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PLANET MINING COMPANY PTY. LTD.

GEOLOGICAL REPORT ON PHOSPHATE LEASE

No. E.L. 26-65

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by

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of

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ABSTRACT.

This report outlines field work conducted on Planet Mining Company Phosphate Lease E.L. 26-65 in North West Tasmania. Preliminary investigations in January 1966 had indicated values of up to 5.4% P_2O_5 in grab samples taken from Cambrian sediments and this present survey was undertaken as a follow up programme.

A field evaluation which included qualitative and quantitative geochemical phosphate determinations, was carried out, but no phosphate values over any significant width were encountered.

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I INTRODUCTION

This report outlines field work conducted between 15th May and 30th May 1966 on Planet Mining Co. Phosphate Lease No. E.L. 26.65 in North West Tasmania.

The field work was carried out to follow up information gained from preliminary investigations conducted in January 1966. The preliminary investigations had indicated favorable environmental conditions and values of up to 5.4% P₂O₅ had been obtained in grab samples taken from Cambrian sediments.

The Cambrian rocks of the lease area occupy three north to south trending strips between the coast and the Arthur River. These rocks are in general poorly exposed.

A detailed sampling and mapping programme was undertaken as follows:

(i) Mapping and qualitative field testing of Cambrian sediments exposed in the lease area.

(ii) Analysis of specimens showing qualitative field indications of above background P₂O₅ values

II PREVIOUS WORK.

The current search for Phosphates in Tasmania was prompted by a report entitled "The future of phosphate exploration in Australia" compiled by Dr. R. O. Brunnschweiler for Planet Mining Co. Summarily this report reviewed economic, geologic and exploration factors relating to phosphate deposits in Australia. From theoretical considerations Dr. Brunnschweiler made recommendations as to sedimentary basins where phosphate concentrations might be expected. Amongst these were included the Gippsland/Otway etc. Tertiary basins.

Subsequent to this report Planet Mining Co. obtained phosphate leases in north west Tasmania and the offshore islands where areas of marine Tertiary strata were considered to have commercial phosphate potential. The first investigations were undertaken by McKellar, Brunnschweiler and Watts (Preliminary report Watts 1966) by means of a reconnaissance flight to delineate marine Tertiary strata and accessibility of the lease areas. This reconnaissance flight led to the following general conclusions:

(i) The geomorphology of the offshore islands seemed to preclude any great thickness of Tertiary.

(ii) Significant marine Tertiary sediments were possibly present in the vicinity of Green Point on the west coast of Tasmania.

Following this a reconnaissance literature and field investigation was undertaken (Watts 1966) to further evaluate the possibilities for commercial phosphates. The results and conclusions drawn from this work were included in the Preliminary report (Watts 1966). Summarily this work led to the following general conclusions:

1) The marine Tertiary showed no evidence of being a potentially commercial phosphate producer.

2) The Palaeozoic rocks of the mainland lease, however, showed an interesting phosphate potential, with scattered high P₂O₅ values and to a limited extent, favourable environmental conditions.

These preliminary investigations therefore resulted in a shift in emphasis from Tertiary to Palaeozoic rocks as regards possible phosphate accumulations.

III FIELD PROCEDURES

In general phosphate exploration has proved difficult due to the non diagnostic field nature of this class of deposits. Because of this, qualitative geochemical field tests were generally employed in addition to normal geologic mapping procedures.

To this end representative grab samples were collected for each lithology. These were subjected to a qualitative field test for phosphate. In those cases where a positive reaction was obtained a channel sampling programme over a maximum of 5 feet intervals was undertaken and the samples assayed quantitatively.

A total of 128 samples were qualitatively assessed and a further 44 sent for P2O5 analysis.

IV GEOLOGY AND GEOCHEMISTRY

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1) General

Pre-Cambrian rocks occur over most of the area. In general these consist of a sedimentary formation (Quartzites, Dolomites etc.) and a metamorphic formation which together comprise the Table Cape Group. Age relationships within the group are difficult to define.

Generally sedimentation in Pre-Cambrian times was affected by the existence of a large geanticlinal ridge extending south west across Tasmania from the vicinity of Ulverstone to the south coast.

