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CRA EXPLORATION PTY. LIMITED
ACN 000 057 125

MOUNT FRANKLAND EL 18/92
REPORT ON EXPLORATION FOR THE FIRST YEAR OF TENURE
6/11/92 TO 5/10/93

93-3511.
Lorinna Dam Top Hold

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1. SUMMARY

CRA Exploration Pty. Limited (CRAE) is exploring Mount Frankland EL 18/92 for sediment hosted Cu deposits in a range of lithological and structural settings. Numerous small vein-hosted Cu workings along a 30 km NNW trend centred on Balfour indicated that Cu mineralising processes were active in the area, hence there may be some potential for larger Cu bodies of interest to CRAE.

Two Cu targets are under consideration, stratiform replacement of the Balfour pyrrhotitic siltstone, and large irregular, stratabound silica-dolomite bodies on the Balfour Cu trend.

The Balfour pyrrhotitic siltstone is regarded as being prospective for Cu deposits analogous to major stratiform sedimentary Cu deposits such as the Kupfershiefer, White Pine etc. In these deposits, Cu mineralisation is generally localised within a sedimentary "chemical trap" such as a sulphidic, carbonaceous or evaporitic unit, that overlies a porous arenaceous unit. Copper-rich fluids migrating through the arenites or via faults are constrained by overlying less-permeable horizons and react with the chemical trap to produce Cu sulphide-rich beds.

The magnetic Balfour pyrrhotitic siltstone sits at the boundary between the Lagoon River Quartzite and locally carbonaceous Interview Siltstone. The conceptual model being considered is that Cu-rich hydrothermal fluids migrating through the Lagoon River Quartzite or via major faults have replaced Fe in the pyrrhotitic siltstone to form a Cu sulphide horizon. Replacement of the pyrrhotite will cause the magnetic response to be destroyed.

In addition, small discordant quartz-dolomite veins along the Balfour trend may, in favourable structural locations, develop into large silica-dolomite (-Cu) bodies similar to the irregular but broadly stratabound Mount Isa Cu orebody.

Aeromagnetic surveys indicate several major structures, probably active over a long period, intersect the Balfour pyrrhotitic siltstone, and may provide increased fluid access to this unit. Some of these structural-stratigraphic intersections show destruction or weakening of magnetic response, possibly suggestive of sulphide replacement. Each of these areas requires investigation.

Additional work in this regard should be firstly directed at The Gap prospect, where the Balfour Pyrrhotite Siltstone is displaced 1 km on an E-W sinistral fault. Initial soil sampling programs probably did not extend far enough W to cover the pyrrhotitic siltstone. Weakly elevated Cu values at the SW end of soil traverses may be a vector to higher values further W.

2. INTRODUCTION

Mount Frankland EL 18/92 was granted to CRA Exploration Pty. Limited (CRAE) on 6th November 1992. The EL covers 177 km^2 located at Balfour, in the NW of Tasmania (Plan Tv 451). During the first two years of tenure, CRAE has a statutory obligation to expend $70800.

CRAE's principal commodity of interest in the area is Cu. Regional studies of Cu potential in Proterozoic sequences Australia-wide by CRAE drew attention to NW Tasmania as being prospective for stratiform/stratabound Cu mineralisation in a variety of lithological and structural settings within the Rocky Cape Group and the Smithton Trough. Numerous small vein-hosted Cu workings along a 30 km NNW trend centred on Balfour indicated that Cu mineralising processes were active in the area, hence there may be some potential for larger Cu bodies of interest to CRAE. Tenement was subsequently applied for and was granted.

Work completed during the first year of tenure included open-file data review, geological mapping, soil and rockchip geochemistry, and ground and airborne magnetometer surveys. This report details all exploration activities conducted within EL 18/92 by CRAE during 1992/93.

3. CONCLUSIONS

Exploration activities during the first year of tenure have generally been of a reconnaissance nature. Insufficient work has been completed to confirm or dismiss the validity of the conceptual model that Cu-rich hydrothermal fluids migrating through the Lagoon River Quartzite or major structures have replaced Fe in the Balfour pyrrhotitic siltstone to form a Cu sulphide horizon.

The detailed aeromagnetic survey indicates several major structures, probably active over a long period, intersect the Balfour pyrrhotitic siltstone, and may provide increased fluid access to this unit. Some of these structural-stratigraphic intersections show destruction or weakening of magnetic response, possibly suggestive of sulphide replacement. Each of these areas requires investigation.

Additional work in this regard should be firstly directed at The Gap, where the pyrrhotitic siltstone unit probably was not covered by the initial soil and mapping programs. Weakly elevated Cu values at the SW end of soil traverses may be a vector to higher values further W?

The chloritic siltstone has been shown to be a regionally extensive unit, and is not related to chlorite alteration of a carbonaceous, sulphidic horizon.

In addition the small discordant quartz-dolomite veins may, in favourable structural locations, develop into large silica-dolomite (-Cu) bodies similar to the irregular but broadly stratabound Mount Isa Cu orebody. Very weak magnetic responses from line of lode extending from The Clump to the S show this discordant mineralisation post-dates movement on the Roger River Fault and Balfour Transform. The general vicinity of The Clump and Murray's Reward are prime targets, however they fall outside EL 18/92.

Review of existing stream sediment data suggests this technique may not be effective in the EL area, due to problems of leaching, quartz lag cover, and weakly incised drainage. C-horizon soil sampling, where the lag can be penetrated, is effective and should be the main reconnaissance geochemical tool.

4. RECOMMENDATIONS

Investigations at The Gap prospect should be extended further to the W. Additional soil rockchip sampling should be completed at 100m x 25m spacing between 323500E and 324500E for approximately 500m N of the fault. Gradient array IP surveys may help identify any near-surface sulphide zones.

Other targets identified as a result of the airborne magnetic survey will require follow-up by mapping, ground magnetic traverses and soil/rockchip geochemistry. Priority should be given to areas where structural-stratigraphic intersections show destruction or weakening of magnetic response of the Balfour pyrrhotitic siltstone, possibly suggestive of sulphide replacement.

More regionally it is necessary to accurately locate the Balfour Pyrrhotite Siltstone at several points within the tenement to be able to characterise its geochemical signature and detailed stratigraphic relationships.

5. REGIONAL GEOLOGY

There are no recent detailed published descriptions of the regional geology of the Balfour area. The regional framework is summarised in Turner (1989).

The Rocky Cape Association forms basement in NW Tasmania. To the E of the Smithton Trough four units are recognised; Cowrie Siltstone (lowermost), Detention Quartzite, Irby Siltstone and Jacob Quartzite, which together are formally known as the Rocky Cape Group. To the W and S of the Smithton Trough the Proterozoic succession is less well defined. From base to top the stratigraphy is; Pedder River Siltstone, Lagoon River Quartzite, Interview Siltstone (includes Balfour Slates), and an upper unnamed quartzite unit. At the present level of understanding it is not possible to correlate these units across the Balfour Transform and Smithton Trough to the Rocky Cape Group.

Pedder River Siltstone (unknown thickness) is a distinctive unit of dominantly dark grey, poorly bedded siltstone in which slump and scour and fill structures are prominent. Pyritic and graphitic siltstones which are reflected in EM surveys have been recorded within the sequence at several localities. Interbedded sandstones and siltstones with minor conglomerate are found at the upper transition to the Lagoon River Quartzite. Adjacent to the Interview Granite a hornfels lens has been recognised at this transition which has associated rhyolitic rocks. The Pedder River Siltstone has a characteristically quiet magnetic expression in the mapped sections.

Lagoon River Quartzite (unknown thickness) is a distinctive white, generally massive, recrystallised, but in part cross bedded and well sorted, quartz sandstone to quartzite, with rare shale interbeds. From Temma N mudstones are recorded within the predominantly quartzite sequence, particularly near the W coast. This may represent a lateral interdigitation of the Pedder River Siltstones and the Lagoon River Quartzite as the former is not recognised in the area. Between the Arthur River mouth and Cape Grim the outcropping Rocky Cape Group is predominantly a quartz arenite, although there are a few relatively thick (>125m) intercalated mudstone and siltstone bands and some conglomerates. While the bulk of the Lagoon River Quartzite has a noisy magnetic expression, the upper section has a characteristic quiet magnetic signature. Structural analysis indicates that the bulk of this unit is located on the eastern limb of an anticlinorium whose axis is just to the west of the coastline, with the main area of the Pedder River Siltstone possibly being in its core.

Interview Siltstone (unknown thickness) is a light to medium grey, finely laminated chloritic siltstone and mudstone with relatively thin interbedded quartzite bands. The basal sections of the Interview Siltstone appear to lens to the north into the upper Lagoon River Quartzite. A pronounced magnetic band is apparent at the transition from the Lagoon River Quartzite. This band is known to represent up to 5% disseminated pyrrhotite or magnetite within grey shales and lesser interbedded quartzites. Sections of the lower Interview Siltstone above this magnetic band comprise black carbonaceous (to graphitic) and pyritic siltstone and shale, particularly from the Arthur River to around 10 km SSE of Balfour. A similar magnetic unit is indicated at the top of the Interview Siltstone. Apart from the pyritic/graphitic band described above there is a marked lack of regional EM conductors in contrast to the Cowrie Siltstone where they are shown by field inspection to be graphitic and/or pyritic units.

In the southern section of this domain the main Interview Siltstone is overlain by more micaceous quartz sandstone to quartzite and crossbedded quartz arenites with interbedded siltstone as mapped on the Corinna and Pieman Heads 1:50 000 sheets (between 41 45' and 41 30'S).

In the late Precambrian, around 700Ma, shallow basins were forming in the stretched intracratonic area between the Rocky Cape and Tyennan Regions and within the Rocky Cape region itself. Coarse clastic sediments (conglomerates and sandstones) of the Forest Conglomerate, Donaldson Fm and base of the Timbs Gp were deposited. In the Smithton area, the Forest Conglomerate and quartzite is best observed where the Bass Hwy crosses the Black River. Here the basal angular unconformity with the Cowrie siltstone is exposed, and the overlying Black River Dolomite is visible. The Forest Conglomerate is preserved on the W side of the basin at Marrawah and to the S on Mount Frankland.

Turbidite sequences of interbedded sands and silts of upper Donaldson Fm, Timbs Gp (and Oonah Fm?) were laid down as the intracratonic basin deepened. The Smithton Trough was a shallow shelf environment at this time and so did not receive any of this phase of deeper basin sedimentation.

As the rift phase drew to a close, sag phase Black River Dolomite, Savage Dolomite, ?Timbs Gp magnesite horizons, and Success Creek Gp limestones were deposited. Black River Dolomite is extensively exposed on the E side of the Smithton Trough from Forest SSW to beyond the Arthur River. It is most commonly seen as a laminated chert, although it is unclear whether the chert is a primary sediment or recent silicification. Stratigraphic hole Forest No. 1 intersected 295m of Black River Dolomite comprised of carbonate and black mudstone units, locally pyritic (Brown, 1989a). Algal laminated units are present, indicating shallow water conditions. Within the EL a black laminated siltstone marks the boundary between the dolomite and overlying basalt and lithic wacke sequences.

Rift tholeiites and associated mafic-derived sediments of the Smithton Volcanics, Bernafai Volcanics, Timbs Gp and Crimson Creek Fm erupted over the now filled basins. On the Trowutta 1:50000 sheet, the Smithton Volcanics and associated sediments have been named the Kanunnah Sub-group, comprising the Keppel Creek Siltstone, essentially a mafic-derived lithic wacke, and Spinks Creek Basalt, a massive tholeiite (John Everard, pers. comm.). Within the Trowutta EL, the mafic lithic wacke is clearly exposed on the Roger River fault escarpment on the E side of the Roger River road. Basalt appears lesser in extent, although it is glassy, massive and resistant to weathering. Where exposed on the Gun road near the Trowutta Caves State Reserve, flecks of native Cu are common.

Airborne magnetic images clearly show the distribution of the Kanunnah Sub-group. It is important to note that the magnetic stratigraphy is absent from the W side of the Roger River fault, indicating this structure had a major control on the extent of early Cambrian sedimentation and volcanism.

Overlying the Kanunnah Sub-group is the Smithton Dolomite. This unit is a poorly exposed dolomitic limestone present in the drainages of the Duck and Montague Rivers. It is believed to be conformable with the Kanunnah Sub-group. It is proposed to formally name the stratigraphy from the Forest Conglomerate to the Smithton Dolomite the Togari Group (John Everard, pers. comm.).

During the early to middle Cambrian, a postulated arc-continent collision caused overthrusting of ultramafic-mafic rocks and related sediments, from a subduction complex whose location is unknown but may lie buried within the Dundas Trough. No ultramafics are known in the area of the Smithton Trough, although it is worth noting that significant alluvial chromite occurs near Britton's Swamp (Kosseris, 1988).

Post-collision extension tectonics then produced troughs into which the Dundas Gp sediments and Mount Read Volcanics were deposited. In the Smithton Trough, a middle to late Cambrian correlate of the Dundas Group, the Scopus Formation, overlies the Smithton Dolomite with probable disconformity (John Everard, pers. comm.). This formation is dominated by fossiliferous siltstones. The Scopus Formation forms the core of the presently preserved Smithton Trough and is best seen in the Christmas Hills area.

No units are preserved from between Cambrian and Tertiary times. Flat-lying Tertiary basalts and sediments and Quaternary deposits partially obscure the older geology.

6. MINERALISATION

Copper and Sn mineralisation are developed within Mount Frankland EL 18/92.

Extensive copper mineralisation is found in Rocky Cape Group sediments, particularly over a 25 km long interval from the Clump Mine to the N of Balfour to the Norfolk Ranges to the S. Virtually all of the known occurrences are present as transgressive veins developed within or parallel to the NW-SE trending 'Balfour Transform' series of faults. A number of other prospects have been located to the S in a similar stratigraphic position just to the E of the Interview Granite and higher in the sequence within quartzites and siltstone in the Toner River area (AMG coordinates 5 410 000mN, 335 000mE). Lesser copper, with or without lead, zinc and abundant arsenopyrite, has been encountered in association with transgressive magnetite lodes in the Temma area near the coast W of Balfour.

The tested mineralisation in the Balfour Belt largely comprises cross cutting quartz, dolomite and quartz-dolomite veins and vein systems developed within structures parallel to the 'Balfour Transform' direction. Cupriferous mineralisation consists essentially of chalcopyrite, with lesser amounts of 'secondary' copper sulphides, in a pyritic quartz-dolomite gangue. It is stated that ".. secondary sulphides, notably covellite and chalcocite have been observed at several prospects, but are rarely of economic importance."Chalcopyrite occurs as irregular and discontinuous blebs and stringers, commonly concentrated along incipient fractures, generally intimately associated with pyrite. Trace amounts of galena and sphalerite are associated with the cupriferous sulphides. Silver and gold values are negligible.

Surface leaching of dolomitic components and copper is strong, with little evidence of dolomite at the surface and only weak Cu values in costeans.

Much of the testing of the Balfour prospects has been directed at the transgressive vein systems, with only the visible mineralisation being assayed. Never the less a few drill holes have been assayed over substantial thicknesses returning intersections of the order of 30m @ 0.3% Cu.

Some of the better intersections obtained in the 37 diamond holes drilled by ACI include:

DDH14	84.43 - 105.61m	16.6m true	@ 0.95% Cu
DDH16	63.39 - 84.13m,	20.74m	@ 1.44% Cu,
including		8.1m	@ 2.49% Cu
DDH 17	30.48 - 37.64m,	7.16m	@ 0.95% Cu,
including	36.12 - 37.64m	1.52m	@ 3.46% Cu
DDH 23	56.99 - 60.81m	3.1m true	@ 2.1% Cu
DDH 33	118.11 - 124.35m	5.4m true	@ 1.31% Cu

ACI outlined approximately 0.5mt @ 0.8% Cu as a body with dimensions of 220 x 220 x 7m at Murrays Reward. This body strikes at 140 degrees and dips at 50 to 60 degrees to the SW. The enclosing sediments strike N-S and dip steeply E.

Despite the fact that virtually all of the lodes known and drilled are transgressive, they align well along the strike of the host sequence and are largely within the Carbonaceous Shale centred on the 'Balfour Transform'.

Tin mineralisation is found in the Rocky Cape Group in the Balfour area where it accompanies pyrrhotite bearing tourmalinitic siltstones and interbedded quartzites at the transition from the Lagoon River Quartzite to the Interview Siltstone. Only low grade mineralisation has been located, mainly as vein swarms within this unit at Specimen Hill.

7. PREVIOUS EXPLORATION

This summary of previous exploration activities within the Balfour area is not all inclusive and only lists the more significant efforts that have a bearing on the current evaluation, omitting those that have contributed no new information of note.

BHP drill tested the Specimen Hill Sn-W prospect with seven vertical diamond holes while *three angle holes into the Murrays Reward Prospect at Balfour were planned (no results are* available for the latter) in the early 1960's.

Pickands Mather & Co International geochemically sampled an extensive area of the Rocky Cape Group from 1965 onwards and drilled a number of strong magnetic anomalies, mainly discordant magnetite lodes in the sequence to the west of Balfour. All were thin (10 to 15m) with no significant base metals, although some thin low grade Pb, Ag, Zn and Cu mineralisation was encountered. Title was held as EL 12/65.

ACI Ltd exploration at Balfour during the period 1968 to 1974 where a series of Cu prospects, all of which were centred upon old workings, were tested by a total of 37 diamond drill holes in eight prospects over a strike length of 17 km. This did not represent an even coverage. Drilling on individual prospects comprised a single hole, or two or three holes testing a 100m strike length on most, with the longest coverage being of the order of 1 km at Murrays Reward. The targets were transgressive zones of veining. The result was the delineation of a resource of 0.5mt @ 0.8% Cu in a transgressive body at the Murrays Reward prospect. This work was within the larger EL 16/68.

Esso Australia Ltd flew a Catalina borne INPUT EM survey on 800m spaced lines over most of the Rocky Cape Group to the south of the Arthur River. A cursory helicopter based follow up of a wide selection of anomalies explained virtually all as being due to pyritic and/or graphitic shales. No drilling was undertaken. The tenement was EL 2/73.

CRA Exploration Pty Limited, later joined in joint venture by Geopeko Limited, undertook a regional panned concentrate sampling coverage of much of the Rocky Cape Group during 1977, the principal target being Sn. Follow up work was carried out, generally testing magnetic targets accompanied by geochemical responses. Eight diamond holes were drilled at Specimen Hill immediately to the west of Balfour and one at Mt Hazelton 10 km SSE of Balfour (there are no details of this hole in the CRAE report system). A further two diamond holes were drilled to test strong magnetic anomalies within the quartzites and mudstones near the coast to the west of Balfour (on the Little Eel and Possum Creek prospects, with the best intersection being 3m @ 2% Pb and 13 g/t Ag). Most of the other magnetic anomalies within the Rocky Cape Group were tested at surface, particularly those to the east of the Interview Granite, with no positive results. In the early 1980's attention was focussed on the base metal potential of the region, particularly Pb/Zn within the Cowrie Siltstone unit to the east of Balfour.

A number of geochemical anomalies in this area remain unexplained. The only other drill hole has been to test a coincident magnetic and EM response with weak base metal soil geochemistry at the Red Prospect near the Arthur River 25 km to the NNW of Balfour. The tenements involved were EI's 1/77, 1/79, 12/80, 36/80, 4/83 and 61/83.

8. EXPLORATION ACTIVITIES FOR THE PERIOD 19/9/92 TO 18/8/93

8.1 Exploration Philosophy

CRAE's principal commodity of interest in the Balfour area is Cu. Regional studies of Cu potential in Proterozoic sequences Australia-wide by CRAE drew attention to NW Tasmania as being prospective for stratiform/stratabound Cu mineralisation in a variety of lithological and structural settings within the Rocky Cape Group and the Smithton Trough.

Three general areas conceptually may be prospective for sediment-hosted Cu targets; the Balfour trend, Arthur Lineament, and Smithton Trough.

Within the Balfour trend, the pyrrhotitic siltstone is regarded as being prospective for Cu deposits analogous to major stratiform sedimentary Cu deposits such as the *Kupfershiefer, White Pine etc.* In these deposits, Cu mineralisation is generally localised within a sedimentary "chemical trap" such as a sulphidic, carbonaceous or evaporitic unit, that overlies a porous arenaceous unit. Copper-rich fluids migrating through the arenites are constrained by overlying less-permeable horizons and react with the chemical trap to produce Cu sulphide-rich beds. This mineralisation may be developed in small quantities over vast distances, such as in the Kupfershiefer, Zambian Cu belt or Belt Supergroup. Fluid focussing mechanisms such as basement highs or faults are needed to produce large ore-grade accumulations.

It is important to note that an obvious source for the Cu mineralisation may not necessarily be present. At White Pine, the Portage Lake lavas are considered a potential source, but in the Zambian Cu belt there are no known source rocks within the Lower Roan Group or underlying basement.

The Balfour pyrrhotitic siltstone sits at the boundary between the more porous sands of the Lagoon River Quartzite and the finer carbonaceous and chloritic silts of the Interview Siltstone. *This horizon is a prominent magnetic marker as it contains up to 5%* pyrrhotite. Copper mineralisation is developed parallel but adjacent to the pyrrhotitic siltstone over a strike length of 30 km as apparently discordant quartz-dolomite-sulphide veins. Two major structures active in the Cambrian cut the Balfour pyrrhotitic siltstone in the vicinity of Murray's Reward and The Clump; the Roger River Fault and the Balfour Transform.

The conceptual model being considered is that Cu-rich hydrothermal fluids migrating through the Lagoon River Quartzite or via these faults (or other major structures) have replaced Fe in the pyrrhotite siltstone to form a Cu sulphide horizon. Replacement of the pyrrhotite will cause the magnetic response to be destroyed, and Fe to be displaced forming a haematitic or chloritic alteration halo.

In addition the small discordant quartz-dolomite veins may, in favourable structural locations, develop into large silica-dolomite (-Cu) bodies similar to the irregular but broadly stratabound Mount Isa Cu orebody. Drilling by ACI at The Clump indicated quartz-dolomite mineralisation at this prospect may be conformable with the enclosing sediments.

8.2 Literature Review and Data Compilation

Key open-file and CRAE reports have been reviewed as part of the research into the Cu potential of NW Tasmania. This review is summarised in the relevant section above.

All available CRAE and competitor stream sediment geochemistry was reassessed. Copper values are not particularly anomalous, reflecting the high degree of leaching in the Rocky Cape region, combined with the overall low tenor of metal values within the Rocky Cape Association lithologies. Experience from world-wide sedimentary Cu deposits suggests these may have a subtle geochemical signature, so low stream results may not be indicative of barren ground.

8.3 Geological Mapping

The stratigraphy of the Balfour area is as follows, from the base upward.

Sandstone-shale sequence, >1500m thick - this is probably the equivalent of the Lagoon River Quartzite. It generally comprises quartz sandstone with ferruginous sandstone units and intercalated thin black carbonaceous laminated shale bands. The shales range from 1cm partings to 25m bands, averaging 3 to 8m. These shales comprise fine silt and clay size material and account for a substantial proportion of the sequence. The quartz sandstones comprise quartz grains from 0.2 to 1mm in diameter with diagenetic overgrowths of silica as well as both silica and carbonate cement, while the ferruginous varieties have silica, iron oxide and minor carbonate as cement. Current bedding, ripple marks and cross bedding are evident in the ferruginous bands, being more prevalent to the west, with an increasing incidence of graded bedding to the east. The contact between this and the overlying carbonaceous shale is transitional, represented by a decrease in the grain size of the sandstones and increase in the proportion of shale interbeds. Within the transition to the overlying shales there is a band of tourmaline rich siltstone and shale carrying up to 5% pyrrhotite. This is reflected in the airborne magnetics and appears to represent a regionally traceable marker horizon. This unit is termed the **Balfour Pyrrhotitic Siltstone.**

Carbonaceous Shale, approximately 800m thick - this unit is essentially identical to the shale interbeds within the sandstone-shale unit. the lithologies include carbonaceous siltstone and shale, quartzose siltstone and graphitic and carbonaceous shale. The graphitic facies are apparently restricted to zones of shearing and faults. There is little lithological variation within this unit apart from several thin (2 to 10m thick) but persistent quartzite/quartz sandstone bands on the eastern margin, a concentration of interbedded siltstones and shales towards the centre and a dolomitic quartzite lens recognised in some sections. In drilling the unit is predominantly composed of graded beds of siltstone and shale. The siltstones range from 2cm to 10m thick, are crossbedded, with slump structures, micro unconformities, microfaulting, washout structures, have doubly graded beds and are cut by clastic dykes. They comprise fine subangular to rounded quartz grains with very minor iron oxides, euhedral pyrite and amorphous carbonaceous material and diagenetic silica, iron oxide and carbonate overgrowths and cement. The shales are black due to their high carbonaceous content and are well laminated forming units of 2mm to 25m thick between siltstone bands, although most are 1 to 10cm thick. These shales consist of very fine silt and clay sized fragments to subangular quartz grains, fine amorphous carbonaceous matter, sericite, chlorite, clay minerals and variable amounts of fine pyrite, iron oxides and carbonate. The quartz content varies from 75 to 90%. Sections of this unit are chloritic in the prospect area and as such are similar to the overlying chloritic siltstone unit.

Pyrite grains are ubiquitous throughout the unit and are concentrated in any one bed within the coarser siltstone at the base of the graded unit and within the massive coarse siltstone bands throughout.

A '**dolomitic quartzite**' facies has been described within the carbonaceous shale unit, particularly from the area of the Clump prospect, but also from Murrays Reward. There is confusion over this 'unit' as 'quartz dolomite' appears to be present in two forms in the mineralised area:-

- a conformable 'dolomitic quartzite' lens, which has been traced for over 2 km of strike length and has been deformed with the enclosing sediments
- quartz-dolomite vein systems which are transgressive and are generally developed parallel to the 'Balfour Transform' direction.

Both types of 'quartz-dolomite' carry copper mineralisation.

In drilling at the Clump, the 'dolomitic quartzite' comprises coarsely crystalline dolomite and quartz occurring together in all proportions, but generally in the ratio dolomite:quartz of 60:40. Accessory minerals are pyrite and chalcopyrite with minor chlorite, carbonaceous material and tremolitic amphiboles. The pyrite content may be up to 50% and occurs as coarsely disseminated euhedral grains together with finely disseminated grains. Chalcopyrite occurs as finely disseminated grains and a few that are coarse and randomly distributed. In thin section the dolomite is recrystallised and unstrained, while the quartz is recrystallised, strained and undulose with pressure solution sutured intergranular boundaries modifying earlier mosaic texture. Both quartz and amphibole corrode the pyrite and chalcopyrite. The pyritic content of the enclosing siltstones and shales increases markedly towards the 'dolomitic quartzite'.

Chloritic Siltstone, 500m thick - this unit overlies the carbonaceous shale and is homogeneous throughout. It is very well laminated, has slight grading over 2 to 5cm units and appears to represent the chloritic equivalent of the shale of the 'carbonaceous shale' unit, comprising fine clay fraction size quartz grains, amorphous carbonaceous material, clay minerals, chlorite and sericite.

Siltstone, unspecified thickness - in places the basal section comprises a quartz, quartzite and quartz sandstone pebble conglomerate up to 20m thick overlying the chloritic shales. The siltstone comprises a regular alternation of dark grey and pale grey-brown arenaceous siltstone beds up to 5cm thick. It is only exposed on the western slopes of Mount Frankland.

