CONTENTS ENVELOPE 206

TENEMENT: O.E.L. No. 24

TENEMENT HOLDER: Beach Petroleum N.L.

REPORT:

PLANS:

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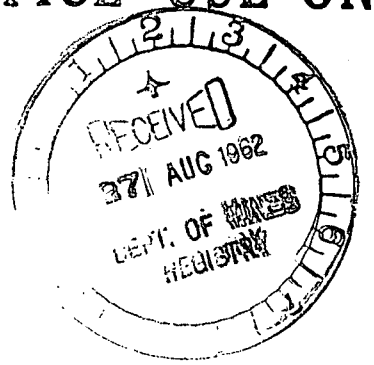
Appendix 3
SR 11/5/50



00 3

BEACH PETROLEUM N.L.

Comment on

GEOLOGICAL CROSS SECTIONS

through

(O.E.L. 24 St. Vincent Gulf Province)

by

Bruce Webb, M.Sc.

Chief Geologist Geosurveys
(Australia) Ltd.

31st July, 1962.

LIST OF CONTENTS

Plans to accompany Report:

Appendices

I. INTRODUCTION.

Basic geological data has been made available by courtesy of Petroleum Refineries Aust. Pty. Ltd. concerning drill holes put down on the sea floor south of Hallett Cove. In this brief summary report, use is made of this data and incorporated along with information available from the South Australian Mines Department in so far as it has application to the study of the structure and stratigraphy of St. Vincent Gulf.

The newly available information is of considerable value in the prediction of possible offshore structure necessary in planning future offshore drilling programmes of a preliminary exploration nature. The new data provides direct indication of pre-Quaternary geology out to approximately 2,000 feet beyond the sea coast.

II. PREVIOUS INVESTIGATIONS.

The Echunga 1-mile Geological map sheet (South Australian Geological Survey) covers the immediate coastal area in this vicinity.

Reports on the geology of the region have previously been published, principally Sprigg (1944 and 1961), Glaessner and Parkin (1958), although palaeontological reports by several authorities referring to the Port Noarlunga and Halletts Cove Tertiary and Permian sections have indirect application to the present investigation.

II. PREVIOUS INVESTIGATIONS. (Continued) 00 6

Aerial geological, and submarine investigations by Mr. R. C. Sprigg in the area earlier this year, has carried knowledge of the sea floor geology north from Whitten Bluff into the immediate vicinity of Port Stanvac. Gently folded Tertiary beds plunge anticlinally to the South seaward from Whitten Bluff. Horse-shoe Reef, approximately one mile to the northwest, represents the swinging of the beds on to the gentle west-limb of the fold. Projected north these beds are expected to parallel the coast and dip westerly somewhere off-shore from Port Stanvac. The newly presented boring data confirms this pattern and provides new factual evidence for the deposition of Tertiary beds beneath the Gulf proper.

III. PORT STANVAC INVESTIGATIONS.

A study has been made of off-shore geological relationships based on information resulting from drilling being carried out in connection with the Oil Refinery Site near Hallet Cove. The information obtained from two stratigraphic holes, put down by rotary drilling rig, has been combined with information from several shallow foundation testing holes. Samples from certain of these holes were submitted to the Department of Mines for Palaeontological Examination, and the resulting reports are included below as appendices. Previous investigations carried out in the area by the Department of Mines have been referred to, and this information incorporated in the accompanying geological

sections. Information is now available up to a distance of 2000 feet westward from the present shoreline.

(a) Stratigraphy and Structure.

Drilling has indicated the presence of two principle layers of the travertine or kunkar dipping gently westwards, below Recent marine sands. The material which has been kunkarised includes coarse calcareous quartz sand of late-Pleistocene to early-Recent age. (Bore 15, 19' 3" to 19' 7"). Beneath the kunkar layers in the holes west of No. 2 stratigraphic hole, grey and yellow brown mottled clays with some sandy material occur, up to 10 feet or more in thickness. Samples of this material are concluded by Dr. Ludbrook to be marine sediments of probable Pleistocene age.

It is possible that the developments of (submarine) kunkar layers off-shore can be correlated with the kunkar and marl earths mapped on the coastal areas; and the underlying marine Pleistocene sediments may be a seaward extension of the Pleistocene sandy and mottled clays of the coastal section.

