RIO TINTO AUSTRALIAN EXPLORATION PTY. LIMITED

AND

ELECTROLYTIC ZINC CO. OF AUSTRALASIA PTY. LTD.

EXPLORATION PROGRAMME

IN NORTH WESTERN TASMANIA

PRP/7/100

REVIEW OF ACTIVITIES TO 31st MAY, 1957

06_5284

Exploration Programme in North Western Tasmania
PRP/7/100, Review of activities to 31 May 1957
Electrolytic Zinc Company of Australasia Limited; Rio
Campana, B.; Jensen, H.E.; M

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PRP/7/100

REVIEW OF ACTIVITIES TO 31ST MAY, 1957

CONTENTS.

plus King, Clarke } submitted 15/7/57.

Rio Tinto Australian Exploration Pty. Limited

SUMMARY REPORT ON EXPLORATION ACTIVITIES WESTERN TASMANIA

By D. King

Introduction

This report summarises geological exploration activities conducted from the Zeehan field office for the six month period completed on the 31st May, 1957.

The report does not include any detailed reference to the conduct of airborne geophysical surveys or exploration in the Waratah district, both of which have involved Zeehan staff but were directly supervised from Melbourne.

A technical staff of four experienced geologists and three graduate geologists were permanently engaged at Zeehan during the past field season - December to May - while two other qualified geologists were employed on a temporary basis. General planning of the survey was directed by senior geological and geophysical staff who paid periodic visits from Melbourne. Undergraduates representing mainland and Tasmanian universities were among the field assistants supporting the geological parties.

The permanent field complement has been considerably reduced by transfers to Cloncurry during the past month, leaving a skeleton staff to conduct the more restricted programme enforced by winter conditions.

Accompanying Plan (none)

A plan showing the location of all prospects and exploration activities with which the Zeehan staff have been concerned accompanies this report. (See below)

Summary and Recommendations

The following general conclusions and recommendations are drawn from this review of Western Tasmanian operations. More particular recommendations are contained in the notes on the various prospects.

Note: An extended copy has already been included in E.Z. Review Report.

1. Progress in General

The first six months of actual exploration work in Tasmania have been largely concerned with preliminary inspections of numerous geophysical anomalies and mineral prospects which it was hoped may lead to immediate successes. Although no outstanding economic developments have yet been reported, the preliminary work has led to the present stage at which we have established an impressive list of tangible prospects and a valuable background knowledge of the region. A balanced staff has been built up by the addition of supervising economic and regional geologists and their influence can be expected to be of material benefit in the planning, conduct and results of future exploration.

2. Aeromagnetic Anomalies.

Ground work on aeromagnetic anomalies has largely been of a reconnaissance nature on the basis of which a minority due to basic igneous rocks or magnetic iron ore can be eliminated from further interest. There remain a large number of interesting magnetic highs which require a thorough analysis by systematic ground mapping and ground geophysics; of particular interest are those within the mineralised porphyry level defined by the regional mapping.

It is also to be noted that the early checking was based on preliminary maps which showed only approximate locations of the magnetic highs.

3. Airborne E.M. Anomalies

Only the most spectacular or favourably located E.M. anomalies have received any ground inspection to date, and investigations are in most cases incomplete and inconclusive.

4. Associated E.M & Aeromagnetic Anomalies

There are four prospects at which we have superimposed aeromagnetic and airborne E.M. anomalies. Each of these are in areas containing gabbroic rocks. It is of interest in this respect that many ore-bodies of the Dundas and Rosebery districts are localised at gabbro contacts.

The most encouraging results obtained so far are at the Paterson Hill prospect.

5. Geochemical

The results to hand have shown that geochemical prospecting is applicable to some areas of the West Coast, and is well worth pursuing - particularly in supplementing the

detailed investigation of anomalies and other prospects.

6. Appraisal of Mines and Prospects

The investigation of productive mines, prospects and abandoned mines is an aspect of our programme which requires much additional work. The main interest in such investigations lies in the possibility of recognising large, low-grade ore-bodies, favourably placed for cheap mining methods, which have been previously considered only for richer shoots - a common early practice in Tasmanian mining.

Details of mining areas receiving or deserving attention are listed in the report.

1) GROUND INVESTIGATIONS OF AIRBORNE GEOPHYSICAL ANOMALIES

The ground investigation of airborne geophysical anomalies - aeromagnetic and aeroelectromagnetic - was one of the principal activities of the geological staff throughout the past field season. In the initial stages, ground checking was essentially of a reconnaissance nature, justified by the endeavour to find any important ore-bodies that may have been immediately indicated by the survey.

In the latter part of the season, ground geophysical exploration was introduced and provided a sound basis for follow-up work in the more promising anomalous areas.

The following statement gives particulars of the most significant anomalies recorded, together with ground work undertaken, or required.

A. Association of Aeromagnetic and Airborne E.M. Anomalies

Areas in which aeromagnetic and airborne E.M. anomalies were jointly recorded have naturally been considered of prior importance as indications of mineralisation.

Such an association applies in the four cases detailed hereunder:

(a) Paterson Hill (Embracing Paterson Hill aeromagnetic anomaly and airborne E.M. anomalies Nos. 31/5, 27/6, 24/6, 27/5, 28/5, 23/6, 26/5, 20/5, 13/5, 19/6) both types of recordings indicate an elongated anomalous area trending north-south over a length of about one mile - with the axis of the magnetic anomaly slightly to the west of the E.M. high. Ground S.P. work was undertaken from a camp set up on the north bank of the Pieman River and had satisfactorily re-established anomalies when work was temporarily suspended. Geochemical prospecting was tried in the area without any useful results because of a thick blanket of glacial sediments. Geological observations were similarly handicapped, although

a belt of gabbro was observed a few hundred yards to the west of the interesting area.

Owing to difficulties of access and servicing, completion of this promising project may have to be postponed until next summer.

(Refer Monthly Reports Dec. DK, MM; Jan. JHR; Feb. JHR, ABC; March JHR; April MM)

(b) Razorback Area (Embracing Razorback No.2 aeromagnetic anomaly and airborne E.M. anomaly 7/4 - of added interest because of its proximity to the currently worked Razorback tin-bearing sulphide mine)

Intensive geological prospecting was carried out in this area, found to be centred about a large intrusive body of gabbro. Weak sulphide mineralisation as veins were discovered in the anomalous area by both geological (copper-iron) and geochemical (lead-zinc) surveys, but work was abandoned after completion of a reasonably thorough investigation (Refer MR Dec. Jan. JHR and Feb. ABC)

(c) Commonwealth Hill (Marked by a single high order aero-E.M. anomaly No. 26/1 coinciding with the southern end of Pine Hill No. aeromagnetic anomaly - within an S.P.L. held by the Renison Bell Company).

Ground investigations revealed that the country rocks consist of massive slates, intruded to the south by gabbro. Some prospecting pits on sulphide veins were seen in slates near the locus of the anomalies but no further action was taken in accordance with the general policy on this property.
(Vide MR Jan., DK March)

(d) Renison Bell North. An area embracing four air E.M. anomalies (Nos. 29/6, 28/6, 26/6, 25/6) and the Renison North aeromagnetic anomaly.
No ground work has been undertaken on this prospect, which is difficult of access except at low river level. Existing maps indicate that gabbroic rocks occur in this vicinity (MR Jan JHR).

A general observation is that these four cases of associated E.M. and magnetic anomalies are all located in areas featuring some gabbroic rocks. However, there are numerous instances in which important mineralisation is developed at gabbro contacts, e.g. Montana copper-nickel, Razorback, Karlsen and Riley, Ground Prize and Adelaide mines - so that the association should actually be favourably regarded.

a

B. AEROMAGNETIC ANOMALIES

A number of the aeromagnetic anomalies can be readily eliminated on geological grounds as primarily caused by extensive bodies of magnetic, basic intrusive rocks and known iron ore occurrences. However, of the remainder, it may be generally stated that most have not received sufficient ground work to justify sound judgment of their importance.

The anomalies considered so far include only the well-defined highs selected from the survey charts, although some attention to lows would also seem desirable in view of the close association of one with the Comstock mineralised zone near Queenstown. The selected anomalies are described hereunder in four groups which reflect our current views on their geological setting and significance.

(a) Anomalies Related to Magnetic Iron Ore

Mt. Agnew - Eight or more lenticular bodies of magnetite occur here near the margins of altered basic igneous rocks. The largest body of iron is the Tenth Legion deposit which has an exposed length of 1,400 feet and average width of 50 feet. These deposits lie within a government reservation (MR Dec. JHR)

Trial Harbour - Ground observations have shown that ultrabasic rocks and sediments in this area are abnormally rich in disseminated magnetite, which is considered to adequately explain the anomaly. Geochemical work detected mineral traces presumed due to contamination from distant mine dumps (MR Dec.JHR Jan. ABC)

Pine Hill No.1 - The northern section of this elongated anomaly coincides in part with the pyrhotite - rich sulphide deposits on Renison Bell (See also note on Commonwealth Hill area in previous section).

(b) Anomalies Related to Basic Igneous Rocks

The following aeromagnetic highs correspond in shape and position with known occurrences of basic igneous rocks and can clearly be related to mass magnetic effects of disseminated iron ores:

Colebrook West
Gabbro-bronzitite (within E.Z. Company's S.P.L.)

Pine Hill No.2
Gabbro-bronzitite

Mt. Heemskirk
dolerite (M.R. Dec. JHR)

Razorback No.2
gabbro (see description in previous section)

Other anomalies which have been examined in the field and tentatively attributed to gabbro on scanty outcrop evidence are listed hereunder:

Henty River - Intensive ground searches were conducted in this area, which is readily accessible via the Badger Creek timber tramway. Observations were handicapped by dense forest and the presence of superficial glacial sediments. However, a body of outcropping gabbro was mapped on the south western flank of the anomaly, while gabbro boulders believed to be in place were observed nearer the anomaly peak. We now have information on lead-zinc prospects in this area which will require investigation, together with a further analysis of the anomaly (MR Dec. JHR, Jan. JHR, April

Yolande River B - A brief examination revealed that the zone of greatest magnetic intensity is in an area of high relief covered with many boulders of gabbro - considered to be in place (MR Jan. JHR)

Yolande River A - Not inspected, but tentatively referred to gabbro on the evidence of the above (MR Jan. JHR)

(c) Anomalies Within the Mineralised Porphyry Belt

A rather striking arrangement of aeromagnetic anomalies follows the western and eastern contacts of the Owen Conglomerate which forms the trough of the Mt. Murchison-Mt. Lyell synclinorium. The location and trends of many of these magnetic highs closely correspond with the mineralised porphyry zones which have been independently recognised by ground geological prospecting (described in a later section). It should be noted, for example, how clearly the magnetic contours have defined the Red Hills, Lake Dora, Lake Selina and Mt. Tyndall mineralised porphyries, while in other instances such as Lake Selina [illegible] the iron rich sediments of the overlying Jukes Breccia are traced out by the higher magnetic contours.

The relationship of anomalies to mineralisation centres, so clearly indicated above, creates a real significance to the numerous other anomalies occurring near the Owen Conglomerate contacts towards Queenstown which have not yet been investigated.

The following anomalies are referred to this category:

Farrell

Mt. Murchison No.1

Mt. Murchison No.2 (Partly within the E.Z. Co's S.P.L.)

Victoria Peak

Anthony River

Howard Mill (partly within E.Z. Co's S.P.L.) Not checked

Red Hills - Magnetite-hematite-chalcopyrite mineralisation with traces of radioactive elements (E.Z. Co's leases)

Lake Selina No.1 - Red Hills type porphyry with small workings in pyrite-chalcopyrite mineralisation.

Lake Selina No.2 - Hematite-magnetite concentrations (pebbles) in Jukes Breccia.

Mt. Tyndall - Mineralised porphyry with some lead prospects (Mt. Tyndall Mines)

Lake Dora - embraces a wide area of mineralised porphyry with copper and lead prospects.

Mt. Sedgwick E.

Comstock E - a large area of pyritic Schist giving rise to heavily iron-stained outcrop has been observed during regional mapping just west of this anomaly. (MR Apr. BC; DK)

Lake Spicer West - Actually occurs in area of Owen Conglomerate.

Margaret

West Lyell

Linda Valley

(d) Other Anomalies

Four of the anomalies recorded in the Zeehan area have not as yet been clearly related to any particular rock types or mineral concentrations, although three of them are located close to known mining areas. Accordingly, these must receive additional systematic mapping and prospecting.