Quartzite, unspecified thickness - this unit forms Mount Frankland and comprises pink haematitic quartzite and sandstone.

The latter unit may in fact be equivalent to the Forest Conglomerate and Quartzite. Price (1993, Appendix 1) identified conglomerates on a strike ridge of Mount Frankland. Bedding orientations suggested an angular unconformity with the underlying quartz-sericite schists, equivalent to the siltstone described above.

Mapping of fresh road exposures by Price (1993, Appendix 1) has not substantially added to the level of knowledge of the area, apart from affirming the gross stratigraphy and the general moderate to steep E dip and E facing of the sediments. Mapping of road cuts is shown on Plan Tv 539. Two areas of old workings at Balfour South, and old ML 3802 were also inspected and summary maps were produced of the immediate vicinity (Plans Tv 540 and Tv 541).

8.4 Regional Soil and Rockchip Geochemistry

A total of 103 hand-augered C-horizon soil samples were collected at 25m or 50m intervals along sections of the ground magnetometer traverses. Samples were assayed at Analabs Burnie by AAS (aqua regia-perchloric acid digest) for Ag-As-Cu-Pb-Zn-Fe-Mn. Locations and Cu-Zn-Pb-As-Au-Fe-Mn geochemistry are plotted on Plans Tv 586, Tv 616 and Tv 578 to Tv 584. Ledgers and assays are included in Appendix 2. Additional samples were collected from "The Gap" but these will be discussed separately in more detail in another section.

Results are not anomalous, except for sample 3530001 which returned 375 ppm As from over the lode at old ML 3802. Copper values did not exceed 34 ppm, and frequently were less than 10 ppm.

A small number of float and outcrop samples have been collected during the year from various localities. Samples were submitted to Analabs, Burnie for aqua regia - perchloric acid digest for Ag-As-Cu-Fe-Mn-Pb-Zn. Samples were also analysed for Au by fire assay. Ledgers and assay results are listed in Appendix 3, locations and Cu-Zn-Pb-As-Au-Fe-Mn geochemistry are plotted on Plans Tv 586, Tv 616 and Tv 578 to Tv 584.

Significantly elevated results were only recorded from dump samples at old workings or elsewhere along the Cu trend. Best values include 2.3% Cu in a massive chlorite rock (Sample 3308063), and 0.8% As and 1030 ppb Au in a quartz-pyrite rock (Sample 3308062)from the Balfour South workings. Quartz-pyrite lode from Hogback Ridge returned 633 ppm Cu, 1450 ppm As and 215 ppb Au (Sample 3529808). Chloritic shale from old ML 3802 assayed 200 ppm Cu, 3100 ppm As and 44 ppb Au (Sample 3529814). A quartz-pyrite rock from the Clump returned 3458 ppm Cu, 1500 ppm As and 106 ppb Au (Sample 35298104).

Results show a consistent Cu-As-Au association for mineralisation in the discordant Cu lodes. Insufficient sampling has been completed to identify any meaningful Cu geochemical anomalies away from the known Cu lodes.

Near the bridge over the Frankland River, an outcrop of laminated chloritic siltstone with a disseminated metallic blue-green mineral was identified. The mineral was suspected to be bornite. Copper geochemistry was low, casting the observation into doubt. Petrological examination identified the mineral to be "iridescent" haematite, possibly after sulphide. No bornite or other Cu minerals were observed in thin section. The petrological report is included in Appendix 4.

8.5 Ground Magnetometer Survey

During January 1993, several lines of ground magnetic data were collected to define the position of the Balfour Pyrrhotitic Siltstone. The surveys were of dubious quality as the magnetometers were malfunctioning. Only some data has been diurnally corrected due to repeated failure of the base station.

Seven E-W lines of data were collected between 5420000N and 5427000N (Plan Tv 565). Profiles show two magnetic peaks between 400 and 700m apart (Plan Tv 566). Profile shape confirms the E dip of stratigraphy. It is assumed the W peak corresponds to the surface position of the Balfour Pyrrhotitic Siltstone, the E peak within the high magnetic area corresponding to variations in dip, pyrrhotite content or thickness of the siltstone down dip. No magnetic rocks were located in outcrop along the traverse lines.

One line of data was collected from the gap in the magnetic trend to confirm the magnetic break is real. No response was detected confirming a lack of magnetic material in the interval near 5426000N. This area is the subject of further work (discussed below) as the lack of magnetic response theoretically could be due to Cu-rich hydrothermal fluids migrating through the Lagoon River Quartzite replacing Fe in the pyrrhotite siltstone to form a Cu sulphide horizon. Replacement of the pyrrhotite will cause the magnetic response to be destroyed, and Fe to be displaced forming a haematitic or chloritic alteration halo.

Recognition that magnetic stratigraphy may be an important indicator of target areas led to the tenement being covered by a detailed airborne magnetometer survey.

8.6 Mt. Frankland Airborne Survey

The Balfour Pyrrhotitic Siltstone was observed to give a pronounced magnetic response in the regional (500 m line spacing) North-West Tasmania - Project 494 aeromagnetic survey, flown by the BMR. In 1993, specifications were drawn up for a detailed (100 m line spacing), low level aeromagnetic and radiometric survey covering the entire Mt. Frankland EL 19/92 and the SW portion of the adjacent Trowutta EL 18/92 (Plan Tv ?1). The aims of the survey were to;

- define the pyrrhotitic siltstone trend in detail,
- delineate zones of weaker or destroyed magnetic response within the pyrrhotitic siltstone,
- identify the major shears cross cutting the pyrrhotitic siltstone,
- detect and U anomalies associated with Cu mineralisation, as found in the Zambian Cu Belt,
- locate areas of K metasomatism that may broadly indicate zones of fluid migration, and
- aid in the geological understanding of the area.

The acquisition and processing contract was awarded to Kevron Geophysics and the survey was flown in March 1993. Although the predominant flight line direction was E/W (roughly perpendicular to the general strike of geology of the Rocky Cape Association), a 2 x 5 km block was flown in a N/S direction in the area between Mt Frankland and Mt. Balfour (Plan Tv 561). This data was acquired to minimise altitude variations in the radiometric data over the area of the Gap Prospect. In the southern part of the survey area, the flight line spacing over the most rugged portion of the Norfork Range was increased to 200 m.

The digital located data and final plans for the survey were delivered in July 1993. The flight path plan, aeromagnetic stacked profiles and contours have been produced for the portion of the survey flown over the Mt. Frankland EL, including Soloriens Mining EL 53/88 (Plans Tv 556, 561, 558, 614, 615, 613, 562). Details of the flight specifications are included within the logistical report for the survey (Appendix 5). A copy of the located data was sent to Mr. Bob Richardson of the Tasmanian Mines Department.

Preliminary interpretation based on 35 mm slide sets of image processed magnetic and radiometric data in geological context of limited mapping was produced (Plans Tv 599 & 600).

8.6.1 Radiometric Interpretation (Plan Tv 599)

Although deep leaching was known to occur within the survey area, the data appears not to have been adversely affected. Sufficient information was gained from the radiometrics to subdivide the area into three broad domains. The Western and Central domains are thought to occur within the Rocky Cape Association whilst the North-Eastern Domain appears to coincide with the Cambrian Smithton Trough.

Several linear breaks were observed in the radiometric data. Of these, only the Roger River Fault and the Balfour Transform coincide with features interpreted from the aeromagnetic data.

Western Radiometric Domain

The Western and Central domains are separated along a distinct but convoluted NNW trending break in the radiometric response. The Western radiometric domain is characterised by low background in all channels and is interpreted to represent the Lagoon River Quartzite. Towards the south of the survey area, the distinction between the Western and Central domains becomes somewhat subjective. This fuzziness is thought to be related to the 200 m line spacing and the increased ground clearance of the aircraft over the Norfolk Range.

Weak to moderate K and Th anomalies were observed in the northern portion of the Western Domain close to the margin with the Central Domain. These anomalies coincide with tracks and a gravel pit.

Central Radiometric Domain

The Central Radiometric Domain, interpreted to represent the Interview Siltstone, is characterised by a variable but higher background K, Th and U than the adjacent domains. Areas of subdue radiometric responses within the Central Domain generally coincide with topographic highs and have a northerly orientation. This strike direction is conformable to the Rocky Cape stratigraphy and as such these radioactive low zones possibly represent quartzite units within the Interview Siltstone.

The newly built Hemskirk Road coincides with a strong narrow K and Th anomaly. Excavation associated with the road construction are thought to have exposed the bedrock stratigraphy under the leached zone. As a result, the true radiometric character of the bedrock is exhibited in the airborne data. Other areas of ground disturbance exhibiting moderate to strong radiometric responses are marked on the interpretation plan. These include most of the Sn workings, the Balfour South and Development Cu occurrences, gravel pits, and the Balfour township. The areas of ground disturbance within the Central Domain not displaying an associated radiometric feature are listed below:

i. The Cu workings at The Clump and Murrays Reward. The ground disturbances mainly consist of narrow costeans that are probably too small to give an appreciable airborne response.
ii. The two of the three gravel pits north of The Clump Cu workings. These two have been filled in, presumably with leached overburden material.
iii. The Sn workings at Specimen Hill. The reason for this is not known.

The radiometric data strongly suggest that although obscured by leaching, bedrock lithologies within Central Domain contain sufficient radioactive material to be differentiated from the adjacent domains. It is important to note that three gravel pits, the Balfour landing ground and a majority of the roads within the Western Domain exhibit significantly weaker radiometric response than similar ground disturbances within the Central Domain. This would suggest that the most of the unleached bedrock lithologies within the Western Domain do not contain significant amounts of radioactive elements.

Other points of interest within the Central Domain include;

- A large area of broadly coincident elevated Th and K responses were observed in the NW of the EL. This anomalous area appears to cut across magnetic stratigraphic marker beds (Balfour Pyrrhotitic Siltstone). Within this area, the greatest responses were associated with the Frankland River. This radiometric response may represent large scale alteration and as such requires investigation.

- A NNW line of predominantly Th anomalies with elevated K (and coincident magnetic features) was observed to the north of Balfour. The trend appears to be displaced approximately 2.5 km to the NE along the Roger River Fault.

- The Development Cu occurrence (located within Solorien Mining's EL 53/88 appear to be associated with a 1 km halo of depleted radiometrics surrounding a central zone of elevated K (322 700E 5432 500N). The K response coincides with a detailed grid of cut lines and presumably costeaning. The significance of the low radiometric halo is not known.

- The Clump Cu workings, also located within Solorien Mining's EL 53/88, occur near the interpreted margin of the Lagoon River Quartzite. The significance of this requires investigations when the ground becomes available.

- The headwaters of the N/S oriented Smith Creek (9.5 km SSE of Balfour) are broadly coincident with a strongly anomalous K and Th response with intermittent U. Although this anomaly may represent transported bedrock material exposed in a recent land slide, it is important to note that the *radiometric anomaly appears to cut across topography and therefore may* represent a lithological unit.

North-Eastern Radiometric Domain

The North-Eastern Domain is characterised by very low radiometric responses due largely to the non radiometric character of the Smithton Trough lithologies; carbonate, basalt and mafic derived sediment. Within the Trowutta EL (19/92), areas with exceptionally low radiometric responses are interpreted to represent carbonate units, (Parkinson, 1993). In accordance with the mapped stratigraphy, interpreted carbonate units close to the margin of the Smithton Trough are correlated to the Black River Dolomite while carbonates in the middle of the basin are equated to the Smithton Dolomite.

A weak to moderate K and Th anomaly was observed on the western limb of the Smithton Trough, between the two inferred carbonate units. Similar radiometric anomalies were noted within the Trowutta portion of the survey and therefore probably represent the same lithological unit, (Parkinson, 1993).

The North-Eastern Radiometric Domain is terminated against the Balfour Transform Fault.

8.6.2 Magnetics Interpretation (Plan Tv 600)

Using the radiometric interpretation as a broad guide, the aeromagnetics were subdivided into a number of magnetic zones. The character of these zones is described below in interpreted lithological/chronological order (i.e. SW to NE).

Proterozoic Rocky Cape Association

Lagoon River Quartzite

Both the regional and detailed aeromagnetic surveys indicate that the Lagoon River Quartzite is associated with a noisy magnetic signature. Within the Mt. Frankland survey area, four zones of coherent aeromagnetic character were identified. A brief description of the zones follows:

- LQR1 contains NW to NNW oriented magnetic units on the SW margin of the EL. Individual magnetic units were interpreted as terminating against a NNW oriented fault also identifiable on the regional magnetics.

- LRQ2 lies on the eastern margin of the Western Radiometric Domain that is interpreted to represent the Lagoon River Quartzite. The magnetic units within LRQ2 have similar magnetic character as the Balfour Pyrrhotitic Siltstone marker horizon within Interview Siltstone package. It is highly possible that rather than LRQ2 belonging to the Lagoon River Quartzite, it is a fault displaced portion of the Balfour Pyrrhotitic Siltstone. Ground investigations to solve this discrepancy are strongly recommended.

- Located on the western margin of the EL, LQR3 and LRQ4 are made up of predominantly moderate amplitude, near surface magnetic units. These units may represent a magnetic marker horizon within the Lagoon River Quartzite that has been disrupted by folding and shearing.

Interview Siltstone

Four broad magnetic units, labelled IR1, where noted in the northern part of the EL lying on or adjacent to the NW trending margin of the Interview Siltstone Sequence, (as identified by the radiometrics). It is important to note that The Clump Cu workings and The Clump vegetation/topographic feature occur within the most southern magnetic unit. The source of these anomalies is not known.

The dominant magnetic feature within the Interview Siltstone sequence is the Balfour Pyrrhotitic Siltstone. The Balfour Pyrrhotitic Siltstone appears to be made up of at least two strongly magnetic horizons and the width of the unit varies across the survey area. An easterly dip direction, conformable to the Rock Cape Association, was modelled for the Balfour Pyrrhotitic Siltstone.

The Balfour Pyrrhotitic Siltstone was interpreted to be displaced 3.5 km to the NE along the Roger River Fault. Many smaller breaks were identified where the magnetic responses have been destroyed or weakened. It is important to note that the Balfour South, Murrays Reward and Development Cu occurrences lie either on breaks in the magnetics or to the east of the Balfour Pyrrhotitic Siltstone in areas of bland magnetic responses. Zones of major disruption within the Balfour Pyrrhotitic Siltstone and therefore potential areas of significant Cu mineralisation are listed below:

- In the southern portion of the survey where the Balfour Pyrrhotitic Siltstone is interpreted to be terminated against a NW oriented regional fault.

- A group of strongly magnetic NW trending units, (labelled IS2), lie adjacent to the Balfour Pyrrhotitic Siltstone, in the southern portion of the EL. These magnetic units may represent a displaced portion of the Balfour Pyrrhotitic Siltstone and as such warrant investigation.

- Near 326 000E 5422 000N where the Balfour Pyrrhotitic Siltstone is interpreted to be displaced 1 km by a NE oriented sinistral shear.

- The Gap Prospect located at 325 000E 5426 00N where the magnetic response of the Balfour Pyrrhotitic Siltstone is significantly weaker over a 1 km zone, (refer to section 8.7).

- The central portion of the EL where the Balfour Pyrrhotitic Siltstone interpreted to be disrupted by numerous faults, including the Roger River Fault. It is important to note that unit LQR2 lies within this area of chaotic magnetic responses. Most of this area lies within Solorien Mining's EL 53/88.

- The northern portion of the EL, along prominent breaks (~ 200 m wide) where the magnetic signature of the Balfour Pyrrhotitic Siltstone has been reduced along inferred shears. The radiometrics have identified a large belt encompassing these breaks as being elevated in K and Th, suggesting a possible zone of alteration.

South of the Roger River Fault, the Balfour Pyrrhotitic Siltstone lies parallel and close to the western margin of the Interview Siltstone package, (as defined by the radiometric data). This would indicate that the radiometric data are defining a real contact. North of the Roger River Fault, the Balfour Pyrrhotitic Siltstone lies approximately 1 km to the NE of the inferred contact, suggesting either dramatic thickening of the underlying unit or a change in dip resulting in an increase in apparent thickness. Collection of dip measurements of outcropping units along Blackwater Road is required to resolve this uncertainty.

In the northern portion of the EL, a line of strongly magnetic units was observed 1 km to the NE and parallel to the Balfour Pyrrhotitic Siltstone. In approximately the same stratigraphic location south of the Roger River Fault, a series of weak magnetic units was identified. Both sets of magnetic anomalies are associated with elevated Th and K thus suggesting units correspond to the same lithological unit.

Cambrian Smithton Trough

An intermittent magnetic linear (~ 25 nT) immediately to the east of the eastern margin of the Central Radiometric Domain is interpreted to mark the base of the Smithton Trough. Geological mapping Brown, (1989) has indicated that there is an angular unconformity between the Rocky Cape Association and the Smithton Trough, of which the Forest Conglomerate is the basal unit. Although there is no documented evidence to suggest that the Forest Conglomerate has a magnetic response, the position of the magnetic linear between the Rocky Cape and overlying sequence suggests that the Forest Conglomerate may be the cause of the observed anomaly.

A distinctive sequence of a non-magnetic, very low radiometric response occurs to the east of the inferred Forest Conglomerate magnetic unit. Within the Trowutta EL (19/92), this non-magnetic unit correlates to the Black River Dolomite, where it occurs as an inlier.

The Smithton Basalt appears as a slightly west dipping, complex magnetic zone on the eastern limb of the Smithton Trough. Numerous linear breaks interpreted to be due to faulting were observed. Modelling has indicated that a majority of the variability in the magnetic response may be attributed to topographic irregularities over the basalt. On the western limb of the trough, a strongly magnetic linear (~800 nT) is interpreted to be the continuation of the Smithton Basalt. Preliminary modelling has suggested that the basalt dips to the east at a moderate to steep angle and has a susceptibility of ~ 10,000 x 10^{-5} SI.

Immediately to the south of the Balfour Transform Fault and within the Interview Siltstone, a 2 km unit with identical aeromagnetic characteristics to the inferred western limb of the Smithton Basalt was observed. As Smithton Trough appears be terminated against the Balfour Transform Fault it is unclear what this unit represents. An alternative explanation to that presented suggests that this strongly magnetic unit is a dyke-like body intruded across Balfour Transform Fault after the deposition of the Smithton Trough. Ground investigation to solve this ambiguity is warranted.

As indicated by the radiometric data, a thin unit elevated in Th and K occurs on the western limb of the Smithton Basalt. This unit appears to overlie the Smithton Basalt.

The Smithton Dolomite appears as a bland magnetic unit with distinct depressed radiometric response similar to that of the Black River Dolomite.

Inferred Intrusives and Dykes

A deep 6 x ~2 km elliptical magnetic zone lies adjacent to LQR1 within the Lagoon River Quartzite. The character of this broad magnetic feature is consistent with a deep seated moderately magnetic body, possibly a granitoid. Alternatively, the magnetic feature may represent deeply buried equivalents of LQR3 and LRQ4.

On the SE margin of the EL, two broad magnetic anomalies were observed. The northern anomaly is associated with a 100 m topographic feature. In addition, both magnetic anomalies are coincident or adjacent to low radiometric zones. An intrusive source is suggested for both anomalies.

The township of Balfour is located on a Tertiary basaltic plug that is denoted by a topographic high and a pronounced vegetation anomaly. The aeromagnetic data indicate that the plug is associated with discrete magnetic anomaly. Previous workers have proposed that The Clump may also represent a basaltic plug due to similar vegetation and topographic features. It is important to note that the aeromagnetic data indicate that The Clump lies on the flanks of a larger magnetic unit (IS1).

Small basaltic plugs were interpreted from the aeromagnetic data elsewhere within the survey area. Of these inferred plugs, only the magnetic anomalies located at 330 100E 5425 500N and 323 400E 5435 800N have a corresponding topographical expression.

A number of predominantly E/W oriented, strongly magnetic linear units were interpreted to be dykes. Although it is not possible to place an age on the dykes from the available information, it is important to note that the dykes appear to be exploiting Proterozoic and younger structural breaks. Some dykes trend towards the Balfour basalt plug, suggesting a Tertiary age.

8.7 "The Gap" Prospect

"The Gap" prospect is a conceptual target based on the hypothesis that Cu-rich hydrothermal fluids migrating through the Lagoon River Quartzite or via major faults (or other major structures) have replaced Fe in the pyrrhotite siltstone to form a Cu sulphide horizon. Replacement of the pyrrhotite will cause the magnetic response to be destroyed, and Fe to be displaced forming a haematitic or chloritic alteration halo.

The prospect was identified from regional aeromagnetic surveys as being one of the largest magnetic gaps in the Balfour area, and therefore, if the concept above is valid, could potentially host a significant deposit.

Initial work on the prospect included acquiring a line of ground magnetic data (Line 5426350N, Plans Tv 565 and Tv 566). This did little more than reinforce the belief that the magnetic response had been destroyed. The position of the "replaced" unit could not be determined accurately due to the absence of the magnetic response.

A wide zone of chlorite "alteration" was observed in the Heemskirk Road cuttings and a major fault was inferred to cut off the magnetic break (Price, 1993; Appendix 1), which further emphasised the significance of the target area.

Based on these early results it was decided to investigate the prospect in more detail.

8.7.1 Geology

Geology of The Gap consists of primarily of four units which dip steeply E. From W to E they are; carbonaceous siltstone/shale, quartzite, chloritic siltstone, and quartz lode (Plan Tv 585).

Two carbonaceous siltstone/shale units where recorded in soil pits and rare outcrops, separated by a narrow, but prominent quartzite ridge. The westernmost is of unknown thickness, the unit to the E having a subcrop width of 400m. Disseminated pyrite or oxidised sulphide staining is locally present in some samples, although where seen does not exceed 5%.

Between the carbonaceous units is a massive to weakly laminated quartzite that forms a narrow, but prominent ridge trending 170 deg AMG. Width may be as narrow as 20m, but thick quartzite scree extending 100m each side of the outcrop ridge obscures underlying geology.

Above the second carbonaceous siltstone/shale is a well laminated green and white chloritic siltstone, clearly exposed along the Heemskirk Road. This unit was originally believed to be a chloritic altered equivalent of the Balfour Pyrrhotite Siltstone, but is now regarded as a separate lithological unit. Petrological observations suggest the chlorite is believed to be due to mild insipient metamorphism of Mg-rich clays in the original sediment (Appendix 4). There is considerable confusion over the strike of the chloritic unit. Measurements of strike in road cuttings show a consistent 190 deg AMG, whereas plotting of the W limit to the chloritic unit in soil pits suggests a strike of 160 deg AMG, consistent with the quartzite trend. Width of the chloritic zone within the prospect area is up to 350m.

The chloritic siltstone is bounded to the E by the line of the Balfour Cu lodes, as can be seen on the Heemskirk Road . Only massive vein quartz was located in the prospect area. Immediately E of the quartz lode, a siliceous siltstone is exposed in costeans. The siliceous character may be a local effect adjacent to the quartz lode. Road traverses indicate the sequences pass eastward into grey to black laminated shale/siltstone, locally weakly pyritic (Plan Tv 539).

Airborne magnetic data supported by the shape of topographic features suggest a major fault running E-W through the prospect at 5425700N. Ground reconnaissance located brecciated and vuggy quartz along the suspected trace of the fault (Price, 1993; Appendix 1). Displacement of strike ridges indicates sinistral strike-slip movement of about 1 km. Destruction of the magnetic response appears to have only occurred on the N side of this fault, suggesting that this feature could be a control on potential mineralising fluids. The line of the discordant Cu lodes is unaffected by this structure, indicating movement was earlier than formation of the lodes.

8.7.2 Soil and Rockchip Geochemistry

A total of 177 hand-augered C-horizon soil samples were collected at 25m intervals along four 200m-spaced lines. Samples were assayed at Analabs Burnie by AAS (aqua regia-perchloric acid digest) for Ag-As-Bi-Co-Cu-Mo-Ni-Pb-V-Zn-Fe-Mn. Locations and Cu-Zn-Pb-As-Au-Fe-Mn geochemistry are plotted on Plans Tv 586 and Tv 578 to Tv 584. Ledgers and assays are included in Appendix 2.

Maximum soil Cu values peaked at 97 ppm and 82 ppm in adjacent samples at the W end of line 5425900N. Two outcrop grab samples from near the peak Cu soil samples on line 5425900N returned 49 ppm Cu and 55 ppm Cu from laminated carbonaceous siltstones with minor disseminated sulphides (samples 3529847-48, Appendix 3). Plan Tv 578 shows a definite clustering of Cu soil and rockchip anomalies from this area, with weak coincident As and Fe anomalies. Whilst not strongly anomalous, the samples are the highest Cu results from the prospect away from the known Cu lodes.

The next highest Cu results of 62 ppm and 54 ppm Cu are grab samples of siliceous siltstone from a costean over the line of Cu lodes. These samples also show weak Pb-Mo-Ni-As anomalism.

The subcrop of laminated chloritic siltstone appears as a Zn-Fe-Mn (Co-Ni-As?) anomaly, albeit at low levels. The association is assumed to be lithochemical, not due to mineralising processes.

8.7.3 Discussion

The position of the Balfour Pyrrhotite Siltstone or it's non-magnetic equivalent within the prospect area is unclear. It is concluded that the chloritic siltstone is not an altered equivalent of this unit. When the suspected 1 km displacement on the 5425700N fault is taken into account, the magnetic pattern S of the fault would predict the altered continuation to the N to be at approximately 324000E. This would imply that sampling and mapping may not have extended sufficiently far enough to the W to cover the outcrop position of the altered stratigraphy. Anomalous Cu soil and rockchip geochemistry from the SW corner of the grid further suggests the W area is perhaps the most likely position for a sedimentary Cu deposit.

9. ENVIRONMENT AND REHABILITATION

During the year exploration having an environmental impact was confined to minimal cutting of some grid lines and augered soil sampling. Grid lines will naturally regenerate, and soil pits were refilled at the time of sampling. No additional rehabilitation is required.

R.G. PARKINSON

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KEYWORDS

Tasmania, Proterozoic, Literature Review, Soil Sampling, Rockchip Sampling, Airborne Magnetic Survey, Ground Magnetic Survey, Copper.

LOCATION

Burnie	1:250000	SK55-3
Sandy Cape	1:100000	7815
Bluff Point	1:50000	7815N
Balfour	1:50000	7815S
Sumac	1:25000	3244
Dempster	1:25000	3243
Balfour	1:25000	3242
Lily	1:25000	3241
Sundown	1:25000	3044
Temma	1:25000	3043

LIST OF DPO'S

71511, 71514, 71517, 71536, 71537, 71538, 71539, 71547.