In Cambrian times this geanticlinal ridge persisted and was rejuvenated. Primarily Cambrian sedimentation in the lease area was affected by the Rocky Cape geanticline (south west of Wynyard) with sedimentation occurring on the west flank of this in the lease areas.

The extent of the Cambrian rocks in the lease area is shown in Enclosure 1. In general these rocks are poorly exposed and incompletely mapped. Nye (1937) and Guilline (1958) have mapped the northern part of the Cambrian - Pre-Cambrian rocks at Smithton. The two westernmost patches of Cambrian rocks are, in particular, very poorly exposed.

Table I shows a generalised stratigraphic column for the area after Guilline (1958)

TABLE I

Age	Group	Lithology	Thickness
Quaternary		Alluvium	20'
Tertiary		Non marine, marine and volcanics	140'
Cambrian	Dundas	Siltstones-cherts-slates breccias-conglomerates and lavas	5000' ?
Pre-Cambrian	Carbine	Smithton Dolomite Bryant Hill Quartzite Undifferentiated Pre-Cambrian	3200' ?

Nye (1937) draws a somewhat different stratigraphic column for the Smithton district assigning the Bryant Hill Quartzites and the Smithton Dolomite to a Cambro-Ordovician series. This, notwithstanding, his local subdivision of the series is of value. This subdivision is shown in Table 2.

TABLE 2

Age	Group	Stage
Cambro-Ordovician	Dundas	Dolomite stage Slates, breccia and limestone stage. Chert, slate etc. substage. Dolomite substage. Grey-green quartzite stage. White quartzite stage.

Stratigraphic differences apart, of interest for possible phosphate accumulations are Nye's chert, slate etc. substage and slate, breccia and limestone stage. For the purposes of this report these two stages are called Stage I and II respectively. (Enclosure 1) It is with these two stages that the present investigation is primarily concerned.

It must be emphasized that this subdivision has little stratigraphic significance and is a somewhat arbitrary division adopted for convenience only.

The Pre-Cambrian Bryant Hill Quartzites and their correlatives outcrop extensively in the area. In the Smithton district they comprise a fine grained sandstone with rounded quartz set in a predominantly siliceous matrix. The succeeding grey-green quartzites show a more pronounced metamorphic character with gradations and interbeds of a siliceous slaty rock. The Smithton dolomite consists of a light grey, thickly bedded dolomite with pronounced silicification features especially near to the top of the unit.

The stratigraphic relations within the succeeding stages I and II and within the Dundas group generally are difficult to define.

In particular the Smithton Dolomite to Cambrian contact is gradational. In other areas the grey-green quartzite stage of Nye (1937) appears to grade directly into the chert-slate substage of Nye (1937).

Within stage I and II lateral and vertical gradations appear to be the rule. It is probable that stage I may be assigned to the Pre-Cambrian with a gradational contact to the Cambrian stage II.

This, apart ^{from} the likelihood of lateral gradational equivalents of the high background P205 chert values noted previously, gave impetus to the present study.

2) Stage I.

This group of rocks shows a dominant chert-slate lithology comprising dense cherts, siliceous breccias, oolites and purple slates.

In general this stage is poorly exposed, occurring as a narrow strip from the mouth of Deep Creek in the north to Nabageena to the south. South from Nabageena only chert drift of doubtful affinity occurs.

The following outcrops were visited and sampled:

(a) Duck Bay.

A small outcrop 200 yards east of the mouth of Deep Creek consists of dark massive cherts and siliceous breccias. No evidence for above background P205 values was apparent. The location of this is shown in Enclosure 2 Station 1.

(b) Bryant Hill.

Samples of chert and cherty limestone occurring at the base of the hill show analyses of 0.25% P205.

(c) Irishtown Gravel Pits.

The preliminary investigations carried out in the area gave one value of 4.0% P205 for a siliceous conglomerate from this locality. The following section was measured and sampled:

(i) West of Smithton - Trowutta Highway.

Top Thickness	Lithology	Sample No.
5"	Chert, grey to black massive	W15
6"	Chert conglomerate with chert pebbles set in a white silicic matrix	W16
3'	Chert, grey, fractured	W17
4'	Chert as above	W18
2'	Chert as above interbedded with purple slates	W19

Base

Approximately 20 yards to the east the following section is exposed:

	Sample Nos.
Top 6' Weathered silicified oolite	
6' Silicified oolite interbedded with chert	W119
2' Chert and purple slates	W104 to W106

The general aspect of the slates ^{and} cherts is shown in Photos 1 and 2



PHOTO 1.