Cuni - Centred two miles north-west of the Montana Company's copper-nickel prospect, within our S.P.L. Exploration work has been limited to a few cross traverses which indicated occurrences of black pyritic slates near the locus of the high and gabbro intrusions at the periphery. The area is densely timbered (MR Jan.JHR, Feb. JHR)

Swansea North - Situated to the north of the Swansea lead workings of J.J. Hill, and not investigated to date. The presence of the anomaly stresses the need for an examination of this lease at a future date.
(MR Jan. JHR)

Little Henry - Geological and geochemical traverses were made in this area without obtaining any important evidence or conclusions relating to its cause. More detailed work is required.
(MR Dec. JHR; Jan. ABC, JHR)

Razorback No.1 - The plotted position of this high is near Brewery Junction, Dundas, between the massive goss-anous outcrops of the Razorback and Adelaide mining leases. Both these properties are described in a later section as mineral properties requiring attention and the cause of the anomaly - previously suggested as due to gabbro - must be more closely checked.
(MR Dec. JHR)

C. AIRBORNE E.M. ANOMALIES

A total of about sixty aeroelectromagnetic anomalies considered worthy of ground checking were indicated by the helicopter-borne operations which were prematurely concluded in April. The location of the selected anomalies are shown on maps prepared by Senior Geophysicist, E. McCarthy.
(See MR for April).

Ground checking has been restricted so far to E.M. anomalies that coincide with aeromagnetic highs (described in previous section) and to others described hereunder of especially high order or promising location.

Anomaly E.9 - A local high order phase-amplitude anomaly located near the Montana Company's silver-lead mine, Zeehan.

A comprehensive ground investigation was instigated in this area. Geochemical testing gave negative results, but a self-potential survey revealed an intense anomaly near a small exposure of black, carbonaceous shale. The highly carbonaceous sediments are considered a likely cause of the E.M. and S.P. anomalies.

Sterling Valley Area - Four E.M. anomalies (Nos. 1/7, 2/7, 3/7, 4/7) were recorded near the abandoned Sterling Mines, along the southern strike of the Mt. Farrell lodes. A comprehensive survey was conducted here during March and April from a base camp air-freighted in by helicopter.

Geological and geochemical studies yielded evidence of

scattered small sulphide showings. S.P. surveys established the position of the E.M. anomalies on the ground and revealed other anomalous centres. One of the best of these coincides with the Sterling Mine (drilled by E.Z. Company); another on the northern section is of a similar order and is the most interesting result, and six are small variations which are interpreted to represent shallow but small metalliferous bodies. (MR April E.M. - with maps, ABC, BD)

Cuni Area - Five low order anomalies (Nos. A/9, B/9, C/9, D/9, E/9) were registered in our concession two miles south-west of the Montana Company's copper-nickel prospect. Only cursory ground traverses have been undertaken in this general area, and the results were inconclusive (MR Jan. JHR)

b. RADIOACTIVE ANOMALY

Yolande River Area - Anomaly No.12A. An area of abnormal radioactivity was defined near the Yolande River during one of the few sorties that scintillation equipment was operated concurrently with E.M. helicopter surveys.
A ground radiometric survey of this locality is planned.

2) APPRAISAL OF OPERATING MINES

Detailed investigations have been conducted by A.T.A.E. staff on two of the larger operating mines in the region, viz. Renison Bell and Mt. Farrell, both of which were also the subject of especially detailed airborne E.M. surveys. Neither of these propositions were accepted and the issued reports listed hereunder should be consulted for further particulars.

Renison Bell Tin Mine

J.H. Battigan - Notes on an Appraisal of Renison Bell Tin Field 13.3.57

D. King - Preliminary Report on the Regional Geology and Mineralisation in the Renison Bell Prospecting Area 13.3.57

Mount Farrell

B. Drew - Appraisal of the Farrell Mining Field, Tullah, Tasmania, 31.1.57

3) APPRAISAL OF LEASED PROSPECTS

A number of leased mining properties which are being prospected, or worked in a small way, have been looked at, while there are others which should also be considered at a future date.

Montana Copper-Nickel Prospect

The property is situated five miles north-east of Zeehan, and is being actively prospected by the Montana Company.

A brief inspection has indicated the desirability of approaching the Company for details of their exploration results.
(MR April HEJ, DK)

Razorback Tin Mine
Situated Dundas. Tin is being selectively mined from an extensive zone of oxidised capping, reputedly of overall low tin values (less than .5%). A sample of the gossan has been taken by us and submitted for various metal assays. A detailed field investigation is surely warranted in view of the very considerable size of the gossanous outcrop.

Mt. Isa Mines Ltd. are forwarding reports outlining their previous inspection of the property.
(MR March, JHR)

Mt. Lyndsay Tin Mines
Situated about nine miles north-west of Renison Bell. Records indicate a large spread of low grade tin mineralisation, and field investigations are proposed. Two small leases covering most of the abandoned workings are held by M. Garretty.
(MR Jan. JHR)

Robinson's Sylvester Lead Prospect
Zeehan area. The Senior Geologist (HEJ) has made an appraisal of this property with V. Cottle (E.Z. Company) and although prospects are not highly regarded, it seems likely that the free option terms proposed by Robinson will be accepted.

Ground geophysical work would be a useful supplement to the geological work done to date.
(MR April HEJ)

Pituley Prospects
Two interesting sulphide showings were indicated to us by Prospector W. Pituley, namely an occurrence of massive pyrite near Dundas, and pyritic mineralised zones in granite near Mr. Beemskirk (actually on S.P.L. 282 held by other interests). Representative samples are being assayed for metal and radioactive elements.

Also worthy of future appraisal are the followings

Grand Prize Tin Mine
Situated between the Razorback Mine and Renison Bell. Oxidised tin ore has been worked periodically on a small scale from a large surface showing of gossan.

Adelaide Mine
Situated Dundas. This is another extensive gossanous outcrop, worked for galena and crocoite (lead chromate). Drives and crosscuts of an early vintage appear to have thoroughly checked the ore-body for high grade shoots - which were worked - but an estimate of the overall grade is worth our consideration. The deposit is very favourably placed for open-cut operation.

Specimen crocoite and small lead parcels are being currently produced from the mine by local interests.

Swansea Mine
A small silver-lead mine south-west of Zeehan which should be investigated in view of an adjacent aeromagnetic anomaly.

4) APPRAISAL OF ABANDONED MINES (Proposed)

Most of the old mining areas lying within S.P.L.302 will eventually be examined in the course of regional mapping and prospecting activities. Old mines which have been mentioned as possibly worth special attention are described hereunder:-

Zeehan Field
Previous reports on the silver-lead mines of the Zeehan Area are being examined prior to a decision whether a re-appraisal is desirable.

Mariposa Mine
An abandoned silver-lead mine in Gordon River limestones, three miles east of Zeehan. Previous reports by Mt. Isa Mines Ltd. are to be provided.

Queensberry Mine
Lead mines about ten miles south of Zeehan. Commonly described as a good show by local residents, and explored to some extent by North Broken Hill Ltd.

Trial Harbour Nickel
A preliminary investigation of old nickel workings at Trial Harbour revealed only trace amounts of the metal
(MR March JHR)

Chester Mine
A large deposit of pyrites situated about five miles north of Rosebery. The possible association of other sulphides in depth or at the periphery of the orebody is worth testing.

Comet-Curtin Davis Area
A striking number of old mines are located in this part of the Dundas field. The area has been previously examined by North Broken Hill Pty. Ltd. and copies of their reports should be sought and examined.

Tunnel Hill Asbestos
Lying within the Montana Company's S.P.L., 2½ miles south of Renison Bell. It is recommended that an overall grade estimate should be made of chrysotile asbestos deposits at Tunnel Hill. Previous production was by selective mining but the deposit is suitably situated for large-scale open cutting.

5) GEOLOGICAL PROSPECTING ACTIVITIES

Systematic geological mapping and associated mineral prospecting was initiated by R.T.A.E. early in March, under the guidance of Senior Geologist, Dr. B. Campana.

Mapping work was commenced in the highland areas extending from Mt. Murchison to near Queenstown; chosen primarily because of the favourable regional setting for Mt. Lyell type ore repetitions, and secondly because entry to these remote areas was more readily arranged while the A.N.A. helicopter was available.

Three field parties operated on this work during March, and one party in the latter months. A total area of 45 square miles has now been carefully covered, working out from temporary camps at Sterling Valley, Red Hills, Lake Julia Upper Henty River and Lake Margaret.

The mapping work has revealed a number of important criteria in regard to mineral localisation that will have an important bearing in planning future mineral search, and has already been directly responsible for the recognition of a mineralised porphyry level of widespread development; the host rocks of important prospects near Lake Dora and Queenstown.

As this work is extended, there will be the need to map or follow up favourable horizons into the large areas about Rosebery that are held as S.P.L.'s by the E.Z. Company. Accordingly, we should approach the E.Z. Company with a proposal to include these S.P.L.'s in our area of mutual interest.

The application of regional geological studies - involving careful observations in the field and leading to a thorough understanding of stratigraphy, structures and mineralisation controls - has been largely overlooked in previous exploration activities on the West Coast of Tasmania. The realisation of this fact has led some of us to believe that properly conducted regional mapping is likely to be rewarded and is a basic requisite of the R.T.A.E. programme in this area of remarkably widespread sulphide mineralisation.

6) GEOCHEMICAL PROSPECTING

Geochemical prospecting has also been adopted

as another approach to mineral search and yielded some helpful results - described in the preceding notes on various prospects and investigation.

(D. King)

REVIEW OF WORK CARRIED OUT IN TASMANIA

by R.J. Drew

I have been engaged on work connected with exploration activities in North-Western Tasmania (Project PRP7/100) since 8th October, 1956, except for three weeks leave from 15/4/57 to 3/5/57. My work has included:

1. Observer with Aerial Magnetometer Survey of North-Western Tasmania
2. Appraisal of the Farrell Mining Field.
3. Geological mapping at Renison Bell.
4. Geological Mapping in the Sterling Valley.
5. Investigation of Iron Deposits in the vicinity of the Savage River, Waratah District.

1. Aerial Magnetometer Survey of North-Western Tasmania

The aerial magnetometer survey was carried out under contract by Adastra Hunting Geophysics Pty. Ltd. Flying was done at a height of 500 feet with flight lines in east-west directions. The lines were spaced half a mile apart with tie points on the eastern or western extremities of the lines. Navigation was done by using 1" = 1 mile photo-mosaics but continuous photography at the time of the survey was used for accurate control in compiling the final map.

R.A. Searl was Rio Tinto observer for approximately two thirds of the survey, until continual bad weather caused postponement of the work. While Searl was observer 84 hours 30 minutes flying was done.

The Adastra survey party returned to Smithton on the 20th October and departed on the 11th November. During this time I was the Rio Tinto observer. During this time 35 hours 35 minutes flying was done and 47 flight lines were completed. When the aircraft returned to Sydney for renewal of its certificate of airworthiness, 5 full lines and 12 short lines in the Valentines Peak area remained to be flown. I do not know if this work has been completed.

Magnetic intensity readings of 750 gammas (3 step anomaly) and greater were noted by me during flight and plotted approximately. Precise location of the anomalous readings was later supplied by Adastra in the form of magnetic intensity contours on a map.

Four anomalous areas were noted. Two were immediately north of the Heman River between Renison Bell and Rosebery. These are thought to be due to basic igneous rocks mapped in the area.

A broad anomalous zone north of the Waratah-Corinna road between the Huskisson and Savage rivers may be caused by gabbro, pyroxenite and serpentine.

The highest magnetic intensity readings were recorded along the Savage River where the Rio Tinto iron ore deposits occur. Readings of interest were obtained over a length of seven miles, the highest reading being 19,000 gammas. The Rocky River iron deposits and the R.T.A.E. anomaly were flown with Searl as observer.

2. Appraisal of the Farrell Mining Field

An appraisal of the Farrell Mining Field was carried out during December 1956 and January 1957. Rio Tinto had been asked to investigate the Field by the Farrell Mining Company Ltd. which controls most of the field. The area was not considered to have sufficient potential to warrant further work.

