

**MICROFILMED**

REPORT ON FIELD WORK ON  
ALTERATION STUDIES on the  
E.Z. and MT. LYELL AREAS

February - June 1980

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C. EASTOE  
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## 1.0 INTRODUCTION

A week in February, and three-and-a-half months since mid-March have been spent examining alteration-mineralisation relationships in the Mt. Reed Volcanics on the Getty-Lyell-E.Z. joint venture exploration leases. This report summarises the field-observations for the whole period.

### AIMS, BACKGROUND, METHODS

The aims of the investigation are:

- (i) The preparation of a list of alteration types occurring in the Mt. Read Volcanics.
- (ii) The mapping of alteration, with a view to distinguishing a horizon or horizons on which Cambrian syngenetic mineralisation occurred within the volcanics - i.e., distinguishing footwall from hangingwall rocks on a regional scale.

The study is complicated by the structure of the volcanics. Evidence of two phases of deformation can be seen locally, but the effects of folding cannot in general be determined in sequences consisting only of volcanic rocks. A further complication is a Devonian metamorphic episode, during which the volcanics reached lower greenschist facies, undergoing regional alteration (hydrothermal or otherwise) to varying degrees. The problem therefore becomes one of distinguishing rocks twice altered from those only once altered. For orientation, areas with known mineralisation have been examined, much attention being given to basic geology.

The alteration directly associated with sulphide mineralisation differs greatly from "background" alteration in surrounding rocks. Both are relevant to this study, although probably in different ways. For the first, it is sufficient to sample a representative number of small prospects. For the second, sampling is at regular intervals across the strike of the volcanics.

It is not yet possible to report in detail on alteration in the prospects and sections sampled - detailed petrographic work is yet to be undertaken on a suite of polished thin sections now being prepared in Hobart.

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A long term objective of the project is to combine the information on alteration and basic geology with results of the fluid-dynamic investigations of Drs. M Solomon and J Walshe of the University of Tasmania

AREAS EXAMINED

Fig. 1 is a map of the study area (Bulgobac, Sterling Valley, Mt. Black and Mt. Lyell leases) at 1:100,000 scale. Sections which have been sampled and sections it is intended to sample next field season are shown. Four sections were chosen at the outset for an orientation study because they included good road sections and known massive sulphide mineralisation. The Chester-Pieman Road and Rosebery-Mt. Black sections fulfilled these requirements. The Koonye-Jupiter, Hercules-Red Hills and Murchison Gorge (extension of Rosebery-Mt. Black) sections required detailed geological study in order that the alteration pattern be understood as well as possible. Additional sections were investigated at Mt. Jukes-Darwin, along the Burns Peak road and east of the Tyndall Range.

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2.0 DETAILED REPORTS

Burns Peak Road and the Pinnacles-North Pinnacles Area

The volcanics sampled on the Burns Peak Road east of easting 3801 appear relatively fresh; some siliceous, sericitic and pyritic alteration was observed, but the rocks are not intensely sheared and largely retain volcanic textures. They are separated from sediments and volcanics to the west by a sheared sericitic zone which appears to correspond to a ENE trending regional lineament visible on LANDSAT photographs.

West of easting 380, samples of the volcanics have been taken both north and south of the lineament, which passes near the Burns Peak barite occurrence. Those from the area around the Pinnacles mine and Burns Peak are largely quartz-sericitic. Those to the north (from exploration tracks either side of the North Pinnacles Road) are very fresh tuffs and lavas. The contrast in alteration styles may imply that two unrelated sets of volcanic rocks have been juxtaposed along the lineament.

The relationship of the sediments and the volcanics in the North Pinnacles Area was the subject of a detailed study. Along the crest of The Pinnacles feldspar-hornblende pyritic lavas crop out. Along roads A and B (Fig. 2) these are flanked by a characteristic, locally flow-banded rock crowded with xenoliths, and this in turn is flanked by a coarse ash-fall tuff consisting predominantly of feldspar and quartz crystals and containing angular blocks of white, fine-grained lava and tabular blocks of black, feldspar-pyritic material (pumice?). These pyroclastics pass outwards into shales and sandstones interbedded with ash-fall tuffs. Along road A these dip and face east; along road B they are subvertical and face west. Facings were determined from scours. Near the sediment-volcanic contact in the Silver Falls track, most facings were west in the interbedded shales and ash-fall tuffs, but one east facing was observed, and local changes of strike suggest small scale folding. In the Burns Peak Road, a contact between pyroclastic agglomerate and (?) tuffaceous sandstone is exposed at easting 3788. An east facing was determined from an east-dipping, thin, laminated siltstone bed within the agglomerates. The siltstone was disrupted

and scoured by the deposition of the overlying agglomerates. Further east, at 3798, scours give a west facing in west-dipping sediments. At 3800 steeply west-dipping sediments and ash-fall tuffs make contact with a quartz-feldspar-hornblende porphyry. The contact is weathered and sheared, yet there is little to suggest that the sediments were intruded by the porphyry. If the porphyry underlies the sediments conformably, it corresponds stratigraphically with the quartz-feldspar-phyric tuff from roads A and B.

From the above, it is deduced that the volcanics on the Pinnacles Ridge form the core of an anticline and are overlain conformably by the sediments. The sediments form a syncline to the east of the Pinnacles.

Pieman Road

Samples were collected at intervals of about 1 km. Between eastings 3785 and 3810, the rocks are predominantly fragmental (autobrecciated lavas and pyroclastic agglomerates); east of 3810 they are probably predominantly lavas. At this stage, the following observations on alteration and mineralisation are offered :-

- i) Scattered pyrite occurs at most of the sample sites, in rocks of very different alteration type.
- ii) There is a striking contrast between the albite-epidote-chlorite alteration of ?lavas near the Murchison Highway intersection, and the chloritic-sericitic assemblages of the volcanic rocks, still largely fresh, further west.
- iii) The autobrecciated lavas approximately along strike from the Chester Mine show sideritic alteration of feldspar phenocrysts, which weather as a result to a reddish-brown colour.

The old Chester and Langdon's Mines were visited. The massive pyrite-chert body at Chester contains minor amounts of a white, soapy phyllosilicate. Footwall and hangingwall rocks are not well exposed in the vicinity. At Langdon's, a 30 cm vein cuts sericitised volcanic rock. Galena, red to yellow sphalerite and chlorite fill brecciated siderite, itself an earlier breccia filling. The deposit is probably a Devonian remobilisation.