LIST OF PLANS

Plan No.	Title	Scale
Tv 451	Application for Exploration Licence - Mt. Frankland	1:250,000
Tv 539	Mt. Frankland EL 18/92 Balfour Road Cutting Geological Fact Map	1:2,500
Tv 540	Mt. Frankland EL 18/92 Balfour Mine South Sketch Map and Orientation Soil Sampling	1:1,000
Tv 541	Mt. Frankland EL 18/92 Old ML 3802 Sketch Map and Orientation Soil Samples	1:1,000
Tv 616	Mt. Frankland EL 18/92 Soil and Rockchip Sample Locations	1:25,000

Tv 585	Mt. Frankland EL 18/92 "The Gap" Interpreted Geology	1:5,000
Tv 586	Mt. Frankland EL 18/92 "The Gap" Soil and Rockchip Sample Locations	1:5,000
Tv 578	Mt. Frankland EL 18/92 Soil and Rock Geochem - Cu ppm	1:50,000
Tv 579	Mt. Frankland EL 18/92 Soil and Rock Geochem - Zn ppm	1:50,000
Tv 580	Mt. Frankland EL 18/92 Soil and Rock Geochem - Pb ppm	1:50,000
Tv 581	Mt. Frankland EL 18/92 Soil and Rock Geochem - As	1:50,000
Tv 582	Mt. Frankland EL 18/92 Soil and Rock Geochem - Au	1:50,000
Tv 583	Mt. Frankland EL 18/92 Soil and Rock Geochem - Fe%	1:50,000
Tv 584	Mt. Frankland EL 18/92 Soil and Rock Geochem - Mn	1:50,000
Tv 565	Mt. Frankland and Trowutta EL's Northwest Tasmanian Survey First East Derivative Location of Ground Magnetic Traverses	1:100,000
Tv 566	Mt. Frankland EL 18/92 Ground Magnetic Stacked Profiles	1:25,000
Tv 619	Mt. Frankland EL 18/92 Mt. Frankland Survey Location Plan	1:250,000
Tv 556	Mt. Frankland Airborne Geophysical Survey Flight Path	1:25,000
Tv 561	Mt. Frankland Airborne Geophysical Survey Flight Path	1:25,000
Tv 558	Mt. Frankland Airborne Geophysical Survey Residual Magnetic Intensity Profiles	1:25,000
Tv 614	Mt. Frankland EL 18/92 Mt. Frankland Survey Aeromagnetic Stacked Profiles	1:25,000

Tv 615	Mt. Frankland EL 18/92 Mt. Frankland Survey Aeromagnetic Stacked Profiles	1:25,000
Tv 562	Mt. Frankland Airborne Geophysical Survey Total Magnetic Intensity Contours	1:25,000
Tv 613	Mt. Frankland Airborne Geophysical Survey Total Magnetic Intensity Contours	1:25,000
Tv 599	Mt. Frankland EL 18/92 Mt. Frankland Survey Radiometric Interpretation Plan	1:25,000
Tv 600	Mt. Frankland EL 18/92 Mt. Frankland Survey Aeromagnetic Interpretation Plan	1:25,000

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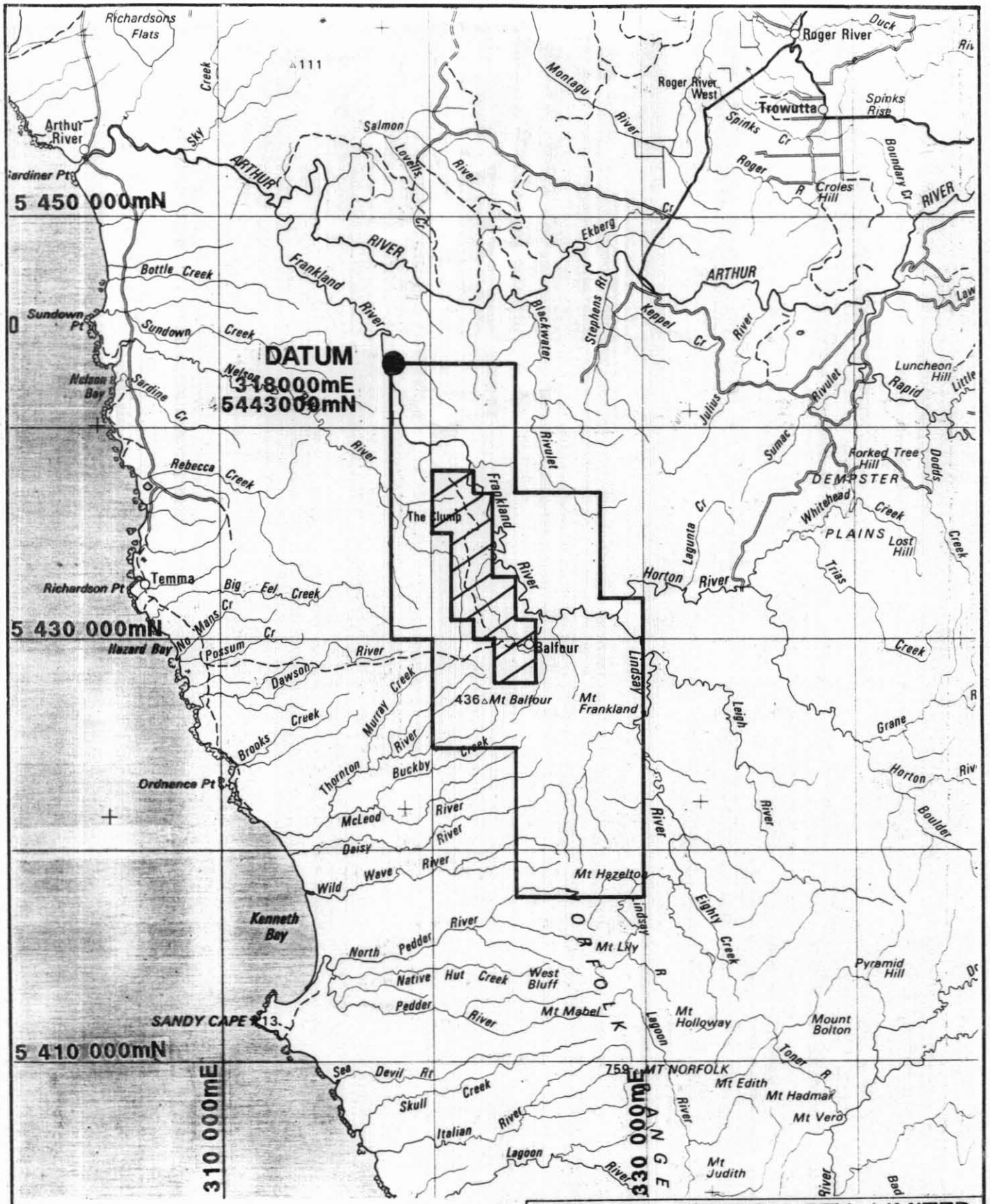
APPENDIX 1:	Memo from C. Price to R. Parkinson
APPENDIX 2:	CRAE soil sampling ledgers and geochemistry
APPENDIX 3:	Rockchip lithological codes, sampling ledgers and geochemistry
APPENDIX 4:	Petrological reports
APPENDIX 5:	Airborne magnetic and radiometric survey logistics report
Appendix 6:	Images from airborne magnetic & radiometric survey (34 slides)



CRA EXPLORATION PTY. LIMITED

Application for Exploration Licence

MT. FRANKLAND 177 km²

Ref.: SK55-03	Scale: 1:250 000
Author T.W.DICKSON	Report No.: 19240
Drawn R.TRAVIERSO	Plan No.: Tv 451

① weathered green siltstone with pyrite veinlets 60°W/000° & pyritic layers 70°SW/126° on average ~beds disturbed by veinlets & soft sediments deformation ms 15–20

② fine grained massive quartzite/siltstone with larger weathered 1py veins FeOx selvedge 12cm ms 10–15

③ vertically dipping black shaley units 3–4cm in white silty bed ms 0–15, contact ~275/070° (?fault)

④ conglomerate, poorley sorted, shaley matrix, immature fragments to 2cm

⑤ large blocks of interlaminated pink & black siltstone & shale pyrite up to 5%, ms 10–20

⑥ buff coloured siltstone, massive occasional block of interlaminated pink/black siltstone/shale

⑦ massive brown siltstone

⑧ interbedded laminated pink–black shale & pyritic grey–buff siltstone (py ~Po large cubic s) bed 60°E/180°

⑨ laminated grey siltstone and black shale, up to 10% py ms 10–20 bed 40°E/010°

⑩ laminated yellow & grey siltstone

⑪ & ⑥ laminated black shale & grey siltstone ~30% py ms 10–20

⑫ pyritic quartzite bed. 50°E/336° ms 10

⑬ & ⑮ & ⑰ pyritic laminated black shale

⑭ quartzite

⑯ pyritic quartzite

⑱ pyritic black shale

⑳ Si–py alteration of quartzite & black shale

㉑ pyritic quartzite & weathered green siltstone py ~ 1–5%

track
2050m from track
laminated grey–black & py⁴ yellow–green shale & siltstone
~10–20% py⁴ siltstone
~10–20% pyritic zone in siltstone
pyritic interlaminated green/yellow & grey/black siltstone–shale ms 10–20
laminated black shale with rarer 20cm lams of light grey siltstone bed. 20°E/025° py up to 10% ms 0–20
laminated grey shale bed. 60°N/135°
laminated black shale
weathered laminated black shale
laminated black shale minor grey siltstone bed. 25°E/015°, py~5%
black shale, minor grey siltstone
laminated black shale
pyritic laminated black shale
laminated black shale & grey siltstone
laminated black shale bed. 80°E/320°
green–brown slatey siltstone
laminated grey siltstone & grey shale bed. 65°W/341°
black slatey shale ~2% py
grey–black laminated shale bed. 65°W/330°
brown–grey slatey siltstone
2050m from track
light grey–green laminated slatey siltstone ms 10% disseminated pyrite bed. 65°W/164°
light grey–green laminated slatey siltstone ms 10% disseminated pyrite bed. 65°W/164°
laminated black shale
black slatey shale
light brown–yellow siltstone bed. 75°W/186°
light grey siltstone
black shale
laminated black shale & grey–green siltstone bed. 65°W/002°
light grey–green siltstone & black shale
light grey–green siltstone & black shale
laminated black slatey shale bed 50°s/050° ms 15–20
laminated black slatey shale bed. 40°S/142°
QUARRY
grey–black slatey shale bed. 40°S/305°, 40°S/110°, 50°S/300°, 30°S/090°
laminated black slatey shale bed. 30°S/300°
laminated black slatey shale bed. 30°S/320°
350m from quarry
black laminated slatey shale ms 0–25 bed. 30°S/300°, 15°S/092°, 10°S/270°
grey siltstone & black shale bed. 20°S/085°

325650E 5425450N — Ground mag survey grid peg
Road with Creek crossing
× 901 — Rock sample location. (Prefix 3529___)
35° — Dip/strike – mag°
Younging dip
67° — Fold plunge & direction – mag°
Fault
Outcrop

Grid North
Mag. North
11.1°

0 50 100 150 200
metres

965029
5 cm

93-3511

CRA EXPLORATION PTY. LIMITED

MT. FRANKLAND EL 18/92
BALFOUR ROAD CUTTING
Geological Fact Map

Ref.: SK55-3, 7815	File: MTFRANK\539
Scale: 1 : 2500	Date: April 1993
Author: COLIN PRICE	Report No.: 19240
Drawn: ROCCO TRAVIERSO	Plan No.: Tv 539

965030

5 421 550N

5 421 500N

5 421 450N

5 421 400N

326 550E

326 600E

326 650E

326 700E

326 750E

326 800E

78° laminated shale/sandstone, grey, trace pyrite

0.5–2.0m wide gossanous quartz lode, dips 70°–80° southwest

concrete foundations

3530023 3530022 3530021 3530020 3530019 3530018 3530014 3530017

015 016

80° pyritic laminated shale/sandstone

3529805–807

58°

Adit: contorted, sheared laminated shale, chlorite-altered, quartz-pyrite-chalcopyrite veins up to 20cm wide parallel to main lode.

Creek

Waratah

5 cm

× 3529805 Rock Chip sample location
• 3530017 Soil sample location
⊗ 3530023 Soil sample location, C horizon sampled all weathered laminated shale & sandstone
80° Bedding dip & strike
58° Cleavage dip & strike
Shaft
Tunnel
Adit
Trench
Mullock Heap

0 0 20 40 60 80
metres

AMG North
Mag. North
11.1°

CRA EXPLORATION PTY. LIMITED

MT FRANKLAND EL 18/92
BALFOUR MINE SOUTH
Sketch Map and Orientation Soil Sampling

Ref.: SK55-3, 7815	File: MtFrank 540
Scale: 1 : 1000	Date: APRIL 1993
Author: COLIN PRICE	Report No.: 19240
Drawn: ROCCO TRAVIERSO	Plan No.: Tv 540

540

93-3511.

5 425 250N
5 425 200N
5 425 150N
5 425 100N
5 425 050N

leached vughy quartz lode

3529812,813

gossanous quartz lode

Bog

Bog

Bog

Bog

30°

ferruginous shale outcrop

70°

1m thick limonite–haematite gossan & ferruginous shale

3530013 3530012 3530011 3530010 3530009 3530008 3529814 3530001 3530002 3530003 3530004 3530005 3530006 3530007

40°

grass over gossan is discoloured (brown)

5 cm

324 350E
324 400E
324 450E
324 500E
324 550E
324 600E
324 650E

93-3511.

965031

× 5259814 Rock Chip sample location
• 3530005 Soil sample location
⊗ 3530013 Soil sample location, C horizon sampled all weathered laminated shale & sandstone with 1–3% oxidised pyrite
80° Bedding dip & strike
Shaft
Trench
Mullock Heap

0 20 40 60 80
metres

AMG North
Mag. North
11.1°

CRA EXPLORATION PTY. LIMITED

MT FRANKLAND EL 18/92
OLD ML 3802 WORKINGS
Sketch Map and Orientation Soil Sampling

Ref.:	SK55–3, 7815	File:	MtFrank\541
Scale:	1 : 1000	Date:	APRIL 1993
Author:	COLIN PRICE	Report No.:	19240
Drawn:	ROCCO TRAVIERSO	Plan No.:	Tv 541

Frankland River
Dark Creek
Wuthering Heights Road
Frankland Blackwater Road
7855
7800,7856–7859
River
Cyril Creek
Nelson Bay River
Frankland River
Lindsay River
Heemskirk
9836
9841
204
054
9910
9909
9835
See Plan Tv 586
9842
9906
9907,08
9845
9846
9847
9848
9843
9844
9901
9902
9903
9815
9904
9905
Road
9813
001
007
013
9814
9834
9824
035
9822
9833
9809
085
9832
9808
9837
9838
EL 18/92
9831
9832
9829,30
9828
River
9827
9826
9825
7861
9816
9817
9821
8062–64
023
018
014
017
9805–7
9811
086
013
9810
9818
9819
9820

9821 × Rock Chip Samples
7800–8064 prefix 330____
9801–9911 prefix 352____

013 Soil Samples prefix 3530___

5 cm

AMG North
Mag. North
11°

965042

93-3511.

0 500 1000 1500 2000
metres

CRA EXPLORATION PTY. LIMITED

MT FRANKLAND EL 18/92
SOIL & ROCK CHIP SAMPLE LOCATIONS

Ref.:	SK 55–03	File:	MtFrank\616
Scale:	1 : 25,000	Date:	October 1993
Author:	Rob Parkinson	Report No.:	19240
Drawn:	Rocco Travierso	Plan No.:	Vv 616

443 442 441 5 440 000mN 439 438 437 436 5 435 000mN 434 433 432 431 5 430 000mN 429 428 427 426 5 425 000mN 424 423 422 421 5 420 000mN 419 418

318 319 320 000mE 321 322 323 324 325 000mE 326 327 328 329 330 000mE

965041

LEGEND

- Q — Quartz scree
- Vq — "Balfour Copper Lode" Quartz vein
- Psi — Laminated green chloritic siltstone
- Pq — Quartzite
- Psh — Dark grey carbonaceous? shale/siltstone
- Dip of sediments
- Fault - position approximate
- Quartz blows on fault

GEOLOGY FROM SOIL PITS AND ROAD MAPPING.

5 cm

93-3511.

AMG North / Mag. North (11°)

0 100 200 300 400 metres

5 426 000mN

324 000mE

325 000mE

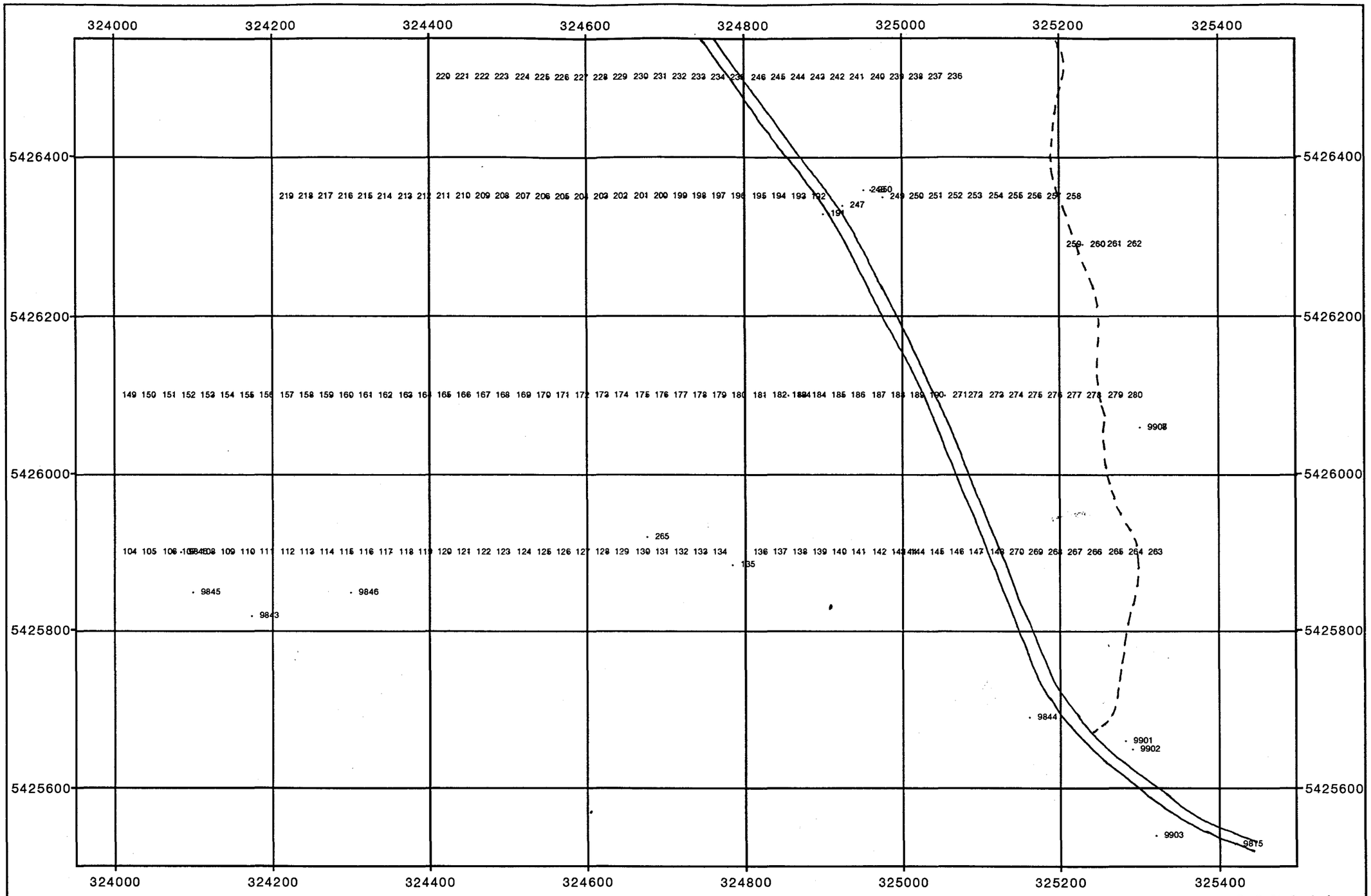
CRA EXPLORATION PTY. LIMITED

MT FRANKLAND EL 18/92

The Gap Prospect

Interpreted Geology

Ref.: SK 55 – 3	File: MtFrank\585
Scale: 1 : 5000	Date: August 1993
Author: R.G. Parkinson	Report No.: 19240
Drawn: R. Travierso	Plan No.: Tv 585



5 cm

Four digit nos prefixed 352----. = ROCKS

Nos 1 to 280 prefixed 3530---. = SOILS

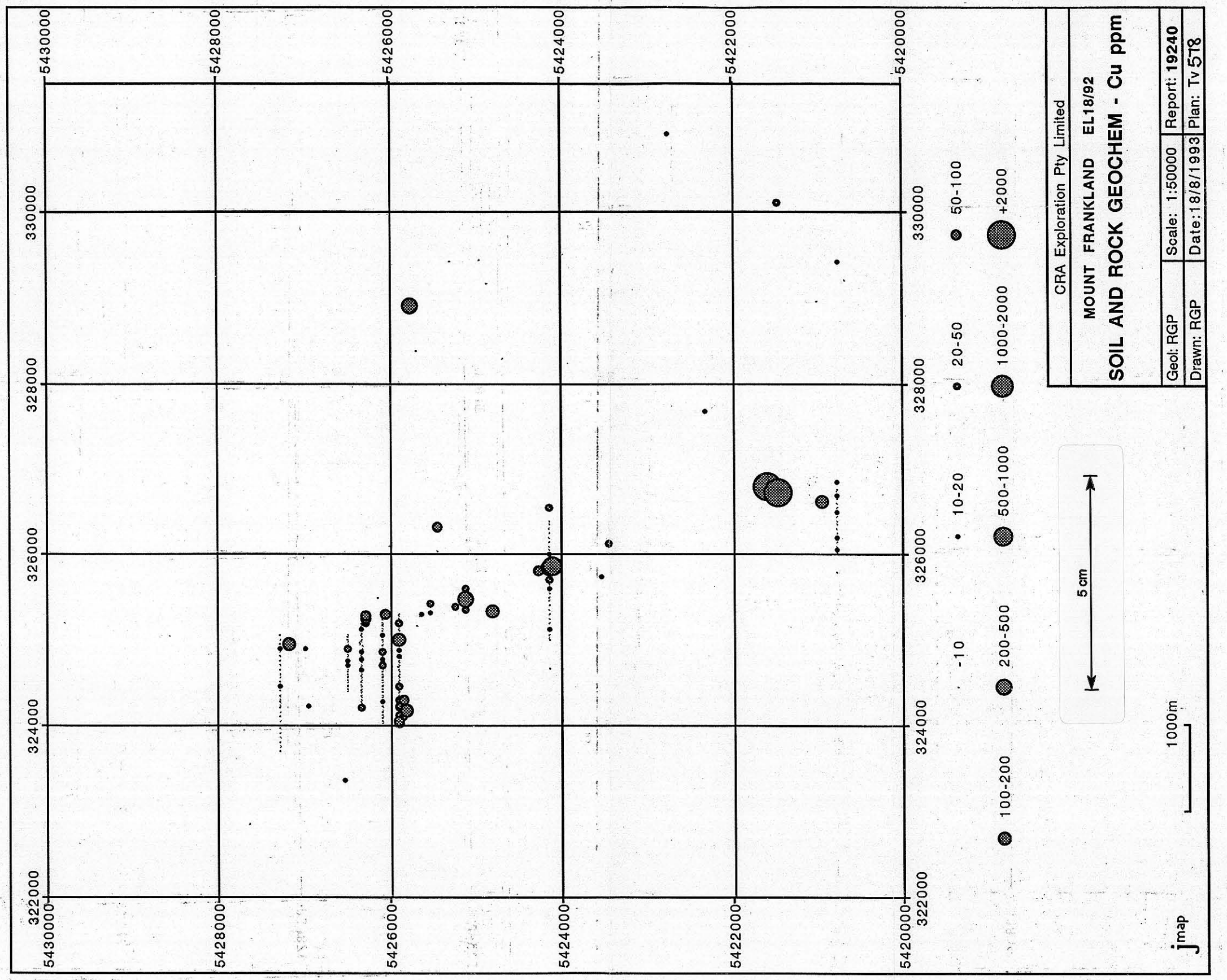
jmap 100m

965040

93-3511.

CRA Exploration Pty Limited		
MT FRANKLAND EL18/92 - "THE GAP"		
SOIL AND ROCK SAMPLE LOCATIONS		
Geol: RGP	Scale: 1:5000	Report: 19
Drawn: RGP	Date: 27/9/1993	Plan: Tv586

965036



CRA Exploration Pty Limited

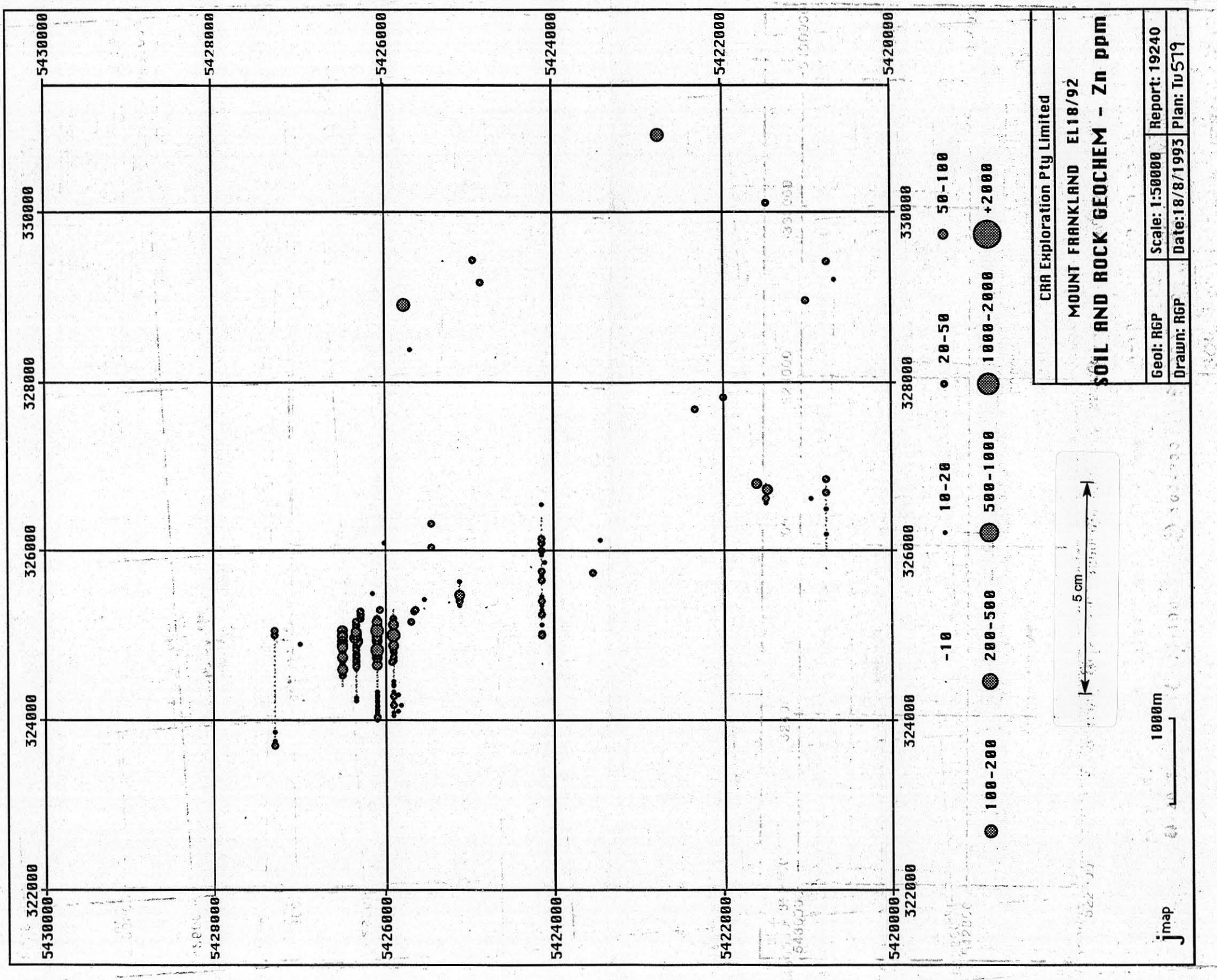
MOUNT FRANKLAND EL18/92

SOIL AND ROCK GEOCHEM - Cu ppm

Geol: RGP	Scale: 1:50000	Report: 19240
Drawn: RGP	Date: 18/8/1993	Plan: Tv 578

93-3511.

