

Rept.Bk.No. 64/116
G.S. No. 3729
Pal. Rep. 9/67



DEPARTMENT OF MINES
SOUTH AUSTRALIA

GEOLOGICAL SURVEY
PALAEOLOGY SECTION

E. AND W.S. DEPT. MILLICENT BORES 2 AND 5,
MICROPALAEOLOGICAL EXAMINATION OF GAMBIER
LIMESTONE SECTIONS

by

J.M. LINDSAY
PALAEOLOGIST

D.M.455/65

22nd June, 1967

MILLICENT BORES #285
PALAEO.
67/22nd June
OTWAY
64/116

R/B 64/116

DEPARTMENT OF MINES
SOUTH AUSTRALIA

D. & W.S. DEPARTMENT MILLICENT CORES 2 AND 5.
MICROPALAEONTOLOGICAL EXAMINATION OF CAMBIER
LIMESTONE SECTIONS

by

J.M. LINDSAY
PALAEONTOLOGIST
PALAEONTOLOGY SECTION

CONTENTS	PAGE
ABSTRACT	1
INTRODUCTION	1
STRATIGRAPHY	2
DESCRIPTIONS OF SAMPLES	4

PLAN

<u>Plan No.</u>	<u>Title</u>
67-423	D. and W.S. Millicent cores 2 and 5, biostratigraphic correlation of Cambier Limestone sections.

Rept.D.R.No. 64/116
G.S. No. 3729
Cal. Rep. 9/67
D.M. 433/65

22nd June, 1967

DEPARTMENT OF MINES
SOUTH AUSTRALIA

Rept. Bk. No. 64/116
G.S. No. 3729
Pal. Rep. 9/67
D.M. 455/65

E. & W.S. DEPARTMENT MILLICENT BORES 2 AND 5,
MICROPALAEONTOLOGICAL EXAMINATION OF GAMBIER
LIMESTONE SECTIONS

ABSTRACT

E. & W.S. Department Millicent bores 2 and 5, respectively in sections 193 and 584, hundred of Mount Muirhead, county Grey, in the Gambier Embayment of the Otway Basin, both bottomed in Gambier Limestone, bore 2 at 600 feet, and bore 5 at 445 feet. In bore 2, three units of Gambier Limestone and a series of foraminiferal events are recognized. Lithological and foraminiferal correlation with bore 5 suggests that if similar sections of Gambier Limestone exist at both localities a further 250 feet, at least, of Gambier Limestone might be expected below the present depth of bore 5.

INTRODUCTION

E. & W.S. Department Millicent bore 2, $1\frac{1}{2}$ miles N.W. of central Millicent, was first drilled in January, 1961, to a depth of 220 feet. In January-February 1967, the bore was deepened to 600 feet.

E. & W.S. Department Millicent bore 5, $1\frac{1}{2}$ miles S.E. of central Millicent, was drilled to 220 feet in February, 1961 and deepened to 445 feet in December, 1966 and January, 1967.

The positions of the bores are plotted on Plan 67-423 accompanying this report.

Bore 5 yielded less water than bore 2, and also appeared to intersect a relatively more early section of Gambier Limestone.

Palaeontological examination of both the Gambier Limestone sections was requested to help explain their differences to compare their stratigraphy, and in particular, to determine

the stratigraphic level in Gambier Limestone at which bore 5 bottomed so that the feasibility of deepening this bore could be considered.

Percussion sludges taken at 5-foot intervals were available. Bore 2 was examined between 220 and 600 feet; bore 5 between 275 and 440 feet. Significant lithological and foraminiferal events which enable correlation between the bores are shown in the section on Plan 67-423.

STRATIGRAPHY

There have been important recent advances in knowledge of the stratigraphy and palaeontology of the Gambier Embayment of the Otway Basin in which Hillicent is situated. In particular, planktonic foraminiferal zonation of the Gambier Limestone has been achieved by N.H. Ludbrook and is outlined in a recent unpublished report (Ludbrook, N.H., 1967, Stratigraphy and correlation of the marine sediments of the Gambier Embayment. Dept. Mines S.A. geol. Surv. Pal. Rep. 6/67, Rept. No. 734).