Beneath the Pleistocene sediments, during drilling at the present seaward end of the jetty, and beneath caisson A (drill holes 4B, 5A, 8) carbonaceous silts and fine sands were intersected. Core samples indicate these sediments

(a) Stratigraphy and Structure. (Continued) 00 8

are flat-lying. Samples were examined by Dr. Ludbrook (Appendix A) and determined as Middle Eocene North Maslin Sands. Approximately 40 feet of these beds was penetrated in Bore 4b, which was still in this material at the bottom of the hole.

The No. 1 stratigraphic hole (located on bent 13) intersected gently dipping weathered bedrock (chocolate shales and siltstones) directly beneath Quaternary sediments at 46' 6" below sea level. The bedrock material resembled the weathered Upper Proterozoic Marinoan sediments outcropping along the coast. No. 2 stratigraphic hole, (located on bent 25) intersected grey clays and gritty grey clays of uncertain age at from approximately 60 feet to 123 feet below sea level. A cored sample was taken at a depth of 68 feet below sea level. This showed the material to consist of blue grey clay with whitish sandy streaks, dipping at approximately 40°. The cuttings suggest that similar material occurs to a depth of 123 feet below sea level where a very hard band of quartzitic rock was encountered, which is probably of Upper Proterozoic (? Marinoan) age. The cored sample contained abundant fresh pyrite crystals. The attitude of the bedding, and lithological character, indicated the material was probably pre-Tertiary, and thus either Permian, or [redacted] strongly weathered Precambrian bedrock.

(a) Stratigraphy and Structure. (Continued) 00 9

The sample was submitted for Palaeontological examination, (see Appendix B). No fossil evidence of age was formed, but a Permian age was suggested. Dr. Ludbrook stated that the sample contained very small pellets of dolomite (or calcite) intergrown with pyrite, and that similar pellets occurred in bore 15 at a comparable stratigraphic level.

Recent drilling indicates that similar materials exist beneath the travertine layer at caisson B, some 400 feet northwards of the present end of the jetty. The relationships in this area are indicated in the accompanying section (GEO 102).

Permian sediments are known to occur a short distance to the north at Hallet Cove. It seems probable that the grey clays with sandy and gritty lenses, encountered in No. 2 stratigraphic bore, and below caisson B are Permian. It is apparent from the drilling already carried out that the North Maslin sands thin out between bore 4b and No. 2 stratigraphic bore, and between 4b and caisson B. These relationships are indicated on the accompanying sections.

As shown on the section on GEO 101, the Precambrian bedrock profile descends relatively rapidly between No. 1 and No. 2 stratigraphic holes. The difference in elevation (approx. 78 ft.) may be related to Permian erosion of the

0010

(a) Stratigraphy and Structure: (Continued)

Precambrian bedrock, or may indicate the presence of minor faulting. It is possible that Permian sediments may exist beneath the North Maslin Sands at bore 4b.

(b) Future Operations.

A further stratigraphic hole is scheduled to be drilled by Geosurveys of Australia Limited on behalf of Beach Petroleum N.L. at the western extremity of the jetty when construction arrangements and weather conditions permit. This hole should give further basic information concerning the Tertiary and ? Permian succession, the depth to and nature of the bedrock, and possible "coastal" faulting to seaward.

Bruce P. Webb
Chief Geologist.

IV. REFERENCES.

0011

Geological Survey South Australia (1954): Geological Atlas of South Australia, Sheet Echunga.

Geological Survey South Australia: Geological Sections, Port Stanvac, Plan No. L60-116.

Glaessner, M.F. and Parkin, L.W. (Ed.) 1958: Geology of South Australia Journal Geological Soc. of Aust. 5:2

Sprigg, R.C. (1961): The Oil and Gas Prospects of the St. Vincent Gulf Graben. Australian Petroleum Exploration Association - 1961 conference on the Geology of South and Eastern Australia.

Sprigg, R.C. (1942): The geology of the Eden-Moana Fault Block. Trans. Royal Society South Australia 66:2.

APPENDIX A

GEOSURVEYS OF AUSTRALIA, SAMPLES FROM OFFSHORE INVESTIGATIONS, PORT STANVAC.

by

N. H. Ludbrook
Senior Palaeontologist

ABSTRACT

Offshore drilling at Port Stanvac has revealed that Pleistocene marine sediments rest directly on carbonaceous beds of the North Maslin Sands.

1. INTRODUCTION

Eight core samples selected from bores 3, 4, 8, and 15 were submitted by B.P. Webb of Geosurveys of Australia Ltd. for palaeontological examination. Almost all the samples were fossiliferous.

2. STRATIGRAPHIC SEQUENCE

(1) Recent marine sands.