965037



CRA Exploration Pty Limited

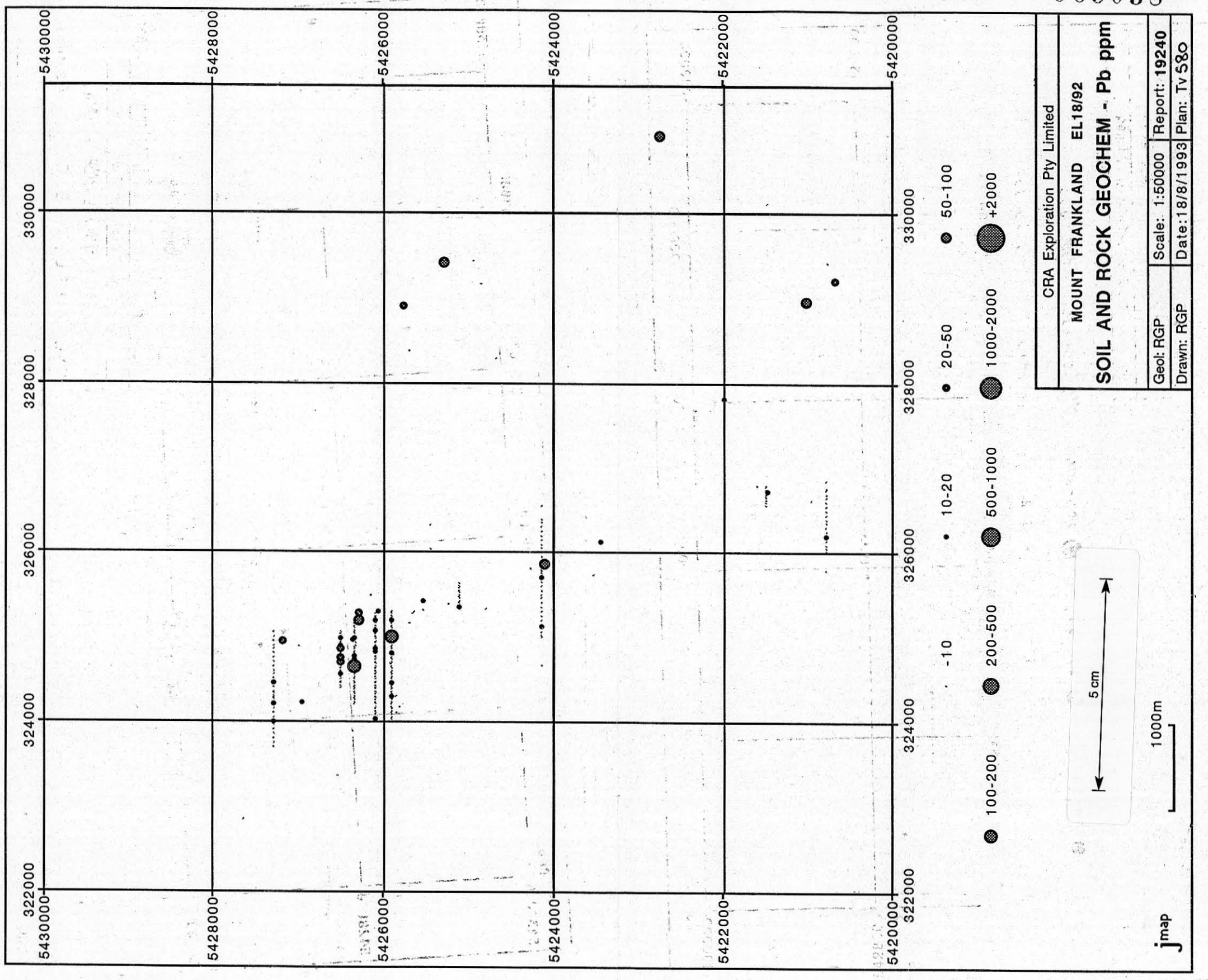
MOUNT FRANKLAND EL18/92

SOIL AND ROCK GEOCHEM - Zn ppm

Geol: RGP	Scale: 1:50000	Report: 19240
Drawn: RGP	Date:18/8/1993	Plan: TU579

93-3511

965038



CRA Exploration Pty Limited

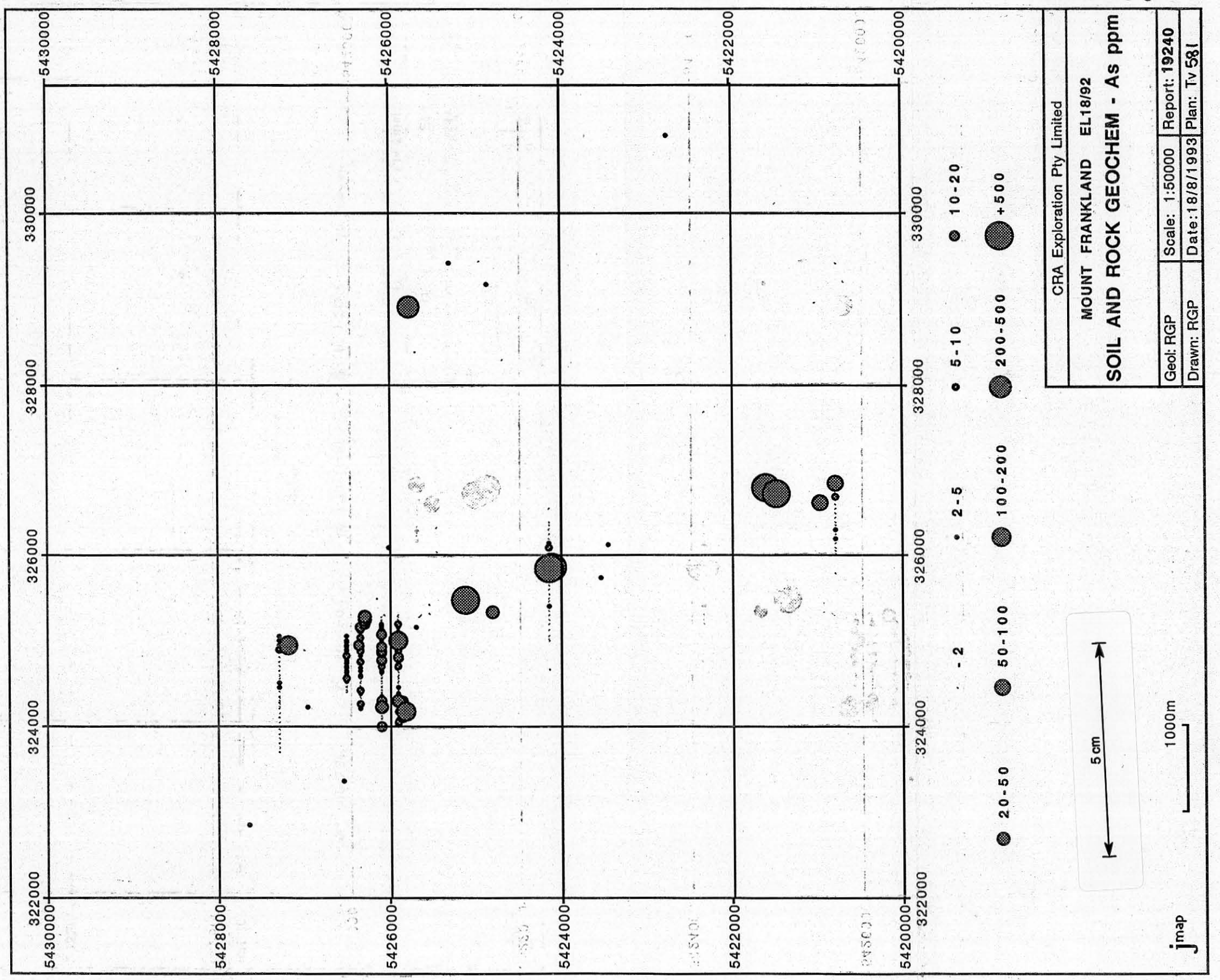
MOUNT FRANKLAND EL18/92

SOIL AND ROCK GEOCHEM - Pb ppm

Geol: RGP	Scale: 1:50000	Report: 19240
Drawn: RGP	Date: 18/8/1993	Plan: Tv580

93-3511.

965039



CRA Exploration Pty Limited

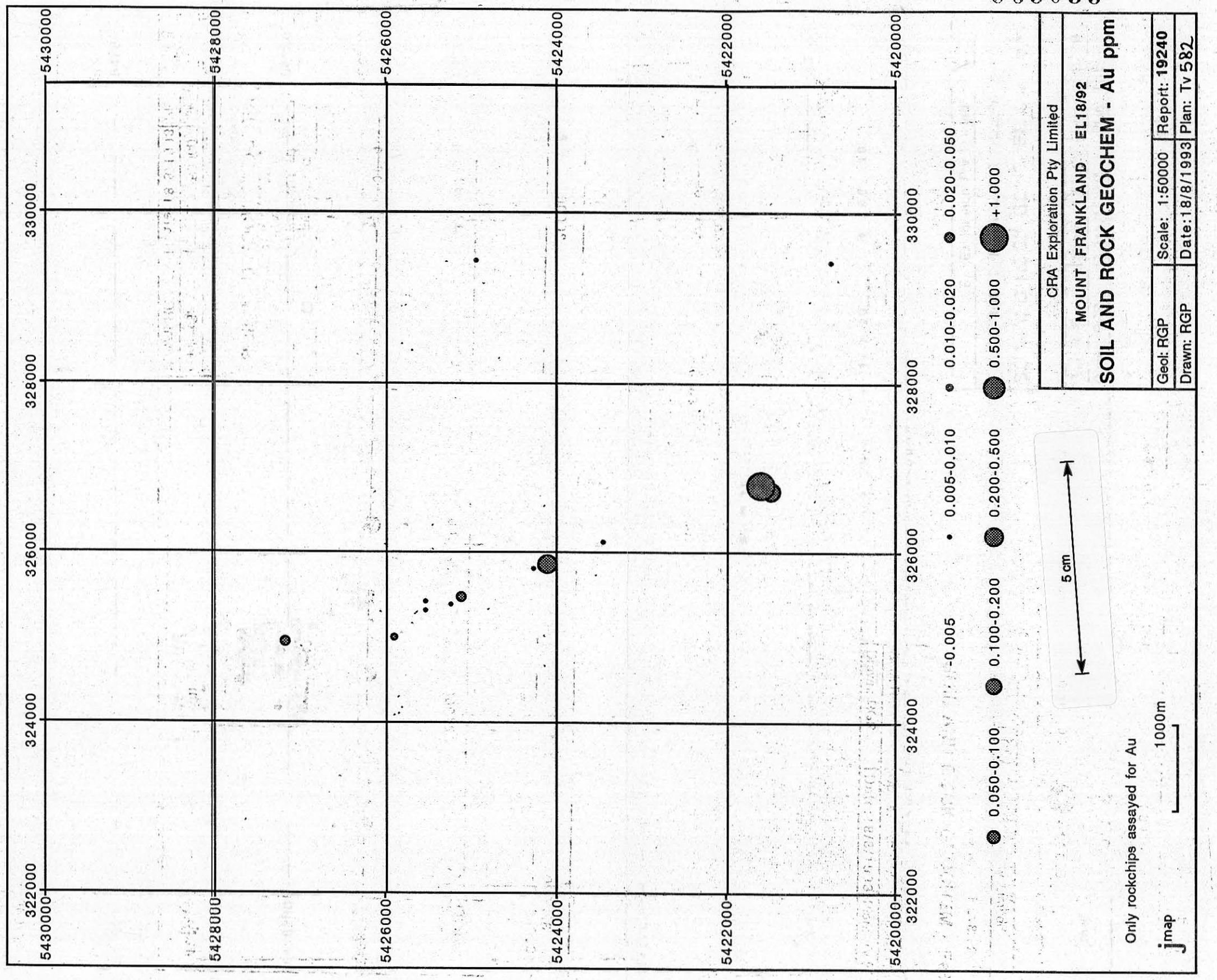
MOUNT FRANKLAND EL18/92

SOIL AND ROCK GEOCHEM - As ppm

Geol: RGP	Scale: 1:50000	Report: 19240
Drawn: RGP	Date:18/8/1993	Plan: Tv 581

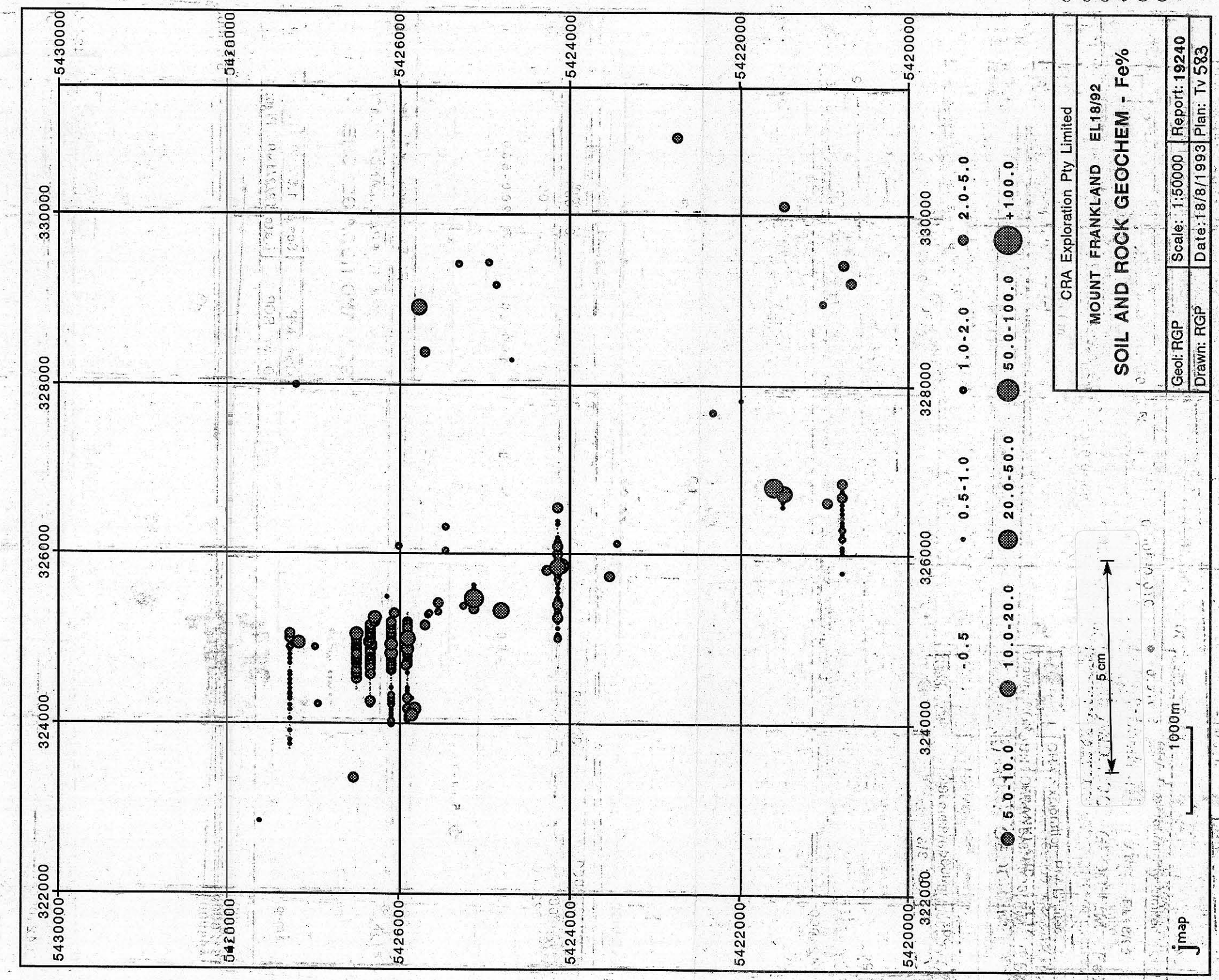
93-3511.

965035



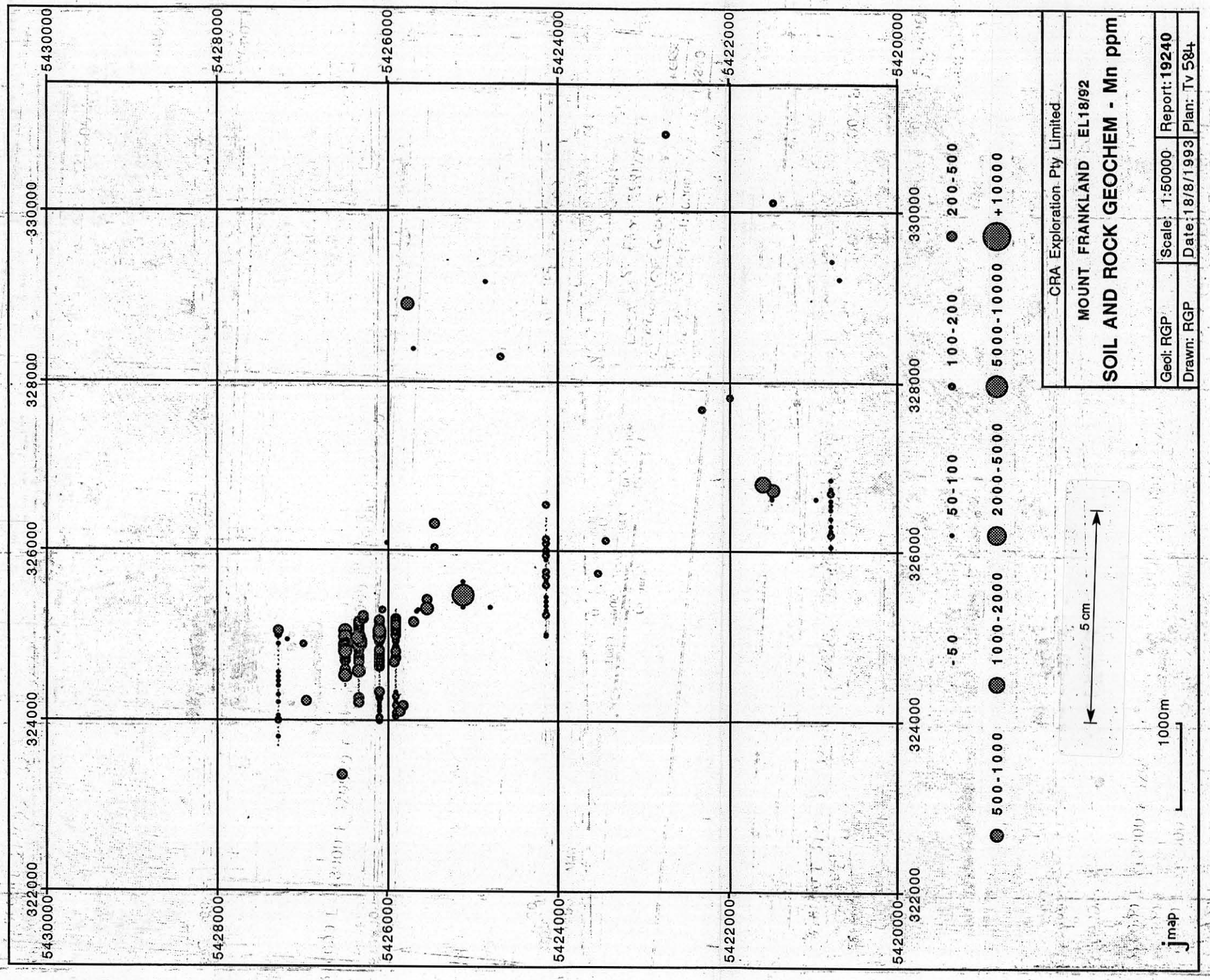
93-3511.

965033



93-3511.

965032



93-3511.

316000 E 318000 E 320000 E 322000 E 324000 E 326000 E 328000 E 330000 E 332000 E 334000 E

5444000 N
5442000 N
5440000 N
5438000 N
5436000 N
5434000 N
5432000 N
5430000 N
5428000 N
5426000 N
5424000 N
5422000 N
5420000 N
5418000 N

5427300N
5426350N
5425950N
5424150N
5421825N
5420800N

Ground Magnetic Lines

316000 E 318000 E 320000 E 322000 E 324000 E 326000 E 328000 E 330000 E 332000 E 334000 E

Grid north bearing 000° AMG

5 cm

Scale 1:100000

1000 0 1000 2000 3000 4000 5000 6000
(meters)

CRA EXPLORATION PTY. LIMITED

MT FRANKLAND & TROWUTTA ELS

NORTHWEST TASMANIA SURVEY

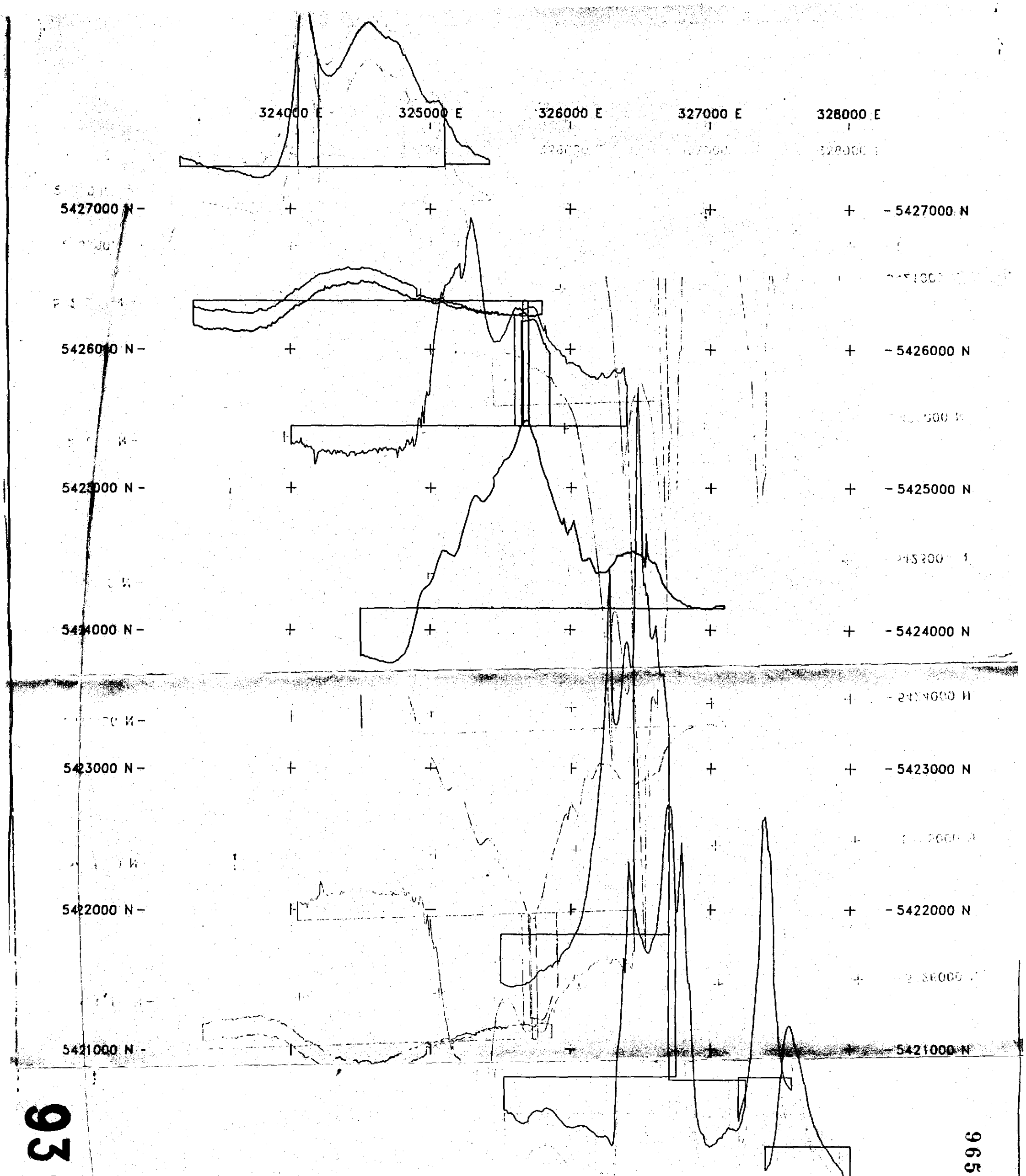
FIRST EAST DERIVATIVE

LOCATION OF GROUND MAGNETIC TRAVERSES

GEO: TA	SCALE: 1:100000	REPORT: 19240
DRAWN: TA	DATE: 21/1/93	PLAN: Tv 565

93-2511

9650034



Vertical scale 50 nT/cm

Base level 62000 nT

5 cm

Scale 1:25000

250 0 250 500 750 1000

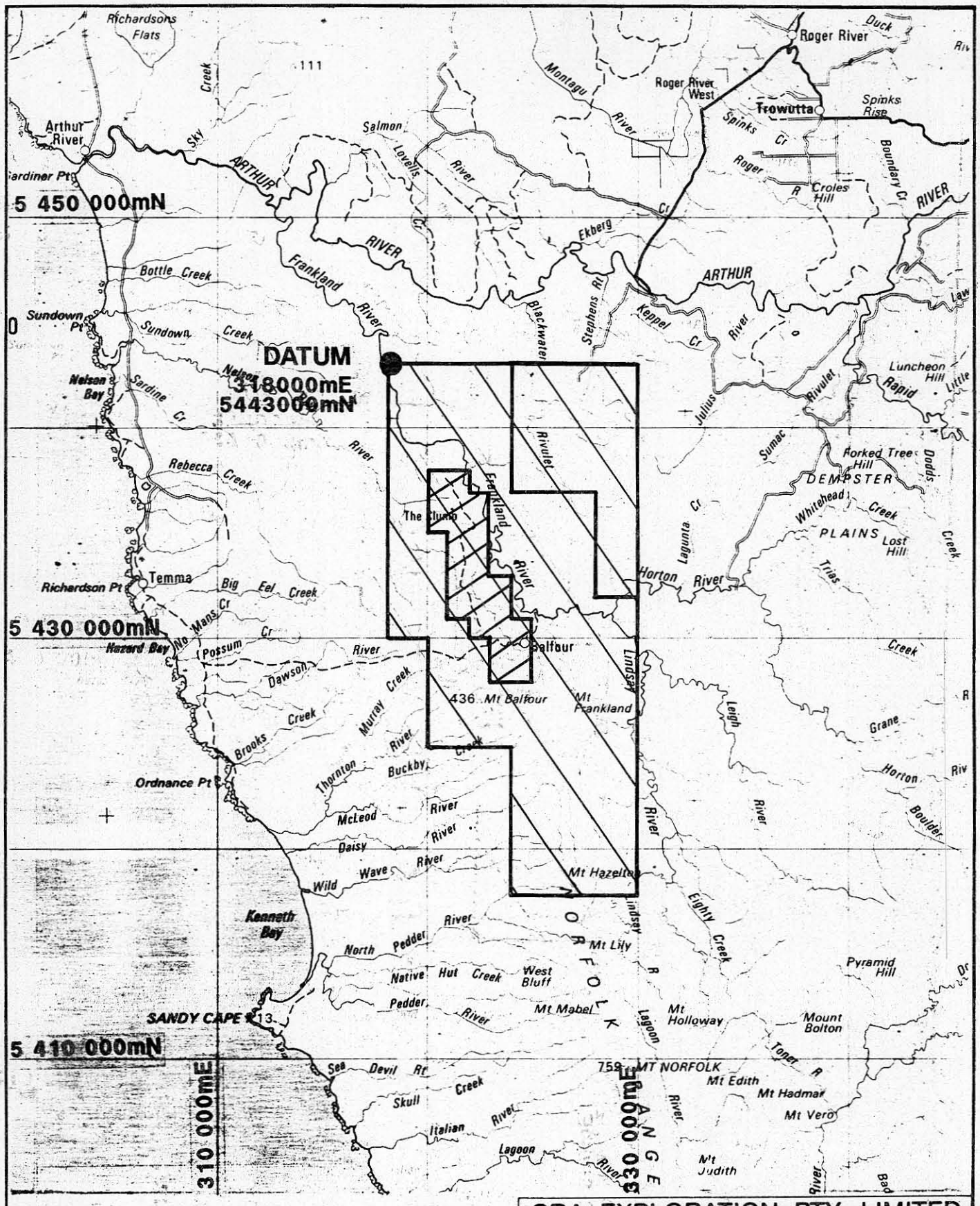
(meters)

Diurnally corrected magnetic data only on line 5425000N

CRA EXPLORATION PTY. LIMITED		
MT. FRANKLAND EL 18/92		
MT. FRANKLAND		
GROUND MAGNETIC STACKED PROFILES		
BURNIE SF55-03		
GEO: TA	SCALE: 1:25000	REPORT: 19240
DRAWN: TA	DATE: 01/03/93	PLAN: Tv566

9650430

02-2551 •



93-3511.