Prior to the present investigation, the only micropalaeontological examination of bores at Hillicent had been done by N.H. Ludbrook (1956, Micropalaeontological examination of sludges from three water bores, Hillicent. Dept. Mines S.A. geol. Surv. Pal. Rep. 6/56, Rept. No. 42/119). These three bores penetrated Recent to Pleistocene sediments up to 200 feet thick, consisting of cream to pale grey calcareous and shelly sands and sandy limestones containing "much reworked Gambier Limestone material increasing with depth". It was considered that Hillicent Hospital bore 1 (T.D. 205 feet) may have entered Gambier Limestone at about 200 feet; that Hillicent Hospital

bore 2 had not entered Gambier Limestone at total depth of 180 feet; and that the Highways Department bore, section 595, Millicent North (.T.D. 120 feet) may possibly have entered Gambier Limestone at about 100 feet. In view of the emphasis in the present investigation not on the Quaternary but on the Gambier Limestone section, these bores have not been re-examined, nor have the comparable intervals in E. and W.S. Millicent bores 2 and 5 been examined. The Quaternary-Gambier boundary in the latter bores is however likely to be at a depth of between 100 and 200 feet.

In E. and W.S. Millicent bore 2, the interval examined (220 - 600 feet) is all in Gambier Limestone. In the sample 220 - 225 feet, some contamination by Quaternary and re-cycled Miocene material is present and would be expected during the initial stages of deepening the hole from its previous depth of 220 feet.

Three lithological units may be recognized in this section of Gambier Limestone:

- (i) an upper grey cherty limestone, marly in part,
220 - 380 feet, thickness at least 160 feet,
- (ii) a cream limestone unit, 380 to about 460 feet,
thickness about 80 feet,
- (iii) a lower grey limestone with spicular chert, more or less marly, about 460 to at least 600 feet,
thickness at least 140 feet.

Unit (i) is of Oligo-Miocene age; units (ii) and (iii) are probably all Oligocene. The bore did not reach Upper Eocene rocks.

The portion examined of E. and W.S. Millicent bore 5 (275 - 440 feet) is all in Gambier Limestone, and as shown on Plan 67-429, appears to correlate wholly with unit (i) in bore

2. Unit (1) is somewhat marly in both cores but more so in core 5.

If similar sections of Gambier Limestone exist at the two localities, a further 250 feet, at least, of Gambier Limestone might be expected below the present depth of core 5.

DESCRIPTIONS OF SAMPLES

E. and W.S. Hillisont Core 2

Depth (feet)

- | | |
|-----------|--|
| 220 - 225 | Pale grey bryozoa limestone, chips of grey fossiliferous chert, cream recrystallized limestone, frequent abraded cream-coloured shell fragments and foraminifera, the latter including (Miocene) <u>Crespinella subanifera</u> , <u>Dicorthis cycloclypens</u> , <u>D. halsburghensis</u> . Oligo-Miocene Gambier Limestone foraminifera include <u>Victoriella conoides</u> , <u>Camarotaria reticulata</u> , <u>Elphidium crespinas</u> , <u>Astramonion centroplax</u> , <u>Cyroidinoides</u> sp. 1, <u>Alabamina tenuimarginata</u> , <u>Globosquadria debilis</u> , <u>Globoretaloides testarugosa</u> , <u>Globigerina sinuata</u> <u>G. sinuata</u> . |
| 225 - 230 | Off-white to pale grey bryozoa limestone, marly, with fine-grained calcite rhombs; grey chert; cream limestone; common <u>Victoriella conoides</u> ; <u>Netoretalia</u> sp. 1, <u>Gibicoides karriiformis</u> enter. |
| 230 - 250 | Off-white bryozoa limestone, marly in part, with minor fine-grained calcite rhombs and prominent coarse chips of grey chert. Consistent Gambier Limestone lithology and microfauna. |
| 250 - 290 | Similar to above, and with <u>Globigerina angulapertura</u> , <u>G.</u> sp. cf. <u>G. angulapertura</u> occasional <u>G. bulloides</u> tending towards <u>G. labiata</u> . <u>Heterotaria semistriata</u> enters at 275 feet. The association of <u>Victoriella conoides</u> and <u>Astramonion centroplax</u> continues. |
| 290 - 335 | Off-white to pale grey bryozoa limestone and grey chert, without calcite rhombs; <u>Victoriella</u> becomes common by 325 feet; the more significant planktonics are <u>Globigerina angulapertura</u> , <u>G. sinuata</u> <u>G. sinuata</u> , <u>G. bulloides</u> , <u>Globoretaloides testarugosa</u> . |
| 335 - 350 | Off-white/pale grey bryozoa limestone and grey chert, silty, marly, with calcite rhombs; <u>Globigerina angulapertura</u> enters at 335 feet; other species as above. |

