RIO TINTO AUSTRALIAN EXPLORATION PTY. LIMITED

MELBOURNE, AUSTRALIA

PROJECT:—

REPORT No.:—

R.T.A.E. AND E.Z. EXPLORATION PROGRAMME

GEOPHYSICAL SURVEYS IN N.W. TASMANIA

TO 31ST MAY 1957 - PROJECT PRP/7/100

by

E. McCarthy

FILE REFERENCE:—

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R.T.A.E. AND B.Z. EXPLORATION PROGRAMME

GEOPHYSICAL SURVEYS IN N.W. TASMANIA

TO 31ST MAY 1957 - PROJECT PRP/7/100

Geophysical surveys conducted in N.W. Tasmania until May 31st, 1957, include airborne magnetometer, airborne electro-magnetometer and spontaneous potential surveys. Notes on each type of survey are given below.

ELECTRO-MAGNETOMETER SURVEY

The helicopter-borne electromagnetic survey over selected areas was conducted from bases at Rosebery, Queenstown, Waratah and Zeehan at intervals during the period November 7, 1956 and April 23 1957. The hatchured portions on the attached map (Plate 5) show the areas covered with an average flight line spacing of one fifth mile. During this period of a total of 60 hours 14 minutes flying time was used. The greater part of the survey was conducted during November and April. No flying was conducted in December and flying was intermittent during January, February and March, due to a variety of causes of a technical and administrative nature. Table 1 attached shows the record of flying times.

Survey flying was conducted from Rosebery during the month of November. During the months of January, February and March the base of operations was Queenstown, when the use of the helicopter was shared between the contractor and outside organisations. Most flying was conducted in April when bases at Rosebery, Waratah, Queenstown and Zeehan were used, and the contractor had the exclusive use of the helicopter. Table I attached shows the times spent on all survey flying. The sortie times have been broken down into transit and turn times, time spent on flight line flying and times spent on flight line flying when the detector equipment was carried below the limit of detectability of 150 feet. All times are given in minutes.

Early in the survey it was realised that full coverage of the area of the Dundas Group of rocks set down as the initial target, could not be achieved effectively. Reasons for this were (a) that it was impossible to fly the helicopter over tree covered country and maintain the height of the detecting equipment within effective range of the ground (b) it was not possible for the helicopter to fly in areas of high topographic relief maintaining the detector within effective range of the ground (c) inability of the navigator to "pin-point" the position of the helicopter over densely wooded country. However, results obtained during the initial stages indicated that the equipment could be a useful prospecting tool in areas difficult of access by more conventional means of transport. Consequently the contractor undertaking the survey was urged to cover as much of the area as possible.

Initially, tests were carried out over known conducting bodies in the Henison Bell area. It was evident from these tests that the range of detectability of the equipment was not greater than 150 feet. These tests also showed the necessity for installing a recording radio-altimeter in the aircraft so that a correction for altitude of the detecting equipment could be applied to the results obtained during the survey.

The purpose of the electromagnetic equipment is to locate conducting bodies in the ground by the measurement of the distortion by the presence of the conducting body of an electromagnetic field set up by the transmitting coil of the equipment. The receiving section of the equipment measures the amplitudes of the "in-phase" and the "out of phase" components of the electromagnetic field at the receiving coil. The presence of conducting bodies within range of the detector causes the amplitude of these components to vary causing anomalies. A variation

in the recorded amplitude in the "in phase" record is referred to as a phase anomaly. A variation in the recorded amplitude of the "out of phase" or "phase quatrature" signal is referred to as an amplitude anomaly.

A number of anomalies both in phase and amplitude signals were recorded during the survey. Three types of anomalies were identified (a) anomalies with a relatively large amplitude change along with a small phase change. These always correspond with low detector altitude and can be classed as "height anomalies" and discarded. (b) anomalies with an amplitude change and a negative phase change. These were recorded over areas where the mineral magnetite was known to occur and were discarded. (c) anomalies where the phase change was equal to or greater than the amplitude change. These were measured, classified and the positions plotted. Examples copied from the actual traces of type a, b and c anomalies are shown on Plate 6.