EXCLUDED AREA
EXISTING EL 53/88

965044

5 cm

CRA EXPLORATION PTY. LIMITED

MT. FRANKLAND EL 18/92

MT. FRANKLAND SURVEY

Ref.: SK55-03	Scale: 1:250 000
Author: T ARAVANIS	Report No.: 19240
Drawn: R.TRAVIERSO	Plan No.: Tv 619

316000.mE 318000.mE 320000.mE 322000.mE 324000.mE 326000.mE 328000.mE 330000.mE 332000.mE 334000.mE

144° 50' 00" E 144° 52' 00" E 144° 54' 00" E 144° 56' 00" E 144° 58' 00" E 145° 00' 00" E

41° 08' 00" S — 5444000.mN

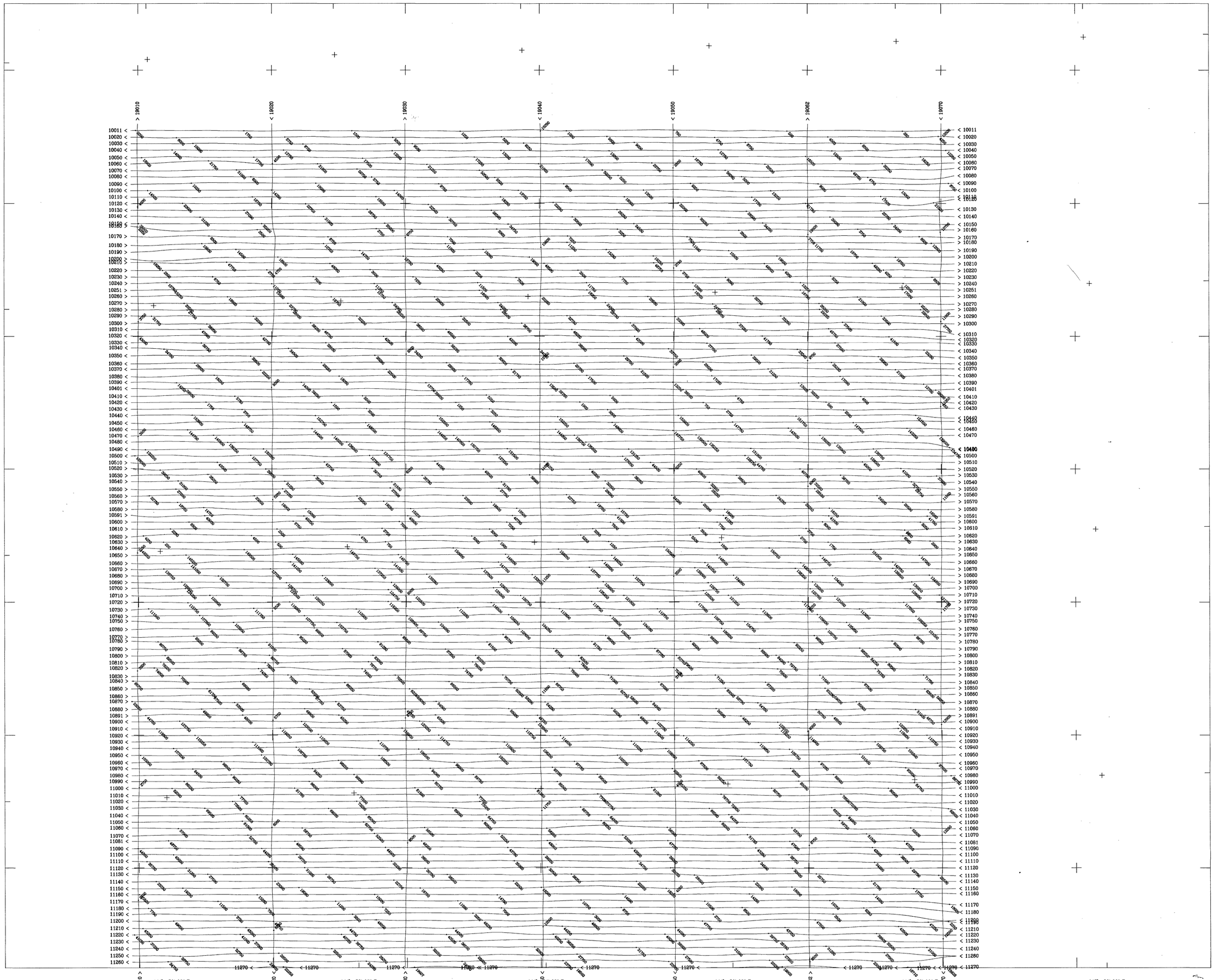
41° 10' 00" S — 5440000.mN

41° 12' 00" S — 5438000.mN

41° 14' 00" S — 5434000.mN

5436000.mN

5432000.mN



93-3511.

SCALE 1:25,000

0.5 0 0.5 1 1.5 2

Kilometres

MAP GRID ZONE 55

SPHEROID : Australian National
PROJECTION : Universal Transverse Mercator

AIRBORNE SURVEY EQUIPMENT

Aircraft	Rockwell Aerocommander 500S VH-KAC
Magnetometer	Scintrex VIW 2321-H8 Cesium Vapour
Magnetometer Resolution	0.001 nT
Magnetometer Compensation	RMS AADC operating in real time
Magnetometer Sample Interval	0.1 seconds (approx 7 metres)
Data Acquisition	RMS DAS-8
Data Recording	DC300 data cartridges
Spectrometer	Geometrics GR800D
Crystal Size	33.6lt downward, 4.2lt upward arrays
Spectrometer Sample Interval	1.0 Seconds (approx 35 metres)
Flight Path Record	VHS Colour Video System
Doppler Navigation System	Singer-Kearfott LDNS
GPS Navigation System	Ashtech XII GPS Receiver

AIRBORNE SURVEY SPECIFICATIONS

Flight Line Direction	090 – 270 degrees
Flight Line Separation	100 metres
Tie Line Direction	180 – 360 degrees
Tie Line Separation	2000 metres
Terrain Clearance	60 metres (MTC)
Kevron Geophysics job number	1188
Survey flown	March 1993

FLIGHT PATH PROCESSING

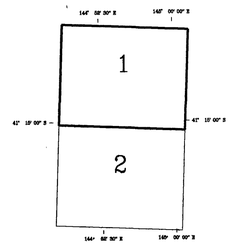
GPS navigation data differentially corrected in real time.

GPS Base Station Base location S 40 59' 36.78", E 145 43' 27.40"

Every 250 th fiducial annotated.

Grid notation refers to Australian Map Grid Zone 55.

Sheet Index



N

True North

Kevron Geophysics PTY.LTD

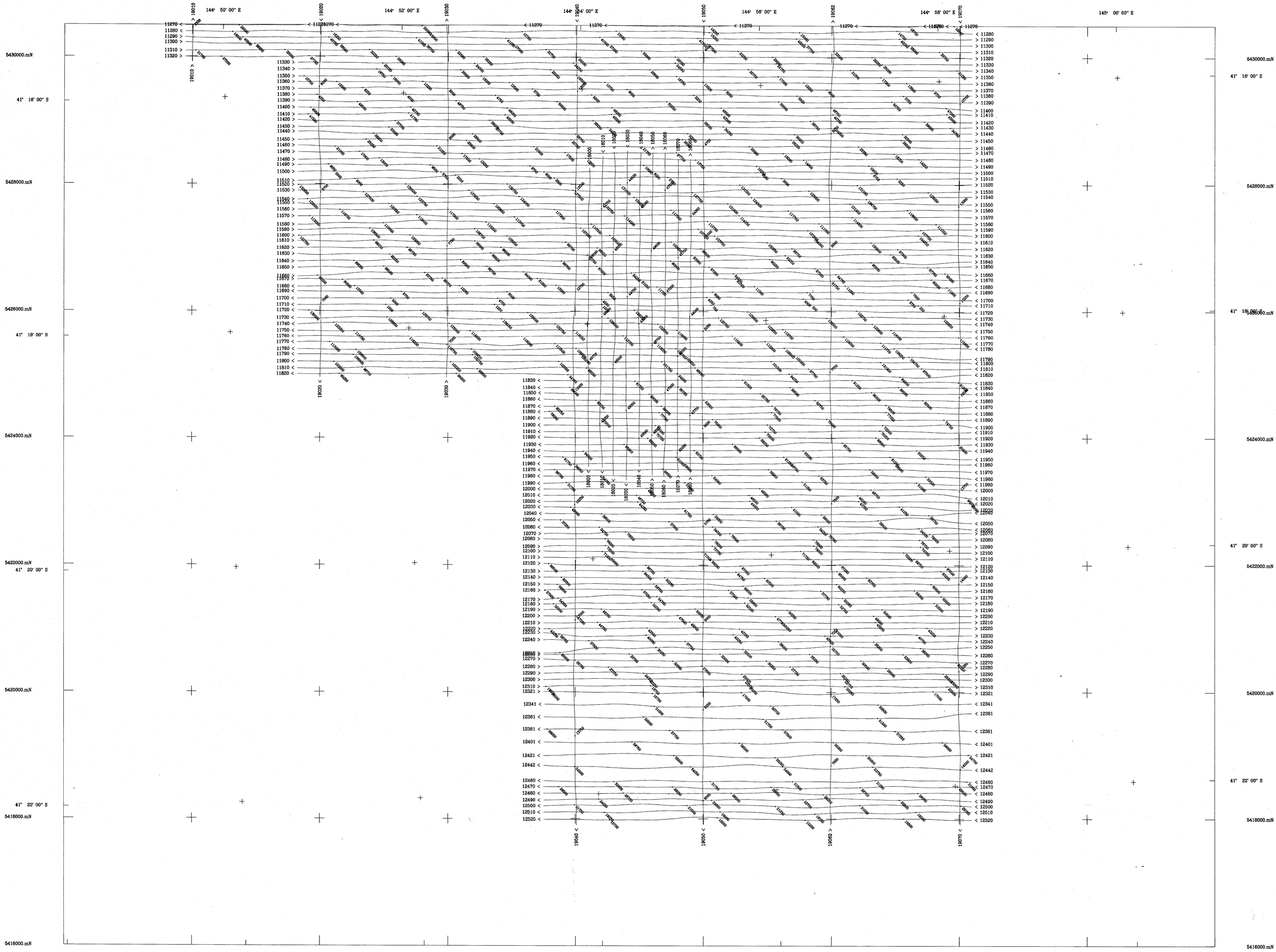
C.R.A. Exploration Pty. Ltd.

Mt Frankland 965046

Airborne Geophysical Survey

Flight Path

DATE : May 1993	REPORT : 19240
DRAWN : Kevron Geophysics Pty. Ltd.	PLAN NO. Tv 556
SCALE 1:25,000	5 cm



93-3511.

AIRBORNE SURVEY EQUIPMENT

Aircraft	Rockwell Aerocommander 500S VH-KAC
Magnetometer	Scintrex VIW 2321-H8 Cesium Vapour
Magnetometer Resolution	0.001 nT
Magnetometer Compensation	RMS AADC operating in real time
Magnetometer Sample Interval	0.1 seconds (approx 7 metres)
Data Acquisition	RMS DAS-8
Data Recording	DC300 data cartridges
Spectrometer	Geometrics GR800D
Crystal Size	33.6lt downward, 4.2lt upward arrays
Spectrometer Sample Interval	1.0 Seconds (approx 35 metres)
Flight Path Record	VHS Colour Video System
Doppler Navigation System	Singer-Kearfott LINS
GPS Navigation System	Ashtech XII GPS Receiver

AIRBORNE SURVEY SPECIFICATIONS

Flight Line Direction	090 – 270 degrees
Flight Line Separation	100 metres
Tie Line Direction	180 – 360 degrees
Tie Line Separation	2000 metres
Terrain Clearance	60 metres (MTC)
Kevron Geophysics job number	1188
Survey flown	March 1993

FLIGHT PATH PROCESSING

GPS navigation data differentially corrected in real time.

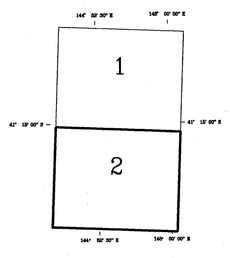
GPS Base Station Base location S 40 59' 36.78", E 145 43' 27.40"

Every 250 th fiducial annotated.

Grid notation refers to Australian Map Grid Zone 55.

Kevron Geophysics PTY LTD

Sheet Index



True North

SCALE 1:25,000

0.5 0 0.5 1 1.5 2

Kilometres

MAP GRID ZONE 55

SPHEROID : Australian National

PROJECTION : Universal Transverse Mercator

C.R.A. Exploration Pty. Ltd.

Mt Frankland 965045

Airborne Geophysical Survey

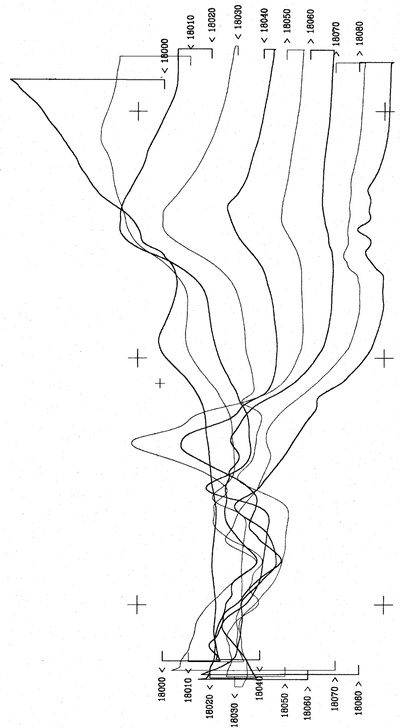
Flight Path

DATE : May 1993	REPORT : 19240
DRAWN : Kevron Geophysics Pty. Ltd.	PLAN NO. Tv 561
SCALE 1:25,000	5 cm

316000.mE 318000.mE 320000.mE 322000.mE 324000.mE 326000.mE 328000.mE 330000.mE 332000.mE 334000.mE

144° 50' 00" E 144° 52' 00" E 144° 54' 00" E 144° 56' 00" E 144° 58' 00" E 145° 00' 00" E

5430000.mN 41° 16' 00" S



5428000.mN

5426000.mN 41° 18' 00" S

5424000.mN

5422000.mN 41° 20' 00" S

5420000.mN

41° 22' 00" S 5418000.mN

5416000.mN

144° 48' 00" E 144° 50' 00" E 144° 52' 00" E 144° 54' 00" E 144° 56' 00" E 144° 58' 00" E 145° 00' 00" E

316000.mE 318000.mE 320000.mE 322000.mE 324000.mE 326000.mE 328000.mE 330000.mE 332000.mE 334000.mE

93-3511.1

SCALE 1:25,000

0.5 0 0.5 1 1.5 2

Kilometres

MAP GRID ZONE 55

SPHEROID : Australian National

PROJECTION : Universal Transverse Mercator

AIRBORNE SURVEY EQUIPMENT

Aircraft	Rockwell Aerocommander 500S VH-KAC
Magnetometer	Scintrex VIW 2321-H8 Cesium Vapour
Magnetometer Resolution	0.001 nT
Magnetometer Compensation	RMS AADC operating in real time
Magnetometer Sample Interval	0.1 seconds (approx 7 metres)
Data Acquisition	RMS DAS-8
Data Recording	DC300 data cartridges
Spectrometer	Geometrics GR800D
Crystal Size	33.6lt downward, 4.2lt upward arrays
Spectrometer Sample Interval	1.0 Seconds (approx 35 metres)
Flight Path Record	VHS Colour Video System
Doppler Navigation System	Singer-Kearfott LDNS
GPS Navigation System	Ashtech XII GPS Receiver

AIRBORNE SURVEY SPECIFICATIONS

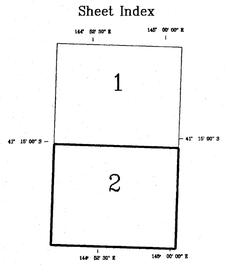
Flight Line Direction	090 - 270 degrees
Flight Line Separation	100 metres
Tie Line Direction	180 - 360 degrees
Tie Line Separation	2000 metres
Terrain Clearance	60 metres (MTC)
Kevron Geophysics job number	1188
Survey flown	March 1993

RESIDUAL MAGNETIC INTENSITY STACKED PROFILES

Diurnal variations removed
IGRF(1990) updated to 1993.3 removed
Value of 5000 added to datum

Datum Base Value	4930 nT
Vertical Scale	50 nT / cm

Sheet Index



N

True North

Kevron Geophysics PTY LTD

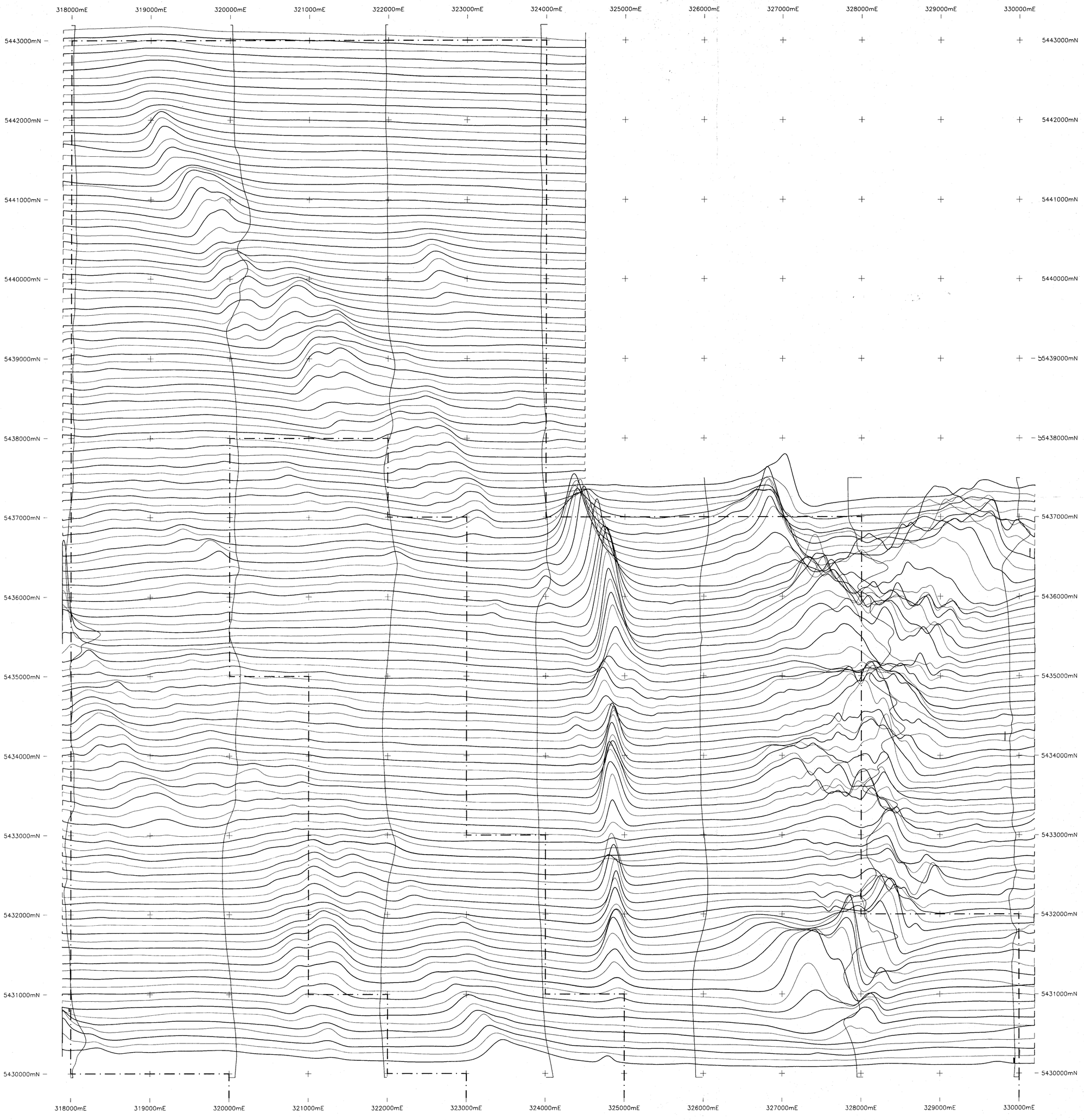
C.R.A. Exploration Pty. Ltd.

Mt Frankland 965047

Airborne Geophysical Survey

Residual Magnetic Intensity Profiles

DATE : Jul 1993	REPORT : 19240
DRAWN : Kevron Geophysics Pty. Ltd.	PLAN NO. TV 558
SCALE 1:25,000	5 cm



AIRBORNE SURVEY EQUIPMENT

Aircraft:	ROCKWELL AEROCOMMANDER 500S VH-KAC
Magnetometer:	SCINTREX VIW 2321-H8 Cesium Vapour
Magnetometer resolution:	0.001 nT
Magnetometer sample interval:	0.10 s (7 m approx.)
Data acquisition:	RMS DAS-8
Data recording:	DC300 data cartridges
Spectrometer:	Geometrics GR800D
Crystal size:	33.6 l downward, 4.2 l upwards arrays
Spectrometer sample interval:	1.0 s (70 m approx.)
Flight path record:	VHS Colour video system
GPS Navigation system:	Ashtech XII GPS receiver

AIRBORNE SURVEY SPECIFICATIONS

Survey flown by:	Kevron Geophysics Pty. Limited - Job No. 1188
Data Acquisition by:	Kevron Geophysics Pty. Limited
Survey date:	March 1993
Flight line direction:	090 - 270 ° AMG
Flight line separation:	100 m
Tie line direction:	000 - 180 ° AMG
Tie line separation:	2000 m
Mean terrain clearance:	60 m

RESIDUAL MAGNETIC STACKED PROFILES

Diurnal variations removed.
IGRF (1990) updated to 1993.3 removed.
Average survey base station value and a constant of 5000 nT added to datum.

Base level:	4930 nT
Vertical scale:	200 nT/cm

965048

5 cm

93-3511

AMG North
Mag. North
11°

0 500 1000 1500 2000
metres

CRA EXPLORATION PTY. LIMITED

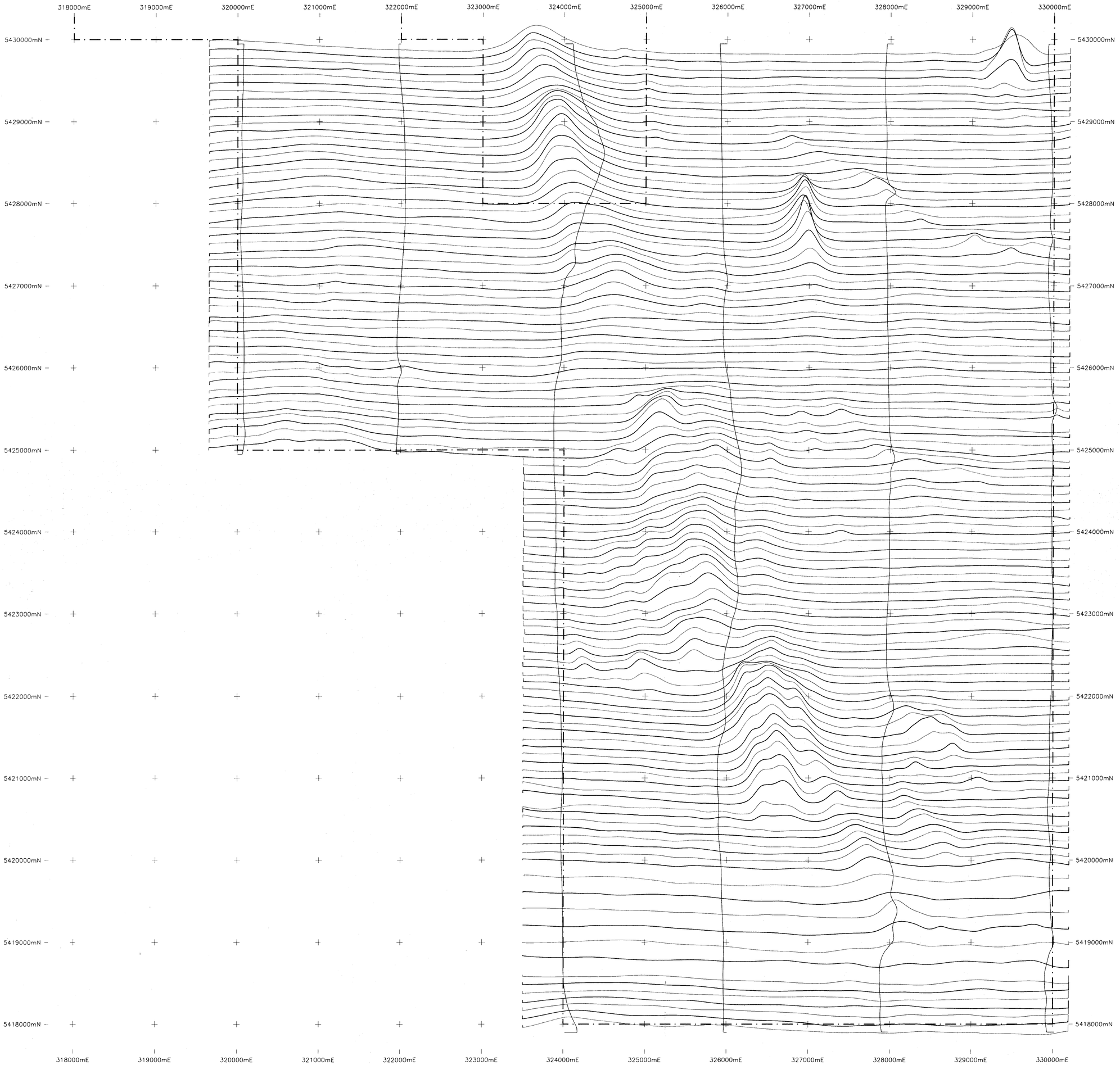
MT FRANKLAND EL 18/92

MT. FRANKLAND SURVEY

AEROMAGNETIC STACKED PROFILES

BURNIE SK55-03

GEO:	TA	*SCALE:*	1:25000	*REPORT:*	19240
DRAWN:	TA	*DATE:*	4/10/93	*PLAN:* Tv	614



AIRBORNE SURVEY EQUIPMENT

Aircraft:	ROCKWELL AEROCOMMANDER 500S VH-KAC
Magnetometer:	SCINTREX VIW 2321-H8 Cesium Vapour
Magnetometer resolution:	0.001 nT
Magnetometer sample interval:	0.10 s (7 m approx.)
Data acquisition:	RMS DAS-8
Data recording:	DC300 data cartridges
Spectrometer:	Geometrics GR800D
Crystal size:	33.6 l downward, 4.2 l upwards arrays
Spectrometer sample interval:	1.0 s (70 m approx.)
Flight path record:	VHS Colour video system
GPS Navigation system:	Ashtech XII GPS receiver

AIRBORNE SURVEY SPECIFICATIONS

Survey flown by:	Kevron Geophysics Pty. Limited - Job No. 1188
Data Acquisition by:	Kevron Geophysics Pty. Limited
Survey date:	March 1993
Flight line direction:	090 - 270 ° AMG
Flight line separation:	100 m
Tie line direction:	000 - 180 ° AMG
Tie line separation:	2000 m
Mean terrain clearance:	60 m

RESIDUAL MAGNETIC STACKED PROFILES

Diurnal variations removed.
IGRF (1990) updated to 1993.3 removed.
Average survey base station value and a constant of 5000 nT added to datum.

