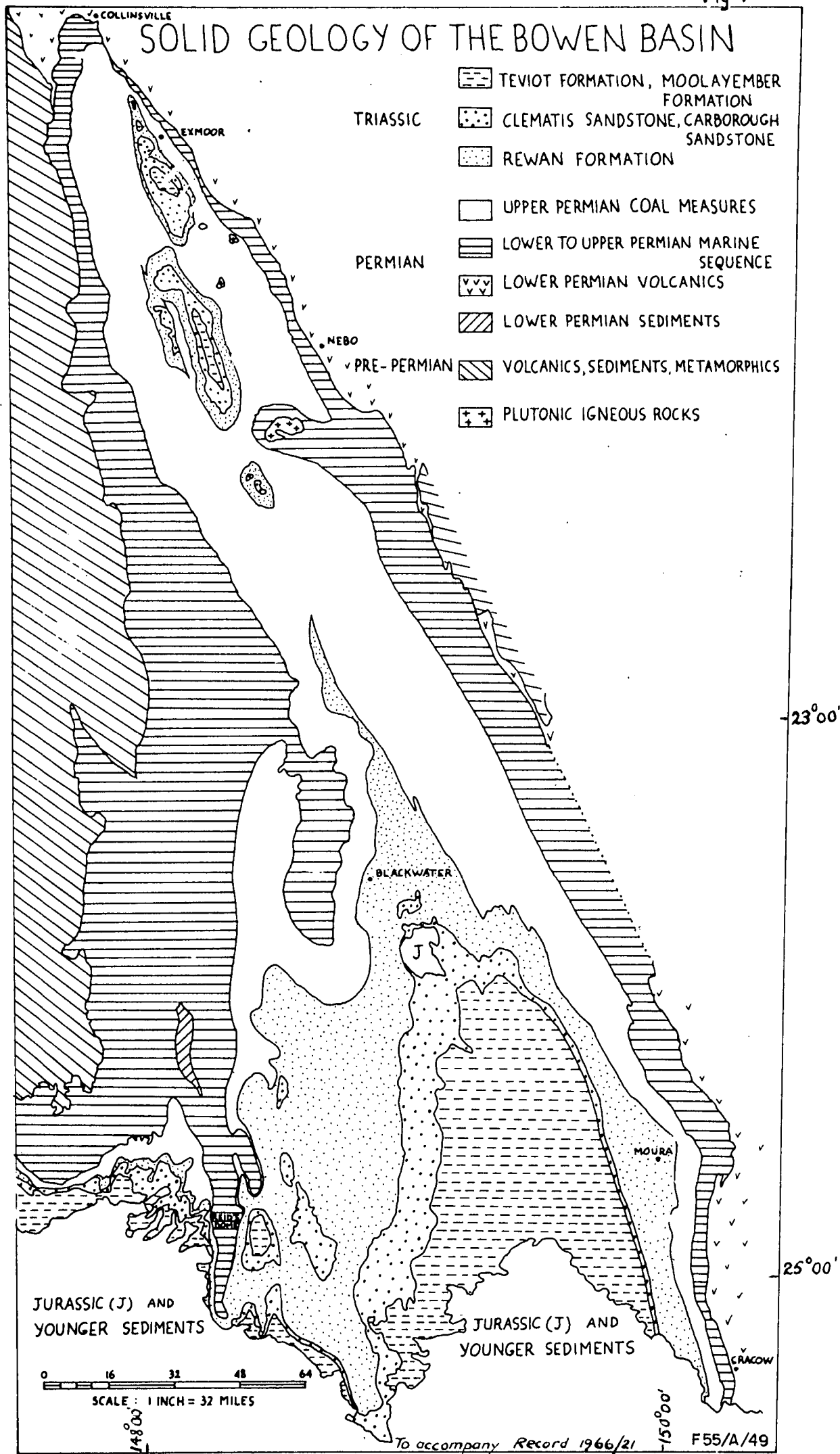
Table 1.	Symbols used in plans and sections
" 2.	Comparison of stratigraphic nomenclature in Blackwater area
" 3.	Summary of cross-stratification in the Blackwater area
" 4.	Summary of Upper Permian and Lower Triassic units

FIGURES

Figure 1.	Solid geology of the Bowen Basin
" 2.	Geology of the Cracow area
" 3.	Composite section - Cracow area
" 4.	Composite section - Reids Dome area
" 5.	Geological sketch map of the Reids Dome area
" 6.	Composite section - Blackwater area
" 7.	Geology of the Blackwater area
" 8.	Geology of the Nebo area
" 9.	Composite section - Nebo area - scale 1"=500'
" 10.	Composite section - Exmoor area - scale 1"=500'
" 11.	Geological sketch map of the Exmoor area
" 12.	Geological sketch map of the Collinsville area

APPENDIX I. Measured stratigraphic sections - scale (1"=50ft and 1"=200 ft)

The information contained in this report has been obtained by the Department of National Development, as part of the policy of the Commonwealth Government, to assist in the exploration and development of mineral resources. It may not be published in any form or used in a company prospectus without the permission in writing of the Director, Bureau of Mineral Resources, Geology and Geophysics.



NOTES ON SOME UPPER PERMIAN AND LOWER TRIASSIC UNITS
OF THE BOWEN BASIN, QUEENSLAND

by
A.R. Jensen and M. Arman

Records 1966/21

SUMMARY

This report presents field observations made on the Blackwater Group (the Upper Bowen Coal Measures) during 1965. It is not intended to be a complete report on this unit, and few conclusions are drawn from the data presented. Stratigraphic sections measured in the Blackwater Group and part of the underlying Back Creek Group in each of five main localities are presented, and cross-bedding data from units within the groups are summarized.

INTRODUCTION

The Bowen Basin occupies an area of about 25,000 square miles in central eastern Queensland, and is known to extend south subsurface beneath the Surat Basin. This basin was the site of eugeosynclinal deposition from the Lower Permian or earlier to the Triassic. The geology of various parts of the basin has been described in numerous papers since 1879 to the present day, and the Bureau of Mineral Resources and the Geological Survey of Queensland have prepared maps and reports on the geology of each of the twelve 1:250,000 Sheet areas which cover the Bowen Basin. The simplified map of the solid geology of the basin (Figure 1) has been compiled from this work.

The Permian stratigraphic succession of the basin can be broadly summarized by stating that the basal unit, the Lower Bowen Volcanics is overlain by a dominantly marine unit, the Middle Bowen Beds, which in turn is overlain by the dominantly continental Upper Bowen Coal Measures. The continental Triassic succession consists of the Rewan Formation overlain by the Clematis or Carborough Sandstone and these are overlain by the Moolayember or Teviot Formation. As a result of the joint Commonwealth/State survey of the Bowen Basin formal names have been proposed to replace the old names in the Permian sequence:

<u>Old Name</u>	<u>Proposed New Name</u>
Upper Bowen Coal Measures	Blackwater Group
Middle Bowen Beds	Back Creek Group
Lower Bowen Volcanics	Lizzie Creek Volcanics

During 1965 the authors spent four months studying the Blackwater Group to collect information on the stratigraphy of the group. Because the group crops out over such a large area (about 15,000 square miles), it was not possible in the time available to trace units on the ground from one area to another. Instead, stratigraphic sections and sedimentary structures indicating current directions were measured in each of five main areas (see Fig. 1). A further three localities were briefly examined while the party moved between the main work areas. This is a progress report recording a summary of the main observations at each locality. Further field-work and shallow drilling will be undertaken during 1966, and a petrographic study of samples will be made before the final report is written. At this stage no attempt is made to draw any conclusion from the observations. Local stratigraphic names are used and few tentative correlations are made.

Symbols used in plans and sections throughout this record are explained in Table 1.

ACKNOWLEDGEMENT

We are indebted to geologists of Utah Development Corporation for helpful discussions on the geology of the coal measures in the Blackwater area.

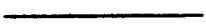
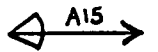
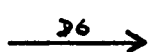
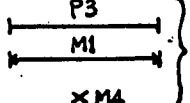
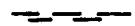
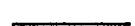
CRACOW AREA

The Permian sequence cropping out in the Cracow area was examined in some detail by geologists from Mines Administration Pty Ltd in 1954 (Mines Administration Pty Ltd, 1959). The Back Creek Group was defined as comprising the Oxtrack Formation at the base, followed by the Orange Creek, Acacia, Passion Hill and Mount Steel Formations. With the exception of Orange Creek Formation, which is replaced by Barfield Formation, this nomenclature is followed in this report; the Barfield Formation occupies the same stratigraphic position in the sequence in the Theodore-Moura area. The Back Creek Group is overlain by the Gylanda Formation, the Baralaba Coal Measures, and the Rewan Formation (Jensen, Greogry and Forbes, 1964). The distribution of units in the area around Gylanda Homestead is shown in Figure 2. Sections were measured throughout the upper part of the Upper Permian sequence in the Gylanda area and Figure 3 is a composite stratigraphic column of the sequence showing the stratigraphic position of samples. The measured stratigraphic sections are presented at a scale of 1 inch to 50 feet in Appendix I.

Cross-stratification is not common in Upper Permian units of the Cracow area. Two sets of measurements were made in the Gylanda Formation both near Gylanda Homestead. At one locality the direction of transportation was towards $180^{\circ} \pm 30^{\circ}$ (18 readings) and at another $85^{\circ} \pm 11^{\circ}$ (12 readings). The orientation of the long axes of pebbles in a sandstone cropping out near Dawson Park Homestead

Table 1

SYMBOLS USED IN PLANS AND SECTIONS.

	Geological boundary	
	Syncline, showing plunge	
	Anticline, showing plunge	
	Fault	
Where location of boundaries, folds and faults is approximate, line is broken; where inferred, queried; where concealed, boundaries and folds are dotted, faults are shown by short dashes.		
	Strike and dip, measured.	
	Dip $< 15^\circ$, air-photo interpretation.	
	Dip $< 5^\circ$, " " "	
	Dip $15^\circ - 45^\circ$, " " "	
	Beds vertical.	
	Trend-lines, with dips; air-photo interpretation.	
	Average direction of cross-bedding, with indication of spread of directions, and locality number	
	Average direction of cross-bedding, and locality number	
	Macrofossil locality.	
	Plant fossil locality.	
	Fossil log locality or horizon.	
	Roads and tracks.	
	B.M.R. shallow drill hole.	
	Measured section locations.	
	Homestead.	
	Conglomerate	f Fine-grained
	Arenite	m Medium
	Siltstone	c Coarse
	Shale, mudstone, claystone.	vc Very coarse
	Limestone.	f-m Fine to medium
	Chert	
	Argillite, probably tuffaceous.	
	Tuff.	
	Coal	⊙ Discoidal calcareous concretion.
	Intrusives	
	Laminated.	
	Thin-bedded	
	Medium-bedded	
	Thick-bedded	
	Massive	
	, cross-bedded	
	Calcareous	

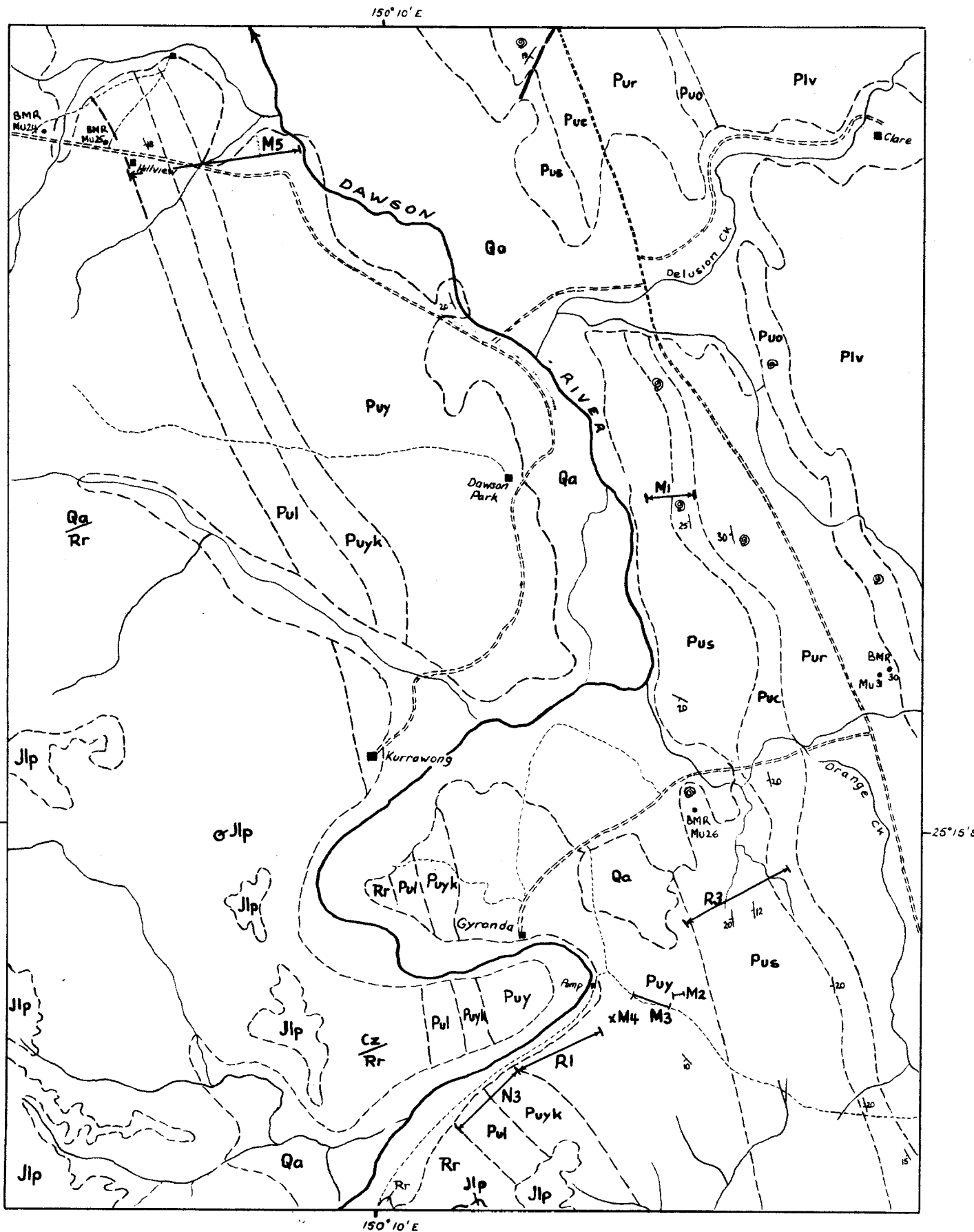


Fig 2
GEOLOGY OF THE CRACOW AREA

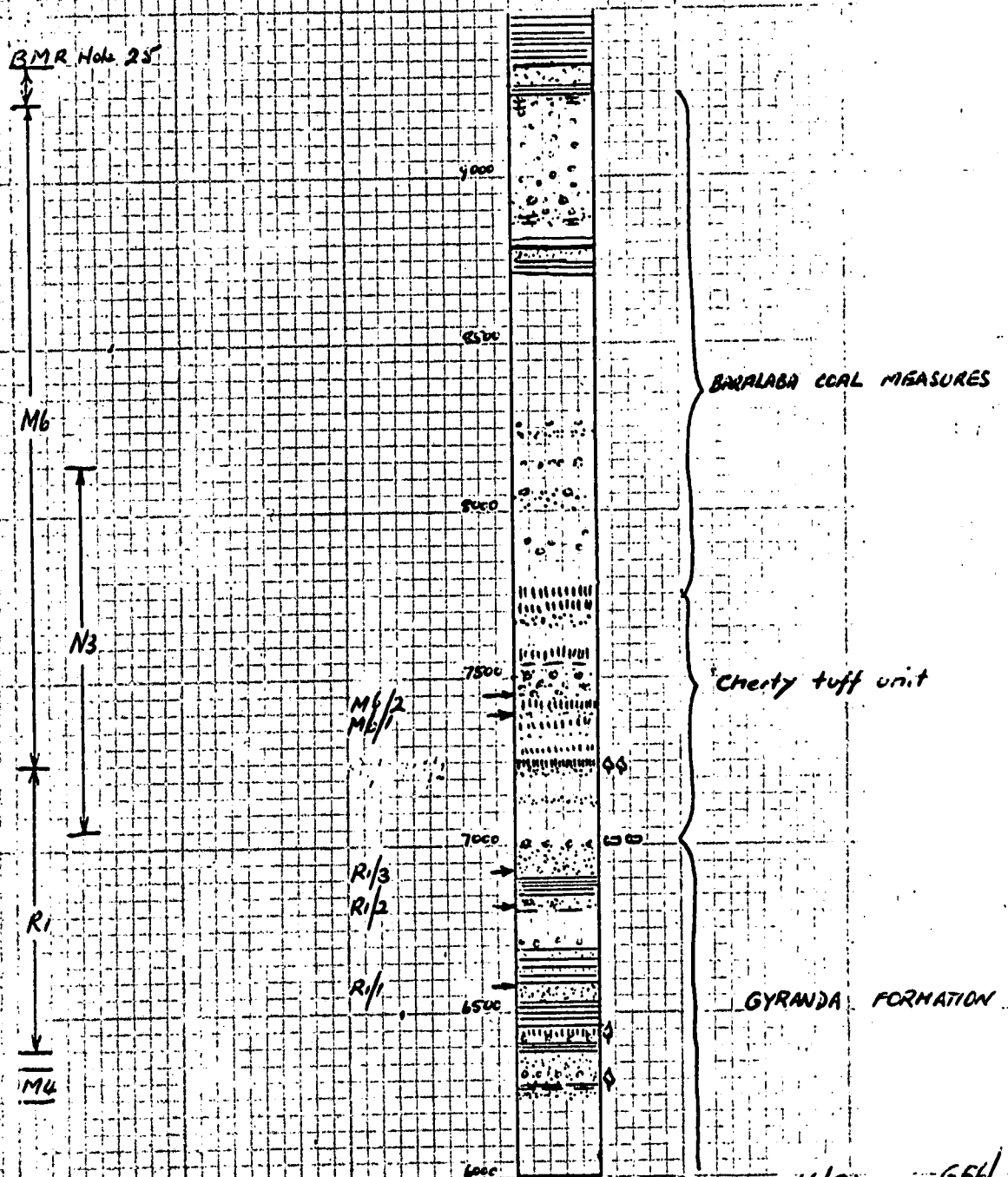
Quaternary	Qa	Alluvium, soil
Jurassic	Jlp	Precipice Sandstone
Triassic	Rr	Rewan Formation
Upper Permian	Pul	Baralaba Coal Measures
	Puyk	Tuff, tuffaceous sediments
	Puy	Gyronda Formation
	Pus	Mount Steel Formation
	Pue	Acacia Formation
	Pur	Barfield Formation
	Pvo	Oxtrack Formation
Lower Permian	Plv	Camboon Andesite

0 1 2 3 4 5 MILES

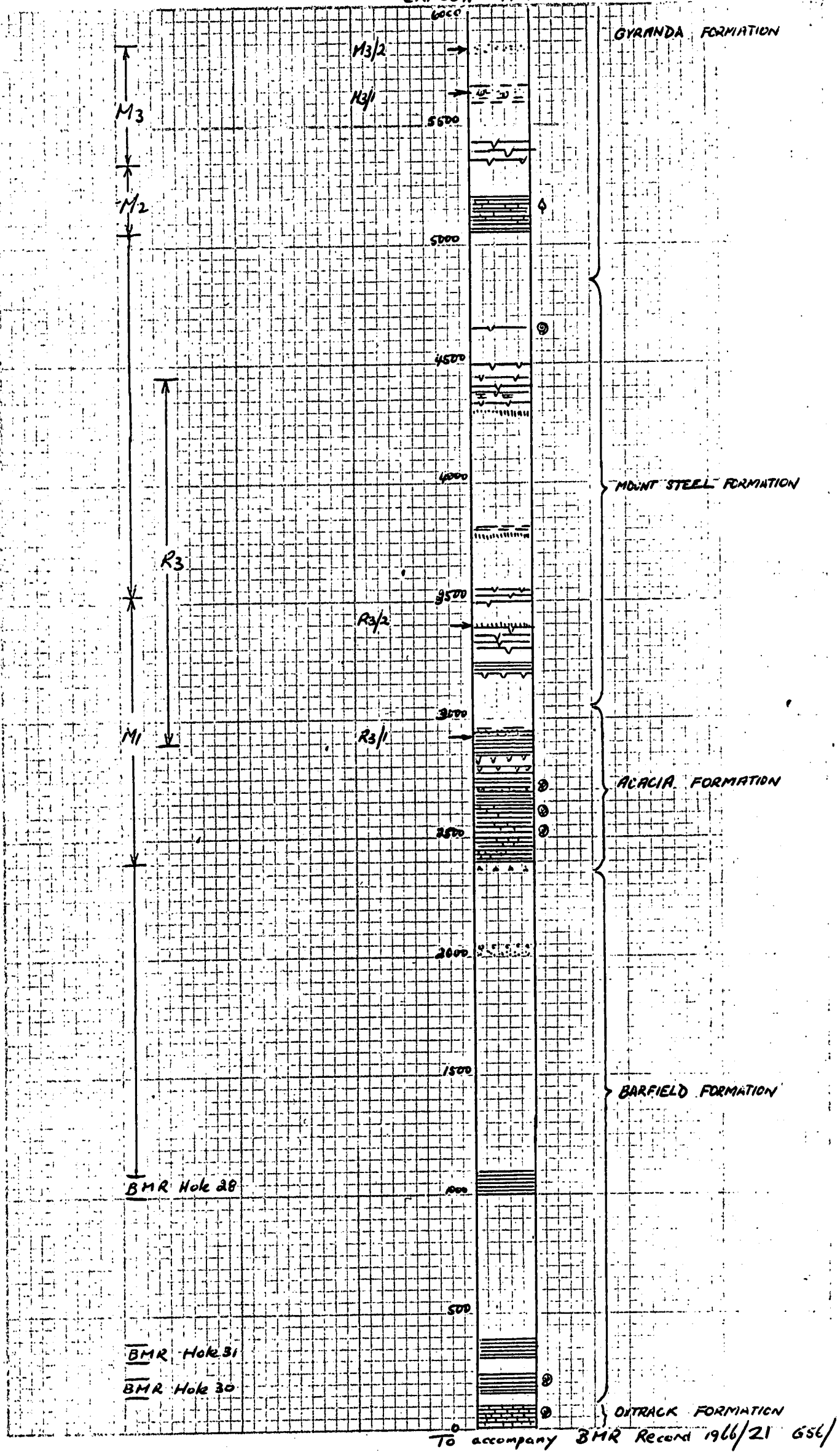
Fig 3

COMPOSITE SECTION - CRACOW AREA

1" = 500'



CRACOW AREA



was $110^{\circ} \pm 13^{\circ}$ (65 readings), the direction also being derived from small scale cross-lamination.

The few exposures of cross-stratification seen in the Baralaba Coal Measures in the Gylanda area indicate a direction of sediment transport towards the north. This is further supported by the huge north-dipping foresets exposed in the Moura open-cut mine, which will be described in some detail in the final report. All azimuths given in degrees east of north.

REIDS DOME AREA

An Upper Permian and Lower Triassic sequence is exposed in the Reid's Dome area, in the south-eastern corner of the Springsure 1:250,000 Sheet area.* The Upper Permian sequence consists of the Peawaddy Formation overlain by the Black Alley Shale, which is in turn overlain by the 'Upper Bandanna' Formation (Mollan, Kirkegaard, Exon and Dickins, 1964; Mollan, Exon and Kirkegaard, 1964). The Mantuan Productus Bed is at the top of the Black Alley Shale.

The Permian sequence is overlain by the Rewan Formation which consists of a lower sandstone unit with minor red mudstone, and an upper red mudstone unit with some green sandstone. These units are loosely termed 'Upper' and 'Lower' Rewan Formation.

A composite section (Fig. 4) has been compiled from sections measured in the field (Sections N4, N5, R6, N6 in Appendix I). The geology of the area is shown in Figure 5 which also shows the location of measured sections.

Cross-stratification in the Upper Bandanna Formation (303 readings) and in the 'Lower' Rewan Formation (211 readings) indicates a direction of sedimentation towards the north.

BLACKWATER AREA

The most recent attempt to define units in the Blackwater area is based on mapping by Utah Development Corporation and the B.M.R. (Malone, Olgers and Kirkegaard, in prep.). The new nomenclature is compared with that of Mines Administration 1959.

* Subsequent reference to 1:250,000 Sheet areas is signified by the use of capital letter e.g., SPRINGSURE.

Table 4

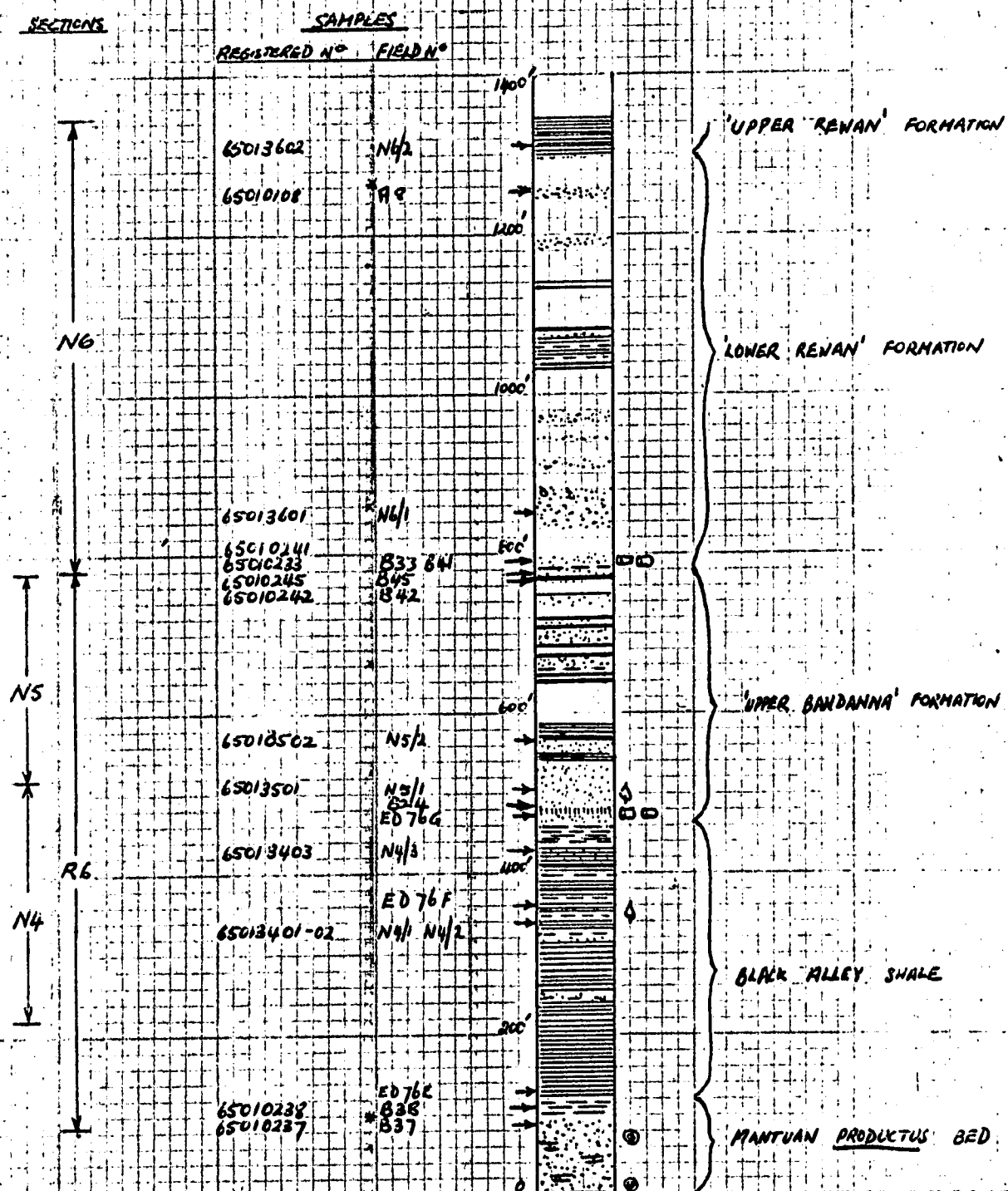
Summary of Upper Permian and Lower Triassic units in the Nebo area

Symbol	Formal Name	Lithology	Approx. Thickness	Cross-bedding	
				Toward	No. of readings
Rr	Rewan Formation	Sublabile and lithic green sandstone with red-brown mudstone	3000'	SSW	81
Pf ₂ Pf Pf ₁	Elphinstone Coal Measures Fort Cooper Coal Measures	Brown sublabile calcareous sandstone, carbonaceous shale, coal, brown sandy calcarenite { Tuffaceous lithic sandstone haematitic in places, conglomerate, hard white cherty tuff with plant impressions, minor coal	400' 1000'	South-east	60
Pe ₂ Pe Pe ₁		Brown calcareous lithic sandstone, conglomerate { Carbonaceous mudstone grey mudstone, lithic sandstone, minor coal	900' 1100'		
Pd		Brown tuffaceous siltstone grading to tuffaceous lithic sandstone, chert, ? flow rocks	1400'	South	107
Pc ₄		Calcareous lithic sandstone, conglomerate, minor coal, carbonaceous mudstone	1400'		
Pc ₃	Top of Blenheim Formation	Calcareous sublabile sandstone, blue micaceous mudstone, coquinitic limestone	1800'		

Fig 4

COMPOSITE SECTION - RUDS DOME AREA

1" = 200'



* Approximate stratigraphic position

Table 2

<u>Malone et al. (in prep.)</u>		<u>Mines Administration 1959</u>	
Rewan Formation	}	Woodlands Member	Taurus Formation
Sagittarius Sandstone Member			
Rangal Coal Measures			
Burngrove Formation			
Fairhill Formation	}		
German Creek Coal Measures	{	Carnangarra Member	
		MacMillan Member	
		Crocker Formation →	

A composite section compiled from sections measured in the Blackwater area is shown in Figure 6, and the measured sections at 1" to 50' are included in Appendix I. The locations of the measured sections are shown in Figure 7. Table 3 presents a summary of cross-stratification directions in the area.

