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REPORT ON FIELD MAPPING RELATED TO
ALTERATION STUDIES IN THE
MOUNT READ VOLCANIC ARC

81-1634

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May 1981

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INTRODUCTION

This report follows on from a similar report prepared after the 1980 field season. In the 1980 report, certain aims and methods of the study were explained. In brief, the aims were :

- (i) The preparation of a list of alteration types.
- (ii) The mapping of alteration with a view to distinguishing a horizon or horizons favourable for massive sulphide mineralisation.

During the 1981 field season, sampling of small prospects and of sections across the strike of the volcanics has continued towards aims (i) and (ii).

Other aspects of the study have been pursued this field season, viz. :

- (iii) The mapping of footwall alteration along-strike from known mineralisation in order to examine variations in alteration style as a function of distance from the known central feeder.
- (iv) Examination of the alteration associated with probable Devonian hydrothermal activity in the Mt. Read Volcanics and flanking sediments near Rosebery, with a view to delineating tin exploration targets.
- (v) Northward and southward extension of more detailed mapping of the type carried out in the Rosebery-Hercules area in 1980.

The areas visited and sampled are shown in Fig. 1.

This report consists of detailed accounts, area by area, of field observations. Areas dealt with in 1980 are mentioned only if additions or corrections are required. Some petrographic and analytical data are available and are cited where necessary, but will not be reported fully until later in 1981 when all such data become available. For this reason, work related to aims (iii) and (iv) above will be held over until a later report.

1. NORTH BULGOBAC

Sampling of volcanic rocks in this Area is hampered by poor outcrop and a general predominance of sediments including reworked tuffs.

North of Boco Siding (at 5387700N, 382400E) the sediments comprise grey and white, laminated sandstones and shales. A small body of pink, massive (?) ashflow tuff is apparently interbedded with the sediments. Extensive outcrops of a massive, pink to brown quartz-feldspar porphyry occur on the track north-west of Sawmill Creek (5390300N, 381700E and environs). This has been interpreted as an intrusion by E.Z. Co. geologists. Its texture could be consistent with an intrusive origin, but no corroborative contact relationships have been observed.

Between Animal Creek and Mt Charter, only sediments (some of pyroclastic derivation) are exposed along the Murchison Highway. A north-west facing, based on truncated cross-bedding, was found in the cutting just north of Animal Creek.

With the permission of Aberfoyle Exploration (on whose exploration lease it lies), the Mt Charter barite was examined. Evidence regarding the origin of the barite is as follows :

- (i) Much of the barite is coarsely crystalline, similar to vein barites elsewhere in the Mt Read Volcanics.
- (ii) Abundant pyrite is present with the barite, and in one specimen the barite (of sugary texture in this case) and pyrite are vaguely banded. Sphalerite and galena are also present locally. These sulphides, and especially pyrite, are not commonly remobilised into barite veins elsewhere. The banding may be a sedimentary texture.
- (iii) Sharply-bounded clasts of pyritic shale occur within a layer of (?) volcanic rock of different weathering characteristics within the barite mineralisation. Another rock-type nearby consists of grey chert-like clasts in a pyritic matrix. Both of these suggest syngenetic pyrite mineralisation.

A syngenetic origin for the barite cannot be ruled out, even though much of it is coarsely crystalline, presumably recrystallised in situ or remobilised.

2. MURCHISON HIGHWAY SECTION

Preliminary petrographic work on samples from the HEC Pieman Road section indicated a zone of distinctive alteration between Farm Creek and a point about 1 km east of Boco Creek (Fig. 2). Calcium-bearing minerals (calcite and epidote) replace plagioclase on either side of this interval, whereas no calcic minerals replace plagioclase within the interval. A comparison with the mineralogy of the volcanics in the Rosebery area suggests that this difference in alteration style might represent hangingwall to footwall transitions (with respect to repetitions of a massive sulphide host horizon), although much more subtly expressed than near Rosebery.

The regional strike is north-east. A northeastward continuation of the distinctive interval in the Pieman Road coincides with the line of mineralisation defined by Que River (Pb, Zn, Cu; syngenetic), Mt Charter (Ba; possibly syngenetic) and Mt Block (Ba; unknown origin.) The line crosses the Murchison Highway between the Pieman Road and Burns Peak Track intersections. This section of the highway was sampled in order to see whether the zone of distinctive alteration could be located.

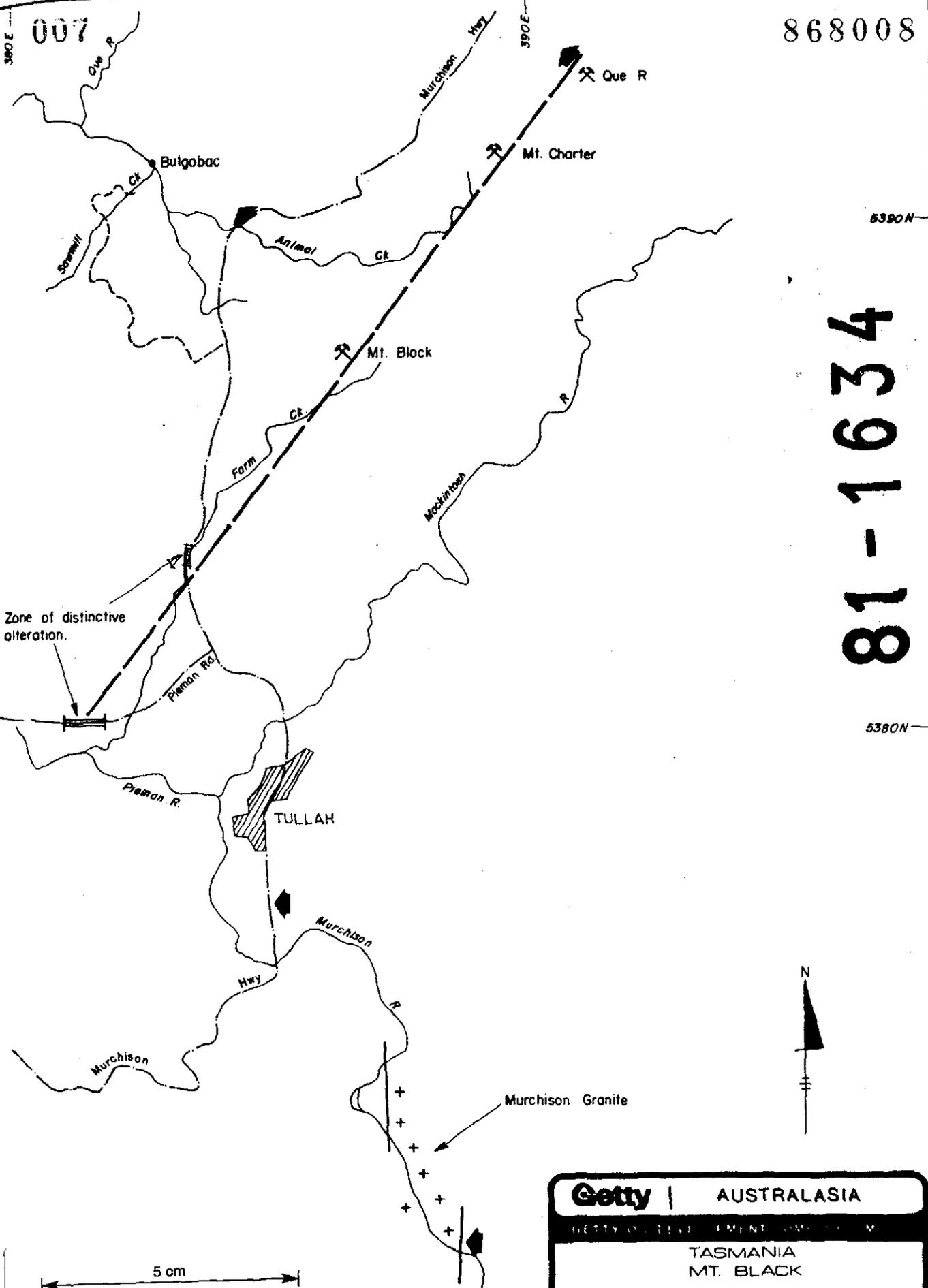
In and around three of the four sample sites, the volcanics are massive, hard rocks of relatively fresh appearance. Coarse fragmental varieties are prominent. Only in the cuttings north of Farm Creek (5382900N, 383500E) do the rocks appear more altered. This may be the zone sought, but confirmation awaits the preparation of thin sections.

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Zone of distinctive alteration.



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NORTH BULGOBAC, PIEMAN RD & MURCHISON GORGE	
Author: C. Eason	Scale: 1:50,000 (MCHIA)
Drawn: K. Turner	Date: June 1981
Revised:	FIGURE No 2

3. MURCHISON GORGE (see also 1980 report)

David Polya of the University of Tasmania has undertaken an Honours field project in this area. The following new observations were made when I accompanied Polya in the field :

- (i) Pink to green rhyolites directly west of the Owen Conglomerate and volcanoclastic breccia in the cuttings of the HEC Murchison Road correspond to pink-weathered "Darwin-type" rhyolites on the south bank of the Murchison River. (This was not recognised in 1980). Nonetheless, there may still be a fault offset within the volcanic rocks along this section of the river. The conglomerate and breccia do not appear to be offset.
- (ii) The gorge section was examined upstream of the dam-site, as far east as the eastern contact of the Murchison Granite (5369700N, 389000E) on the north-east bank.

The granite was examined at intervals. Epidote + quartz veins (\pm amphibole, sulphides) occur widely, as does disseminated pyrite.

The eastern contact is irregular at outcrop scale, and is definitely intrusive. Some minor fine-grained intrusive phases may occur within the country rock near the contact. The country rock is easily accessible for about 200m upstream of the contact.

The country rock is massive to sheared, and near the contact it appears to have been recrystallised (the effect of contact metamorphism?). The rocks near the contact, those in which textures have been preserved, may have been crystal tuffs. Further upstream, tuffaceous units several metres thick alternate with thinly-bedded, sandstones and shales. All dip west. The sandstones and shales were deposited in an unstable environment, as indicated by graded bedding, slumping and scouring. Most of the sedimentary structures - truncated laminae and flame--structures indicate west facings, but there is ambiguity near one large slump--structure. A definite west facing is indicated by scours truncating shale laminae at the base of one of the tuffaceous units.

Alteration and sulphide-oxide mineralisation of the kinds found at the western contact are absent at the eastern contact.

On the evidence of available attitudes and facings (at the eastern contact and in the Farrell Slates), the Murchison ^{granite} ~~barite~~ appears to be a sill-like intrusion within a pile consisting largely of volcanic rocks and dipping and facing west. The presence of mineralisation only in the rocks originally above the granite is consistent with mineralisation from hot waters circulating above, and driven by heat from the granite. The rocks beneath presumably remained dry.

cf. Darwin
Granite

4. CHESTER TO HOWARDS ROAD

Fig. 3 is a detailed map of the area between Chester and Howards Road, showing alteration styles and inferred repetitions of the Rosebery host horizon. The map of the area between Rosebery and Hercules, prepared in 1980, is incorporated with modifications. The explanation below deals with the area in three sections; Rosebery to Hercules, north of Rosebery, and south of Hercules.

A. ROSEBERY to HERCULES: additional notes

(i) The Dalmerý Mineralisation:

East of the residue dams at Rosebery Lodes, galena, sphalerite and pyrite occur in the old Dalmerý workings. The sulphides occur as veins and minor disseminations in silicified volcanic rock, and do not resemble Rosebery-type massive, banded ore, nor does their host resemble Rosebery host-rock. Two hundred metres west, shale fragments are abundant in an outcrop of rhyolitic pyroclastics between two residue dams. Presumably the host horizon passes close to this outcrop, any sediment having been eroded away during the deposition of the Massive Pyroclastics, or covered by mine tailings. The Dalmerý mineralisation thus appears to be of vein-type, enclosed in hangingwall rocks.

(ii) Koonya area:

Re-examination of the cutting beside the Mt Read Road just north of the Koonya track has indicated that the geology is more complicated than suspected earlier. Strikes vary visibly (the shales at the northern end striking 337° true, and other units to the south striking more to the west) and the cleavage--bedding relationship in plan in the shales is inconsistent with a closure to the north-east (the interpretation in the 1980 report). The meanings of the facings from this cutting are therefore uncertain. There may be parasitic folds or interference structures (two cleavages have been observed at Rosebery), in which cases the original interpretation (that the Koonya mineralisation faces east) could stand. The zonation and moderate east dip of the orebody have been demonstrated by diamond drilling and are consistent with an eastfacing and a synclinal closure (in section) to the east.