Only two mines of any size have been worked. The North Mount Farrell from 1899 to its closure in 1932 produced 349,711 long tons of ore for 48,563 tons of lead and 4,994 ounces of silver; the New North Mount Farrell from its discovery in 1933 to 1956 has produced 198,581 tons (long) of ore for a recovery of 31,452 long tons of lead and 3,592,549 ounces of silver. Grade of ore would be about 10-12% lead and 13 ounces of silver per ton.

The lodes occur in a shear zone in interbedded slates and tuffs within a few hundred feet of the boundary of the massive pyroclastics. Individual ore shoots are up to 400 feet long with a pitch length of 400 feet and average width of 2 to 3 feet.

The known favourable shear zone has been diamond drilled by the Farrell Mining Company and the E.Z. Company for a length of 1½ miles without finding economic mineralisation.

3. Geological Mapping, Renison Bell

Surface and underground mapping was done at Renison Bell as part of the Company's investigation of the leases held by Renison Associated Tin Mines, N.L.

Production to the end of 1955 has been approximately 400,000 tons of ore for a recovery of 2,900 tons of metallic tin valued at approximately £A850,000.

Two types of lodes occur:

a. Steeply dipping fissure lodes, and
b. Flat sill like bodies.

The lodes are enclosed in gently folded shales and sandstones

of the Dundas Group of Middle Cambrian age. The flat sill like floor at the battery workings has supplied most of the production for many years.

Mineralization consists of cassiterite, pyrite, arsenopyrite and pynhotite in a quartz and dolomite gangue.

Dr. Fisher of the Bureau of Mineral Resources conservatively estimated ore reserves at 750,000 tons of average grade 0.75% Sn. From the Rio Tinto work, the maximum potential of the field was of the order of 3,000,000 tons of average grade about 0.5% Sn. This was less than needed for Rio Tinto to carry out further work.

4. Geological Mapping in the Sterling Valley Area

A. Geology

Ordovician Owen Conglomerate overlies Cambrian Dundas Group rocks with angular unconformity. The Cambrian section from west to east is:-

Massive hydroclastics
Interbedded, slates, tuffs and schists
Porphyroid rocks
Jukes Breccia

The 'porphyroid' rocks are possibly felspathised and chloritised lavas and tuffs.
The Cambrian rocks strike about 340° to 350° magnetic and dip about 70° west. However, dips are very rare owing to the development of schistos ity, and as a consequence structure is difficult to interpret. However from the section, since elsewhere the Jukes Breccia is the youngest member of the Cambrian sequence, it appears that the section is overturned. Supporting evidence for this was not seen but Professor Carey found current bedding which indicated overturning.

B. Mineral Occurrences

Many minor occurrences of PbS - ZnS mineralisation were found. These include the Sterling Valley mine, Thomas' Blocks and Pennefather's prospect. Although widespread, the mineralisation seemed to be only in minor amounts at any one place. Drilling by the E.Z. Company at the Sterling Valley mine did not find economic mineralisation. Thomas' Blocks and Pennefather's prospects have been reported on previously by the E.Z. Company and were not considered to be very good.

C. Geochemical Prospecting

Some geochemical prospecting was done with A. Clark. On the whole the area was unfavourable for this work as no silts have

been deposited in the creeks. No interesting anomalies were located.

D. Geophysical

Ground self-potential work was done over four anomalies found by the airborne electromagnetic survey. One of these anomalies was over the Sterling Mine and the other three occurred in the same host rocks and approximately along strike north of the Sterling Mine. The ground S.P. re-established the anomalies, but as all the anomalies were comparable to the one over the Sterling Mine, it cannot be expected the other anomalies will warrant testing.

A refly of the Sterling Valley area with the airborne electromagnetic equipment failed to find any anomalies. Since the earlier anomalies were re-established with ground work, it appears likely the equipment was not working properly on the refly.

5. Investigation of the Iron Deposits in the Vicinity of the Savage River, Waratah area - R.T.A.E. Anomaly

The R.T.A.E. airborne magnetometer anomaly was located on the ground and track cutting is at present being carried out to determine the limits of iron. The anomaly is about 31 miles from Waratah on the Waratah-Corinna road and ¾ mile west of the road.

A base line has been cut for a length of two miles along the anomaly and three east-west tracks each about 1,600 feet long are being cut.

Hematite rubble is found over a length of about 5,000 feet with some gaps and a maximum width of about 500 feet.

The iron ore is possibly a magmatic segregation of magnetite as lenses in a belt of metamorphosed basic igneous rocks. The deposits are conformable with the country rocks and strike about 340° and dip approximately 60° - 80°E. However outcrop is very poor, with only two outcrops seen so far, so the dip information may be unreliable.

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Rio Tinto Australian Exploration Pty. Limited

TASMANIAN INVESTIGATIONS PRP/7/100 = SUMMARY REPORT FOR PERIOD 1ST JANUARY TO 1ST MAY, 1957

by A.R. Clark

General

The following summary report outlines the general field results and conclusions of a method for geochemically testing stream silts for traces of copper, lead and zinc. The method was introduced into Australia after successful application in Canada by Mr. J.K.B. Booth.

Original Scope of Method.

The technique of geochemically testing stream silts for traces of Cu Pb and Zn by an "on the spot" dithizone colorimetrically test, was originally specific for silts. It was considered that a loose mechanical adhesion of traces of Pb Cu Zn onto clay particles would be suitable for this type of dithizone test. In this manner the indigenous trace elements of soils were not considered and the complicated oxidation and bondage factors of soils excluded. However the results of soil sampling mineralised ground in Queensland were successful, hence the completed investigations in Tasmania were initiated in respect to the following points:

(a) To test the silts of streams and creeks

(b) To test soils

(c) To formulate field methods.

Stream Silts

Traverses were completed along the streams and creeks draining the mining areas from Zeehan to Trial Harbour. The geochemical anomalies obtained were due to contamination from dumped mine material. Such mining areas are not generally favourable for geochemistry, but the contaminated creeks do lead in many cases to old unknown shafts and adits. From the material scattered about, a reasonable indication of the ore value and occurrence can be estimated.

The streams and rivers draining the airborne anomalies - Razorback, Little Henty, Henty River, Paterson Hill, Trial Harbour, 9F and Renison Bell were tested. One low anomaly was located only on the Razorback Airborne Anomaly. Mr. J.K. Booth accompanied the writer on an inspection of the small fissure vein containing zinc and lead. The showing was considered not to be of economic importance and the clay within a radius of 150 feet of the

mineralisation was unreactive. It did prove however that the strength of the geochemical anomaly was in direct relation to the grade and width of the mineralisation and hence, that the field technique is applicable to silts.

The streams about the old mining areas at the Sterling Valley, Lake Dora and Lake Julie were tested. Contaminated silts were located and further geochemical work is necessary at the three areas, co-ordinated with Geophysical Self Potential Methods.

It was found that the majority of the creeks, streams and rivers can only be successfully tested during the months January to May inclusive. The comparatively low rainfall during these months allows the silts to be deposited. For quick general reconnaissance the creeks must be waded as the task of moving through the brush on the stream and river banks is too slow and difficult. An uncomfortable task but not an impossible one.

Soil Horizons

The quartzitic rocks are resistant to weathering processes, and hence soils formed from such rock types are generally thin. With the high rainfall of Tasmania, the humic acids are present in such soils. It was found as a result of work completed at the Pinnacles Mine and the Sterling Mine that the humic acids were reactive on the chemical reagents and mask the colourmetrical tests.

It was found at the Sterling Mine that by defining possible sulphide mineralisation by Self Potential Methods first, then geochemically testing the geophysical traverse line each 5 feet, geochemical anomalies were obtained. The geochemical anomalies were restricted to a black mineralised state which weathers into several feet of soil. Hence with the two separate methods combined trench lengths can be accurately defined, the trenches cut and thence examined. This technique is to be employed over the Self Potential Anomalies at Paterson Hills.

Button Grass Swamps

No geochemical anomalies were obtained on button grass swamps about the mentioned localities. The humic acid content of such areas is extremely high and the writer considers that the oxidation factors related to the humic soils will prevent the practical use of this "on the spot" geochemical technique in such areas.

For the present time only the creeks draining into such areas, should be examined for the silts.

Glacial Deposits

The Pleistowe Glacial Deposits of the Paterson Hill area, Sterling Mine, Lake Dora and Lake Julie were examined. No geochemical anomalies were obtained to a depth of 3 feet.

The Paterson Hill area is well covered by glacial deposits, and whilst no anomalies were located on the initial survey, the area is to be re-examined. Trenches will be cut over the defined Self Potential Anomalies, thence the material in the trenches will be geochemically tested.

If positive chemical tests are obtained, a definite correlation will be sought in connection with the glacial deposits. Significant traces of heavy metals have been detected from glacial tills overlying gold and base metal mineralisation in Canada. It may be possible that the technique as used in Tasmania may have to be modified. For this reason the glacial deposits cannot be ruled out as a possible guide to underlying mineralisation.

Conclusions and Recommendations

The geochemical work completed to date in Tasmania has been of an exploratory nature. Good targets for orientational work were difficult to locate, although the work at the Sterling Mine was very satisfactory.

The following points list the major points which have emerged from the work completed:

1. The technique of geochemically testing stream silts for traces of lead, copper and zinc is applicable to the silt from the streams, creeks and rivers of Tasmania.

2. The button grass swamps contain a chemical environment beyond the scope of the geochemical technique.

3. In areas of quartzitic rocks and glacial deposits, geophysical self-potential methods are to be used with the geochemical methods, especially over "airborne" anomalous areas.

4. The geochemical surveys are to be used as a follow-up tool to a geological survey, i.e. the writer discovered cobbles of heavily pyritised black slate in the bed of the Henty River. The river and creeks provide the access to this area, therefore geochemical traverses will be carried out with the geological traverse.

5. The writer considers that the technique is the most promising ground "prospecting" tool that a field geologist can have with him in the field. All field geologists must use the technique whenever field traverses are carried out.

A.B. Clark

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

NORTHWEST TASMANIA - PROJECT PRP/7/100

REVIEW OF ACTIVITIES TO 31ST MAY 1957

by
R.S. Matheson, Exploration Manager

CONTENTS

ILLUSTRATIONS

Plate No.	Description	Scale
1	Plan N.W. Tasmania showing S.P.L.'s Held and Applied For.	8 miles to 1 inch
2	Red Hills Area - Proposed Areas for Pegging	20 chns to 1 inch
3	Map illustrating Investigations completed, in progress or proposed within S.P.L.302.	1 mile to 1 inch
4	Simplified Geological Map and Sections of the Mt. Murchison - Lake Dora Area.	1 mile to 1 inch
5	E.M. Anomaly Plan, S.P.L. 302	1 mile to 1 inch
6	Charts Records Illustrating Types of E.M. Anomalies.	-

GENERAL.

Work in connection with the joint exploration activities of the R.T.A.E. and E.Z. Companies in north-west Tasmania was initiated in June 1956.

A review of activities to the 31st May 1957 is given in the following pages and the form of the report is as follows:-

General Report of Exploration Manager (R.S. Matheson)
Detailed Report of Senior Mining Geologist (H.E. Jensen)
Detailed Report of Senior Regional Geologist (B. Campana)
Detailed Report of Senior Geophysicist (E. McCarthy)
Detailed Report of Geologist-in-Charge, Zeehan (J.H. Rattigan)

Financial statements showing expenditure on the project to date are attached, and a diagrammatic summary of this expenditure under different headings accompanies the report of the Exploration Manager.

A set of plans illustrating areas held and applied for and the scope of geological and geophysical activities to date are also attached.

AREA OF INVESTIGATION

When exploration activities commenced in June 1956, the area for operations was that embraced by S.P.L.302 involving 3,750 square miles. It was soon seen that our area of interest extended beyond the boundaries of S.P.L.302, so that two additional S.P.L.'s were applied for and one of these has already been granted (Plate 1) Details of the S.P.L.'s at present held are as follows :-

Tenement	Area	Remarks
S.P.L. 302	3,750 sq. miles	Held in name of R.S. Matheson
S.P.L. 311	180 " "	Held in name of J.H. Rattigan
S.P.L. -	30 " "	Applied for by B. Campana

Within the boundaries of these holdings exploration rights are not secured over mining tenements previously pegged or applied for, over freehold property, over Crown Reserves or over leased Crown Land.

Arrangements have already been made with our solicitors to obtain permits of entry to freehold property and leased Crown land and so secure for us priority for exploration thereon. Applications can be lodged with the Tasmanian Government for rights to explore on Government Reserves if our preliminary investigations indicate this action is warranted. This matter could be involved and is best left until we are assured that detailed ground investigations on such areas are desirable.

