UNION OIL DEVELOPMENT CORPORATION

BLACK BLUFF (E.L. 10/74)

ANNUAL REPORT

1974/75 FIELD SEASON

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1. INTRODUCTION

The Black Bluff Exploration Licence (E.L. 10/74) is situated in northwest Tasmania, approximately 50 kilometers south of Burnie. The E.L. was pegged in May 1974 by R. D. McNeil, and is 133 sq. kilometers in area. Access to the southeast part of the E.L. (Bond Range area) is via the road to Cradle Mountain; access to the northwest (Cattley Creek area) is via the logging roads south of Hampshire. The terrain is rugged with areas of dense rain forests, and the elevation is between 600 and 1,300 meters. Heavy rain and snow falls during winter preclude any possibility of effective field work from a temporary camp during this period; hence field work is restricted to the summer and autumn seasons.

Regional and detailed stream sampling was carried out over this area in 1968 by Pickands Mather; no values were considered worthy of follow-up work. Tasminex N.L. held the ground until 1974; however, very little information has been submitted on their work.

2. SUMMARY

Exploration has been confined to a volcanogenic copper-lead-zinc search over areas of Cambrian Mount Read Volcanics which are known to contain economic deposits at Queenstown and Rosebery. The areas of Cambrian volcanics which have been examined to date occur in the southeast (Bond Range) and south-central(Black Bluff Range) areas of the E.L. Further outcrops of volcanics occur in the northwest (Cattley Creek) part of the E.L., but have not yet been explored. Field work was carried out between December 1974 and February 1975 and consisted of mapping, stream, rock and soil sampling, and ground geophysics.

The Cambrian Mount Read Volcanics are unconformably overlain by the Ordovician Owen quartzites and conglomerates which form the rugged northeast trending anticlinal ranges of Black Bluff and Bond Range. Outcrops of the Cambrian volcanics in the Black Bluff Range are restricted to two "windows". The Bond Range contains extensive acid volcanic outcrop along its eastern slope; while to the east of Bond Range the acid volcanics are covered by Tertiary basalts except where exposed in river valleys or as original topographic highs.

Four anomalous zones have been found in the Bond Range area which warrant further investigation in the 1975/76 field season.

3. RECOMMENDATIONS

(i) The four anomalous areas (A, B, C and D) found during the 1974/75 season should be tested in detail by soil and/or auger sampling, ground geophysics and mapping, with the aim of providing drill targets for the 1976/77 season.

(ii) The initial program for the Cattley Creek area should consist of mapping, soil and stream sampling, and possibly some ground geophysics.

(iii) An airborne E.M. survey should be flown over the areas of Cambrian volcanics.

4. WORK COMPLETED

Field work began on the Black Bluff E.L. (10/74) in early December 1974 and was terminated by February 9, 1975.

(i) Gridding

Five grid lines totalling 15,800 meters were orientated northwest-southeast over the Bond Range and the basalt plain to the east. Station spacing on each grid was 50 meters and the grids were spaced between 1,600 meter and 800 meter intervals, depending on the accessibility of the terrain. Control for the grids was obtained by plotting occasional grid locations onto enlarged (1:15,840) aerial photographs.

(ii) Stream Sampling

This was confined to testing the areas of known Mount Read Volcanic units; essentially, the entire Bond Range and two "windows" in the Black Bluff Range. A total of 134 sample locations covering an area of approximately 30 sq. kilomters, gave a sample density of 4.5 per sq. kilometer. Two samples were taken at each location; one was a conventional sediment sample (fines from the bottom of the creek channel), while the other was of humic rich bank material from below the water level; the purpose of this will be discussed in the geochemistry section.

(iii) Soil Sampling

Short soil traverses were carried out over two I.P. anomalies (lines C and D) and a geologically interesting area (line F). The sample depth was approximately 10 centimeters (humic rich Al horizon), and the intervals were 25 meters on lines C and F, and 50 meters on line D. The total number of samples was 74.

(iv) Rock Chip Sampling

The 27 rock chip samples taken throughout the area were not used to give a systematic coverage or define a primary target, but to give a general idea of background values and to test any samples with iron oxide material or hydrothermal alteration.

(v) I.P. Survey

Fourteen line kilometers of pole-dipole induced polarisation data were obtained on six lines across the main belt of Cambrian volcanics outcropping on Bond Range and to the east where they are covered by shallow Tertiary basalts. For details of this work and discussions of anomalies, refer to the appended Geophysical Report by B. K. Salisbury.

(vi) Geological Mapping

Mapping of the Bond Range area was carried out by Mrs. E. B. Corbett (Consulting Geologist) using the 1:15,840 scale topographic plan as her base map. Emphasis of the mapping was on the Cambrian Mount Read Volcanic belt which outcrops primarily along Bond Range, with smaller outcrops occurring in the Black Bluff Range and near the Iris River bridge.

5. GEOLOGY

The following is the abstract from E. B. Corbett's Geological Report on the Bond Range Area which is appended to this report:

> "Cambrian acid volcanic rocks of potential economic interest are exposed in the Bond Range and its western flanks, overlain by a thin cover of Ordovician quartzites. To the east they are covered by up to 400 ft. of flat-lying Teriary basalt.
>
> The major north-east tending Devonian structures - anticlines on the Bond Range and the Black Bluff Range and a syncline in the Vale of Belvoir - are

cut off near the eastern edge of the licence by a major structure, here called the Kauri Fault.

The Bond Range apparently represents the western edge of a Cambrian cone or cones of ash-fall tuffs, intruded by the parent magma (quartz-porphyry) and selectively silicified at the northern end of the range. Silicification is accompanied (?) by mineralisation of the surrounding rocks. On the southern end of the Bond Range and in "windows" within the quartzite west of Lake Lea rhyolites are interbedded with crystal tuffs and rhyolite complexes near the Iris Bridge may be associated with a granodiorite porphyry. The volcanics now exposed probably formed highs which influenced Ordovician sedimentation and Tabberabberan folding."

A brief field examination of previously mapped undifferentiated Cambrian rocks (Burnie, 1:250,000 Geology) occurring in the northwest area of E.L. 10/74 (Cattley Creek), has found the geology to consist of a sequence of acid volcanics (rhyolites) and/or pyroclastics interbedded with fine grained sediments. This area is 20 kilometers on strike from the Mackintosh Prospect which to date has outlined reserves of 5 million tonnes ore averaging 0.3% copper, 5.8% lead, 10.1% zinc, 103 gm/tonne silver and 2 gm/tonne gold, plus another 700,000 tonnes ore averaging 1.7% copper, 2.9% lead, 5.1% zinc and 58 gm/tonne silver.

6. GEOCHEMISTRY

(i) Stream (Sediment and Humic)

Two samples were taken at each location; one, a conventional sample of fine sediment material from the bottom of the stream channel, while the other consisted of the humic rich sludge material from underneath the bank of the stream below the water level. It has been shown elsewhere by W. Baker (Mines Department Geochemist) that the humic bank material was capable of complexing metallic ions from the water, and therefore better distinguishing anomalous samples. However, it is evident from the results from this program that there is no significant difference between the sediment or humic samples.