(iii) Salisbury area:

The contact between sediments and volcanics in cuttings on the Williamsford Road is clearly exposed, but gives no facing.

(iv) Dallwitz to South Dallwitz:

Between the east-facing lens of sediment in the road cutting at (5367500N, 377540E) and the South Dallwitz sediments, only one occurrence of sediments has been found. This was a loose block, moved by a bulldozer, beside the Mt Read Road near (5365930N, 377600E). Volcanic rocks in the area are well-bedded. Elsewhere in the zone between the two lenses, green local vesicular basalt (or andesite) is common. The rock weathers to a bright orange clay, easily distinguished from the weathering products of the more acid volcanics. At (5366660N, 377670E) a small block of it is apparently included in rhyolitic/dacitic volcanics, but most is definitely intrusive and discordant, occurring in both pre- and post-sediment rocks. The sedimentary horizons in this area may have been favourable zones for the emplacement of basic intrusions late in the Cambrian volcanic cycle.

(v) Hercules to Williamsford:

The relationship between the massive sulphide host horizons at Hercules and at the Williamsford-Ring PA group of workings remains unclear. Field work in 1980 showed similar attitudes and facings in both areas, but there is an apparent offset of 300 to 400m perpendicular to strike. Two mineralised horizons of different age seem unlikely, because there is no indication of another horizon in the hangingwall of the horizon between Williamsford and Jupiter Cu, where the Hercules horizon would project. There is a continuous section of the hangingwall in the track east of the Williamsford Road. In contrast, alteration marks the Hercules host horizon strongly 1 km south of the Hercules deposit. There is no clear evidence for a fault on aerial photographs or in outcrop, but a single steep-dipping fault could account for the offsets in the sediments/host horizons at Hercules and at Dallwitz. The same fracture would also truncate the major linear features which control the headwaters of Baker Creek and the Ring River. Because the horizons dip east on the Hercules side and steeply west on the Dallwitz side, an upward displacement of the southern block relative to the northern could account for the lateral displacements shown in Fig. 3.

B. NORTH OF ROSEBERY

A series of sediment lenses extends north of Rosebery around the western flank of Mt Black, and there are several occurrences of sediments in the Pieman Valley near the Bastyan dam-site. All were examined for facings, attitude and their relationship to alteration, and the following observations were made :-

(i) North Primrose Lens:

A lens of sediment north of Primrose is best exposed along the flume road at (5374430N, 377940E). The laminated shales and siltstones exhibit small scale folds, and facings from within the lens are therefore unreliable. The contacts with the enclosing volcanics are obscured by fill. To the west, small outcrops of volcanics project through the fill, and this section is succeeded westward by interbedded volcanics and sediments, and then by more-or-less continuous outcrop of sediments as far as the Bobadil road. To the east of the lens, fill is succeeded by massive quartz-sericite rock, locally containing altered clasts of black shale.

The position of this lens is similar to that of the lens east of Primrose (the East Primrose lens) with respect to the quartz-sericite rocks of the Rosebery footwall. Therefore the North Primrose lens probably also faces west and may be offset from the East Primrose lens by a small fault.

The boundary of the Mt Read Volcanics against the Rosebery Group is said to pass through the section exposed along the flume road, and is said to be a fault. The flume road certainly passes from Stitt Quartzite into Mt Read Volcanics, but the position and nature of the boundary in this particular place are in doubt because of the interbedding of volcanics and sediments.

(ii) The Bobadil Lenses:

Several lenses of black shale enclosed and separated by pyroclastics crop out in a track between (5376800N, 377400E) and (5376800N, 377660E). The westernmost is truncated to the south by a fault, and may be an offset of the next lens to the east.

The sediments are mainly chaotic black shales with no internal bedding. They contain irregular blocks of pyroclastics. Only the western part of the easternmost lens (the one exposed in the gravel pit near the power lines) is finely laminated, a grey siltstone. In three cases, pyroclastics immediately to the west of sediments appear to have reworked the sediments.

In the gravel pit, the pyroclastic-sediment contact strikes approximately 202° (true), compared with the strike of the laminated siltstone (179°), and a large, disoriented block of siltstone (strike 212° , dip 80° E) appears to be surrounded entirely by pyroclastics. In the other two cases, the westernmost lens, and one within the group of lenses, wispy black bodies, presumably reworked mud, occur in the pyroclastics adjacent to chaotic black shale. A west facing for this group of sediments is thus established.

In the gravel pit, the laminated sediments dip 40° E. Such an amount of overturning is not observed elsewhere in the Mt Read Volcanics, and may well be due to slumping. The evidence of attitudes (which is not vital) must therefore be treated with caution. The sedimentology of the shales and the pyroclastics suggests that both were derived elsewhere and deposited by slumping.

Little pyroclastic rock is exposed to the west of the sediments, between them and the Stitt Quartzite. Some is epidote-bearing, but may be transported blocks in glacials. To the east, in the track leading to the Bastyan dam-site, the volcanic rock is hard, grey, little-sheared and pyritic.

(iii) The Cutty Sark Track Lenses:

These occur in the track between (5376230N, 378240E) and (5376150N, 378300E). The easternmost lens consists of mudstone enclosed by pyroclastics containing no mudstone clast at either contact. Bedding is at best vague, the only measurement giving a strike of 192° (true) and a dip of 30° - 40° E. At the western end of the road section, two thin bands of grey shale are enclosed by pyroclastics. These strike 167° (true) and dip 60 - 70° E. In the central part of the section, there is a band of pyroclastics bearing abundant clasts of grey shale and siltstone. This is separated from the sediments on both sides by pyroclastics with no sediment clasts, and provides no indication of facing.

Exposure of pyroclastics to the west of the westernmost shales is very poor. To the east, massive green volcanic rock with chloritic patches is found in the track as far as the area of the Cutty Sark prospect. There are more thin pyritic bands. Some is flow-banded.

A narrow band of sediment within these volcanics (at 5376380N, 378840E) is reported to face east (E.Z. Co. maps). The facing evidence was not located, but would be of questionable value because of a small fold within the band.

The relatively shallow east dip of the easternmost lens is to be compared

with dips of 45°E or steeper in the Rosebery host rock to the south. The shallow attitude may be the result of slumping; the unit, which is only 10m thick, may be a raft. The smaller blocks of sediment in pyroclastics nearby have such an origin. Again, there may have been little or no deposition of sediment in situ.

(iv) Bobadil to Karlson's Knob:

No large bodies of sediment are known in this area. Grey shale clasts were found in pyroclastics occurring as float on the old zig-zag track near (5375590N, 378220E). In the power-line track near (5375750N, 377770E) there is relatively fresh ash-flow tuff succeeded eastward by bedded tuff, some fine grained, which in turn is succeeded by ash flows with east-dipping primary foliation.

(v) Pieman Valley:

The dam-site excavations on the north bank of the Pieman expose a swarm of rafts of black shale in three dimensions near (5378300N, 377830E), and similar rafts appear to occur on the south bank. They consist of finely-- laminated black shale, and range in size up to 10m thick and tens of metres long. Another raft is exposed at (5378500N, 378570E); this consists of grey, pyritic, sericitic siltstone and shale and is not bedded. All of the rafts are enclosed in massive, grey-green, quartz-phyric ash-flow tuff. There is no hydrothermal alteration associated with the rafts. Sericite-- chlorite alteration occurs only within a few metres of the faulted boundary of the volcanics against the Stitt Quartzite, both near the river and along the Pieman Road. This alteration might be associated with hydrothermal activity along the fault.

Two bodies of sediment occur in the new Emu Bay Railway cutting at (5379450N, 379000E). They are small, and do not cover the entire area shown on E.Z. Co. maps. The western body consists of laminated siltstone interbedded with tuff. Pyrite is present in the tuff and the siltstone. The body is up to 5m thick. The bedding dips about 45° NE and the top and bottom surfaces are discordant with respect to the laminations. The eastern body consists of about 5m of tuffs and sediments which dip steeply west and face west. Pyrite is present. The western body is a transported raft; the eastern body may also be one. Both are enclosed within massive, grey-green ash-flow tuffs without hydrothermal alteration.

Another body of sediments occurs in the banks of the Pieman near (5379760N,

379640E), just upstream of Boco Creek, adjacent to the blocky ash-flow tuff exposed to the east and along the Pieman Road. The sediment is well-bedded, slump-folded chert or fine pyroclastic material with minor pyrite. Westward, the sediment is cherty, but grey-green and more massive. Pieces of similar material occur in the blocky ash-flow tuff, possibly indicating an east facing. The unit is not exposed in road cuttings. Another thin unit of chert, occurs within the blocky ash-flow about 200m upstream. There is no significant hydrothermal alteration in the ash-flow tuffs in the vicinity of the cherts. It is difficult to tell whether they are in situ or whether they are giant transported rafts. Green (Econ. Geol, 1980) has suggested that the large block of ash-flow tuff exposed in a nearby road cutting (at 5380570N, 379810E) slumped into its present attitude. The primary foliation, marked by fiamme, has a shallow west dip whereas the primary foliation in the blocky ash-flow tuff 400m SE is subvertical. A similar origin is possible for the chert bodies, although dips in the cherts are very steep.

(vi) Discussion

Two bands of sediment appear to exist on the western flanks of Mt Black. The western band faces west, and east-facings have been obtained from the eastern band at Rosebery only. A single, tight anticline is indicated in the volcanics between the Pieman River and Rosebery. Relatively fresh, massive volcanics occur to the east of the eastern band along its whole length. The anticline is truncated to the north by the western, faulted boundary of the Mt Read Volcanics near the Pieman River. Sediment occurrences north of the Pieman River are derived blocks, presumably from a northern continuation, now lost, of the Rosebery host horizon and disrupted and transported by one or more ash-flows. Fairly homogeneous ash-flow tuff bearing disoriented blocks may continue as much as 2 km east of the faulted boundary. Huge eruptions must have occurred, after the ore-forming event in this area, from vents beneath accumulated sediment which became dispersed through the ash-flow tuff as angular rafts.

(vii) Chester Pinnacles, and other minor mineralisation:

The Chester deposit does not now lie on a visible continuation of the Rosebery host horizon. No detailed examination of the surrounding volcanics has been carried out north of the Pieman Road, but it is suggested that Chester lies within the belt of relatively fresh, massive ash-flows which bear the rafts of sediment. The Chester deposit itself may be an allochthonous block.

No attempt will be made to fit the Pinnacles mineralisation into the scheme of things further south. The mineralisation may not be of massive, stratiform type. Some E.Z. Co. drill-holes (PP34, 36, 40) with relatively rich intersections contained mainly vein-type mineralisation, there being two short intersections of semi-massive ore of indeterminate origin.

The Langdons and Cutty Sark prospects appear to be of vein-type, enclosed within hangingwall rocks.

C. SOUTH OF HERCULES

Work around Hercules and the area to the south relies heavily on recent mapping by R. Weedon, whose contribution is duly acknowledged.

(i) The Hercules Sediment Lens:

Grey shales and siltstones with sporadic mineralisation can be traced continuously from the Hercules mine to (5365450N, 376570E). South of this point, Cambrian rocks are obscured by Carboniferous tillite. The sediments are laminated, and dip and face consistently east. In the footwall, the volcanics have been altered to a quartz + sericite + chlorite assemblage with patchy pyrite. Ash-flow textures are widely preserved. R. Weedon (pers. comm.) has mapped a more-or-less continuous chloritic zone separated from the sediments by a quartz-sericite zone. Hydrothermal alteration continues into the hangingwall up to 100m. Quartz-sericite assemblages are developed adjacent to the sediment, and pass transitionally into relatively fresh ash-flow tuffs. The transition is clearly visible as a change from smooth to jagged topography, moving east from the sediment.

(ii) South Hercules Sediments:

Laminated sediments and reworked pyroclastics are exposed in the tracks around the junction of the White Spur and Moore's Pimple tracks. East-facing sediments crop out in the White Spur track between (5365430N, 376430E) and (5365180N, 376430E) and can be traced from the latter point south-west towards the creek. The facings are from truncated laminae and reworked blocks of sediment in the overlying pyroclastics. In the track towards Moore's Pimple, there are west-facing, well-bedded sediments and reworked pyroclastics around (5365160N, 376300E), the facings based on scours truncating laminae. North of the track, this sediment layer is represented by a reworked tuff containing quartz grit and abundant blocks of grey shale.