Slates exposed in Irishtown Gravel Pits.



PHOTO 2

Cherts exposed in Irishtown Gravel Pits.

(ii) East of Road.

Approximately 10' of breccias grey and brown cherts are exposed.

Qualitative and quantitative tests of these samples yielded values of 4.2% P2O5 for the 2' bed represented by sample W19. The remainder of the samples showed values up to a maximum of 0.72% P2O5 for the cherts of sample No. W106

(d) Occasional scattered outcrops and drift occur south from the Irishtown Gravel Pits. These invariably show a chert lithology with no indications of phosphates. The only remaining extensive outcrop of this stage is at the Nabageena gravel pits.

(e) Nabageena Gravel Pits.

(i) North side of Smithton Nabageena Road

Top	Thickness	Lithology	Sample No.
	5'	Chert with thinly interbedded silicified mudstones	W30
	2'	Shale and slaty shale	W31
	6'	Chert with interbeds of silicified lavas and ash	W32
	4'	Chert interbedded with kaolinised red mudstones	W33
	4'	Cherts	W34
	30'	Cherts and mudstones	W35
		Basalt ?	
Base			

(ii) South side of Smithton Nabageena Road.

This sequence lies above the previously described outcrop.

Top	Thickness	Lithology	Sample No.
	5'	Silicified cherty dolomites	W67
	1'	Kaolinised volcanics	W68
	4'	Massive splintery shale	W69
	8'	Shales, slates and silicified slates	W70
	5'	Spotted shales and slates	W71
	5'	Blocky siltstones	W72
	5'	Blocky slates	W73
	6'	Cherty laminated shales and slates	W74
Base	4'	Spotted slates	W75

Sample W69 here represents the transition from stage I to stage II. These beds strike at approximately 15° dipping 30° to the west. No significant above background analysis for P205 ^{were} encountered and the value of up to 5.3% P205 for sample No. W34 noted in the preliminary investigations ^{were} not duplicated. Maximum values of 0.47% P205 were obtained.

Photos No. 3 and 4 show the general aspect of the cherts and the topography of the southern quarry.

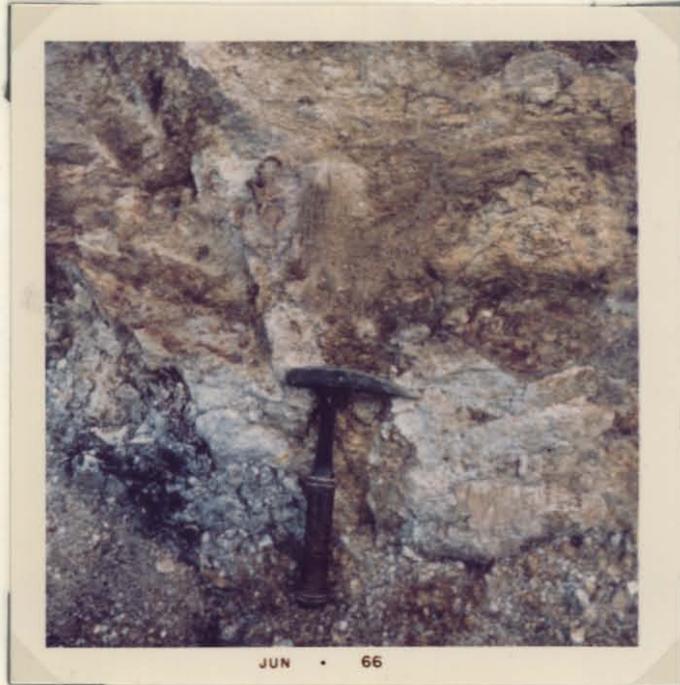


PHOTO 3

Cherts exposed in Northern outcrop.



PHOTO 4

Quarry on south side of road.

(e) Edith Creek

Scattered chert outcrops occur in this chert to the west of the Nabageena road quarries. No. P205 values in these cherts were recorded.

3) Stage 2.