All samples were dried and sieved to minus 80 mesh and minus 20 plus 80 mesh fractions in the field. The minus 80 mesh fractions were analysed by A.M.D.E.L. for copper, lead and zinc, and then stored in U.O.D.C.'s Kalgoorlie office, while the minus 20 plus 80 mesh fractions were stored in the U.O.D.C. Hobart office.

The sediment samples were digested by perchloric acid at 180°C for 30 minutes, then diluted with water and determined by A.A.S. Humic samples were first ashed overnight in a test tube at 180°C before being digested by hot perchloric acid and subjected to A.A.S.determination.

The assessment of values of the sediment samples are as follows:

Copper

<2 - 7 ppm: background, with majority of values less than 2 ppm

8 - 14 ppm: significant when occurrring with either a lead or zinc anomaly

15 - 21 ppm: weakly anomalous, it has been found that these are always associated with a lead or zinc anomaly

22 - 38 ppm(highest value obtained): anomalous

Lead

< 5 - 100 ppm: background (generally in <5 - 30 ppm range)

100 - 140 ppm: weakly anomalous

140 - 440 ppm(highest value): anomalous

Zinc

<2 - 50 ppm: background (generally <30 ppm)

50 - 90 ppm: weakly anomalous

90 - 210 ppm(highest value): anomalous

Sample localities with single (one element) weakly anomalous values are not considered significant and no follow-up work is recommended.

Most anomalous values are combined with weakly anomalous or anomalous values of one or both of the other elements, and it is these sample localities that are classed as significant and warrant further investigation. Where several nearby samples are also classed as significant, it is strongly recommended that further definitive work be done to ascertain the source of the anomalies.

(ii) Soil

Samples were taken at a depth of approximately 10 centimeters in the Al horizon, then dried and sieved (minus 80 mesh) and analysed by A.M.D.E.L. using the perchloric acid digestion and A.A.S. determination. The samples are now stored at U.O.D.C.'s Kalgoorlie office.

The short soil lines on sections of grids C, D and F were aimed at testing geophysical (lines C and D) and geological (line F) features and no definite correlation can be made between them. The limited number of samples allows only broad estimates for background and anomalous values. However, it is obvious that samples taken over basalt have higher background copper (20 - 40 ppm) and zinc (50 - 100 ppm) than samples over the acid volcanics (5 - 10 ppm copper and 10 - 40 ppm zinc); conversely, the background lead values are far higher over the volcanics (30 - 80 ppm) than over the basalts (5 - 30 ppm).

Samples with single element values over twice background, or element values slightly over background but occurring with a significant value of another element, are classed as anomalous. Lead is the most predominant and significant anomalous element in the soil samples and may indicate that the highly acid condition of the "button grass" soils has extensively leached the more mobile zinc and copper values, therefore masking their presence as anomalies. Because of this, greater emphasis has been placed on the anomalous lead values as indications of copper, lead and zinc mineralisation.

(iii) Rock Chip

Each rock chip sample consisted of four to six pieces from the one outcrop. The samples were pulverised and analysed by A.M.D.E.L. using perchloric acid digestion and A.A.S. determination. The pulps are stored at U.O.D.C.'s Kalgoorlie office, and representative hand specimens at the Hobart office.

Where no evidence of any sulphide mineralisation can be seen, the background values of outcropping acid tuffs, rhyolites and porphyries range from less than 2 ppm to 5 ppm copper, less than 5 ppm to 12 ppm lead and 2 ppm to 60 ppm zinc. Two samples (S-875 and S-881) which contained limonite coatings on fractures and some sulphide boxworks, were found to be moderately anomalous (S-875: 145 ppm copper, 28 ppm lead, 270 ppm zinc; and S-881: 20 ppm copper, 220 ppm lead, 440 ppm zinc). Four samples (S-883 to S-886) from the north end of Bond Range, in the vicinity of silica alteration zones, contain anomalous values of zinc (360, 95, 95, 170 ppm) and very weakly anomalous values of copper (5, 15, 10, 12 ppm) and lead (12, 45, 28, 10 ppm).

7. DISCUSSION OF ANOMALOUS AREAS AND RECOMMENDATIONS

The four major anomalous areas are here denoted as A, B, C and D and three minor (one sample) anomalies as E, F and G.

(i) Area A consists of five significant lead-zinc stream sediment anomalies which delineate a zone of up to 800 meters in strike. Although the copper values are not classed as anomalous, it must be noted that they are three to four times higher than the general background values for that area. A drill hole put down by Tasminex N.L. was located on the fringe of this area, and a sample of core left at the site was found to be anomalous (20 ppm copper, 220 ppm lead, 440 ppm zinc); however, the information concerning this hole has not been submitted to the Mines Department by Tasminex, and therefore it is not known what preliminary work was done, or on what target the drill hole was sited.

It is proposed to define the source of these anomalies by soil and auger sampling on a grid spacing of 200 meters and sample intervals of 25 meters. Also, detail mapping and rock chip sampling will be done over the area.

(ii) Area B consists of a coincident I.P./resistivity and lead soil anomaly on line C (15.00 to 16.00 W), and a stream anomaly from the creek which drains the area. The I.P./resistivity anomaly is thought to represent a thin dikelike source of about 150 meters thickness. The associated lead soil values support this estimate with a zone of 100 meters being anomalous (170, 270, 220 and 140 ppm). The lead stream anomaly at the junction of the Fall River some 400 meters to the northeast is strongly anomalous (440 ppm lead), especially in the humic bank material (600 ppm lead), and this may indicate that the target area is further along strike to the east-north-east. The broad weak I.P. anomaly occurring at 12.00 W on line D some 1,400 meters to the east-north-east is probably a continuation of this zone. Soil sampling over the I.P. response on line D revealed only two separate weak lead anomalies; however, due to the partial basalt cover of the acid volcanics at this point, there is a possibility that a significant anomalous zone could have been masked.

(iii) Area C consists of two stream sample anomalies from separate creeks which are 400 meters apart and drain the northwest slope of the Bond Range.

The most westerly of these two streams, contains a lead anomaly (210 ppm) from a humic sample taken in a tributary which drains an area containing an anomalous copper-zinc rock chip sample (see Area G) and therefore it is probable that these are related. The other possibility for the source of the two stream anomalies is a narrow phyllite unit (possible fine tuff) which occurs as the uppermost volcanic unit and is unconformably overlain by the Owen Conglomerate.

The variation in lead and zinc values from the two stream samples may indicate a primary metal zoning in this area.

27051 ; 38 ppm copper, 140 ppm lead, 42 ppm zinc
27052 : 35 ppm copper, 5 ppm lead, 210 ppm zinc

It is proposed to test this area with several short soil lines as well as mapping and rock chip sampling. Closer spaced stream sampling could also be used.

(iv) Area D consists of several stream sediment anomalies, five zones of soil anomalies and four rock chip anomalies. The area delineated by these anomalies is approximately 800 x 400 meters and occurs on steep slopes covered with thick vegetation at the northeast end of the Bond Range.

All six stream samples from the two creek system draining this area show anomalous copper and lead values, while only three samples contain weak zinc anomalies. The soil sample traverse delineated five zones of anomalous lead and copper values with some weak coincident zinc anomalies. Three of the zones are fifty meters wide (2 sample points) and two are 75 meters wide (3 sample points).