Table 3

<u>Unit</u>	<u>Direction</u>	<u>No. of readings</u>
Sagittarius Sandstone Member	Towards N.N.W.	101
Rangal Coal Measures	" S.S.E.	158
Burngrove Formation	" S.S.E.	72
Fairhill Coal Measures	" South	103
German Creek Coal Measures (mainly Carnangarra Sandstone)	" East	349

NEBO AREA

Reid (1946) divided the Upper Bowen Coal Measures in the Nebo area into the basal Fort Cooper Coal Measures containing limonitic sandstone, brown shale, and white fossiliferous cherty shale, and the Elphinstone Coal Measures, consisting of yellowish to grey sandstone, shale and coal. Reid thought that these formations composed the entire sequence between the Middle Bowen Beds and the Carborough Sandstone. However, it appears that he did not recognize that the Elphinstone Measures are overlain by about 3000 feet of a red mudstone/greenish sandstone sequence which can be correlated with the Rewan Formation; and that the Fort Cooper Coal Measures are underlain by nearly 2000 feet of probable non-marine sediments which can be included in the Upper Bowen Coal Measures.

For the purposes of description, the sequence in this area is divided into seven units as shown and defined in Table 4, and Figs. 8 and 9. The composite

stratigraphic column (Fig. 9) was compiled from measured sections shown at 1 inch to 50 feet and 1 inch to 200 feet in Appendix I.

EXMOOR-COLLINSVILLE AREA

Exmoor and Collinsville are at the northern end of the basin (Fig.1). The top part of the Blenheim Formation and basal part of the Blackwater Group crop out particularly well in the Bowen River near Exmoor and Fig. 10 is the section measured at this place. The units defined in the Nebo area (Pc to Pf) were identified in the Exmoor area and Fig. 11 shows their distribution and the main directions of cross-bedding. It appears that a south-westerly direction of sediment transport was dominant in the Blenheim-Exmoor area in many units, and that a south-easterly direction was dominant in the Collinsville area where only the lower units crop out.

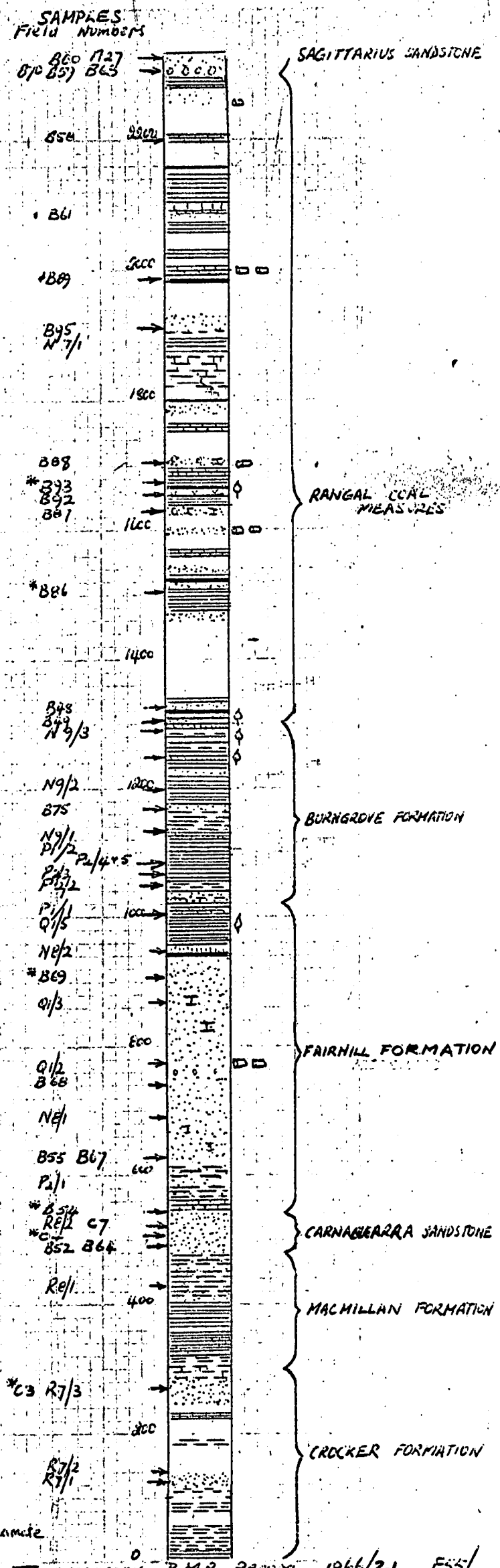
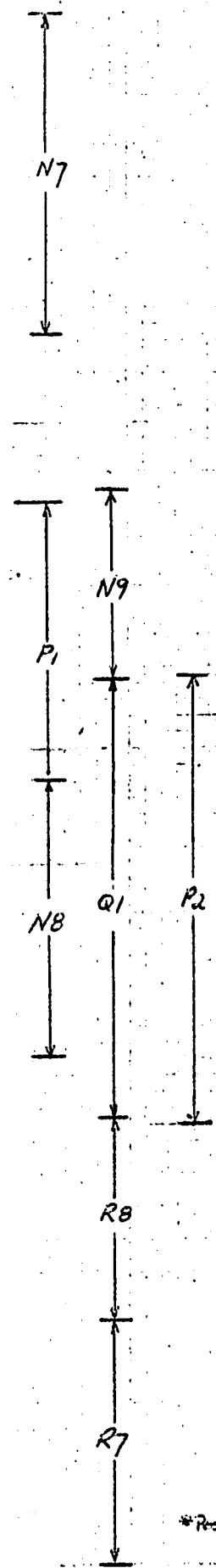
CONCLUSIONS

The Rewan Formation exists throughout the Bowen Basin, beneath the Clematis Sandstone in the southern areas and the Carborough Sandstone in the north. The Rewan Formation is everywhere underlain by coal measures which are in turn underlain by distinctive white cherty tuff. This tuff, probably a useful marker bed, has also been observed in the Reids Dome area beneath the 'Upper Bandanna' Coal Measures, but not in the Blackwater area. It could be equivalent to the Burngrove Formation or possibly to the strata associated with the basal part of the Rangel Coal Measures. It is hoped that further study will solve this problem.

REFERENCES

- JENSEN, A.R., GREGORY, C.M., and FORBES, V.R., 1964 - The geology of the Taroom 1:250,000 Sheet area and of the western third of the Mundubbera 1:250,000 Sheet area. Bur. Min. Resour. Aust. Rec. 1964/61.
- MINES ADMINISTRATION PTY LTD, 1959 - New Names in Queensland stratigraphy. Aust. Oil Gas J. 5 (8), 27-35.
- MALONE, E.J., OLGERS, F., and KIRKEGAARD, A.G., in prep. - The geology of the Duaringa and St. Lawrence 1:250,000 Sheet areas. Bur. Min. Resour. Aust. Rep.
- MOLLAN, R.G., EXON, N.F., and KIRKEGAARD, A.G., 1964 - The geology of the Springsure 1:250,000 Sheet area, Queensland. Bur. Min. Resour. Aust. Rec. 1964/27.
- MOLLAN, R.G., KIRKEGAARD, A.G., EXON, N.F., and DICKINS, J.M., 1964 - Note on the Permian rocks of the Springsure area and proposal of a new name, Peawaddy Formation. Qld. Govt. Min. J. 65 (757), 576-581.
- REID, J.H., 1946 - Geological reconnaissance of the Nebo district coal areas. Qld. Govt. Min. J. 47, 10-13.

Fig 6
COMPOSITE SECTION
BLACKWATER AREA
1" = 200'



*Position approximate

23°13'

23°48'
148°30'

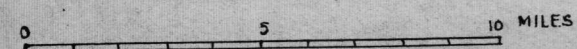
148°55'

Fig.7

GEOLOGY OF THE BLACKWATER AREA

Based on Bureau of Mineral Resources Preliminary
1:250,000 Edition, 1965. DUARINGA

Scale 1 : 250,000



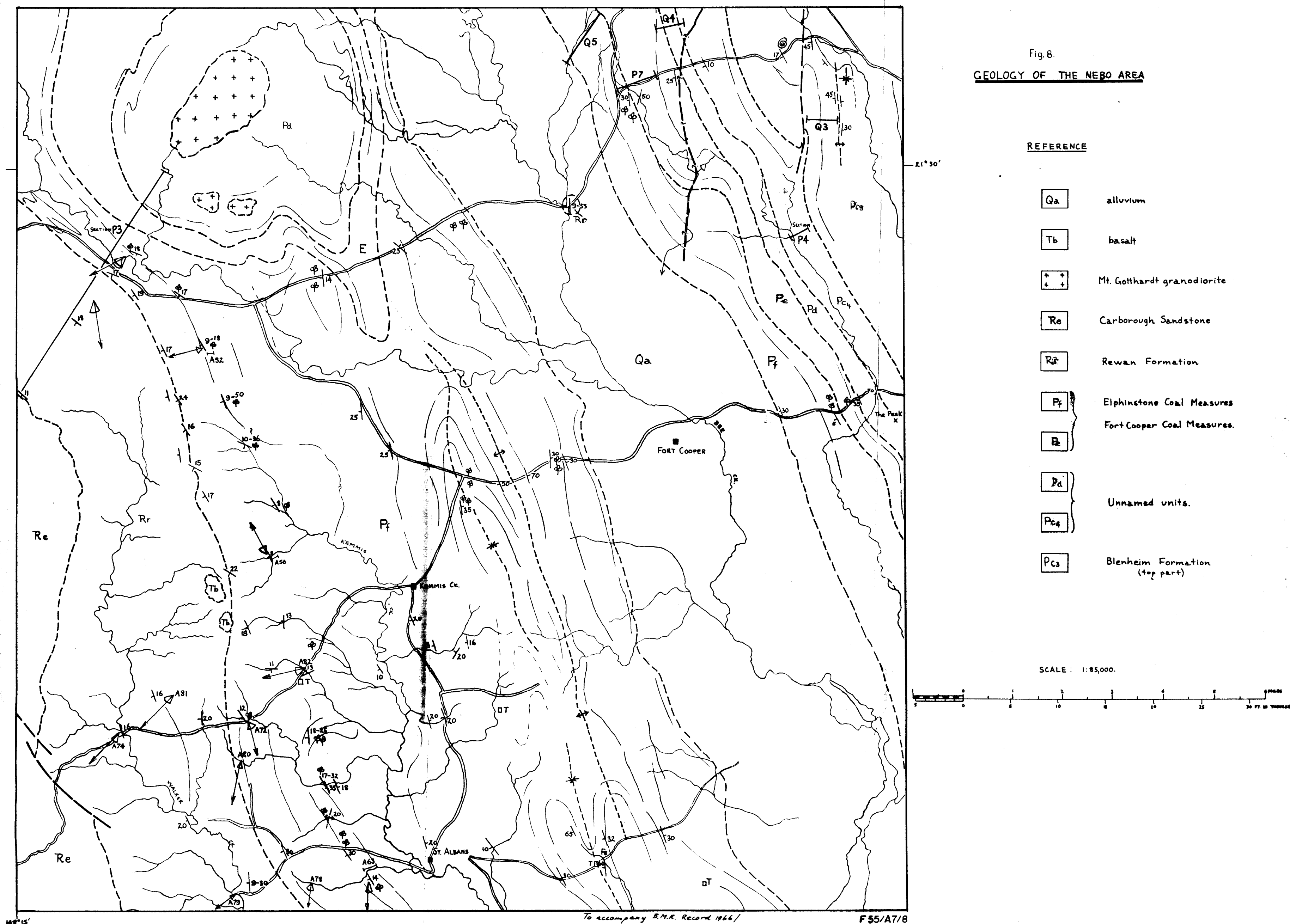
REFERENCE

QUATERNARY	Qa	alluvium
UNDIFFERENTIATED CAINOZOIC	Cz	alluvium, soil, etc.
		laterite
TERTIARY	Ta	alluvium
	Tb	basalt
	Rr	Rewan Formation
TRIASSIC	Rs	Sagittarius Sandstone Member
	Puj	Rangal Coal Measures
	Pug	Burngrove Formation
UPPER PERMIAN	Puh	Fair Hill Formation
	Pud	? Carnangara Sandstone German Creek Coal Measures
	Pum	Maria Formation

To accompany Record 1966/21

F 55/A16/4

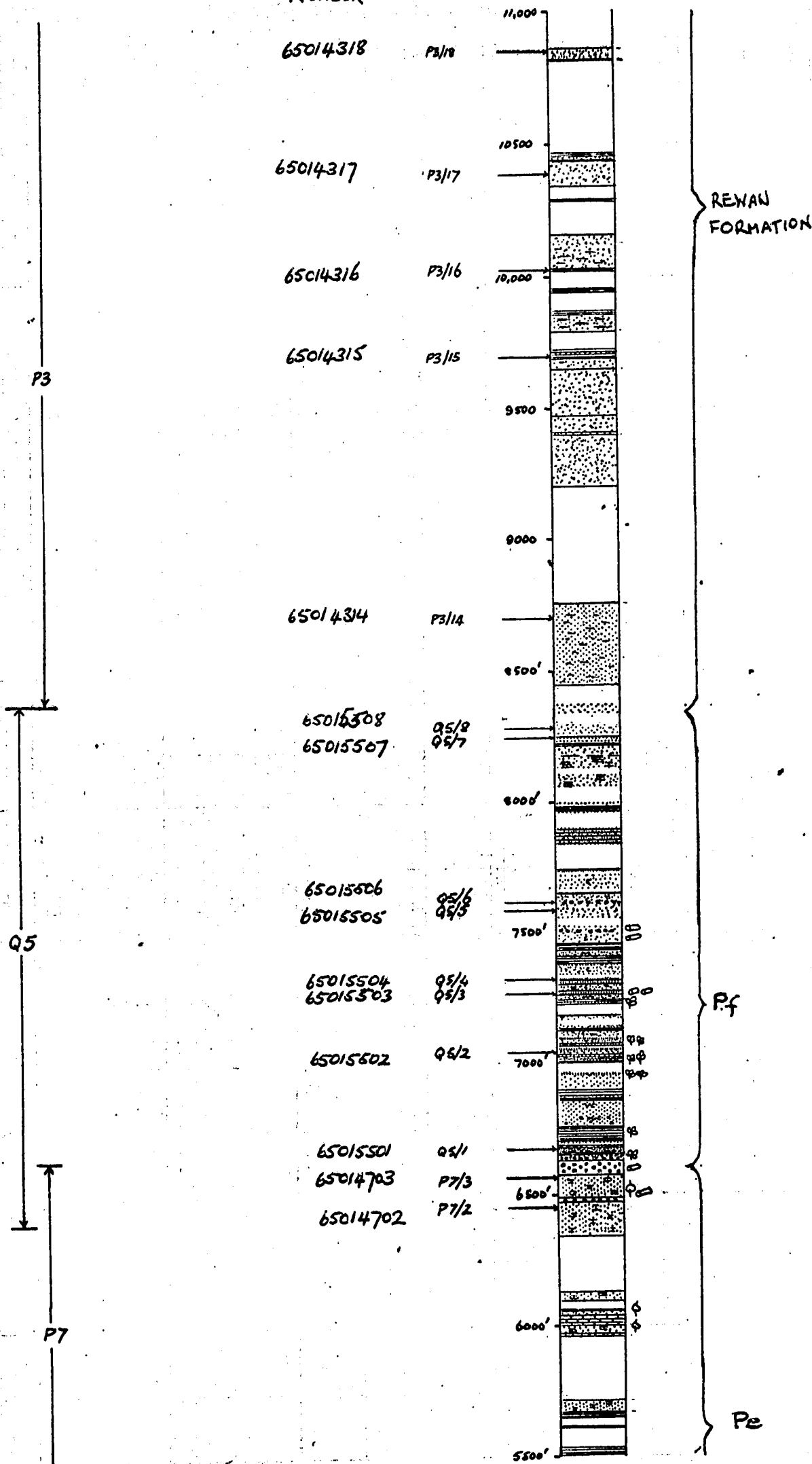
Fig. 8.
GEOLOGY OF THE NEBO AREA



COMPOSITE SECTION - NEBC AREA

Fig. 9

Scale 1" = 500'
See text for description of units, Proc



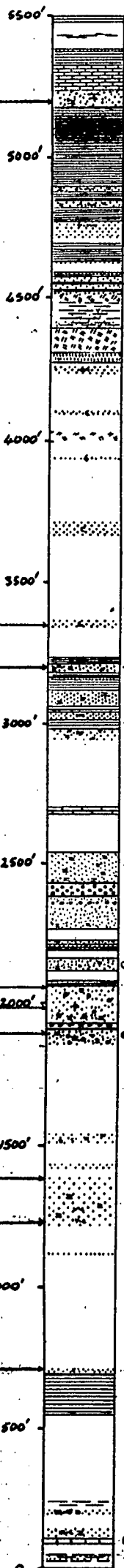
REGISTERED
NUMBER

FIELD N°



65014701

P7/1



65015402

Q4/2

65015401

Q4/1

65014403

P4/3

65014402

P4/2

65014401

P4/1

65015303

Q3/3

65015302

Q3/2

65015301

Q3/1

Pa

Pc4

Blenheim Formation
(top part)

Pc3

Fig.10

COMPOSITE SECTION - EXMOOR AREA

1" = 500'

See text for description of units

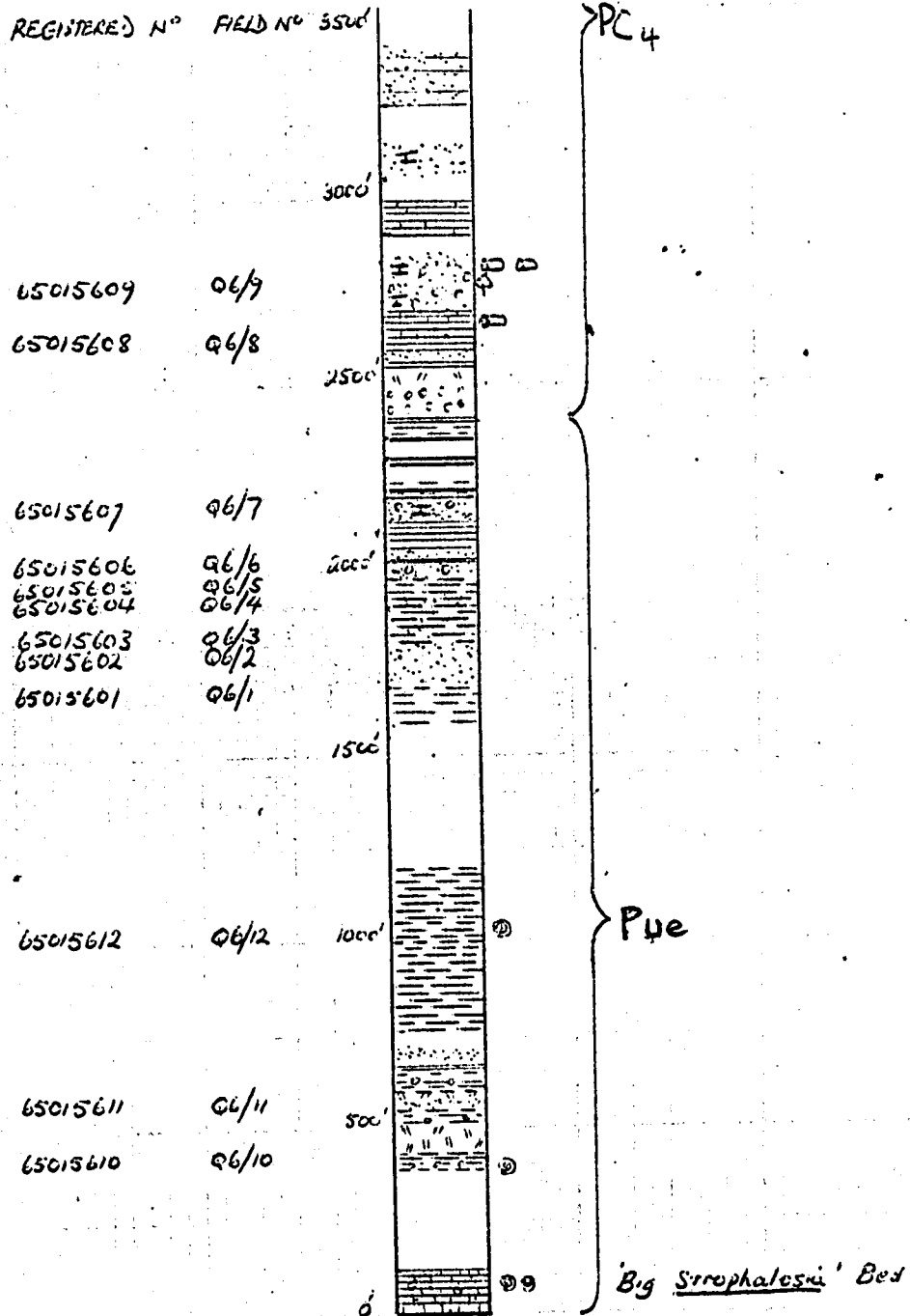
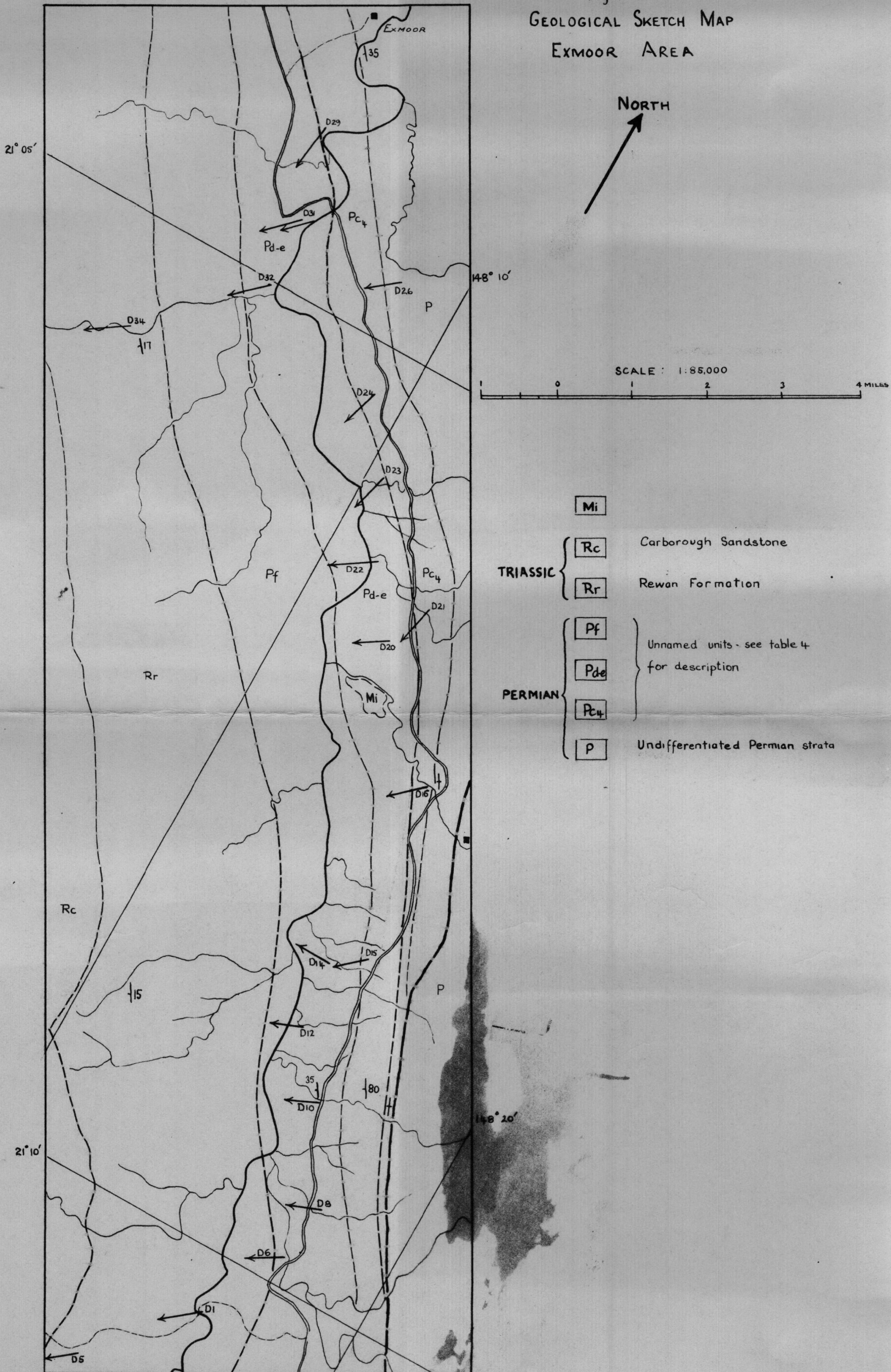