Base level:	4930 nT
Vertical scale:	200 nT/cm

965049

5 cm

93-3511.

AMG North
Mag. North
11°

0 500 1000 1500 2000
metres

CRA EXPLORATION PTY. LIMITED

MT FRANKLAND EL 18/92

MT. FRANKLAND SURVEY

AEROMAGNETIC STACKED PROFILES

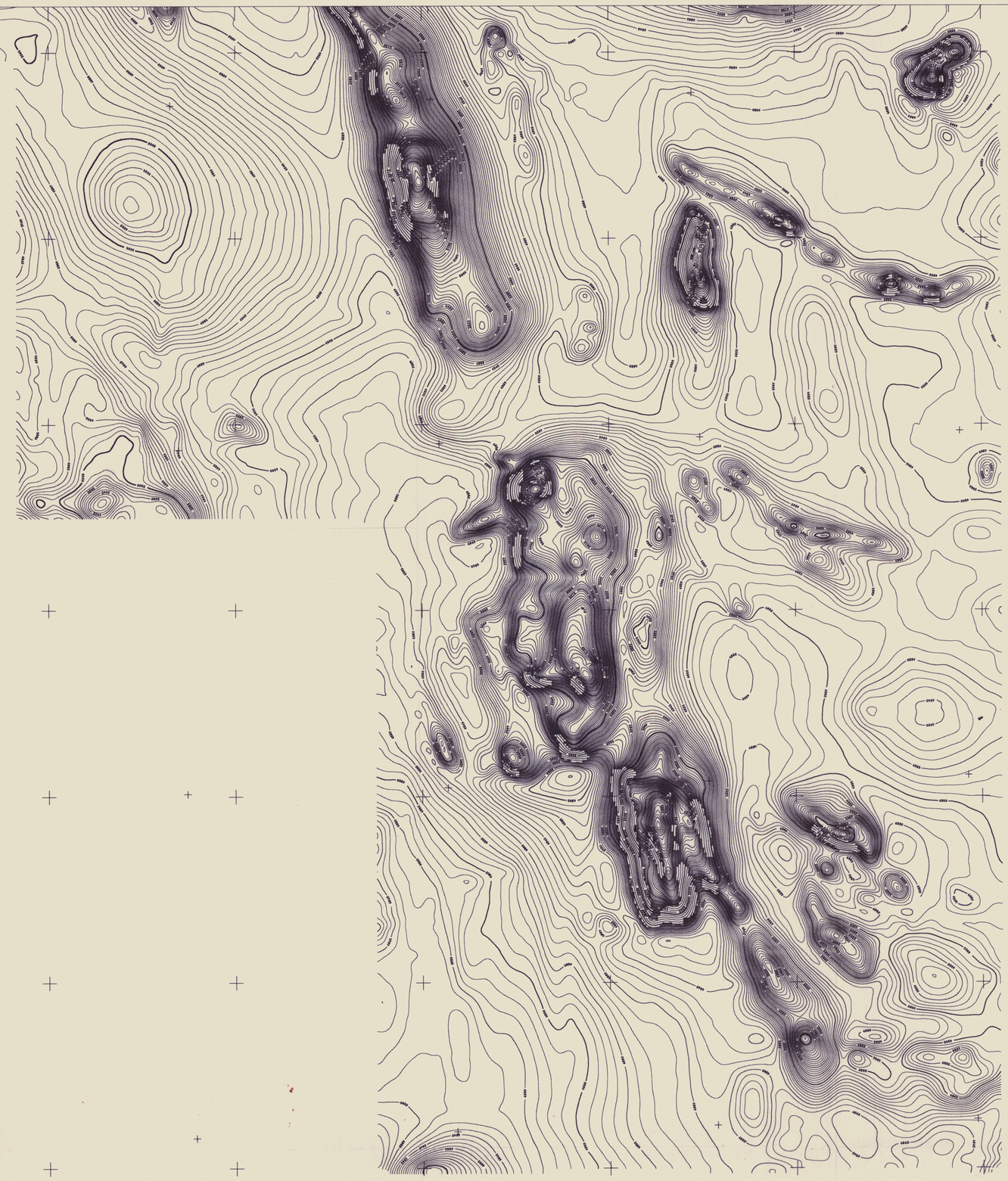
BURNIE SK55-03

GEO:	TA	*SCALE:*	1:25000	*REPORT:*	19240
DRAWN:	TA	*DATE:*	4/10/93	*PLAN:*	Tv 615

316000.mE 318000.mE 320000.mE 322000.mE 324000.mE 326000.mE 328000.mE 330000.mE 332000.mE 334000.mE

144° 48' 00" E 144° 50' 00" E 144° 52' 00" E 144° 54' 00" E 144° 56' 00" E 144° 58' 00" E 145° 00' 00" E

5430000.mN 41° 16' 00" S
5428000.mN
5426000.mN 41° 18' 00" S
5424000.mN
5422000.mN 41° 20' 00" S
5420000.mN 41° 22' 00" S
5418000.mN
5416000.mN



965053
93-3511

SCALE 1:25,000

0.5 0 0.5 1 1.5 2
Kilometres
MAP GRID ZONE 55

SPHEROID : Australian National
PROJECTION : Universal Transverse Mercator

AIRBORNE SURVEY EQUIPMENT

Aircraft	Rockwell Aerocommander 500S VH-KAC
Magnetometer	Scintrex VIW 2321-H8 Cesium Vapour
Magnetometer Resolution	0.001 nT
Magnetometer Compensation	RMS AADC operating in real time
Magnetometer Sample Interval	0.1 seconds (approx 7 metres)
Data Acquisition	RMS DAS-8
Data Recording	DC300 data cartridges
Spectrometer	Geometrics GR800D
Crystal Size	33.6lt downward, 4.2lt upward arrays
Spectrometer Sample Interval	1.0 Seconds (approx 35 metres)
Flight Path Record	VHS Colour Video System
Doppler Navigation System	Singer-Kearfott LDNS
GPS Navigation System	Ashtech XII GPS Receiver

AIRBORNE SURVEY SPECIFICATIONS

Flight Line Direction	090 - 270 degrees
Flight Line Separation	100 metres
Tie Line Direction	180 - 360 degrees
Tie Line Separation	2000 metres
Terrain Clearance	60 metres (MTC)
Kevron Geophysics job number	1188
Survey flown	March 1993

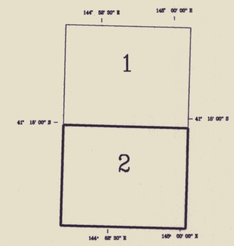
TOTAL MAGNETIC INTENSITY CONTOURS

Diurnal variations removed.
IGRF(1990) updated to 1993.3 removed.
Average survey base station value of
5000 nT added to datum.

Grid mesh 25 x 25 metres

Contour Intervals 5, 20, 100, 500 nT

Sheet Index



N
True North

Kevron Geophysics PTY LTD

C.R.A. Exploration Pty. Ltd.

Mt Frankland

Airborne Geophysical Survey

Total Magnetic Intensity Contours

DATE : Jul 1993	REPORT : 19240
DRAWN : Kevron Geophysics Pty. Ltd.	PLAN NO. Tv 562
SCALE 1:25,000	5 cm

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144° 50' 00" E 144° 52' 00" E 144° 54' 00" E 144° 56' 00" E 144° 58' 00" E 145° 00' 00" E

41° 08' 00" S — 5444000.mN

41° 10' 00" S — 5442000.mN

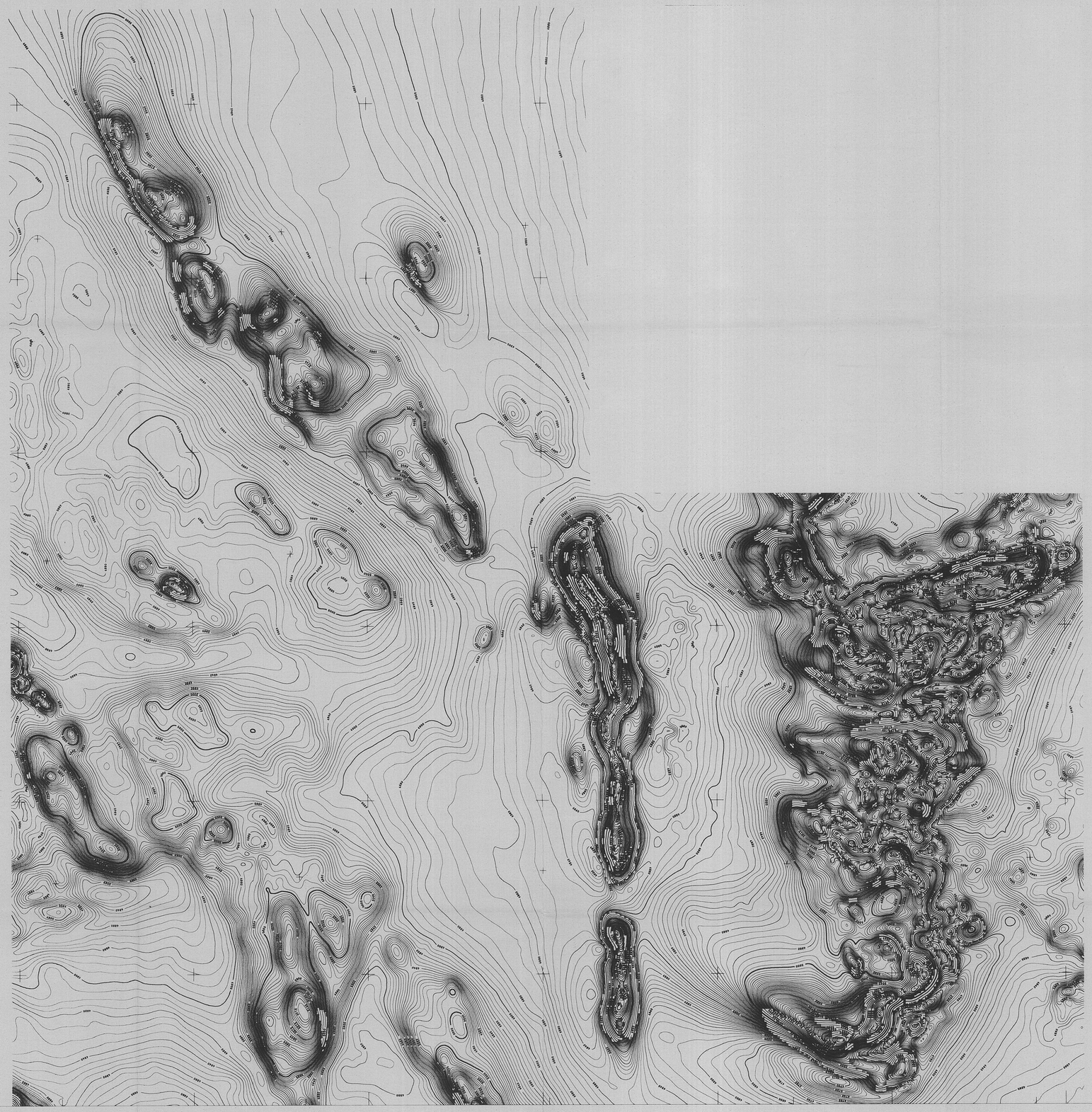
41° 12' 00" S — 5440000.mN

5438000.mN

5436000.mN

41° 14' 00" S — 5434000.mN

5432000.mN



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93-3511. 965051

SCALE 1:25,000

0.5 0 0.5 1 1.5 2

Kilometres

MAP GRID ZONE 55

SPHEROID : Australian National

PROJECTION : Universal Transverse Mercator

AIRBORNE SURVEY EQUIPMENT

Aircraft	Rockwell Aerocommander 500S VH-KAC
Magnetometer	Scintrex VIW 2321-H6 Cesium Vapour
Magnetometer Resolution	0.001 nT
Magnetometer Compensation	RMS AADC operating in real time
Magnetometer Sample Interval	0.1 seconds (approx 7 metres)
Data Acquisition	RMS DAS-6
Data Recording	DC300 data cartridges
Spectrometer	Geometrics GR800D
Crystal Size	33.6lt downward, 4.2lt upward arrays
Spectrometer Sample Interval	1.0 Seconds (approx 35 metres)
Flight Path Record	VHS Colour Video System
Doppler Navigation System	Singer-Kearfott LDNS
GPS Navigation System	Ashtech XII GPS Receiver

AIRBORNE SURVEY SPECIFICATIONS

Flight Line Direction	090 - 270 degrees
Flight Line Separation	100 metres
Tie Line Direction	180 - 360 degrees
Tie Line Separation	2000 metres
Terrain Clearance	60 metres (MTC)
Kevron Geophysics job number	1188
Survey flown	March 1993

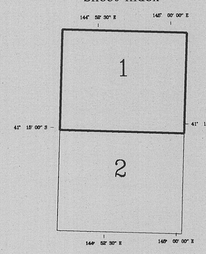
TOTAL MAGNETIC INTENSITY CONTOURS

Diurnal variations removed.
IGRF(1990) updated to 1993.3 removed.
Average survey base station value of
5000 nT added to datum.

Grid mesh 25 x 25 metres

Contour Intervals 5, 20, 100, 500 nT

Sheet Index



N

True North

Kevron Geophysics PTY LTD

C.R.A. Exploration Pty. Ltd.	
Mt Frankland	
Airborne Geophysical Survey	
Total Magnetic Intensity Contours	
DATE : Jul 1993	REPORT : 19240
DRAWN : Kevron Geophysics Pty. Ltd.	PLAN NO. Tv 613
SCALE 1:25,000	5 cm

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5443000mN 5442000mN 5441000mN 5440000mN 5439000mN 5438000mN 5437000mN 5436000mN 5435000mN 5434000mN 5433000mN 5432000mN 5431000mN 5430000mN 5429000mN 5428000mN 5427000mN 5426000mN 5425000mN 5424000mN 5423000mN 5422000mN 5421000mN 5420000mN 5419000mN 5418000mN

ROGER RIVER FAULT

BALFOUR TRANSFORM

HEEMSKIRK ROAD (K & Th ANOMALY)

CENTRAL RADIOMETRIC DOMAIN (INTERVIEW SILTSTONE?)

NORTH-EASTERN RADIOMETRIC DOMAIN (SMITHTON TROUGH) QUARTZITE?)

WESTERN RADIOMETRIC DOMAIN (LAGOON RIVER QUARTZITE?)

GP

The Clump

Landing Ground

Murrays Reward

Specimen Hill

Development

cut lines

Balfour South

LRZ

REFERENCE

- K FEATURE
- Th FEATURE
- GROUND DISTURBANCES
  - Moderate-Strong K & Th Anomaly
  - Road
  - Weak-Moderate K & Th Anomaly
  - Road
- LRZ — ZONES OF LOW RADIOMETRIC RESPONSES (Central Radiometric Domain)
- ZONES OF VERY LOW RADIOMETRIC RESPONSES (Black River Dolomite?)
- ZONES OF VERY LOW RADIOMETRIC RESPONSES (Smithton Dolomite)
- TIN WORKINGS
- COPPER WORKINGS/OCCURANCES
- BALFOUR TOWNSHIP
- GP — GRAVEL PIT
- RADIOMETRIC LINEATION

965050

5 cm

93-3511.

AMG North / Mag. North 11°

0 500 1000 1500 2000 metres

CRA EXPLORATION PTY. LIMITED

MT FRANKLAND EL 18/92

MT. FRANKLAND SURVEY
RADIOMETRIC INTERPRETATION

BURNIE SK55-03

GEO: TA	SCALE: 1:25000	REPORT: 19240
DRAWN: TA	DATE: 27/09/93	PLAN: Tv 599

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5443000mN 5442000mN 5441000mN 5440000mN 5439000mN 5438000mN 5437000mN 5436000mN 5435000mN 5434000mN 5433000mN 5432000mN 5431000mN 5430000mN 5429000mN 5428000mN 5427000mN 5426000mN 5425000mN 5424000mN 5423000mN 5422000mN 5421000mN 5420000mN 5419000mN 5418000mN

BPS
IS1
LRQ4
LRQ3
LRQ2
LRQ1
IS2
The Clump
Development
Carbonate
Roger River Fault
Balfour Transform
Trowutta EL 19/92
Balfour
Murrays Reward
Mt. Balfour
Mt Frankland
Balfour South
Mt Hazelton
400m
600m

REFERENCE

- Tertiary Basalt Plug, (Inferred)
- Inferred Dykes
- Possible Intrusive

CAMBRIAN SMITHTON TROUGH
- Smithton Dolerite?
- Smithton Basalt
- Black River Dolomite?
- Forest Conglomerate Magnetic Unit?
- Interpreted Margin of the Interview Siltstone and Smithton Trough

PROTEROZOIC INTERVIEW SILTSTONE
- Unnamed Magnetic Unit
- IS2
- BPS — Balfour Pyrrhotitic Siltstone
- IS1
- Interpreted Margin of the Lagoon River Quartzite and Interview Siltstone

PROTEROZOIC LAGOON RIVER QUARTZITE
- LRQ4
- LRQ3
- LRQ2
- LRQ1

5 cm

- Undifferentiated Magnetic Unit (strong)
- Undifferentiated Magnetic Unit (weak)
- Inferred Shear
- Copper Occurances
- Interpreted Smithton Trough Axis
- Interpreted Dip Direction
- Topographic Contour m above sea level

93-3511. 965052

AMG North / Mag. North 11°

0 500 1000 1500 2000 metres

CRA EXPLORATION PTY. LIMITED

MT FRANKLAND EL 18/92

MT. FRANKLAND SURVEY
AEROMAGNETIC INTERPRETATION PLAN

BURNIE SK55-03

GEO:	TA	SCALE:	1:25000	REPORT:	19240
DRAWN:	TA	DATE:	27/09/93	PLAN: Tv	600

APPENDIX 1

MEMO FROM C. PRICE TO R. PARKINSON

APPENDIX 1.

965055

C R A EXPLORATION PTY. LIMITED
(INC. IN N.S.W.) A.C.N. 000 057 125
21 KEANE ST., CURRAJONG, TOWNSVILLE, QLD. 4812

P.O. BOX 518, AITKENVALE, Q. 4814
TELEPHONE : (077) 75 2277
FAX : (077) 75 3446

8 March 1993

MEMORANDUM TO: R G Parkinson
COPY TO: T W Dickson
FROM: C D Price

BALFOUR EXPLORATION PROGRAMME - FEBRUARY 1993

SUMMARY

A three week exploration programme was aimed at a first-pass assessment of the southern part of Mount Frankland EL 18/92 for stratiform-type copper deposits. A ground magnetic survey covered 13.4 line kilometres on seven east-west lines, 56 rock chip and 103 soil samples were collected and a 40km^2 area traversed and mapped. Old copper mines on the 20km long Balfour Copper Trend were also inspected.

The ground magnetic survey confirmed a 1km gap in a NNE-trending magnetic high identified on airborne magnetic data. Magnetic susceptibilities of all rocks in the area were less than 40 x 10^{-5} SI units.

Assay results for rock chip and soil samples have not been received. C-horizon soil sampling only worked well across flat areas.

The old copper workings consist of quartz-pyrite(-chalcopyrite) lodes up to 3m wide with chlorite wallrock alteration. The lodes appear to be localised in dextral shear zones. The lode copper mineralisation was emplaced after or in the waning stages of the major deformation phase at Balfour (Tabberabberan Orogeny).

The main rock types of the Proterozoic Rocky Cape Group encountered were pyritic laminated shale/sandstone ("pyjama rock"), pyritic shale and quartz sandstone. This sequence is undifferentiated and along the Balfour Copper Trend generally dips at 40° - 80° to the east (eastward facing). To the east and west of the Copper Trend folding is open and shallow dips are common.

In the 1km magnetic "gap" there is strong chlorite alteration of shales and development of sericite-quartz schist. The gap appears to be bounded by east-west trending sinistral (?) faults. Mount Frankland is capped by steeply dipping pink conglomerate and quartz grit, which may be the basal unit of the overlying Smithton Dolomite.

There is a fair chance of a large epigenetic copper deposit in the Balfour Copper Trend, particularly in the magnetic gap. Further exploration work should include 1:10,000 scale mapping of the "gap", detailed logging of the Heemskirk Road cuttings, soil sampling of line 5426350N, repeating the ground magnetic survey on existing lines and photogeological interpretation of 1:25,000 scale colour aerial photographs.

INTRODUCTION

This exploration programme was carried out without prior knowledge of the geological history of northwest Tasmania. Due to the limited time available it was decided to concentrate on understanding the structure of the southern part of the tenement and to determine the cause of the prominent gap in the NNW-trending magnetic high near Mount Frankland.

Brief History (relevant to current exploration)

1901	Murrays Reward copper lode discovered.
1901 - 1914	Prospecting and mining of copper lodes on the 20km long Balfour Copper Trend. Main mines were Murrays Reward, Central Balfour and Balfour South.
1960's - 1973	ACI did extensive trenching and 37 diamond drillholes. Main drill targets were Murrays Reward (incl. 41m @ 0.93% Cu) and The Clump. Pyrite-chalcopyrite mineralisation, mostly with quartz-dolomite lode, but indications of stratiform mineralisation as well.
1978 - 1980	CRAE tin exploration (JV with Geopeko) at Specimen Hill.
1983 - 1985	CRAE regional stream sediment sampling survey and inspection of small workings around Dohertys Pimple. Very low -80# copper values (2-5ppm bg) partly due to leached silicified rocks at surface. 59ppm Cu from Cassiterite Creek. No follow-up on Balfour Copper Trend.
1988 - 1993	Area from The Clump to Balfour held by Soloriens Mining. No drilling or gridding carried out but flagging and topofil cotton indicate some mapping in the last few months. A few mineral leases still cover Specimen Hill, Murrays Reward and Central Balfour.

The Mount Frankland tenement surrounds the Soloriens Mining tenement and covers the southern half of the Balfour Copper Trend. The Trend has many features of large Proterozoic-hosted stratiform copper deposits, including:

- Proterozoic (1100my?) black shale/sandstone sequence
- known lode-type copper deposits
- structural focus (fault zones, transform faults, moderate dips)
- possible favourable host horizons (pyritic shale and sandstone, pyrrhotitic siltstone)

GROUND MAGNETIC SURVEY

Seven east-west lines (079° magnetic) totalling 13.4km were pegged every 50m and a ground magnetic survey carried out using MP3 magnetometers. However the base station magnetometer only worked properly for one day, and only line 5425350N was corrected for diurnal variation.

The uncorrected data is still useful and confirmed a 1km gap in a NNW-trending magnetic high (see attached plan).

No magnetic rocks outcropped on or near the magnetic lines, even on the fresh road cutting along line 5425350N (maximum magnetic susceptibility 40 x 10^{-5} SI units). The steep magnetic gradients and strong anomalies on the southern two lines indicate a near surface magnetic source.

Outcrop along the magnetic lines is limited but the attached geological sections should help in interpreting the data. No pyrrhotitic sediments were observed but pyrrhotitic siltstone has been reported from Specimen Hill and near Mount Norfolk. A possible extension of the magnetic high in the northern part of the tenement corresponds to pale green sandstone and siltstone with disseminated magnetite.

The ground magnetic survey should be repeated.

SOIL SAMPLING

A total of 103 soil samples were collected at 25m or 50m spacing along three of the east-west magnetic lines, and over quartz-pyrite-chalcopyrite lodes at Balfour South and at 325475E 5425110N. A good C-horizon sample of usually weathered interbedded shale and sandstone was obtained using a hand auger across flat areas. However on hill slopes and ridges, a layer of silicified lag generally prevented the C-horizon from being reached. A sample was still taken but the mixture of dark organic soil and silicified rock chips will probably be useless.

Assay results are awaited.

ROCK CHIP SAMPLING

A total of 53 rock chip samples were collected during mapping traverses and from copper workings near The Clump, Balfour South, the "Hogback Ridge" and the "Old ML 3802 Working" at 325475E 5425110N. Results are awaited.

GEOLOGICAL MAPPING

Most of the southern part of Mount Frankland EL 18/92 (40km^2) was traversed and geologically mapped. To quote Ward (1911) "The absence of timber from a large portion of the region covered during this examination is favourable to rapid movement, but the universal presence of a peaty vegetable cover obscures most effectively the details of geological structure, and to some extent also the distribution of lithological types."

Weathering in the Balfour area has resulted in a silicified lag over all rock types, although the laminated texture of shales and sandstones can still be seen.

Outcrop on ridges consists of silicified, leached sediments and quartz lodes. Information on strike and sometimes dip can be gained. Fresh outcrops generally occur at the base of slopes or on hillsides where the overlying peat and silicified lag has been washed away. Luckily the new Heemskirk Road provides brilliant cuttings of fresh rock. (N.B. Most outcrops are between 1m^2 and 20m^2, so the size is exaggerated on the maps presented).

Rocky Cape Group

The dominant rock type is laminated black shale and white-grey quartz-rich sandstone (pyjama rock). This grades into coarse quartz sandstone units with only minor shale interbeds. Most rocks contain about 1% fine disseminated pyrite although up to 10% pyrite occurs in black shales and sandstones in some road cuttings. Facing can be determined from most fresh outcrops. Soft sediment deformation is common and the sequence was probably deposited in moderate to deep water by turbidity currents.