By far the most anomalous values came from the sample at 6.00 W which contained 42 ppm copper, 240 ppm lead and 260 ppm zinc. Unlike the stream or soil anomalies, the rock chip samples are anomalous only in zinc (360, 95, 95, and 170 ppm), while the copper and lead values are only weakly anomalous.

Tasminex prospected this area for uranium and thorium in 1973, and obtained anomalous radon stream water values and a rock chip sample which contained 9,500 ppm thorium and 250 ppm uranium. This area was subsequently examined by P. L. F. Collins from the Mines Department, and he concluded that the radio-active material was leached from the devitrified glass in a particular tuff unit, and then concentrated in fractures and on the weathered outcrop. The two thin sections described in Collins' report noted the presence of sulphides; one was a crystallo-lithic tuff with bands of disseminated sulphides (unknown width or type), and irregular elongate patches of chlorite; the other thin section was of a quartz-porphyry lava which contained five percent disseminated pyrite in the crypto-crystalline groundmass.

Hydrothermal alteration is indicated by the outcropping spines and ridges of silicified tuffs. Silica has completely flooded these tuffs and all the mafic and potassic minerals have been leached; fortunately the preservation of the texture allows comparison with the "unaltered" rock which is adjacent and on strike from the silicified rock. E. B. Corbett has noted specularite in the silicified spines and pyrite and hematite in the flanking "unaltered" rocks (refer to the geological report for more details).

It is evident from the alteration and geochemistry in this area that further field work is warranted. However, due to the difficult terrain and the lack of time available, it is recommended that work be limited to three or four soil and/or auger lines and rock chip sampling.

Note: an I.P. traverse across this area did not give any response and therefore downgrades the possibility of a major sulphide system occurring.

(v) Areas E and F are single stream anomalies which are on strike with the Area A anomaly, but are separated by streams which do not carry anomalous values.

Area E is 1,000 meters to the northeast of Area A, and contains 6 ppm copper, 200 ppm lead and 120 ppm zinc.

Area F is 1,400 meters to the southwest of Area A, and is only weakly anomalous in lead (140 ppm). There is a weak (possible) I.P. anomaly occurring on line A some 200 meters southwest of this anomaly.

These areas warrant only brief geological examination to ascertain the source of the values.

(vi) Area G contains a single rock chip anomaly occurring near the northeast end of Bond Range. The sample is a well foliated quartz crystal tuff with a moderate amount of limonite coatings and boxwork textures in the fractures. The sample values were: 145 ppm copper, 28 ppm lead, and 270 ppm zinc.

It is proposed to run three short soil or auger lines, and to map the area in detail.

(vii) Cattley Creek

Acid volcanics, cherts and fine grained sediments belonging to the Mount Read Volcanic Suite occur in the northwest area of E.L. 10/74. This area is 20 kilometers on strike from the recent Mackintosh discovery, and therefore warrants a comprehensive program of mapping, soil and stream geochemistry and geophysics during this coming field season. Adequate coverage of this ground would necessitate at least six grid lines at 800 meter spacing with an average length of 2,000 meters.

8. RECOMMENDATIONS FOR GEOPHYSICS by B. K. Salisbury

Additional test of the I.P. anomaly near Station 15 on line C is proposed. This work would trace the feature along strike away from its intersect on line C. Vertical loop electromagnetic and/or I.P. traverses on short parallel lines would be used. Since the area is relatively open, the linecutting should be minimal and the feature can be pursued as far as its character warrants along strike. Lines at 100 meter spacing would be necessary for E.M. work; otherwise, they would be placed at 200 meter intervals for the I.P. survey.

Airborne electromagnetic surveys at 400 meter line spacing of the main volcanic belt east of Lake Lea and of the Cambrian section in the extreme northwestern corner of the licence block are also proposed.

PRELIMINARY GEOLOGICAL REPORT - BOND RANGE AREA, NORTHERN TASMANIA

E.L. 10/74 - BLACK BLUFF

E. B. CORBETT

SENIOR GEOLOGIST
(Consultant)
Hobart, July 1975

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PRELIMINARY GEOLOGICAL REPORT - BOND RANGE AREA, NORTHERN TASMANIA

E.L. 10/74 - BLACK BLUFF

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PRELIMINARY GEOLOGICAL REPORT - BOND RANGE AREA

ABSTRACT

Cambrian acid volcanic rocks of potential economic interest are exposed in the Bond Range and its western flanks, overlain by a thin cover of Ordovician quartzites. To the east they are covered by up to 400 ft. of flat-lying Tertiary basalt.

The major north-east tending Devonian structures - anticlines on the Bond Range and the Black Bluff Range and a syncline in the Vale of Belvoir - are cut off near the eastern edge of the Licence by a major structure, here called the Kauri Fault.

The Bond Range apparently represents the western edge of a Cambrian cone or cones of ash-fall tuffs, intruded by the parent magma (quartz-porphyry) and selectively silicified at the northern end of the range. Silicification is accompanied (?) by mineralisation of the surrounding rocks. On the southern end of the Bond Range and in "windows" within the quartzite west of Lake Lea rhyolites are interbedded with crystal tuffs and rhyolite complexes near the Iris Bridge may be associated with a granodiorite prophyry. The volcanics now exposed probably formed highs which influenced Ordovician sedimentation and Tabberabberan folding.

INTRODUCTION

The area in which mapping is now virtually completed is bounded by the Vale of Belvoir and the southern and eastern Licence boundaries. Most effort has been concentrated on the Cambrian rocks of the Bond Range, and their boundaries and internal stratigraphy have been carefully mapped. Distribution of other formations has been checked but the predominence of scree and alluvium obscures boundaries in many cases. Mapping by the Mines Department has been used as a guide, particularly in the basalt areas, but the present map of Cambrian rocks is more detailed and accurate than the 1966 work.

Mapping was recorded on 1:15,840 topographic field sheets with the aid of 1:50,000 black and white aerial photography and 1:15,840 enlargements.

This report is presented as a preliminary note, and some points may be modified by petrological studies.

STRATIGRAPHY

(a) Quaternary-Recent

The broad valleys of Fall River and its tributaries are filled with peat and swampy soils to depths of about three feet, with minor gravels at the base. Bedrock is seldom encountered. Well-rounded boulders of quartzites and slate, porphyry, dolerite and basalt up to ten feet across are scattered along the edges of the valleys. These boulders must have been transported by ice, and in particular the presence of dolerite ten miles from the nearest source (across rough topography) indicates glaciation of an extent not previously considered.

Modern siliceous breccias (silcrete) occur in two places, lying close to the Ordovician Cambrian contact. The breccias consist of rounded and angular quartzite boulders unevenly distributed in a fine crystalline silica matrix, unlike any breccia produced by normal sedimentation. In each case basalt lies a little to the east, and the breccias may be related to these flows.

(b) Tertiary

Tertiary basalt covers most of the area east of the Bond Range. The basalt consists of scattered yellowish olivine phenocrysts in a generally very fine groundmass. Textural variations include laminations (seen particularly on weathered surfaces) and very strong vesiculation. Vesicles are generally empty, though a few contain white zeolite (?) and carbonate. Vesicular basalts tend to outcrop on hill tops, and may represent the upper part of a single flow covering much of the area.