Fig 11
GEOLOGICAL SKETCH MAP
EXMOOR AREA



- | | | |
|----------|------------|--|
| | Mi | |
| TRIASSIC | Rc | Carborough Sandstone |
| | Rr | Rewan Formation |
| PERMIAN | Pf | } Unnamed units - see table 4
for description |
| | Pde | |
| | Pc4 | |
| | P | Undifferentiated Permian strata |

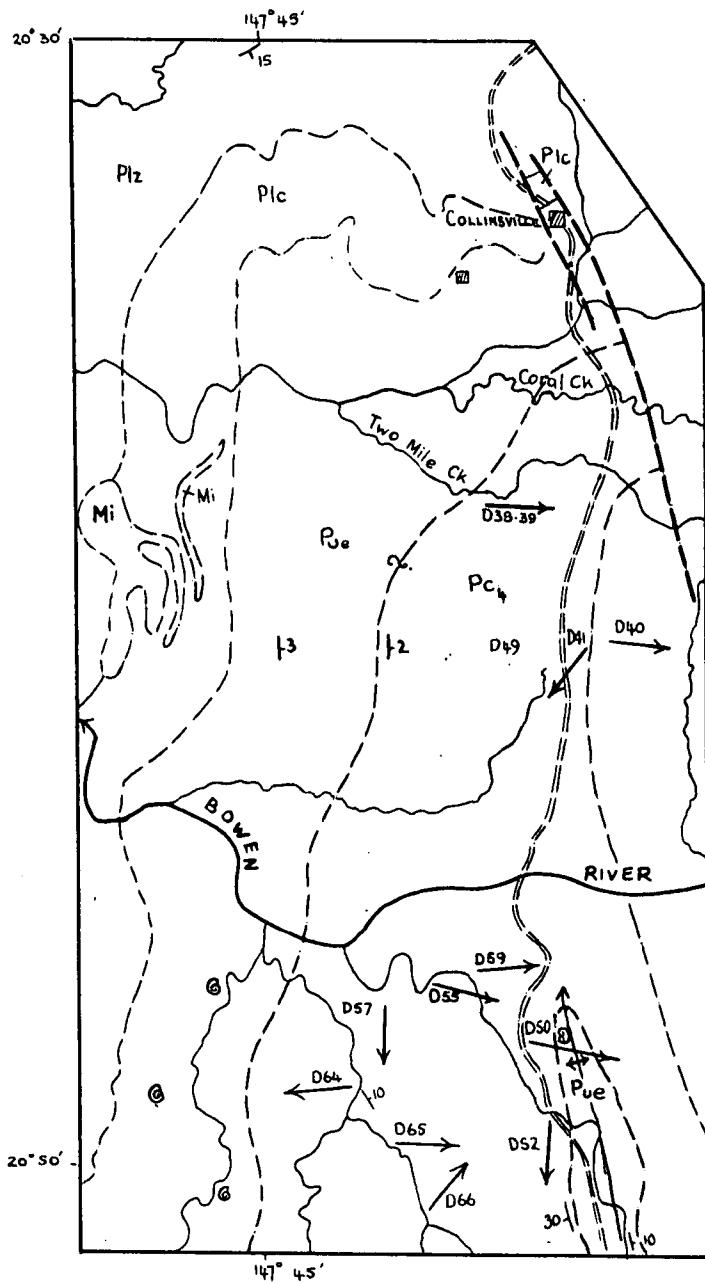
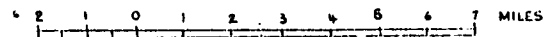


Fig 12
GEOLOGICAL SKETCH MAP
COLLINSVILLE AREA
Scale 1:250,000



MESOZOIC	Mi	Intrusive rocks
	Pc4	Unnamed unit
PERMIAN	Pue	Blenheim Formation
	Plc	Collinsville Coal Measures
	Plz	Lizzie Creek Volcanics

To accompany BMR Record 1966/21

Appendix I

Measured stratigraphic sections

<u>Section</u>	<u>Page</u>	<u>Area</u>	<u>Relevant composite section</u>
M1	2	{ Cracow	Figure 3
R3	3		
M2	6		
M3	7		
M4	6		
R1	8	{ Reids Dome	Figure 4
N3	10		
M6	11		
N4	12		
N5	13		
R6	14	{ Blackwater	Figure 6
N6	15		
R7	16		
R8	17		
Q1	18		
N8	19	{ Nebo	Figure 9
P2	20		
P1	21		
N9	22		
N7	23		
Q3	24	{ Exmoor	
P4	26		
Q4	28		
P7	32		
Qs	35		
P3	39		
Q6	43		

1200'

MEASURED SECTION M1.

Section measured by tape & compass 1/2 mile north of Mt. Steel, MUNDUGGERA 1:250,000 sheet area, starting 313700E 1265300N, finishing 318000E 1265100N. Base is about 2400 feet above the Ostrack Form.

163' Scattered outcrop of argillite (as below).

750'

315' Hard, mainly light brown to buff argillite, tending to be green in places; partly massive and partly thinly bedded. Abundant worm tubes in some beds.

No outcrop.

500'

9' Greenish brown mudstone with grey siltstone intercalations. Thin limestone bed near top.

17' Black mudstone tending to greenish grey muddy siltstone upwards. Fossiliferous near the top, with crinoids, corals and bryozoa.

No outcrop.

400'

21' Brownish grey mudstone, and 2 ft of brownish grey tuff at base. The mudstone is slightly silty; with minor fossiliferous (bryozoa) layers and siliceous (?) concretions in places. Calcareous concretions near the top - up to 4 cm.

No outcrop.

T130F

T130E

10' light brown weathered, coarse-grained tuff.

16' Dark grey mudstone with a few volcanic (?) pebbles and thin beds of bluish grey laminated muddy arenite and dark grey fine grained limestone near top.

5' Lapilli tuff; more weathered at top.

54' Brownish blue to dark grey mudstone, with minor thin beds of limestone and calcareous arenite. The bottom 14 ft (mudstone) has a "peppery" appearance.

T130D

11' Bluish grey to brown labile arenite; massive, coarse and fairly well sorted, containing a few clasts up to 5 mm.

No outcrop.

5' Brown muddy siltstone with fossiliferous calcareous pods (gastropods & corals).

No outcrop.

300'

21' Brown mudstone, slightly layered, with lenses of fossiliferous limestone (corals).

6' Dark brown mudstone, unfossiliferous, with grey-brown limestone.

32' Greenish brown mudstone with thin layers of polyzoa and corals; calcareous concretions and glauconite; lenses of bluish grey limestone.

200'

60' Greenish to dark brown mudstone, containing abundant plants reworked by organisms in places. At 232', about a 1 foot band of calcareous mudstone with brachio-pods and polyzoa.

No outcrop.

38' Greenish brown mudstone silty in places, with calcareous veins and veinlets and some shaley clasts. Slightly laminated.

No outcrop.

100'

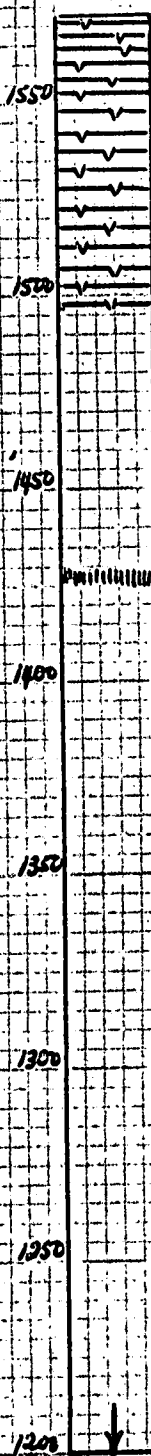
13' Dark grey to brown mudstone, slightly silty, with calcareous veinlets, a few fragments of glauconite and a pebble of coarse-grained arenite. Concretionary bed about 6" thick at the top.

No outcrop.

57' Greenish brown silty mudstone with minor thin beds of grey calcareous mudstones and shaley clasts up to 4 mm. long. Brownish white calcareous claystone of about 1 ft thick near the base.

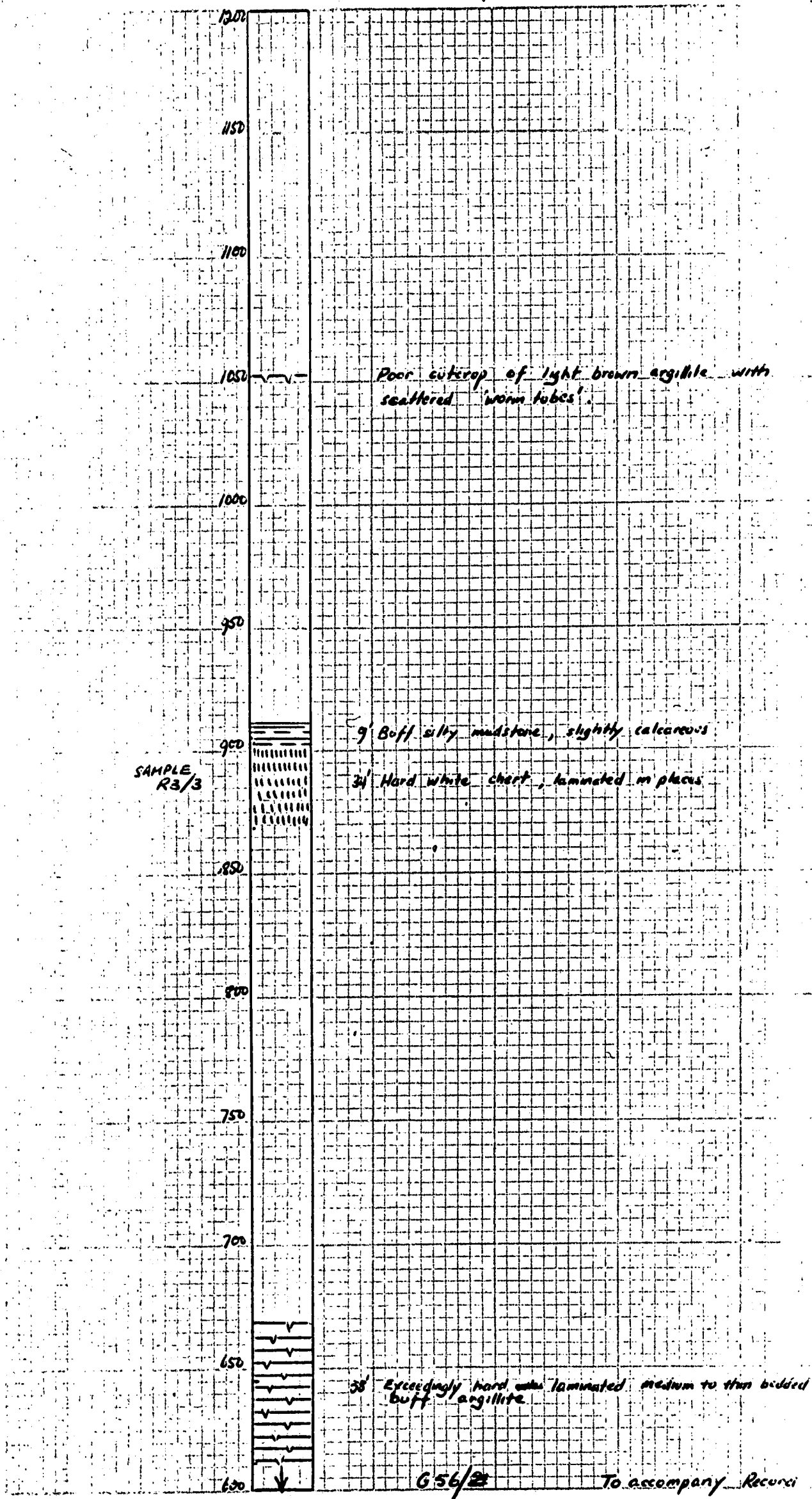
MEASURED SECTION R3

Section measured with tape and compass 2 miles east of Gyroda homestead, MUNDUBBERA 1:252,000 sheet area, starting 314900E 1857600N, finishing 313150E 1853100N. Base of section estimated to be about 2900 feet above the Orrock Formation. See Fig. 3



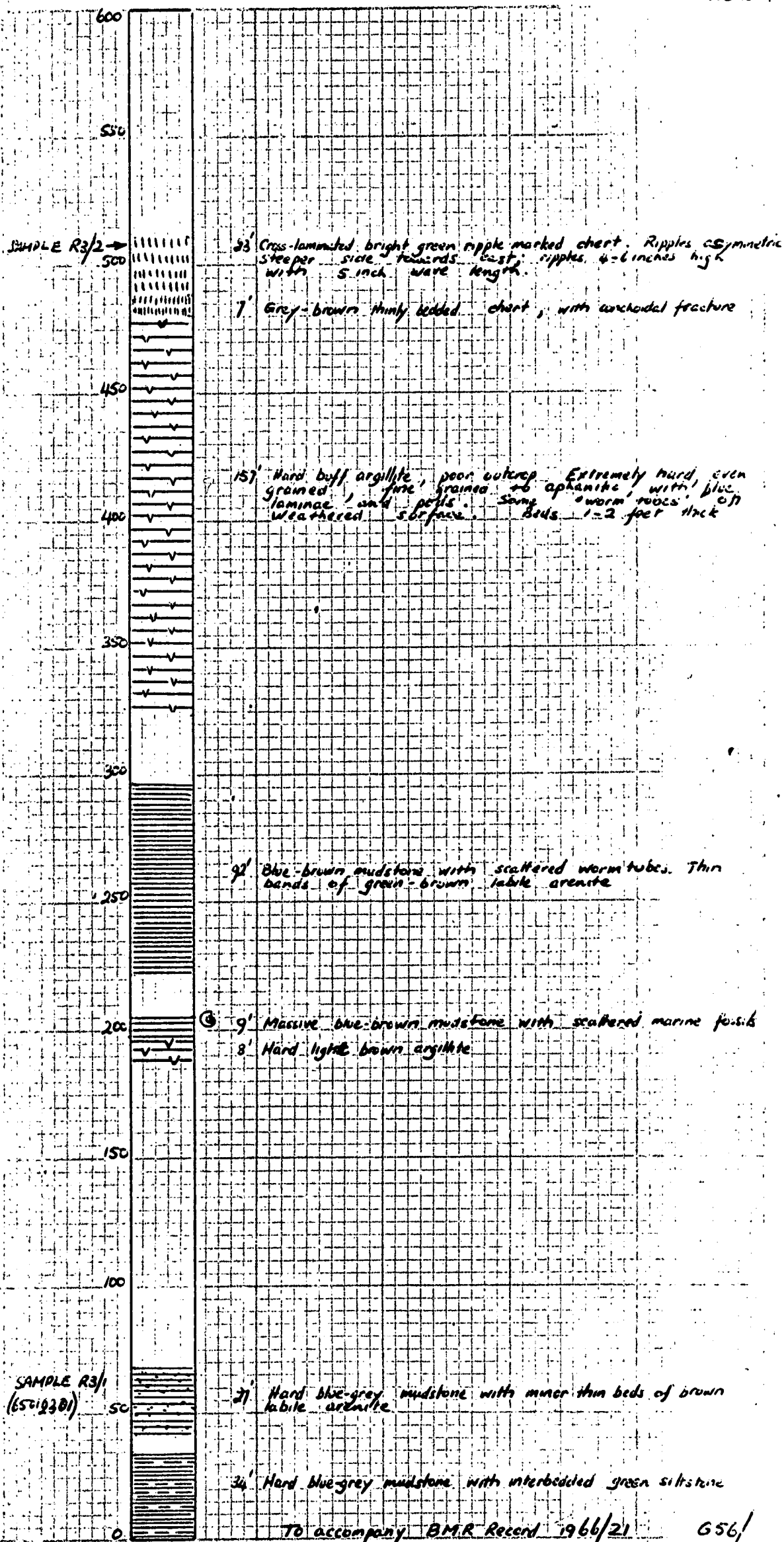
75' Buff to light grey argillite - slightly laminated with rare calcareous concretions.

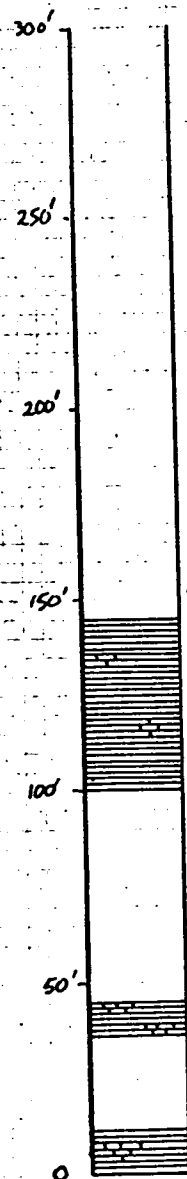
5' White to light grey chert



G56/22

To accompany Recorci 1964/21





MEASURED SECTION M2

Section measured by tape and compass 2 miles south-east of Gyraunda Homestead MUNDUBBERA 1:250,000 Sheet area, starting 313400E, 1857800N, finishing 312900E, 1857700N. Base of section about 7450 feet above Oxtrack Formation. (See Fig 3)

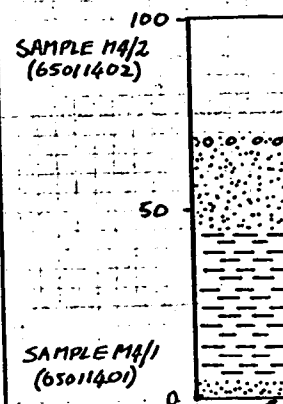
46' Dark brown mudstone with interbeds of brown to brownish-grey calcareous mudstone; carbonaceous debris and some fossil leaves.

7' Brown mudstone, tending to greenish-brown; generally calcareous.

11' Light brown silty mudstone. Some calcareous concretions up to 1 foot thick.

MEASURED SECTION M4.

Section measured by tape and abney level $1\frac{1}{2}$ miles south east of Gyraunda Homestead, MUNDUBBERA 1:250,000 Sheet area. Starting 312100E 1857000N. Base of section about 8500 feet above Oxtrack Formation. (See Fig 3)



22' Brown-green fine sandstone, lustre mottled near base, medium to thick bedded, cross-bedded. Fine conglomerate at top.

42' Light greenish brown siltstone with fossil leaves and minor wood fragments; some carbonaceous laminae.

5' Light green-brown labile arenite fine to medium grained, with some carbonaceous laminae; thin to medium-bedded.

To accompany B.M.R. Record 1966/21

MEASURED SECTION M3.

Section measured by tape and compass
1 1/2 miles S.E. of Gyrauda homestead, MUNDUBBERA
1:250,000 sheet area; starting 313400 E 1857100 N,
finishing 312600 E, 1857000 N. Base of section
about 7800 ft. above Ostrack Formation.
(See Fig.3)

SAMPLE M3/2
(65011302)

10' light brown sandstone, well sorted.

SAMPLE M3/1
(65011301)

6' light brown mudstone.

10' Fine sandy conglomerate, calcareous in places,
with mudstone intercalations.

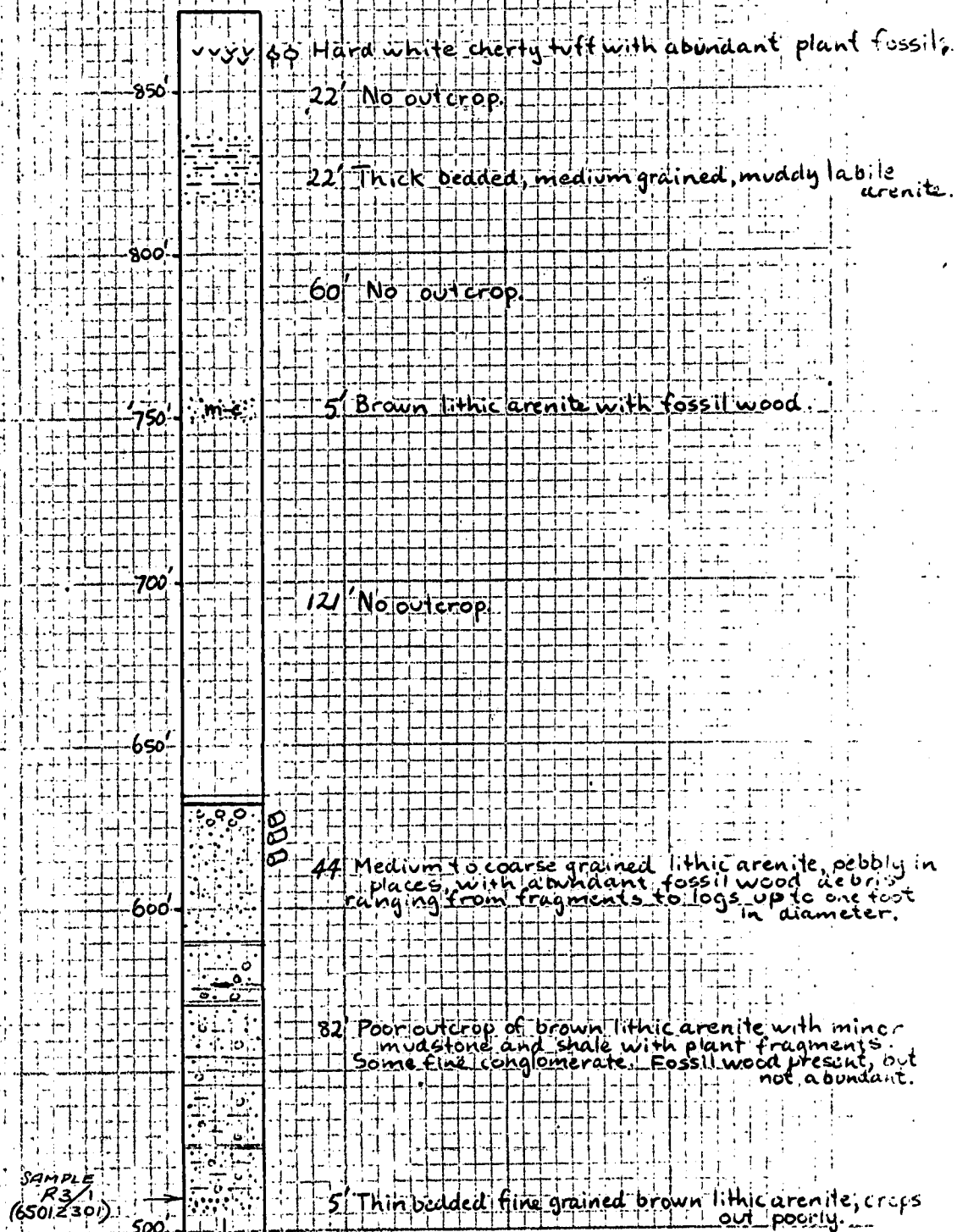
37' light brown silty mudstone, well laminated, non-
calcareous, with some plant debris. Minor small
slump structures. Conglomerate towards top.

73' Hard greenish-brown cherty mudstone, laminated.
Contains some carbonaceous fragments.
Minor intraformational conglomerate.

MEASURED SECTION R1.

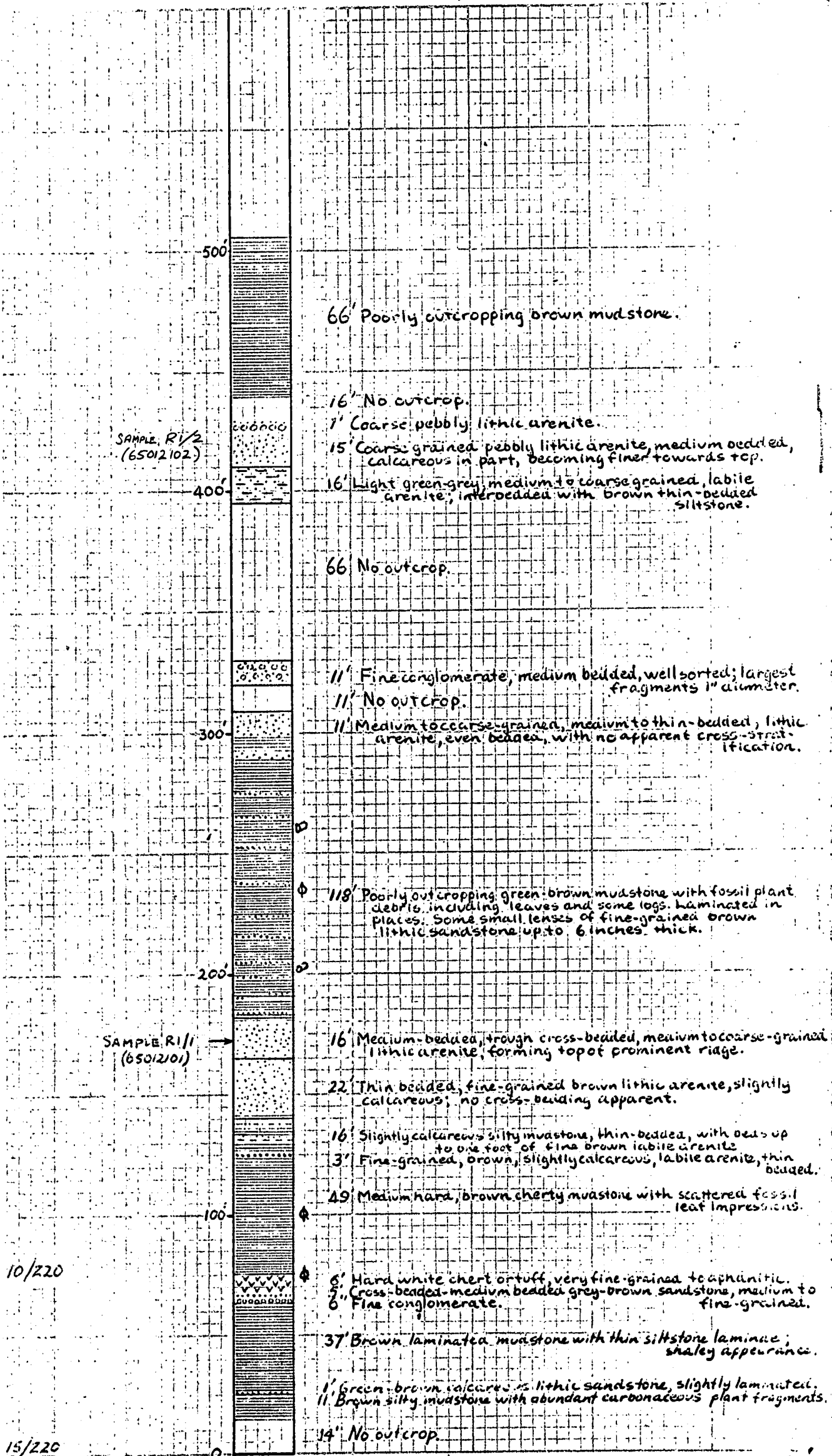
Section measured by abney level $1\frac{1}{4}$ miles southeast of Gyraunda homestead, MUNDUBBERA 1:250,000 sheet area, starting 312000 E, 1836200 N, finishing 311000 E, 1855800 N. Base of section estimated to be about 6200 feet above the Oxtack Formation.