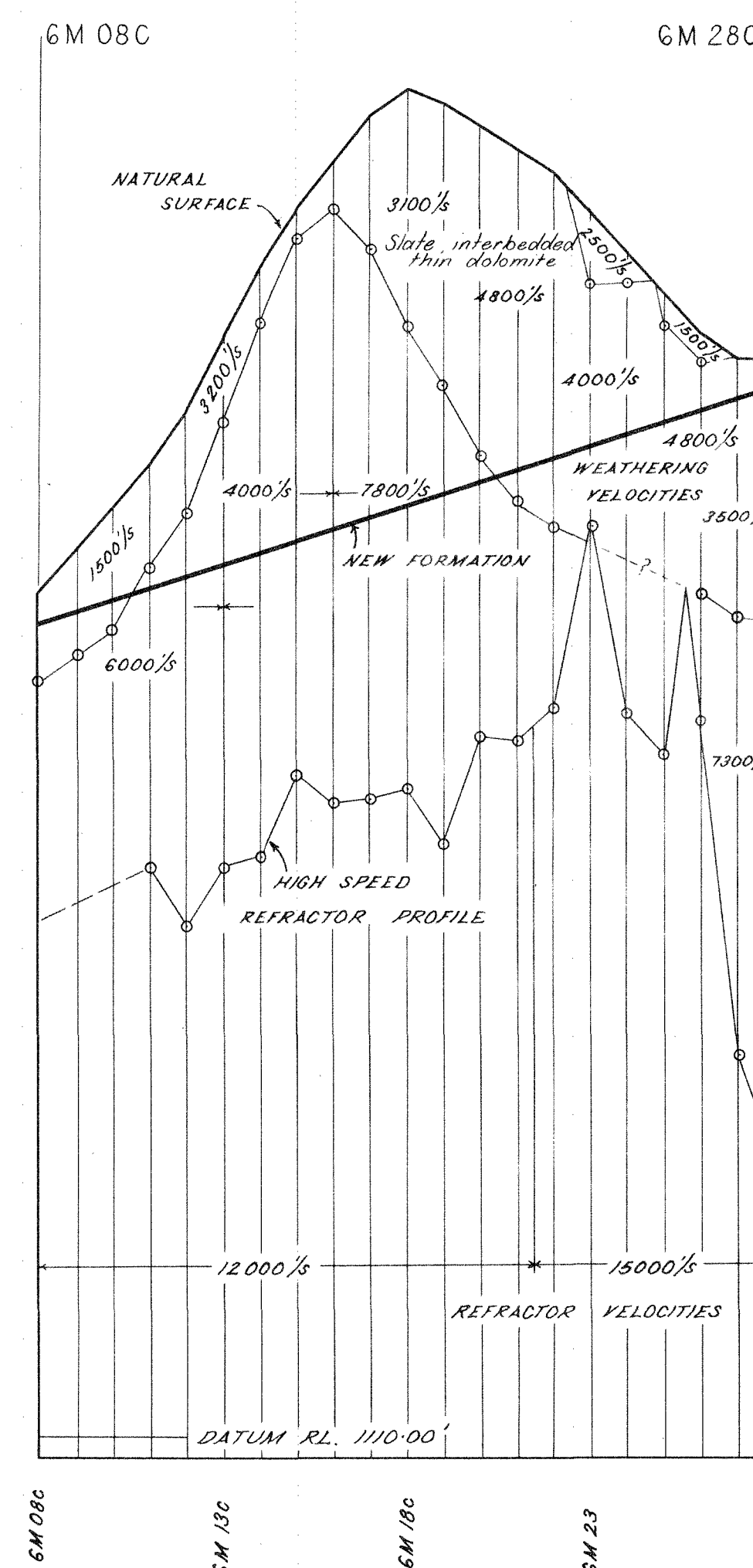