The basalt varies in thickness from a veneer of rounded boulders 5-20 ft. thick to at least 400 ft. thick east of the Fall -Lea junction. More than one flow may well exist in areas of maximum thickness, but no detailed mapping has been done.

The basalt is not mineralised.

(c) Ordovician

(i) Gordon Limestone

Limestone outcrops in the Vale of Belvoir between the cheese factory and the north end of Lake Lea and again in a tributary of the Lea River just west of the Kauri Fault. Several small limonite deposits have been reported near limestone-basalt contacts.

The limestone has not been studied for this report.

(ii) Owen correlates

All the siliceous rocks have been included as "Owen correlates" by the Mines Department, although the old name "Moina Sandstone" seems more reasonable for most of them in this area. Basal conglomerates do occur on the northwestern limb of the Bond Range anticline along the northern half of the range, where they are about 10 ft. thick, and consist of close-packed, well-rounded cobbles, mainly derived from Precambrian sources. A few fragments of Cambrian volcanics occur, and these are generally well cleaved. Disorientation of these boulders shows their cleavage to be pre-Ordovician.

On the Black Bluff Range west of Lake Lea the conglomerates reach 100 ft. thickness (e.g. on Prospect Mt.) and in places 10-15 ft. of breccia (equivalent to the "Jukes Breccia" of older stratigraphy) is developed on an uneven surface of Cambrian Volcanics. However it is a striking feature that in most places the basal Ordovician beds are massive pink sandstones (quartzites) in beds up to 4 ft. thick, many riddled with long vertical worm burrows filled with pale fine sand. Minor shales occur near the base in a few areas (e.g. under Bond Hill).

Quartzites predominate throughout the Bond Range sequence but north of the Kauri Fault rocks are more variable.

(d) Cambrian

The sequence on the Bond Range is:

top	volcanic siltstone
	medium- and coarse-grained tuffs
	rhyolite lava flows
intruded by	pink quartz-porphyry

(i) Volcanic Siltstone

This rock is dark grey and fine- to very fine-grained, with scattered small quartz porphyroblasts. It shows strong penetrative cleavage, with shiny sericite developed on schistocity surfaces. Original structures are obscured by the cleavage, but in outcrop this unit closely parallels the overlying conglomerate and the contact may be disconformable rather than uncomformable.

This unit may be a siltstone derived from volcanic material rather than a tuff, possibly deposited after volcanic activity ceased. It occurs only at the north-east end of the range on the western flank, where it outcrops consistently for two miles between Line D and the Kauri Fault.

(ii) The Volcanic Sequences in the Bond Range

Pyroclastic rocks and lava flows are now recognised to occur along the whole length of the Bond Range. Apart from two isolated rhyolite centres near the Iris Bridge they do not occur east of the range.

Lava flows

Lava flows are not recognised with certainty but much of the volcanic pile west and south of Bond Hill appears to be igneous rocks. They are rhyolites, or more correctly quartz-keratophyres, since the whole sequence probably belongs to the spilite suite. Quartz phenocrysts are the only macroscopic minerals, and they do not always occur. The lavas are pale yellow or greenish when fresh, with very fine feldspathic groundmasses of devitrified glass. Rhyolite exposed in the north end of the window between Lake Lea and Bond Hill has abundant quartz phenocrysts (2-3 mm.), a few feldspars visible in the groundmass and shows indistinct flow banding and rare autobrecciation - this one of the few places where evidence of origin is available. In the same area glassy aphyric and porphyritic rhyolites are interbedded with medium-grained tuffs and agglomerates, providing an unusually varied sequence.

No lava flows have been recognised on Bond Range north of Bond Peak, but fragments of yellow glassy rhyolite occur in some of the coarse tuffs. South of the Lake Lea track the Cambrian sequence expands and rhyolites are abundant.

Pyroclastics

Tuffs dominate the Cambrian succession on the north end of Bond Range. Characteristically, they are coarse-grained, with round quartz crystals 3-4 mm. across in a groundmass of crystal fragments and micaceous minerals (chlorite and sericite). Rhyolite occurs as rare inclusions 2-6 mm. long but other lithic fragments have not been recognised. One agglomerate relatively rich in rock fragments occurs in the window west of Bond Hill. Shearing and the recrystallisation of micaceous minerals makes it impossible to recognise any original glassy material.

Medium- and fine-grained tuffs are generally similar to the coarse-grained rocks, but round quartz crystals may be less abundant. Crystal tuffs rich in feldspar are uncommon. Very fine tuffs originally rich in glass occur south of Bond Hill.

Diagnostic textures in the tuffs are rare. In a few cases there is a suggestion of grading and in one instance banding parallel to bedding can be measured. From their general texture and the absence of any evidence for flow it is reasonably certain these pyroclastics are entirely ash-fall tuffs. Ash-flow rocks probably exist south of the Lake Lea track and north of the Kauri Fault but have yet to be mapped in detail.

Other Volcanics

In the two "windows" west of Lake Lea in the Black Bluff Range rhyolites predominate with minor tuffs. The rhyolites are pale yellow and very fine-grained (originally glassy) with small scattered quartz phenocrysts. In the southern "window" autobrecciation textures and flow banding provide good evidence of an igneous origin, and it is likely that more than one flow exists. Coarse crystal tuffs flank the rhyolite in the southern area and fine glassy tuffs occur in the northern "window". Mapping in the "windows" is incomplete.

South of the old V.D.L. track fine glassy rocks, both tuffs and lavas, are common. No detailed mapping has been done on this area, which is south of the Licence boundary.

(iii) Igneous Intrusive

Quartz-Porphyry

Cambrian exposures east of the Bond Range are dominated by massive pink quartz-porphyry. The freshest outcrops are on the old V.D.L. track at the head of the Iris River, but there is remarkably little variation between these and the northernmost exposures near the Kauri Fault. The porphyry forms massive rounded pink outcrops in which phenocrysts of quartz are quite characteristic - they are large (3-5 mm.) and rounded, often with radial cracks, and are glassy clear. Pyroxene remnants form idioblastic laths 2-4 mm. long and shadowy pale green feldspars are seen in some specimens. Chlorite occurs as patches 1-2 mm. across, with a few up to 1.5 cm. containing pyrite. In more altered rocks six-sided cyrstals of micaceous chlorite are the dominant ferromagnesian mineral. Angular white feldspar crystals and rounded patches of coarse feldspar and/or carbonate up to 1.2 cm. across are not abundant but are characteristic of the porphyry.

The groundmass is always pink or creamy and very fine-grained, with a waxy appearance due to abundant sericite.

Textural variations over the whole six miles of exposure are slight, and there is little doubt the porphyry is a single shallow sub-volcanic intrusion. The tuffs are derived by explosive volcanism from magma of the same composition as the porphyry, which is likely to represent the last pulse of magmatic activity in the volcanic cycle. There is no evidence that the porphyry ever reached the surface.

At the north end of Bond Range the central porphyry intrusions are roughly parallel with mapped boundaries in the tuffs, but contacts are not exposed. On Tuff Saddle a very irregular contact between tuff and porphyry is well exposed. The porphyry transgresses the tuff cleavage (which is apparently close to the bedding) and tuff is included in the porphyry. This contact is good evidence for intrusion of tuff by porphyry. No alteration occurs, and none is expected, since the two rocks are similar in composition.