### Murchison Gorge

The occurrence of granite in the Murchison Gorge about 3 km east of the mineralised Farrell Slates suggests a possible relationship between the emplacement of the granite (providing a heat source for circulating waters) and the sulphide mineralisation in the Farrell Slates. The area therefore warranted investigation as perhaps the most complete section of a hydrothermal system in the Mt. Read Volcanics.

The Slates (slate and shale with minor interbedded tuffaceous sandstone) dip steeply west in a quarry near the Murchison Dam Road, and a west facing (graded sandstone) was observed near the eastern limit of the Slates in an area without visible small scale folding. They abut the Henty Fault to the west, and are consequently highly deformed locally. So, too, are the sulphides they contain. Although Cu, Pb, Zn and Fe sulphides and barite are present, the relative metal proportions are not typical of massive sulphide mineralisation. The Farrell ores probably originated as Cambrian massive sulphides, and underwent subsequent remobilisation and redistribution during the Devonian.

The granite is a somewhat sheared rock of typical granitic texture, containing abundant chlorite and light green feldspar. Around the dam-site it invades a quartz-phyric rhyolite, now dark green, heavily sheared and consisting of an assemblage including chlorite, and pyrite is locally almost complete, the resultant rock having an irregular banded texture. This type of alteration continues westward along the Murchison Gorge between the two granite occurrences. In the Sophia tunnel, the contact is sharp. On the country-rock side, pyrite-magnetite mineralisation appears to intensify towards the contact. The granite by the contact is pyritic, and is altered to an assemblage including coarse red feldspar (probably K-feldspar) both as disseminated crystals and dyke-like bodies lining the contact. The nature of the contact is different further west along the Murchison Gorge, where bodies of granite and feldspar porphyry a few metres wide intimately invade altered rhyolites of pink to green colour. Quartz and chlorite veins, some with minor sulphides, are prominent locally.

This is interpreted as a higher-level contact, with more explosive intrusive and hydrothermal phenomena, than the one in the tunnel.

The section of volcanic rocks between the Murchison Granite and the Farrell Slates is incomplete because of downfolding (and possibly some downfaulting) of the Owen Conglomerate into the volcanics at the eastern end of the Murchison Gorge. The structure of the conglomerate must be taken into consideration in inferring the relationship of the granite and the Farrell Slates.

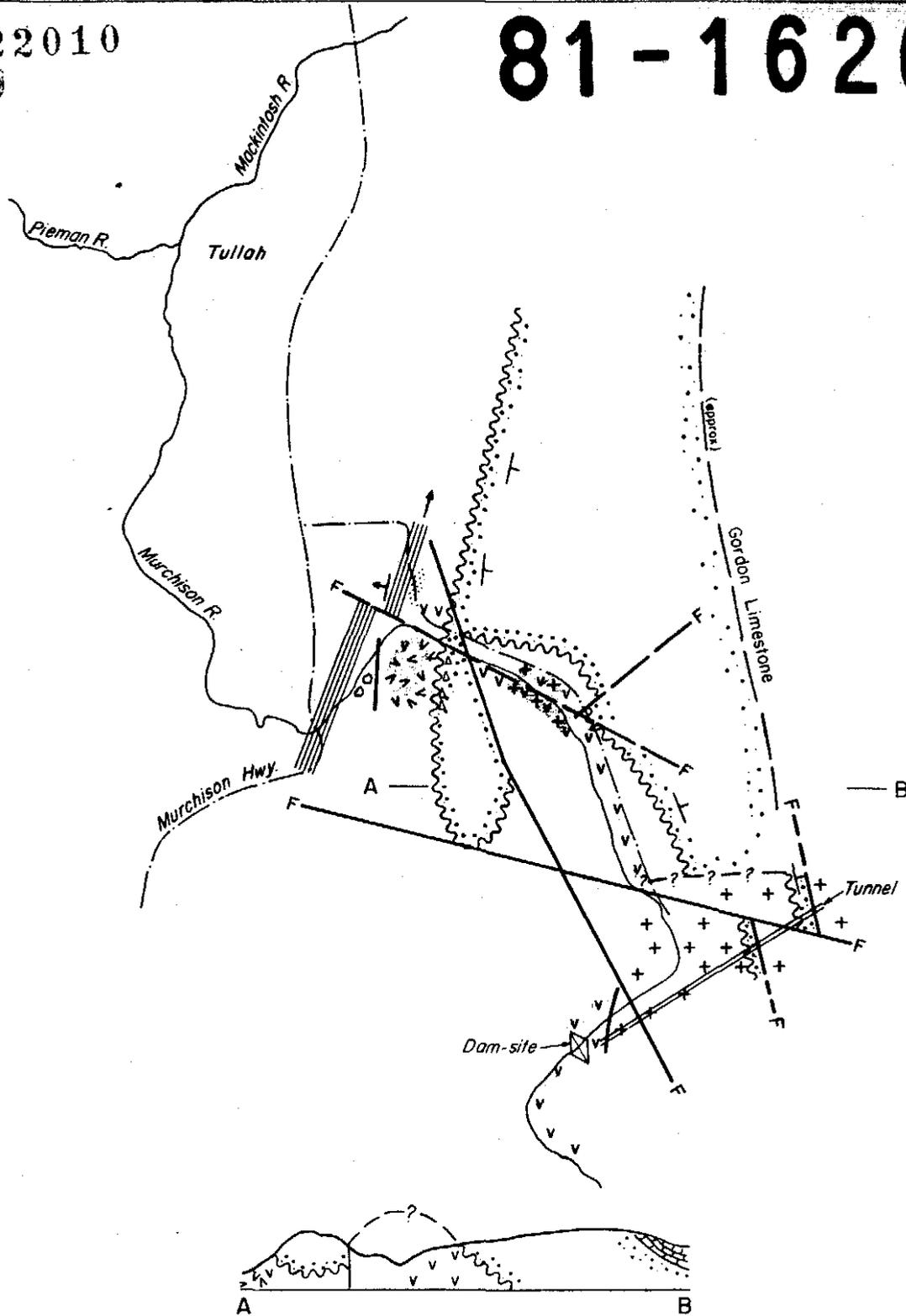
The Owen Conglomerate is thickest at its western limit, i.e. in Mt. Farrell. The steep western contact with the Mt. Read Volcanics was probably the active margin of a subsiding basin in which the conglomerate and underlying volcanoclastic breccia were deposited. Southeastward, however, the sedimentary facies at the unconformity over the volcanics changes. In the Sophia Tunnel, thinly bedded quartz sandstones lie immediately over the unconformity which is preserved as a thin sliver faulted down into the granite. There, deepening of the basin must have been relatively slow. Thus the Murchison Granite both high and low levels, was exposed prior to the deposition of the Owen Conglomerate, implying significant Cambrian deformation (here tilting to the north west) and erosion. North of the Murchison Gorge the Owen Conglomerate occupies the western limb of a large syncline, the axis of which plunges north and coincides with the Sophia valley. The syncline appears to bifurcate south of the Gorge, as shown in Fig. 3. The volcanics and granite exposed in the Gorge therefore form a north-plunging anticline. They are folded under the conglomerate at the western end of the Gorge, re-emerging as the Farrell Slates and underlying sericitised volcanics to the west.