Other observed rock types in the Rocky Cape Group were:

- *Dolomitic shale and micritic dolomite beds up to 2m thick near Dohertys Pimple.* These dolomite beds outcrop well and could be useful marker horizons.
- Narrow east-west striking basic dykes. Strongly weathered and unmineralised.
- Green chlorite-altered siltstone and sandstone outcropping 800m ?? of the Heemskirk Road cuttings. Also observed in soil samples and outcrop between 424900E-425160E on line 5427300N. Appear to be confined to the magnetic "gap" and as a narrow selvege to quartz-pyrite-chalcopyrite lodes.

On the western slope of Mount Frankland a 1km section of sericite-quartz schist with 1-4% pyrite as disseminated cubes was observed. The schist is strongly foliated (strike 140° - 160° magnetic, dip 70° - 85° west) and the original sediment was an interbedded shale and sandstone, probably of the Rocky Cape Group. Bedding is tightly folded with small scale fold axes plunging at 45° - 75° to the northwest. Bedding has a gross ENE strike and dip of 60° - 80° north.

Mount Frankland Conglomerate and Grit

Mount Frankland is a strike ridge capped by very resistant beds of pink quartz grit and cobble conglomerate. The beds have a strike of 135-150° magnetic, are steeply dipping and probably young to the east. They have the same strong foliation as the sericite-quartz schist, including elongated pebbles and cobbles.

The contact between the schist and the conglomerate/grit is not exposed but bedding orientation indicates an angular unconformity. The cobbles are rounded and consist of quartzite and laminated silicified shale/sandstone, probably derived from the Rocky Cape Group.

Quartz veins and tension gashes are common in the conglomerate and grit. However there is no indication of sulphides with the quartz.

The Mount Frankland conglomerate and grit is not part of the Rocky Cape Group and may be the basal unit of the younger *Smithton Dolomite*.

The Copper Lodes

Quartz lodes up to 3m wide and containing variable amounts of pyrite and chalcopyrite run for over 20km. Most of the lodes are described by Ward (1911) and the Murrays Reward open pit contains the best exposure. Here massive chalcocite and covellite ore was extracted from a supergene zone.

In the southern part of the Mount Frankland EL 18/92, the lode is best developed at the Balfour South mine. Here a quartz-pyrite-chalcopyrite lode up to 2m thick is at the centre of a shear zone striking 130° - 140° magnetic and dipping 75° west. Bedding of the laminated shale and fine grained sandstone is highly contorted within 10m of the lode. Many smaller quartz-pyrite-chalcopyrite veins occur in the contorted wall rocks and the shales are strongly altered to chlorite up to 10m from the lode. The surface expression of the lode is a 1-2m thick gossanous quartz lode with no secondary copper minerals.

Shafts and adits have tested similar lodes at at least 5 other sites within the tenement (see map). These have only minor chalcopyrite, pyrite content is higher and chlorite wallrock alteration is similar but only extends a few metres from the lodes. Similar small workings were trenched near Dohertys Pimple. The surface expression of these lodes is either limonitic gossanous quartz or white vughy quartz. No secondary copper minerals were observed on the surface.

The Balfour Trend quartz-pyrite(-chalcopyrite) lodes were emplaced after or in the waning stages of the main episode of deformation. This was probably the Early to Middle Devonian Tabberabberan Orogeny.

Recent

Recent flat-lying conglomerate and organic rich sandstone was noted on a flat area beside Heemskirk Road (as shown on the geological plan) and in a road cutting at 324080E 5427070N. The conglomerate contains rounded cobbles of quartzite, laminated silicified shale/sandstone and vughy lode quartz.

The layer of dark brown organic soil and peat is rarely thicker than 1.2m.

Structure

The Rocky Cape Group shales and sandstones along the Balfour Copper Trend generally have a NNW strike and dip at 40° - 80° to the east (eastward facing). Away from this 1-3km wide zone of steep easterly dips, the sediments are generally shallower dipping and the strike of bedding is highly variable. A few parasitic folds were observed within the Trend but only one major fold closure was found - a plunging syncline 1km northeast of Dohertys Pimple.

Small scale faults, folding and evidence of fault movement at Murrays Reward mine, along the Heemskirk Road and at Balfour South mine indicate the Balfour Copper Trend is a zone of dextral strike-slip shearing. There was probably a vertical component to the fault movement but indications are often contradictory as to direction.

The strongest shearing is apparent around the copper lodes.

There are a number of strike ridges supported by more resistant sandstone beds and quartz lodes. A photogeological study using 1:25000 aerial colour photographs would be very useful.

The Gap

The magnetic "gap" in the main NNW-trending magnetic high, between Mount Frankland and Mount Balfour, is the area of strongest shearing and alteration within the tenement. A number of features both explain the gap and mark it as the best exploration target:

- chlorite alteration of shale and sandstone along an 800m section of the Heemskirk Road, and between 424900E - 425160E on line 5427300N. Chlorite alteration is otherwise only found within 5m of copper lodes.
- "alteration" of interbedded shale/sandstone to sericite-quartz schist.
- possibly more abundant pyrite in this area.
- a curved east-west sinistral fault definitely marks the southern boundary of the magnetic gap (see map). This fault is marked by a barren quartz lode showing extensive brecciation and open space infill. The vertical displacement of the fault is unknown but a strike-slip of about 800m is indicated from displacement of strike ridges.
- the northern boundary of the "gap" may be a transform fault striking at 055° - 060° magnetic. Such a fault would explain the abrupt end to conglomerate and grit beds north of Mount Frankland and the direction of streams to the south and southeast of Mount Balfour. However no direct evidence of such a fault was observed.

No cause for the magnetic high was found. However the alteration in the magnetic gap could easily have destroyed any magnetite or pyrrhotite within the sediments. A similar magnetic high in the northern part of the tenement is definitely caused by thick green siltstone and sandstone with disseminated magnetite (mag. susc. 200-2000 x 10^{-5} SI units).

CONCLUSIONS AND RECOMMENDATIONS

The gap in the NNW trending magnetic high between Mount Frankland and Mount Balfour definitely exists and is a large (4km^2) area of alteration and shearing. The original idea of the gap being caused by Cu replacing Fe in a magnetic pyrrhotitic siltstone unit is still a possibility but no direct evidence of this was found.

On one of the attached maps I have defined "The Gap". The southern bounding fault is a definite strike-slip fault but the northern bounding fault is only inferred. The chlorite alteration and probable higher pyrite content in this area may be a halo to a large copper deposit. Such a copper deposit may be related to the Balfour copper lodes (Devonian) and be confined to a favourable sulphidic horizon. However a large discordant lode is just as likely. Whatever the case, it will be strongly leached (of copper) to at least 10m depth.

The Balfour Copper Trend could also be prospective for large zinc-lead-silver deposits like Century or Mount Isa/Hilton.

The ideas in this memo are based on only three weeks fieldwork, of which one and a half weeks were spent putting in mag lines and cowering from the rain. A lot more detailed groundwork is needed and "The Gap" should be the focus of the next exploration programme.

The following work is recommended:

Soon

- auger C-horizon soils along line 5426350N at 50m spacing, closing to 25m spacing between 324400E and 325500E. Also soils at 25m spacing from 324800E to 325400E on line 5427300N (to follow-up observed chlorite alteration)
- redo ground magnetic survey on pegged lines, plus small line centred on 327565E 5420260N
- more detailed study of open file reports
- order 1:25000 scale aerial photographs covering Mount Frankland tenement

Before Winter

- photogeological interpretation as an aid to and based on field mapping
- map at 1:10000 scale the Mount Balfour-Mount Frankland area. Best chance of finding outcrop is at the base of slopes. Include isolated magnetic high north of Mount Frankland.
- map in detail the Heemskirk Road cuttings on the Balfour 1:25000 sheet, aiming at a stratigraphic column (by someone with experience in Proterozoic black shales/dolomites).

Hopefully this work will lead to some drill targets and help in interpreting the planned aeromagnetic survey. Best of luck.

Reference

Ward, L.K. 1911 The Mount Balfour Mining Field, Bull. Geol. Surv. Tasmania 10

Colin Price

C D Price
PROJECT GEOLOGIST

9 MARCH 1993

965062

MEMO TO: R.G. PARKINSON

FROM : H J SHAW

BALFOUR

Mapping along the new road was conducted at 1:2500 scale from the track at ~252257 (on the Balfour 1:25000 topo map) to the Lindsay River. The great majority of outcrop mapped consisted of laminated black shales and grey siltstones. Exceptions include thin (~1-5m) strongly pyritic zones (most of the grey siltstone contained ~5-10% disseminated pyrite - "strongly" means ~20-40% py) and a breccia/conglomerate at the westernmost end of the mapping (immediately east of the track junction). This consisted of metre-sized angular blocks of laminated black shale and grey siltstone sitting in a black shaley matrix. There may be a fault at the western boundary of this unit as the beds to the west of it have a very shallow dip while the beds to the east dip steeply.

Also mapped was the track running north from ~252257 to the Specimen Hill area (mapping stopped at approximately the northern boundary of CRAE's EL). Sample and old working locations have been plotted on a master copy of the Balfour 1:25000 topo and are also noted below.

Shaft:	2517E	2850N
Adit:	2495E	2720N

ROCK SAMPLES

3530(?)906	2550E	2645N
----907	2530E	2634N
----908	2525E	2630N
----909	2488E	2705N
----910, 11	2495E	2720N

Bedding strike was all around 330-340° mag and dipped east. Evidence of easterly facing was found around 251272.

APPENDIX 2

CRAE SOIL SAMPLING LEDGERS AND GEOCHEMISTRY

APPENDIX 2.

965064

ROCKCHIP AND DRILLING CODES 17/2/93

BMRLITH

Rock code as per published geological map
For time designation use:-

Q	Quaternary	M	Permian	P	Proterozoic
T	Tertiary	C	Carboniferous	A	Archaean
		S	Silurian		
K	Cretaceous	D	Devonian		
R	Triassic	O	Ordovician		
J	Jurassic	E	Cambrian		

FIELD ID

Field term for rock type
Broad groupings are:-

S	Sedimentary	I	Intrusive	C	Surficial
M	Metamorphic	E	Extrusive	O	Others

SEDIMENTARY

Scg	Conglomerate	Sls	Limestone	Sw	Wacke
Sss	Sandstone	Sch	Chert	Sag	Agglomerate/mixtite
Ssi	Siltstone	Slf	BIF		
Ssh	Shale				
Sbs	Black shale	Sbx	Breccia		

METAMORPHIC

Msl	Slate	Mq	Quartzite	Mmg	Migmatite
Mph	Phyllite	Mm	Marble		
Msc	Schist	Ma	Amphibolite		
Mbs	Graphitic schist	Mcs	Calcsilicate	Msk	Skarn
Mgn	Gneiss	Mh	Hornfels		

INTRUSIVE IGNEOUS

If	Felsic undiff.	Ii	Intermed undiff.	Iu	Ultramafic
Ifp	Felsic porphyry	Iip	Intermed porph	Ius	Serpentinite
Iap	Aplite	Im	Mafic undiff.		
Igr	Granite	Ido	Dolerite	Ipg	Pegmatite
Igd	Granodiorite	Igb	Gabbro		

EXTRUSIVE IGNEOUS

Ery	Rhyolite	Ean	Andesite	Et	Tuff undiff
Edc	Dacite	Eb	Basalt	Eft	Felsic tuff
				Emt	Mafic tuff

SURFICIAL (COVER) MATERIAL

Ca	Alluvium	Clt	Laterite	Csg	Gossan
Cco	Colluvium	Csp	Pisolites		
Cs	Sand	Csf	Ironstone	Ccy	Clay
Cbs	Black soil	Csi	Silcrete		
Cg	Gravel	Ccl	Calcrete	Cv	Vegetation/peat

OTHERS

Ovq	Vein quartz	Omy	Mylonite	Oms	Massive sulphide
Ovc	Vein carbonate	Obx	Breccia		
Ovs	Vein sulphide	Of	Fault gouge	Ox	Unknown

TEXTURAL CODES

WEATHERING/SURFICIAL FEATURES

We	Weathered	Fe	Ferruginous		
Bl	Bleached	Fo	Fe ox in fract		
La	Leached				

MINERALISATION/ALTERATION FEATURES

Gs	Gossanous	Vs	Vein sulphide	Al	Altered
Vn	Veined	Ds	Dissem sulph	Si	Silicified
Di	Disseminated	Fs	Fracture sulph		
		Bs	Banded sulph		

GEOLOGICAL FEATURES

Bd	Bedded	Fr	Fractured	Po	Porphyritic
Bn	Banded	Ib	Interbedded	Sc	Schistose
Bx	Brecciated	Lm	Laminated	Sh	Sheared
Fi	Fissile (slatey)	Ma	Massive	Vu	Vuggy

DIAGNOSTIC MINERALOGY

PRIMARY MINERALISATION

Ga	Galena	Py	Pyrite	Ni	Ni sulphides
Sp	Sphalerite	Po	Pyrrhotite		
Cp	Chalcopyrite	Su	Unknown sulph		

SECONDARY MINERALISATION

Ls	Lead secondaries	Cs	Copper sec.	Ni	Ni secondaries
Zs	Zinc "	Us	Uranium "		

ALTERATION/DIAGNOSTIC MINERALS

Cy	Clay	He	Haematite	Gt	Garnet
Ep	Epidote	Mt	Magnetite	Ky	Kyanite
Cc	Carbonate	Js	Jarosite	To	Tourmaline
Sd	Siderite	Mn	Manganese mins		

COLOUR CODES

L	Light	A	Banded	M	Mottled
D	Dark				
N	Black	P	Purple	V	Green
G	Grey	R	Red	K	Pink
B	Brown	O	Orange	E	Blue
W	White	Y	Yellow	S	Silver

APPENDIX 2: MOUNT FRANKLAND EL18/92. SOIL SAMPLING LEDGERS AND GEOCHEMISTR											
Results in ppm (Fe in %).											
SAMPNO	DPO	EL	GRID	AMGE	AMGN	DEPTH	HORIZON	BMRLITH	FIELDID	COLOUR	COMMENTS
3530001	71537	EL18/92	MOUNT FRANKLAND	325475	5425110	0.6	C	Prq		G	FeSsh
3530002	71537	EL18/92	MOUNT FRANKLAND	325500	5425110	1.0	C	Prq	Ssh	G	Limonite/1-2%Pyrite
3530003	71537	EL18/92	MOUNT FRANKLAND	325525	5425110	0.7	C	Prq		GW	Ssh
3530004	71537	EL18/92	MOUNT FRANKLAND	325550	5425110	1.0	C	Prq		LG	Sl/Mq
3530005	71537	EL18/92	MOUNT FRANKLAND	325575	5425110	1.2	B?	Prq		LG	
3530006	71537	EL18/92	MOUNT FRANKLAND	325600	5425110	1.4	C	Prq	Ssh	G	WeLm
3530007	71537	EL18/92	MOUNT FRANKLAND	325625	5425110	1.3	C	Prq	Ssh		WeLm
3530008	71537	EL18/92	MOUNT FRANKLAND	325450	5425110		C	Prq	Ssh/Sss	GW	LmSl
3530009	71537	EL18/92	MOUNT FRANKLAND	325425	5425110	0.7	C	Prq	Ssh	GYB	1-3%DiPy
3530010	71537	EL18/92	MOUNT FRANKLAND	325400	5425110	0.7	C	Prq	Ssh	YB	
3530011	71537	EL18/92	MOUNT FRANKLAND	325375	5425110	0.5	B-C	Prq		VG	Mq
3530012	71537	EL18/92	MOUNT FRANKLAND	325350	5425110	0.6	C	Prq		Y	MqCySsh
3530013	71537	EL18/92	MOUNT FRANKLAND	325325	5425110	0.5	C	Prq	Ssh	YG	1-2%Py
3530014	71537	EL18/92	MOUNT FRANKLAND	326725	5421500	0.6	C	Prq	Ssh	VWOB	Lm1-5%Py
3530015	71537	EL18/92	MOUNT FRANKLAND	326750	5421500	0.6	C	Prq	Ssh	VO	PyHe
3530016	71537	EL18/92	MOUNT FRANKLAND	326775	5421500	0.6	C	Prq	Ssh	DG	MqFo
3530017	71537	EL18/92	MOUNT FRANKLAND	326795	5421500	0.7	B?	Prq		DB	
3530018	71537	EL18/92	MOUNT FRANKLAND	326700	5421500	0.7	C	Prq		Y	LmSshFo
3530019	71537	EL18/92	MOUNT FRANKLAND	326675	5421500	0.8	C	Prq			SshSssSl
3530020	71537	EL18/92	MOUNT FRANKLAND	326650	5421500	0.6	C	Prq		G	Mq
3530021	71537	EL18/92	MOUNT FRANKLAND	326625	5421500	0.9	C	Prq	SshSss	G	Fo
3530022	71537	EL18/92	MOUNT FRANKLAND	326600	5421500	0.7	C	Prq	SshSss	G	Lm
3530023	71537	EL18/92	MOUNT FRANKLAND	326575	5421500	0.2	C	Prq		G	MqWeSsh
3530024	71539	EL18/92	MOUNT FRANKLAND	323700	5427300	0.6	B?	Prq		GB	Mq
3530025	71539	EL18/92	MOUNT FRANKLAND	323750	5427300	0.8	B?	Prq		GB	Sl
3530026	71539	EL18/92	MOUNT FRANKLAND	323800	5427300	0.3	C	Prq	Sss	G	
3530027	71539	EL18/92	MOUNT FRANKLAND	323850	5427300	0.3	B?	Prq		G	Sl
3530028	71539	EL18/92	MOUNT FRANKLAND	323900	5427300	0.3	A-B	Prq		B	
3530029	71539	EL18/92	MOUNT FRANKLAND	323950	5427300	0.5	A-B	Prq		B	Sl
3530030	71539	EL18/92	MOUNT FRANKLAND	324000	5427300	0.0	CC	Prq	SshSsi		Lm/175/80E
3530031	71539	EL18/92	MOUNT FRANKLAND	324050	5427300	0.4	B	Prq		GB	Sl
3530032	71539	EL18/92	MOUNT FRANKLAND	324100	5427300	0.6	A-B	Prq		B	Sl
3530033	71539	EL18/92	MOUNT FRANKLAND	324150	5427300	0.6	A-B	Prq		B	Sl
3530034	71539	EL18/92	MOUNT FRANKLAND	324200	5427300	0.7	C	Prq		G	WeSsh
3530035	71539	EL18/92	MOUNT FRANKLAND	324225	5427300	0.4	B-C	Prq		LB	
3530036	71539	EL18/92	MOUNT FRANKLAND	324250	5427300	1.3	B	Prq		W	Sl
3530037	71539	EL18/92	MOUNT FRANKLAND	324275	5427300	0.8	C	Prq		GB	WeSss
3530038	71539	EL18/92	MOUNT FRANKLAND	324300	5427300	0.7	B-C	Prq		DB	

SAMPNO	DPO	EL	GRID	AMGE	AMGN	DEPTH	HORIZON	BMRLITH	FIELDID	COLOUR	COMMENTS
3530039	71539	EL18/92	MOUNT FRANKLAND	324325	5427300	0.5	A-B	Prq		DB	Sl
3530040	71539	EL18/92	MOUNT FRANKLAND	324350	5427300	0.5	B-C	Prq		LG	Sl
3530041	71539	EL18/92	MOUNT FRANKLAND	324400	5427300	0.5	B-C	Prq		G	SshMq
3530042	71539	EL18/92	MOUNT FRANKLAND	324450	5427300	0.6	C	Prq	Ssh	GVY	LmFo
3530043	71539	EL18/92	MOUNT FRANKLAND	324500	5427300	0.5	C	Prq	SshSsi	G	Limonite
3530044	71539	EL18/92	MOUNT FRANKLAND	324550	5427300	0.5	C	Prq	SshSss	LG	Sl
3530045	71539	EL18/92	MOUNT FRANKLAND	324600	5427300	0.5	A-B	Prq		B	
3530046	71539	EL18/92	MOUNT FRANKLAND	324650	5427300	0.5	B	Prq		LB	Sl
3530047	71539	EL18/92	MOUNT FRANKLAND	324700	5427300	0.3	A-B	Prq		DB	Mq
3530048	71539	EL18/92	MOUNT FRANKLAND	324750	5427300	0.5	B-C	Prq		B	
3530049	71539	EL18/92	MOUNT FRANKLAND	324800	5427300	0.4	B	Prq			Sl
3530050	71539	EL18/92	MOUNT FRANKLAND	324850	5427300		A-B	Prq		B	Mq
3530051	71539	EL18/92	MOUNT FRANKLAND	324900	5427300	0.0	CC	Prq	SshSss	N	Ovq
3530052	71539	EL18/92	MOUNT FRANKLAND	324950	5427300	0.4	A-B	Prq		B	
3530053	71539	EL18/92	MOUNT FRANKLAND	325000	5427300		C	Prq	Ssh	YB	LimonitePy
3530054	71539	EL18/92	MOUNT FRANKLAND	325050	5427300	0.7	C	Prq	Ssh	V	Chloritic Ssh Limonite
3530055	71539	EL18/92	MOUNT FRANKLAND	325000	5424150	0.5	C	Prq	SshSsi		Limonite
3530056	71539	EL18/92	MOUNT FRANKLAND	325050	5424150	0.7	C	Prq		DB	Sl
3530057	71539	EL18/92	MOUNT FRANKLAND	325120	5424150	1.5	C	Prq	SshSsl		Lm
3530058	71539	EL18/92	MOUNT FRANKLAND	325200	5424150	0.6	A-B	Prq		B	MqSl
3530059	71539	EL18/92	MOUNT FRANKLAND	325250	5424150	0.5	C	Prq	SshSsi		Lm/Limonite/Sl
3530060	71539	EL18/92	MOUNT FRANKLAND	325300	5424150	0.5	C	Prq		DB	Sl
3530061	71539	EL18/92	MOUNT FRANKLAND	325350	5424150	0.7	C	Prq	Ssh	G	LimoniteSl
3530062	71539	EL18/92	MOUNT FRANKLAND	325400	5424150	0.8	C	Prq	SshSss	YB	Py
3530063	71539	EL18/92	MOUNT FRANKLAND	325450	5424150	0.6	C	Prq	Ssh	YBG	LmPy
3530064	71539	EL18/92	MOUNT FRANKLAND	325500	5424150	0.6	B	Prq	SssSsh	G	Mq
3530065	71539	EL18/92	MOUNT FRANKLAND	325550	5424150		C	Prq	Ssh	G	
3530066	71539	EL18/92	MOUNT FRANKLAND	325600	5424150	0.8	C	Prq	Ssh	GB	Mq
3530067	71539	EL18/92	MOUNT FRANKLAND	325650	5424150	0.7	C	Prq	SshSss	GW	Lm
3530068	71539	EL18/92	MOUNT FRANKLAND	325700	5424150	1.4	C	Prq	SshSss	G	Lm
3530069	71539	EL18/92	MOUNT FRANKLAND	325750	5424150	1.4	C	Prq	SshSss	G	Lm
3530070	71539	EL18/92	MOUNT FRANKLAND	325775	5424150	1.1	C	Prq	Ssh	G	
3530071	71539	EL18/92	MOUNT FRANKLAND	325800	5424150	0.0	CC	Prq	SshSss		4%Py
3530072	71539	EL18/92	MOUNT FRANKLAND	325825	5424150	0.3	B	Prq		GB	
3530073	71539	EL18/92	MOUNT FRANKLAND	325850	5424150	0.0	CC	Prq	Ssh		150/52E
3530074	71539	EL18/92	MOUNT FRANKLAND	325875	5424150	0.4	B	Prq		B	
3530075	71539	EL18/92	MOUNT FRANKLAND	325900	5424150		B-C	Prq		GB	
3530076	71539	EL18/92	MOUNT FRANKLAND	325950	5424150		C	Prq	Sss	LG	SshSl
3530077	71539	EL18/92	MOUNT FRANKLAND	326000	5424150	0.4	C	Prq	Ssh	G	
3530078	71539	EL18/92	MOUNT FRANKLAND	326050	5424150	0.5	B-C	Prq	Ssh	G	Lm
3530079	71539	EL18/92	MOUNT FRANKLAND	326100	5424150	0.4	C	Prq	Ssh	Y	WePyFo

SAMPNO	DPO	EL	GRID	AMGE	AMGN	DEPTH	HORIZON	BMRLITH	FIELDID	COLOUR	COMMENTS
3530080	71539	EL18/92	MOUNT FRANKLAND	326140	5424150	0.0	CC	Prq	SshSss	GW	Limonite1%Py40/30E
3530081	71539	EL18/92	MOUNT FRANKLAND	326200	5424150	0.4	B	Prq		B	Sl
3530082	71539	EL18/92	MOUNT FRANKLAND	326250	5424150		B	Prq		LG	Sl
3530083	71539	EL18/92	MOUNT FRANKLAND	326300	5424150	0.4	B	Prq		BLG	
3530084	71539	EL18/92	MOUNT FRANKLAND	326350	5424150	0.4	B-C	Prq		DB	
3530085	71539	EL18/92	MOUNT FRANKLAND	326400	5424150	0.4	B	Prq		B	Sl
3530086	71539	EL18/92	MOUNT FRANKLAND	326015	5420800	0.3	B	Prq		GB	Mq
3530087	71539	EL18/92	MOUNT FRANKLAND	326050	5420800	0.4	B	Prq		GB	Sl
3530088	71539	EL18/92	MOUNT FRANKLAND	326100	5420800	0.3	B-C	Prq			
3530089	71539	EL18/92	MOUNT FRANKLAND	326150	5420800	0.6	B-C	Prq		DB	Sl
3530090	71539	EL18/92	MOUNT FRANKLAND	326200	5420800	1.4	C	Prq	SshSsl	G	Sl
3530091	71539	EL18/92	MOUNT FRANKLAND	326250	5420800	1.0	B	Prq			Sl
3530092	71539	EL18/92	MOUNT FRANKLAND	326300	5420800	0.5	C	Prq	SshSss	Y	Py
3530093	71539	EL18/92	MOUNT FRANKLAND	326350	5420800	0.4	A-B	Prq		DB	Mq
3530094	71539	EL18/92	MOUNT FRANKLAND	326400	5420800	0.4	A-B	Prq		DB	Mq
3530095	71539	EL18/92	MOUNT FRANKLAND	326450	5420800		B	Prq			Sl
3530096	71539	EL18/92	MOUNT FRANKLAND	326500	5420800	0.3	A-B	Prq		B	Mq
3530097	71539	EL18/92	MOUNT FRANKLAND	326550	5420800	0.3	A-B	Prq		B	Mq
3530098	71539	EL18/92	MOUNT FRANKLAND	326600	5420800	0.5	C	Prq	SshSss		Sl
3530099	71539	EL18/92	MOUNT FRANKLAND	326650	5420800	0.4	B	Prq		B	SlSshMq
3530100	71539	EL18/92	MOUNT FRANKLAND	326700	5420800	0.0	CC	Prq	Ssh	YV	Py
3530101	71539	EL18/92	MOUNT FRANKLAND	326750	5420800	0.3	B-C	Prq		GB	Mq
3530102	71539	EL18/92	MOUNT FRANKLAND	326770	5420800	0.0	CC	Prq	SshSss		SlLm
3530103	71539	EL18/92	MOUNT FRANKLAND	326800	5420800	0.5	C	Prq			SlSsh
3530104	71547	EL18/92	THE GAP	324000	5425900	0.2	T?		Os	WDG	Sand and organics
3530105	71547	EL18/92	THE GAP	324025	5425900	0.2	T?		Os	WDG	Sand and organics
3530106	71547	EL18/92	THE GAP	324050	5425900	1.2	C		Ssi?	DG	
3530107	71547	EL18/92	THE GAP	324075	5425900	0.9	C		Ssi?	DG	
3530108	71547	EL18/92	THE GAP	324100	5425900	0.3	C		Ssi	DG	
3530109	71547	EL18/92	THE GAP	324125	5425900	1.3	C+T		Ssi	DG	Qtz gravel contam
3530110	71547	EL18/92	THE GAP	324150	5425900	0.5	C		Ssi	DG	
3530111	71547	EL18/92	THE GAP	324175	5425900	0.5	C		Ccy	YV	Orange spots after Py?
3530112	71547	EL18/92	THE GAP	324200	5425900	0.6	C+T		Ssi?	DG	Qtz gravel and veg contam
3530113	71547	EL18/92	THE GAP	324225	5425900	0.8	C		Ssi?	DG	
3530114	71547	EL18/92	THE GAP	324250	5425900	0.2	B?		Ccy	G	Qtz gravel contam
3530115	71547	EL18/92	THE GAP	324275	5425900	0.5	C		Ccy	YVG	Fe staining, sulphur smell.
3530116	71547	EL18/92	THE GAP	324300	5425900	0.0	OUTCROP		Ssi	DG	
3530117	71547	EL18/92	THE GAP	324325	5425900	1.0	C		Ccy	G	
3530118	71547	EL18/92	THE GAP	324350	5425900	0.6	C		Ccy	GYV	
3530119	71547	EL18/92	THE GAP	324375	5425900	0.4	C?		Mq?	WG	Qtzite gravels and clay
3530120	71547	EL18/92	THE GAP	324400	5425900	0.5	C?		Mq?	WG	Qtzite gravels and clay