Granodiorite Porphyry

This distinctive rock type is known only from boulders, but it appears to underly the basalt north of the camp towards Fall River. Fragments also occur in the quarry near the Iris Bridge.

Fresh specimens are pale grey, with scattered large quartz phenocrysts, small cloudy feldspar patches, black needles of hornblende (?) and scattered pyrite cyrstals in a fine crystalline groundmass. Composition is likely to be granodiorite.

Geographically at least this porphyry is related to the rhyolite complexes near the Iris, which are quite different from the volanics of the Bond Range and their associated pink porphyries.

STRUCTURE

The dominating structural elements are the Lea Syncline, forming the Vale of Belvoir (underlain by Gordon Limestone) and the flanking anticlinal structures of Bond Range and Black Bluff Range. These northeast-tending structures are terminated against the Kauri Fault, north of which Lower Ordovician quartzites extend from Black Bluff almost to the Iris River, with NNW-tending faults apparently controlling the structure.

Cambrian rocks are exposed along anticlinal crests, and in the Bond Range are covered by a thin skin of quartzites, perhaps only 100 ft. thick on the western flank. The Cambrian structures have been interpreted in the past as tectonic domes (aligned undulations in the anticlinal crests) but current mapping suggests the whole Tabberabberan structure is influenced by the shape of the pre-Ordovician terrain. It seems likely that the Bond Range may represent a number of Cambrian cinder cones (or the western flank of a single large one) which have been extensively intruded during the last phase of volcanism. The intrusion is expected to be close to the original volcanic centre or centres and to have represented a high at the time of Ordovician sedimentation. The tuffs were cleaved before the Ordovician, but tectonism may have been rather localised and irregularities in the Cambrian surface may have contributed significantly to the unconformity. This is particularly evident in the Black Bluff Range west and south of Lake Lea where basal breccias and conglomerates vary from 100+ ft. thickness to nil over short strike distances.

It is surprising that no movement has occurred along the Cambrian-Ordovician contact (which is well exposed in a number of places) although Tabberabberan folding must have caused extensive strike slip in the uncleaved quartzites while movement in Cambrian was taken up along essentially vertical cleavage planes which pre-date the unconformity.

Further evidence for the persistence of Cambrian highs which may represent volcanic centres is provided by the rhyolite-breccia complex near the Iris Bridge. These rocks were emergent during Tertiary volcanism, when basalt flowed round them, and at present form small rugged peaks 150 ft. above the plain.

ECONOMIC GEOLOGY

Interest has been concentrated on the Cambrian rocks of the Bond Range, and it has been found that the porphyries mapped by the Mines Department intrude pyroclastic rocks of similar composition and which may have originally formed the western flank of a volcanic cone or cones. The pyroclastics are generally coarse-grained, with a penetrative pre-Ordovician cleavage, a situation potentially favourable for base metal deposition.

Geological interest has centered on the northern end of the range, between the northernmost peak and the Lea River. In this area a series of northeast-striking coarse and medium tuffs are intruded by porphyry and show striking selective silicification. Rocks surrounding the siliceous pods contain hematite and pyrite, and an adit driven into a quartz reef on the southeast side produced small amounts of chalcopyrite and bornite.

Alteration

Seven separate lenses of strong silicification have been mapped and sampled, and surrounding rocks sampled for assay. The lenses outcrop as rugged spines, surrounded by low lying unaltered tuffs.

Silicification is most intense near the Lea River, where the spine consists of very fine yellow silica with a streaky texture, probably indicating replacement of a tuff. On the western side of the spine fine grey tuffs contain small flat lenses of specularite and have patchy green staining. Further west pyritic porphyry contains quartz reefs (apparently unmineralised) while on the eastern side grey tuffs are flanked by porphyry with a quartz reef containing pyrite, chalcopyrite and bornite.

Towards the tope of the range silicification is less intense, and traces of original textures, such as quartz porphyroblasts, are visible in the massive silica. Some outcrops show coarse sheared fragments (?) with interstitial finer schists and masses of creamy silica. Quartz veins are uncommon. Unaltered quartz crystals and rare rhyolite fragments are evidence that the silicified rocks were originally tuffs. In some cases at least, coarse tuff lying between finer beds has been selectively silicified, and there is a sharp lateral cut off of alteration. It is uncertain whether silicification is confined to originally lenticular tuff bodies or just dies out along strike - the former appears to be the case.

The only mineralisation within the spines is specularite and specks of an unidentified blue mineral. Flanking rocks near the river consistently contain pyrite and hematite.

Quartz reefs, which occur within porphyries in the area of interest, and also on the eastern flanks of the range, may be an alternative expression of the silicification. Mineralisation of a reef is only seen at the adit.

SUMMARY

Geological mapping of the Bond Range and the area east to the Iris River is now complete. Tuffs which are the host rocks to a major porphyry intrusion are potential economic targets and surface mineralisation has been observed around lenses of intensely silicified tuffs at the north end of the range.

UNION OIL DEVELOPMENT CORPORATION

GEOPHYSICAL SURVEY ON TASMANIAN E.L. 10/74 - BLACK BLUFF

DECEMBER 1974 through FEBRUARY 1975

Fourteen line kilometers of pole-dipole induced polarization data were obtained on six lines across the main Cambrian volcanic belt east of Lake Lea. These lines are spaced at approximate mile intervals. The lines are not set on a grid pattern, but they basically traverse across strike.

The predominant potential spacing used was 100 meters, while the search depths (na spacings) were 100 and 200 meters. Shallower, more closely spaced, arrays were twice employed in areas of interest defined by the regular arrays.

Time domain, two second pulse, transmission was achieved with a C.G.G. transmitter and monitered with a Scintrex I.P.R. 8. receiver. Currents rarely exceeded two amperes, and often were much under one ampere, leading to some signal-to-noise inadequacies. Data presentation is therefore from the first decay curve window.

Background chargeabilities are low, in the 5 to 10 millivolt/volt range. "Anomalous" features greater than 15 millivolts/volt are noted in several locations.

1. "Owen Anomalies" - Shallowly derived anomalies are noted on the western extremities of Lines F, E, and A. These features have high apparent resistivity and direct correlation with outcropping Owen Conglomerate, starting at its contact with the Cambrian volcanics. Penetration from Owen Conglomerate into the Cambrian volcanic rock occurs on the dip slopes surveyed, as shown by the lower values of chargeability and resistivity of the deeper search depth data. Different lithologic background is an indicated source of these features.

2. Line D - Station 12 Vicinity Anomaly - A broad, shallowly derived anomaly reaching to depth is indicated. The source is a body of some 300 meter width probably having 400 ohm-meter resistivity and 25 millivolt/volt true chargeability, imposing limitations on its potential for possessing large sulphide percentages.

75-1113
507029

A radioactive anomaly in central northern Tasmania (E.L. 14/73).

P.L.F. Collins

An area of anomalous radioactivity within Tasminex N.Ls exploration lease E.L. 14/73 was visited on 20 November 1973 in the presence of the company's prospector.