See Fig 3



To accompany B.M.R. Record 1966/21

F55/



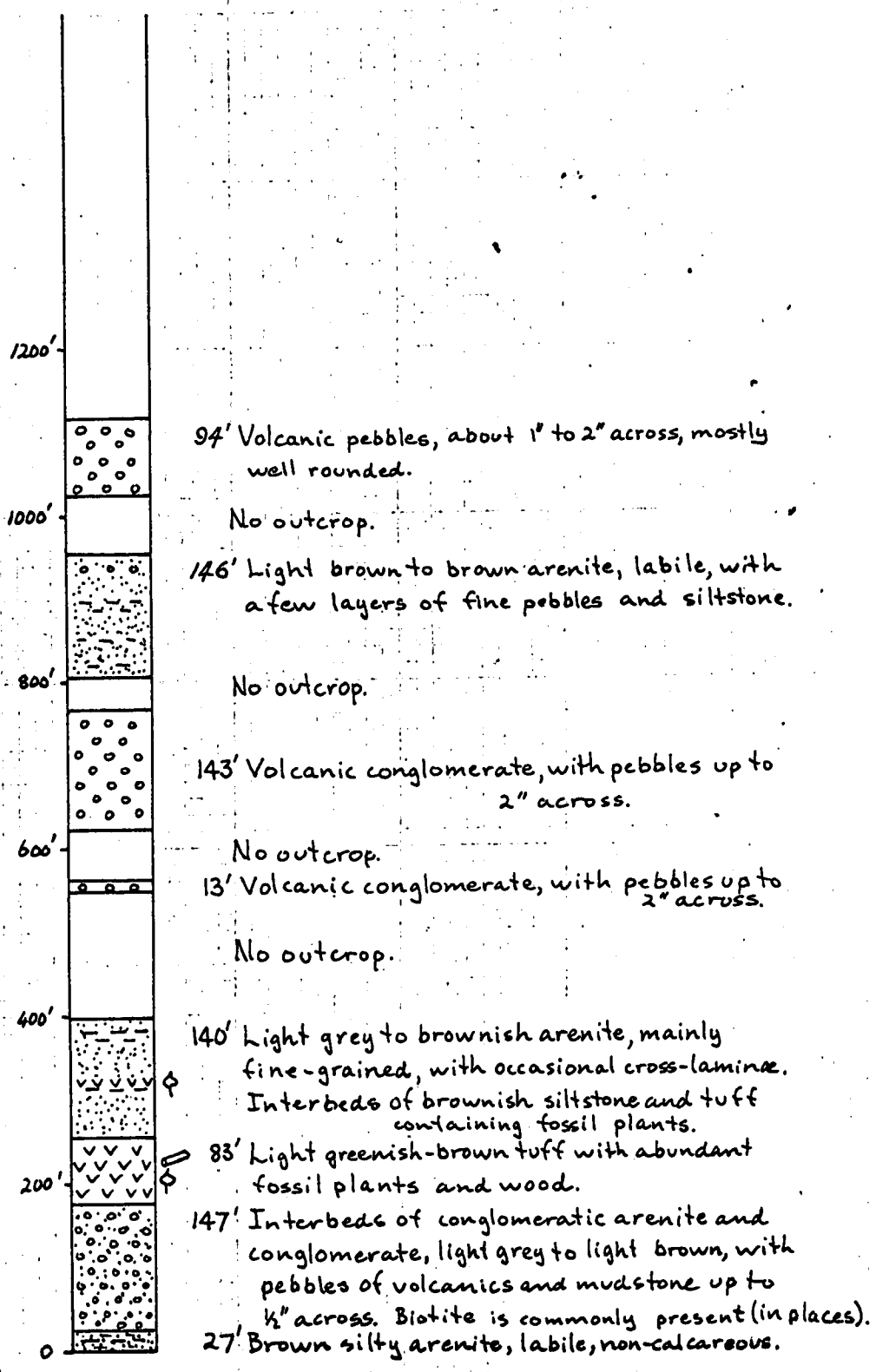
MEASURED SECTION N3.

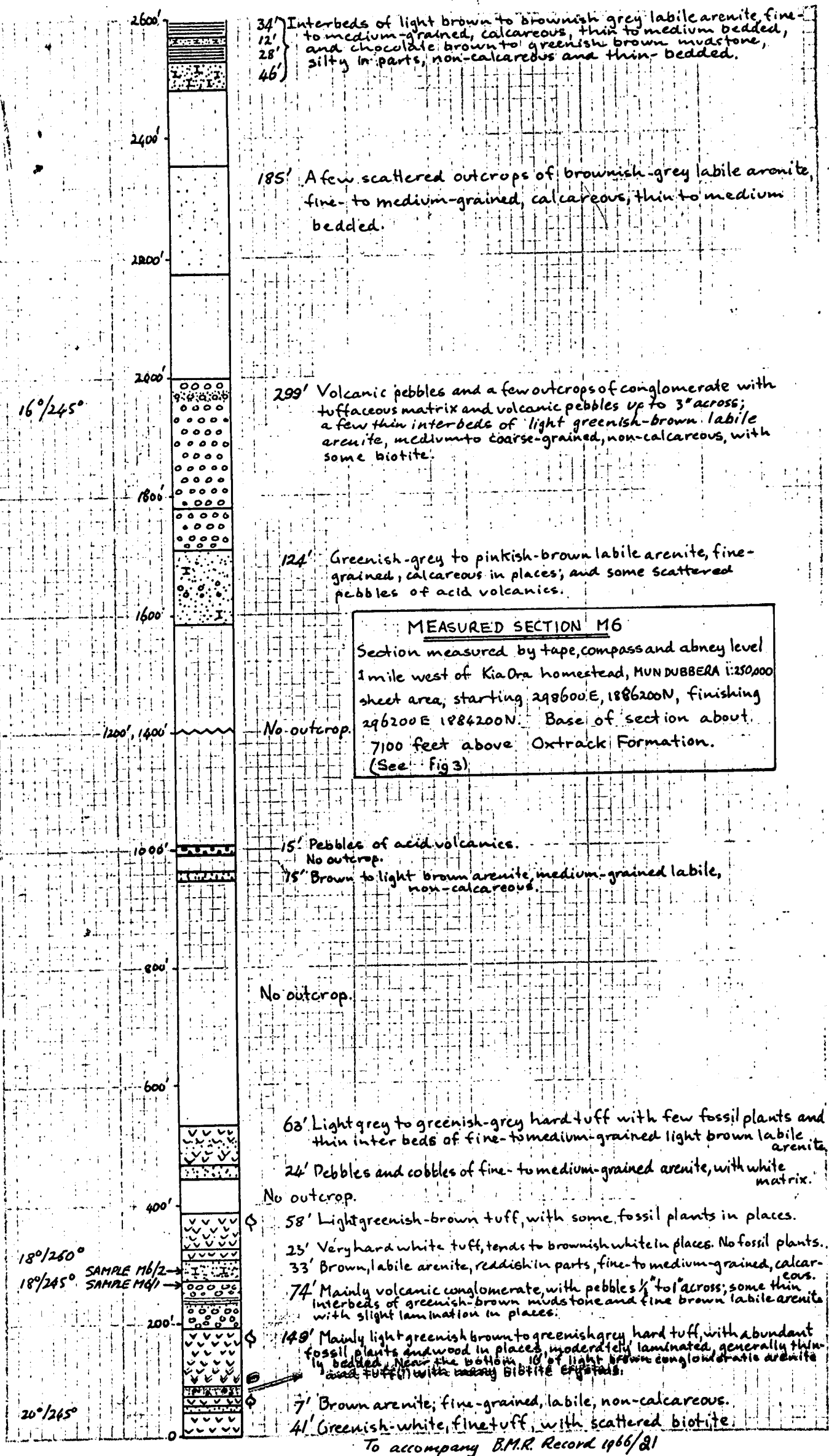
Section measured by tape and compass
 2 miles south-south-west of Gyranda
 Homestead, MUNDUBBERA 1:85,000 photos,
 Run 3, photo 5076; starting 310800 E,
 1855800 N, finishing 309500 E 1855100 N.
 Base of section about 7800 feet above
 Oxtrack Formation.

(See Fig 3)

22°/240°

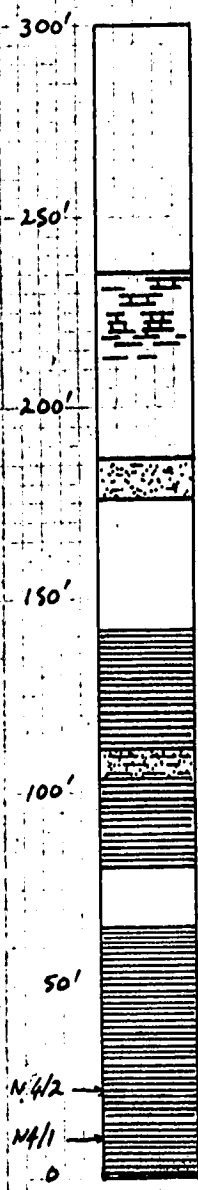
21°/240°





MEASURED SECTION N4

Section measured by tape, compass and abney level about 1/2 mile east of Early Storms Homestead, Eddystone 1:85,000 photos, Run 1, photo 5010, between points A4 and A5 (starting 653800E, 1885000N, finishing 654000E, 1884900N).
See Fig. 4



Poor outcrops of thin to medium bedded calcareous siltstone or sandy limestone.

11' Brown to grey-brown argillaceous arenite, soft, slightly calcareous, thin to medium-bedded and cross-bedded.

31' Brown mudstone, massive, with some plant impressions.

8' Brown micaceous siltstone with scattered plant impressions and papery fracture. Thin band of fine-grained cross-laminated arenite at top.

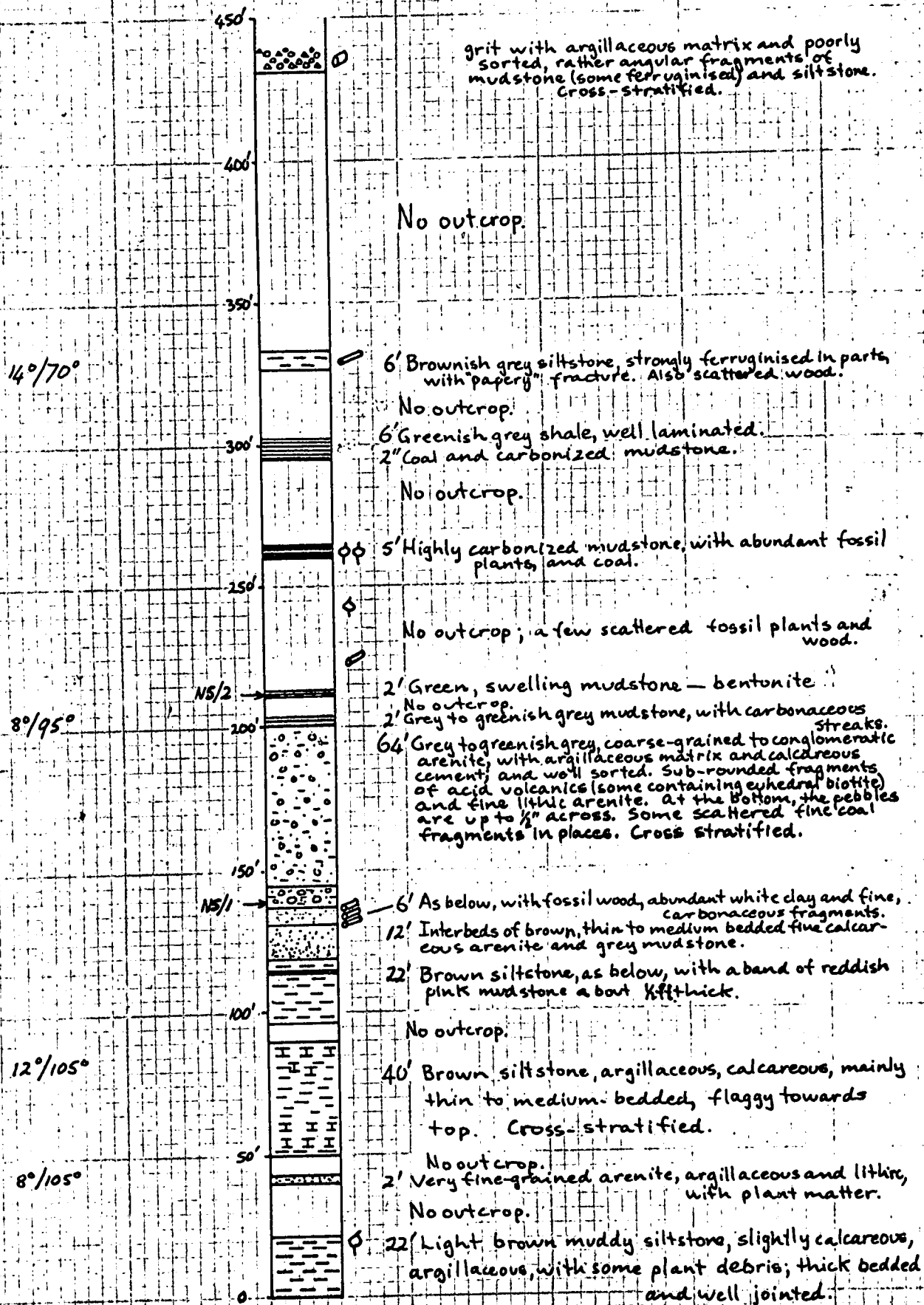
22' Brown mudstone, massive, with minor bands of cross-laminated siltstone.

No outcrop.

65' Mudstone and shale, black to bluish black in the bottom 15', otherwise mainly brown, with thin bands of ferruginous mudstone, minor slump structures and ? worm burrows in places. About 4" thick of green soapy bentonitic around 10' level.

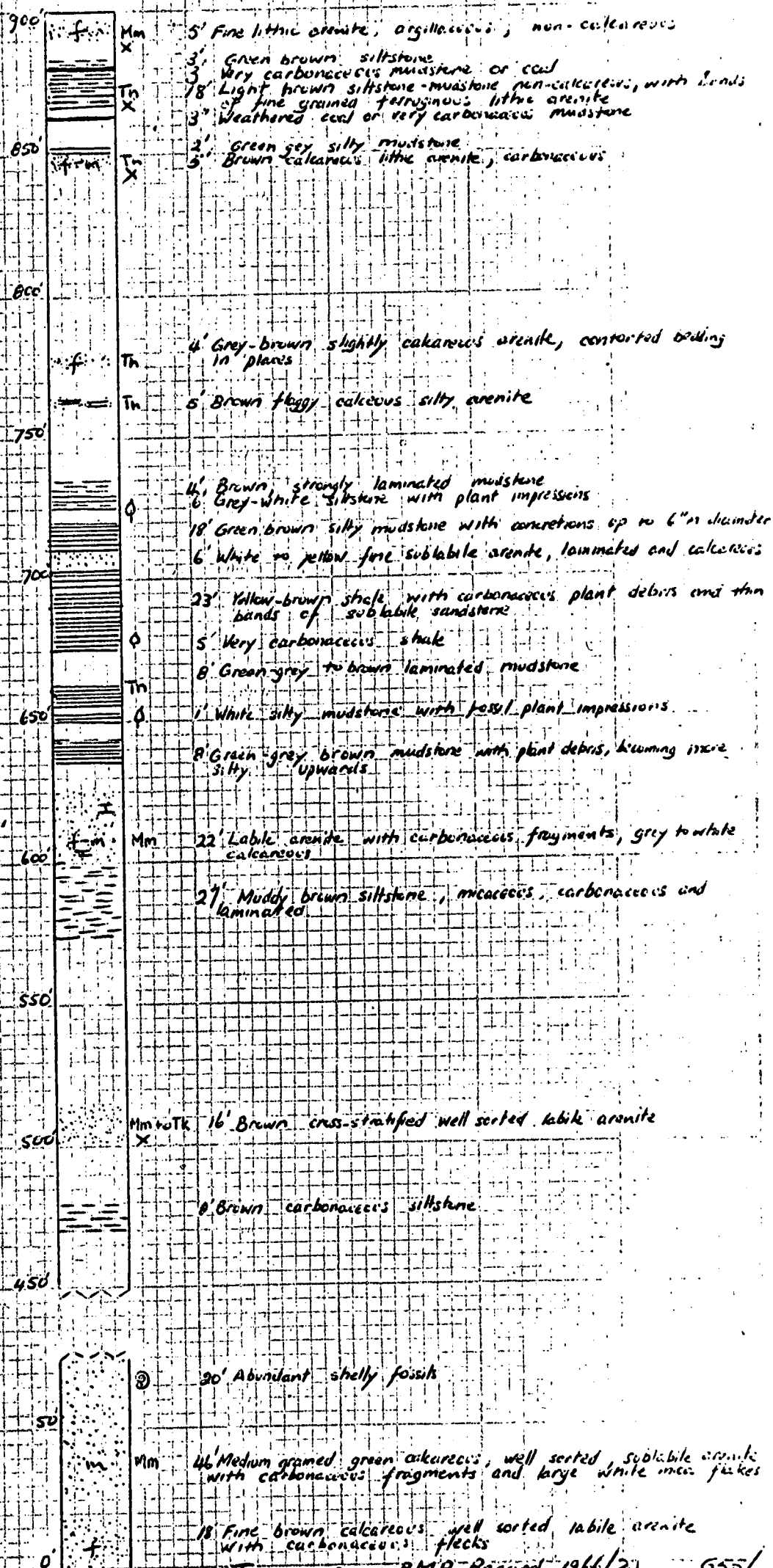
MEASURED SECTION N5.

Section measured by tape, compass and abney level about $\frac{1}{2}$ miles south-southwest of Early Storms Homestead, EDDYSTONE 1:85,000 photos, Run 1, Photo 5010. Starting 654000 E 1882800 N, finishing 654400 E, 1882900 N. See Fig 4



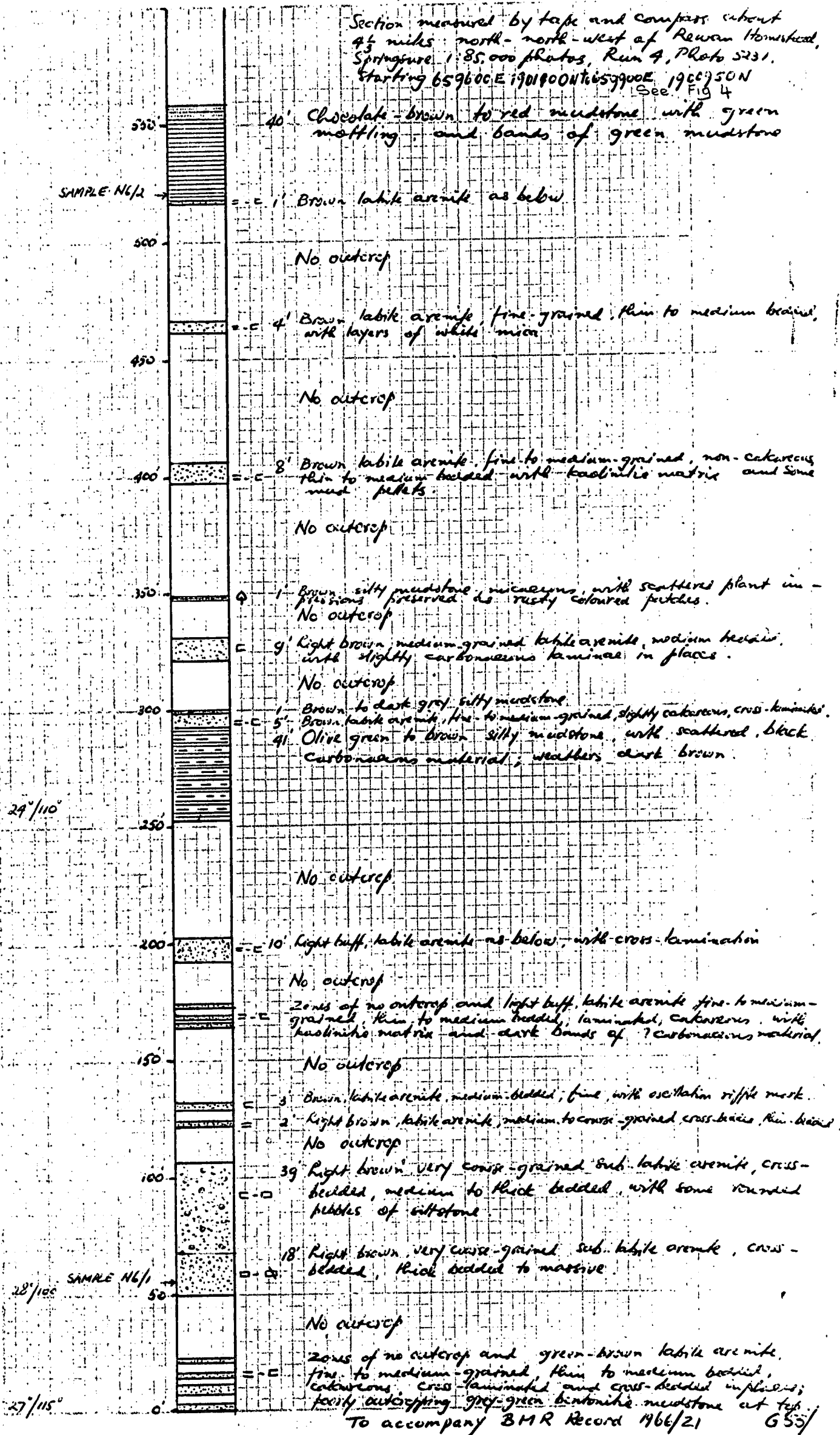
MEASURED SECTION R6

Measured by tape and compass in Sandy Creek,
a tributary of Consuelo Creek, SPRINGFORD 1250,000
Sheet area 659200 E Starting 658250 E 1901000 N, finishing
1905000 N. See Fig 4



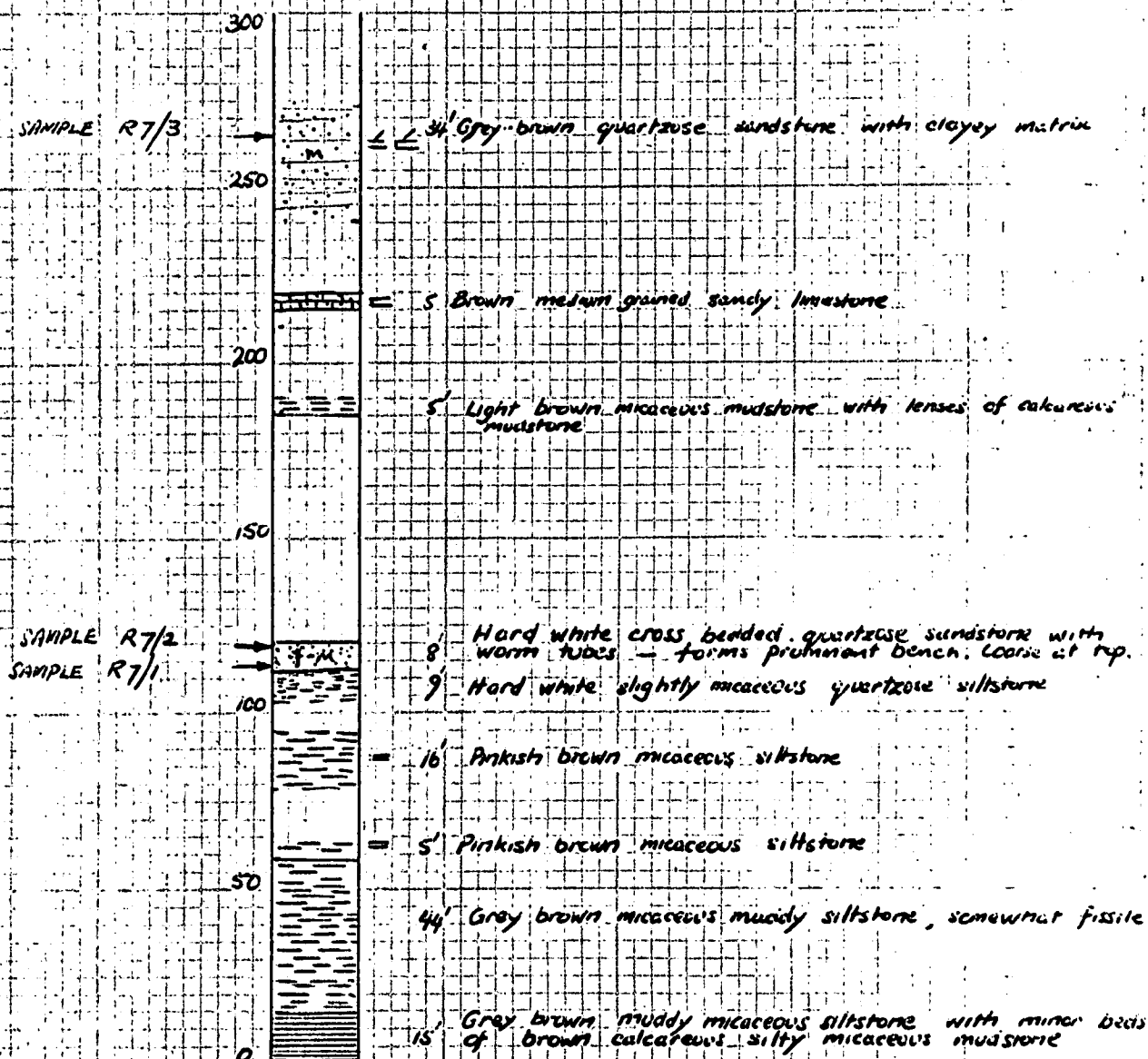
Measured Section N6

Section measured by tape and compass about
4 1/2 miles north-north-west of Revere Homestead,
Springure 1:85,000 photos, Run 4, Photo 5231.
Starting 659606E 1901800N to 659900E 1902750N
See FIG 4



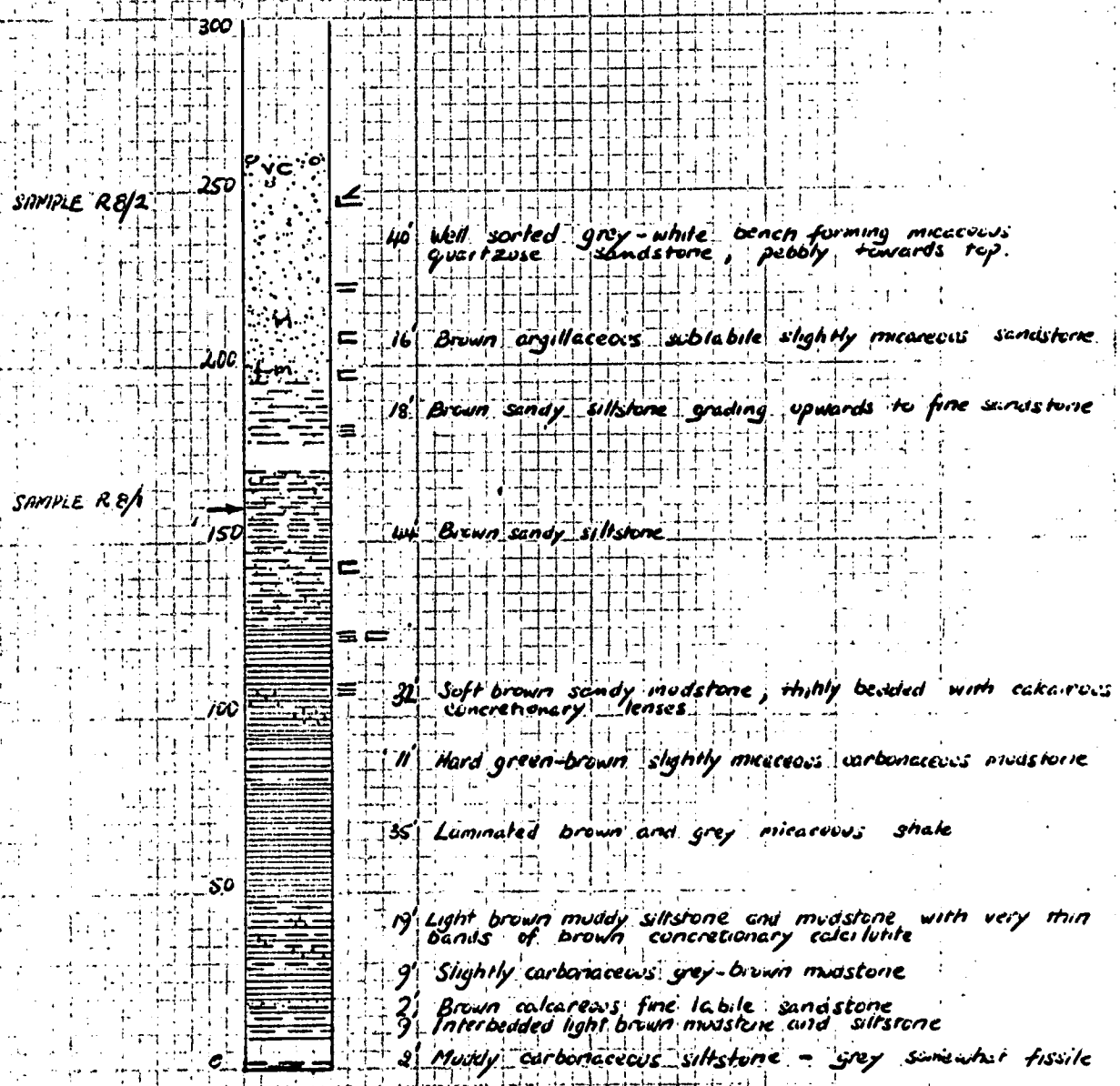
SECTION R7

Measured by abney level at Mount Crocker
Duaringa Run 6/5063 (Duaringa 13600595)