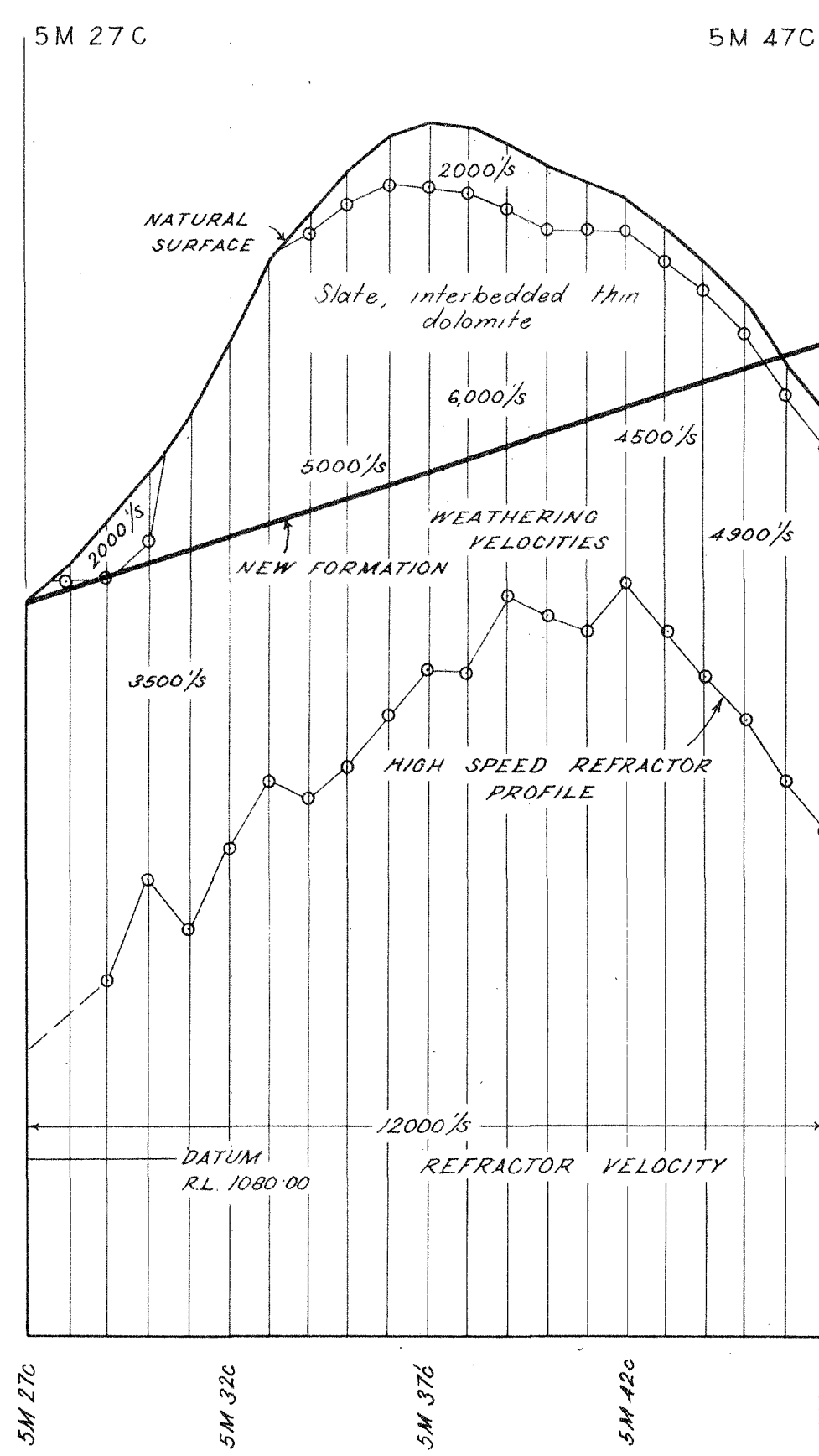
