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DEPARTMENT OF MINES

SOUTH AUSTRALIA

MT. SALT STRUCTURE DRILLING PROJECT OF OIL DEVELOPMENT N.L.

PALAEONTOLOGICAL REPORT

by

N. H. Ludbrook

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ABSTRACT:

Five structure holes drilled to a depth of approximately 1,000 feet in the Hundred of MacDonnell 9 miles south west of Mount Gambier intersected a lower Tertiary section in downward sequence of Gambier Limestone, Buccleuch Group and Knight Group sediments of Upper Oligocene to Eocene age. The maximum thickness of Gambier Limestone was 730 feet in S.H.5, the maximum thickness of Buccleuch Group sediments 100 feet in S.H.4. Both the Gambier Limestone and Knight Group sections are conspicuously zoned.

1. INTRODUCTION

Five shallow structure holes were drilled by Oil Development N.L. to a maximum depth of 1012 feet on Mt. Salt structure, the centre of which is at latitude 37°57'27"S, longitude 140°37'45"E. Core was taken at the bottom of each well and cuttings samples were taken every 10 feet. Recovery in Mt. Salt S.H. No. 2, in the centre of the structure, was poor and nearly 700 feet of the section are indeterminable. In both Mt. Salt S.H. No. 1 and Mt. Salt S.H. No. 5 there are short intervals from which no recovery was obtained, but the interpretation of the sequence is not greatly affected by lack of information on these intervals.

Mt. Salt S.H. No. 1 was spudded in on 19th January 1962 and drilling of Mt. Salt S.H. No. 5 was completed on 1st March 1962.

This report presents stratigraphic interpretation from lithological and general micropalaeontological data. Detailed micropalaeontological study was not attempted.

2. STRATIGRAPHIC SUMMARY

Stratigraphic units intersected in the five wells are as follows:

Age	Formation	Maximum Thickness (feet)
Upper Oligocene (? to Lower Miocene)	Gambier Limestone	730
Upper Eocene	Buccleuch Group greensand	100
Middle to Upper Eocene	Knight Group	402 (to bottom of S.H. 4)

3. GAMBIER LIMESTONE (Upper Oligocene)

The Gambier Limestone intersected in the Mt. Salt area consists of two members. The upper member is composed of cream bryozoal limestone with varying degrees of recrystallization and flinty in places. With the exception of the top 60 feet in Mt. Salt S.H. 3, Victoriella conoidea is present throughout the member. It therefore comes within the "Zone of Victoriella conoidea" which is regarded by most Australian palaeontologists as of Oligocene age. The uppermost 60 feet in S.H. 3 may possibly extend into the Lower Miocene.

The lower member is a grey somewhat marly limestone, dense, and crowded with sponge spicules. It is younger than the glauconitic marl member which occurs in the northern part of County Robe (Ludbrook, 1961, p. 29). The abundant sponge spicules may be a source of silica for the flint bands which occur in the Gambier Limestone and are common in S.H. 5. The thickness of the Gambier Limestone varies from 500 feet in S.H.4 to 730 feet in S.H. 5.

4. BUCCLEUCH GROUP (Upper Eocene)

All wells intersected a thin highly glauconitic marl carrying Globigerina linaperta, Globigerapses index and (rarely) Globoquadrina primitiva. Fish remains are also common.

This bed is an unnamed formation of the Buccleuch Group which occurs notably in the Kingston area, and was intersected in Beachport No. 1 Well. (Ludbrook, 1962). It is

characterized by abundant ovoid glauconite pellets changing to limonite towards the base.

The bed occurs between 710 and 760 feet in S.H.1, 680 to 780 feet in S.H.3, 500 to 600 feet in S.H.4 and 730 to 780 feet in S.H.5.

5. KNIGHT GROUP (Middle to Upper Eocene)

Sands, grits and silty sands of the Knight Group were the oldest sediments intersected. Abundant fish teeth occur in the top levels underneath the Buccleuch Group glauconitic bed. The upper sediments consist of pyritic and limonitic grit. From 35 to 130 feet below the top of the Knight Group there is a conspicuous horizon of quartz grit, with abundant milky quartz. Cores taken at approximately 1000 feet in each well vary from carbonaceous mudstone to carbonaceous silty sandstone. Some megaspores in S.H.2 appear to have been reworked from the Cretaceous.