A close watch is also being kept on pre-existing mining tenements being forfeited, expiring or not granted, to see if it is to our advantage to secure these areas. In this connection a decision has yet to be reached as to whether or not we should

secure the portion of Elliston's forfeited leases overlapping those of the E.Z. Company in the Red Hills area. A study of Plate 2 will indicate that the area in question does not embrace any of the potentially favourable porphyry host rock. These areas would also have to be taken up as leases and may involve manning problems.

STAFF.

The permanent field staff connected with the investigations during the period under review have been as follows :-

Geologist-in-Charge	J.H. Rattigan
Geologists	R.A. Searl
	D. King
	B.J. Drew
	A.B. Clark
	W. Atkinson
	J. Shields
Geophysicist	N.G. Mattocks

Temporary technical staff assisting with the investigations have been Geologists R. Ford, B. Wells and D. Mitchell and University Geology Students J. Walkley, P. Radel and W. Boucaut.

The supervisory staff who have been connected with the operations have been the Managing Director S.B. Dickinson, the Exploration Manager R.S. Matheson, Senior Geologists B. Campana and H.E. Jensen and Senior Geophysicist E. McCarthy.

Draftsmen A. Nye and J. Potter, Technical Assistant W.A. Wagschall and Computer V. Gunn of the Head Office staff have also been closely connected with the work.

Some of the staff have now been diverted to the Cloncurry-Mt. Isa area as exploration activities in Tasmania will be restricted over the winter months.

INVESTIGATIONS

PRELIMINARY WORK

From the 1st June to 30th November, Geologist J.H. Rattigan with Draftsmen A. Nye and J. Potter, and the assistance of Geologists Ford and Wells and Technical Assistant W.A. Wagschall, compiled the basic data in Hobart in connection with the exploration work.

This involved the preparation from aerial photographs of a series of reasonably controlled 1 mile to 1 inch maps of the permit areas to serve as a basis for planning and operations. Two different sets of this series of maps were produced; the first being a geological one showing available geological information with the terminology modified to accord with the current usage of the University of Tasmania; and the second being an overlay mineral production centre one showing also the boundaries of mining tenements held or applied for. Two additional sets of overlay maps are planned, one to show the airborne magnetic results and the other the airborne electro-magnetic results. The preparation of these plans is in progress.

A field office was set up in Zeehan about the beginning of December 1956 and all field staff have since operated from that base.

REGIONAL GEOLOGICAL INVESTIGATIONS

The set of geological maps prepared in Hobart (mentioned above) must be regarded as only preliminary ones subject to amendment as a result of our field investigations. From the practical viewpoint, we will only undertake regional geological mapping in areas considered potentially favourable to mineralisation, and where such work is thought to be warranted, so that it is unlikely that at any stage will we produce revised geological maps for the whole of our permit areas.

Investigations are being directed with first priority to the potentially favourable Dundas Group of rocks of Cambrian age containing the chief existing mines, and with second priority to the Davey Group of rocks of Pre-Cambrian age also extensively mineralised. The investigations are also being concentrated in the first instance on the portions of these favourable belts of rocks extending from Queenstown through Rosebery to Waratah.

Due to the great demand for detailed work during the early stages of our field activities we could not commence a programme for revising the regional mapping until March 1957. This mapping has been carried out under the supervision of Dr. B. Campana who has also been actively engaged in the work. In general, the programme of attack for regional mapping is carefully to re-map within the favourable rock groups (Dundas and Davey), the units potentially favourable to mineralisation and interpret the regional geological structure. It is hoped that this will lead to a proper understanding of the regional control of mineralisation at known mines, and to the selection of localised areas for more detailed investigation.

Mapping of the favourable porphyry unit in the Dundas Group is now almost completed between Red Hills and the Mt. Lyell leases, and scope for further prospecting is already indicated east of the Comstock lode. (Plate 4 and Campana's report). Other favourable units already listed for mapping in the Dundas Group are the Rosebery massive pyroclastic unit, the Renison razorback breccia unit, the Colebrook dolomitic unit, the Savage River gabbro-amphibolite unit, the Oceania limestone unit and the Mt. Bischoff unit.

AIRBORNE GEOPHYSICAL INVESTIGATIONS

Airborne magnetometer surveys over the whole of our permit areas have been carried out on our behalf by Adastra-Hunting Geophysics Pty. Ltd. using a Percival Prince aircraft. The surveys which involved 125.25 flying hours are now completed and final results are just coming to hand. From preliminary results received, we have been able to select the chief magnetic anomalies of interest in the portion of our area under investigation and these are indicated on Plate 3. Discounting the bad weather conditions in Tasmania, this survey was completed very satisfactorily.

The airborne E.M. surveys were also carried out on our behalf by Adastra-Hunting Geophysics Pty. Ltd. using a Sycamore Helicopter chartered from A.N.A. Little progress has been made with this survey, due to difficulties of having to fly the "bird" within 150 feet of the ground in rugged, heavily timbered terrain with trees rising to over 200 feet; and to delays by weather, sharing the helicopter with L.E.E., helicopter breakdowns and damages to the "bird" and other instrument troubles. To date 60.23 payable flying hours have been completed and the helicopter is not likely to be brought back into operation again before December 1957.

In the meantime, consideration will be given to the advantages of using the Canso aircraft instead of the helicopter for further E.M. surveys in Tasmania. The equipment in the Canso allows flying at 500 feet instead of 150 feet from the ground and it should give more complete E.M. coverage of our permit

areas provided the aircraft has sufficient manouvreability in the rough terrain.

Despite the difficulties which have been experienced during the helicopter E.M. surveys some very interesting results have been obtained and ground checking is in progress. The anomalies of interest are shown on Plates 3 and 5.

GROUND GEOLOGICAL AND GEOPHYSICAL INVESTIGATIONS

Detailed ground investigations were carried out in connection with examination of airborne geophysical anomalies and the examination of mineral prospects and properties, and in some cases this has involved self-potential and magnetometer surveys.

The unavailability of the helicopter for "follow up" work until about the middle of March necessitated the restrictions of ground investigations to the more accessible areas. When the helicopter then became available we were able to establish camps in some of the more interesting remote localities of the Red Hills-Queenstown belt.

An ever present difficulty, as far as ground investigations are concerned, over most of the area of investigation is the thick vegetation, and consequently a much slower rate of progress can be expected in north-west Tasmania than in say the Cloncurry-Mt. Isa area. In many places in Tasmania, it is necessary to cut lines through dense scrub to locate and investigate anomalies, and the rate of progress is sometimes not more than 400 feet per day per man.

The areas which have been investigated on the ground are illustrated on Plate 3, and details are given in Rattigan's report.

GEOCHEMICAL PROSPECTING

An additional prospecting aid used in the area was geochemical prospecting, which was introduced by Geologist J.K. Booth of Rio Tinto Canadian Exploration Pty. Ltd. His method involves the testing of stream silt samples rather than stream waters.

The techniques for the geochemical work were passed on to Geologist A.B. Clark during orientation work near known areas of mineralisation, who then applied them to our exploration activities generally.

It appears that this method is applicable to Tasmanian conditions and could be a very useful tool, particularly as we are unlikely to get complete airborne E.M. coverage of our permit areas.

APPRAISALS OF MINING PROPERTIES AND PROSPECTS

During the season the following mining properties have been investigated with regard to possible option arrangements :-

(a) Renison Associated Tin Mines, N.L.
(b) The Farrell Mining Field, Tullah
(c) The Montana Copper Nickel Holdings (in progress)
(d) The Robinson-Sylvester Lead-Zinc Property (in progress)

In addition an appraisal has been made of the Iron Deposits in the Savage River area, which are partly embraced by Government Reserves.

Separate reports have been written and distributed on the properties where investigations have been completed.

The specifications for the type of mineral deposits being sought are those suitable for an operation of the order of 1000 tons per day.

At the Renison property there is a considerable tonnage of reserves, but it is difficult to see any possibility of the average grade of reserves exceeding 0.5% Sn for any large scale operation.

At the Farrell property the known ore bodies are not likely to provide reserves required for a suitable operation, and there are no obvious avenues for prospecting thereon whereby the reserves may be materially increased.

For the above reasons, option negotiations have been discontinued with these two Companies.

The Savage River iron ore deposits show possibilities of development provided satisfactory negotiations can be made with the Tasmanian Government. In the two main deposits in the Rio Tinto area, estimated iron ore reserves to a depth of 500 feet from the surface are of the order of 129,500,000 long tons. Reservations are held regarding the true quality of the magnetite-hematite ore as previous sampling has been inadequate. The true appreciation of the deposits will only be obtained by the proposed drilling programme.

SUMMARY OF RESULTS AND RECOMMENDATIONS

The results of investigations to date can be summarised as follows :-

(1) Airborne magnetometer survey of permit areas completed with numerous interesting anomalies indicated. Ground investigation of anomalies has commenced.

(2) Airborne E.M. surveys by helicopter are only partly completed due to difficult terrain for such surveys, and due to delays from a variety of causes. Interesting results have been obtained proving the value of the method, however, and a ground inspection of anomalies is in progress. Complete examination of some of the more inaccessible anomalies has had to be left for the time being (e.g. the Patterson Hill anomaly).

Consideration is being given to using a Canso aircraft for further E.M. surveys as it carries more sensitive equipment which allows for surveys to be carried out from a higher altitude.

(3) The regional mapping so far completed has shown that this method of attack is likely to be fruitful in localising areas for detailed exploration activities, and it is considered that in places it could provide indications beyond the capabilities of the airborne surveys. We already have indications that there could possibly be an extension of mineralisation eastwards from the Comstock Lode on the Mt. Lyell leases.

The importance of regional remapping of rock units favourable to mineralisation, and of the geological structure, cannot be overstressed; as it is only by this work that we will properly understand the control of mineralisation in the area.

It is recommended that at least two geologists be assigned to this work full time during the next field season.

(4) As a result of the ground investigations we have eliminated from further consideration a number of mining properties anomalies and mineral prospects; we have appraised iron deposits in the Savage River area that contain large potential reserves and warrant testing, and we have located several anomalies and mineral prospects warranting more careful investigation.

Experience in the field this year has shown that helicopter transport of equipment and personnel is the only effective means of establishing and servicing field parties in remote areas, and it is recommended that this become standard practice in the future. Man handling of equipment, apart from being time consuming and physically exhausting, is rather primitive, while pack horses have limited use, as very few suitable tracks are available.

(5) No important discoveries have yet resulted from the geochemical prospecting work to date, but indications are that it will prove a very useful prospecting tool. The programme of work for the next season should allow for full time geochemical work to be carried out in specially selected areas.

(6) During the next field season it is considered there should be at least one geological party assigned solely to the study of old mines, mineral fields and prospects submitted by prospectors, as this will relieve diverting the other staff from their search for new orebodies. The function of such a party would be to sort out the larger deposits that could possibly interest the Company and determine the reason for the previous cessation in mining activities. These studies may involve some detailed geological mapping to properly determine local control of mineralisation and possible repetitions of ore bodies. Ground geophysics may be applied at times to prove or disprove suspected obscured extensions of the deposits.

10th June, 1957

R.S. Matheson
Exploration Manager.

FINANCIAL STATEMENT

Summary of Expenditure to 31st May, 1957

Airborne Magnetometer Surveys	£22,983
" Electro Magnetic Surveys	7,937
Helicopter Charter Flights	1,436
Ground Geological Surveys	17,052
" Geophysical "	4,413
Stores & Equipment	22,173
Travelling & Transport	2,727
Sundries	4,373
Overheads	16,739
	£100,433

E.Z. REVIEW MEETING

RIO AUSTRALIAN EXPLORATION PTY LTD

SUMMARY OF EXPENDITURE AS AT 31ST MAY 1957

Reference :- Cash Expenditure ▬ *Total Expenditure* ▨ *Budget Estimate* ▭

PROJECT	INVESTIGATION	£10000 £20,000 £30,000 £40,000 £50,000 £60,000 £70,000 £80,000 £90,000 £100,000
PRP/7/100	AIRBORNE MAGNETO-METER SURVEY	£22983 £25983 EST.
	AIRBORNE E.M. SURVEYS	£7937
	HELICOPTER CHARTER FLIGHTS	£1436
	GROUND GEOLOGICAL WORK	£17652
	GROUND GEOPHYSICAL WORK	£4413
	STORES AND EQUIPMENT	£22173
	TRAVEL AND TRANSPORT	£2727
	SUNDRIES	£4373
	OVERHEADS	£16739

	£50,000 £100,000 £150,000 £200,000 £250,000 £300,000 £350,000 £400,000 £450,000 £500,000
TOTAL PROGRESSIVE EXPENDITURE	£100,433

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

NORTHWEST TASMANIA - PROJECT PRP/7/100

REVIEW OF ACTIVITIES FROM 18TH MARCH

TO 31ST MAY 1957

by
H.E. Jensen
Senior Geologist (Mining)

CONTENTS

GENERAL

The following tabulation gives details of the various projects that have received attention since 18th March when I joined the Company.