The type (c) of anomalies have been classified into 1st 2nd and 3rd order. This classification and measurement of anomalies is more qualitative than quantitative. Difficulties met in the assessment of anomalies are numerous as listed below: (1) the equipment was not carried over the ground with the detector within range of detectability for all survey time. (2) the distance between ground and the detector was not constant. (3) the radio-altimeter does not faithfully reproduce the contour level of the detector with respect to the ground surface. (4) the equipment response was affected by varying amounts of drift due to variations in the linear dimensions of the housing of the detecting equipment and temperature variations of the detecting equipment affecting the operation of the transistors in the equipment. (5) the stability of the detecting equipment.

The flight lines and type "c" anomalies have been plotted on overlays of aerial photographs. The approximate positions of the anomalies are shown on Plate 5 attached. The classification of anomalies is given in Table II attached.

It will be seen that more anomalies have been recorded in the northern section of the area covered than in the southern section. A large number of the anomalies correspond with the margins of the areas of serpentine or gabbro.

A small amount of follow-up work has been done on some of the anomalies, namely, 4/9 (previously referred to as F/9) in the Renison Bell area, in the Sterling Valley area and in the Patterson Hill area. 4/9 was due to the presence of carbonaceous material. Causes of all anomalies in Renison Bell area were not established; some of them corresponded with sulphide occurrence. In the Sterling Valley anomalies were re-located by ground spontaneous potential surveys and found to correspond with sulphides. In the Patterson Hill area the positions of some anomalies have been re-established by S.P. surveys but the cause of the anomalies is still unknown.

Two areas which warrant further immediate investigation are Patterson Hill area (the junction of Area No. 5 and No. 6 refer - Plate 5) and the Mt. Lindsay area No. 14.

Until further field work has been conducted to establish the causes of plotted anomalies, it is difficult to make a true appraisal of the method. This was the first survey in which this method has been used in Australia, and it was expected that operational difficulties would be encountered. However, at the present stage it can be said that in country where the equipment can be flown within the limit of detectability, the helicopter borne R.M. equipment could be a useful tool in exploration.

SPONTANEOUS POTENTIAL SURVEYS

Spontaneous potential surveys were conducted in three areas, namely in Area 9 (W. Cuni); Patterson Hill; and Sterling Valley. The results of these surveys have been given in monthly reports for months of February, March and April. Of these surveys the one in the Patterson area could be the most interesting. The causes of the measured anomalies have not been established. It is recomended that the surveys in this area be extended to delineate the extent of the anomalies and that other field work be undertaken to establish the sources of the anomalies.

RESULTS - AIRBORNE MAGNETIC SURVEYS

The final contour maps of the following areas have been received from the Contractor: Strahan East, Lyell West, Zeehan West, Zeehan East, Murchison West. Preliminary contours for the whole area have been received.

Most of the intense magnetic anomalies recorded in the southern section of the S.P.L. have been inspected by field geologists. Notes on the results of these inspections have been given in monthly reports.