6. DETAILS OF THE STRUCTURE HOLES

(1) Mt. Salt Structure Hole No. 1

Depth(feet)			Formation
20 -	220	Cream-white bryozoal limestone with Victoriella conoidea.	Gambier Limestone
220 -	280	Cream-white considerably recrystallized bryozoal limestone with Victoriella conoidea.	
280 -	400	No samples.	
400 -	450	Light grey bryozoal limestone rich in sponge spicules, large Lenticulina, Victoriella conoidea.	
450 -	510	Light grey limestone, marly, with Victoriella conoidea, Stomatorbina concentrica, Eponides repandus.	
510 -	610	Light grey dense chalky limestone, abundant spicules, Cyclammina incisa, Gaudryina (Pseudogaudryina), but fauna poorly preserved.	

Depth(feet)		Formation
610 - 650	As above, with abundant spicules.	
650 - 710	Light grey dense limestone with saccharoidal calcite, crinoid ossicles, some glauconite.	
710 - 760	Brown ferruginous sand with Globigerina linaperta, Globigerapsis index, fish remains.	Buccleuch Group
760 - 810	Grey pyritic grit with subrounded grey quartz grains to grit size, shark teeth, pyrite infilled naticid gastropods.	Knight Group
810 - 860	Grey pyritic and limonitic grit with shark teeth.	
860 - 910	Grey quartz grit, pyritic, with abundant milky quartz.	
910 - 960	Grey quartz grit.	
960 - 1002	Grey white pyritic quartz grit with abundant milky quartz grains.	
1002 - 1012	Core 1. Recovered 3 feet, 30 per cent. Dark brown-grey carbonaceous mudstone with very fine angular quartz grains, fine pyrite aggregates, abundant plant remains some carbonized, abundant fine muscovite, occasional chlorite flakes. Two impoverished tests of Cibicides sp.	

(2) Mt. Salt Structure Hole No. 2

0 - 30	No samples.	
30 - 70	Cream recrystallized limestone; fauna obscured by diagenesis.	Gambier Limestone
70 - 80	Cream fine grained partially recrystallized bryozoal limestone with Cassidulina subglobosa, Heronallenia parri.	

Depth(feet)		Formation
80 - 775	No samples.	
775 - 820	Brown medium to coarse pyritic sand with mostly clear quartz grains, angular to subangular and some milky grains, agate grains, limonite grains and iron-staining.	Knight Group
820 - 870	Grey milky quartz grit, somewhat pyritic.	
870 - 992	Grey medium quartz sand, pyritic.	
992 - 1002	Core 1. Recovered 5 feet, 50 per cent. Grey very fine sandstone with fine angular quartz, biotite, muscovite, chlorite and coalified plant remains. Three megaspores: Pyrobolospora reticulata and Pyrobolospora hexapartita.	

(3) Mt. Salt Structure Hole No. 3

0 - 60	Cream friable flinty limestone with Astrononion centroplax, Carpenteria rotaliformis, Eponides repandus, abundant Cibicides pseudoungerianus, rare Globigerina of the bulloides group	Gambier Limestone
60 - 170	Cream partially recrystallized bryozoal limestone with abundant flints, corals, Victoriella conoidea.	
170 - 220	Cream partially recrystallized flinty limestone with bryozoa, echinoids, corals, Victoriella conoidea, Eponides repandus.	

Depth(feet)			Formation
220	- 270	As above with abundant flints and Victoriella.	
270	- 320	Cream flinty partially recrystallized and somewhat chalky bryozoal limestone with Victoriella conoidea.	
320	- 410	Cream recrystallized bryozoal limestone with saccharoidal calcite. Tooth.	
410	- 470	Dense recrystallized limestone.	
470	- 510	Grey chalky dense limestone with spicules.	
510	- 680	Grey somewhat marly limestone with abundant Stomatorbina concentrica and Carpenteria rotaliformis.	
680	- 760	Grey marly limestone, somewhat glauconitic, limonitized, shark's tooth.	Buccleuch Group
760	- 770	Grey glauconitic marl with pyrite and quartz, Globigerina linaperta, Globigerapsis index.	
770	- 780	As above with shark tooth.	
780	- 820	Brown limonitic sand with Ammodiscus parri (probably from cavings).	Knight Group
820	- 840	Brown silty quartz sand and limonite pellets. Ribbed tooth.	
840	- 850	Brown ferruginized sandstone.	
850	- 900	As above, with carbonaceous silt, agate grains, pyrite, subrounded polished brown quartz.	
900	- 992	As above.	