The geology of the south bank of the Murchison differs from that of the north bank at the western end of the Gorge. The Farrell Slates are offset, and units of pink rhyolite and autobrecciated lava present to the south are absent to the north. This section of the gorge probably follows a fault downthrown to the north.

Geological observation appears consistent with a pile of volcanics and associated sediments intruded by granite and zoned in alteration, (sericitic at the top, magnetite-chloritic at the base around the main intrusion). Whether the Farrell mineralisation and the granite were related is tested in part by the level of intrusion relative to the Farrell Slates. The nearest

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Sketch Cross-Section

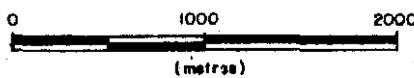
- Autobrecciated lava
- 'Darwin-type' pink rhyolite
- Pink-altered rhyolite, intruded by granite
- Chlorite-magnetite altered rhyolite
- Murchison granite
- Undifferentiated volcanics
- Farrell slates
- Owen conglomerate
- Volcaniclastic breccia
- Sericitic alteration

- Attitude of bedding, with facing.
- F** Fault

Notes - After field observations & air photo interpretation. (photo no. T679/61)



5 cm



<b>Getty</b>   AUSTRALASIA	
GETTY OIL DEVELOPMENT COMPANY LIMITED	
MT. LYELL MURCHISON GORGE	
<b>GEOLOGY</b>	
Author: C. Easton	Scale: 1:40000
Drawn: J. Lumadan	Date: July 1980
Revised:	<b>FIGURE NO. 3</b>

granite is now about 1 km west of the Slates; allowing for deformation and dips, the original depth below the Slates was probably 1-2 km. The bulk of the granite is 2-3 km (originally 3-4?) below the Slates. The highest intrusions are unexpectedly shallow, but may not be too shallow for a terrain of calc-alkaline volcanism. If these drove the subsurface convection which mineralised the Slates, the convection cells must have been shallow and therefore unlikely to form large deposits in this area.

*unless granite was re-introduced at a late stage, possibly subsequent to main mineralisation phase.*

Rosebery to Mt. Read

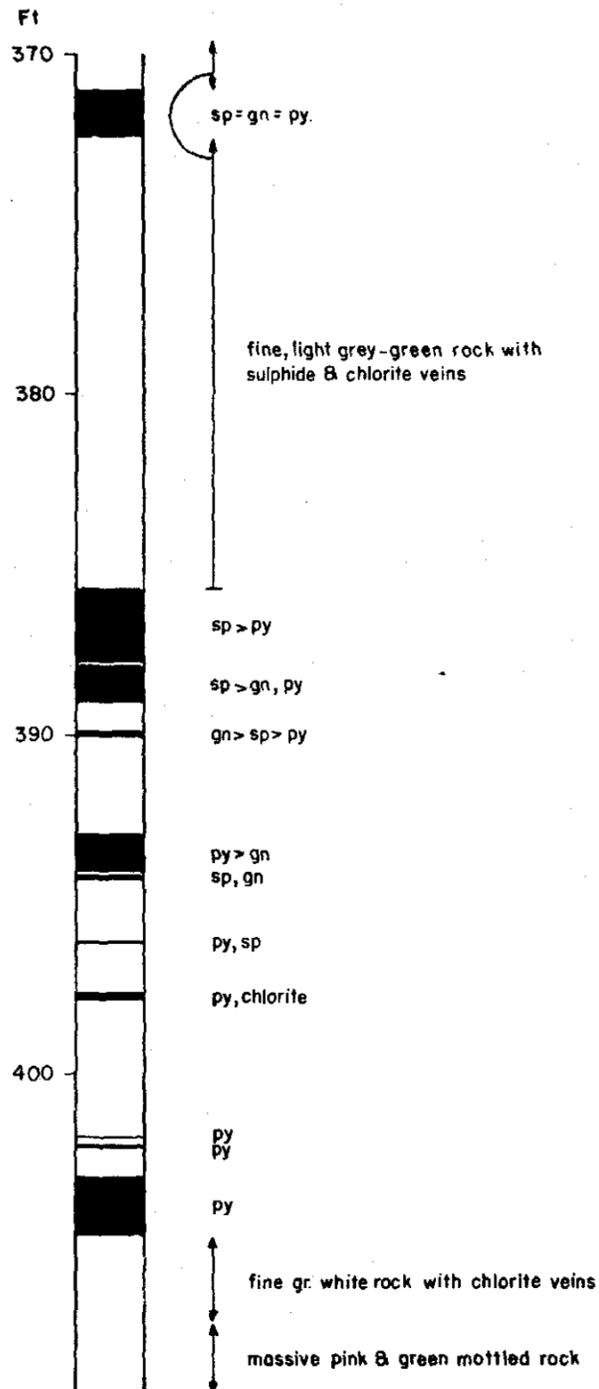
The relationship of the Rosebery, Hercules and smaller massive sulphide deposits (Koonya, Grand Centre, Jupiter Pb-Zn, Jupiter Cu, and Ring PA) of the intervening area has not been resolved beyond doubt to date. The area includes both relatively fresh and extremely altered volcanic rocks in close and apparently complex relationship with the sulphide deposits. The geology of the area has been re-examined as part of the alteration orientation programme.