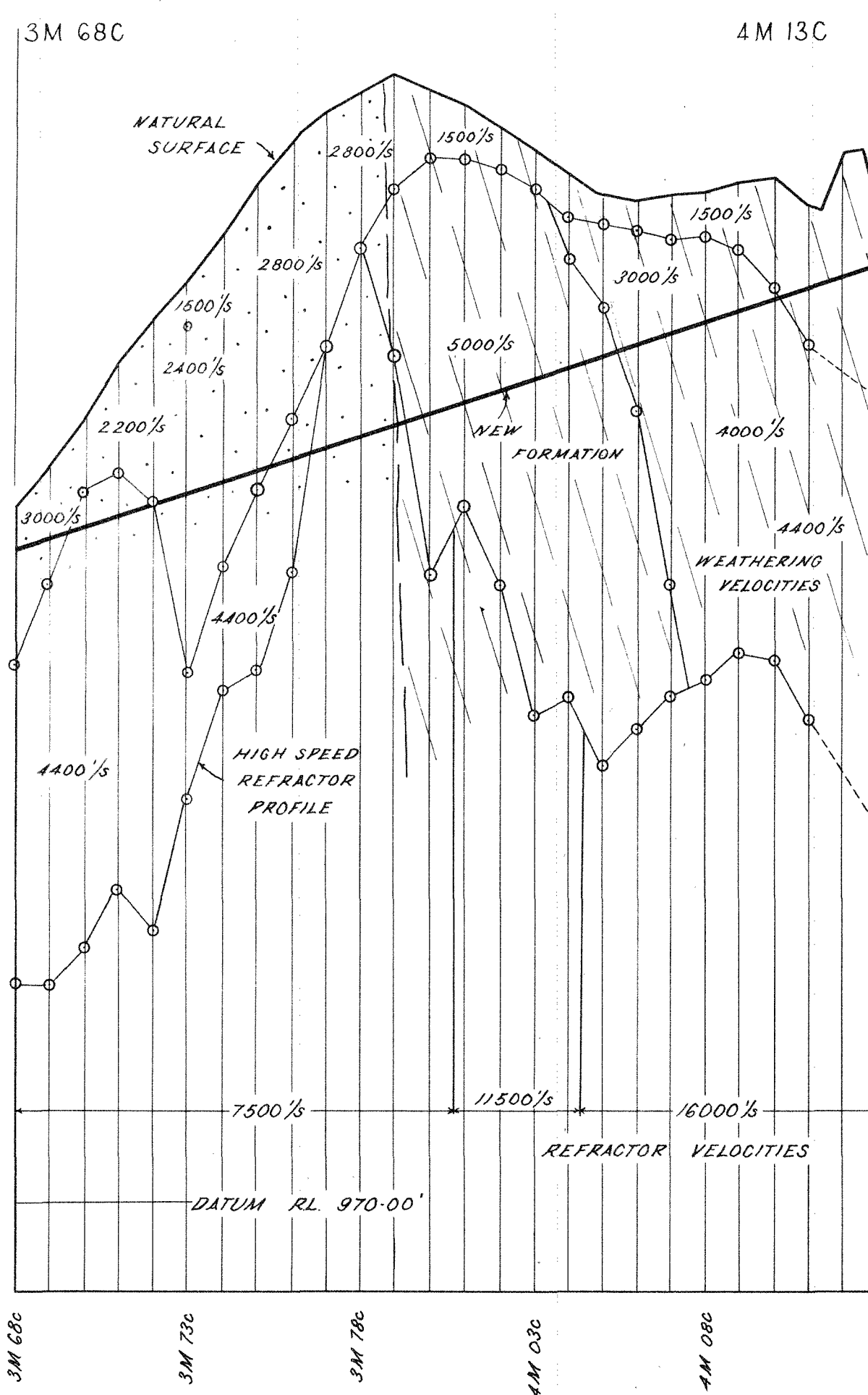