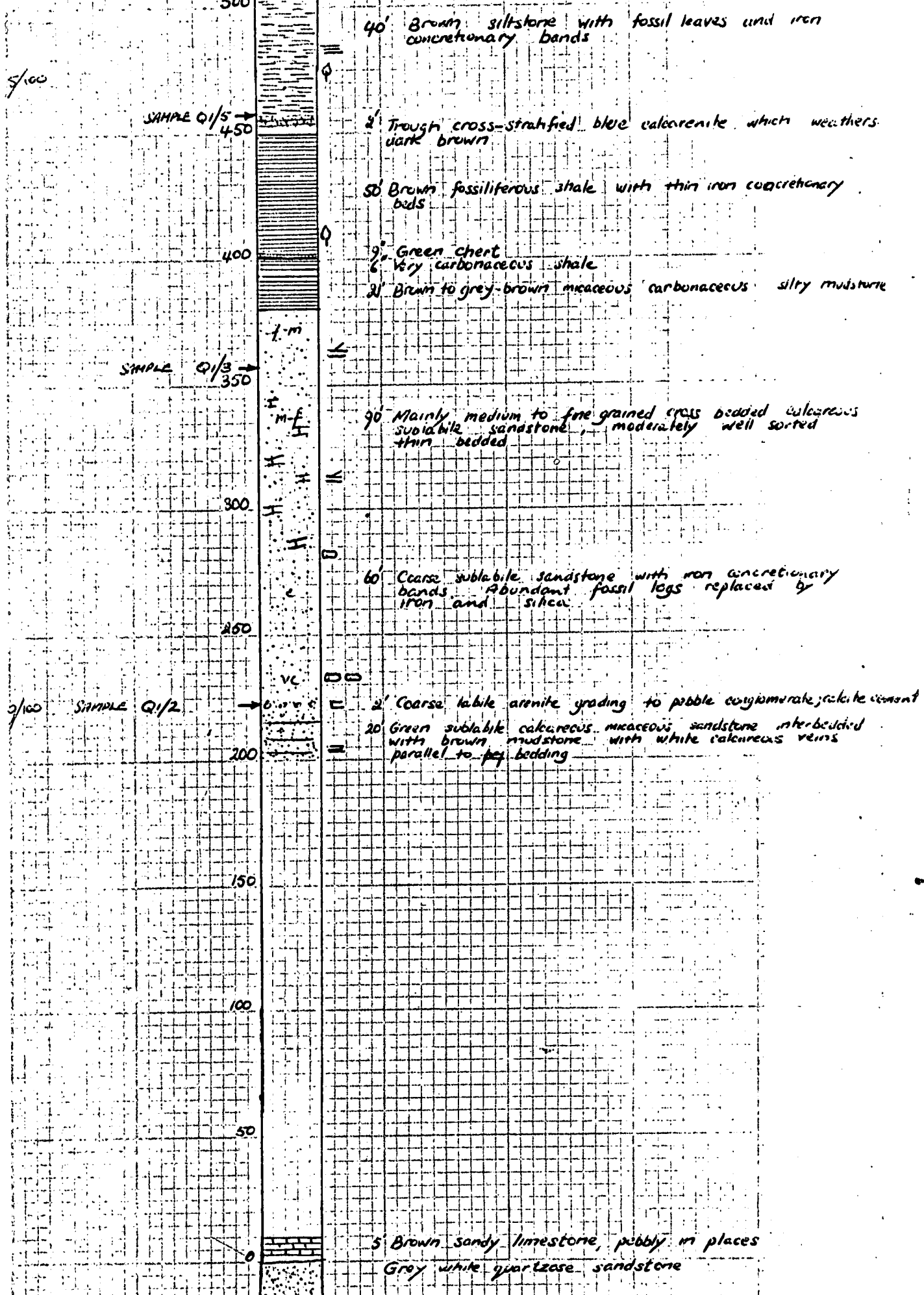
SECTION R8

Measured with Abney level on north face
of Mount MacMillan, Duaringa Run 4/5029
(Duaringa 14060918)



SECTION Q1

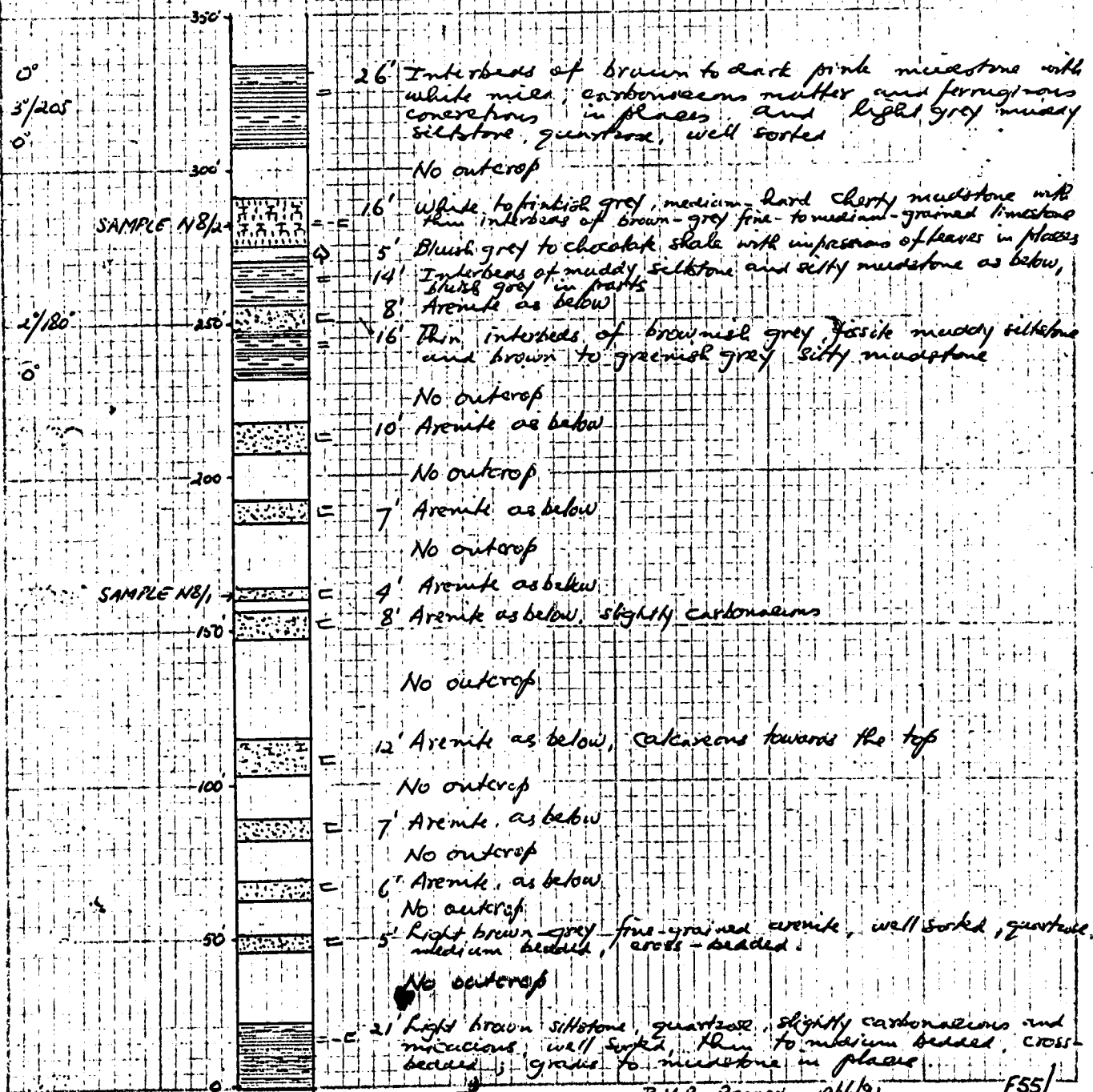
Measured with aneroid barometer and corrected
for dip, four miles north of Coonwarrah homestead
Duaringa Run 3/5070 near post B83
(Duaringa ~~505207~~ 15050997)



Measured Section N8

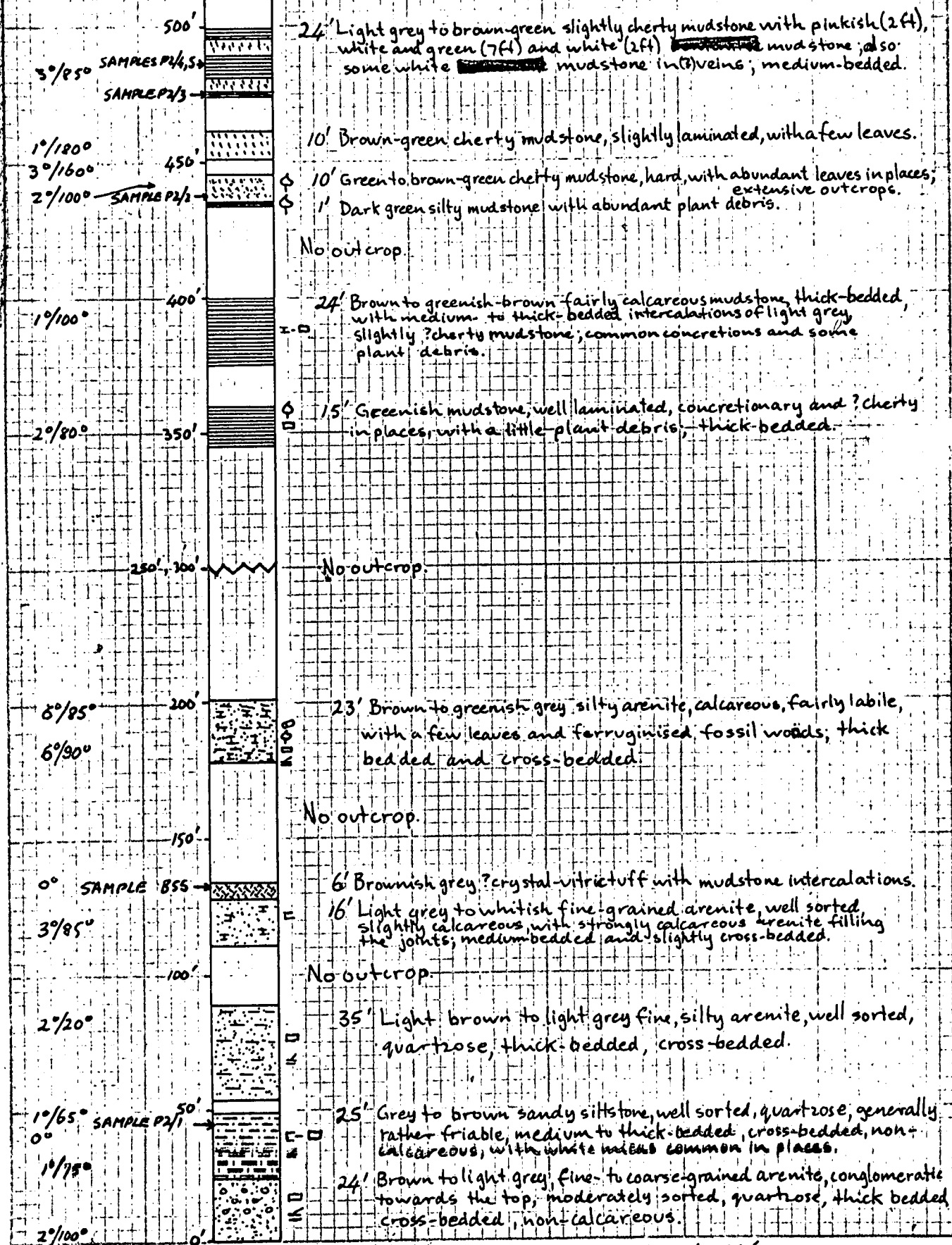
Section measured by tape, compass and almy level about 2 miles north-east of Fair Hill Homestead. During 1:25,000 photos, Run 3, Photo 5073, starting 126350 E, 2100240 N, finishing 125900 E, 2100600 N.

Base and top of Fair Hill Sandstone are estimated to be about 25 feet and 50 feet below and above of section respectively.



MEASURED SECTION P2.

Section measured by tape, compass, abney level and pacing, about 1 mile south of Tolmies Railway Station, Dvaringa 1:85,000 photos, Run 6, Photo 5061, Starting 146200E 2055700N, finishing 152000E, 2060000N.



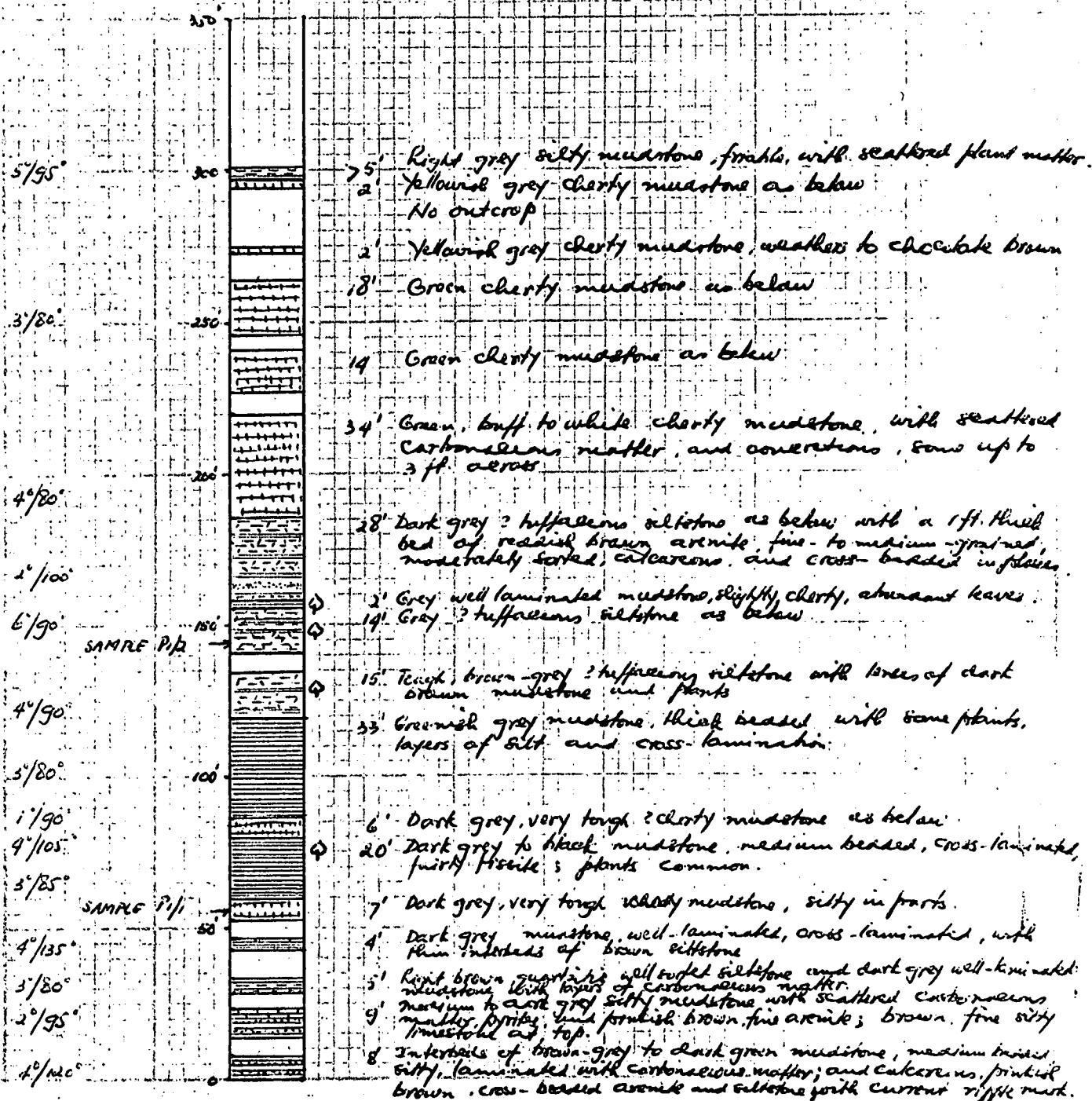
To accompany B.M.R. Record 1966/21

Measured Section P1

Section measured by tape, compass and
 survey level about 6 miles north of Coon-
 ranch Homestead, Durango 1:85,000
 photos; Run 3, Plate 5070, Starting
 151700 E, 2402000 N. finishing 153200 E,
 2401900 N.

To accompany B.M.R. Record 1966/21

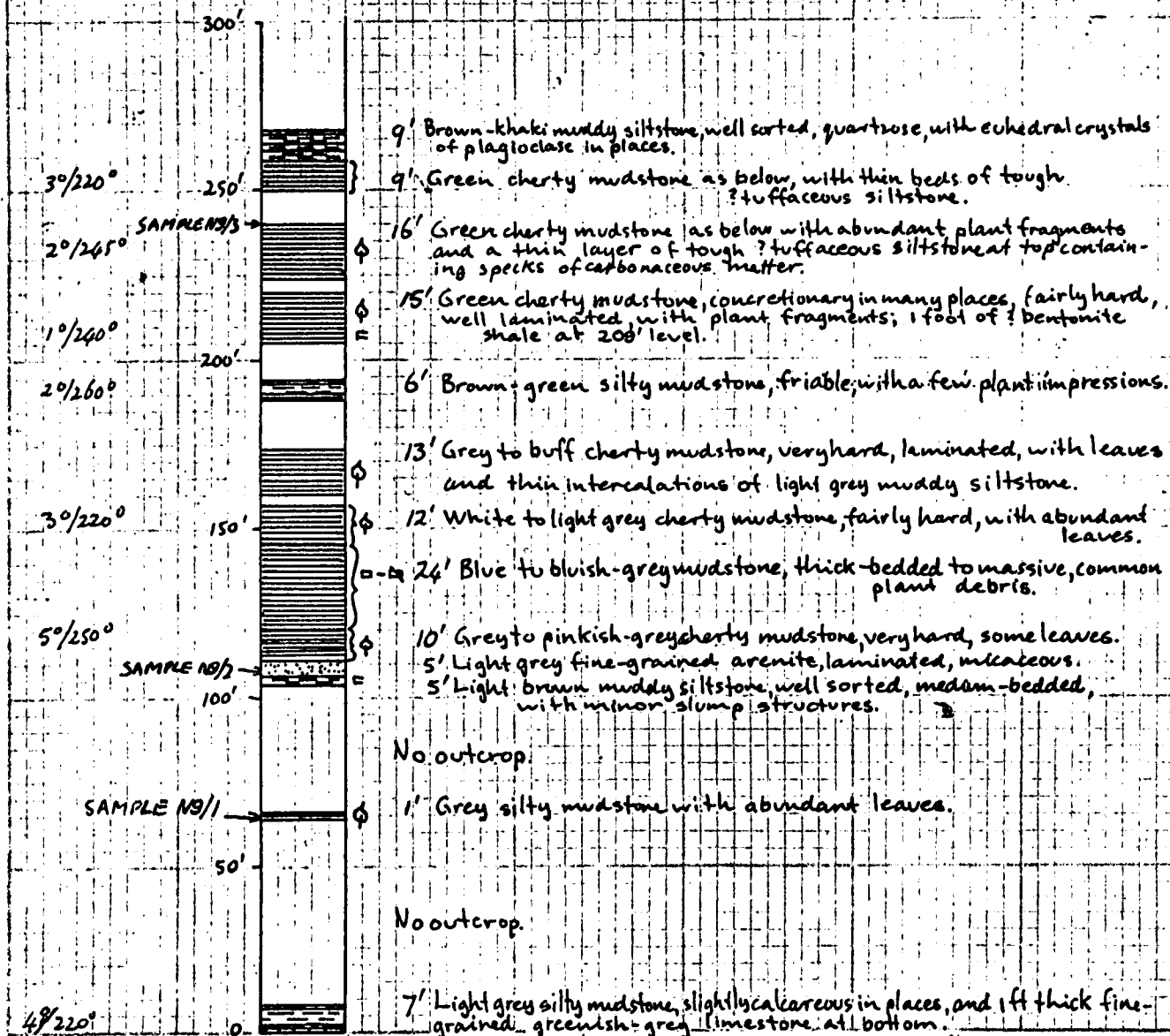
F55/



MEASURED SECTION N9.

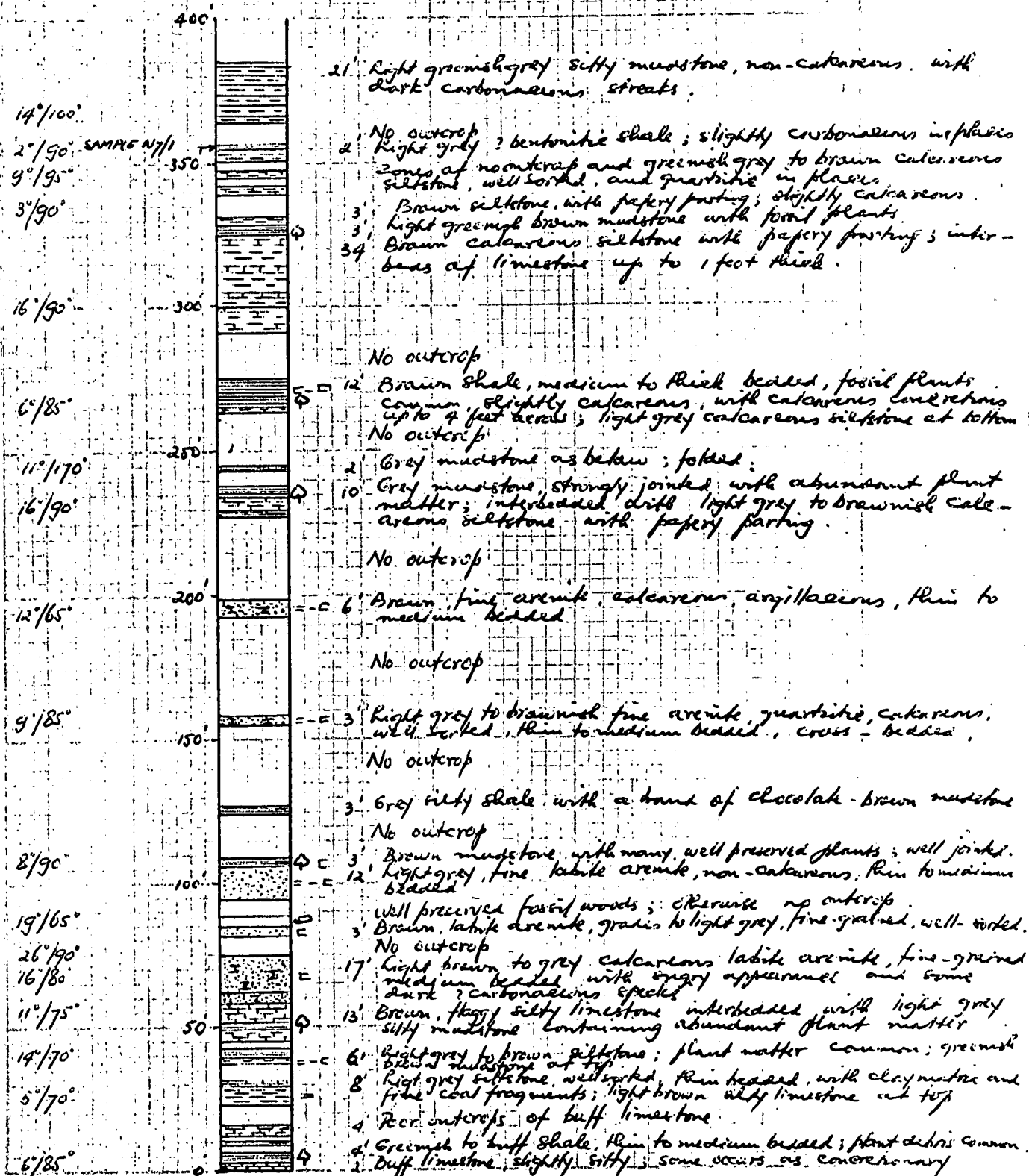
Section measured by tape, compass and abney level about 1 mile east-south-east of Fair Hill Homestead, Duaringa 1:85,000 photos, Run 3, photo 5073, starting 124400E 2099500N, finishing 123600E, 2099500N.

Base of section is estimated to be about 75 feet above the base of Burngrove Shale.



To accompany B.M.R. Record 1966/21

Section measured by tape and compass about 2.3 miles south-south-east of Burngrove ~~to~~ ⁴ ~~the~~ Homestead, Daringa 1:85,000 photos, Run 7, Photo 5083, starting 151400E, 204600N, finishing 153100E, 2047200N.



SECTION Q3

Measured with tape and compass about
7.5 miles N.N.E. of Fort Cooper Homestead, MOUNT
COOLON T-250,000 sheet, starting 68305-E
23168--N, finishing 68187-E, 231678-N.