Several lenses of sediment, mainly shales and tuffaceous sandstones, some enriched in Pb and Zn, have been located during exploration of the area, and the various geological maps which have been produced tend to link these into continuous horizons flanking Bald Hill. On the assumption of a single mineralised horizon, the position of Koonya-Grand Centre on the Bald Hill ridge is a problem. As extra evidence, facings have been sought wherever possible from the sediments and the following data has been obtained :

- i) The shale in the road cutting between Rosebery and Primrose faces west, based on small scours and clasts of dark slate in lighter sericitic schist immediately to the west of the westernmost unit, a black slate. This confirms previous observation and deduction, and is to be compared with the east facing of the Rosebery host rock.
- ii) The sediments at Rosebery Lodes face east at their eastern margin. Black slate clasts are found in the overlying Massive Pyroclastics.
- iii) The sedimentary lens in a cutting of the Mt Read Road, immediately north of the Koonya track, faces north-east, based on a clast of white sericitic shale within a sandstone (possible graded) which overlies a bed of the same white, sericitic shale. There is also a lava flow-base on to shale, giving the same facing.  
The Koonya massive sulphide horizon is close, and may be continuous with the sediments. The one intersection in DDH KP 196 is shown in Fig. 4; the progression from pyrite rich to sphalerite rich massive ore corroborates the sedimentary facing, although disseminated pyrite is distributed far into the hangingwall.
- iv) The Dallwitz shale lenses. Two lenses are exposed in the Dallwitz drilling track. At its eastern contact, the eastern lens has laminations contorted and truncated by lava which flowed over it,

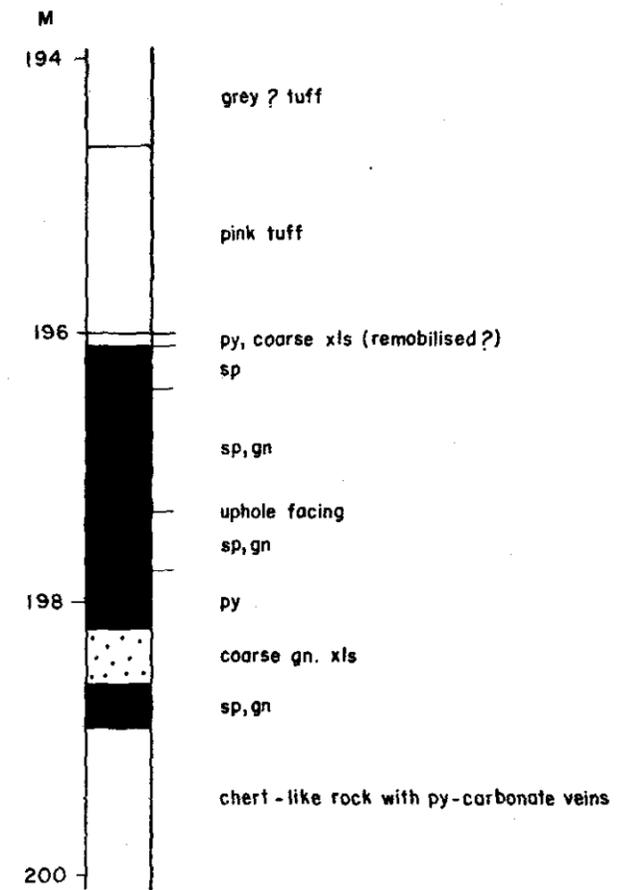
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KP 196



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RL5



Note:- Drill cores showing progression from pyrite to sphalerite rock as evidence of facing.

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 GETTY OIL DEVELOPMENT COMPANY LIMITED  
 MT. LYELL  
**KOONYA & ROSEBERY SECTIONS**  
 Author: C. Enstos  
 Drawn: J. Lumsden  
 Revised:  
 Scale: as shown  
 Date: July 1980  
**FIGURE No. 4**  
 FILE No. 4400/82

013 indicating an east facing. Truncated bedding within the lens confirms the facing. The western lens is scoured at its contact with tuff to the west, indicating a west facing. The granophyre sheet between the lenses probably intrudes the hinge zone of the implied fold. A third shale exposure occurs beside the Mt Read Road 300m south of the Dallwitz track. The slates are scoured at their eastern contact with an ash-flow which contains large shale clasts, and therefore face east.

- v) The road to the Hercules mine intersects the Ring PA deposit 300m east of Williamsford. The zonation of the deposit - dark sphalerite (?) - bearing, pyrite banded chert bounded sharply by tuff to the east and succeeded westward by bedded pyrite lenses and heavily fractured and altered rock bearing pyrite stringers - indicates an east facing.
- vi) At Hercules, in spite of structural complexities, the relative disposition of sediments and ore and a very prominent alteration zone (including a chloritic pipe beneath the quartz-sericite zone) indicate an east facing.
- vii) Drillcore from the South Dallwitz shale lens has yielded several west facings (J. Mill, pers. comm).
- viii) Drillcore and road exposure of the shales and breccias (slump deposits ?) associated with the Jupiter Pb-Zn deposit gave no satisfactory facings.