The relationships between this and the preceding stage have been noted previously. This stage is an approximate correlation of the slate, breccia and limestone stage of Nye (1934).

Nye (1934) estimates the thickness at this stage as approximately 4,000'.

A virtually complete section of this can be followed from the bridge at Smithton around the coast. The extent of the outcrops is shown in the appended sketch map (Enclosure 2). Stations 2 to 4 (Enclosure 2) shows a variable sequence of mudstones, siltstones, slates with cherty laminations. The general structure is shown in the accompanying sketch map but minor small scale folding and faulting features are common.

An intensive sampling and testing programme was undertaken. No significant phosphate values were noted with a maximum value of 0.83% P₂O₅ being obtained from a green massive mudstone taken from station 3.

Photos 5, 6 and 7 illustrate the general aspect of these sediments exposed on the shore.



PHOTO 5

Siltstones and sandstones exposed on Duck Bay Beach.



PHOTO 6

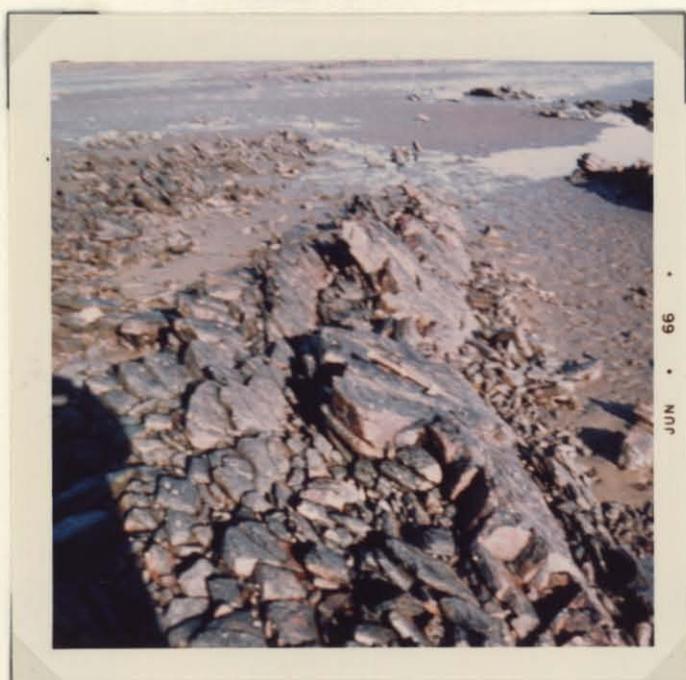


PHOTO 7

Steeply dipping slates exposed on Duck Bay Beach.

From Station 4 to Park Point, lavas are exposed. In the Duck Bay Estuary a sequence of green massive mudstones, slates, sandstones and tuffs outcrop. Again these show variable small scale structural contortions. Sampling of these rocks again gave no above background phosphate indications.

At station 8 (south of Smithton Bridge) a sequence of highly weathered oolites are exposed but show no above background P205 values.

Further exposures of this stage occur at Montague extending approximately one mile east and west of the jetty. The stratigraphic affinities of these rocks are in doubt, but they show similarities to the sequence as exposed in the Duck Bay estuary. A total of 23 samples were collected and tested with no significant values.

Inland this stage outcrops poorly. Traverses in the Christmas Hills area, Allen Creek, Scandelbury Hill, Meany Hill and

various roadside outcrops yielded weathered slates, mudstones and lavas with no P₂O₅ values.

A traverse along part of the Arthur River was undertaken (Enclosure 1) in an attempt to define a cross section of this stage in the wouth outcrop area. Massive cliffs of limestone and cherty limestone were encountered but for the most part outcrops were very limited.

In summary this stage exhibited no phosphate bearing characteristics.

V CONCLUSIONS AND RECOMMENDATIONS

The surveys conducted to date have failed to show any values greater than 5.4% over any significant widths. Because of the thorough sampling and testing programme undertaken in the present survey, no commercial accumulations of phosphates may be expected in the outcrops of Cambrian strata examined in the lease areas.

The scattered high values occur primarily in the cherts of Stage I with only minor values of up to 0.82% P₂O₅ in the Stage II rocks. Although gradations between the two stages are common this is not accompanied by an increased phosphate content.