The relationship, (a) between these sediments, and (b) between them and the Hercules sediments, is not obvious, and the possibilities are multiplied by the presence to the south of another group of sediments unrelated to the Hercules sediment (see Section vii, below). The east-facing sediments appear to be truncated by a fault on the eastern side. Between them and the west-facing sediments are silicified and sericitised volcanic rocks. The west-facing sediments are succeeded southwestward by flow-banded lavas and ash-flow tuffs, massive and relatively fresh, as far as (5364800N, 375850E). The sediments converge at a small angle towards a point in the creek to the south, and appear to close. Cleavage-bedding relationships are consistent with such a closure (cleavage and bedding attitudes had to be measured a few metres apart in the west-facing sediments). See Fig. 3.

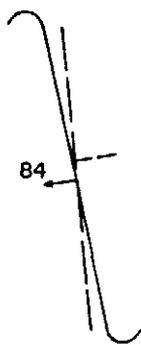
The occurrence of quartz-grits and the continuity of sediment outcrop south of the proposed closure in the creek might suggest an affinity with the submarine-facies pyroclastics to the south (section vii), but this would be inconsistent with the proposed structure and the types of volcanic rock along the Moores Pimple track. Presumably two unrelated sediments are juxtaposed in the bed of the creek. The sequence of alteration types along the Moores Pimple track suggests an affinity with the volcanics in the Hercules area, and the east-facing sediments may be part of the Hercules lens offset by faulting.

(iii) The South Dallwitz Sediments:

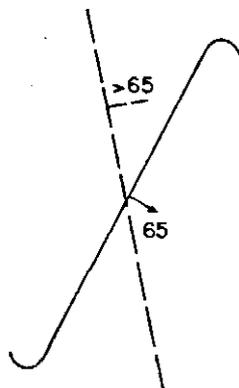
At its northern end, the South Dallwitz track intersects shales, siltstones, cherts and interbedded tuffs over a 1.3 km interval. Basalt, presumably intrusive, is common. The west facings from drill-core were confirmed on the surface near the western and eastern limits of the sediments (see Fig. 3). Most strikes are west of north, except in the costeans near (5365650N, 377800E) where a north plunging parasitic fold is indicated.

At the southern end of the track, a small lens of sediments shown on an E.Z. Co. map was not located. A small, weathered intrusion of basalt may have been mistaken for sediment. Otherwise, this end of the track lies largely in massive, pink, relatively fresh ash-flow tuff.

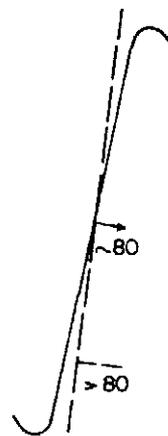
West-facing Sediments
(South Hercules)



East-facing Sediments
(South Hercules)



Hercules Sediments



In Plan.

LEGEND:

- Cleavage
- Bedding

Notes:-



81-1634

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GETTY OIL DEVELOPMENT COMPANY LIMITED	
TASMANIA MT. BLACK	
BEDDING - CLEAVAGE RELATIONSHIPS	
SOUTH HERCULES	
Author: C. Easton	Scale: Not to scale
Drawn: K. Turner	Date: June 1981
Revised:	FIGURE NO. 4

(iv) Lake Johnston Lens:

Investigations in this area constituted a test of the methods being used in this study. In the 1980 report, it was explained that the west facings in the South Dallwitz sediments (compared with east facings along the easternmost repetition of the host horizon from Dallwitz to Rosebery) implied another repetition of the host horizon to the east of the South Dallwitz sediments. Subsequent petrographic work showed hangingwall style alteration in the volcanic rocks east of the summit of Mt Read. Therefore the repetition was predicted to occur between the summit and the South Dallwitz sediments, and sought along the Lake Johnston track.

A thin band of grey shales was found at (5365380N, 378250E) and a band of laminated sandstone and siltstone lies east of the creek bed at (5365580N, 378200E). In the latter, truncated cross-bedding gave a west facing in beds dipping 50-60°W, but there is evidence of small scale folding within the sediments. To the west (on the track) the volcanics are highly sheared, quartz-sericite-chlorite schists. To the east, massive pink relatively fresh ash-flow tuff occurs within 100m of the sediments. Relatively fresh rocks appear on the Lake Johnston track southeast of the sediments, but outcrop is largely obscured by till. This sequence of alteration is consistent with a gross eastfacing across the sediment.

Much of the outcrop in the track north-east of the sediments is weathered basalt, presumably intrusive.

(v) Howards Road Sediments:

Shale, siltstone and tuff form a thick sequence cropping out between (5362330N, 378770E) and (5362070N, 378350E approx.) along Howards Road, and along a timber track north as far as (5362900N, 378450E). A definite west-facing was observed at (5362100N, 378450E) where a reworked pyroclastic rock scours underlying shale, truncating laminae and enclosed shale blocks. Another such contact with overlying shale clasts was observed at (5362290N, 378550E), but the contact is quartz-veined and may be faulted. Near the eastern limit of the sediments on Howards Road, a doubtful east-facing based on graded bedding was obtained from beds dipping 70°W. The alteration sequence is consistent with a west-facing across the sediments as a whole. In the logging track north of (5362900N, 378560E) the volcanics are sheared quartz-sericite schists. In another track to the east of the sediments and north of (5361950N, 377830E), massive pink relatively fresh ash-flow tuffs are present. The tuffs become more altered to the north, probably indicating

a close approach to the top of the sediments. Note that sediments reported on this track (E.Z. Co. map) appear to be weathered basalts.

An east-facing repetition of the sediment horizon is predicted to the east of the sediments discussed above. It has not been located in the logging tracks above Howards Road (see Fig. 3); there quartz-sericite-altered volcanics terminate eastwards against a quartz diorite intrusion. It has not been located on Howards Road either, where the outcrops east of the known sediments are of relatively fresh ash-flow tuff or flow-banded lava. However, much of the first 700m east of the sediments is obscured by till or by intrusions. Beyond 700m east, the outcrop of relatively fresh rocks becomes almost continuous.

Howards Road west of the sediments intersects massive, relatively fresh volcanic rocks between Dobson Creek and White Spur Creek. Between Dobson Creek and Jones Creek, the volcanics do not have the "relatively fresh" appearance of the pink ash-flow apparently along-strike, 100-200m north. Some appear to be altered tuffaceous sediments. The reason for the apparent change along-strike is not known.

The Howards Road sediments appear to correlate with the South Dallwitz sediments with which they are consistent in attitude and facing. A small dextral offset, due either to a fault or to a small parasitic fold like the one in the South Dallwitz area, is implied between the two.

(vi) East Hercules Mineralisation:

The East Hercules workings (near 5366600N, 377150E) are associated with a band of intense chlorite-pyrite mineralisation. They are the northernmost of a line of small workings which prospected pyrite-chlorite zones with chalcopyrite and sphalerite-bearing veins. The southernmost shown on Fig. 3 had only quartz-siderite veins on its dump. Quartz-sericite alteration, probably associated with this mineralisation, is exposed in the track near (5365800N, 377070E). These occurrences of sulphide and altered rock appear to be enclosed within the relatively fresh, massive variety of ash-flow tuff. No sediment is associated with any of them. They are probably remobilisations of syngenetic sulphide along a single fracture zone.

(vii) South-west corner:

The areas described above consist largely of ash-flow tuffs and lavas, probably of terrestrial origin. Water-laid sediments appear to be limited to one dist-

inctive horizon. By contrast, the south-western corner of the area under consideration consists almost entirely of reworked tuffs, sandstones, siltstones and shales of submarine origin. The abrupt, irregular, discordant boundary between the two facies suggests that they are distinct units, of different age.

Corbett (Econ. Geol. 1981) correlated these rocks with his Western Sequence in the Queenstown area and has suggested that the boundary represents the wall of a caldera subsidence structure. Within this framework, a block of submarine-facies pyroclastics enclosed by ash-flows on the White Spur track would demonstrate that the submarine-facies rocks are the older unit. The supposed detached block, which is marked by large shale clasts, could not be distinguished from tuffs to the south along White Spur track on re-examination. Blocks of shale occur intermittently along the whole section. Accordingly the boundary has been redrawn in Fig. 3, and no conclusion is drawn as to the relative ages of the rocks.

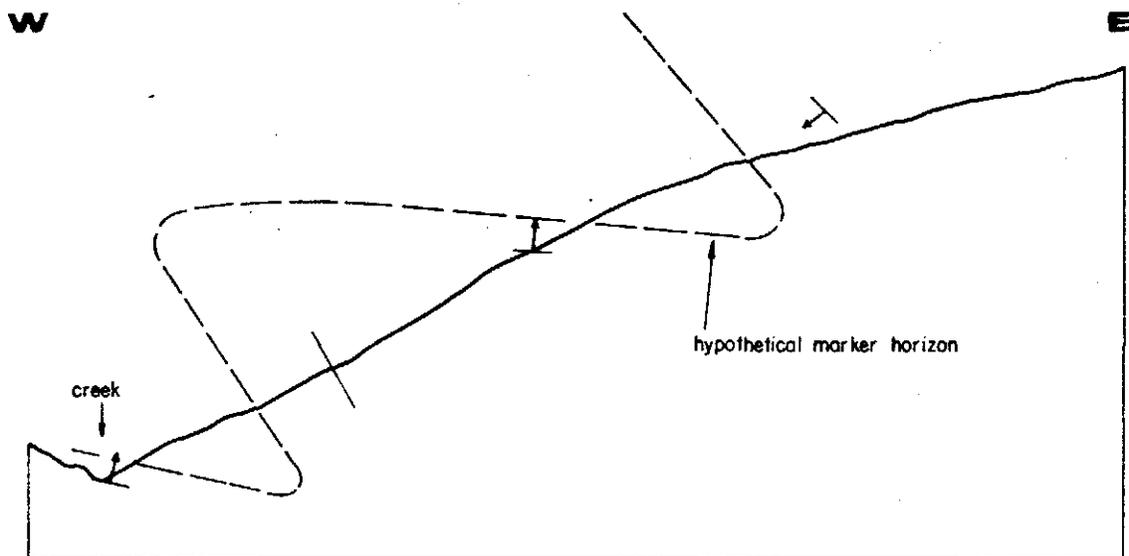
The geology of the whole area has not been examined in detail. Corbett (op. cit.) has determined the major structures, a series of upright, open to tight folds with axes of northerly trend. This structural style is consistent with that in the volcanics elsewhere in the Rosebery-Hercules area. On a smaller scale, the structures appear to be more complicated. For example, the attitudes and inferred structure of the section of logging track between (5363620N, 375740E) and (5363630N, 375620E) are shown in Fig. 5. Such structures are not found in the terrestrial pyroclastics (as far as can be seen in the ash-flows, which lack markers) and are probably the result of syndepositional deformation. This would be in keeping with the abundant shale clasts and scours which indicate an unstable environment of deposition. Blocks of shale several metres long can be identified in tuffaceous sandstone along the White Spur track, and the large outcrop of cherty sediments near (5365300N, 377100E) may also be a transported block.

One instance of mineralisation, boulders of massive, fine-grained pyrite, is recorded on the White Spur track by Corbett (op. cit.). A massive sulphide horizon therefore exists within this unit. In the field, there are no visible differences in alteration style which might help to locate it (no petrography has been done yet.) The location of such a horizon by any geological means could be difficult because of irregular syndepositional structures.

(viii) Summary:

The Rosebery host horizon is repeated, tightly folded, about two anticlinal

022



LEGEND:

projected dip, with facing.

5 cm

81-1634



Notes:- V/H = 1

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GETTY OIL DEVELOPMENT AUSTRALASIA LIMITED	
TASMANIA MT. LYELL	
STRUCTURE IN SUBMARINE PYROCLASTICS. WHITE SPUR	
Author: C. Foster	Scale: 1:1000
Drawn: K. Turner	Date: June 1981
Revised:	FIGURE No. 5

axes separated by a broader syncline with a core of more competent hangingwall style pyroclastics. The western anticline is truncated by the western boundary of the Mt Read Volcanics between Jupiter and the South Hercules lenses (where both limbs and a closure are present over a short interval). The eastern anticline is presumably truncated by the north branch of the Henty Fault south of Howards Road.

Note that alteration criteria developed elsewhere, particularly in the Hercules area, have been invoked to complete the picture in the South Dallwitz and Howards Road areas.