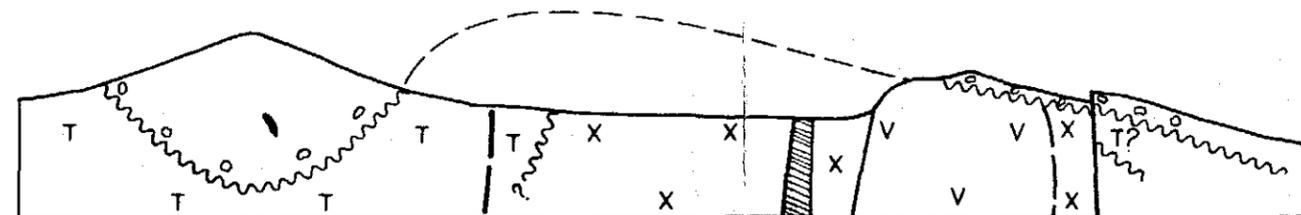
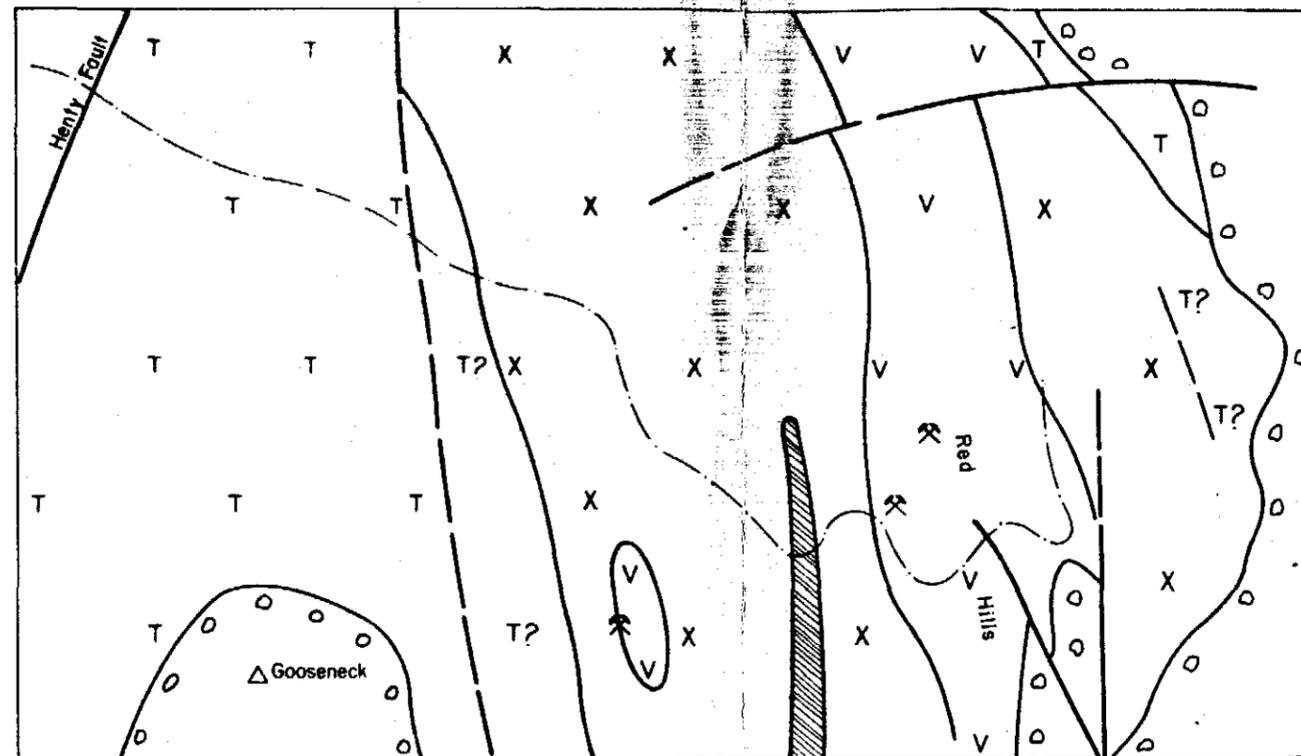
On aerial photographs, a continuous linear feature is traceable north from the Ring PA to the Jupiter Cu workings (a massive pyrite lens) and possibly beyond. West of this feature, the volcanics are altered to a quartz-sericite assemblage. To the east, relatively fresh ash-flows succeed the altered rocks. Note that sericitic/argillic alteration apparently persists some distance east of this east facing mineralised horizon. This can be seen in the track between Williamsford and Dallwitz, where the mineralised horizon is represented by an argillised, iron-stained zone. Rosebery deposit similarly faces east, but the corresponding change in alteration style is abrupt. There may have been a depositional hiatus at Rosebery, marked by partial removal of the black slate. Other such transitions from quartz-sericite schist to relatively fresh pyroclastics are present in the bulldozer scraping between Rosebery Lodes and Koonya and to the north of Jupiter Creek, between the Jupiter Pb-Zn workings and the Mt Read Road. It may be possible to interpret both of these as being at least close to the mineralised horizon, without sediments, and facing towards the relatively

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unaltered pyroclastics. Adding this consideration to the facings, the interpretation in Fig. 5 is offered.

Discussion:

- i) The folding is extremely tight where quartz-sericite rocks are occupying the fold cores, but appears to be more open where massive ash-flow tuffs are involved, as between Williamsford and Dallwitz. This is consistent with the expected mechanical properties of the rocks.
- ii) The folding becomes more complex the further south one proceeds from Rosebery. East of Hercules there may be several repetitions of the mineralised horizon, and there is added complexity due to a set of major NW-SE fractures visible on aerial photographs.
- iii) The South Dallwitz sediments cannot be related to the Dallwitz shales with certainty because of one of these fractures. Certainly, the east facing at the eastern margin of the Dallwitz lenses and the west at South Dallwitz are incompatible for a continuous horizon. East of the South Dallwitz lens, west dips continue down the eastern spur of Mt Read.
- iv) A west facing is attributed to Jupiter Pb-Zn on the basis of the west facing in the Primrose shale lens. Several other occurrences of shale have been reported by E.Z. geologists within the Mt Read Volcanics between Primrose and Jupiter, near the faulted boundary with the Rosebery Group. These appear to be part of a continuous horizon. The boundary between fresh ash-flow tuff and quartz-sericite schist north of Jupiter Creek has not been mapped precisely, but (within its known limits) must be close to continuous with the similar boundary south of the creek. Thus the two Jupiter deposits would lie on opposite limbs of a tight fold; no fault along the creek need be involved to separate two originally associated deposits. North of Jupiter Creek, the east-facing boundary is inferred to continue in the general direction of Koonya, interrupted only by a prominently outcropping, apparently fault-bounded block at the crest of the ridge. The east facing at Koonya is compatible.
- v) The Ring PA horizon cannot be traced with certainty to Hercules, with which it would be compatible in dip and facing. Sericitic highly altered volcanics crop out along the Hercules road except on the first sharp bend above Ring PA where relatively fresh pyroclastic rock is preserved. The mineralised horizon may



Sketch Cross-Section along southern edge of map

- Owen conglomerate
- Tyndall group lavas & pyroclastics (quartz - feldspar phyric)
- Pyroclastics (predominantly feldspar - phyric)
- Rhyolite
- Shale
- Track
- Fault
- Geological boundary

5 cm



Notes:- After Mt. Lyell geologists & K. Corbett.