The anomalous area [38/977892] is situated on steep hill slopes forming the southern bank of the Lea River in central northern Tasmania (fig. 1); and is readily accessible by logging roads which leave the Cradle Mountain road at the eastern end of the Middlesex Plains. A brief inspection was also made at a second area of interest which is situated approximately 1.5 km east of Leary's Corner, where the Cradle Mountain road crosses the Iris River [38/964832].

LEA RIVER ANOMALY

Previous work undertaken by Tasminex N.L. included geochemical sampling and reconnaissance scintillometer surveys. The geochemical sampling indicated anomalous radon in the water in a creek flowing north-east to the Lea River (fig. 1); and high uranium and thorium values of 0.025% U and 0.95% Th were obtained in a single rock sample which was described by Cooper (1973) as a silicified rock formed by the replacement of limestone. It would appear that, from the petrographic description of this rock (Cooper, 1973), the high uranium and thorium values are probably due to monazite which commonly contains 4-12% ThO_2 and up to 30% ThO_2 in the variety cheralite (Deer *et al.*, 1966).

A scintillometer survey over the area surrounding this rock sample revealed a rather small anomaly, of the order of 30 m in diameter.

Geology

The anomalous area is situated within Cambrian quartz and quartz feldspar porphyries which are unconformably overlain by Ordovician conglomerates, with Tertiary basalt blanketing much of the surrounding areas (Barton, C.M. *et al.*).

The Cambrian sequence appears to be dominated by quartz porphyry lavas (*e.g.* 73-658*) consisting of rounded quartz phenocrysts 0.5-5 mm in diameter in an aphanitic groundmass. Within this lava sequence is a sheared tuffaceous unit which consists of quartz crystals and lithic fragments in a siliceous matrix (73-659). Although it was indicated that the sample containing the high uranium and thorium values was from within this tuffaceous unit, a silicified rock which could have formed from the replacement of limestone was not observed.

Apart from the opaque minerals, there were no other minerals observed in thin sections of either the lava (73-658) or the tuff (73-659) which could readily account for radioactivity.

Filling fractures within the lavas are several quartz veins up to one metre wide which had previously been prospected by means of trenches, two adits and a shallow shaft, but only one of these veins contains significant quantities of pyrite, chalcopyrite and possibly some cobaltite (fig. 1).

---

*Detailed descriptions of the specimens referred to in the text are given in Appendix 1.

intillometer

The radioactivity of the tuffaceous unit was measured in the field with a scintillometer supplied by Tasminex N.L. and this indicated up to 10 times the background radioactivity for a weathered outcrop of the tuff whilst only 2-3 times background was obtained from fresh rock. Near-background radioactivity was recorded for both the lavas and the quartz veins.

IRIS RIVER ANOMALY

At the second locality, immediately west of the Iris River, an outcrop of Cambrian quartz porphyry lava protrudes above the recent soil and Quaternary sediments of the Middlesex Plains; and once again no radioactive minerals were observed in a thin section of this lava (73-660).

The scintillometer recorded near-background radioactivity for the lava but up to 20-30 times background for the water saturated soil surrounding the outcrop.

SUMMARY AND DISCUSSION

To summarise, it would appear that the only significant radioactivity at the Lea River anomaly is associated with the tuffaceous unit in the Cambrian quartz porphyry lavas and that weathered outcrop of this tuff is more radioactive than the fresh rock. At the Iris River anomaly the radioactivity is confined to the water saturated soil surrounding the outcropping quartz porphyry lava.

The radioactivity does not appear to be of magmatic origin as there are no known granitic intrusions in the area, nor are there any major faults which could have acted as channels for uraniferous solutions. A brief search of the literature has revealed that siliceous glassy igneous rocks contain 6-7 ppm uranium of which 40% is readily leachable on devitrification of the glass (Bunker and Mackallor, 1973; McKelvey *et al.*, 1955). Since the tuff would contain more glassy fragments than the lava, it is therefore reasonable to expect higher radioactivity in the tuffaceous unit. Upon weathering, the uranium, which is now bound up in clays (McKelvey *et al.*, 1955), would be concentrated in joints and fractures in the rock; thus accounting for the more radioactive weathered surface outcrop of the tuffaceous unit.

At the Iris River locality, the relatively high radioactivity of the water saturated soil can be explained by leaching of the volcanic rock by groundwater and absorption of the uranium ions by clays in the soil.

CONCLUSIONS

The radioactive anomaly at the Lea River locality is attributed to the tuffaceous unit as it contains a greater proportion of glassy fragments from which uranium has been leached during devitrification of the glass and concentrated in the weathered surfaces of the tuff. Leaching of the volcanic rocks by groundwater and subsequent concentration in the surrounding soil has caused the apparent high radioactivity at the Iris River locality.

Therefore, the apparent anomalous radioactivity at both localities is due to secondary surface enrichment of uranium-bearing minerals, which has resulted from weathering and leaching of volcanic rocks originally containing very low concentrations of uranium.

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APPENDIX 1

Petrographic descriptions of Cambrian quartz porphyry lavas and tuffs.

73-658. [38/978895]. Quartz porphyry lava.

A cream to light brown rock consisting of rounded quartz phenocrysts in an aphanitic groundmass. In thin section the phenocrysts are subhedral with well rounded corners and range from 0.5-5 mm in diameter. Embayment of the phenocrysts by the cryptocrystalline groundmass is common. Quartz microveins are prominent in the groundmass and can be traced through the phenocrysts along lines of silica alteration. The phenocrysts comprise 40-50% of the rock.

73-659. [38/977892]. Sheared, crystallo-lithic tuff.

The light grey-green rock contains quartz phenocrysts and green lithic fragments in a siliceous matrix. The rock has been sheared and contains bands of disseminated sulphides, and irregu..r elongate patches of chlorite.

In thin section the rock consists of approximately equal quantities of quartz phenocrysts (40%) and lithic fragments (35%) in a cryptocrystalline groundmass (20%) which has been sericitised and chloritised. The broken and angular quartz phenocrysts often have quartz-sericite pressure shadows and are occasionally embayed. The very fine-grained lithic fragments, which are of both sedimentary and volcanic origin, have also been sericitised, and often have indistinct margins. Opaque minerals (5%) are disseminated throughout the rock. Very fine, elongate, blood-red flakes of hematite are often associated with the opaque minerals.

73-660. [38/964832]. Quartz porphyry lava.

The rock is similar to 73-658 but the often embayed quartz phenocrysts are much smaller, ranging from 0.4-1 mm across, and only comprise 10-20% of the rock. The cryptocrystalline groundmass contains approximately 5% pyrite in disseminated patches.

[20 December 1973]

3. Line C - Station 15+50 Anomaly - A thin, dikelike source is indicated. The feature bears a nebulous resistivity low, and may well represent sulphide or graphitic occurrence. Its indicated thickness is around 150 meters. A button grass swamp completely masks the geologic expression of the area. This is the writer's favorite anomaly of all those defined by I.P. work on Union's two Tasmanian Licence Blocks.

4. Line C - Station 32+00 Anomaly - A feature of weaker, but similar nature, to that of Station 15+50 on this line. A dikelike source may be indicated. Not a great target due to low amplitude.