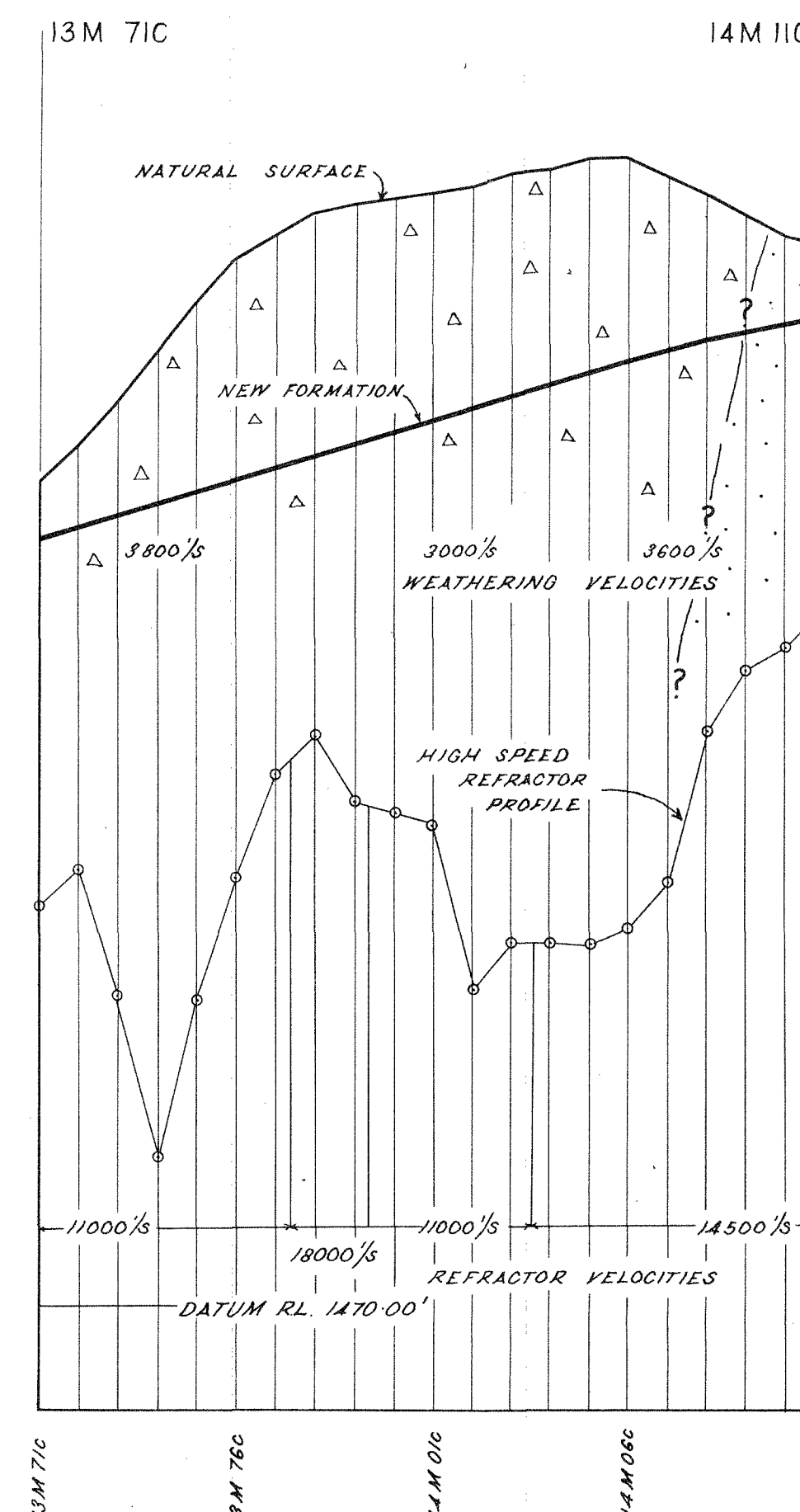