The relinquishment of Phosphate Lease E.L. 26-65 is therefore recommended.

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APPENDIX I

SAMPLE AND ASSAY RESULTS.

No.	Location	Stage	Width	Lithology	%P205
W6	Duck Bay Beach	2	12'	Mudstones	0.2
W7	"	2	40'	Siltstones	0.2
W8	"	2	30'	"	0.15
W9	"	2	11'	Sandy shales and cherts	0.11
W19	Irishtown Gravel Pits	1	2'	Cherts and purple slates	4.2
W21	Bryant Hill	1	2'	Chert drift	0.25
W22	Duck Bay Beach	2	5'	Red mudstones	0.15
W23	"	2	6'	Green sandstones	0.48
W24	"	2	8'	Red sandy mudstone	0.44
W25	"	2	9'	Siltstone	0.69
W26	"	2	10'	Mudstone	0.83
W27	"	2	30'	Shale	0.25
W28	"	2	20'	Mudstone	0.55
W29	"	2	5'	Siltstone	0.79
W30	Nabageena Quarry	1	5'	Chert and kaolin	0.3
W35	"	1	30'	Cherts	0.47
W37	Duck Bay Beach	2	10'	Red mudstones	0.32
W39	"	2	12'	Green-grey siltstones	0.38
W65	Allen Creek	2	2'	Shale: dark grey, massive	0.61
W66	" "	2	4'	Massive mudstone-claystone	0.34
W71	Nabageena Quarry	1	5'	Slate - siltstone	0.21
W77	Duck Bay Beach	2	7'	Green mudstones	0.57
W78	"	2	15'	Siltstone	0.53
W79	"	2	25'	Silty slaty shale	0.54
W80	"	2	200'	Grey-green mudstone	0.57
W81	"	2	15'	Kaolinised mudstone	0.37
W82	"	2	10'	Red mudstone-shale	0.53
W83	"	2	5'	Shale with chert	0.54
W84	"	2	10'	Black, shale	0.19
W86	"	2	12'	Mudstone	0.41

No.	Location	Stage	Width	Lithology	%P205
W87	Duck Bay Beach	2	15'	Silty mudstone	0.32
W89	"	2	20'	Mudstone and chert	0.46
W91	"	2	4'	Slates	0.24
W92	"	2	10'	Blocky mudstone	0.25
W93	"	2	15'	Red mudstone	0.27
W95	Smithton Bridge	2	10'	Mudstone	0.26
W96	"	2	10'	Weathered oolitic limestone	0.30
W106	Irishtown quarry	1	6'	Cherts	0.72
W113	"	1	6'	Silicified oolite	0.07
W114	"	1	6'	Silicified oolite	0.02
W115	"	1	2'	Oolite and chert	0.04
W116	"	1	4'	Oolite and chert	0.52
W117	"	1	2'	Slates	0.15
W118	"	1	2'	Weathered silty slates	0.21