D. GENERAL SUMMARY, CHESTER TO HOWARDS ROAD

Tight folding about anticlinal axes, one north of Rosebery and two south of Koonya, accounts for all major autochthonous sedimentary units in this section of the Mt. Read Volcanics, and rationalises the alteration patterns. The area between Koonya and Rosebery may be complex.

Further repetitions of the host horizon on the eastern side of this area (which is limited by the Henty Fault) may occur on the eastern spur of Mt Read where disrupted blocks of turbidite occur in pyroclastics of (?) submarine origin, or on the western side of the Sterling Valley, near the Murchison Highway, where drill holes have intersected west-facing sediments (J. Mill, pers. comm.). These possibilities are represented in the cross-sections (Fig. 6). Another possibility north of Mt Black, was discussed in Section 2, above.

The thick volcanic pile which now constitutes Mt Black appears to have acted as a pivot point and competent block during the deformation of the volcanics. Regional strikes swing about 45° around Mt Black, and the number of repetitions of the Rosebery host horizon is reduced where the horizon passes beneath the pile.

5. THE RING RIVER SECTION

Although strictly not part of the Mt Read Volcanics, the folded sediments in the bed of the Ring River are considered here because they may be lateral equivalents of part of the volcanics, and because they contain syngenetic sulphide mineralisation.

In the 5 km section of gorge below Baker Creek, two groups of sediments are exposed, a clastic association and a carbonate association. The two associations are probably conformable, and mixed rock types occur to a small extent.

The clastic association consists of black and grey shales, siltstones, greywackes, sandstones and conglomerates. The shales are commonly laminated and irregularly contorted. Folds with rounded or angular closures are common. Sandstones and siltstones are interbedded with the shales in various proportions, but in most cases are the minor component. They occur as disrupted beds and in some cases are isoclinally folded at outcrop scale. The attitudes of such beds appear to diverge from trends applying to the whole area. Between points RR14 and RR16 (Fig. 7), the clastic association is represented by monotonous, poorly sorted sandstone bearing quartz grains of coarse sand grade and rare disrupted clasts of laminated shale. The conglomerates consist of angular to rounded, poorly-sorted lithic pebbles and boulders in a dominant mud, silt or sand matrix. At RR4, the pebbles and boulders may include some of tuffaceous origin. Angular pebbles of massive, fine-grained pyrite are abundant at RR2 and RR3. Between these localities, a bed of finely-laminated pyrite about 0.5 cm thick occurs in situ, which suggests that the pyrite pebbles were of local origin, possibly exhalative. A nodular or disseminated habit might be expected for biogenic pyrite. Near RR14, a conglomerate of angular quartz pebbles up to 2 cm long was noted.

The abundance of features ascribable to slumping and to deposition from turbidity currents and the composition of the sediments suggest deep-water deposition in an unstable tectonic environment, i.e. this is a flysch association. Petrographic work has shown that quartz and feldspar of volcanic origin and deformed quartz of metamorphic (Precambrian ?) origin are present in these rocks.

The carbonate association consists largely of massive, featureless or laminated pale grey dolomites or limestones. Small aggregates of pyrite occur throughout. Subsidiary clastic units occur at RR5, RR9 and RR11, in the last case cross-bedded calcarenite or calcareous greywacke. The clastic units are also pyritic. Minor sulphide mineralisation occurs in what appear to be zones of alteration within the limestone at RR8 and RR9. Pyrite and chalcopyrite are disseminated in a host containing abundant, large laths of albite in sheaves or randomly oriented.

The environment of deposition of the carbonates was probably deep marine and unstable. The limestone is enclosed between flysch units, is pyritic (indicating a reducing environment) and shows local evidence of slumping and current deposition. The main limestone unit is thick (150-200m?). No fossils have been observed.

Upstream of RR14, moderate to steep easterly dips are the rule, except in the section RR7 to RR8. This section appears to cut the limb of a fold, as sketched speculatively on the map. East-facings were recorded from the section RR7 to RR8 where the limestone should be overturned. Facings from within the flysch units are regarded as unreliable.

These sediments may be lateral equivalents of the submarine pyroclastics south of Hercules (Section 4.C. vii). The environments are comparable but the facies differ, the Ring River sediments having more of the character of sandstone or greywackes rather than of tuffs. If this is so they were deposited further from the volcanic centres than the submarine pyroclastics.

6. LAKE SELINA AND LAKE DORA AREAS

Two aspects of the geology have been examined.

A. THE DORA CONGLOMERATE

(i) Composition:

The large clasts range in size from pebbles to large boulders rounded to subrounded, and mainly of quartz-phyric volcanic rock. Rounded pebbles and cobbles of quartz and quartzite and rare pebbles of massive magnetite are also encountered. The matrix consists of sand to coarse quartz grit and in places occurs as cross-bedded lenses with few or no large clasts. Flow-banded lavas are interbedded with the conglomerate west of Lake Dora.

Although some direct pyroclastic input is probable, most of the material of the conglomerate appears to have been subject to sedimentary processes. Most was derived from local, quartz-phyric volcanic formations. The magnetite may have come from older, mineralised volcanic rocks. The quartz and quartzite were derived from the Precambrian metamorphic rocks to the west.

The conglomerate contains calcite in the vicinity of an adit near (5353500N, 388000E). The adit walls bear calcite decorations which could be an alteration product of plagioclase.

(ii) Structure:

East-west strikes are common in sandstone lenses within the conglomerate, much more common than in the mineralised volcanic rocks elsewhere in the Mt Read Volcanics. The structural style of the Dora Conglomerate is more akin to that of the Owen Conglomerate.

(iii) Mineralisation

Numerous small workings have prospected sulphides in a broad zone of patchy to intense chloritisation stretching from Lake Spicer to Walford Peak. The sulphides occur apparently as veins and disseminations. Galena and sphalerite are prominent at Walford Peak and in the prospect at (5353500N, 388000E), south of Lake Dora. West of Lake Dora, pyrite and chalcopyrite are the most abundant sulphides. At (5353900N, 387750E) a trench exposes a sub-vertical zone of semi-massive vein and replacement pyrite about 2m thick.

(iv) Relationship with Other Units:

The contact with the Sticht Range beds is exposed in outcrop, but is so sheared that bedding in the slumped sediments of the Sticht Range beds is not distinguishable. The slumped sediments contain lenses of grit similar to that in the adjacent conglomerate, but these could be deformed clastic dykes. The nature of the contact will only become clear after detailed mapping on both sides of the contact.

The evidence of composition and structure suggests that the Dora Conglomerate is younger than other mineralised rocks in the Mt Read Volcanics. It is overlain unconformably by the Owen Conglomerate. It resembles conglomerates on the eastern side of Mt Jukes (these are overlain unconformably by the Owen Conglomerate the the basal lensoid Jukes Breccia, and in turn overlie mineralised rhyolites unconformably). It does not resemble the volcanoclastic breccia on Mt Selina. That breccia is overlain unconformably by the Owen Conglomerate, and despite its dissimilar appearance, could be a facies variant of the Dora Conglomerate.

B. NORTH-WEST OF LAKE SELINA

The volcanic rocks of the short section along the track north-west of Mt Selina are difficult to identify on field criteria. At the creek at (5364650N, 386600E) they appear to be quartz and feldspar-phyric ash-flow tuff. There, and at (5364300N, 386150E) the volcanics are intruded by sheets of pink and green mottled, altered intrusive rock. In the latter case, the contacts are mineralised with pyrite, magnetite and chlorite on the western side and pyrite, magnetite, galena and chlorite on the eastern side. At (5363250N, 385400E) the volcanics are hornfelsed, indicating another intrusion nearby. The hornfels contains veins of hematite several centimetres thick. The contact metamorphism took place before the deposition of the volcanoclastic breccia on Mt Selina because the breccia contains blocks of hematite-veined hornfels. These intrusions may be related to the porphyry intersected in the Lake Selina drill holes, or to the Murchison Granite.

The volcanoclastic breccia contains manganese mineralisation. Blocks of massive pyrolusite occur in loose ground (fault breccia?) at (5363650N, 385500E). Quartz veins nearby contain recrystallised pyrolusite.

Note that although this section of the Mt Read Volcanics could lie along strike from the rocks in the Murchison Gorge, nothing resembling the extensive mineralisation and alteration in the gorge has been recognised.

7. BRADSHAW'S ROAD

This section passes from Comstock Tuff correlate, through the Howards Anomaly mineralised horizon and andesites of the Central Sequence to Western Sequence sediments, pyroclastics and intrusive porphyries. The following aspects are worthy of comment.

A. Howards Anomaly Mineralisation

Howards Anomaly sequence correlatable with mineralised horizons at Mt. ...

Beds of massive hematite are exposed in a costean and in the bed of Tyndall Creek. This appears to be the oxide-facies equivalent of massive pyrite mineralisation (c.f. massive magnetite mineralisation at Bredalbane and Cow Flat, N.S.W., and Savage R., Tasmania). That hematite is the principal mineral implies very oxidising conditions, presumably in shallow water. It is the primary iron mineral because clasts of it are preserved in a chloritic matrix in a small turbidite deposit in one of the costeans. Other exhalative minerals - barite, silica, carbonates - accumulate independent of oxidation conditions. Copper, lead and zinc may tend to disperse in an oxidising environment.

B. The Boundary of Central and Western Sequence Rocks

The andesites beneath the mineralised horizon at Howards Anomaly (the horizon dips east, is thought to face east) adjoin sediments at their western contact. The sediments dip east and cleavage is steeper than bedding, implying a synclinal closure to the east. They cannot therefore represent a repetition by folding of the mineralised horizon at Howards Anomaly. They are probably the easternmost unit of the Western Sequence in this area.

C. Composition of the Western Sequence

The reworked tuffs shales, siltstones and greywackes of the Western Sequence enclose significant quantities of volcanic rocks of direct eruptive origin, and differ in this respect from Western Sequence rocks north of the Henty Fault (Section 4 C. vii). If the two sets of rocks do correlate, those exposed along Bradshaws Road must have been closer to a centre of volcanic activity. The eruptive rocks include: (1) a thick ash-flow tuff near (5353600N, 378450E). This is sericitised and loosely silicified, and contains abundant blocks of black shale and dark green volcanic rock; (2) a laminated vitric tuff with no visible phenocrysts near (5351400N, 376700E); (3) a possible ash-flow tuff at (5350100N, 376250E).

There are also massive porphyry units, thought to be intrusive. One, at (5352000N,