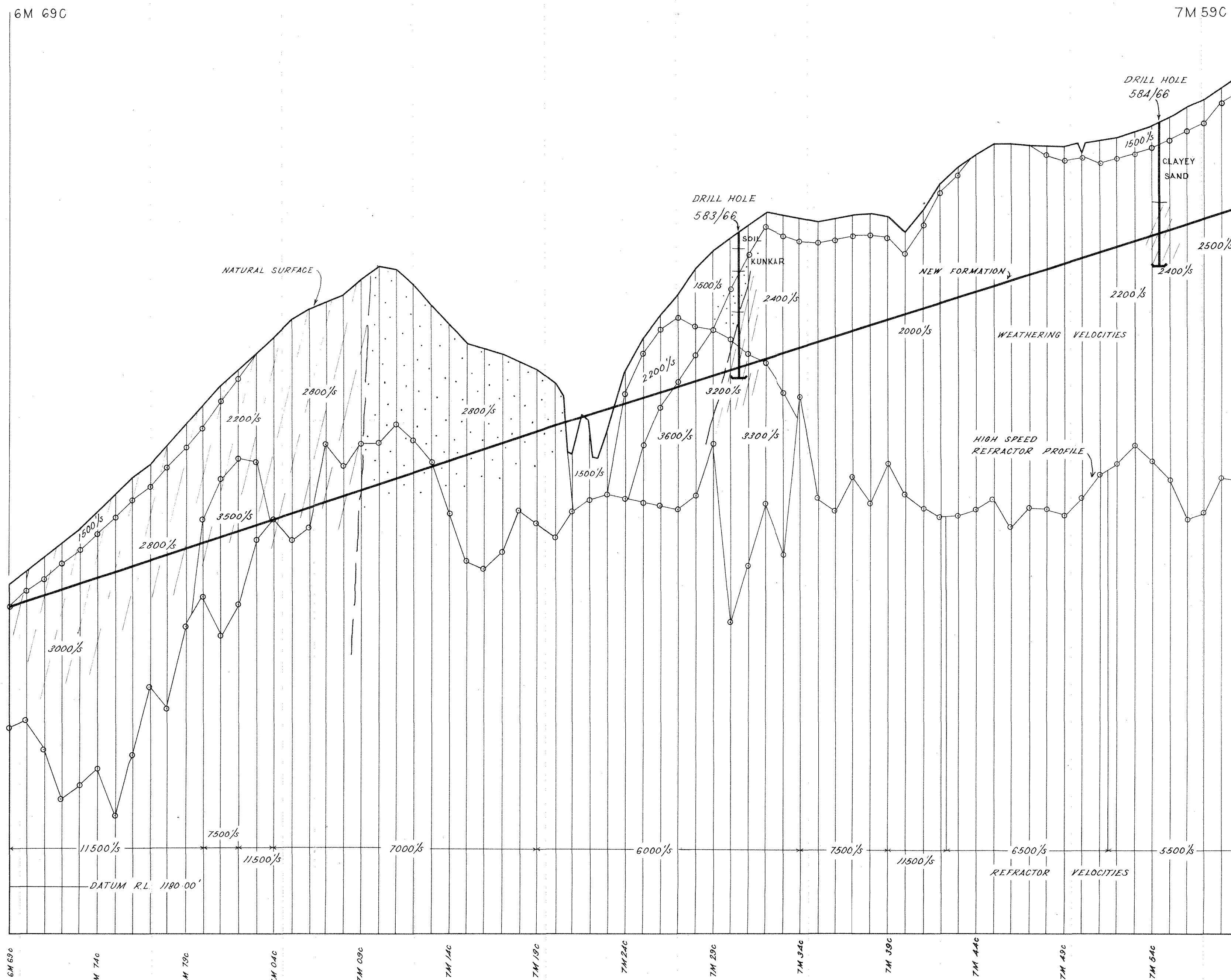
Depth (feet)