Depth(feet)		Formation
992 - 1002	Core 1. Recovered 3'4", 33 per cent. Brown interlaminated siltstone, very fine sandstone and mudstone; carbonaceous, micaceous.	

(4) Mt. Salt Structure Hole No. 4

10 - 60	Cream friable bryozoal limestone with Victoriella conoidea.	Gambier Limestone
60 - 150	Cream recrystallized somewhat chalky limestone with Victoriella conoidea.	
150 - 250	Cream recrystallzied bryozoal limestone.	
250 - 300	Cream fine grained recrystallized limestone with saccharoidal calcite.	
300 - 500	Grey marly limestone with abundant sponge spicules.	
500 - 550	Grey glauconitic and pyritic marly limestone with abundant spicules.	Buccleuch Group
550 - 580	Greenish glauconitic marl with Cibicides pseudoconvexus and Cibicides umbonifer, large Lenticulina, Globigerina linaperta, Globigerapsis index, Pseudopolymorphina sp., Epistomina elegans.	
580 - 600	Greenish glauconitic and limonitic sand with shark and other fish teeth, glauconite and limonite pellets, Globigerapsis index.	
600 - 610	Brown, limonitic sand with shark teeth, Glomospira sp.	Knight Group

Depth(feet)		Formation
610 - 650	Brown limonitic grit with teeth and other fish remains.	
650 - 700	Red brown limonitic quartz grit with shark teeth and other vertebrate remains.	
700 - 718	Grey pyritic gritty sandstone.	
718 - 992	Grey pyritic gritty sandstone with milky quartz.	
992 - 1002	Core 1. Recovered 1 foot, 10 per cent.	