From information supplied by Mr. Webb, the uppermost sediments were marine sands of Recent origin. None of this material was submitted for examination.

(2) Pleistocene clayey sands.

The youngest material submitted consisted of grey and yellow brown mottled clayey calcareous quartz sand, represented by samples from Bore 3 23-24 ft. 28-29 ft., and Bore 15 19'3"-19'7". Shallow water foraminifera principally Discorbis mira. Discorbis dimidiatus and species of Elphidium are common in the material but most of the mollusca are too fragmentary for determination.

The sediments have been exposed since deposition as in addition to their being kunkarized, a small land shell occurred in Bore 3, 23-24 feet.

They also appear to contain a good deal of reworked material, possibly from the Port Willunga Beds. The source of this material is doubtful as no Port Willunga Beds occur in the immediate vicinity of Hallett Cove, but currents could account for its presence in the Pleistocene sediments.

The general appearence of the microfossils suggests a Pleistocene age, as there is a general lack of original colour in the mollusca and secondary calcification of the foraminifera. They may, however, be as young as early Recent.

(3) Eocene silty sands - North Maslin Sands.

Bore 4 (a) - b 30-31', Bore 4a b 59-60' and Bore 8 83-90'6" passed through highly carbonaceous silty fine quartz sand and sandy silt. Plant spores are very abundant in the material, with Notho faqus spp., Triorites harrisi and Myrteacidites spp. This material belongs to the North Maslin Sands.

The fine pale grey quartz sand in Bore 8 at 95'6" - 97'6" is also characteristic of some lenses in the North Maslin Sands.

3. DETAILS OF THE CORE SAMPLES

Grey and yellow-brown mottled clayey calcareous sand with patches of white calcite. Washings consist of medium to coarse subangular to subrounded quartz, calcite, limonitic clay Discorbis, Elphidium, Bolivina and a small hilicoid land shell present.

28 - 29' Pleistocene

Grey and yellow-brown mottled clayey clacareous sand with coarse

angular to subrounded quartz, limonitic ochre, calcite, shell fragments. The shell fragments are very eroded, but otherwise fresh in appearance, with some original colour. Foraminifera include Bolivina sp. Discorbis mira, Elphidium macellum, Elphidium advenum, Discorbinella biconcava, Bittium (Semibittium) granarium present.

Bore 4(a) - b 30 - 31' North Maslin Sands (Middle Eocene)

Dark brown carbonaceous sandy silt.

59 - 60' North Maslin Sands (Middle Eocene)

Dark Brown carbonaceous silty sand with abundant plant spores including Triorites harrisi, Nothofagus spp. Myrteacidites spp.

Bore 8 83 - 90'6" North Maslin Sands (Middle Eocene)

Dark brown micaceous silty sand with fine angular quartz grains, loosely cemented with carbonaceous silty matter, fine muscovite.

95'6" - 97'6" North Maslin Sands (Middle Eocene)

Pale grey very fine quartz sand, even-grained, with fine angular quartz, some carbonaceous matter, occasional pyrite, One test of Cibicides sp.

Bore 15 19'3" - 19'7" Pleistocene

Coarse angular to rounded quartz to gravel size, abundant broken shell fragments, much abraded and lacking colour, fragments of kunkar.

32'4" - 33'2" Pleistocene

Grey clay; washings consisting of fine clay material or very finely divided silicaland microscopic specks of pyrite.

0015

Bore Hole 15 33'2" - 33'4" Pleistocene

Pale grey pelletty clay with pellets and nodules of very fine silica cemented with limonitic clay and calcite; fine angular quartz, occasional worn shell fragments, fine pyrite.

Signed. N. H. Ludbrook
Senior Palaeontologist

NHL:AGK
29/5/62

APPENDIX B

0016

DEPARTMENT OF MINES, SOUTH AUSTRALIA

Sample No. F 146/62

Reference 1739/57

PALAEONTOLOGICAL EXAMINATION OF MATERIAL

Locality:	Off-shore	Distance and direction from nearest town or station Port Stanvac.
Details:	Collected from bore No. 2.	
	Stratigraphic hole	
	Depth 82'6"	
Information required	Age	
Submitted by	B.P. Webb, Geosurveys of Australia Ltd.	
Address	Da Costa Building, Grenfell Street, Adelaide.	
Date	7.6.62	

PALAEONTOLOGIST'S REPORT

Core sample of pale blue-grey pyritic claystone with streaks of pyritic sand.

When washed the sample consists of very small pellets of dolomite (or calcite) intergrown with pyrite, and abundant fresh pyrite crystals.