Project No.	Place Investigated	District	Mineral Occurrence	Recommendations
PRP/7/100	Robinson-Sylvesters	Zeehan	Pb, Zn	Geophysical work.
PRP/7/100	Montana Silver Lead Coy.	Zeehan	Ni, Cu	Being investigated.
PRP/7/100	Miller	Magnet	Ni	No work warranted.
PRP/7/100	Savage River	Corinna	Fe	Proposed diamond drilling programme.
PRP/7/100	R.T.A.E. Anomaly	Corinna	Fe	Line cutting

ROBINSON-SYLVESTERS PROSPECT

Robinson-Sylvesters Prospect is situated 3 miles west of Zeehan. A free option for a period of 2 years with the right to purchase the mineral claim for £7,000 was offered to the Company.

I accompanied Mr. Cottle of the Electrolytic Zinc Company of Australia Ltd. and inspected a small area which had been trenched. Six shallow pits have been sunk to test lead zinc mineralisation. The occurrences are typical of other small lenses found in this field.

It has been recommended that the Company accepts Mr.Robinson's offer and at some convenient time geophysical work be undertaken, to be followed by diamond drilling if results are encouraging.

MONTANA SILVER LEAD COMPANY.

Recent work on the Montana Silver Lead Company's nickel-copper leases approximately 5 miles north of Zeehan has been reported to have yielded encouraging results. The principals of this Company have agreed to make all information available, but have requested that the matter be treated confidentially and at this stage they do not want it to become known that R.T.A.E. are interested.

The data supplied by the Montana Silver Lead Company, together with information collected from published reports and records obtained from the Tasmanian Department of Mines have been reviewed.

A full report has been compiled describing all aspects of work that has been undertaken since the Copper Nickel deposits were discovered in 1893. Unfortunately there are no plans showing the extent of the underground workings which are full of water.

It is recommended that no action be taken. It is further recommended that should the Montana Silver Lead Company abandon their leases at some future date an accurate survey should

made of surface workings and diamond drill holes. This information, together with a detailed geological plan of the surface would provide for a better correlation of geological features, and a better assessment could be made of the exploratory diamond drilling already completed.

MILLERS NICKEL PROSPECT

Old workings situated on the Company's S.P.L. No. 302, and approximately 11 miles west of Waratah were brought to the Company's notice by Mr. A. Miller. These workings, amounting to some 1,000 feet of drifting were examined and as no well defined formation was found no work is warranted.

IRON DEPOSIT SAVAGE RIVER AREA

In conjunction with Mr. T. Hughes and party of the Tasmanian Geological Survey a preliminary examination was made of the iron deposit on the Tasmanian Government's reservation; this deposit is called the Rio Tinto Iron ore deposit and has been known of for a number of years.

The examination revealed two large lenticular iron ore deposits having lengths of 2,860 and 3,440 feet respectively. The average widths indicated by magnetometer surveys are 260 and 350 feet respectively.

Previous scattered sampling indicated a high grade ore body averaging 65 per cent. iron, and low in impurities (titanic oxide trace; silica 0.38 to 2.4 per cent; alumina 0.02 to 0.22 per cent; phosphoric acid nil to 0.38 per cent; and sulphur 0.01 to 3.66 per cent.)

A diamond drilling programme has been proposed, comprising some 9,000 feet in nine holes, and if successful, could outline some 129,500,000 long tons of ore.

R.T.A.E. ANOMALY

The Adastra-Hunting Geophysics Pty. Ltd. Co., who carried out airborne surveys on our behalf, located an anomaly 6 miles south of the Rio Tinto deposits in an area where the presence of iron has not been previously recorded. An examination of the area could only be made by cutting lines on a ridge covered with a dense growth of bauera and ti-tree. It has been reported that hematite scree has been found extending for a length of ½ mile by 200 feet wide. The line cutting is being continued to fully cover the anomaly which trends in a north-north-westerly direction for a length of 2½ miles by ½ mile wide. On completing this line cutting a preliminary examination will be made with a view to initiating a diamond drill programme.

10th June, 1957

H.E. Jensen
Senior Geologist (Mining)

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

NORTHWEST TASMANIA - PROJECT PRP/7/100

REVIEW OF THE REGIONAL MAPPING WORK DURING THE FIELD SEASON MARCH-MAY 1957

by
B. Campana
(Senior Geologist - Regional)

C O N T E N T S

GENERAL

In accordance with the instructions received from the Managing Director, I commenced the regional geological study of portions of our West Tasmanian property at the beginning of March, when I joined the Company's geological staff. I was directed to formulate and carry out a regional mapping programme based on the following premises :

1. Selection of economically promising areas within our 3,000 square mile concession (S.P.L. 302)

2. Factual geological mapping of these areas at the scale 4 inches = 1 mile, combined with detailed stratigraphic and structural studies.

3. Supervision of the geological parties engaged in this type of work, and introduction of adequate cartographic and sampling procedures.

4. Compilation of geological maps and reports as a basis for further investigations by geophysical, geochemical or drilling operations.

Ten weeks were thus spent in the field, and satisfactory progress was made in spite of poor weather and unexpected difficulties of access due to the rugged, heavily timbered and often tractless ground. The more significant observations have been expounded in the monthly reports for April and May, and a comprehensive geological report is now in course of preparation. What follows is a brief critical review of the regional work done by our staff and by previous workers. Some remarks are added on the future approach and possible economic developments of our regional mapping programme.

NECESSITY FOR RESTRICTING THE REGIONAL MAPPING TO FAVOURABLE AREAS AND THE SELECTIVE CRITERIA ADOPTED.

The procedure of trial and error, i.e. an empirical approach to regional geological exploration, would hardly succeed in our West Tasmanian property. Indeed, it can be stated that success will largely depend on our geological sense of anticipation - on the geologist's ability to draw 'a priori' a clear distinction between the ground to be thoroughly explored and accurately mapped, and the ground where such work is hardly justified. There is no hope of completing detailed mapping of our concessions in a few years, even if the ground were reasonably clear and the field season much longer. As things stand, I estimate that one party would map no more than one hundred square miles every season. This inevitably leads to a selection of geologically favourable but restricted areas, and the question arises as to which criteria can be satisfactorily applied for this selection.

It is stated in the local geological literature that the fact that most of the mineral deposits of the area occur in Cambrian rocks of the Dundas Group should greatly assist the prospecting operations. This fact has certainly to be considered, but the inference is obviously too broad to be of any real value. The Dundas Group occupies the largest portion of our concession and little is known of the relation between the mineral deposits and stratigraphic or structural setting. Besides, the known mineral occurrenc es are not confined to the Dundas terrains. Indeed, it has been recently suggested that part at least of the Mt. Lyell copper deposits occur in the overlying Owen Conglomerate; and it is an established fact that one of the four operating mines in the area - the Oceania Mine, near Zeehan - is exploiting a silver-lead deposit which occurs at a still higher stratigraphic level, in the Gordon Limestone.

It has also been pointed out that various regional structures, and in particular the numerous axial rises which affect the north-south fold axis of the Cambrian-Ordovician succession, would provide favourable loci for mineralization. The usefulness of this prospecting criterion is however limited, for the areas involved in these axial culminations are too extensive and too ill-defined to be wholly considered for detailed ground surveys.

It thus appeared to the writer that the most promising approach was to study the specific mineralization characteristics and the geological successions of known mineralised fields; to map these fields in detail, and to undertake a most thorough search for their possible lateral or vertical extension.

PRIORITY OF THE AREA BETWEEN ROSEBERY AND MOUNT LYELL

Following this principle, it became manifest that priority should be given to the portion of our property which stretches in a north-south direction from the Pieman River to Mt. Lyell, through the known mineralized field of Rosebery, Red Hill, Lake Dora, Mt. Tyndall and Comstock. This area is relatively small, some 250 square miles in all, and could be adequately mapped in the course of two favourable field seasons. It contains three out of the four productive mines of the West Tasmanian Coast: Mt. Lyell, at its southern end, and Rosebery-Hercules-Tullah Mines in its northern portion. Finally, the area forms a well defined geological unit whose tectonic, stratigraphic and metallogenic features can be investigated and correlated by the ordinary methods of surface geology.

It has thus been decided, in agreement with the Managing Director and the Exploration Manager of our Company, to give priority to this area in the regional mapping programme, and field work started on the 10th March.

A geological party comprising D. King and the writer and intermittently assisted by a junior member of the staff, has been almost continuously engaged in the mapping of this area until the end of May. Less continuous, but valuable work to the regional mapping, has been carried out during the same period by A. Clark and B. Drew. The former mapped part of the Lake Dora and Lake Julia area; the latter studied the stratigraphic succession in the Sterling Valley. The writer's party successively operated from camps established at Red Hill, Lake Julia and Lake Margaret.

PROGRESS OF THE MAPPING WORK

The area investigated so far is shown in the simplified geological map attached to this report. All the geological data (boundary, stratigraphic and tectonic observations, mineralization phenomena) are recorded on vertical photographs and field books, and the related rock and mineral specimens have been included in the regional specimen collection at the Zeehan office. A master plan, grouping the mapping data to the photograph scale, is in the compilation stage, and a start has been made in the preparation of a general geological map of the southern half of our concession, at the scale 2 inches = 1 mile. The detailed geological descriptions, structural sections, and critical review of the literature dealing with this area will form the object of a future geological report by the writer.

MINERALIZATION CONTROL AND ECONOMIC POSSIBILITIES OF THE ROSEBERY-RED HILL-LAKE DORA-COMSTOCK AREA

It has been shown in the monthly reports for April and May that this area lends itself to accurate mapping as long as the transport of persons and field equipment is carried out by helicopter. It has also been shown that a stratigraphic succession of more than local validity can be established. This could allow the stratigraphic correlation of the host rocks of many mineral deposits, thus providing a firm basis for tectonic interpretation.

Finally, an identical pattern of mineralization has been recognized at Red Hills, Lake Julia, Lake Dora and south of Mt. Sedgwick in the Comstock area, suggesting a definite mineralization control at a given stratigraphic level. If this is proved correct (by further field observations and by petrological studies) we would have recognized a most important prospecting criterion which should guide not only geological, geophysical or geochemical investigations but also actual drilling operation.

It has been shown in a preceding monthly report that the Dundas Group ends in this area by a coarse, poorly sorted, iron-rich breccia which underlies disconformably the Owen Conglomerate. Underlying this breccia are reddish-weathering porphyries, whose thickness does not exceed 500 feet, which appears to have a tabular disposition and to which are associated all the copper deposits of the Red Hills-Lake Dora-Mt. Tyndall zone. We inferred that this association could well provide a reliable prospecting criterion, even though no satisfactory metallogenic explanation could be given as yet. But in the last four weeks we have the opportunity to observe the same geological succession and analagous mineralization phenomena in the Comstock area, along the southern spurs of Mt. Sedgwick. There the Owen Conglomerate is also underlain by coarse breccias, with minor slate intercalations, whose lower beds are metasomatically felspathized (and mineralized) and appear to pass to porphyritic rocks quite similar in appearance and composition to the Red Hills-Lake Dora porphyries. But in the Comstock area these rocks retain unmistakable bedding features, and it must therefore follow that they represent metasomatic products of felspathization. The Comstock ore body is situated at this intensely felspathized level.

It would therefore appear that there is a genetic relation between felspathization (and mineralization) phenomena and the porphyry bodies; and that these phenomena have especially affected, in this area at least, the upper beds of the Cambrian Group. The localization of the mineral bodies in these beds, along or just beneath the Cambrian-Ordovician unconformity would thus be readily accounted for. Their association with felspar porphyries would be equally understandable; and the type and mode of occurrence of these deposits would be quite in agreement with this view.