CONTINUED NEXT PAGE

WAAA

400 FEET

NO OUTCROP

SAMPLE Q3/1

700

= 14' Hard quartzose sandstone

= 7' Hard blue micaceous muddy siltstone

650

55' Massive dark grey micaceous silty mudstone

600

2' Grey fine muddy siltstone, hard and calcareous

550

70' Massive dark grey micaceous silty mudstone

8' Massive blue or dark grey micaceous silty mudstone

1' Brown laminated fine cone-in-cone limestone

-510 Feet

NO OUTCROP

WAAA

Blue micaceous muddy siltstone

200

5' Fine blue brown muddy slightly calcareous sublabile sandstone with minor mica

14' Hard sublabile sandstone

150

35' Hard sublabile sandstone with scattered marine fossils

100

7' Hard blue-brown coquina

3' Grey-brown slightly calcareous coarse sublabile arenite with some
proclasts, notably brachiopod spines12' Blue coquinitic limestone with abundant Strophalosia

50

21' Thinly bedded blue-brown micaceous siltstone and fine poorly
sorted labile arenite

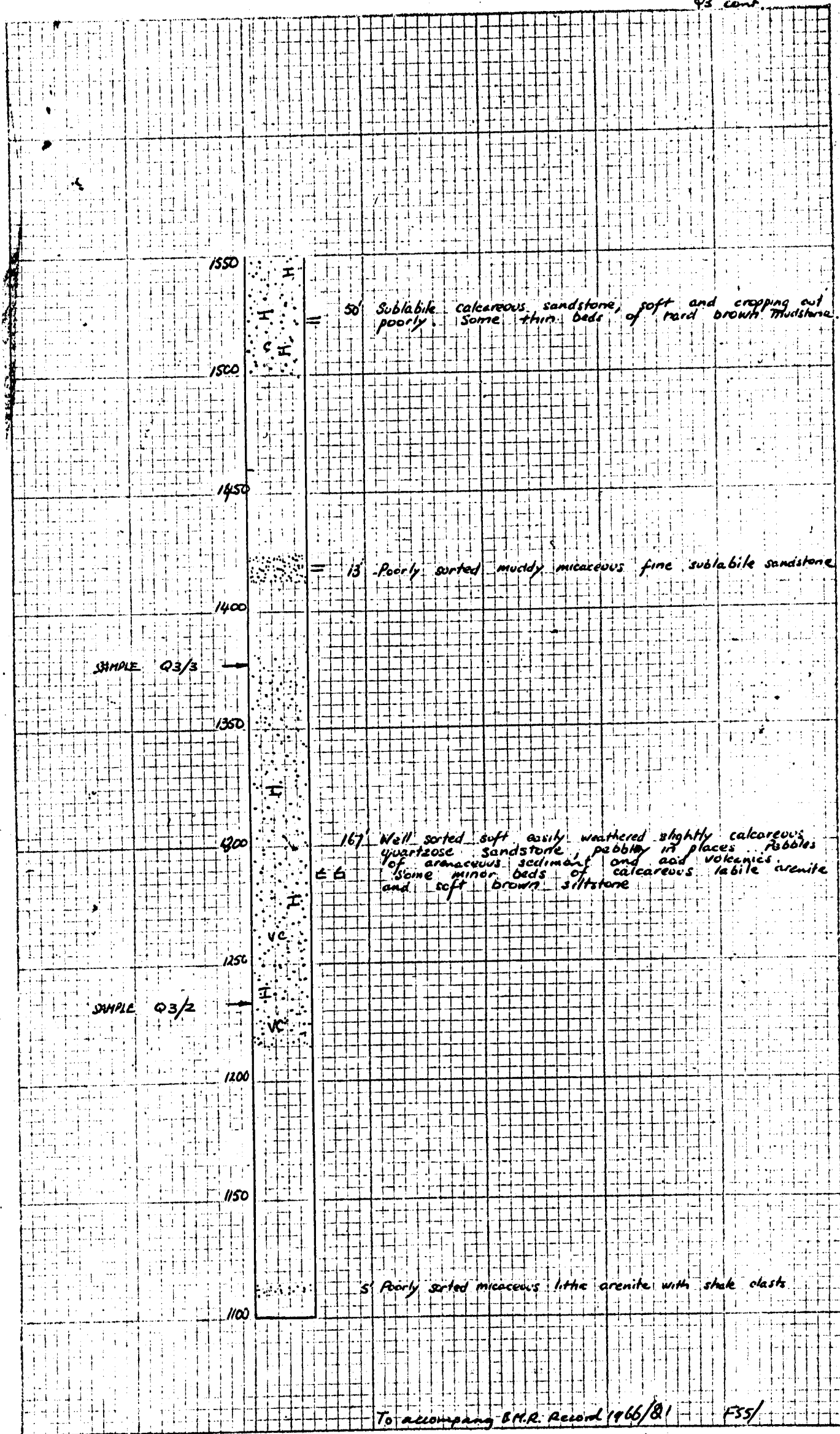
0

2' Grey sublabile well sorted medium grained sandstone

To accompany B.M.R. Record 1966/21

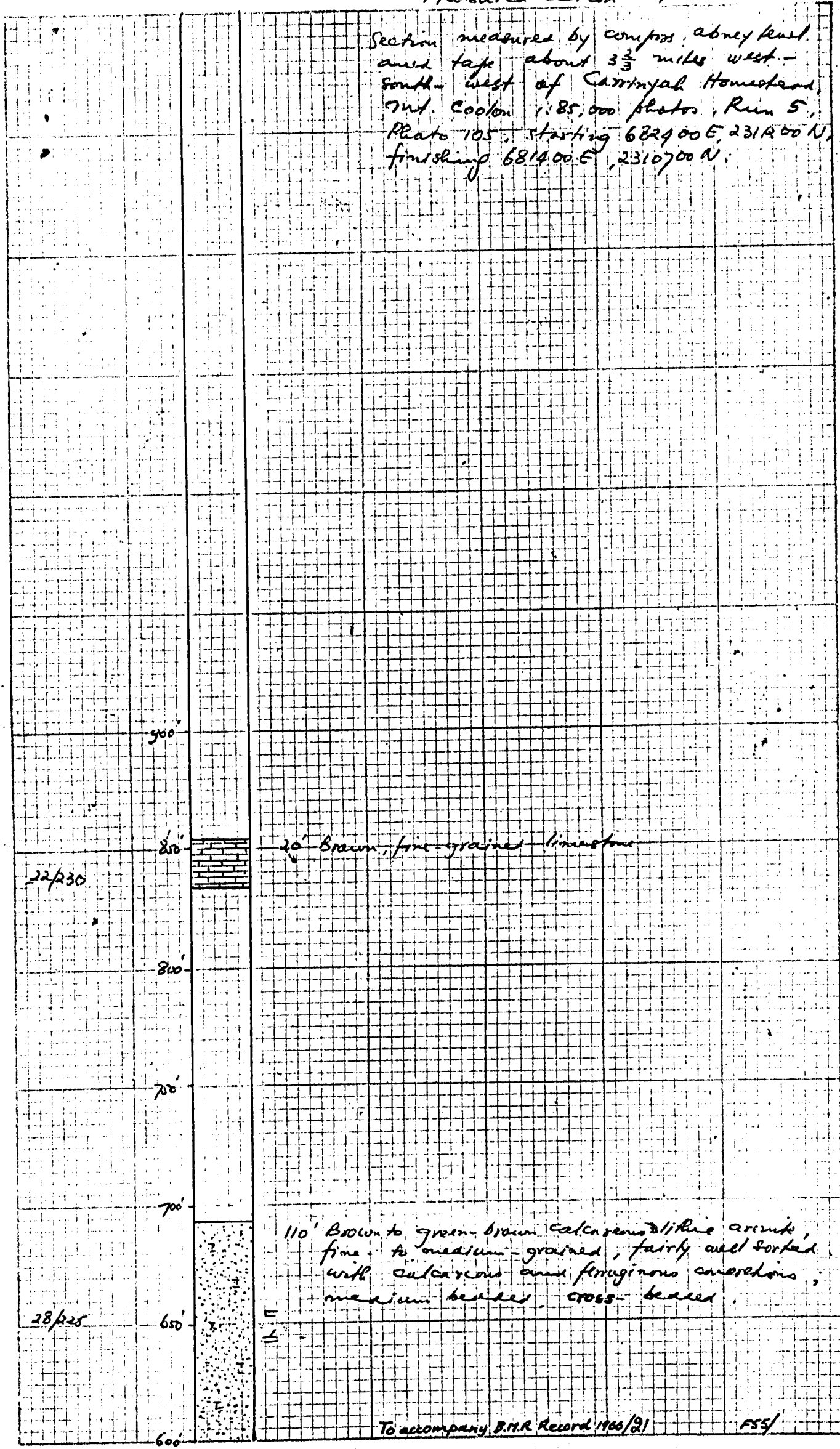
F55/

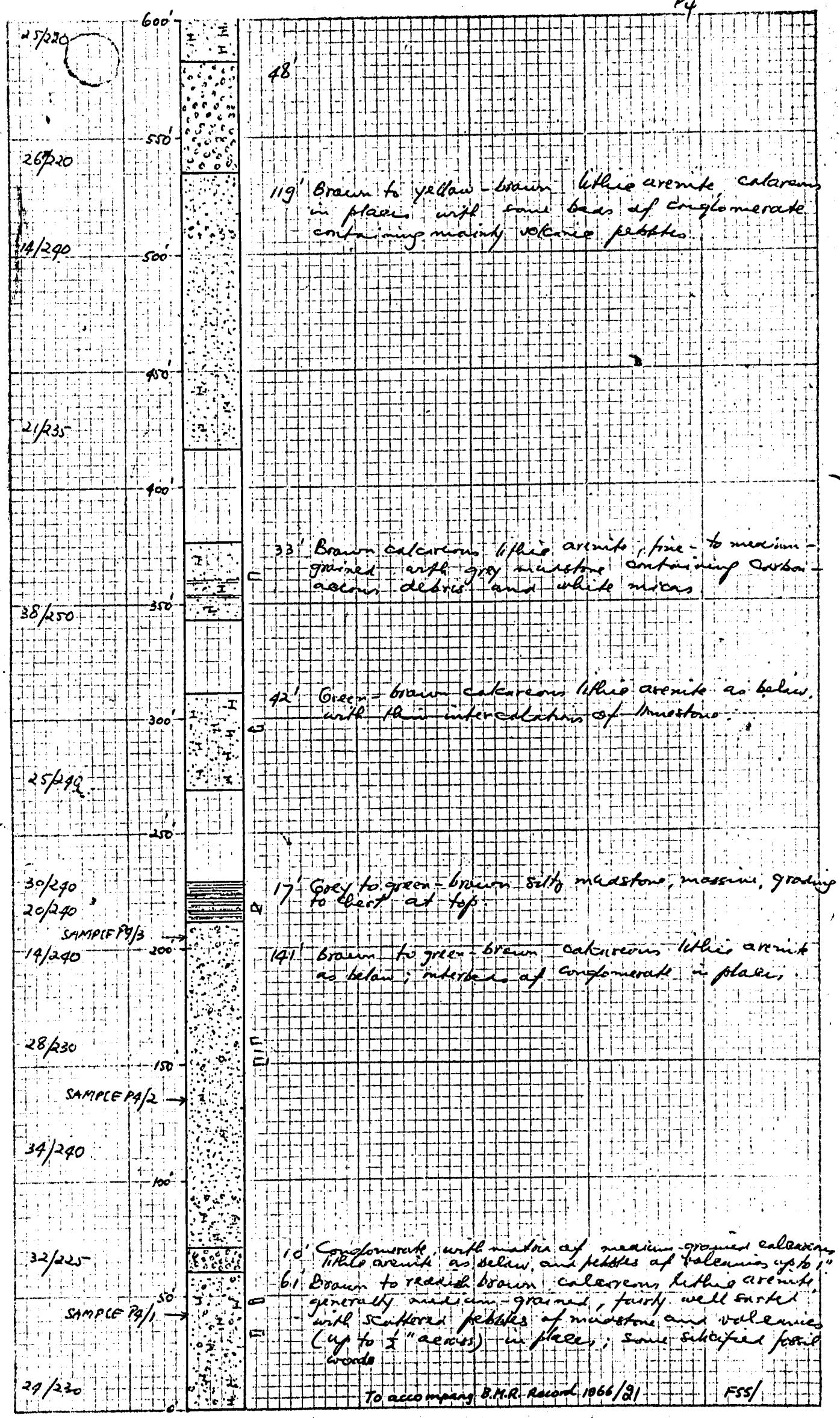
Q3 cont.



Measured section P4

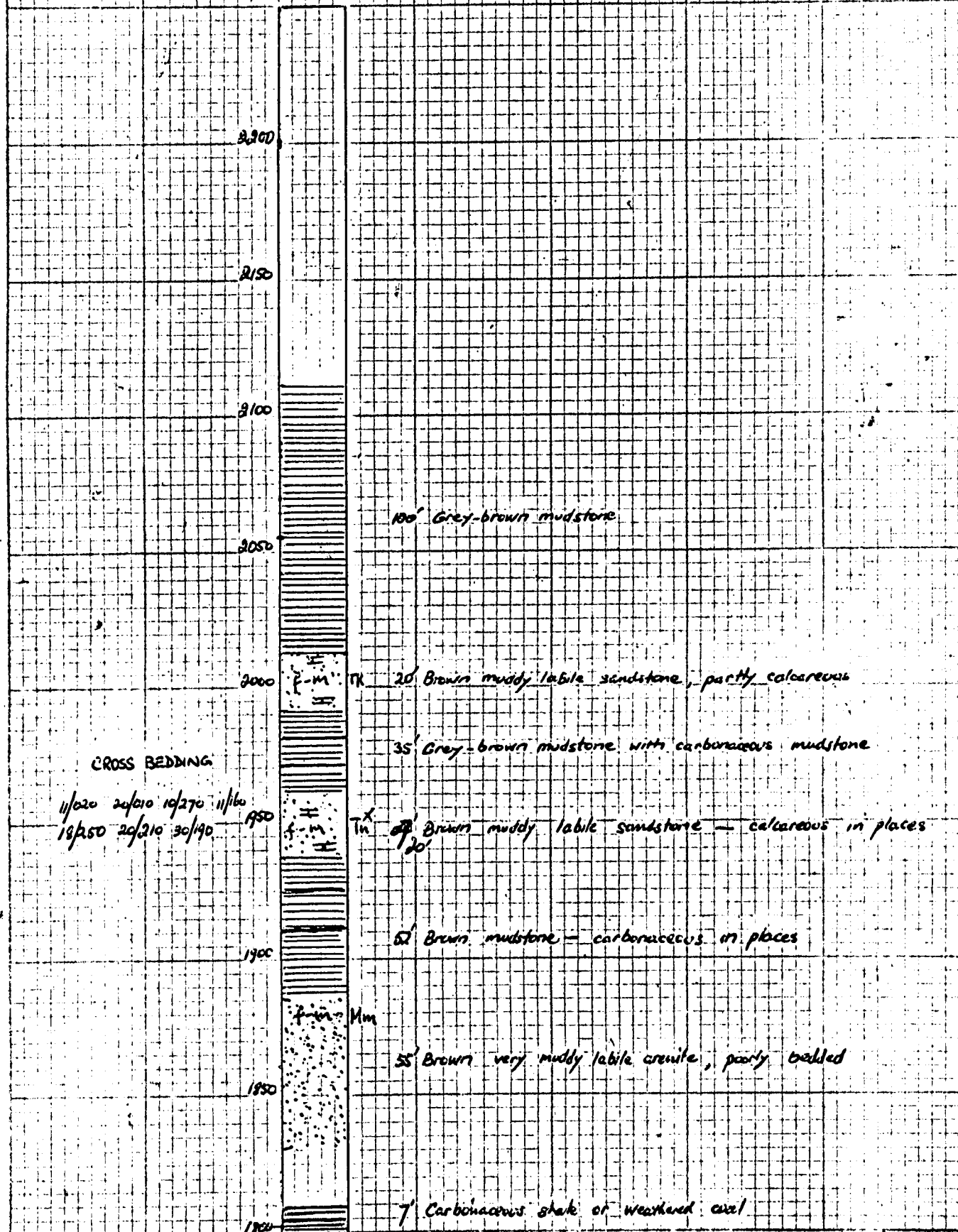
Section measured by compass, abney level and tape about $3\frac{2}{3}$ miles west-southwest of Carrizal Homestead, Int. Co. 1:85,000 photos, Run 5, Plate 105, starting 682900 E, 231200 N, finishing 681400 E, 2310700 N.





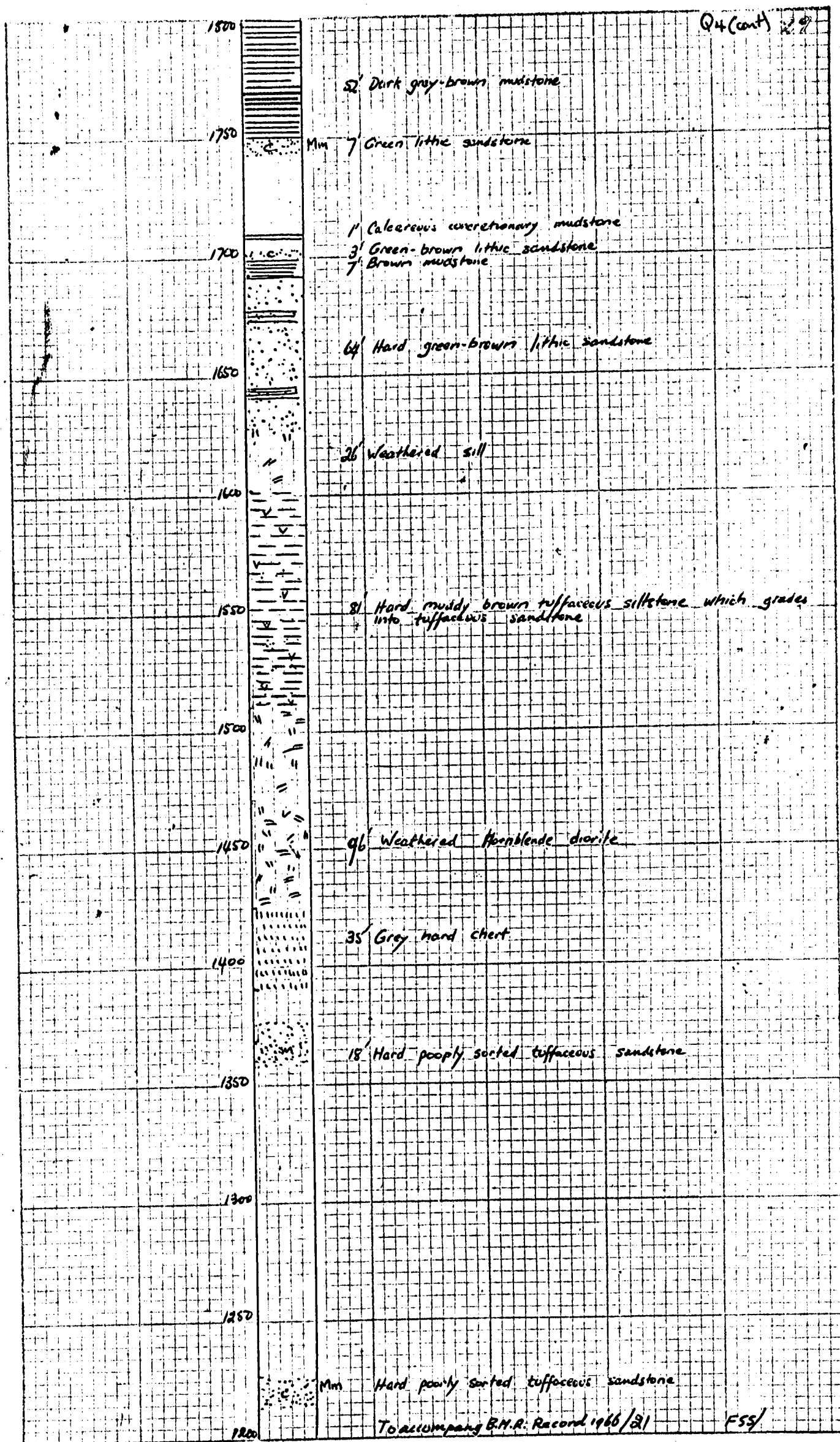
SECTION CD 4

Section measured by tape and compass
about 8.4 miles due north of Fort Cooper Home-
stead, MOUNT. COOLIDGE 1:250,000 sheet, starting
67753-E 23199--N, finishing 67660-E
231962--N.



To accompany B.M.R. Record 1966/21

FSS



Q4 cont.

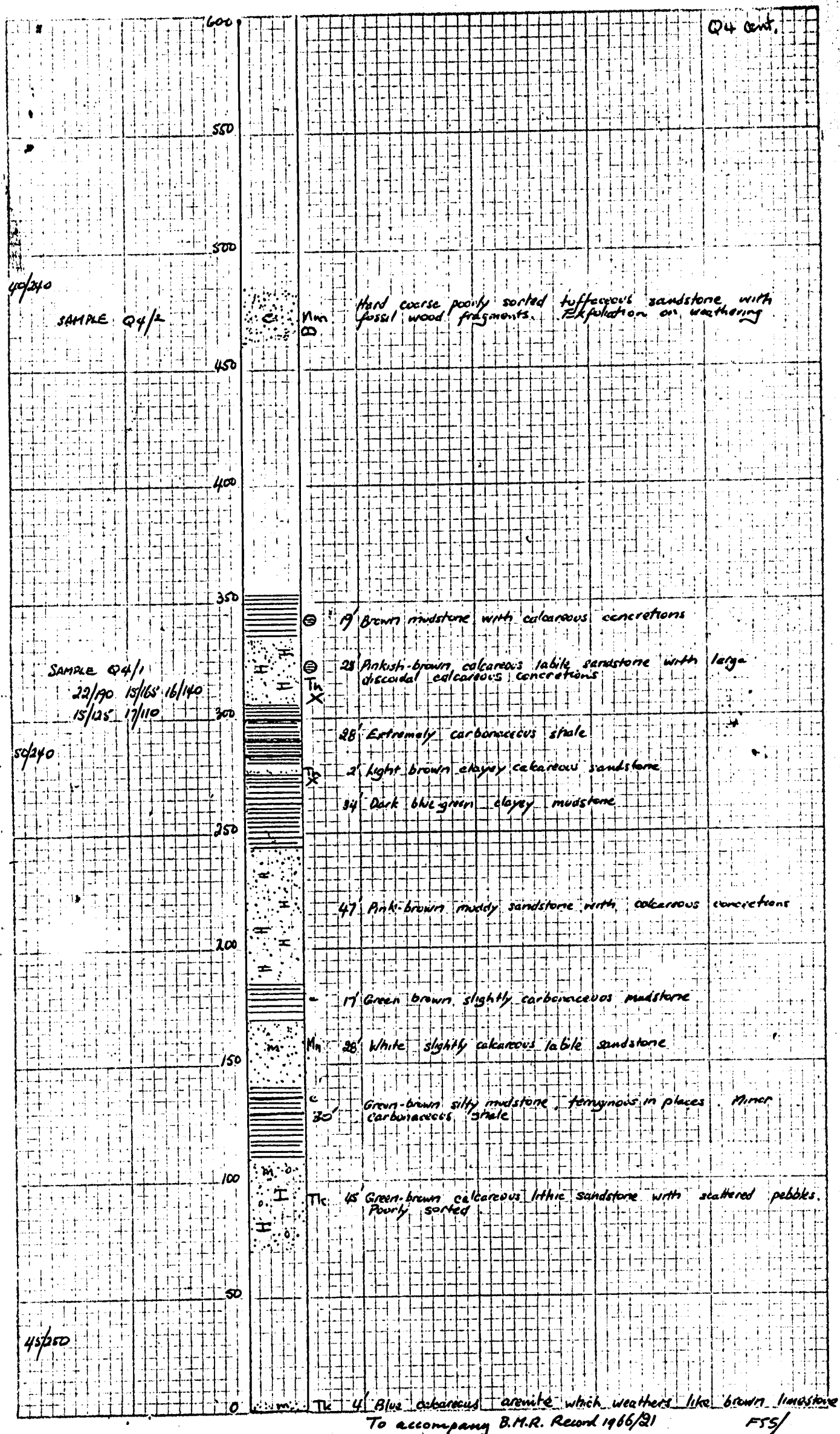
32' Weathered hornblende diorite silt

TmX 6' Lithic muddy sandstone

Hard coarse poorly sorted buffaceous sandstone

To accompany B.M.R. Record 1966/21

FSS/



40/240

SAMPLE Q4/2

Man

Hard coarse poorly sorted tuffaceous sandstone with fossil wood fragments. Exfoliation on weathering

SAMPLE Q4/1

22/190	15/165	16/140
15/125	17/110	

59/240

5

19 Brown mudstone with calcareous concretions



28 Pinkish-brown calcareous labile sandstone with large discoidal calcareous concretions

變

28' Extremely carbonaceous shale

2' light brown clayey calcareous sandstone

34' Dark blue-green clayey mudstone

3

47' Pink-brown muddy sandstone with calcareous concretions

Min:

28' White slightly calcareous labile sandstone

4

Green-brown silty mudstone, ferruginous in places. Minor
carbonaceous shale

17c:

45 Green-brown calcareous lithic sandstone with scattered pebbles
Poorly sorted.

Tw

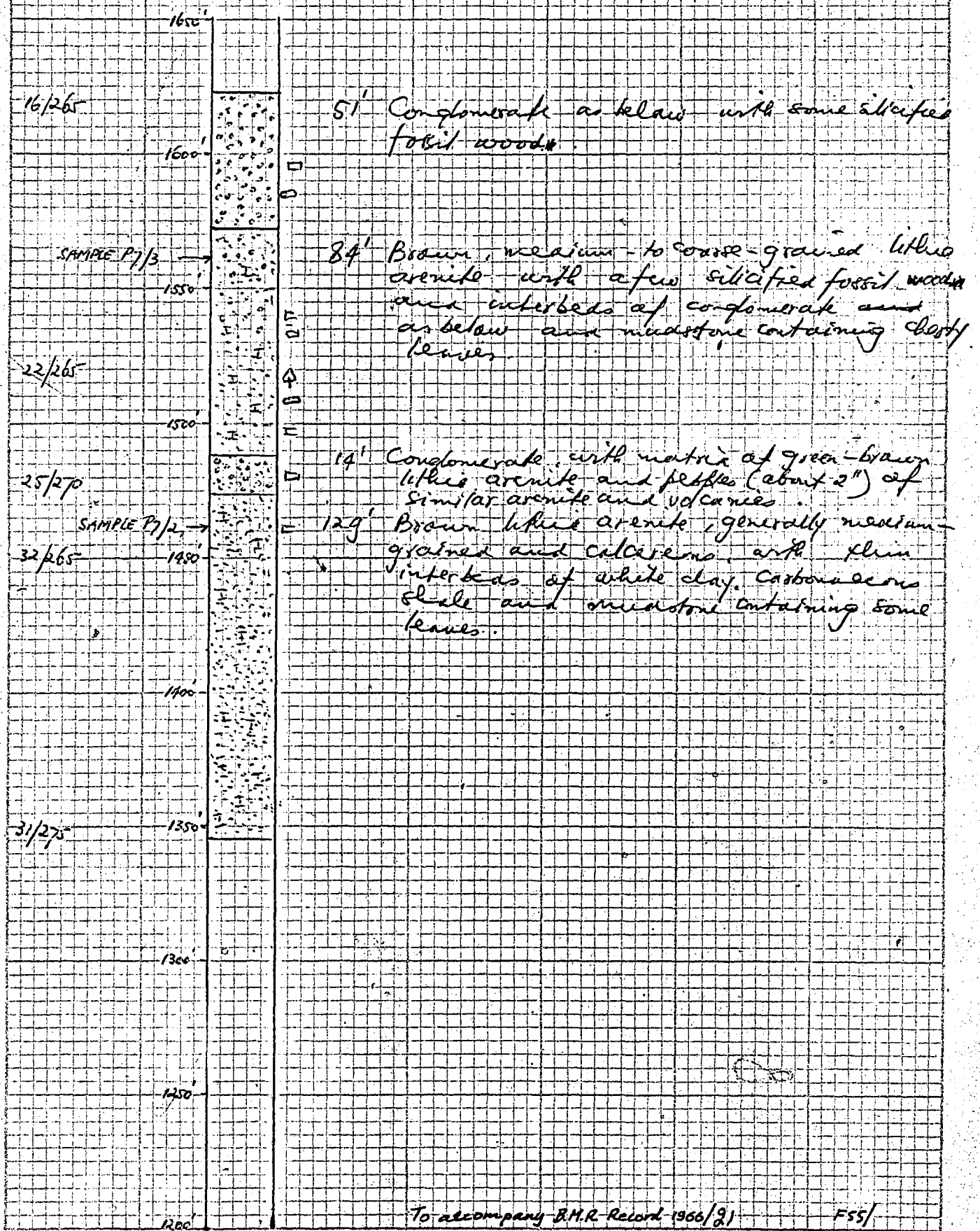
4' Blue asbaceous arenite which weathers like brown limestone