Apparent resistivities vary markedly over the area. The lowest observed values are less than 100 ohm-meters to the east near the Tertiary basalt, and the highest values are in excess of 2000 ohm-meters to the west over Owen Conglomerate or in presumed Cambrian rocks. Profile stacking shows some line-to-line section similarity not easily noted in the pseudosection data.

Blair Salisbury

Blair Salisbury

Plan

Sketch map Lea River area radio active anomaly

LEGEND

18	Basic-Intermediate volcanic and associated rocks
19	Mid-upper Cambrian fossiliferous greywacke turbidites, Unfossiliferous greywacke turbidites and orthoquartzite
34	Mid-upper Cambrian acid-intermediate volcanics with fossiliferous upper Cambrian shallow water deposits
u	Undifferentiated Cambrian volcanics and sediments

UNION OIL DEVELOPMENT CORPORATION

DISTRIBUTION OF CAMBRIAN VOLCANIC AND SEDIMENTARY SEQUENCES TASMANIA

Scale: 1: 500,000

Plan No 457

Plan 1

5 cm


U.O.D.C.
GEOLOGY OF THE BOND RANGE
TASMANIA
Mapping by E. Corbett with acknowledgement to Mines Dept 1" = 1ml Mackintosh sheet
Mapped: Jan - Mar '75
Plan No 444
Drafted: P.M.S. Mar '75
Ammended: June '75
0 .25 .50 .75 1 mile
R.F. 1: 15,840
(E.L.10/74)
5 cm
The geology to the north west of Bond Range has been taken from the Mackintosh 1: 63,360 geological plan (first edition 1966). Slight modifications were made where the geology is known to differ from that printed on the Macintosh sheet.
J.L. McGregor-Dawson.
Scale approx. 1: 158,400
RELIABILITY DIAGRAM
Area covered by field traverses
Remaining geology taken from Mackintosh 1: 63,360 Geology plan
Geology of the unmapped area taken from the Burnie 1: 250,000 geology plan
(First edition 1973)
Scale 1: 100,000
Undifferentiated Cambrian. Presumed to be Mt Read Volcanics
Tertiary Basalt
Ordovician Owen Conglomerate & Sandstone
Black Bluff
Black Bluff Range
Mount Cattley
Lake Lea
Bond Range
AREA COVERED BY THE 1:15,840 GEOLOGY MAP
Boundary of E.L. 10/74
LEGEND
Quaternary
2 Qa Alluvium, glacial debris, swamp soils
7 Qts Talus deposits of sandstone & conglomerate
Tertiary
10 Tb Basalt
Ordovician
Owen group
15 Og Gordon limestone
21 Oou Undifferentiated Owen group
Oos Owen sandstone with minor conglomerate units
20 Ooc Basal Owen conglomerate
Cambrian
Mt Read volcanic group
41 Єuv Undifferentiated Mt Read volcanics Dominantly rhyolite
43 Єtp Tuffaceous phyllite
52 Єr Rhyolites
61 Єra Rhyolite agglomerate
54 Єrt Rhyolite & glassy tuffs
47 Єp Ash fall tuffs (vary from fine to coarse grain)
51 sil. Silicious alteration
50 Єqk Pink quartz porphyry (qtz. keratophyre)
63 Єfp White feldspar porphyry (known from bldrs. only)
Geological boundary
Geological boundary, position uncertain
Foliation
Bedding
Direction of fold plunge
Fault
CATTLEY PLAIN
Bare Mt
Prospect Mt.
RANGE
LAKE LEA
LEA RIVER
KAURI FAULT
BLACK BLUFF RANGE
VALE OF BELVOIR
BOND RANGE
Bonds Hill
FALL PLAIN
FALL R
MIDDLESEX PLAINS
IRIS R
Rocky Mt
BOUNDARY OF EXPLORATION LICENCE 10/74
Lake Lea Track
Sunshine Ck
Cradle Mt
WILMOT


U. O. D. C.
BLACK BLUFF
TASMANIA
(E.L.10/74)
STREAM SEDIMENT SAMPLE RESULTS
Date: June '75 Scale: 1:15,840 Plan No: 446
KEY
Sample Number Cu Pb Zn ppm
5 cm
N
LAKE LEA


U. O. D. C.
BLACK BLUFF
TASMANIA
(E.L.10/74)
HUMIC SAMPLE RESULTS
Date: June '75 Scale: 1:15,840 Plan No 445
KEY
Sample location • Cu Pb Zn p.p.m.
5 cm
N
LAKE LEA


U. O. D. C.
BLACK BLUFF
TASMANIA
(E.L.10/74)
SOIL SAMPLE RESULTS
Date June '75 Scale 1:15,840 Plan No 447
0 ·25 ·50 ·75 1·0mile
0 400 800 1200 1600 metres
KEY
Sample location Cu,Pb,Zn, ppm
5 cm
N
LAKE LEA

U. O. D. C.

BLACK BLUFF

TASMANIA

(E.L.10/74)

ROCK CHIP SAMPLE RESULTS, HAND SPECIMEN LOCATIONS AND I.P. ANOMALIES

Date June '75   Scale: 1:15,840   Plan No 448

0 ·25 ·50 ·75 1·0 mile
0 400 800 1200 1600 metres

Sample No	Cu	Pb	Zn
S 866	2	5	10
7	2	5	8
8	2	5	5
9	2	18	8
70	2	12	12
1	2	8	5
2	2	5	5
3	2	8	55
4	5	5	32
5	145	28	270
6	2	5	5
7	5	5	18
8	2	12	8
9	5	20	100
80	6	5	28
1	20	220	440
2	2	5	75
3	5	12	360
4	15	45	95
5	10	28	95
6	12	10	170
7	2	5	60
8	2	10	2
9	2	5	5
90	2	5	8
1	30	10	10
2	2	5	5

N.B. TS = Thin section

Sample No	
S 901	
2	
3	TS
4	TS
5	
6	
7	
8	TS
9	
10	
1	TS
2	TS
3	
4	TS
5	
6	
7	TS
8	
9	
20	TS
1	TS
2	TS
3	TS
4	
5	
6	TS
7	
8	
9	TS
30	
1	TS
2	
3	
4	TS
5	
6	TS
7	
8	
9	
40	

Sample No	
S 941	
2	TS
3	TS
4	TS
5	TS
6	TS
7	TS
8	
9	
50	TS
1	
2	
3	
4	
5	TS
6	
7	TS
8	
9	TS
60	
1	
2	
3	
4	TS
5	TS
6	
7	TS
8	
9	
70	
1	
2	
3	TS
4	
5	
6	
7	TS
8	
9	
80	

Sample No	
S 981	
2	TS
3	
4	
5	TS
6	
7	TS
8	
9	
90	
NS	
92	TS
3	
4	TS
5	TS
6	
7	TS
8	TS
9	
1000	TS
1	TS
2	
3	
4	
5	TS
6	TS
S1007	

? [- - - - -] Questionable I.P. anomaly
I.P. anomaly - shaded area possible minimum body thickness
N.B. Owen derived anomalies not displayed