Without discussing here the theoretical inplications, it has to be pointed out the value of these relations for our future prospecting operations in this area. An application has already been attempted in the Comstock area, in order to locate the possible extension of the Comstock ore body within the boundaries of our lease (see monthly report for May).

Concluding this brief review of our regional work in Tasmania, I suggest that the next summer season should be devoted to detailed mapping in the tract of country stretching from the Pieman River to the Mt. Lyell mining field, up to some 10 miles from the eastern boundary of our property. We may reasonably hope to clarify, in so doing, the following questions :

1. Subdivision and stratigraphic succession of the Cambrian-Ordovician sequences.

2. General tectonics of this area. Structural-stratigraphic correlations between the Rosebery-Hercules zone of mineralization and the Sterling-Red Hills-Lake Julia-Lake Dora field.

3. Extension and potential value of the Lake Selina-Lake Dora deposits, as a result of combined geological and geophysical methods.

4. Extension, within our area, of the Comstock ore body.

5. Mineralization controls and their economic significance.

10th June, 1957

B. Campana
Senior Geologist(Regional)

R.T.A.E. AND E.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 I 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 Renison 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 E.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	65	-	-	-	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.			

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

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

NORTHWEST TASMANIA - PROJECT PRP/7/100

REVIEW OF ACTIVITIES TO 31ST MAY 1957.

by

J. H. Rattigan, Geologist

CONTENTS

GENERAL

Exploration in Western Tasmania has been in progress one year as at 31st May, 1957. The exploration has been carried out by Rio Tinto Australian Exploration Pty. Limited on behalf of the Rio Tinto Mining Company of Australia and E.Z. Industries Ltd.

Work commenced following the granting of S.P.L.302 pegged on behalf of Rio Tinto Australian Exploration Pty. Limited. Since the pegging of the original S.P.L.302 two additional areas have been granted or applied for as S.P.Ls covering ground on the eastern margins of S.P.L.302 which was considered to have some mineral potential.

Activity on our permit areas has included compilation of maps and basic data relating to geology and mineral resources and production, and land and mineral tenure, airborne magnetometer electromagnetic, and scintillometer surveys, and ground surveys in the field. Ground surveys have included investigations into the source of geophysical anomalies, employing geological and ground geophysical work, investigations of mineral occurrences within our S.P.Ls, appraisals of properties not included within the terms of our permits but accessible to us as propositions, geochemical prospecting and regional geological mapping.

STAFF

Technical staff and temporary employees who have been in Tasmania for periods on work concerned with exploration of our permit areas are listed below. In addition to those listed, the Managing Director, Exploration Manager and Senior Geophysicist have spent several periods inspecting work in progress and in the field.

Dr. B. Campana	8 weeks	Senior Geologist - Regional mapping
H. Jensen	2 weeks	Senior Geologist - Mining
J. H. Rattigan	47 weeks	Geologist-in-charge, field operations
D. King	26 weeks	Geologist - liaison with contracting E.M. Crews, regional geology.
B. Drew	30 weeks	Geologist - liaison with airborne geophysical crew, examination of mining properties, investigation of geophysical anomalies.
A. Clark	12 weeks	Geologist - geochemical prospecting and regional mapping.
R. Searl	11 weeks	Geologist - liaison with contracting airborne magnetometer crews
W. Atkinson	18 weeks	Student - later appointed geologist
N. Mattocks	20 weeks	Student - later appointed geophysicist
J. Shields	18 weeks	Student - later appointed geologist
R. Ford	27 weeks(part time) 12 weeks(full time)	Temporary geological assistant " " "
B. Wells	18 weeks(part time)	Temporary geological assistant

D.Mitchell	10 weeks	Temporary geologist
J. Walkley	14 weeks	Student
P. Radel	3 weeks	Student
W. Boucaut	14 weeks	Student
A. Nye	9 weeks	Draftsman
W. Potter	8 weeks	Draftsman
W. Wagschall	1 week	Technical Assistant, Indexing.

PRELIMINARY WORK

Before undertaking actual field investigations of our permit areas the period from June 1st to December 1st was spent in compiling a series of geological maps and basic data on mineral resources and land and mineral tenure. At the time this work commenced no complete coverage of reliably controlled topographic maps, and no regional geological maps at a convenient scale existed.

A set of reasonably controlled base topographic maps at standard 1 mile to 1 inch scale covering our permit areas were prepared by reducing various maps prepared from aerial photographs by government and private organisations, supplemented by our own template layouts. In this work J. H. Rattigan was assisted by draftsmen A. Nye and J. Potter.

Scattered geological data was assembled and supplemented over wide areas by aerial photo interpretation. The data was reduced to one mile to one inch sheets and terminology modified to accord with current usage of the Tasmanian University.

A series of overlays at 1-mile to 1-inch scale showing mineral occurrences and also leases and reserves excluded from the terms of our permit areas were prepared with the assistance of Miss Wagschall and the Melbourne drafting staff.

This preliminary work gave a basis for planning exploration activities. Large areas covered by rocks with no mineral potential, such as the basalt and dolerite sheets and Permian and Tertiary deposits were eliminated from consideration. Exploration techniques were directed to areas of Lower Palaeozoic and Pre-Cambrian rocks, which on the basis of known mineral occurrences would appear to have best prospects of further mineral discovery.

AIRBORNE GEOPHYSICAL INVESTIGATIONS

This work is reviewed in detail by the Senior Geophysicist.

A complete systematic airborne magnetometer coverage of the S.P.Ls 302 and 311 was completed but all computed results are not to hand. The magnetic patterns confirmed various geological units recognised and major fault features recognised on the preliminary geological maps. Anomalies were recorded over known and unknown mineralised areas. These included -

(1) Confirmation of anomalies recorded by the B.M.R. over the Long Plains magnetite deposits, two of which are held under government reservations, but one major anomaly was recorded within S.P.L.302

(2) Anomalies recorded over magnetite deposits of the Heemskirk area.

(3) Anomalies recorded in the area Mt. Lindsay Tin Field where tin is associated with magnetite.

(4) Anomalies recorded in the mineralised porphyry belt extending north from Queenstown along the western margin of our S.P.L.302. These include the Red Hills anomaly where a magnete copper association is known, and anomalies over similar deposits and over secondary magnetite placers in the Cambrian rocks which were previously unknown.

Initially a wide belt of Cambrian rocks was outlined for systematic coverage by helicopter-borne E.M. detector. However, due to limitations imposed by the effectiveness of the instruments, rugged terrain, weather conditions, prior commitments of the one helicopter available and mechanical damage at various times to both helicopter and E.M. detector, the coverage obtained during the season was in no way as great as anticipated.

Orientation tests over known sulphide bodies in Western Tasmania did however prove that sulphide bodies could be picked up by the detector in use, provided a height limit was imposed.

A scintillometer was installed with the E.M. detector but performance generally was unreliable though one radioactive anomaly 12A was discovered.

GROUND SURVEYS

During the field season it was decided to allot staff to specific functions as far as commitments allowed. These included -

A. Ground examination of airborne geophysical anomalies.

B. Inspection of mineral prospects and properties.

C. Ground geophysical investigations.

D. Geochemical prospecting using stream silt and waters and residual soils.

E. Regional geological investigations with a view to determining stratigraphic and structural controls of mineralisation inspecific areas considered most favourable for prospecting.

Ground investigations were hampered to some degree early in the field season by prior commitments of the one helicopter which did not allow of its use for transport of field parties to remote areas. After March 8th the helicopter became available and was used in establishing and supplying field parties.

1. Ground Examination of Magnetometer Anomalies.

Most of the magnetometer anomalies recorded in the southern parts of our permit area were investigated by ground methods. Many of these could be related to outcropping basic rocks including serpentinised ultrabasic rocks, dolerite, basalt and amphibole bearing rocks, some of which are undoubtedly of plutonic igneous origin. Several new discoveries of serpentine rock are known as a result of this work. While no economic minerals, other than asbestos, have yet been found in association with new serpentine-bodies their presence has increased the area of potential ground in which nickeliferous deposits might occur.

Two airborne magnetic anomalies occur over previously known magnetite deposits in the Savage River and Rocky River areas. These are held under Government Reservation but have been inspected

by the staff.

A third anomaly detected in the same general area but within S.P.L.302 has been shown from recent ground investigations to be caused by iron ores of similar type to the known occurrences. Preliminary investigations have shown this new deposit to be quite extensive.

A magnetic anomaly near Mt. Agnew apparently results from the cumulative effects of a number of relatively small bodies of magnetite, the largest being known as the Tenth Legion deposit. These deposits are also held under government reservation but have been inspected.

A number of magnetic anomalies were recorded along the West Coast range between Mt. Farrell and Mt. Owen. The source of the anomalies is attributed to the occurrence of magnetite in porphyry hodies and in clastic sediments of the Upper part of the Dundas Group. Such occurrences were first recognised early in the season after a brief investigation of the Linda Valley anomaly, but the full significance as marker beds and pointers to mineralisation was not realised until a regional mapping programme along the West Coast Range under the supervision of Dr. Campana succeeded in subdividing Upper part of the Dundas Group and recognising zones of mineralisation.

2. Ground Investigation of Airborne Electromagnetic Anomalies.

All anomalies detected were not examined on the ground although the most interesting recorded in the early part of the field season were investigated. The plotted positions of anomalies is subject to error of at least 500 feet and in most cases probably more due to limitations of navigation in difficult terrain. Relocation of plotted positions of anomalies in dense timber is difficult and must be based on compass traverses. This means that any detailed ground investigations into the cause of each individual anomaly must cover a rather wide search area to eliminate all possibilities.

Of the anomalies examined few were found to occur in areas of outcrop and purely geological investigations into the source were, therefore, of limited use. For this reason ground S.P. surveys in several areas were employed as the most convenient method of confirming on the ground the position of airborne E.M. anomalies.

This method employed near the position of anomaly 9F in the West Cuni area indicated that highly carbonaceous shales, found by pitting, gave a marked response to the E.M. detector.

A group of anomalies was detected in the Colebrook Hill - Patterson Hill area west of Rosebery. Some of these may be duplication of a similar source due to navigational error in separate flights and surveys. Some of the anomalies can be referred to sulphide bodies (copper) known and worked on Colebrook Hill. Anomalies north of the Pieman River, in the Patterson Hill area, which lies within S.P.L.302, were investigated. Ground Geological surveys showed poor exposure but a serpentine body discovered is probably the cause of an airborne magnetic anomaly recorded. S.P. surveys were undertaken to relocate the airborne E.M. anomalies. This work was abandoned before all anomalies were covered due to commitments in other directions. A linear belt of anomalies believed to lie largely in sediments adjacent to a trending serpentine body were found during this work. Exposures are poor however, and the type of rock underlying the anomalous belt remains to be definitely determined.

It is possible that these interesting S.P. anomalies are developed over a bed of carbonaceous or pyritic slates but the possibility of sulphide deposits cannot be disregarded and it is suggested that some pitting over anomalies should be carried out for geological information.

In the Sterling Valley east of Rosebery the area surrounding a line of anomalies extending north from the Sterling Mine was examined for geological information and S.P. surveys were carried out to relocate airborne anomalies. A number of S.P. anomalies were outlined including one over the Sterling Mine area which is held by, and has been drilled by, the E.Z. Company, and one within S.P.L. 302 which appears to be similar in form to that at the Sterling Mine. The geological environment in the Sterling Valley is similar to that of the Mt. Farrel Mines (Pb Zn) at Tullah.

Several other E.M. anomalies were investigated but apart from known sulphide workings, no sulphide bodies were discovered, although poor exposure in most areas requires that more detailed work be employed for exhaustive testing.

3. Geochemical Prospecting

J. Booth of Riocanex staff initiated field staff into techniques of stream silt sampling and geochemical testing, using portable field kits developed in Canada. Orientation work was carried out near known sulphide occurrences to determine the suitability of the Canadian technique to conditions in Western Tasmania. The geochemical technique can be used for -

(i) Systematic prospecting of drainage basins utilising stream silts and perhaps stream waters. In effect a relatively rapid, cheap and direct method of wildcat prospecting is available and can be localised to target areas, determined by favourable geological environment.

(ii) Specific investigations using stream silt sampling or residual soil samples, in areas where airborne or ground geophysical anomalies have been detected with a view to possibly eliminating non metallic sources for anomalies.