- 350 - 380 Off-white/pale grey bryozoal limestone, marly in part, and minor grey chert; Heliopinopsis sp. enters at 350 feet, Victoriella conoides and Hefkerina semierata occur rarely, significant planktonics include occasional Globigerina labiacrassata, G. angulicenturialis, G. sp. cf. G. ampliapertura, and G. emapertura.
- 380 - 440 Cream bryozoal and echinoidal limestone, somewhat recrystallized, slightly glauconitic, with only minor chert and calcite rhombs; Gumbelitra stansensis enters at 410 feet, Chilogumbelina cubensis at 420 feet, occasional Victoriella conoides and G. labiacrassata.
- 440 - 475 Limestone and marl, cream to pale grey, with abundant calcite rhombs and some grey chert; slightly glauconitic; Globigerina angiperoidea enters at 470 feet.
- 475 - 550 Pale grey/white limestone, in part cherty, silty, marly, with calcite rhombs; Globigerina labiacrassata is frequent and typical; G. angiperoidea angiperoidea, Chilogumbelina cubensis and Gumbelitra stansensis continue.
- 550 - 600 Limestone and marl, pale grey/white, with some grey spicular chert; planktonic species as far 475-550 feet; Turborotalia sp. cf. T. guma enters at 595 feet.

E. and W.S. Millicent Bore 5

- 275 - 350 Grey limestone and marl, bryozoal, with dark grey chert, calcite rhombs, slightly glauconitic in part, occasional pyrite aggregates from 305 feet; planktonics include Globigerina emapertura, Globorotaloides testarumae; benthonics Astrorhina sentradax (from 285 feet), Victoriella conoides Gyradineides sp. 1 (from 295 feet), Elphidium crassum (from 300 feet), Cibicides karreriiformis (from 310 feet).
- 350 - 430 Grey limestone, more or less marly, silty, bryozoal, with dark grey chert, calcite rhombs; similar microfauna to above, and in addition Hefkerina semierata, Globigerina sp. cf. G. labiacrassata, G. sp. cf. G. ampliapertura enter at 380 feet, and Turborotalia opima occurs rarely at 400 - 405 feet.
- 430 - 440 As above with Globigerina angulicenturialis.
- 440 - 445 No sample.

J. M. Lindsay



LEGEND

- Quartzite and Sandstone.....
- Slate, laminated siltstone.....
- Tillite.....

Horizontal Scale : 1 inch = 4 chains
Vertical Scale : 1 inch = 10 feet

Seismic Interpretation by G.W. Kendall
Geology by M. N. Hiern

DEPARTMENT OF MINES — SOUTH AUSTRALIA
SEISMIC VELOCITIES AND PROFILES
GLADSTONE TO JAMESTOWN
PROPOSED RAILWAY CUTTINGS

Drn. G.W.K. SCALE: AS SHOWN
Tcd. R.H. 67-156
Ckd. GaA/7
Exd. DATE: 6-4-67