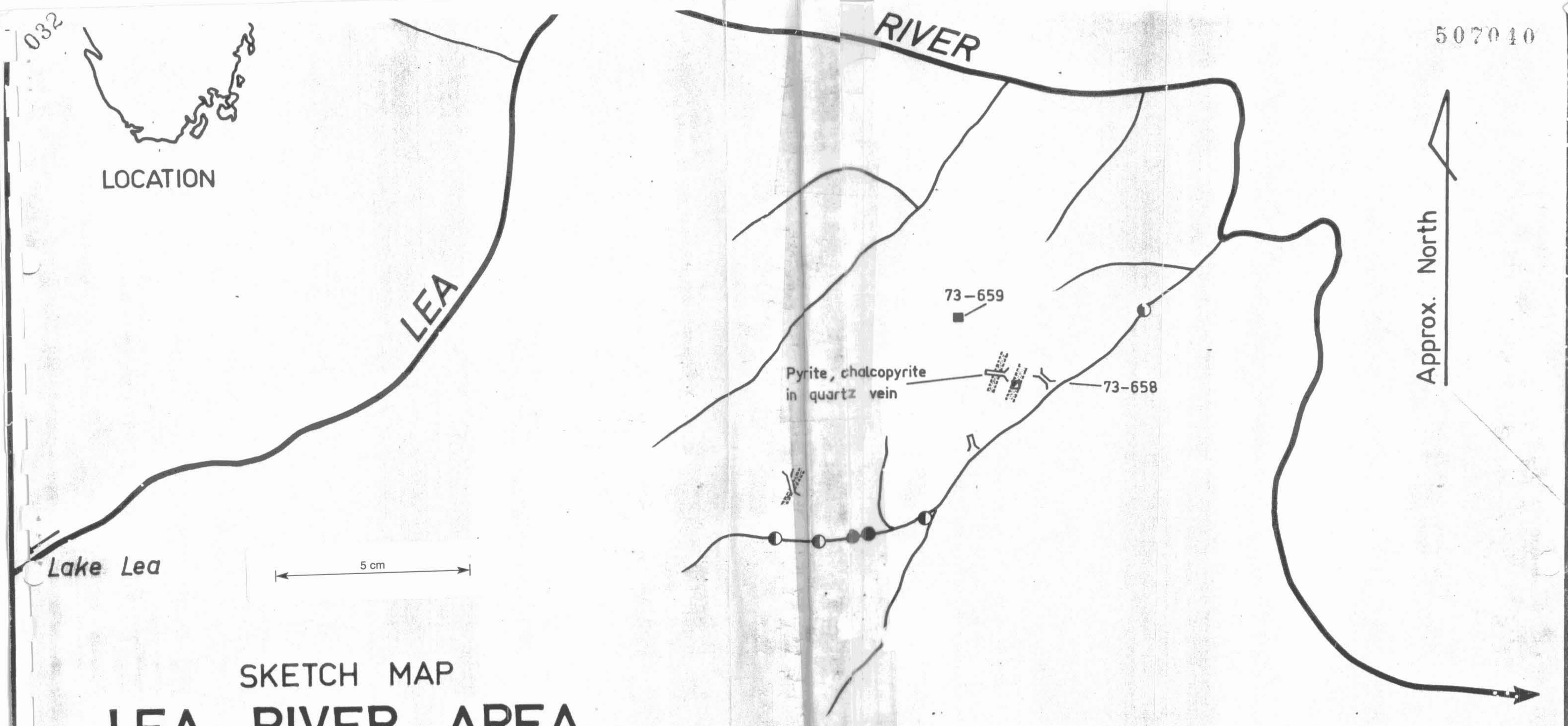
507039


U. O. D. C.
BLACK BLUFF
TASMANIA
ANOMALOUS AREAS
Date 12-8-75 Scale 1:15,840 Plan No. 464
0 .25 .50 .75 1.0 mile
0 400 800 1200 1600 metres
LEGEND
(Cu-Pb) Stream sediment anomaly showing anomalous element
Cu-Pb
Cu-Pb-Zn
Pb
Soil anomalies
Zn
Cu-Zn
Pb-Zn
Rock chip anomaly
Questionable I.P. anomaly
I.P. anomaly - shaded area indicates possible minimum body thickness
5 cm
N
LAKE LEA
Area A
Area B
Area C
Area D
Area E
Area F
Area G
(Pb: Humic Sample)
Conductive body at depth?

1594

032

507040



SKETCH MAP

LEA RIVER AREA RADIOACTIVE ANOMALY

0 — 500 Metres

GEOLOGIST : P.L.F. COLLINS
Draughtsman : T.R. Bellis
Date : December 1973

Department of Mines - Tasmania 3814-44

GEOCHEMICAL SAMPLING

(based on work by TASMINEX N.L., 1973)

Anomalous Radon in water samples

- ◐ > 250 pCi/l
- ● > 1000 pCi/l

Anomalous Uranium and Thorium in rock sample

- ■ 250 ppm U, 9500 ppm Th

(pCi/l - picocuries per litre, ppm - parts per million)

Quartz veins

Adit

Shaft

Trench

73-659 Sample localities


U. O. D. C
GEOLOGY OF THE BOND RANGE
TASMANIA
Mapping by E. Corbett with acknowledgement to Mines Dept 1"=1m Mackintosh sheet
Mapped: Jan - Mar '75
Plan No 444
Drafted: RMS Mar '75
Ammended: June '75
0 ·25 ·50 ·75 1 mile
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5 cm
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J.L. McGregor-Dawson.
Geology of the unmapped area taken from the Burnie 1:250,000 geology plan
(First edition 1973)
Scale 1:100,000
AREA COVERED BY THE 1:15,840 GEOLOGY MAP
Black Bluff
LEGEND
Quaternary
Tertiary
Ordovician
Cambrian
Owen group
Mt Read volcanic group
2 Qa Alluvium, glacial debris, swamp soils
7 Qts Talus deposits of sandstone & conglomerate
10 Tb Basalt
15 Og Gordon limestone
21 Oou Undifferentiated Owen group
Oos Owen sandstone with minor conglomerate units
20 Ooc Basal Owen conglomerate
41 Ɛuv Undifferentiated Mt Read volcanics Dominantly rhyolite
43 Ɛtp Tuffaceous phyllite
52 Ɛr Rhyolites
61 Ɛra Rhyolite agglomerate
54 Ɛrt Rhyolite & glassy tuffs
47 Ɛp Ash fall tuffs (vary from fine to coarse grain)
51 sil Silicious alteration
50 Ɛqk Pink quartz porphyry (qtz keratophyre)
63 Ɛfp White feldspar porphyry (known from bldrs. only)
Geological boundary
Geological boundary, position uncertain
Foliation
Bedding
Direction of fold plunge
Fault
Scale approx. 1: 158,400
RELIABILITY DIAGRAM
Area covered by field traverses
Remaining geology taken from Mackintosh 1:63,360 Geology plan
CATTLEY PLAIN
BLACK BLUFF RANGE
Prospect Mt.
Bare Mt
Rocky Mt.
VALE OF BELVOIR
LAKE LEA
BOND RANGE
Bonds Hill
FALL PLAIN
MIDDLESEX PLAINS
KAURI FAULT
BOUNDARY OF EXPLORATION LICENCE 10/74
Lake Lea Track