No direct fossil evidence of the age is contained in the sample but a Permian age is suggested.

The pellets in Bore 15 at 33'2" - 33'4" are somewhat similar to those in the present sample. If the two are not to be correlated it is possible that the material in Bore 15 is derived from that represented by Bore 2 at 82'6".

Signed N. H. Ludbrook
SENIOR PALAEONTOLOGIST

Date 10.7.1962

27 AUG 1962

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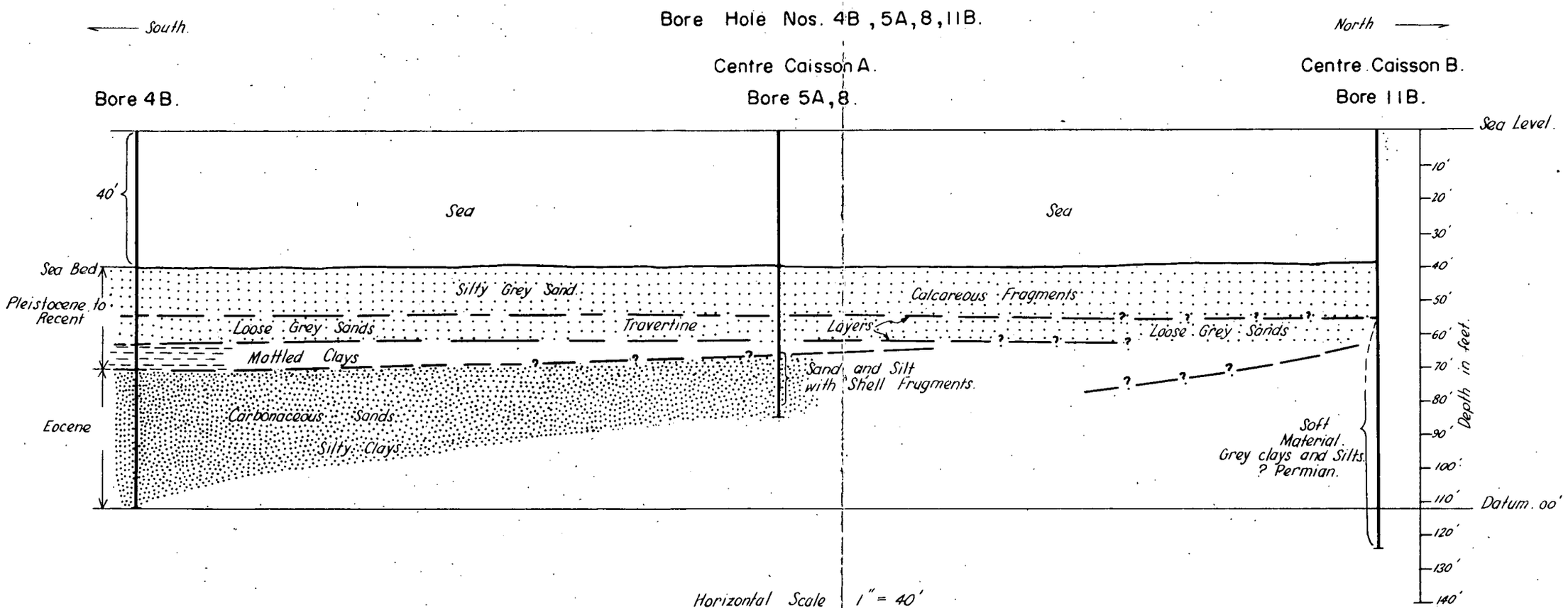
GEOLOGICAL SECTION PT. STANVAC.

0017

SOUTH — NORTH SECTION.