E. McCarthy
Senior Geophysicist

12th June, 1957

TABLE I

ANALYSIS OF FLYING TIME

Date	Sortie	Duration Minutes	T & T Time Minutes	Line Flying Time	Time Below 150'	Area	Area Number	Rolls
12.11.56	1	95	-	-	-	Renison Bell	1	5
12.11.56	2	70	-	-	-	" "	1	6
12.11.56	4	70	-	-	-	Tullah	2	7)
12.11.56	5	35	-	-	-	Tullah	2	)
16.11.56	1	115	69	46	6	Razorback	4	99A
16.11.56	2	55	33	22	5	Renison Bell	3	10,10A
16.11.56	3	50	29	21	4.5	Renison Bell	3	12,12A
17.11.56	1	110	54	56	40.5	Rosebery	5	11,11A
27.11.56	1	65	25	40	17.5	Rosebery	5	15 15A
28.11.56	1	95	42	53	26	Nth.Pieman	6	16 16A
28.11.56	2	80	21	59	48	Nth. Pieman	6	16 16A
28.11.56	3	85	49	36	19	Nth. Pieman	6	17 17A
28.11.56	4	60	23	37	27	Sterling	7	19 19A
8.1.57	1	30	-	-	-	Renison Bell	1	20 20A
12.1.57	1	85	-	-	-	Renison Bell	1	21 21A
13.1.57	1	55	37	18	16.5	W. Cuni	9	23 23A
11.2.57	1	65	28	37	12	L.Margaret	15	24 24A
11.2.57	2	65	28	37	12	W. Lyell	12	25 25A
11.2.57	3	90	47	43	29	W.Lyell, L.Margaret	12,15	26 26A
12.2.57	1	85	55	30	15	L. Margaret	15 15A	27 27A
8.3.57	1	60	36	24	17	Lake Dora	16	28 28A
8.3.57	2	75	50	25	14	Lake Dora	16	28 28A
2.4.57	1	99	24	75	37.5	W. Lyell	12S	29 29A
2.4.57	2	75	33	40	24	W. Lyell, Henty	12S 17	30 30A
2.4.57	3	50	37	13	6.5	Henty	17	31 31A
4.4.57	1	80	31.5	47	28	King River,)	27	
						Comstock)	11	32 32A
						W. Lyell)	12N	
5.4.57	1	100	53.5	45	24	Little Henty	26	33 33A

TABLE I

ANALYSIS OF FLYING TIME

Date	Sortie	Duration Minutes	T & T Time Minutes	Line Flying Time	Time Below 150'	Area	Area Number	Rolls
6.4.57	1	100	36.5	63.5	34	Boko	20	34 34A
7.4.57	1	90	45.5	33	16	Mt. Lindsay	14	35 35A
7.4.57	2	115	45.5	45.5	30	Mt. Lindsay	14	36 36A
7.4.57	3	80	29	43.5	28	Mt. Lindsay	14	37 37A
8.4.57	1	80	42.5	36.5	22	Sterling Valley	22	38 38A
9.4.57	1	65	27	36	32.5	S.Williamsford	10	39 39A
14.4.57	1	100	33	51	18.5	N. Waratah	28	40 40A
14.4.57	2	60	30	27.5	12	N. Waratah	28	41 41A
14.4.57	3	90	24.5	55	38.5	Bischoff	29	42 42A
14.4.57	4	75	28.5	37.5	22	White River	30	43 43A
15.4.57	1	85	48	37	23	S.Valentines Peak	31	44 44A
15.4.57	2	85	55.5	28	18	Pinnacles	32	45 45A
15.4.57	3	50	35	15	11	Sophia Valley	21	46 46A
16.4.57	1	35	27	8	3	Dundas River	13	47 47A
17.4.57	1	85	39	42	25	Stanley River	23	48 48A
17.4.57	2	50	26	19.5	11.5	Sophia Valley	21	49 49A
22.4.57	1	105	24	70	32	W. Cuni	9	50 50A
22.4.57	2	105	35	66	35.5	W.Cuni	9	51 51A
22.4.57	3	50	36	14	7.5	Dundas River	13	52 52A
23.4.57	1	85	34	50	19	Stanley River	23	53 53A
		59h.29m.	25h.6.5m.	26h.22.5m.	14h.28m.			