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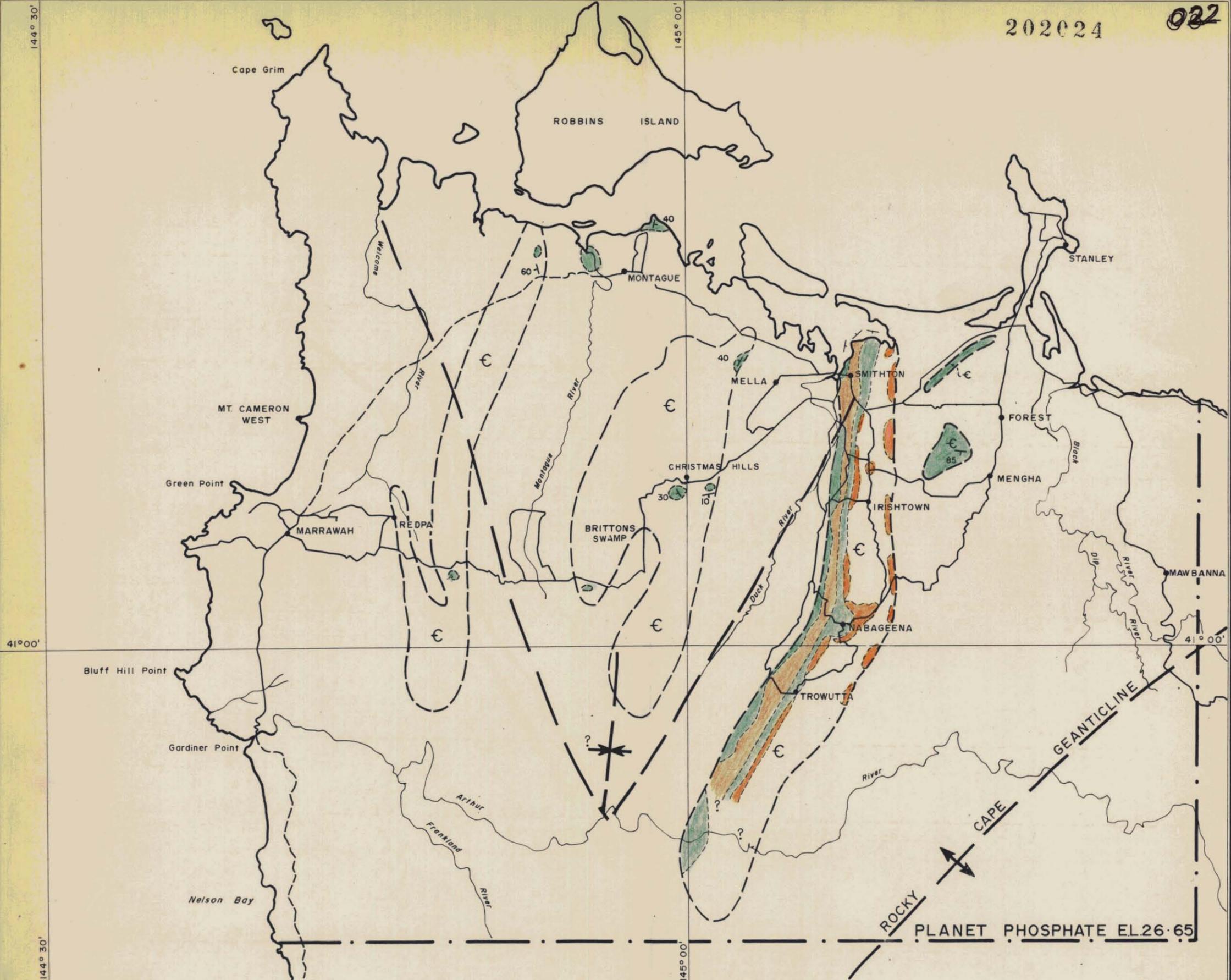
VII ENCLOSURES

1. Phosphate lease E.L. 26-65 showing geology and extent of Cambrian rocks.
2. Geological sketch map of coast between Deep Creek and Smithton.

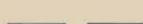
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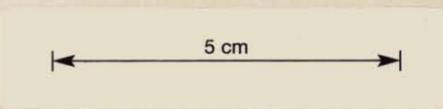
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REFERENCE

-  CAMBRIAN LAVAS
-  CAMBRIAN STAGE II
-  CAMBRIAN STAGE I
-  MAJOR STRUCTURAL AXIS
-  CAMBRIAN
-  APPROXIMATE EXTENT OF CAMBRIAN