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<b>Getty</b>   AUSTRALASIA	
GETTY OIL DEVELOPMENT COMPANY LIMITED	
MT. LYELL RED HILLS AREA	
<b>GEOLOGY</b>	
Author: C. Foster	Scale: 1:15840
Drawn: J. Lumsden	Date: July 1980
Revised:	FIGURE NO. 5
FILE NO. 4400/24	

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- therefore largely follow the road, with some displacement due to folding or faulting (which cannot be seen on aerial photographs). Alternatively, two mineralised horizons must be postulated.
- vi) The small anticline in the sediments at Dallwitz is probably repeated south along the Mt Read road due to fault displacement. No continuation of the sedimentary lens in the road cutting is found further north, and the lens is succeeded eastward (at the northern end of the cutting) by a flow banded lava similar to those overlying the easternmost sediments in the Dallwitz track. The western limb of the anticline in the area may be represented by the boundary between grey-green sericitic tuff and pink ash-flow tuff about 160m west of the Mt Read Road.
  - vii) A continuous horizon between the Rosebery Lodes and Dallwitz sediments would be consistent with facings, but has not been traced in outcrop.
  - viii) The east facings at Rosebery Lodes and Koonya imply either two mineralisation events or tight folding and a west facing repetition of the horizon between the two. Folding is preferred as an explanation of the intervening alteration boundary, as described above. Otherwise, it is difficult to account for the persistence of relatively fresh ash-flow tuffs in sharp contact with and below the altered rocks beneath the Rosebery Lodes mineralised horizon. The apparent strikes (visible in aerial photographs) of ash-flow tuffs near the sharp bend in the Mt Read Road below Koonya suggest a fold closure in the area.
  - ix) The relationship of Grand Centre and Koonya and the broad zone of sericitic alteration around these deposits are difficult to understand because glacial deposits cover all but track outcrop in the vicinity. "Ash-flow tuffs" logged near the collar of DDH KP196 do not appear to be true ash-flow tuffs to this investigator. The upper Grand Centre mineralisation consists largely of discrete pyrite cubes in a chlorite-sericite matrix, and may be syngenetic. The strike of the Koonya gossan precludes continuity between Grand Centre and the east dipping, east facing Koonya horizon. It is suggested without any other corroboration, that Grand Centre may lie on a west facing limb continuous with the change of alteration types just north of Koonya.

- x) Continuity between the Rosebery and Rosebery Lodes sedimentary lenses is likely on grounds of lithological similarity and facing.
- xi) The Salisbury and Chamberlain deposits on the western side of Bald Hill are tourmaline-bearing vein deposits, of probably Devonian age and not relevant to these considerations.

#### Conclusions:

Facings and alteration patterns detected to date imply tight folding and several repetitions in the area, for a single mineralised horizon, the number of repetitions increasing southward. It does not seem necessary on the evidence accrued to postulate more than one mineralising horizon, with the possible exception of the difficulty in relating Ring PA to Hercules.

Other repetitions of the mineralised horizon may be present: the easternmost known occurrences at Dallwitz and South Dallwitz face in opposite directions, so that east of one or the other the horizon should be repeated. On this depends the classification of the volcanics from there east as footwall or hangingwall rocks.

In so far as concerns the alteration study, the contrast between hangingwall and footwall rocks near known mineralisation is encouraging. It remains to be seen whether similar or analogous differences apply away from such highly mineralised areas. The observed continuation of sericitic alteration into the hangingwall suggests that alteration may not be able to locate precisely a mineralised horizon - rather, it may define a favourable band of rock for mineralisation.

#### Further Work:

A traverse east of Hercules and a re-examination of the eastern spur of Mt Read may yield further useful facings, as may a black shale in a cutting on the Williamsford Road near the Murchison Highway. Other sedimentary lenses: north of Rosebery, at the old Mt Black Pty. workings and south of Hercules, remain to be investigated.

## Red Hills

This area was included in the orientation study because Mt Darwin-type footwall mineralisation and alteration, a minor lens of sediment associated with massive sphalerite-galena-pyrite and overlying pyroclastics could all be sampled. The geology (Fig. 6) is well established (Mt Lyell exploration reports, 1975-6 and 1976-7). In summary, Owen Conglomerate and Tyndall Group lava and tuff unconformably overlie a group of pyroclastics, sediments and lavas which crop out on and around The Red Hills. The Red Hills themselves consist of pink to greenish altered rhyolite containing veins of magnetite-chlorite-pyrite + chalcopyrite with associated chloritic alteration. A sequence of pyroclastics, shale and black slate with massive and disseminated sulphide overlies the rhyolite conformably. The sediments face west on the evidence of truncated bedding in diamond drill core. The rocks overlying the sediments are mainly coarse-grained pyroclastics, but they include a body of massive to flow-banded, relatively unaltered rhyolite veined in one place by quartz, siderite, minor galena and pyrite - a unique mineralisation style in the area. Tyndall Group lava is also sparingly mineralised; a shaft near the road just north of the Gooseneck prospected a quartz vein with minor chalcopyrite.

All of the volcanic rocks, including the Tyndall Group, were sampled along the road. Samples were also taken from most of the sulphide occurrences in the rhyolites. It was noted that the amount of chlorite in the Red Hills rhyolite diminished south of the main prospects, and that sericitic alteration immediately underlies the sediments exposed in the track. Hanging-wall rocks also appear to have undergone some chlorite-sericite alteration, but to a lesser extent than footwall rocks.

The DDH massive sulphide intersection (RH5) is close to one of the larger footwall-type vein chalcopyrite prospects. No massive sulphide ore has been found in rocks overlying the other larger prospect, where mineralisation and alteration are, however, more intense. The zonation of the massive sulphide intersection in RH5 is given in Fig. 4.

Lakes Dora, Spicer, Selina

The belt of Mt Read Volcanics in this area is a linear zone oriented along-strike, so that it is not possible to take across-strike sections like those studied elsewhere. Samples of the various types of mineralisation and alteration have been taken along the whole zone for comparison with other parts of the Volcanics.

The Lake Selina and Lake Dora-Walford Peak mineralisations occur in different rock types. The intervening area, around Lake Rolleston, is obscured by till so that the relationship of the two areas cannot be investigated.