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TABLE II

RECORDED ANOMALIES

Area No	Area Name	Total Anomalies	Order of Anomalies 1st	2nd	3rd
1	Renison Bell	11	-	26/1 27/1	(23/1 29/1 30/1 31/1 32/1 33/1 47/1 48/1 (49/1
	These exclude anomalies recorded over known working at Renison Bell.				
4	Razorback	2	-	-	7/4 12/4
5	Rosebery	14	1a/5 1b/5	-	(6/5 8/5 9/5 11/5 19/5 2o/5 22/5 23/5 26/5 (30/5 31/5
6	North Pieman	15	6/6 7/6 (Colebrook)	1/6 5/6 20/6	(13/6 14/6 15/6 19/6 23/6 24/6 25/6 27/6 (28/6 29/6
7	Sterling Valley	4	-	-	1/7 2/7 3/7 4/7
9	West Cuni	18	-	6/9 11/9 14/9	1/9 2/9 3/9 4/9 5/9 7/9 8/9 10/9 12/9 13/9 15/9 16/9 17/9 18/9
10	S. Williamsford	Nil	-	-	-
11	Comstock	1	-	-	1/11
12	W. Lyell	3	-	-	1/12 2/12 3/12
13	Dundas River	3	-	-	1/13 2/13 3/13
14	Mt. Lindsay	20	8/14 9/14 14/14	3/14 5/14 10/14 15/14	(1/14 2/14 4/14 6/14 7/14 11/14 12/14 13/14 (16/14 17/14 18/14 19/14 20/14
15	Rolleston	2	-	-	1/15 2/15
16	Lake Dora	1	-	-	1/16
17	Henty	Nil	-	-	-
20	Boko	Nil	-	-	-
21	Sophia Valley	11	-	5/21 7/21 11/21	1/21 2/21 3/21 4/21 6/21 8/21 9/21 10/21
22	Sterling Valley	Nil	-	-	-
23	Stanley River	15	3/23	2/23 4/23	(1/23 5/23 6/23 7/23 8/23 9/23 10/23 13/23 (14/23 15/23
26	Little Henty	Nil	-	-	-
27	King River	Nil	-	-	-
28	N. Waratah	13	-	1/28	(2/28 3/28 4/28 5/28 6/28 7/28 8/28 9/28 (10/28 11/28 12/28 13/28
29	Bischoff	10	-	10/29	1/29 2/29 3/29 4/29 5/29 6/29 7/29 8/29 9/29
30	White River	9	-	7/30	1/30 2/30 3/30 4/30 5/30 6/30 8/30 9/30
31	S.Valentines Peak	Nil	-	-	-
32	Pinnacles	2	-	-	1/32 2/32