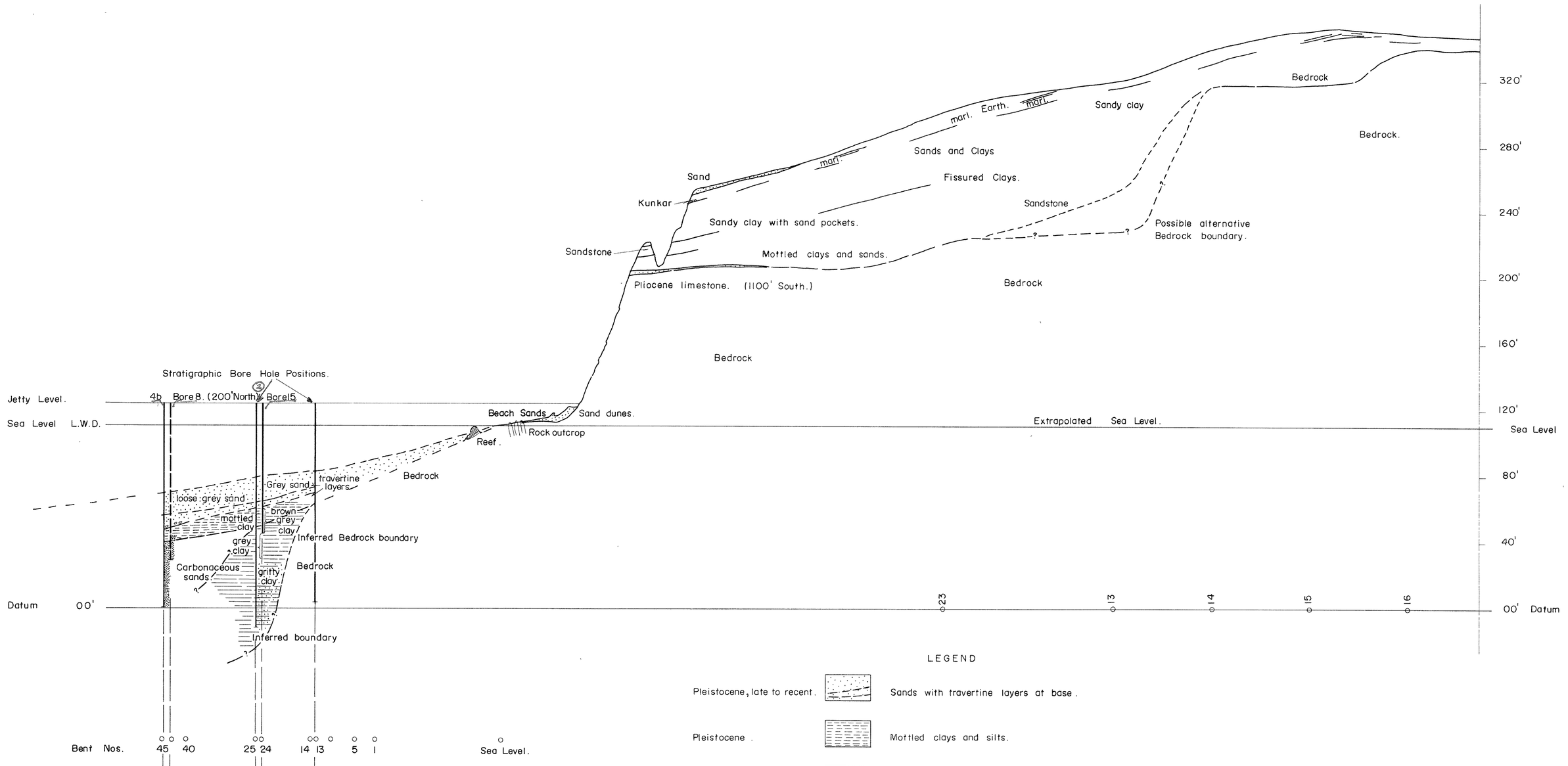


Horizontal Scale 1" = 40'
Vertical Scale 1" = 40'

GEO.102.

GEOLOGICAL SECTIONS
PORT STANVAC

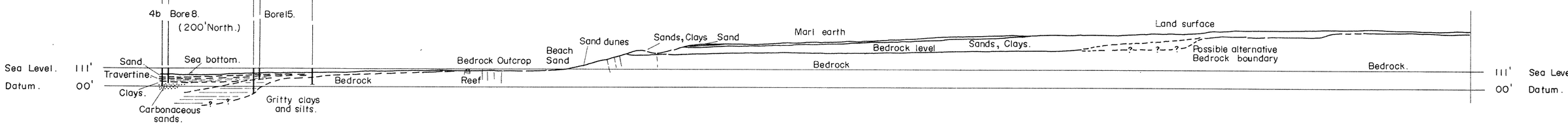
Horizontal Scale . 1" = 400'
Vertical Scale . 1" = 40' (exaggerated 10x.)



LEGEND

Pleistocene, late to recent.		Sands with travertine layers at base.
Pleistocene.		Mottled clays and silts.
Middle Eocene.		North Maslin sand , carbonaceous siltstones and fine sandstones.
Age Uncertain.		Grey clays. Gritty grey clays.

Horizontal Scale . 1" = 400'
Vertical Scale . 1" = 400'



Landward Geology after S.A. Dept. of Mines.

GEO. 101. 4