To accompany B.M.R. Record 1966/21

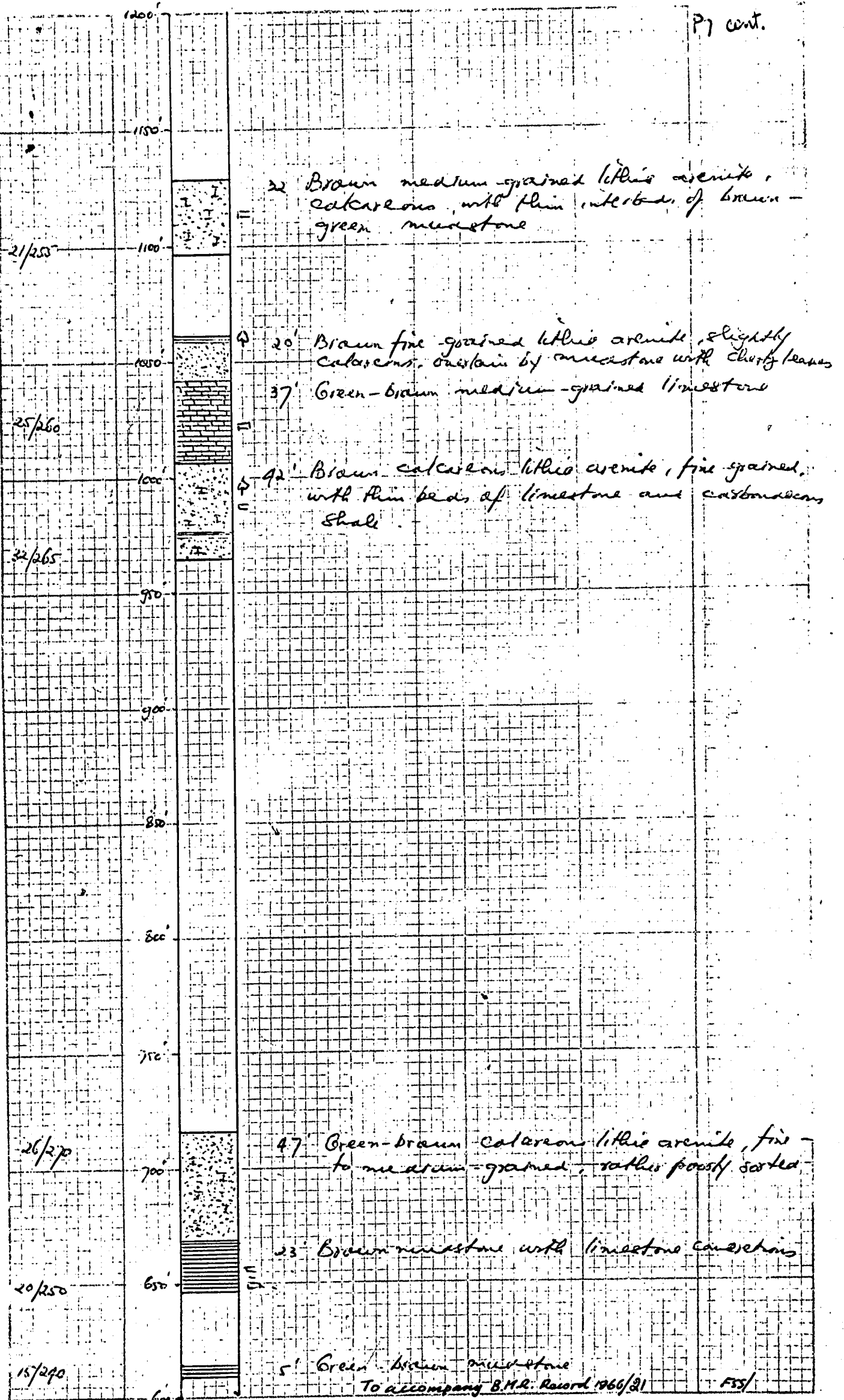
FSS/

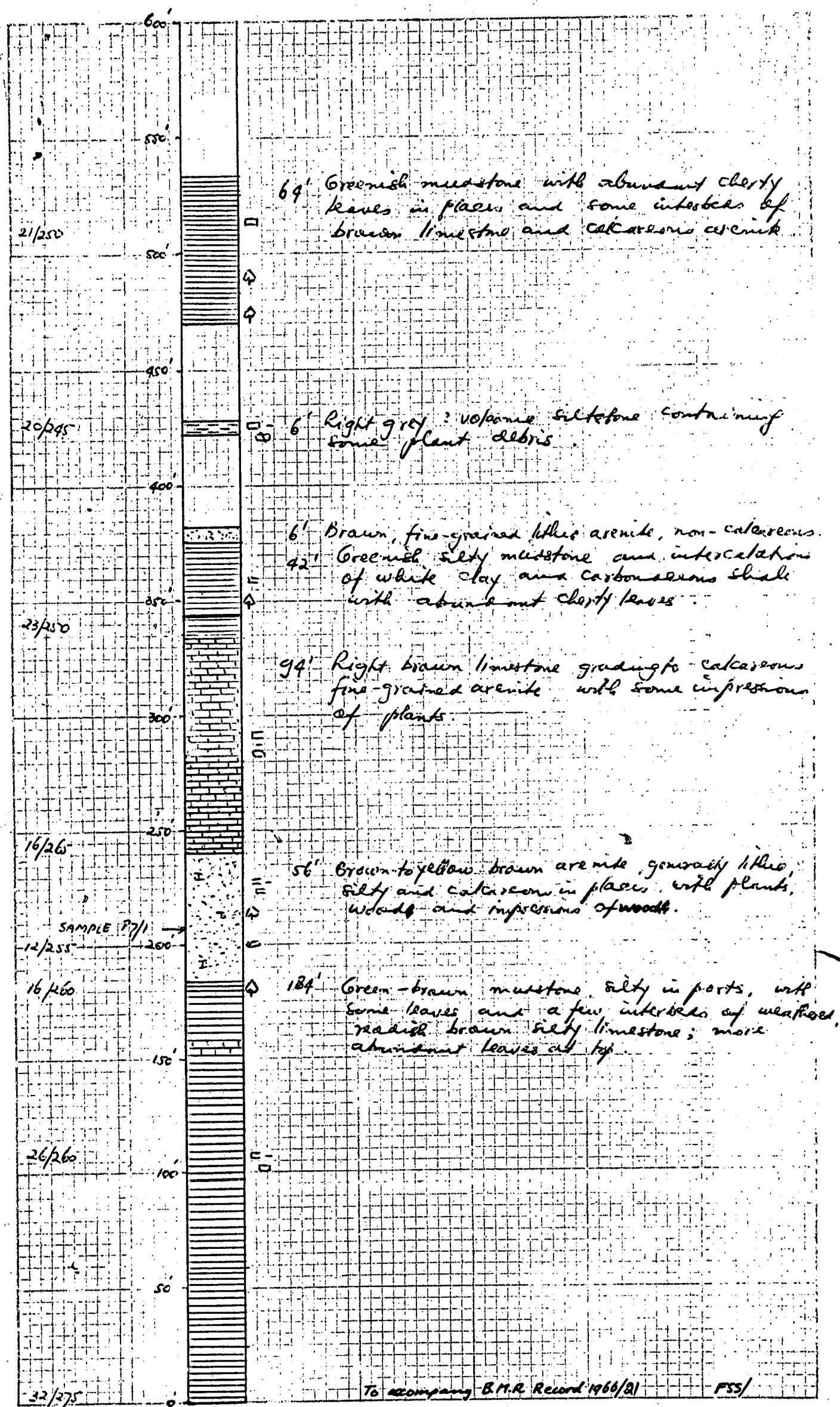
Measured Section P7

Section measured by compass, abney level and tape about 6 2/3 miles west-north-west of CARRINYAH Homestead, Mt. Coolum 1:85,000 photos, Run 4, Photo 146, starting 677700 E, 2317000 N, finishing 675500 E, 2317200 N.



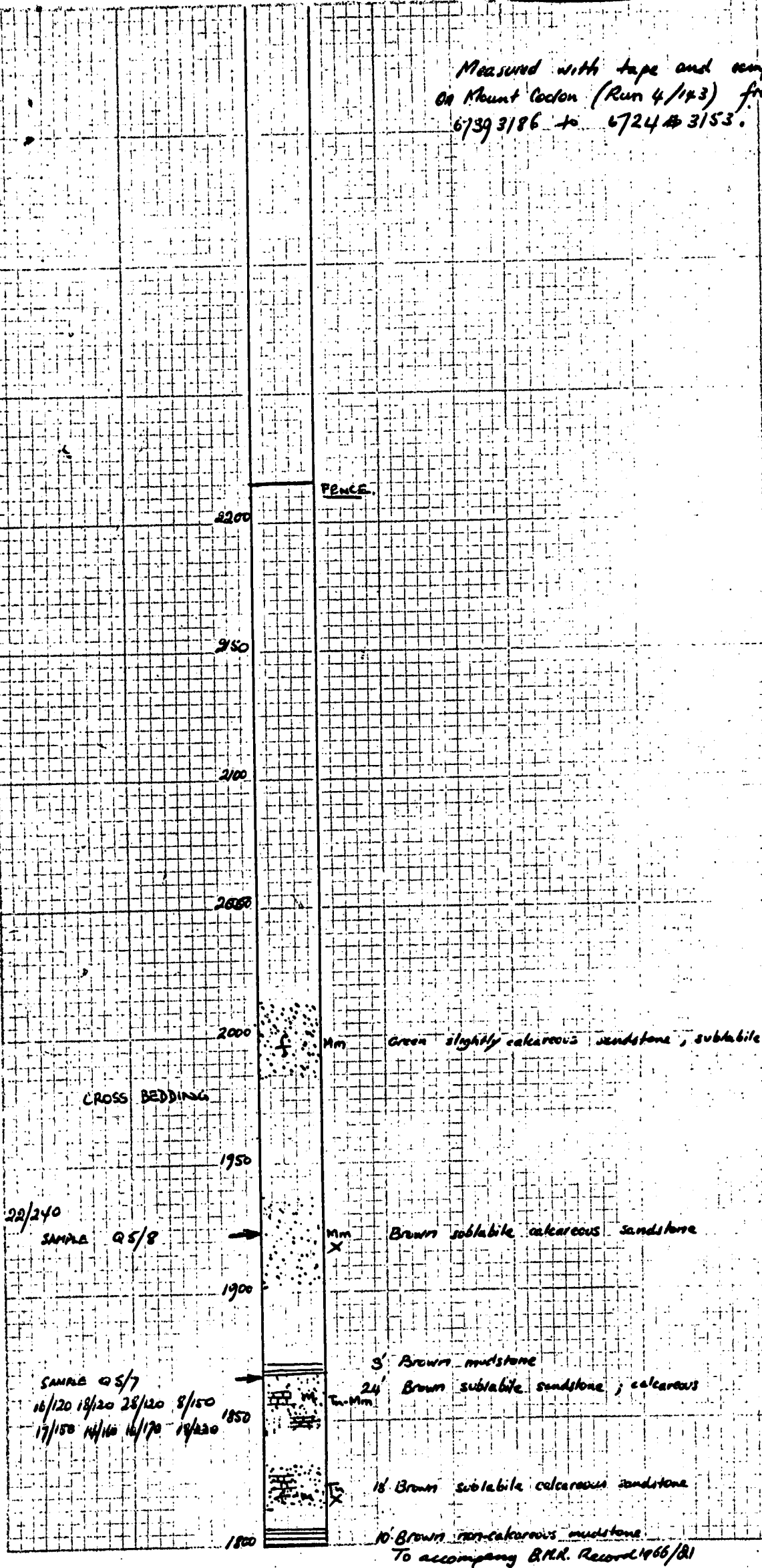
P. 1 cont.

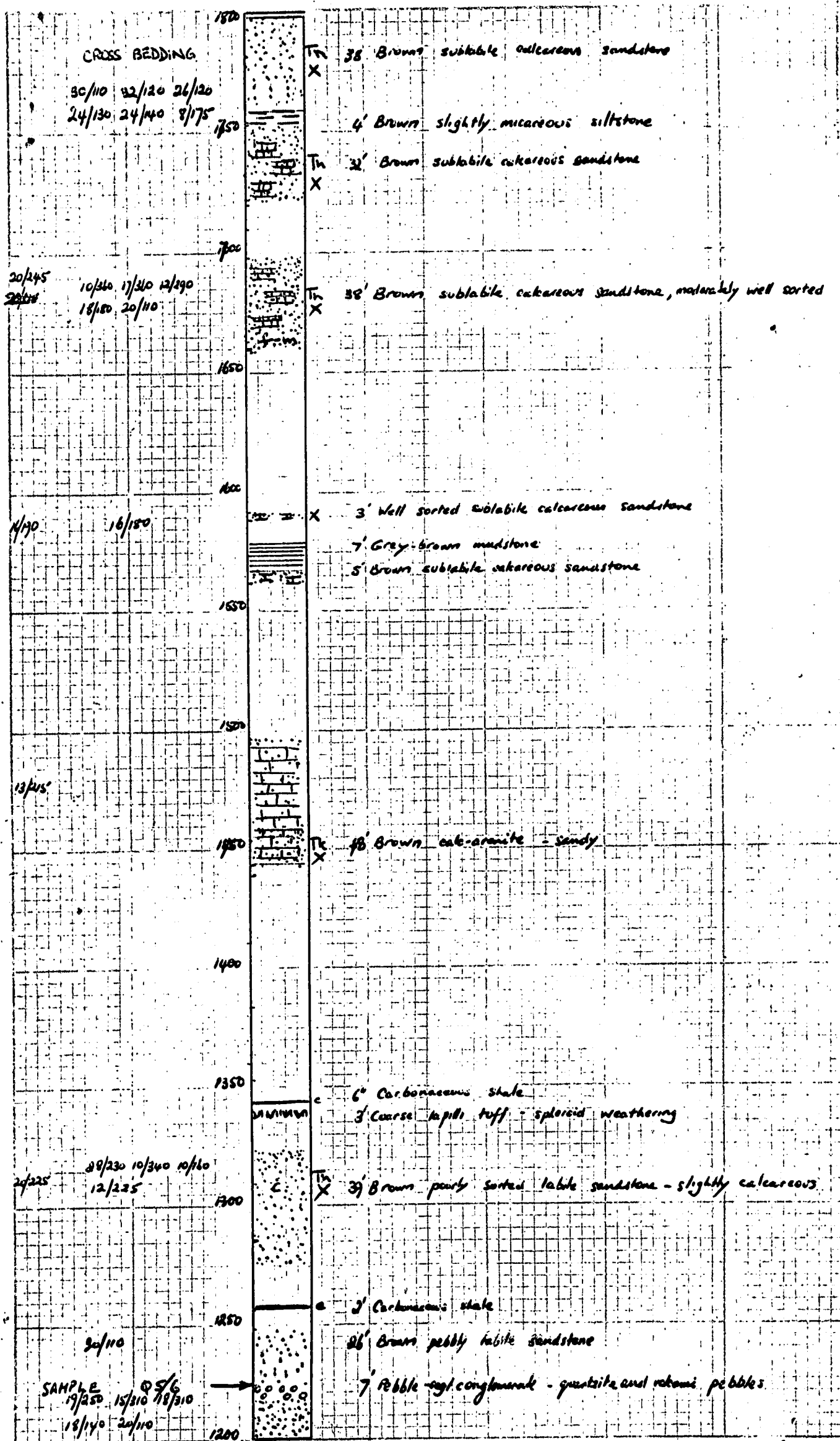


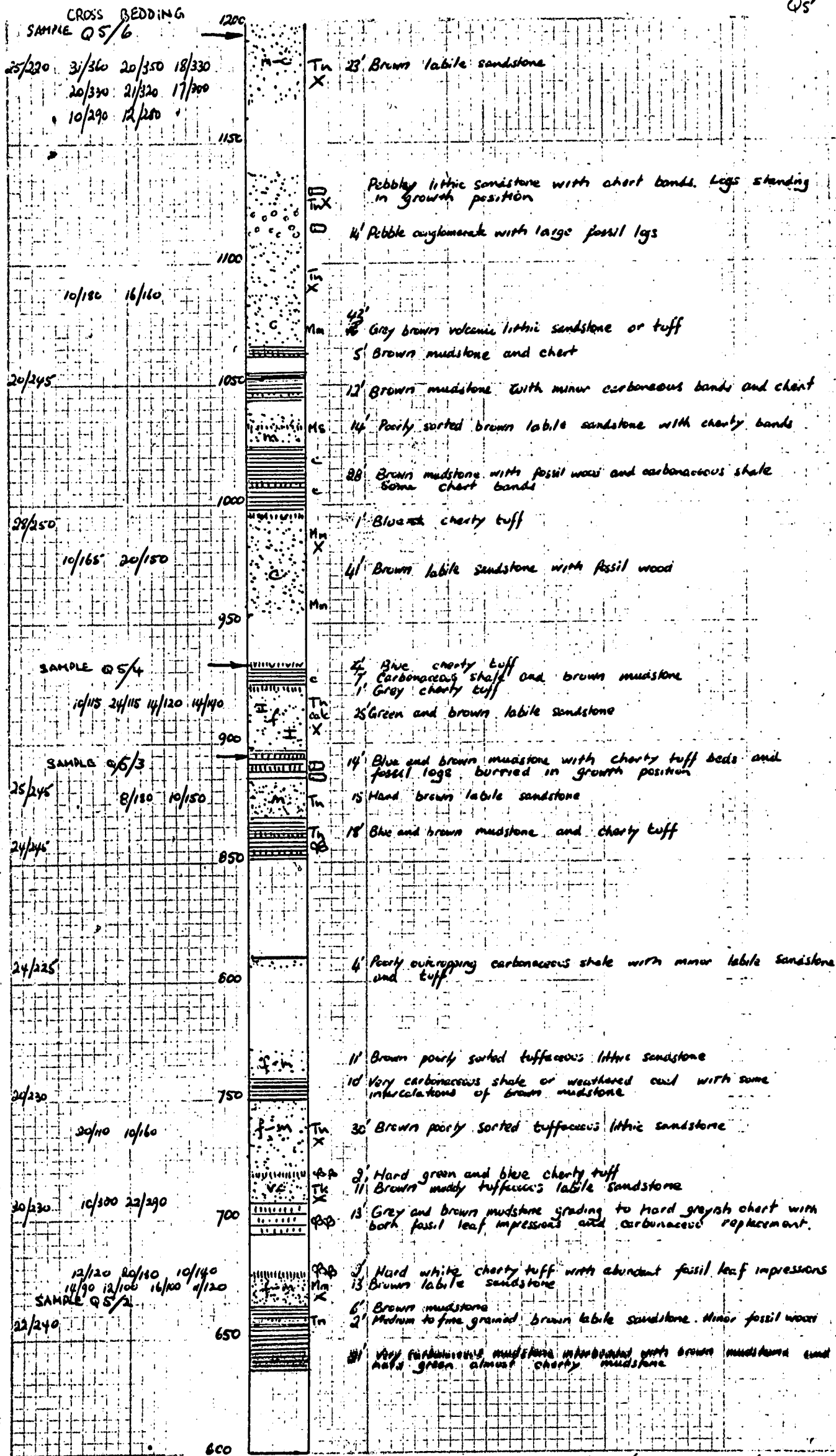


SECTION Q5

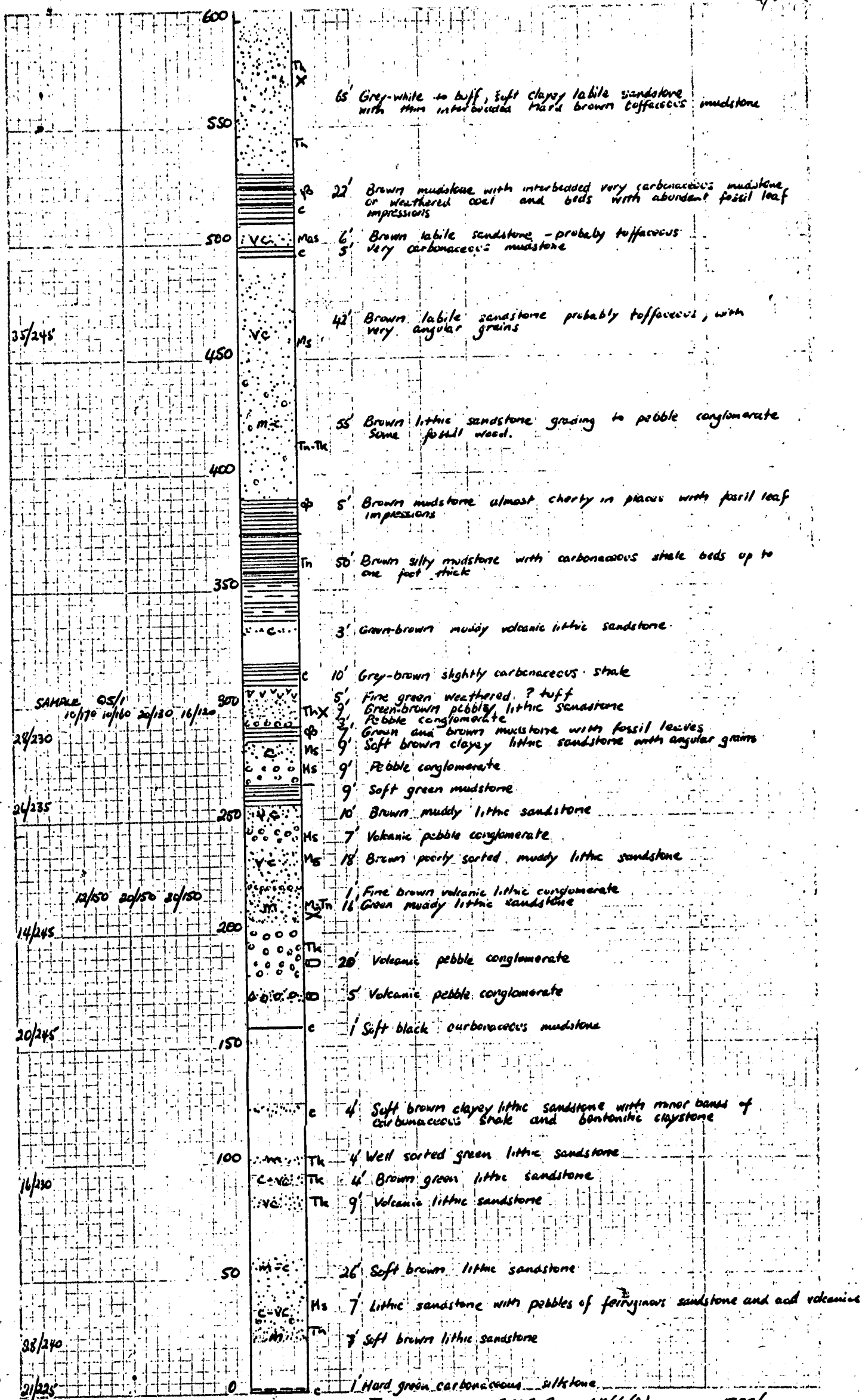
Measured with tape and compass
on Mount Codon (Run 4/143) from
6739 3/86 to 6724 3/53.