8. MOUNT SEDGWICK AND LAKE MARGARET ROAD

A. Central Sequence

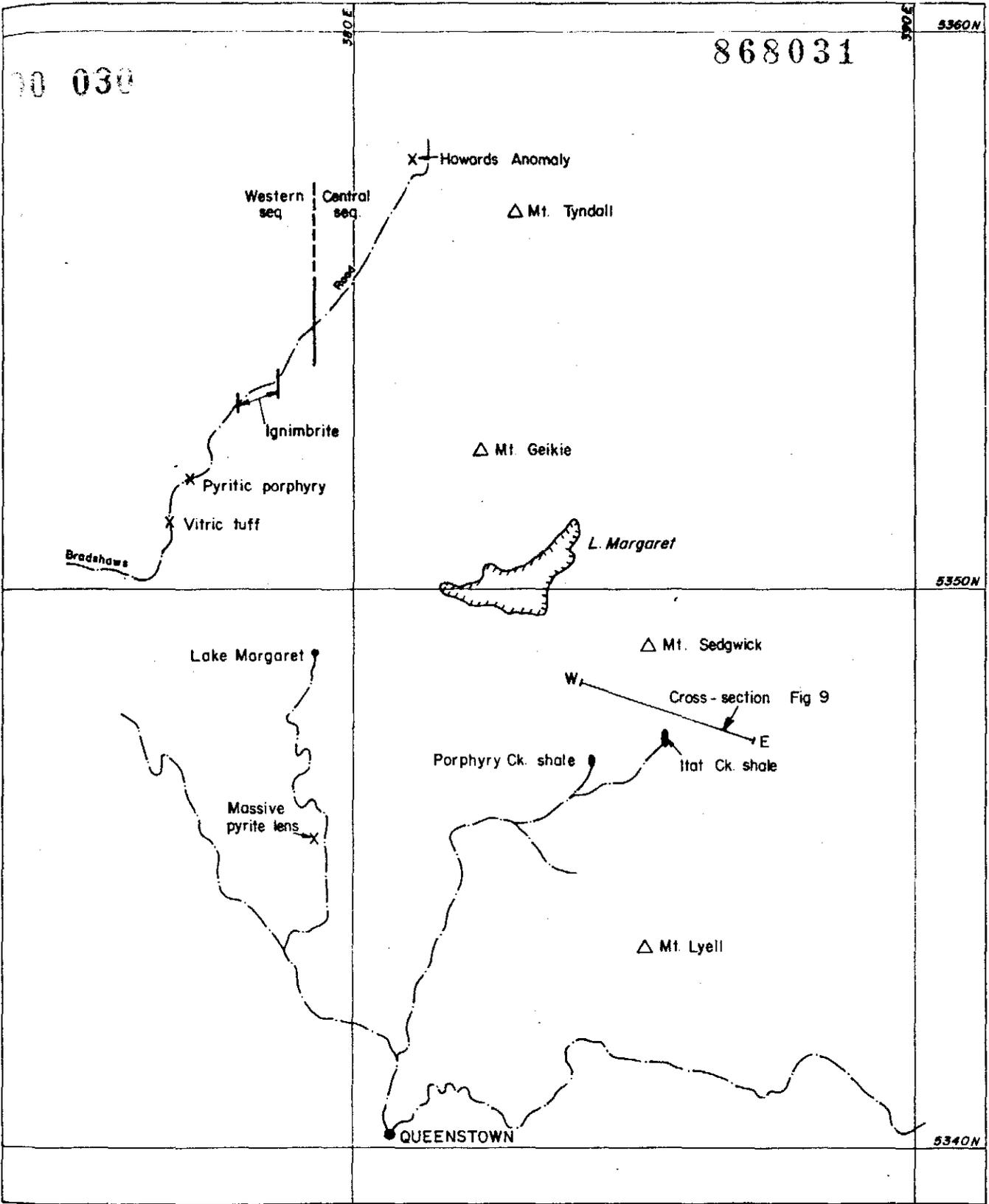
This section covers a variety of rock-types from the Central Sequence. Recent mapping by M. Hutton has shown that there is a massive sulphide host horizon exposed near Itat Creek on the south face of Mt Sedgwick. Hutton has inferred a syncline to the west of Itat Ck (see Fig. 8). The rocks in the core are of great interest as one of the two known extensive exposures of hangingwall rocks (with respect to a massive sulphide host horizon) south of the Henty Fault. The other is west of Red Hills in a similar structure - probably the same structure.

Black shale marks the host horizon (5348200N, 385500E). Sulphide in situ is not exposed, but blocks of massive sphalerite-galena are present with blocks of black shale in the overlying, relatively fresh, massive ash-flow tuff. The shale thus faces west. The volcanics beneath the black shale (i.e. to the east) are strongly sericitised. Sericitised rocks continue east as far as the knoll of pink, magnetite-veined "Darwin type" rhyolite, with the exception of the massive pink quartz-porphyry on top of the ridge east of Itat Creek. The quartz porphyry may contain epidote as an alteration product, and has been folded into its present position (Fig. 9) relative to the more altered rocks.

A lens of sediment at the western side of the section, at (5347350N, 384200E) was examined to see if it marks the repetition of the host horizon on the western limb of the syncline. A tentative east facing, based on grading and scours, was obtained from a bed within the lens, and the bed dips steeply east. The area mapped as sediment appears to comprise two or more small shale lenses separated by pyroclastics containing clasts of shale. West of the shales are outcrops of massive pink quartz-porphyry comparable with that overlying the shale at Itat Creek. Hutton mapped shale lenses within the porphyry west of Itat Creek; presumably the lenses of shale in question are in a similar stratigraphic position. The east-facing repetition of the host horizon has not been located, and may be covered by Owen Conglomerate, or may be present in the belt of volcanics at Lake Margaret township. This belt has been sampled on the Comstock road and at the West Queen River.

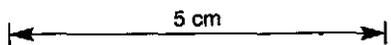
B. Western Sequence

Poor exposure and deep weathering make systematic sampling of these rocks difficult. The characteristic shales and siltstones are interbedded with tuffs,



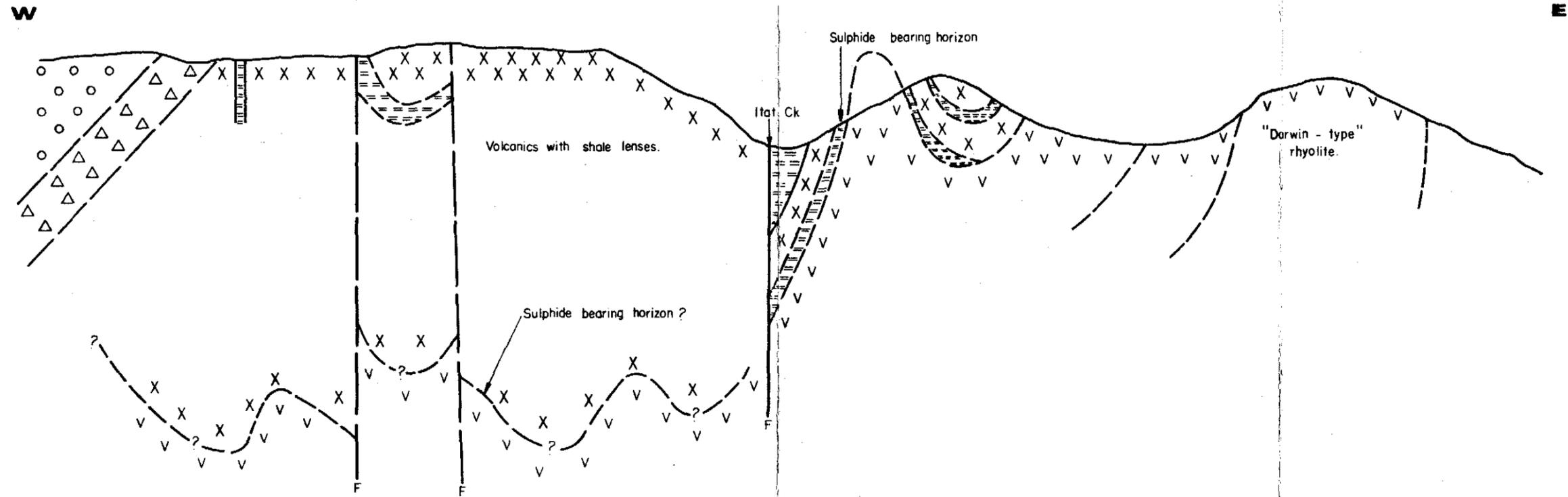
LEGEND:

Notes:-



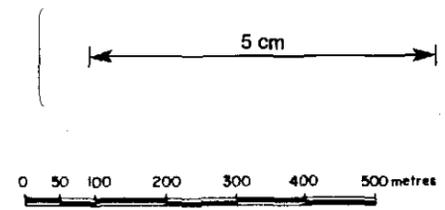
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TASMANIA MT. LYELL	
BRADSHAW RD, MT. SEDGWICK, & LAKE MARGARET RD.	
Author: C. Foster	Scale: 1:100,000
Drawn: K. Turner	Date: June 1981
Revised:	FIGURE NO. 8



- Owen Conglomerate
- Tyndall Group
- Volcanics overlying sulphide host horizon
- Volcanics underlying sulphide host horizon
- Shale
- Fault

81-1634



Note: After M.J. Hutton, 1980, with modifications.

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TASMANIA	
MT. LYELL	
CROSS-SECTION	
ON PART LINE 1800N,	
BEATRICE GRID	
Author: C. Easton	Scale: 1:10,000
Drawn: K. Turner	Date: June 1981
Revised:	FIGURE NO. 9
FILE No. 4400/34	

mostly highly sheared. Of interest is the deposit of pyrite exposed in a cutting of the Lake Margaret tramway. The lens is siliceous, and has a very steep west dip and a sharp western contact. It is banded in a way which suggests bedding. It is enclosed by tuffs which are too weathered for petrographic study.

9. MOUNT HUXLEY

The track to Mt Huxley provides a section across part of the Western Sequence sediments and tuffs into the tuffs and lavas of the Central Sequence. The contact of the Western and Central Sequences is on the western slope of Whip Spur, and the contact of the Central and Eastern Sequences is just east of the track, below Huxley Saddle.

In the Central Sequence volcanics, there is a marked change in alteration style across the section. On the western slopes of Whip Spur and east of Whip Spur quartz-sericite alteration is predominant. The rocks are light grey-green and are commonly strongly sheared. On the crest of Whip Spur, massive, green, flow-banded lavas crop out. The eastern boundary of the lavas (best exposed in a superseded loop of the Huxley track) is marked by a band of laminated shale and siltstone dipping steeply west. The change in alteration style is quite abrupt, occurring within a few tens of metres across-strike.

Other lenses of sediment occur east of the Huxley track, 1 km north of the summit of Mt Huxley. One (marked A in Fig. 10) continues 100-200m along strike. No dip could be measured. The shale is hematitic in part, and may pass into sheared sericitic volcanics along strike. The volcanics host a small group of barite veins. To the east, the volcanics are sheared and sericitic, and contain patchy, trace pyrite mineralisation. Some retain flow-banding texture. To the west, more massive flow-banded and autobrecciated lavas and ash-flow tuff occur in the immediate vicinity. Two spurs west, another group of sediments and bedded tuffs (labelled B) crops out. This dips west, and the cleavage is steeper than the bedding. Disseminated pyrite occurs in a zone of grey siliceous rock, apparently slumped pyritic chert breccia. It contains irregular blocks of grey chert.

The zone in which the sediments occur appears to mark a transition between sericitic alteration and fresher rock, the change in this case being less abrupt than the one on Whip Spur. Both transition zones may lie on the eastern limb of a tight syncline; a structure suggested by Brophy (MLM & R Co, Exploration Report, 1974-5). On Whip Spur, the same horizon may be represented by the alteration boundary on the western side of the spur. These observations suggest that a folded host horizon favourable for massive sulphide mineralisation is present in this area, at least locally marked by sediments.

10. KING RIVER

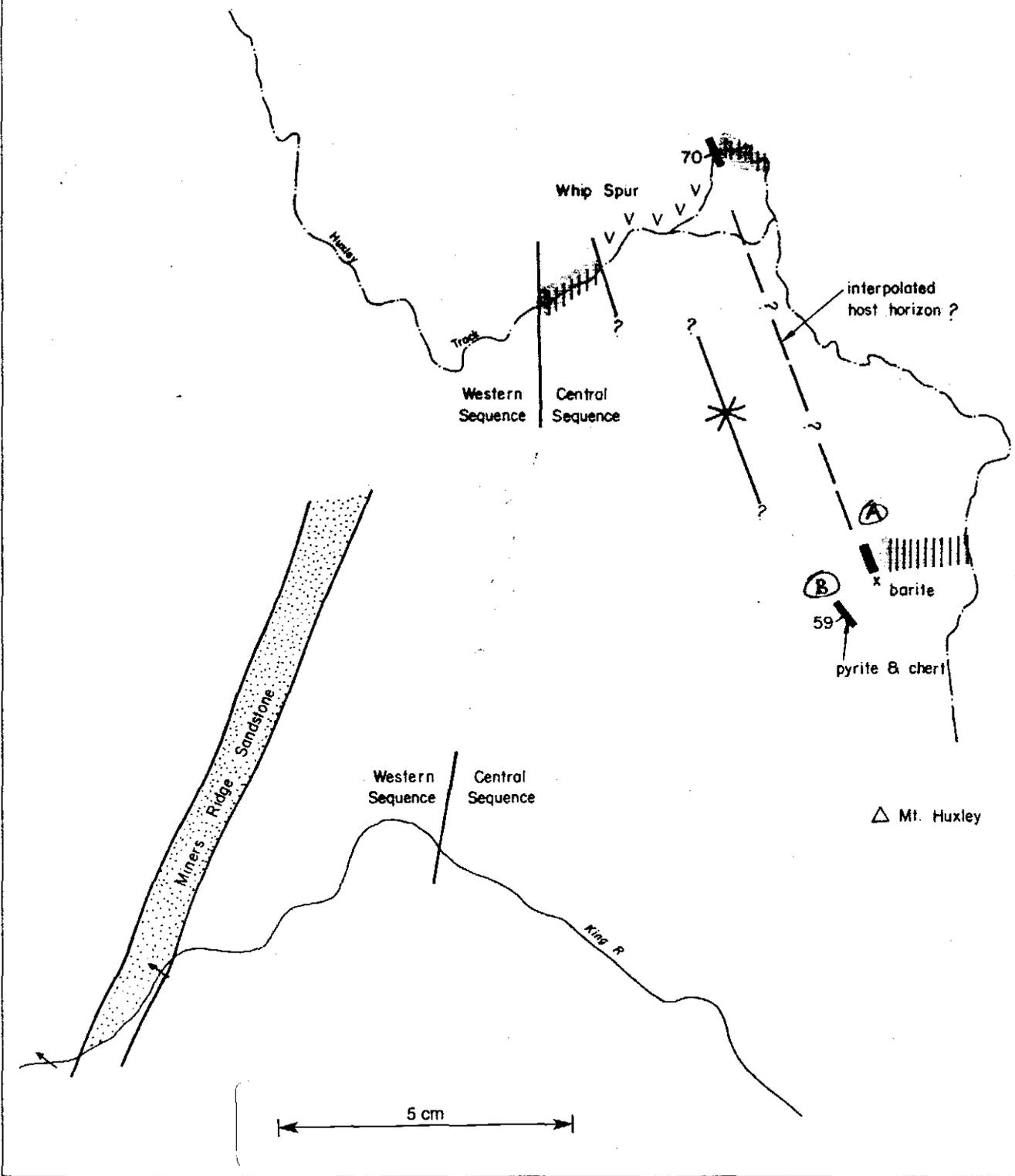
Much of the section through the Eastern and Western Sequences was sampled and examined in the bed of the river. The Central Sequence was examined on the north slopes of Mt Jukes, west of the Jukes Pty workings. Both the Eastern and Western Sequence rocks appear to be fresher than Central Sequence rocks (but this is yet to be checked by petrography).