The geochemical technique in Tasmania was done by A.B. Clark who has written a separate report. The technique in stream silt sampling and testing is difficult at times, as in the rainy season creek courses cannot be negotiated and no silts are exposed in stream beds, and even in the drier season from December - March flash floods at intervals seriously hamper such work. However, the method has been proved to have application during times of low water, by the finding of a minor geochemical anomaly which was traced to its source - minor Pb veins in the Razorback area.

To date no interesting discovery of base metals has been detected by geochemical methods in Western Tasmania, but confidence is felt in its application as a cheap direct method covering a considerable area of ground, provided operating conditions are favourable.

4. Appraisals of Mineral Prospects and Properties.

Several properties were investigated during the field season to appraise their attractiveness as large-scale mining propositions. These included the Mt. Farrell Pb-Zn properties and the Renison Bell Tin Field. Neither of these properties could be recommended for projects on the scale required, on the basis of present knowledge, though the Renison Bell field is largely untested. Separate reports describing investigations and conclusions have been written on these properties.

Since March the investigation of mining properties has been supervised by the Senior Mining Geologist, H.Jensen, who has been recently investigating several properties, including the Cuni copper-nickel deposits held by the Montana Silver-Lead Co. and also magnetite deposits of the Savage River, held under reservation by the Tasmanian Government. A separate review has been written on this work by Mr. H. Jensen.

Several old prospects, principally of tin, copper, silver lead and nickel, within S.P.L.302 have been briefly examined at various times, but none appeared of especial interest though detailed information is often lacking due to poor outcrop and inaccessibility of old workings.

5. Regional Geological Investigations

These have been supervised by the Senior Regional Geologist Dr. Campana since March and he has written a review on this work. Regional geological mapping has been carried out in the areas outlined on Plate 3. Regional mapping to date has covered two main areas which are fairly accessible and have good exposures, one being west of Rosebery to Renison Bell and the other south from Tullah to Queenstown. In addition many miscellaneous investigations carried out have given geological information which will be of use in regional geological plans.

Most interesting features which have emerged from the geological mapping is the recognition of lithological units and mineralised zones (Cu Fe Pb) in the Upper part of the Dundas Group rocks mapped at intervals between Tullah and Queenstown as described by Dr.Campana.

CONCLUSIONS AND RECOMMENDATIONS

1. Means of Operating Ground Field Parties

Our experiences in the field this year have demonstrated that helicopter transport of equipment and personnel is the only effective present means of establishing and servicing field parties in areas where the normal means of access are poor. Man hauling of equipment was made to one camp at Patterson Hills, and proved time consuming and physically exhausting. Pack horses are of limited use as very few suitable tracks are available.

Several parties can be serviced effectively and efficiently by means of a helicopter provided the aircraft is available at call so that movements and preparing of equipment can be planned to proper advantage.

2. Field Operations to May 31st, 1957.

The work to date was handicapped to some extent by lack of full call of helicopter for use by field parties until late in the season. However, much valuable basic information has been assembled, field staff have been familiarised with new terrain and field techniques, several prospects have been eliminated from consideration and some interesting avenues for exploration have become apparent.

3. Suggestions re Future Programme

Within our permit areas it is considered the best chance of finding economic mineral deposits are in exploration methods covering -

(1) The belts of the Dundas Group rocks between Queenstown and Valentines Peak and west of Waratah. In these areas particular attention should be paid to -

(a) contact zones with acid and basic igneous rocks

(b) mineralised porphyry belts, such as that along the face of the West Coast Range and its northern extensions.

(c) such lithological markers which may control mineralisation as the boundaries of the "massive pyroclastic formation" recognised by the E.Z. Company geologists.

(d) structurally complex areas such as the faulted zones near Zeehan where ore bodies were localised in fault zones.

(2) Contact zones between granite and basic rocks and between various differentiates in the large bodies of basic and ultrabasic rocks.

(3) Belts of Pre-Cambrian rocks in which basic rocks, carbonate rocks or strongly metamorphosed rocks occur. The Mt. Bischoff main lode was localised in carbonate rocks of Pre-Cambrian age, and magnetite deposits (with associate shoots of sulphide and gold) and some small but rich gold lodes are localised in metamorphosed belt of Pre-Cambrian rocks in the Long Plains district.

(4) Carbonate rocks of Ordovician Age especially near granite contacts and faulted zones.

4. Methods & Techniques

Regional geological mapping of target areas should be undertaken to determine possible stratigraphic and/or structural controls for mineralisation and restricting areas for consideration by more detailed ground exploration techniques.

Detailed examination of records and workings of the many old mineral occurrences should be undertaken to evaluate prospects of extensions or repetitions of ore.

Geochemical and ground geophysical surveys should be made to aid in assessing airborne anomalies, extent of mineralisation near known prospects and in localised areas selected on favourable stratigraphic and structural grounds from regional mapping.

Specific recommendations on geological and geophysical work to be undertaken are contained in the reviews of the Senior Geologists and Senior Geophysicist.

J. H. Rattigan
Geologist.

10th June, 1957

145°00' 145°30' 146°00'

THREE HUMMOCK Is.
HUNTER Is
CAPE GRIM
ROBBINS Is.
Cape Grim
North Pt.
Perkins Bay
Stanley
Smithton
WOOLNORTH
Rocky Cape
TABLE CAPE
SMITHTON
Marrawah
Redpa
West Pt
Table Cape
Wynyard
Duck R.
41°
Burnie
River
Arthur
BLUFF POINT
TROWUTTA
BURNIE
Nelson Bay
River Blythe
MAGNET
807500yN
BALFOUR
S.P.L 302
VALENTINES
PEAK
Sandy Cape
Mt NORFOLK
Waratah
SPL
311
MACKINTOSH
CORINNA
PIEMAN RIVER
Pieman R.
845000yE
870000yN
Rosebery
Renison Bell
Granville Hbr
ZEEHAN
MURCHISON
Zeehan
Gormanston
Queenstown
3MILES
10 MILES
DATUM
AGD
STRAHAN
LYELL
Strahan
Macquarie Hbr

RIO AUSTRALIAN EXPLORATION PTY LIMITED

N.W. TASMANIA
S.P.L'S.
HELD AND APPLIED FOR

Scale 8miles to inch | PRP/7/100 | PLATE 1

5 cm

06-5284

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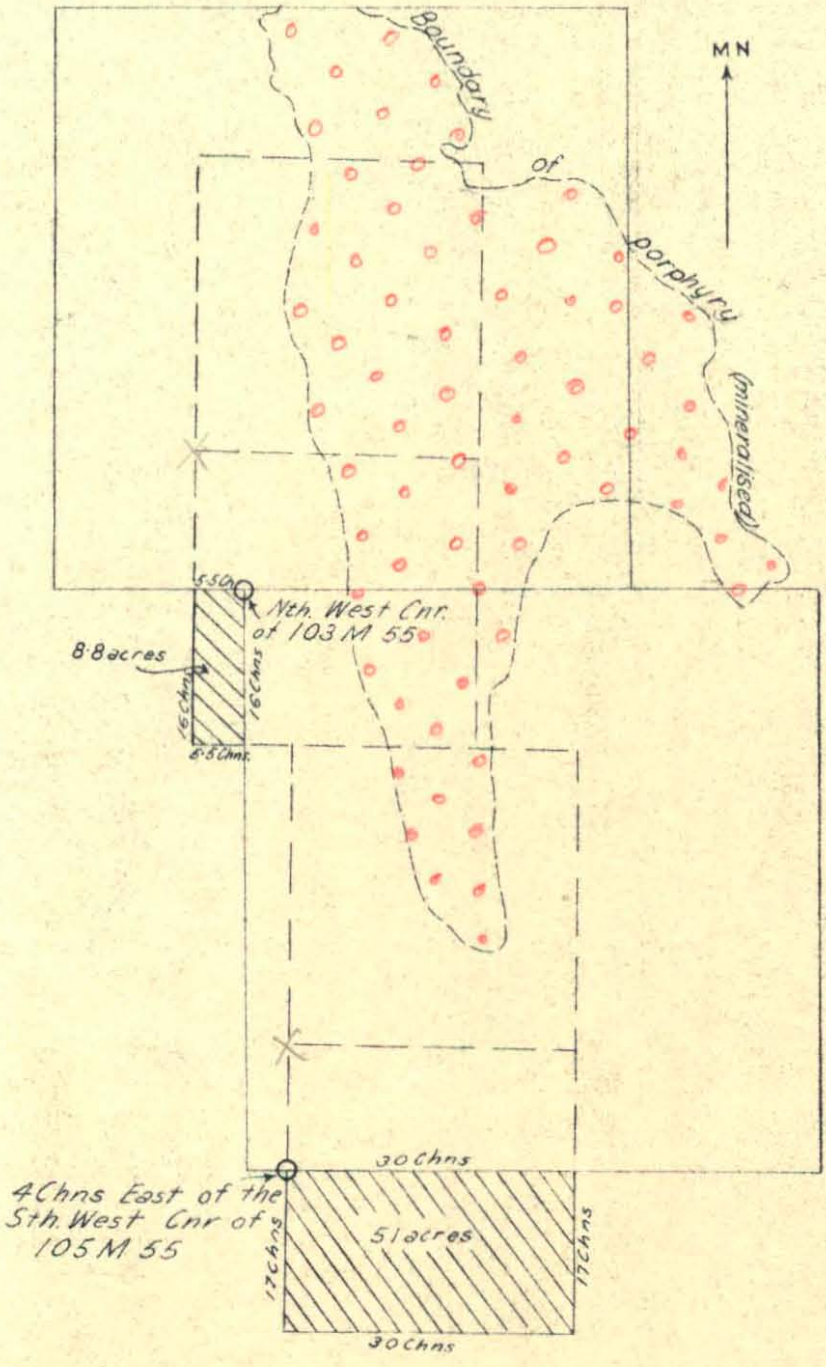
RED HILLS AREA

Proposed Areas for Pegging

DATE | SCALE 20 chns to 1 inch | PLATE 2

Geologist | Geophysicist

Draftsman | Authority PRP/7/100



Porphyry (mineralised)

5 cm

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SIMPLIFIED GEOLOGICAL MAP AND SECTIONS OF Mt MURCHISON - LAKE DORA AREA WESTERN TASMANIA

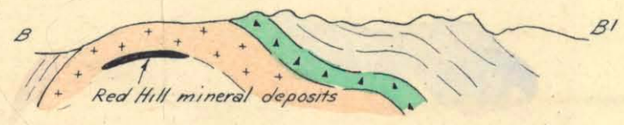
Showing the Distribution and Geological Control of Porphyry-type Fe-Cu-Pb Mineralisation

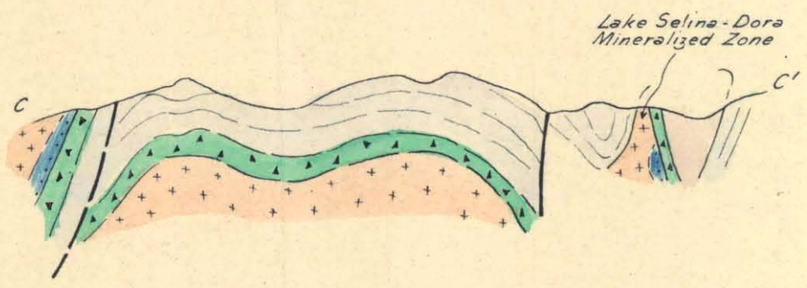
Scale 1inch to 1mile

TN

Geology by B. Campana, D. King and A. Clark
April '57

PRP/7/100





- *Scree and morainic deposits*
- *Owen conglomerate*
- *Breccia horizon (? Jukes breccia)*
- *Bedded magnetite concentrations, grit, and greywacke*
- *Porphyries with Fe-Cu-Pb mineralization*
- *Pyroclastics - quartz-sericite schists and lavas*
- *Mine workings*
- *Boundary of R.T.A.E. concession*
- *Areasheld by other interests*
- *Area recommended for pegging as S.P.L.*

PLATE 4

5 cm

06-5284

PLATE 3

MAP ILLUSTRATING INVESTIGATIONS COMPLETED, IN PROGRESS OR PROPOSED WITHIN S.P.L. 302

LEGEND

- Areas occupied by Cambrian Dundas Group and basic intrusive
- Areas occupied by Stanley
- Airborne Geophysical anomalies:
- Aeromagnetic anomaly.
- Airborne E.M. Anomaly.
- Radioactive anomaly.
- Sites of ground geophysical exploration.
- Operating mines — investigation completed.
- Leased prospects — investigation commenced or proposed.
- Abandoned mines.
- Areas covered by reconnaissance geological work.
- Field camp sites.
- Mineralised areas investigated by mapping.
- Major areas held under Lease, Reservation or S.P.L. by other interests.