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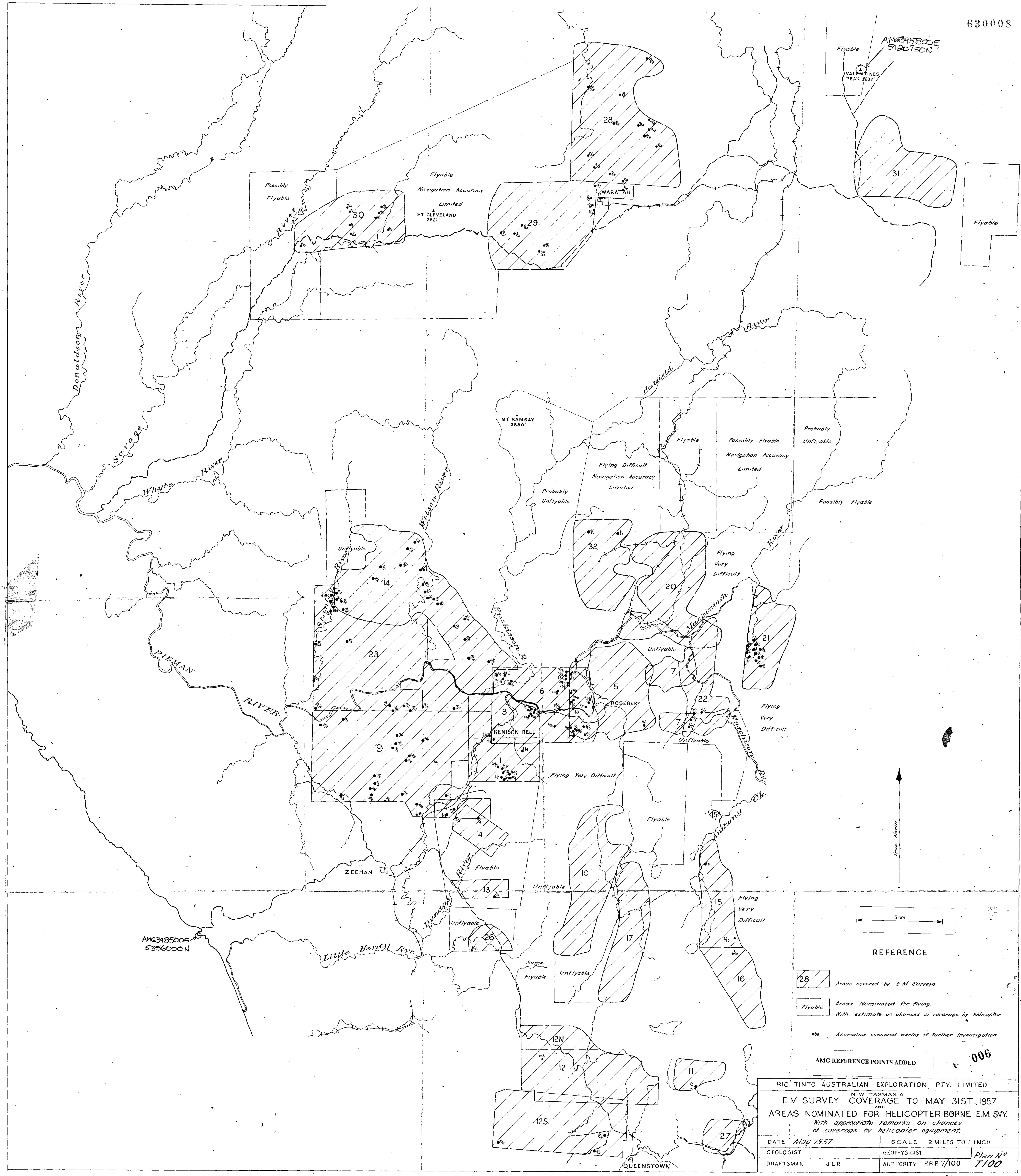
AMG395800E 5420750N
Flyable
VALENTINES PEAK 3637'
Possibly Flyable
Flyable
Navigation Accuracy Limited
MT CLEVELAND 2821'
30
29
28
WARATAH
31
Flyable
Donaldson River
Savage
River
Whyte River
Hatfield
River
MT RAMSAY 3890'
Flyable
Possibly Flyable
Navigation Accuracy Limited
Probably Unflyable
Flying Difficult
Navigation Accuracy Limited
Probably Unflyable
Possibly Flyable
Wilson River
Unflyable
Stanley River
14
32
20
Flying Very Difficult
River
Huskisson R.
Mackintosh
21
PIEMAN
RIVER
23
Unflyable
6
5
7
ROSEBERY
3
22
7
RENISON BELL
Unflyable
Flying Very Difficult
9
Murchison Rv.
1
Flying Very Difficult
15A
Anthony Ck.
Flyable
4
True North
ZEEHAN
Flyable
River
10
13
Unflyable
15
Flying Very Difficult
Dundas
Unflyable
17
26
AMG348500E 5356000N
Little Henty Rvr.
Some Flyable
Unflyable
16
5 cm
REFERENCE
28
Areas covered by EM Surveys
Flyable
Areas Nominated for flying. With estimate on chances of coverage by helicopter
Anomalies consered worthy of further investigation
12N
12A
12
11
12S
27
QUEENSTOWN

AMG REFERENCE POINTS ADDED

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RIO TINTO AUSTRALIAN EXPLORATION PTY. LIMITED

N W TASMANIA

E.M. SURVEY COVERAGE TO MAY 31ST., 1957. AND AREAS NOMINATED FOR HELICOPTER-BORNE E.M. SVY.

With appropriate remarks on chances of coverage by helicopter equipment.

DATE May 1957	SCALE 2 MILES TO 1 INCH
GEOLOGIST	GEOPHYSICIST
DRAFTSMAN J.L.P.	AUTHORITY P.R.P. 7/100

Plan No T100

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