The Eastern Sequence rocks are quartz- and feldspar-phyric. In the eastern part of the gorge, coarse fragmental lavas or pyroclastics bear large blocks of pink, green and purple quartz- and feldspar-phyric lava. Further west, volcanic rocks without large fragments predominate. There is no visible bedding in the gorge but the unconformable contact with Central Sequence lavas near Jukes Pty ^{is regarded as a fault} East-
ern Sequence rocks include quartz grit and conglomerate comparable with the Dora Conglomerate (Section 6, A). *At Jukes Pty*

The Central Sequence rocks appear to be mainly feldspar-phyric lavas with well-developed snowflake devitrification texture. The mineralised rocks at Jukes Pty, however, are quartz-phyric. The strong chloritic alteration at Jukes Pty diminishes rapidly westwards. The volcanics 600m west of the workings are a pale hematite purple colour and bear hematite and cherty-silica veins. This development of hematite may indicate an approach to an ancient erosion surface (on which, possibly, Western Sequence rocks were deposited). The hematite may be the product of metamorphism of orange hydrated iron oxides formed by weathering. Such a mineralogical evolution is visible in the chloritised rocks corresponding to the Jukes Pty mineralisation. Recent weathering has imparted a bright red-orange colour to these rocks except immediately beneath the unconformity at the base of the Owen Conglomerate and lensoid Jukes Breccia. There, the rocks are an intense hematitic purple. They were weathered, presumably to a red-orange colour, in the late Cambrian or early Ordovician, and metamorphosed in the Devonian.

In the Western Sequence, quartz-feldspar porphyries are interbedded with flysch-type sediments. The porphyries are extrusive at least in part, because the base of the Miners Ridge Sandstone includes blocks of the adjacent porphyry. (At the contact, the porphyry also includes a body of black shale, but the shale contains pebbles of porphyry and is a clastic dyke). At the top of the Miners Ridge Sandstone is a contorted black shale, and the tuffaceous greywacke adjacent to the west includes rafts of the black shale. West facings are indicated at both contacts of the Miners Ridge Sandstone (see Fig. 10).

035



LEGEND:

-  Quartz-sericite alteration
-  Massive andesites
-  Sediment lens with dip
-  Facing, King River gorge

Notes: - From Mt Lyell Co. maps & Corbett, 1979, with additions.



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GETTY OIL DEVELOPMENT COMPANY (P) LTD	
TASMANIA MT. LYELL	
HUXLEY TRACK & KING RIVER GORGE	
Author: C. Foster	Scale: 1:50,000
Drawn: K. Inyon	Date: June 1981
Revised:	FIGURE No. 10

81-1634

11. CONCLUDING COMMENTS

The state of knowledge of the structure of the Mt Read Volcanics north of the Henty Fault has been summarised in Section 4.D. It remains to speculate on the structure of the volcanics south of the Henty Fault. Fig. 12 attempts to relate all massive sulphide mineralisation and associated footwall mineralisation to a single host horizon repeated across the belt by folding.

There are three lines of mineralisation, two truncated by the Henty Fault. The western line includes the Henty Fault Zone massive sulphide lens (east-facing) ^{3. fault boundary} the massive oxide mineralisation at Howards Anomaly (tentatively east facing) and its southward continuation towards Basin Lake (facing as yet unknown) and the Mt Lyell deposits (east facing). The central line includes the mineralised Farrell Slates (west facing) and their southward continuation into Sterling Valley, the Red Hills sediments and massive sulphide lens (west facing) and the Itat Creek shale on Mt Sedgwick (west facing). The eastern line is not represented by sediments or massive sulphide lenses. The supposed host horizon probably passed east of the footwall-style mineralisation at Lake Selina and has been faulted out. It may pass beneath the Dora Conglomerate and be the source of the Lake Dora sulphides. The relationship of sediments and sulphides in the Huxley area to others further north is unclear.

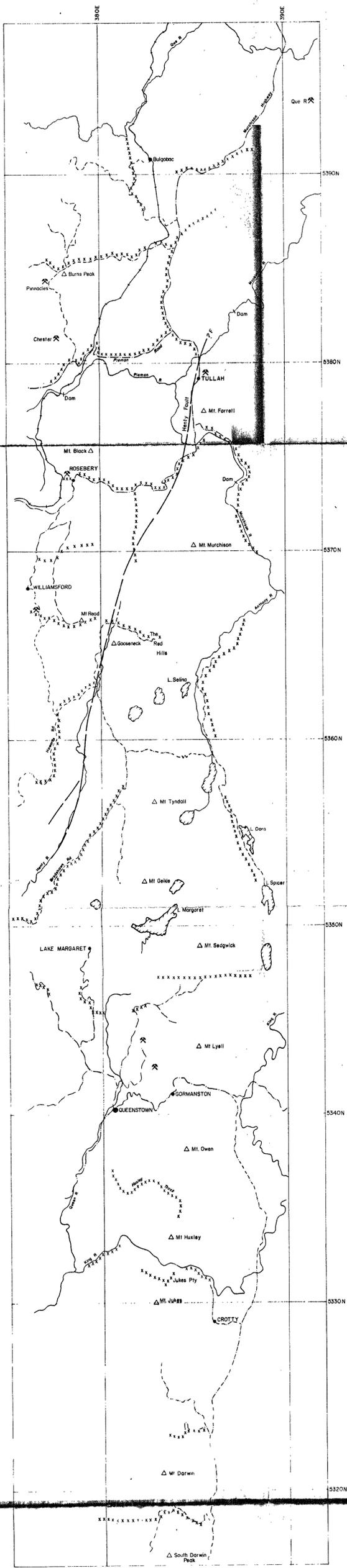
South of the King River, only footwall-style mineralisation is known. At East Darwin, this may have formed at shallow depth. East and west of Mt Darwin, where the structure of the Central Sequence appears to be anticlinal with the Darwin Granite and massive "Darwin type" rhyolites at the core (White, Ph. D. 1973), rocks in which a host horizon might have been preserved are faulted or eroded away.

North of the King River, granite and "Darwin type" rhyolite are exposed only in the eroded anticline between the central and eastern lines of mineralisation. Volcanics younger than mineralisation occur in the core of the syncline between the western and central lines. Most are covered by Owen Conglomerate between the Gooseneck and Mt Sedgwick.

The folding of the Owen Conglomerate is out of sympathy with that in the Central Sequence, for example, on Mt Sedgwick where the Owen Conglomerate is anticlinal and the Central Sequence apparently synclinal. This is a further indication of the episode of folding between the Central Sequence volcanism and the deposition of the Tyndall Group (other evidence being the unconformities on the Darwin and Murchison Granite). Later, Tabberabberan, folding appears to have been coaxial with the result that fold-styles have remained simple in the volcanics.

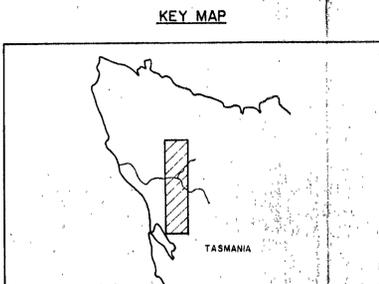
037

The question of correlation across the Henty Fault remains unanswered. One event could account for all massive sulphide mineralisation in each area. It is not possible to match the points where the Henty Fault truncates the host horizons on either side; considerable vertical movement may be involved. The broad anticline south of the fault (contrasting with the tight anticlines in the Rosebery-Hercules area) no doubt reflect the competence of the "Darwin-type" rhyolites and the granites. That these are only exposed south of the fault may be evidence of uplift of the southern block relative to the northern during the Cambrian. Since the Cambrian, the southern block must have been downthrown relative to the northern block in order to receive the Owen Conglomerate. The displacement of the line of Owen type conglomerates along the fault between Mt Farrell and Mayday Mt could reflect a major transcurrent movement along the Henty Fault since the Ordovician or, more likely, a deflection of the trough structures which received the conglomerate along a major pre-existing line of weakness.



81-1634

LEGEND	TOPOGRAPHICAL	GEOLOGICAL	GEOCHEMICAL
Geological boundary Observed	△ 90 Trig station, elevation m	xxxxxx Traverses sampled	
Geological boundary Inferred	2WD road		
Outcrop. Scree or float	4WD road		
Strike, dip of bedding, measured	Track		
Anticline Overturned	Fence		
Syncline Overturned	Homestead		
Plunge of minor fold	Stream		
Unconformity	Railway		
Fault	Dam		
Shear zone	Bar		
Strike, dip of joint location	Lake		
Cosson			
Minor mineral occurrence			
Mine, prospect			
Cosson			
Specimen location			
Diamond drill hole			
Percussion drill hole			



Notes: - After Lands Dept 1:100000 series, sheets 803, 804

868039 SCALE 5000 10000metres

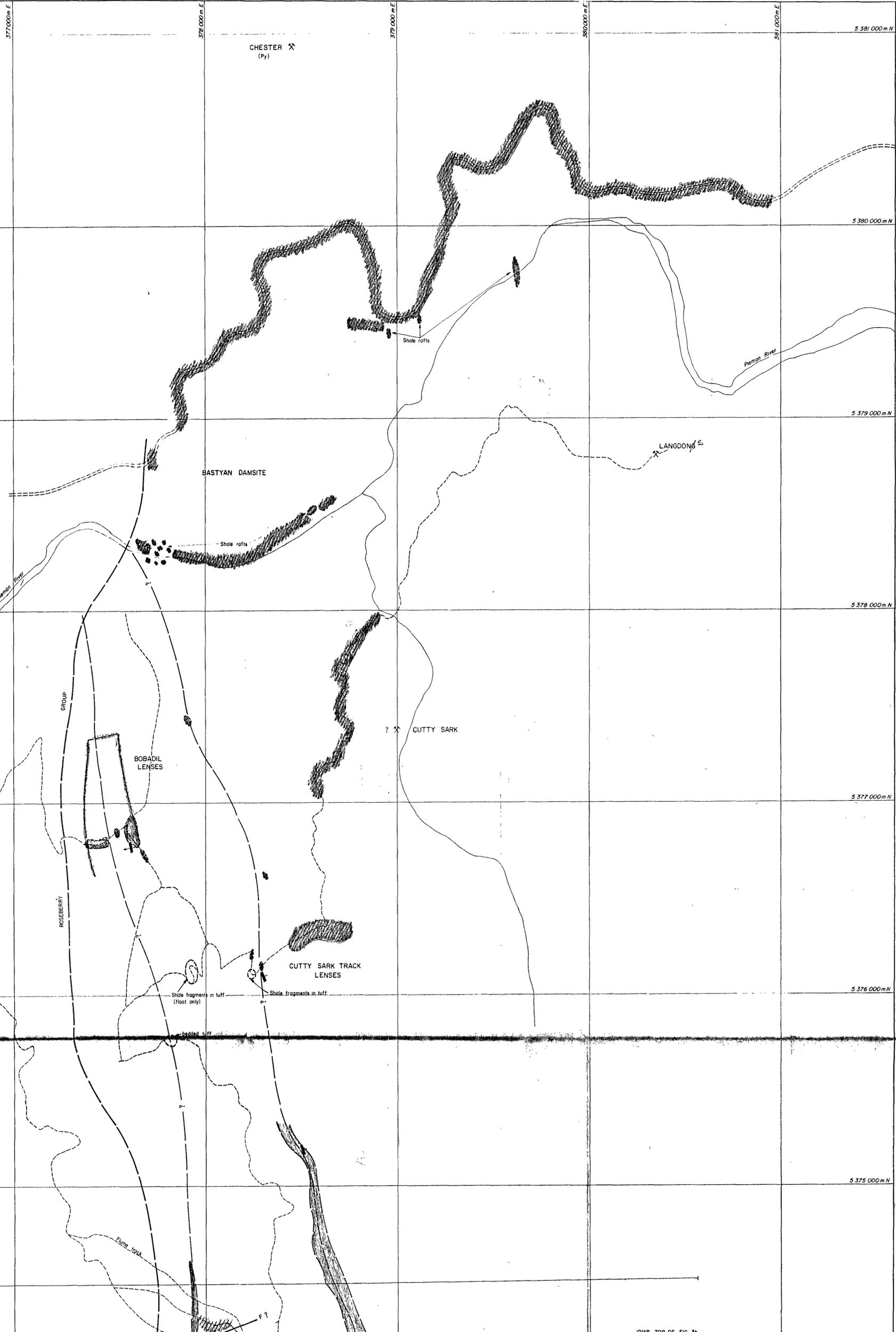
5cm 9073

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MT LYELL

TRAVERSES
ACROSS MT. READ VOLCANICS

Author: J. Easton	Scale: 1:100000
Drawn: J. Easton	Date: July 1980
Revised: June 1981	File No: 400/28
	Fig No:



SEOLOGICAL

- Sediments (extended between outcrops interpretive)
- Pyroclastics relatively fresh (mainly ash-flow tuffs)
- Pyroclastics with quartz-sericite alteration
- Submarine facies pyroclastics
- Faulted western boundary of volcanics
- Host horizon

LEGEND

- Geological boundary Observed
- Geological boundary Inferred
- Outcrop scree or float
- Strike, dip of bedding, measured
- Strike, dip of bedding, inferred
- Anticline Overturned
- Syncline Overturned
- Plunge of minor fold
- Unconformity
- Fault
- Shear zone
- Strike, dip of post-tectonic cleavage
- Gneiss
- Minor mineral occurrence
- Mine, prospect
- Colliery
- Pastern location
- Dam and lake
- Percussion of hole

TOPOGRAPHICAL

- Trig station, elevation m
- Mud
- Vehicle track
- Track
- Fence
- Homestead
- Stream
- Railway
- Dam
- Bore

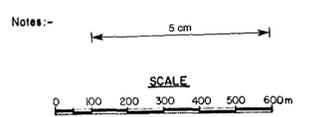
GEOPHYSICAL GEOCHEMICAL

JOINS TOP OF FIG. 3b

868040

KEY MAP

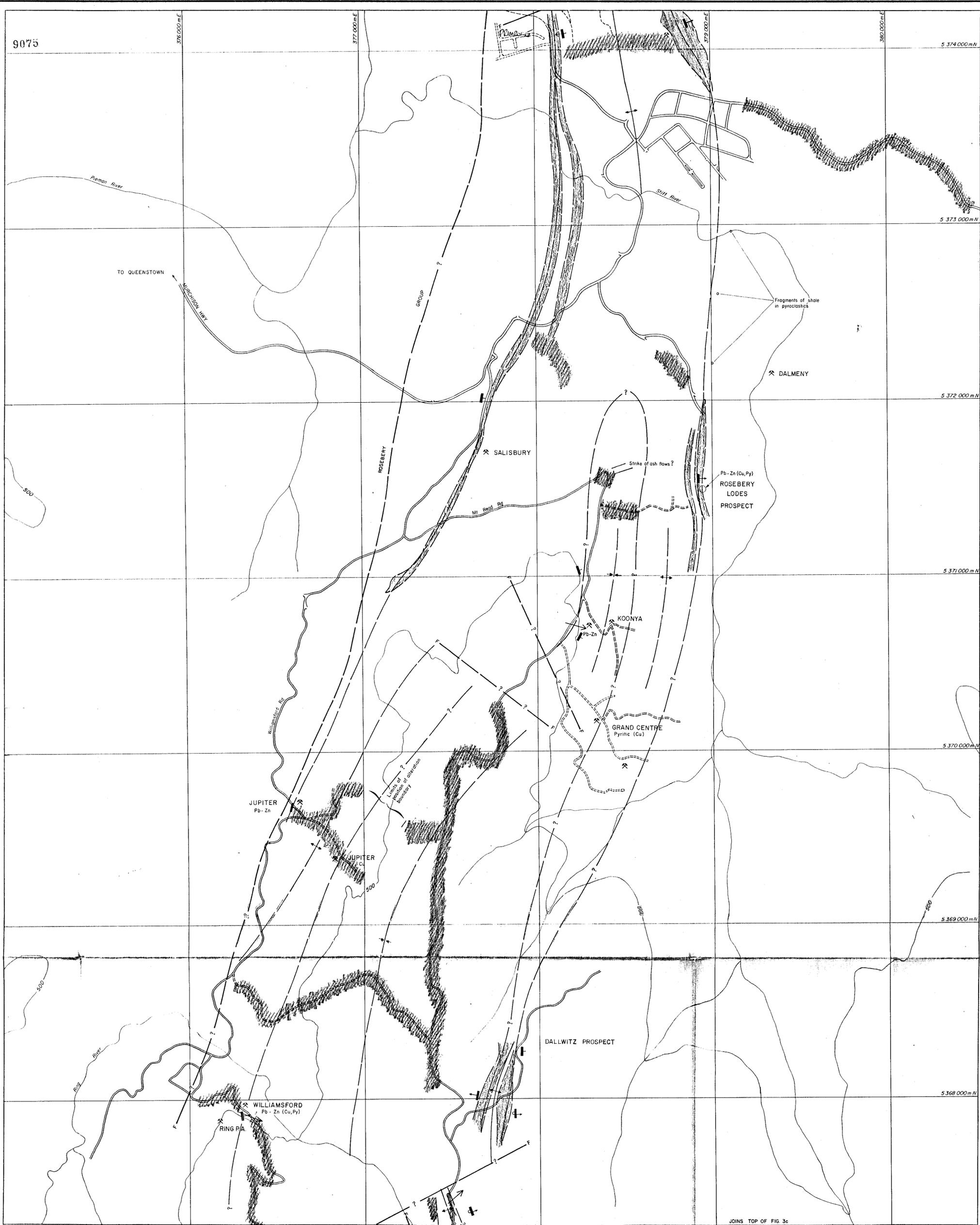
81-1634



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 GETTY OIL DEVELOPMENT COMPANY LIMITED
 TASMANIA
CHESTER TO HOWARDS RD
NORTH SECTION

Author: C. Eades	Scale: 1:10000
Drawn: H. Turner	Date: July 1981
Revised:	File No: 4400/2b

Fig No 3a



GEOLOGICAL

- Sediments (extended between outcrops interpretive)
- Pyroclastics relatively fresh (mainly ash-flow tuffs)
- Pyroclastics with quartz-sericite alteration
- Submarine facies pyroclastics
- Faulted western boundary of volcanics
- Host horizon

LEGEND

- Geological boundary Observed
- Geological boundary Inferred
- Outcrop Strike or fault
- Strike-slip of bedding measured vertical
- Anticline Overturned
- Syncline Overturned
- Plunge of minor fold
- Uncertainty
- Fault
- Shear zone
- Strike-slip of post-tectonic cleavage
- Copper
- Minor mineral occurrence
- Mine, prospect
- Copper
- Specimen location
- Diamond drill hole
- Percussion drill hole

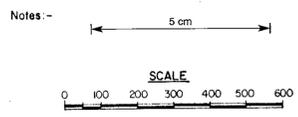
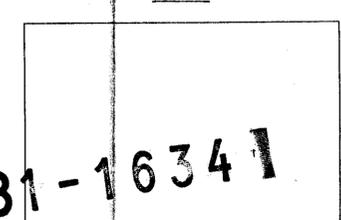
TOPOGRAPHICAL

- Trig station, elevation m
- Road
- Vehicle track
- Track
- Fence
- Homestead
- Stream
- Railway
- Dam
- Bore

GEOPHYSICAL GEOCHEMICAL

- Magnetic anomaly
- Geochemical anomaly

KEY MAP



Notes -

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TASMANIA

CHESTER TO HOWARDS RD

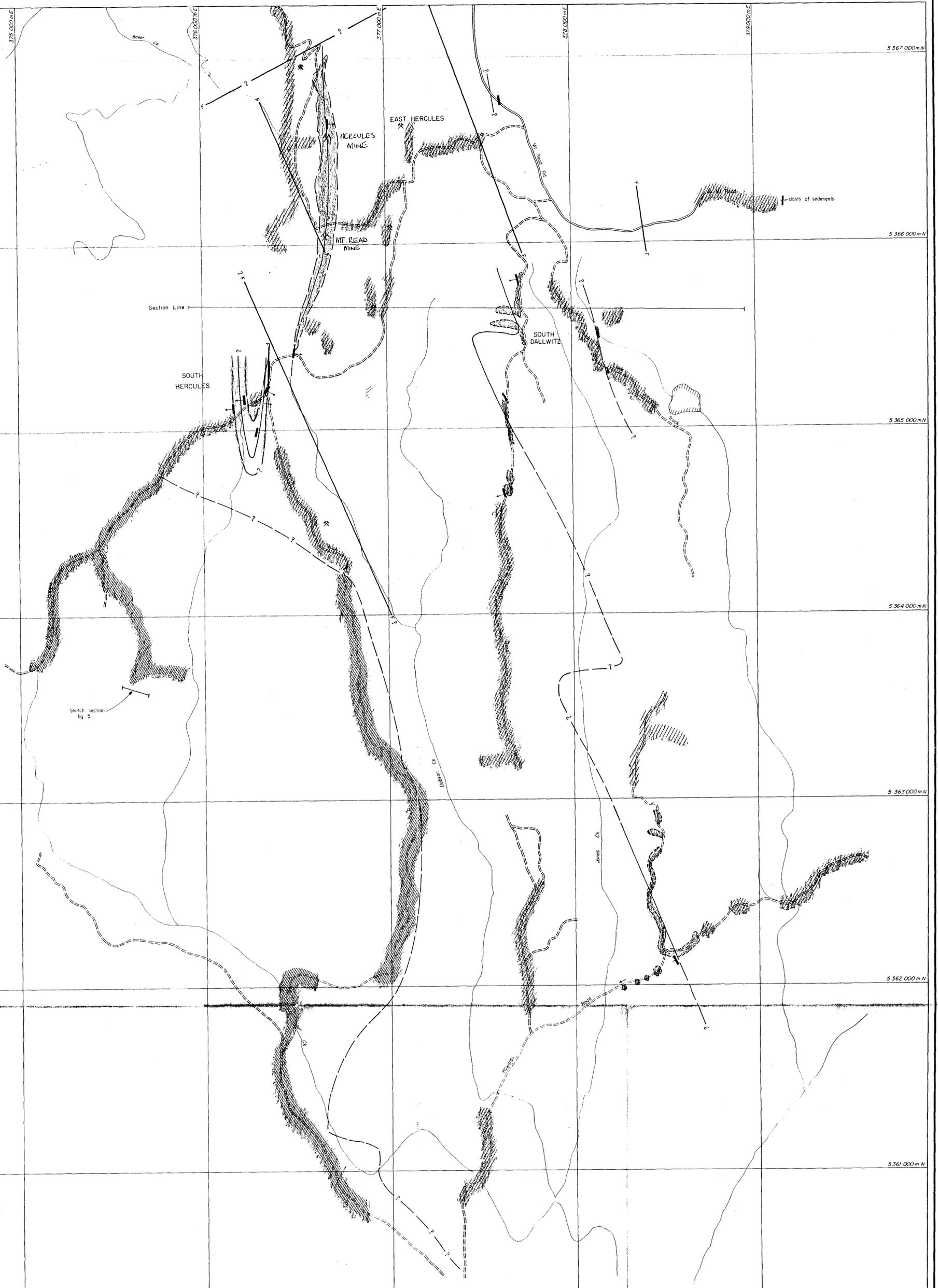
CENTRAL SECTION

Author: C. Easton Scale: 1:60,000

Drawn: M. Turner Date: July 1980

Revised: No. 4400/28 19" x 30"