The Lake Dora mineralisation (pyrite-chalcopyrite with intense and widespread chloritic alteration) occurs in sheared quartz-phyllsilicate rocks which show much coarse-grained, angular quartz on weathered surfaces. Some contain too high a proportion of quartz to be quartz-phyric volcanics, and may be volcanoclastic sandstones. They are interbedded with very coarse grained volcanoclastic conglomerates which become more predominant towards Lake Spicer. Quartz-phyric lava occurs east of Lake Dora. In the Mount Read Volcanics south of Queenstown, mineralisation of this type does not occur in rocks of this nature. At Jukes Pty, such rocks unconformably overlie rhyolites with chalcopyrite-chlorite-pyrite-Fe oxide mineralisation. Thus there is the possibility of a phase of mineralisation unrelated to massive sulphide mineralisation elsewhere in the Mt Read Volcanics.

The Lake Selina mineralisation consists of abundant pyrite as veins and disseminations in sericitised or chloritised volcanics. Certain coarse grained intrusive rocks to the east of the mineralised zone have been correlated with the Murchison granite to the north. The unit at the base of DDH LS5 is not a granitoid in texture, but may be a post-mineralisation quartz-hornblende porphyry, perhaps associated with Tyndall Group vulcanism. The outcrop in costeans near lines 40N and 48N may include some sheared, very altered granitoid.

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Jukes-Darwin Area

The belt of altered rhyolites between South Darwin Peak and the King River Gorge are host, with the Darwin Granite, to vein mineralisation of the following types: pyrite-chalcopyrite-chlorite + iron oxides, iron oxide-chlorite, barite; to massive iron oxide + sulphides; and to hematite-barite mineralisation which probably represents ancient gossan. All of these were sampled for a study of S-isotopes and chlorite compositions. By analogy with Red Hills, associated massive sulphide mineralisation might occur in pyroclastic rocks flanking the rhyolites either to the east or to the west. Two sections, along the tracks to South Darwin Plateau and East Darwin, have been sampled for the alteration study. Sericitic alteration with veins and disseminations of chalcopyrite and pyrite at East Darwin may be footwall type alteration, but no massive sulphide lenses have been located in the area. A zone of sericitic alteration has been located east of (or possibly in the sheared eastern margin of) the Darwin Granite. A swarm of disrupted and deformed barite veins occurs within the zone.

Howard's Anomaly

DDH HA4 has been examined and sampled for petrographic, isotopic and possibly micro-palaeontological study. The DDH intersection consists largely of altered tuffs, mixed and interbedded with a variety of chemical sediments including massive galena-sphalerite-pyrite, limestone, hematitic chert, pyrite, hematite, magnetite and barite. All are present in minor quantities except the limestone. The massive sulphide lens underlies the other chemical sediments and probably slumped into its present position. The whole unit faces east (two indications) and may be in the same stratigraphic and structural position as the Henty Fault Zone massive sulphide occurrence further north

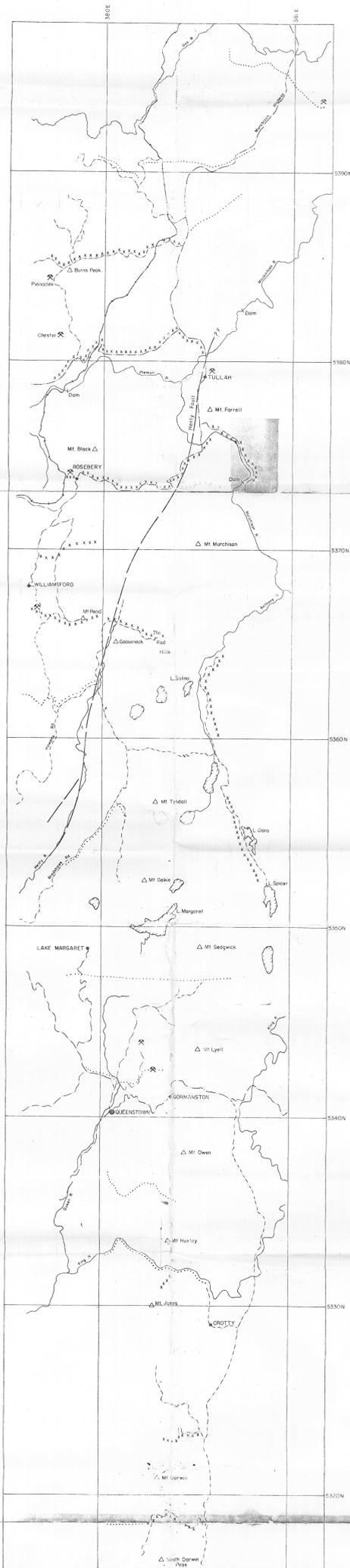
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3.0 CONCLUDING OBSERVATIONS

It has been useful to begin this investigation with the hypothesis of a single event responsible for massive sulphide formation in the Mount Read Volcanics. It would appear difficult to prove such a hypothesis, whether for the entire region or only for certain areas of it, given the difficulty of establishing a stratigraphy within the volcanics. At best, one can establish whether the geological evidence is consistent with a single mineralising event, as has been attempted in the Rosebery-Mt. Read area. Already, it appears that the Lake Dora mineralisation may be of a different generation.

At present, there seems to be no way of correlating either rock units or mineralisation events across the Henty Fault (see Fig. 1). The fault is a major discontinuity within the Cambrian and Ordovician rocks of the area. For example, the Owen Conglomerate and the underlying volcanic breccias, tuffs and lavas of the Tyndall Group crop out only to the east and south of the fault; so do the altered rhyolites like those on Mt Darwin and at Red Hills, and granites. (A sediment apparently composed of immature granitic detritus has recently been reported in DDH at North Pinnacles, northwest of the fault, however. Styles of mineralisation and associated alteration may also differ across the fault, but more work is required to show whether this is truly so. Footwall alteration and mineralisation appear to predominate in outcrop south and east of the fault, and hangingwall rocks north and west. The difference is probably one of structural evolution, but it could imply that different episodes of mineralisation are exposed on each side of the Henty Fault.