PLANET MINING COMPANY
PHOSPHATE LEASE IN NORTHWEST TASMANIA
 SHOWING EXTENT OF CAMBRIAN ROCKS.
 LEASE NUMBER E.L. 26.65

CUNDILL MEYERS AND ASSOCIATES
 TO ACCOMPANY REPORT BY T.R. WATTS
 AUGUST 1966

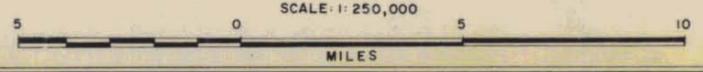
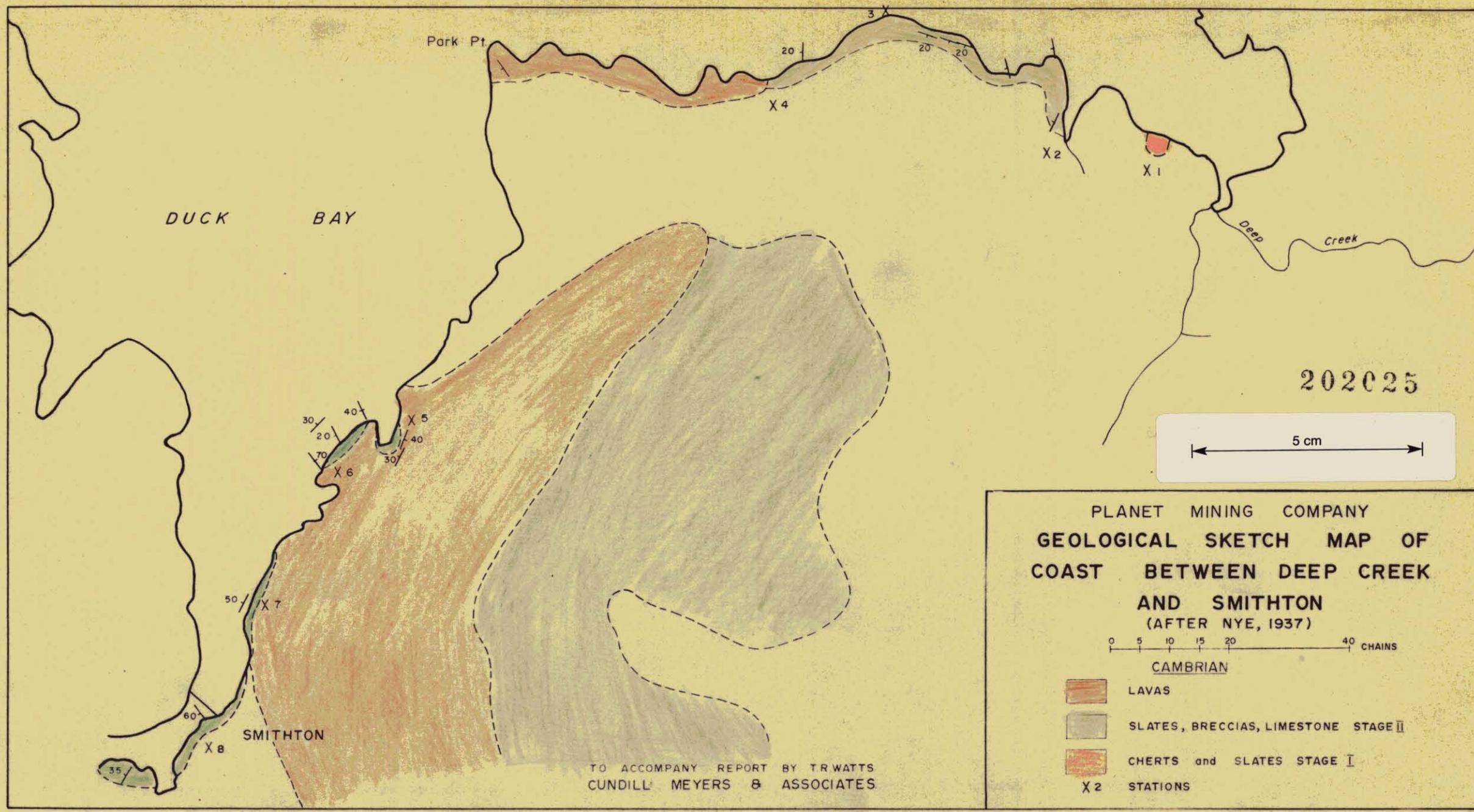
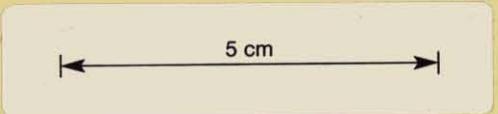


FIG. 1



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PLANET MINING COMPANY
**GEOLOGICAL SKETCH MAP OF
 COAST BETWEEN DEEP CREEK
 AND SMITHTON**
 (AFTER NYE, 1937)

0 5 10 15 20 40 CHAINS

CAMBRIAN

- LAVAS
- SLATES, BRECCIAS, LIMESTONE STAGE II
- CHERTS and SLATES STAGE I
- X 2 STATIONS

TO ACCOMPANY REPORT BY TR WATTS
CUNDILL MEYERS & ASSOCIATES