81-16341



Section Line

Sketch section fig 5

<p>GEOLOGICAL</p> <ul style="list-style-type: none"> Sediments (extended between outcrops interpretive) Pyroclastics relatively fresh (mainly ash-flow tuffs) Pyroclastics with quartz-sericite alteration Submarine facies pyroclastics Faulted western boundary of volcanics Host horizon 	<p>LEGEND</p> <ul style="list-style-type: none"> Geological boundary observed Outcrop scree or foot Strike, dip of bedding, measured Strike, dip of bedding, estimated Anticline Overturned Syncline Overturned Plunge of minor fold Unconformity Fault Shear zone Strike, dip of joint Rotation Cleavage Green Minor mineral occurrence Mass product Cation Specimen location Diamond in a hole Percussion pit hole 	<p>TOPOGRAPHICAL</p> <ul style="list-style-type: none"> Trig station, elevation in metres Road Vehicle track Track Fence Homestead Stream Railway Dam Bore 	<p>GEOPHYSICAL GEOCHEMICAL</p>
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Notes: -

SCALE

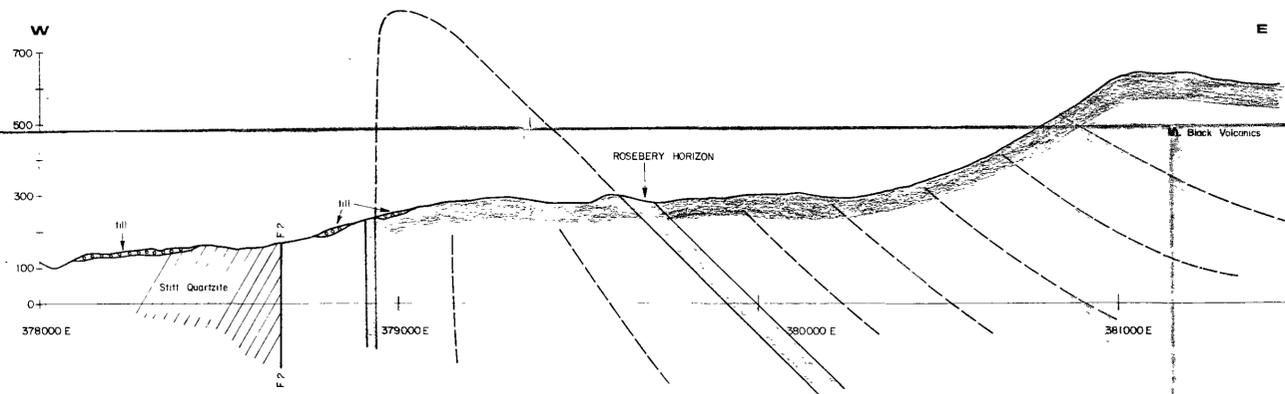
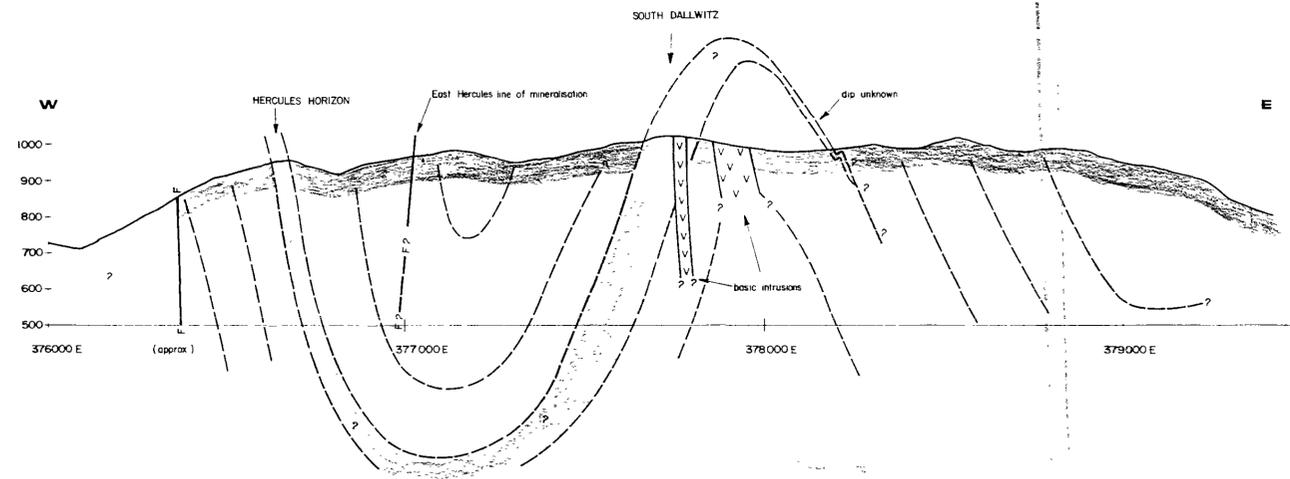
0 100 200 300 400 500 600m

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 TASMANIA
CHESTER TO HOWARDS RD
SOUTH SECTION

Author: C. Ertter	Scale: 1:10,000
Drawn: K. Turner	Date: July 1991
Revised:	File No: 4400/28
	Page No: 3c

81-1634



81-1634

GEOLOGICAL

- Sediments (extent between outcrops interpretive)
- Pyroclastics - relatively fresh (mainly ash-flow tuffs)
- Pyroclastics with quartz-sericite alteration
-
-
-
-
-
-

LEGEND

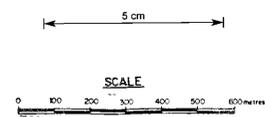
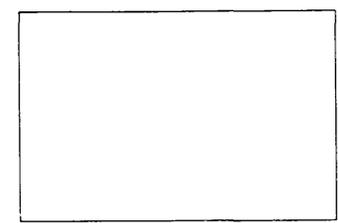
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TOPOGRAPHICAL

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**GEOPHYSICAL
GEOCHEMICAL**

KEY MAP



Notes -

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 GEITY DEVELOPMENT COMPANY LIMITED
 TASMANIA
 MT LYELL

**CROSS-SECTIONS
 CHESTER TO HOWARDS RD**

Author: C. Easton Scale: 1:10,000
 Drawn: K. Sizer Date: June 1991
 Revised: No. 400/31 Pg. 6

374 000 E

374 500 E

375 000 E

375 500 E

376 000 E

376 500 E

5 368 500 N

5 368 000 N

5 367 500 N

5 367 000 N

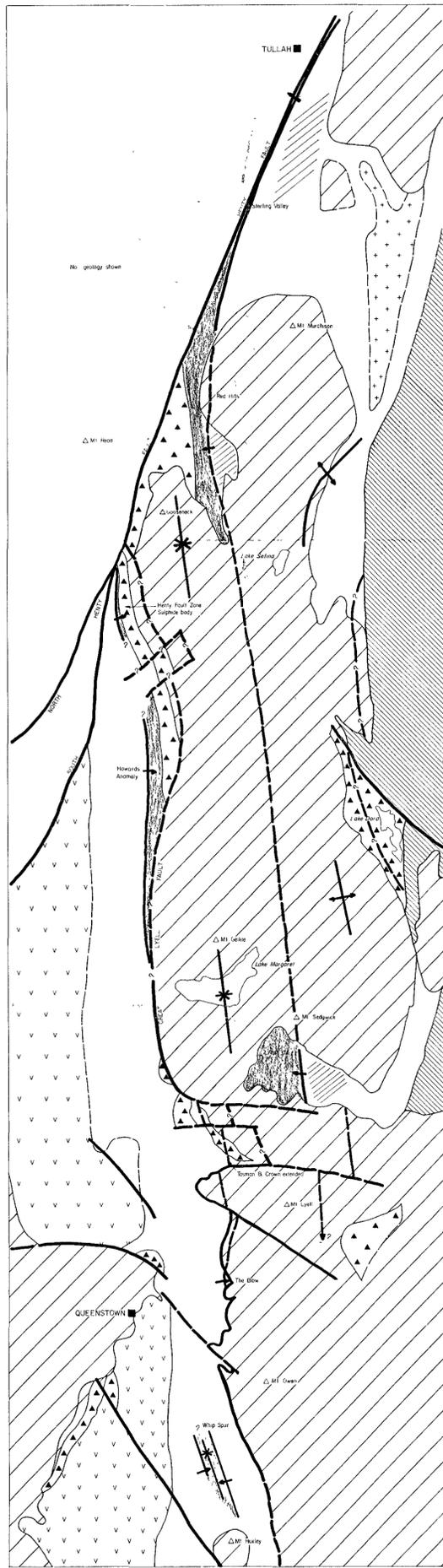
5 366 500 N



81-1634

Notes - From E2 Company

<p>GEOLOGICAL</p> <ul style="list-style-type: none"> L Carbonate association C Clastic association Q Coarser quartz-bearing clastics P Pyrite-beaded or as pebbles in conglomerate A Suspected altered limestone 	<p>LEGEND</p> <ul style="list-style-type: none"> Geological boundary Observed Geological boundary Inferred Fault Strike, dip of bedding Altitude with facing Aerial ropeway 	<p>TOPOGRAPHICAL</p> <ul style="list-style-type: none"> Track River 	<p>GEOPHYSICAL GEOCHEMICAL</p>	<p>KEY MAP</p> <div style="border: 1px solid black; width: 100px; height: 100px; margin: 0 auto;"></div>	<p>SCALE</p> <p>0 50 100 200 300 metres</p> <p>5 cm</p>	<p>868044</p> <p>Getty AUSTRALASIA</p> <p>GETTY OIL DEVELOPMENT COMPANY LIMITED</p> <p>TASMANIA MT BLACK</p> <p>RING RIVER SECTION</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td>Author: C. Bostice</td> <td>Scale: 1:5000</td> </tr> <tr> <td>Drawn: K. Turner</td> <td>Date: June 1981</td> </tr> <tr> <td>Revised:</td> <td>File No: 868044/32</td> </tr> <tr> <td></td> <td>Page No: 7</td> </tr> </table>	Author: C. Bostice	Scale: 1:5000	Drawn: K. Turner	Date: June 1981	Revised:	File No: 868044/32		Page No: 7
Author: C. Bostice	Scale: 1:5000													
Drawn: K. Turner	Date: June 1981													
Revised:	File No: 868044/32													
	Page No: 7													



GEOLOGICAL

- Owen Conglomerate (excluding basal (blue breccia) and younger formations)
- Central Tuff, Owen Conglomerate and corrieans
- Western Sequence
- Central Sequence, post-mineralisation
- Central Sequence, pre-mineralisation ("Down-type" (negative hatched))
- Gneiss
- Host horizon, with facing
- Host horizon, inferred buried
- Fold axis, inferred in Central Sequence (not in Owen Conglomerate)
- Significant faults
- Formations older than Mt. Read Volcanics

LEGEND

- Geological boundary Observed
- Geological boundary Inferred
- Outcrop, Scree or float
- Strike, dip of bedding, measured vertical
- Anticline Overturned
- Syncline Overturned
- Plunge of minor fold
- Unconformity
- Fault
- Shear zone
- Strike, dip of joint
- Fissure
- Chertage
- Gusher
- Near mineral occurrence
- Mine, prospect
- Colleen
- Specimen location
- Diamond drill hole
- Percussion drill hole

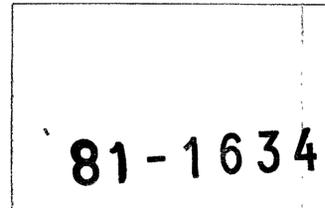
TOPOGRAPHICAL

- Trig station, elevation in m
- Road
- Vehicle track
- Frock
- Fence
- Stream
- Railway
- Dam
- Bore

GEOPHYSICAL GEOCHEMICAL

- Triangulation station
- Magnetic declination
- Gravity
- Seismicity
- Geophysical anomaly
- Geochemical anomaly

KEY MAP



Notes: - After Corbett et al 1974, 1981 with additions

868045

SCALE



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**POSSIBLE STRUCTURE
 CENTRAL SEQUENCE
 MT. READ VOLCANICS**

Author: Jones	Scale: 1:50,000
Drawn: J. Jones	Date: 1981
Revised:	File No: 81-1634
	Fig. No: 11