(5) Mt. Salt Structure Hole No. 5

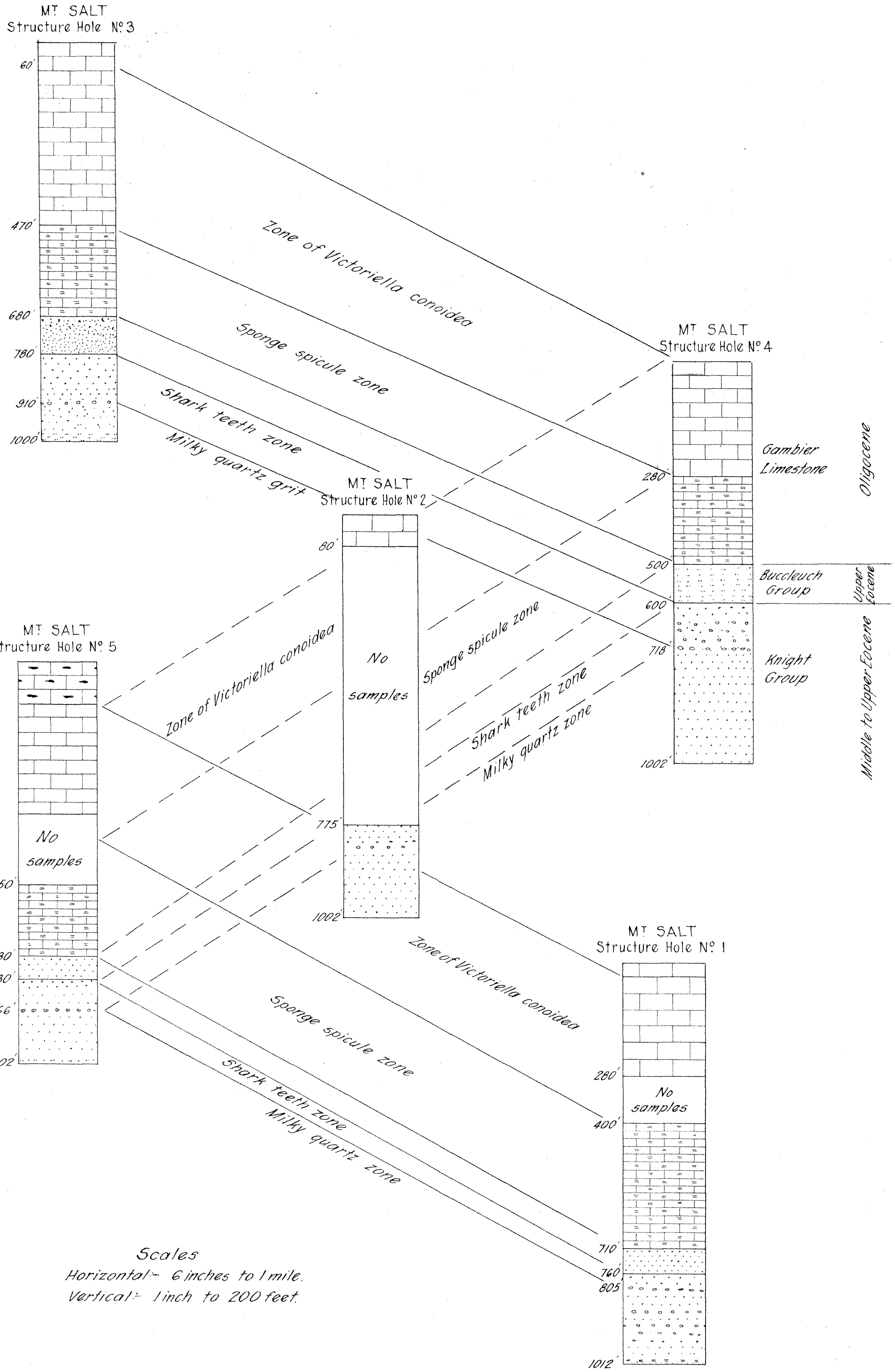
10 - 60	Cream flinty friable bryozoal limestone with Vagocibicides maoria.	Gambier Limestone
60 - 110	Cream flinty, bryozoal limestone.	
110 - 160	Cream flinty bryozoal limestone with abundant Victoriella conoidea.	
160 - 260	Cream chalky recrystallized bryozoal limestone with Victoriella conoidea.	
260 - 310	Cream recrystallized bryozoal limestone with Victoriella conoidea.	
310 - 370	Cream recrystallized bryozoal limestone with saccharoidal calcite.	
370 - 550	No samples.	
550 - 700	Grey marly limestone with abundant spicules.	
700 - 720	Grey marly limestone with pyrite inclusions, quartz sand, some limonite.	
720 - 730	Grey marly limestone with saccharoidal calcite.	
730 - 740	Greenish glauconitic marl with Cyclammina incisa, large Lenticulina and glauconite pellets.	Buccleuch Group

Depth(feet)			Formation
740	- 750	Greenish glauconitic sand with *Globigerapsis index* and *Globoquadrina primitiva*.	
750	- 760	Greenish glauconitic and limonitic sand with fish remains.	
760	- 780	Brownish limonitic sand with green glauconite pellets changing to limonite.	
780	- 790	Red brown limonite and quartz sand.	Knight Group
790	- 800	Brown limonitic sand with abundant quartz, fish teeth.	
800	- 810	Red brown limonitic sand.	
810	- 860	Grey and clear pyritic quartz grit.	
860	- 910	Grey quartz grit with mostly clear quartz some pyrite and milky quartz grains.	
910	- 992	As above.	
992	- 1002	Core 1. Recovered 5'4". 53 per cent. Dark brown highly carbonaceous sandy silt with patches of light brown fine sand consisting of very fine angular quartz grains.	

7. REFERENCES

LUDBROOK, N.H., 1961 - Stratigraphy of the Murray Basin in South Australia. Geol. Surv. S. Aust. Bull. 36.

LUDBROOK, N.H., 1962 - South East Oil Syndicate Ltd. Beachport No. 1 Well, Subsurface Stratigraphy and Micropalaeontological Study. S.A. Dept.Mines Pal. Rep. 2/62 (unpublished).



Scales
Horizontal:- 6 inches to 1 mile.
Vertical:- 1 inch to 200 feet.

To accompany report by N.H. Ludbrook

S.A. DEPARTMENT OF MINES

No.	Amendment	Exd.	Date

MT SALT
STRUCTURE DRILLING PROJECT OF OIL DEVELOPMENT N. L.

Approved	Passed		Scale : as above
		Drn.	62-612
	NH	Tcd. M.B.L.	Kd 20
		Ckd.	
Director		Exd.	Date 28·8·62

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