CHRIS EASTOE  
Geologist



81-1626

GEOLOGICAL



LEGEND

- Geological boundary Observed
- Geological boundary Inferred
- Outcrop Same or Red
- Strike, dip of bedding, measured
- Strike, dip of bedding, estimated
- Anticline Overturned
- Spine Overturned
- Plunge of minor fold
- Uncertainty
- Fault
- Shear zone
- Strike, dip of joint
- Striation
- cleavage
- Geon
- Major mineral occurrence
- Min. prospect
- Geon
- Section location
- Demanded drill hole
- Percussion drill hole

TOPOGRAPHICAL

- Trig station, elevation m
- 2WD road
- 4WD road
- Track
- Fence
- Homestead
- Stream
- Railway
- Dam
- Bore
- Lake

GEOCHEMICAL

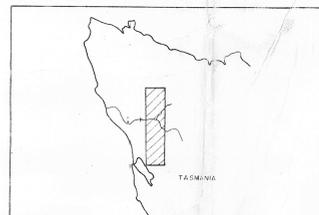
- Traverses sampled
- Traverses recommended for future work

Notes - All Land Dept 1:50,000 maps, sheets 8013, 8014

SCALE



KEY MAP

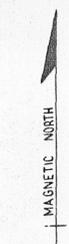
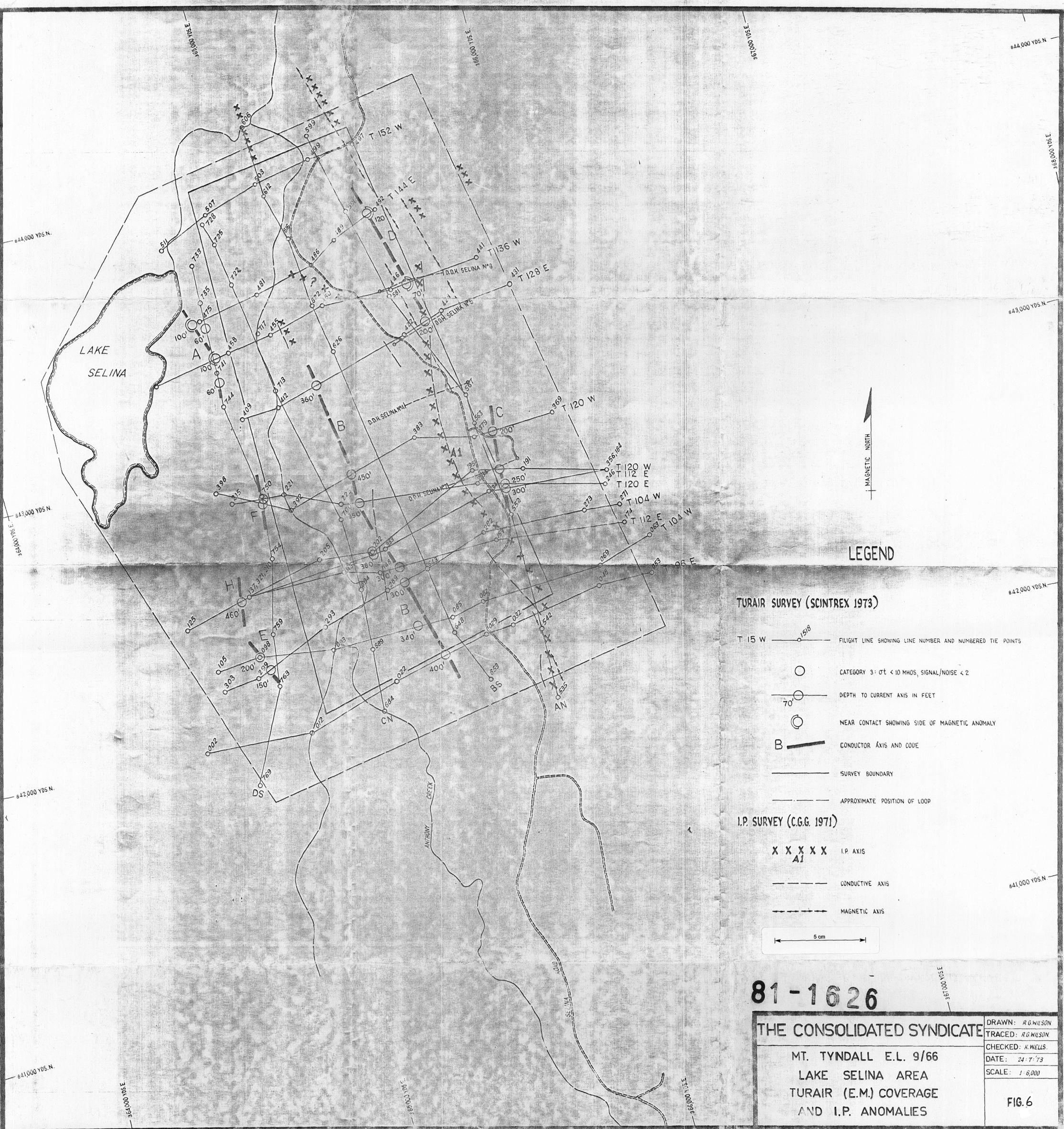


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 GETTY OIL DEVELOPMENT COMPANY LIMITED  
 MT LYELL  
 TRAVERSES  
 ACROSS MT READ VOLCANICS

Author: C Espino	Scale: 1:50,000
Drawn: J. Gardner	Date: July 2000
Revised:	File No: 4400/20
	Fig No: 1

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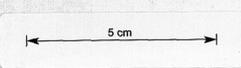
**LEGEND**

**TURAIR SURVEY (SCINTREX 1973)**

- T 15 W — 1518 — FLIGHT LINE SHOWING LINE NUMBER AND NUMBERED THE POINTS
- CATEGORY 3:  $\sigma T < 10$  MHOS, SIGNAL/NOISE  $< 2$
- 70' — DEPTH TO CURRENT AXIS IN FEET
- — NEAR CONTACT SHOWING SIDE OF MAGNETIC ANOMALY
- B — CONDUCTOR AXIS AND CODE
- SURVEY BOUNDARY
- - - - - APPROXIMATE POSITION OF LOOP

**I.P. SURVEY (C.G.G. 1971)**

- X X X X X A1 — I.P. AXIS
- - - - - CONDUCTIVE AXIS
- - - - - MAGNETIC AXIS



**81-1626**

**THE CONSOLIDATED SYNDICATE**

MT. TYNDALL E.L. 9/66  
 LAKE SELINA AREA  
 TURAIR (E.M.) COVERAGE  
 AND I.P. ANOMALIES

DRAWN: R.G. WILSON  
 TRACED: R.G. WILSON  
 CHECKED: K. WELLS  
 DATE: 24-7-73  
 SCALE: 1-6,000

**FIG. 6**

ANG COORDINATES