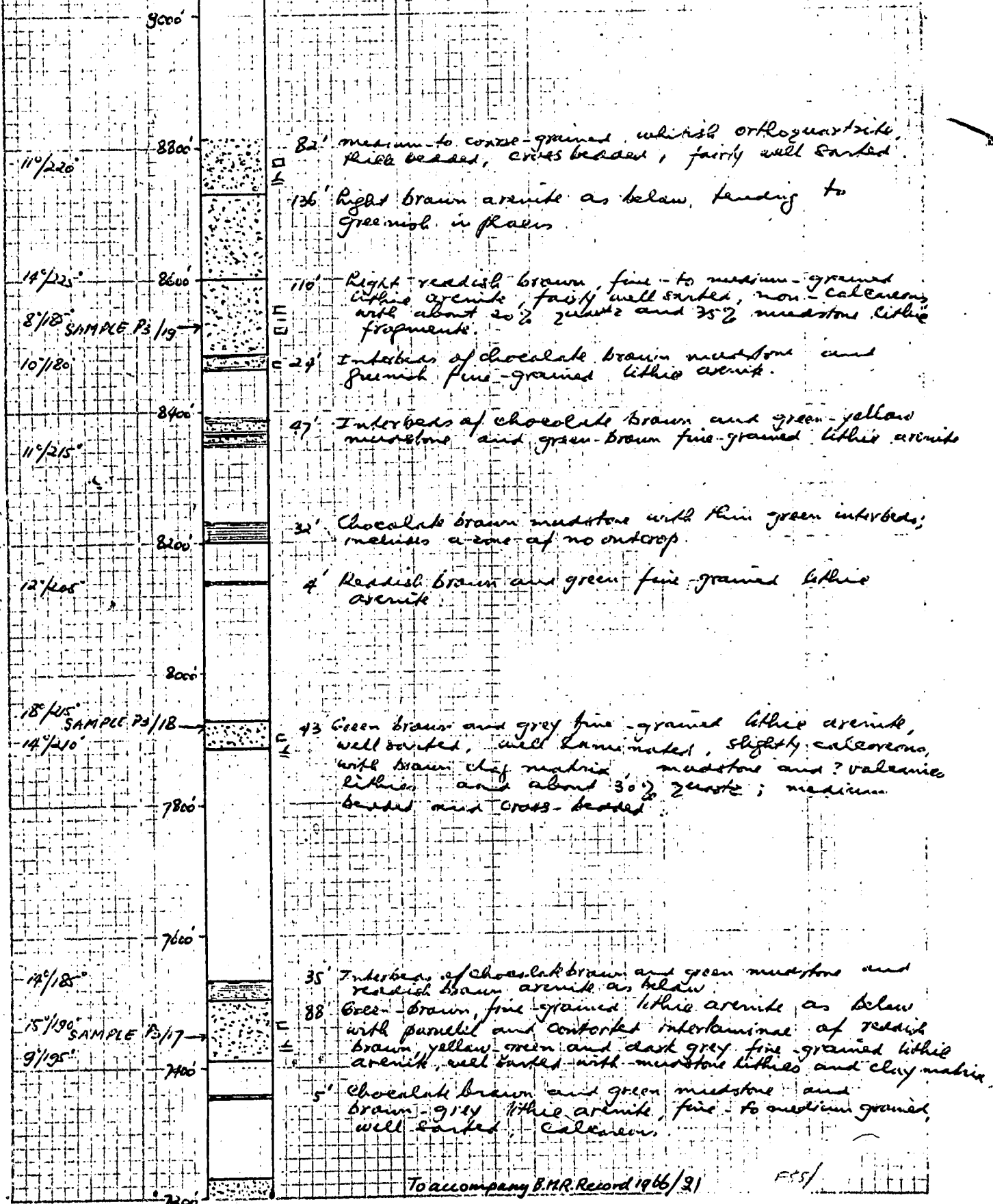


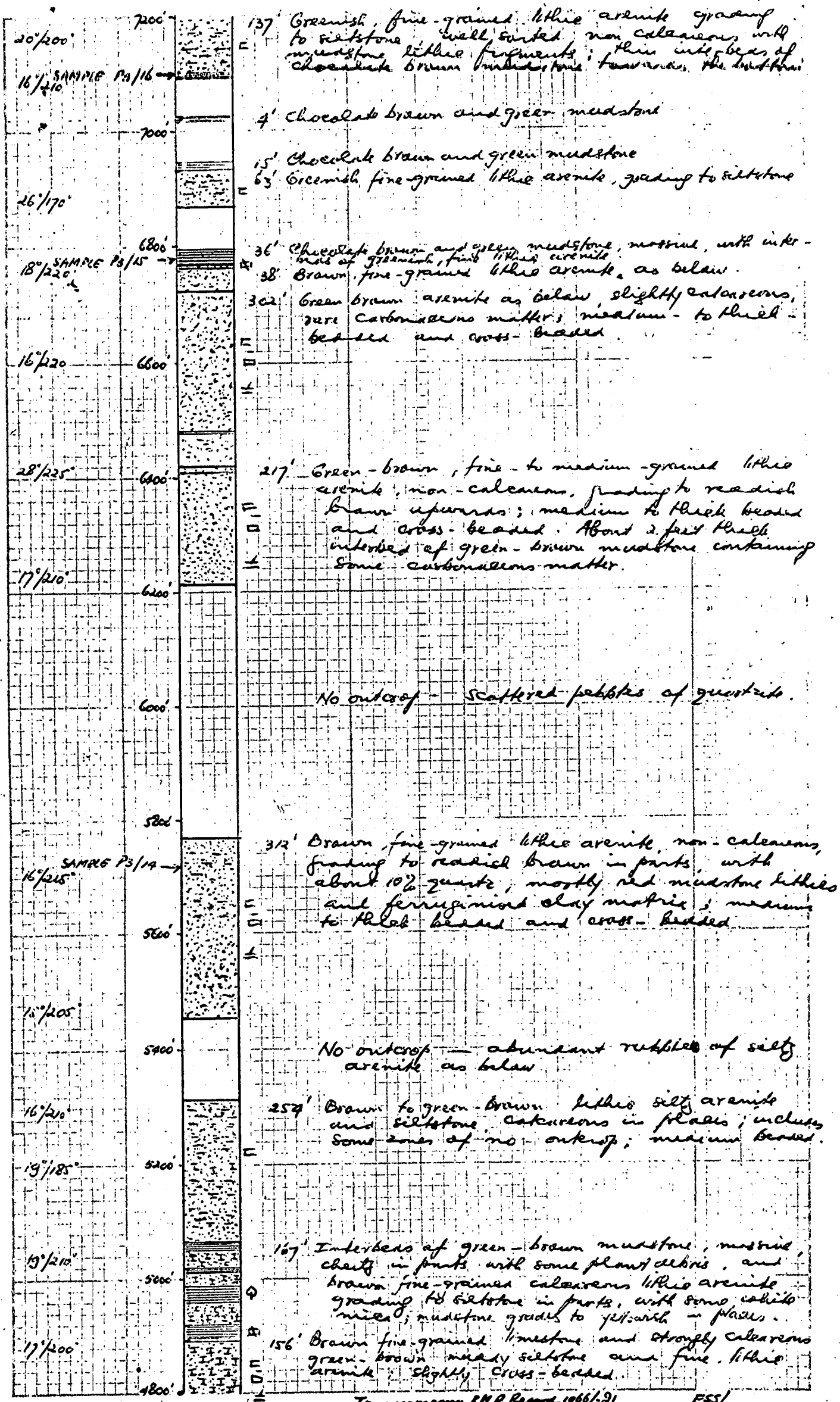
6/5

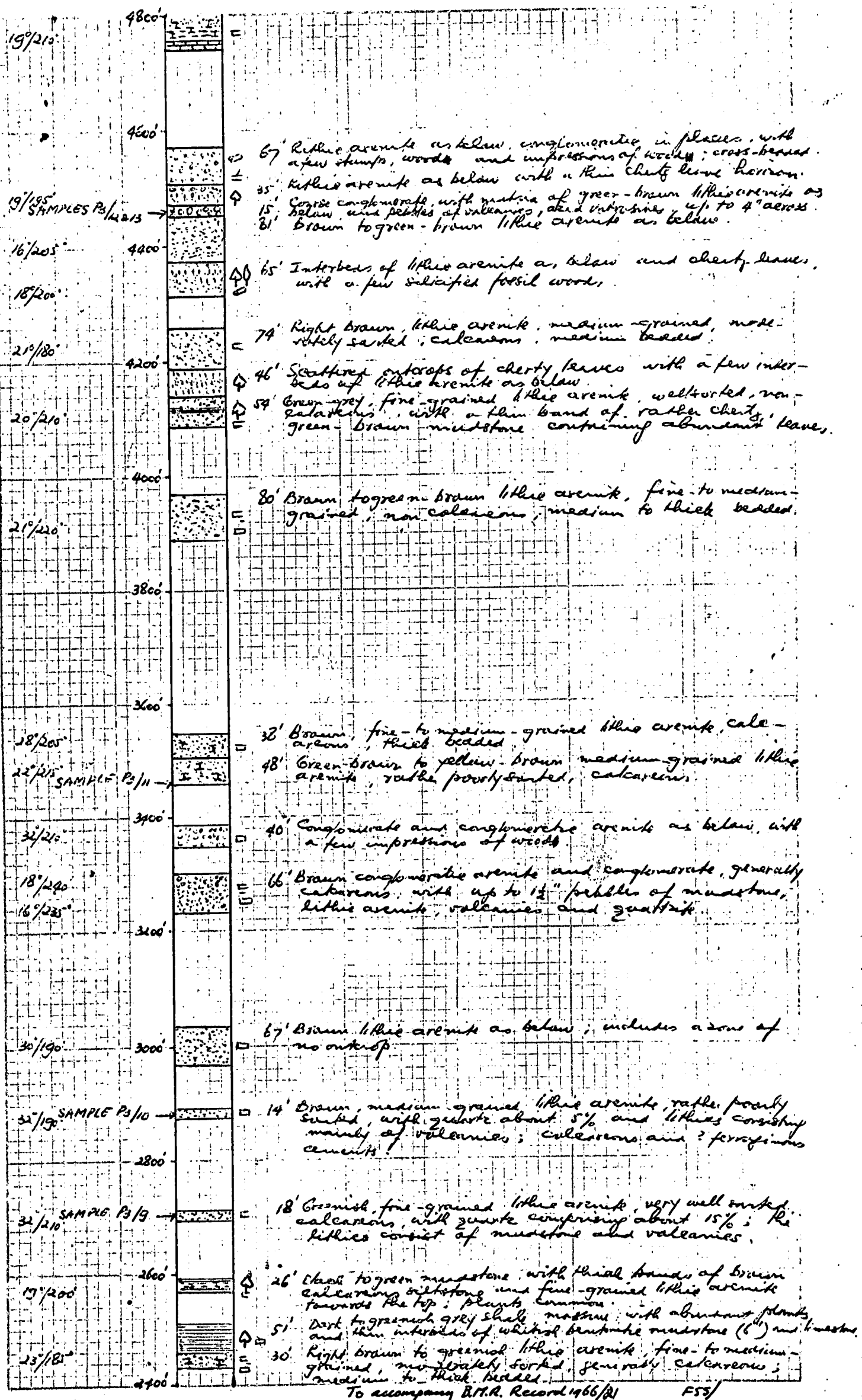


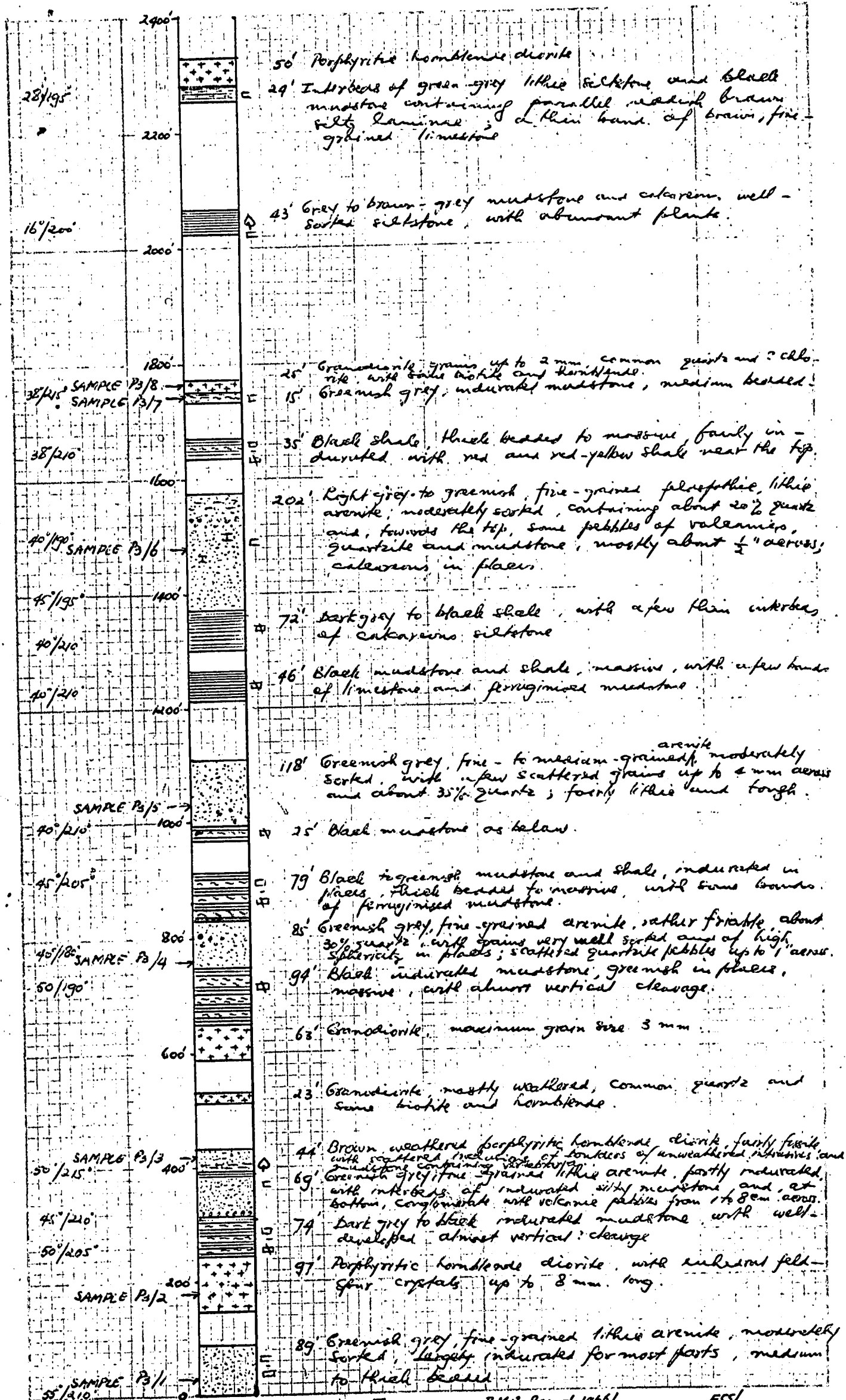
Measured Section P3

Section measured by compass, abney level and pacing about 2 to 7 miles south-south-west of Mt. Gatharret, Mt. Cocon 1:25,000 photos. Run 5, Photo 111 starting 659200 E, 2313900 N, finishing 655800 E, 2305300 N.









SECTION 06

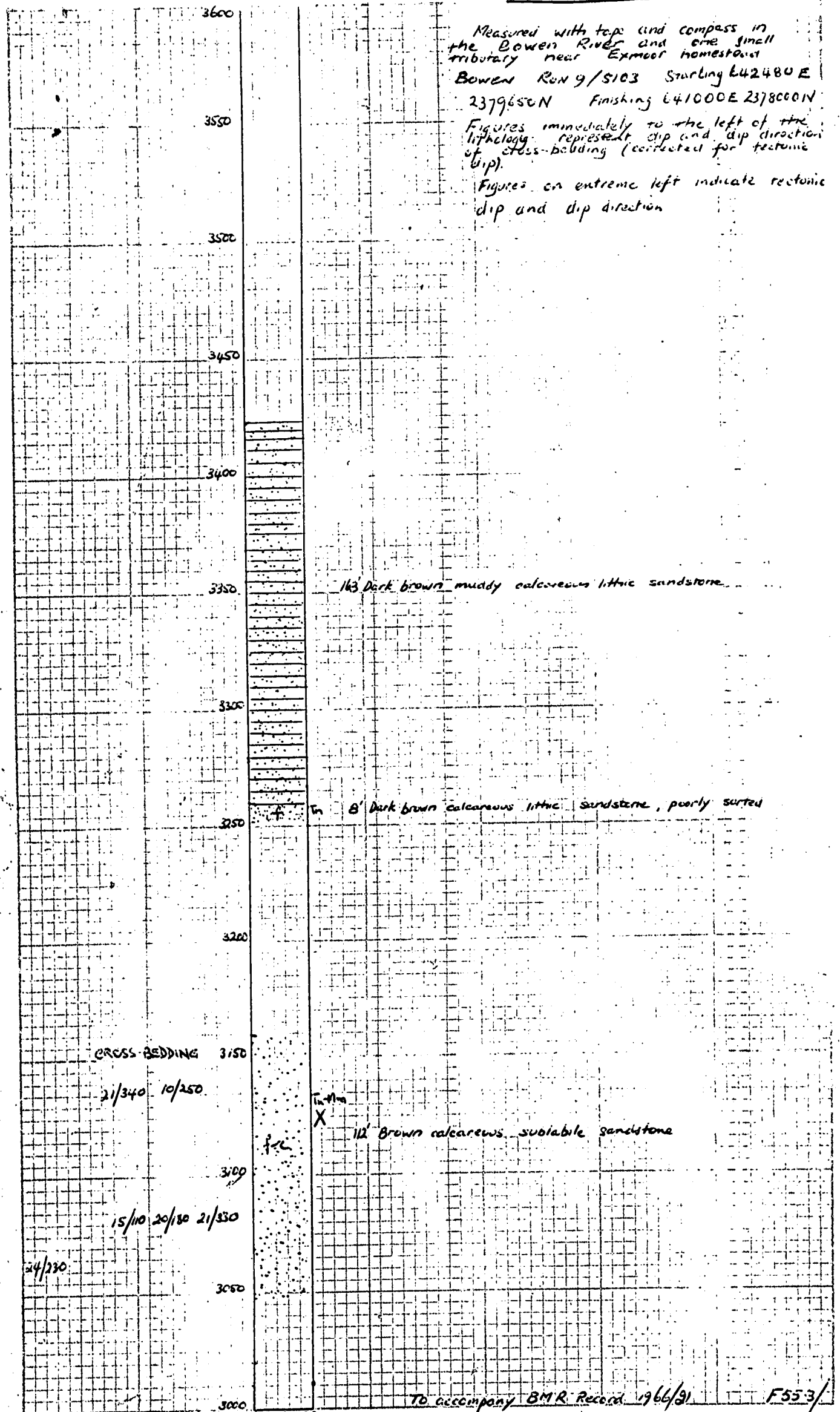
Measured with tape and compass in
the Bowen River and one small
tributary near Exmoor homestead

Bowen Run 9/5103 Stirling L42480E

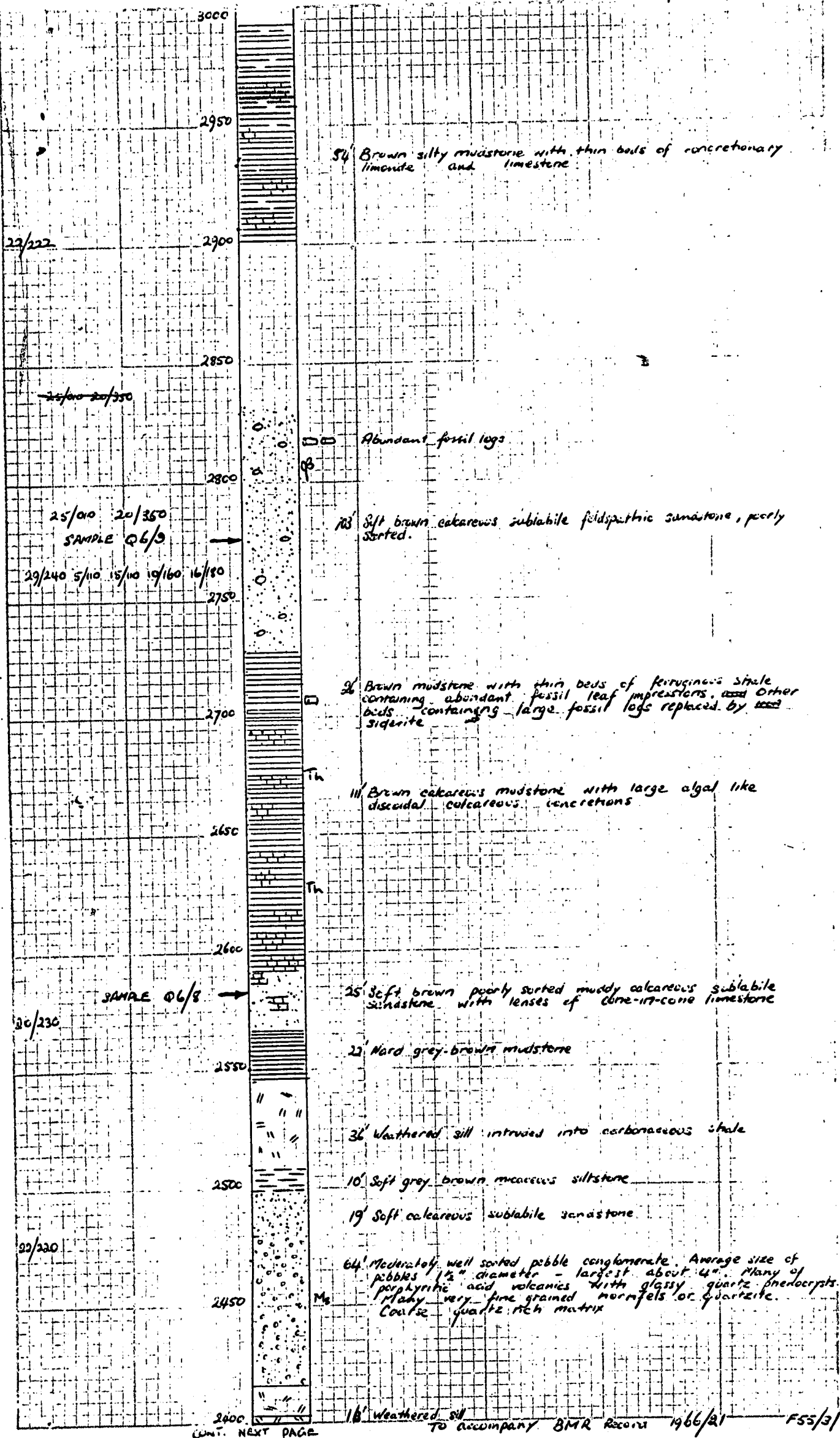
2379650N Finishing L41000E 2378000N

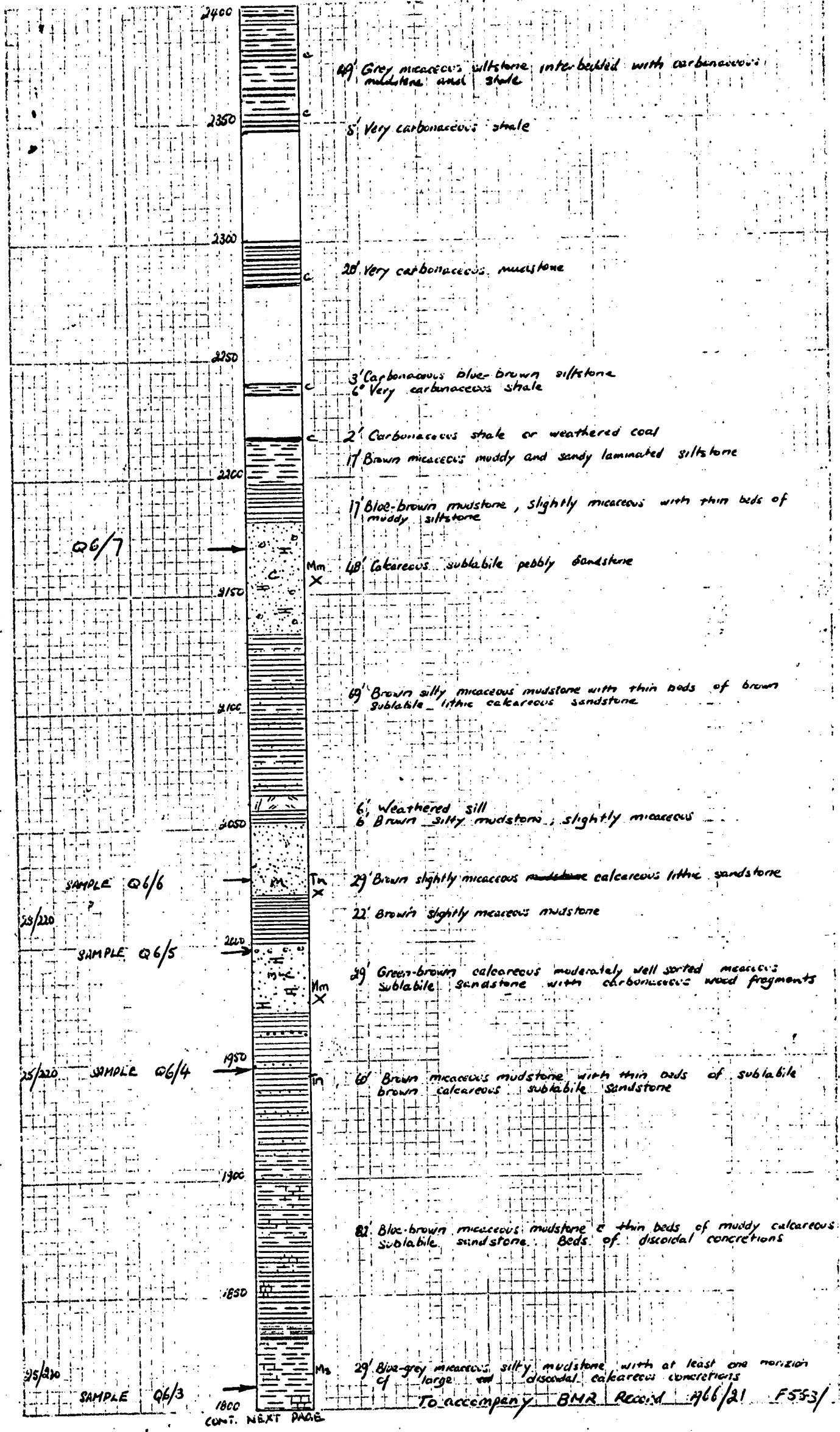
Figures immediately to the left of the
lithology represent dip and dip direction
of cross-bedding (corrected for tectonic
dip).

Figures on extreme left indicate tectonic
dip and dip direction

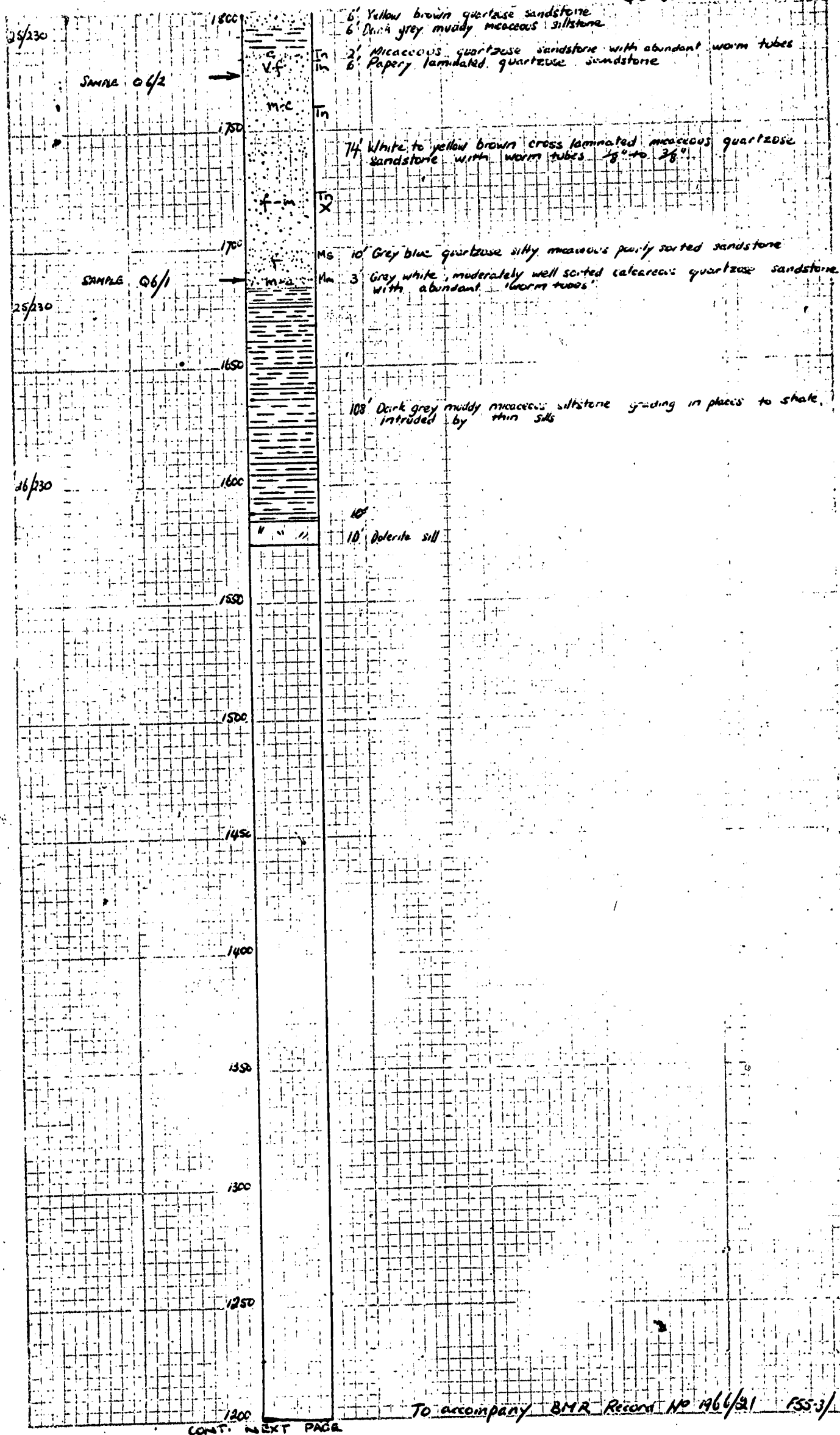


Q6 CWT.





Q6 CONT.



Q6 CONT