Southern Boundary of S.P.L. 302

Eastern Boundary of S.P.L. 302

5 cm

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Flyable

VALENTINES PEAK 3637

28

31

Flyable

Possibly Flyable

Navigation Accuracy Limited

MT. CLEVELAND 2821

30

29

WARATAH

Donaldson River

Savage River

Whyte River

Wilson River

Hatfield River

MT. RAMSAY 3890'

Flyable

Possibly Flyable

Navigation Accuracy Limited

Probably Unflyable

Flying Difficult Navigation Accuracy Limited

Probably Unflyable

Possibly Flyable

32

Flying Very Difficult

20

Mackintosh River

21

Unflyable

Stanley River

14

Hushisson R.

23

PIEMAN RIVER

6

5

ROSEBERY

7

22

Flying Very Difficult

3

RENISON BELL

7

Unflyable

9

1

Flying Very Difficult

Murchison R.

4

Flyable

Anthony Ck.

ZEEHAN

River

Flyable

10

Unflyable

15

Flying Very Difficult

13

Dundas

Unflyable

17

26

Little Henty Rvr.

Some Flyable

Unflyable

16

12N

12A

12

11

12S

27

QUEENSTOWN

True North

REFERENCE

28 — Areas covered by E.M. Surveys

Flyable — Areas Nominated for flying. With estimate on chances of coverage by helicopter

•⅓₆ — Anomalies consered worthy of further investigation

5 cm

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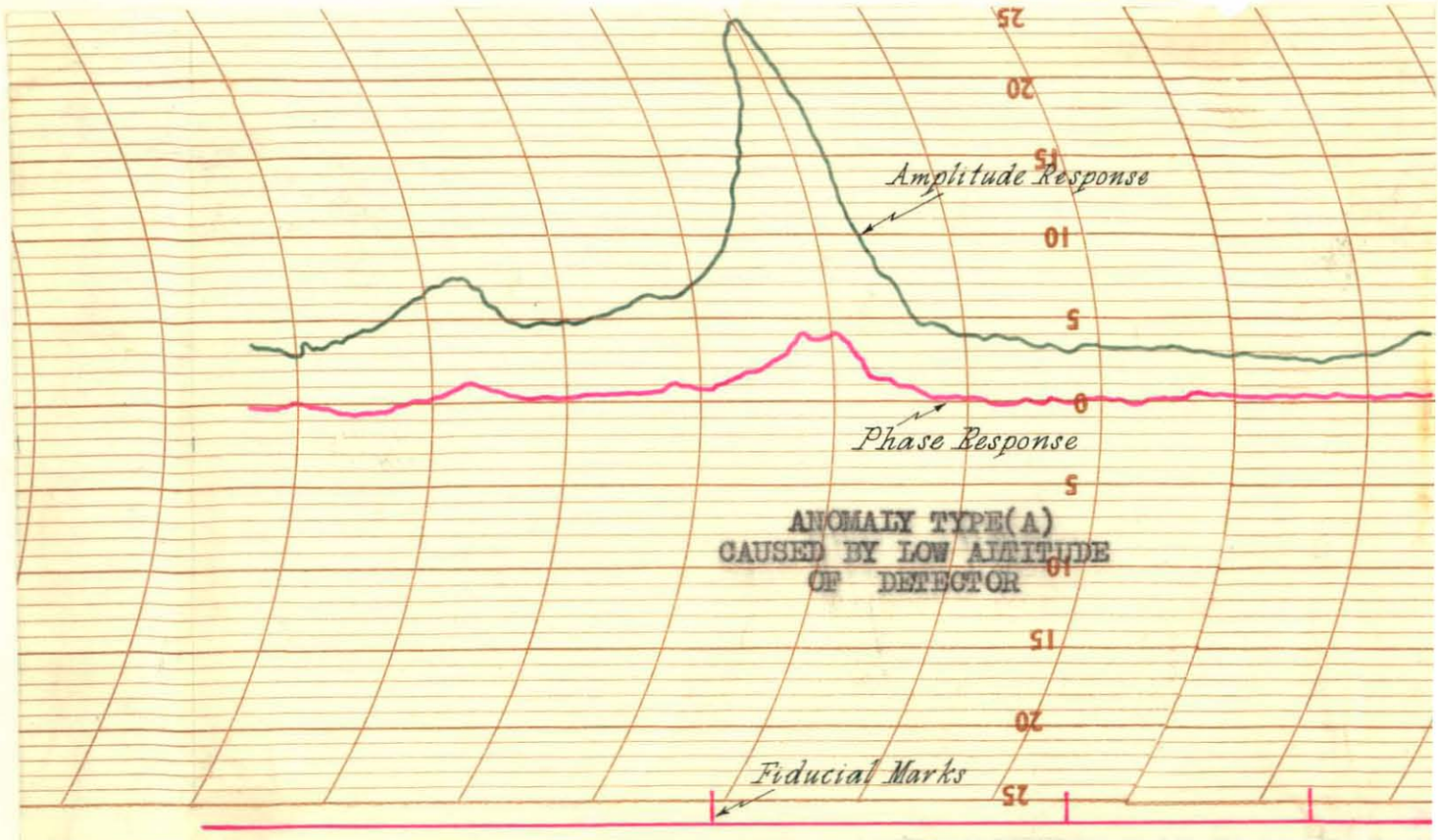
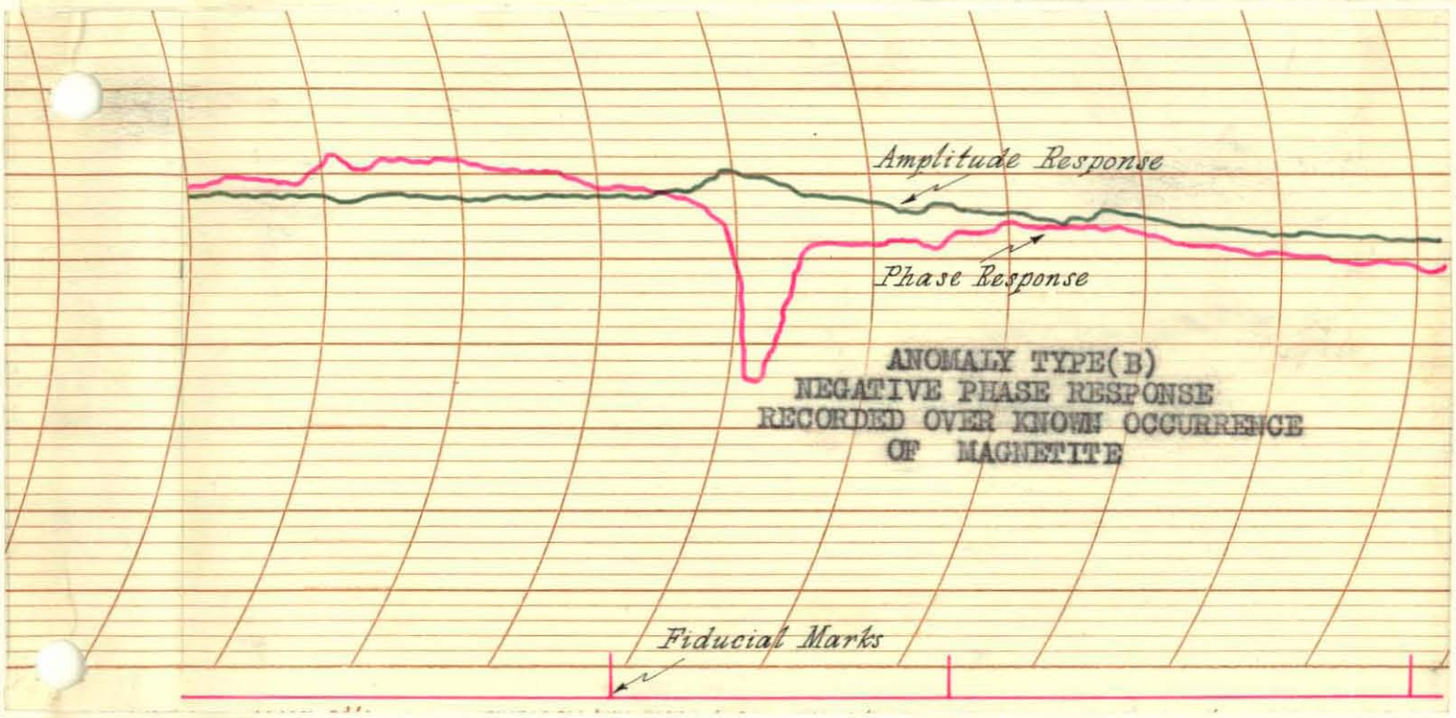
N.W. TASMANIA

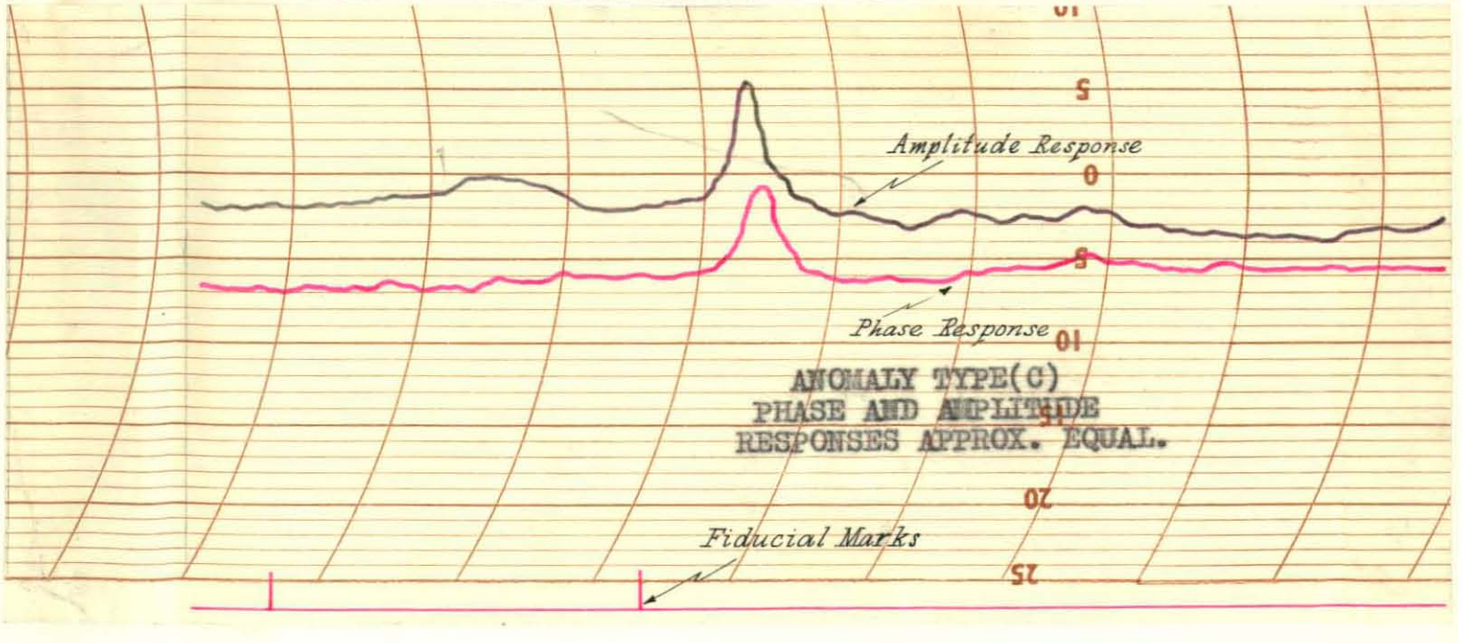
E.M. SURVEY COVERAGE TO MAY 31ST., 1957 AND AREAS NOMINATED FOR HELICOPTER-BORNE E.M. SVY.

With appropriate remarks on chances of coverage by helicopter equipment.

DATE	SCALE 2 MILES TO 1 INCH	
GEOLOGIST	GEOPHYSICIST	PLATE 5
DRAFTSMAN J.L.P.	AUTHORITY P.R.P. 7/100	







TYPES OF E.M. ANOMALIES

PLATE 6.