SAMPNO	DPO	EL	GRID	AMGE	AMGN	DEPTH	HORIZON	BMRLITH	FIELDID	COLOUR	COMMENTS
3530121	71547	EL18/92	THE GAP	324425	5425900	0.1	C		Ssi	ADBOB	Lam siltst. Sid alt?
3530122	71547	EL18/92	THE GAP	324450	5425900	0.5	C		Ccy	DG	
3530123	71547	EL18/92	THE GAP	324475	5425900	0.4	T?		Cg	LGW	Qtzite gravels scree
3530124	71547	EL18/92	THE GAP	324500	5425900	0.6	T?		Cg	LGW	Qtzite gravels scree
3530125	71547	EL18/92	THE GAP	324525	5425900	0.1	T?		Cg	LGW	Qtzite gravels scree
3530126	71547	EL18/92	THE GAP	324550	5425900	0.0	OUTCROP		Mq	W	Top of ridge
3530127	71547	EL18/92	THE GAP	324575	5425900	0.2	T?		Cg	LGW	Qtzite gravels scree
3530128	71547	EL18/92	THE GAP	324600	5425900	0.0	T?		Cg	LGW	Qtzite gravels scree?
3530129	71547	EL18/92	THE GAP	324625	5425900	0.5	T		Cg	LGW	Qtzite gravels scree
3530130	71547	EL18/92	THE GAP	324650	5425900	0.3	T		Cg	LGW	Qtzite gravels scree
3530131	71547	EL18/92	THE GAP	324675	5425900	0.5	C		Ssi	G	
3530132	71547	EL18/92	THE GAP	324700	5425900	0.3	C		Ssi	V	Chloritic siltst. 80.180deg AMG
3530133	71547	EL18/92	THE GAP	324725	5425900	0.5	C		Ssi	YV	Chloritic siltst.
3530134	71547	EL18/92	THE GAP	324750	5425900	0.4	B?		Ccy	LB	
3530135	71547	EL18/92	THE GAP	324785	5425885	0.0	OUTCROP		Ssi	G	
3530136	71547	EL18/92	THE GAP	324800	5425900	0.5	C		Ccy	YV	Chloritic.
3530137	71547	EL18/92	THE GAP	324825	5425900	0.5	C+T		Ccy	DGV	Minor chlorite
3530138	71547	EL18/92	THE GAP	324850	5425900	0.6	C		Ccy	DG	Carbonaceous
3530139	71547	EL18/92	THE GAP	324875	5425900	0.4	C		Ccy	YO	Minor chlorite
3530140	71547	EL18/92	THE GAP	324900	5425900	0.6	C		Ssi	DG	Minor dissem Py
3530141	71547	EL18/92	THE GAP	324925	5425900	0.9	C		Ssi	DG	
3530142	71547	EL18/92	THE GAP	324950	5425900	0.6	C		Ssi	DG	Spotted siltst
3530143	71547	EL18/92	THE GAP	324975	5425900	0.5	C		Ssi	DG	Spotted siltst
3530144	71547	EL18/92	THE GAP	325000	5425900	0.5	C		Ccy	MVR	Chloritic clay with Fe spots.
3530145	71547	EL18/92	THE GAP	325025	5425900	0.7	C		Ccy	LVG	Chloritic?
3530146	71547	EL18/92	THE GAP	325050	5425900	1.0	C		Ccy	LV	Chloritic clay.
3530147	71547	EL18/92	THE GAP	325075	5425900	1.0	C		Ccy	LV	Chloritic clay.
3530148	71547	EL18/92	THE GAP	325100	5425900	1.0	C		Ssi	LV	Chloritic siltst.
3530149	71547	EL18/92	THE GAP	324000	5426100	1.0	C		Ssi	DG	
3530150	71547	EL18/92	THE GAP	324025	5426100	0.8	C		Ssi	DG	
3530151	71547	EL18/92	THE GAP	324050	5426100	0.5	C		Ccy	G	
3530152	71547	EL18/92	THE GAP	324075	5426100	0.3	C		Ccy	DG	
3530153	71547	EL18/92	THE GAP	324100	5426100	0.4	C		Ccy	DG	
3530154	71547	EL18/92	THE GAP	324125	5426100	0.4	C		Ccy	DG	Carbonaceous
3530155	71547	EL18/92	THE GAP	324150	5426100	0.6	C		Ccy	DG	Carbonaceous
3530156	71547	EL18/92	THE GAP	324175	5426100	0.5	C		Ccy	DG	
3530157	71547	EL18/92	THE GAP	324200	5426100	0.8	C		Ccy	DG	
3530158	71547	EL18/92	THE GAP	324225	5426100	0.4	C		Ccy	DG	
3530159	71547	EL18/92	THE GAP	324250	5426100	0.8	C		Ccy	DG	Micaceous
3530160	71547	EL18/92	THE GAP	324275	5426100	1.2	C		Ccy	DG	
3530161	71547	EL18/92	THE GAP	324300	5426100	0.7	C		Ccy	DG	

SAMPNO	DPO	EL	GRID	AMGE	AMGN	DEPTH	HORIZON	BMRLITH	FIELDID	COLOUR	COMMENTS
3530162	71547	EL18/92	THE GAP	324325	5426100	1.0	C		Ssi	DG	
3530163	71547	EL18/92	THE GAP	324350	5426100	0.5	T		CgCcy	WG	
3530164	71547	EL18/92	THE GAP	324375	5426100	0.7	T?		Os	G	
3530165	71547	EL18/92	THE GAP	324400	5426100	0.2	T		CgCcy	WG	Scree
3530166	71547	EL18/92	THE GAP	324425	5426100	0.2	T		CgCcy	WG	Scree
3530167	71547	EL18/92	THE GAP	324450	5426100	0.4	T		CgCcy	WG	Scree
3530168	71547	EL18/92	THE GAP	324475	5426100	0.0	OUTCROP		Mq	W	Top of ridge
3530169	71547	EL18/92	THE GAP	324500	5426100	0.1	T		CgCcy	WG	Scree
3530170	71547	EL18/92	THE GAP	324525	5426100	0.3	T		CgCcy	WG	Scree
3530171	71547	EL18/92	THE GAP	324550	5426100	1.0	C?		Os	BG	
3530172	71547	EL18/92	THE GAP	324575	5426100	0.4	T		CgCcy	WG	
3530173	71547	EL18/92	THE GAP	324600	5426100	0.6	C		Ssi	DG	Carbonaceous
3530174	71547	EL18/92	THE GAP	324625	5426100	0.6	C		Ssi	DG	Carbonaceous
3530175	71547	EL18/92	THE GAP	324650	5426100	0.6	C		Ccy	LG	
3530176	71547	EL18/92	THE GAP	324675	5426100	0.6	C?		Ccy	LB	
3530177	71547	EL18/92	THE GAP	324700	5426100	0.5	C		Ccy	DG	
3530178	71547	EL18/92	THE GAP	324725	5426100	0.7	C		Ccy	G	Carbonaceous siltst.
3530179	71547	EL18/92	THE GAP	324750	5426100	0.8	C		Ccy	LV	Chloritic
3530180	71547	EL18/92	THE GAP	324775	5426100	0.9	C		Ssi	DG	Carbonaceous + Fe staining
3530181	71547	EL18/92	THE GAP	324800	5426100	0.8	C		Ssi	ANW	
3530182	71547	EL18/92	THE GAP	324825	5426100	0.9	C		Ccy	LGV	Chloritic?
3530183	71547	EL18/92	THE GAP	324850	5426100	0.1	C		Ccy	LG	
3530184	71547	EL18/92	THE GAP	324875	5426100	0.7	C		Ccy	OG	Fe stained
3530185	71547	EL18/92	THE GAP	324900	5426100	0.7	C?		CsCcy	LG	Gravels or bedrock?
3530186	71547	EL18/92	THE GAP	324925	5426100	0.7	C		Ccy	OV	Chloritic and Fe stained
3530187	71547	EL18/92	THE GAP	324950	5426100	0.6	C		Ccy	LVG	Chloritic
3530188	71547	EL18/92	THE GAP	324975	5426100	0.9	C		Ccy	YV	Chloritic
3530189	71547	EL18/92	THE GAP	325000	5426100	0.4	C		Ssi	LV	Chloritic
3530190	71547	EL18/92	THE GAP	325025	5426100	0.0	OUTCROP		Ssi	AWV	Chloritic
3530191	71547	EL18/92	THE GAP	324900	5426330	0.0	OUTCROP		Ssi	AWV	Chloritic and spotted
3530192	71547	EL18/92	THE GAP	324875	5426350	0.8	C		Ccy	LV	Chloritic
3530193	71547	EL18/92	THE GAP	324850	5426350	1.8	C		Ccy	LGV	Chloritic?
3530194	71547	EL18/92	THE GAP	324825	5426350	0.8	C		Ccy	LG	
3530195	71547	EL18/92	THE GAP	324800	5426350	0.7	C		Ccy	DG	Carbonaceous
3530196	71547	EL18/92	THE GAP	324775	5426350	1.0	C		Ccy	DGN	Carbonaceous
3530197	71547	EL18/92	THE GAP	324750	5426350	0.8	C		Ccy	MYV	Chloritic
3530198	71547	EL18/92	THE GAP	324725	5426350	0.7	C		Ccy	DG	Carbonaceous
3530199	71547	EL18/92	THE GAP	324700	5426350	0.9	C		Ccy	DG	Carbonaceous
3530200	71547	EL18/92	THE GAP	324675	5426350	0.7	C		Ccy	DG	Carbonaceous
3530201	71547	EL18/92	THE GAP	324650	5426350	0.8	C		Ccy	DG	Carbonaceous
3530202	71547	EL18/92	THE GAP	324625	5426350	0.6	C		Ccy	DG	Carbonaceous + minor dissem Py

SAMPNO	DPO	EL	GRID	AMGE	AMGN	DEPTH	HORIZON	BMRLITH	FIELDID	COLOUR	COMMENTS
3530203	71547	EL18/92	THE GAP	324600	5426350	1.1	C		Ccy	DG	Carbonaceous
3530204	71547	EL18/92	THE GAP	324575	5426350	0.7	C		Ccy	LV	Chloritic
3530205	71547	EL18/92	THE GAP	324550	5426350	0.3	T		CgCcy	WG	Scree
3530206	71547	EL18/92	THE GAP	324525	5426350	0.4	T		Cg	W	Scree
3530207	71547	EL18/92	THE GAP	324500	5426350	0.5	C		Ssi	G	
3530208	71547	EL18/92	THE GAP	324475	5426350	0.5	C+T		CgSsi	WG	
3530209	71547	EL18/92	THE GAP	324450	5426350	0.5	T		Cg	W	Scree
3530210	71547	EL18/92	THE GAP	324425	5426350	0.0	OUTCROP		Mq	W	Top of ridge
3530211	71547	EL18/92	THE GAP	324400	5426350	0.4	T		Cg	W	Scree
3530212	71547	EL18/92	THE GAP	324375	5426350	0.7	C		Ssi	MGBV	
3530213	71547	EL18/92	THE GAP	324350	5426350	0.8	T		CgCcy	WG	Scree
3530214	71547	EL18/92	THE GAP	324325	5426350	0.7	T		CgCcy	WG	Scree
3530215	71547	EL18/92	THE GAP	324300	5426350	0.6	T		CgCcy	WG	Scree
3530216	71547	EL18/92	THE GAP	324275	5426350	0.6	C		Ccy	DG	Micaceous
3530217	71547	EL18/92	THE GAP	324250	5426350	0.7	C		Ccy	DG	
3530218	71547	EL18/92	THE GAP	324225	5426350	0.8	C		Ccy	DG	
3530219	71547	EL18/92	THE GAP	324200	5426350	1.1	C		Ssi	G	Micaceous
3530220	71547	EL18/92	THE GAP	324400	5426500	0.0	T		Cg	W	Scree
3530221	71547	EL18/92	THE GAP	324425	5426500	0.0	OUTCROP		Mq	W	Top of ridge. 2% voids after Py
3530222	71547	EL18/92	THE GAP	324450	5426500	0.2	T		Cg	W	Scree
3530223	71547	EL18/92	THE GAP	324475	5426500	0.6	T		Cg	W	Scree
3530224	71547	EL18/92	THE GAP	324500	5426500	0.6	T		Cg	W	Scree
3530225	71547	EL18/92	THE GAP	324525	5426500	0.3	C		Ssi	AWN	
3530226	71547	EL18/92	THE GAP	324550	5426500	0.5	C		Ccy	DG	Carbonaceous
3530227	71547	EL18/92	THE GAP	324575	5426500	0.4	C		Ccy	DG	
3530228	71547	EL18/92	THE GAP	324600	5426500	0.4	C		Ccy	DG	
3530229	71547	EL18/92	THE GAP	324625	5426500	0.5	C		Ccy	DG	
3530230	71547	EL18/92	THE GAP	324650	5426500	0.6	C		Ccy	DG	Carbonaceous
3530231	71547	EL18/92	THE GAP	324675	5426500	0.7	C		Ccy	DG	Carbonaceous
3530232	71547	EL18/92	THE GAP	324700	5426500	1.0	C		Ssh	DG	Carbonaceous and micaceous.
3530233	71547	EL18/92	THE GAP	324725	5426500	1.0	C		Ssh	DG	Carbonaceous and micaceous.
3530234	71547	EL18/92	THE GAP	324750	5426500	0.6	C		Ccy	DG	
3530235	71547	EL18/92	THE GAP	324775	5426500	0.0	OUTCROP		Ssi	AWN	W side of rd.
3530236	71547	EL18/92	THE GAP	325050	5426500	0.8	C		Ccy	MYV	Chloritic
3530237	71547	EL18/92	THE GAP	325025	5426500	0.6	C		Ccy	V	Chloritic
3530238	71547	EL18/92	THE GAP	325000	5426500	0.8	C		Ccy	V	Chloritic
3530239	71547	EL18/92	THE GAP	324975	5426500	1.2	C		Ccy	V	Chloritic
3530240	71547	EL18/92	THE GAP	324950	5426500	1.3	C?		Ccy	LGV	Chloritic? + some veg contam.
3530241	71547	EL18/92	THE GAP	324925	5426500	1.1	C		Ccy	LV	Chloritic
3530242	71547	EL18/92	THE GAP	324900	5426500	1.4	C		Ccy	LV	Chloritic
3530243	71547	EL18/92	THE GAP	324875	5426500	1.3	C		Ccy	LV	Chloritic

SAMPNO	DPO	EL	GRID	AMGE	AMGN	DEPTH	HORIZON	BMRLITH	FIELDID	COLOUR	COMMENTS
3530244	71547	EL18/92	THE GAP	324850	5426500	1.2	C		Ccy	LV	Chloritic
3530245	71547	EL18/92	THE GAP	324825	5426500	1.0	C		Ccy	MYV	Chloritic
3530246	71547	EL18/92	THE GAP	324800	5426500	1.0	C		Ccy	LV	Chloritic. E side of rd.
3530247	71547	EL18/92	THE GAP	324925	5426340	0.0	OUTCROP		Ssh	LV	Chloritic. E side of rd.
3530248	71547	EL18/92	THE GAP	324950	5426360	0.2	C		Ccy	LV	Chloritic. Trace dissem Py.
3530249	71547	EL18/92	THE GAP	324975	5426350	1.1	C		Ccy	LV	Chloritic
3530250	71547	EL18/92	THE GAP	325000	5426350	0.9	C		Ccy	LV	Chloritic
3530251	71547	EL18/92	THE GAP	325025	5426350	0.9	C		Ccy	LV	Chloritic
3530252	71547	EL18/92	THE GAP	325050	5426350	1.0	C		Ccy	LV	Chloritic
3530253	71547	EL18/92	THE GAP	325075	5426350	0.9	C		Ccy	LV	Chloritic
3530254	71547	EL18/92	THE GAP	325100	5426350	1.0	C+T		SsiCg	LVB	Chloritic + gravel contam.
3530255	71547	EL18/92	THE GAP	325125	5426350	1.0	C		Ccy	LV	Chloritic
3530256	71547	EL18/92	THE GAP	325150	5426350	0.7	C		Ccy	MYV	Chloritic
3530257	71547	EL18/92	THE GAP	325175	5426350	0.6	C		Ccy	LLB	
3530258	71547	EL18/92	THE GAP	325200	5426350	0.0	OUTCROP?		Ovq	W	Vein Qtz subcrop? On track.
3530259	71547	EL18/92	THE GAP	325200	5426290	0.0	OUTCROP		Ssi	ALB	Lam siltst in costean.
3530260	71547	EL18/92	THE GAP	325230	5426290	0.0	OUTCROP		Ssi	G	Qtz vein (and track) at 5220E.
3530261	71547	EL18/92	THE GAP	325250	5426290	0.0	OUTCROP		Ssi	N	Siliceous with 5% vein Py. In costean.
3530262	71547	EL18/92	THE GAP	325275	5426290	0.0	OUTCROP		Ssi	N	Carbonaceous. In costean.
3530263	71547	EL18/92	THE GAP	325300	5425900	0.5	C		Ccy	LLB	East of qtz vein?
3530264	71547	EL18/92	THE GAP	325275	5425900	0.5	T		Ovq	W	Vein qtz scree. Track at 5295E
3530265	71547	EL18/92	THE GAP	325250	5425900	0.9	T		CgCcy	WB	Vein qtz scree.
3530266	71547	EL18/92	THE GAP	325225	5425900	0.1	B?		Ccy	LG	
3530267	71547	EL18/92	THE GAP	325200	5425900	0.9	C		Ccy	LV	Chloritic
3530268	71547	EL18/92	THE GAP	325175	5425900	0.8	B		Ccy	LLB	
3530269	71547	EL18/92	THE GAP	325150	5425900	0.9	C		Ccy	LV	Chloritic
3530270	71547	EL18/92	THE GAP	325125	5425900	0.0	OUTCROP		Ccy	LV	Chloritic. E side of rd.
3530271	71547	EL18/92	THE GAP	325055	5426100	0.0	OUTCROP		Ssi	LV	Chloritic. E side of rd.
3530272	71547	EL18/92	THE GAP	325075	5426100	0.2	C		Ssi	LV	Spotted chloritic.
3530273	71547	EL18/92	THE GAP	325100	5426100	1.4	C		Ssi	ALV	Spotted and laminated chloritic.
3530274	71547	EL18/92	THE GAP	325125	5426100	0.8	B?		Ccy	DB	
3530275	71547	EL18/92	THE GAP	325150	5426100	1.0	C		Ccy	LV	Chloritic
3530276	71547	EL18/92	THE GAP	325175	5426100	0.9	C		Ccy	LV	Chloritic
3530277	71547	EL18/92	THE GAP	325200	5426100	0.8	C		Ccy	LV	Chloritic
3530278	71547	EL18/92	THE GAP	325225	5426100	0.5	T		Ovq	W	Vein qtz scree.
3530279	71547	EL18/92	THE GAP	325250	5426100	0.5	T		Ovq	W	Vein qtz scree/subcrop? On track.
3530280	71547	EL18/92	THE GAP	325275	5426100	0.5	T		Ovq	W	Vein qtz scree.

APPENDIX 2: MOUNT FRANKLAND EL18/92. SOIL SAMPLING LEDGERS AND GEOCHEMISTRY												
Results in ppm (Fe in %).												
SAMPNO	Ag	As	Cu	Pb	Zn	Fe%	Mn	Bi	Mo	Ni	V	Co
3530001	-1	375	34	6	33	4.06	381					
3530002	-1	-50	15	4	9	1.32	86					
3530003	-1	-50	8	-3	3	0.48	52					
3530004	-1	-50	10	-3	4	0.55	51					
3530005	-1	-50	6	-3	5	0.89	81					
3530006	-1	-50	22	6	4	0.52	51					
3530007	-1	-50	7	-3	10	0.69	52					
3530008	-1	-50	12	9	8	0.62	100					
3530009	-1	-50	7	-3	20	3.84	84					
3530010	-1	-50	13	-3	29	4.43	170					
3530011	1	-50	4	-3	10	0.75	26					
3530012	-1	-50	21	11	10	2.16	54					
3530013	-1	-50	13	6	8	1.13	58					
3530014	-1	-50	13	4	7	2.95	50					
3530015	-1	-50	9	-3	21	4.32	204					
3530016	-1	50	23	3	6	1.86	78					
3530017	1	-50	23	-3	4	0.4	31					
3530018	-1	-50	19	3	14	3.94	45					
3530019	1	-50	3	4	6	0.42	47					
3530020	-1	-50	5	-3	8	0.63	75					
3530021	-1	-50	4	-3	21	0.92	55					
3530022	1	-50	8	4	9	0.41	17					
3530023	-1	-50	5	4	11	0.53	46					
3530024	-1	-1	8	-3	22	0.34	20					
3530025	-1	-1	7	-3	19	0.63	35					
3530026	-1	-1	4	3	9	0.77	81					
3530027	-1	-1	4	-3	12	0.4	24					
3530028	-1	-1	4	-3	9	0.63	38					
3530029	-1	-1	3	-3	3	0.42	25					
3530030	-1	-1	-2	12	4	0.44	180					
3530031	-1	-1	6	-3	5	0.6	53					
3530032	-1	-1	5	3	8	0.4	24					
3530033	-1	-1	6	-3	6	0.76	43					
3530034	-1	1	5	18	9	0.73	89					
3530035	-1	-1	4	-3	6	0.39	24					
3530036	-1	-1	3	-3	6	0.31	16					
3530037	-1	-1	4	6	6	0.56	47					
3530038	-1	-1	6	3	6	0.95	53					

SAMPNO	Ag	As	Cu	Pb	Zn	Fe%	Mn	Bi	Mo	Ni	V	Co
3530039	-1	-1	5	-3	4	0.8	43					
3530040	-1	-1	5	-3	4	0.69	35					
3530041	-1	-1	8	5	8	0.74	57					
3530042	-1	2	15	15	6	0.81	72					
3530043	-1	2	5	9	6	0.53	68					
3530044	-1	1	4	6	9	0.71	52					
3530045	-1	-1	8	5	5	0.54	29					
3530046	-1	-1	4	-3	3	0.45	23					
3530047	-1	-1	4	3	5	0.58	37					
3530048	-1	-1	4	4	3	0.56	30					
3530049	-1	-1	4	3	3	0.53	28					
3530050	-1	-1	5	3	4	0.63	35					
3530051	-1	9	12	5	7	1.3	77					
3530052	-1	2	5	-3	3	0.4	20					
3530053	-1	4	3	-3	29	2.56	135					
3530054	-1	2	3	-3	41	2.4	435					
3530055	-1	-1	3	-3	20	1.62	65					
3530056	-1	-1	3	4	7	0.56	34					
3530057	-1	-1	10	10	11	0.63	43					
3530058	-1	-1	5	5	4	0.93	48					
3530059	-1	-1	3	-3	27	2.48	110					
3530060	-1	-1	7	4	17	1.11	59					
3530061	-1	-1	4	4	17	1.06	53					
3530062	-1	3	9	3	23	3.07	82					
3530063	-1	-1	3	5	16	1.26	59					
3530064	-1	1	4	-3	4	0.52	40					
3530065	-1	-1	3	3	9	0.65	27					
3530066	-1	-1	10	6	6	0.88	110					
3530067	-1	1	7	-3	20	0.98	73					
3530068	-1	-1	20	13	11	1.09	135					
3530069	-1	2	9	6	20	1.65	160					
3530070	-1	1	6	5	7	0.5	24					
3530071	-1	4	9	5	5	0.7	19					
3530072	-1	1	8	3	7	0.65	48					
3530073	-1	4	10	3	5	0.52	38					
3530074	-1	-1	9	-3	3	0.49	38					
3530075	-1	-1	8	4	3	0.54	67					
3530076	-1	-1	3	5	12	1.36	180					
3530077	-1	2	14	7	27	2.14	165					
3530078	-1	-1	4	6	7	0.7	61					
3530079	-1	9	5	4	25	4.04	105					

SAMPNO	Ag	As	Cu	Pb	Zn	Fe%	Mn	Bi	Mo	Ni	V	Co
3530080	-1	4	3	4	21	1.21	120					
3530081	-1	1	7	3	6	0.54	44					
3530082	-1	-1	3	4	4	0.39	27					
3530083	-1	-1	6	-3	4	0.47	28					
3530084	-1	-1	7	3	4	0.73	43					
3530085	-1	-1	6	4	4	0.71	45					
3530086	-1	-1	7	3	5	0.7	48					
3530087	-1	-1	10	5	8	0.8	75					
3530088	-1	-1	5	5	4	0.73	46					
3530089	-1	-1	5	3	3	0.47	49					
3530090	-1	2	11	18	15	1.22	120					
3530091	-1	-1	6	7	5	0.67	55					
3530092	-1	2	7	5	8	1.32	85					
3530093	-1	-1	6	4	4	0.64	37					
3530094	-1	-1	8	6	8	0.89	57					
3530095	-1	-1	5	6	7	0.73	49					
3530096	-1	-1	10	9	19	0.86	68					
3530097	-1	-1	6	7	5	0.76	72					
3530098	-1	-1	6	5	4	0.59	51					
3530099	-1	-1	7	-3	6	0.6	39					
3530100	-1	9	19	3	39	2.83	120					
3530101	-1	1	7	3	7	0.58	52					
3530102	-1	-1	6	-3	6	0.52	43					
3530103	-1	-1	5	3	8	0.64	48					
3530104	-1	-1	5	-2	6	0.36	23	-10	-5	4	10	-3
3530105	-1	5	97	5	3	0.47	29	-10	-5	6	14	-3
3530106	-1	8	82	7	16	1.38	120	-10	-5	8	35	-3
3530107	-1	2	6	4	15	1.39	140	-10	-5	8	47	-3
3530108	-1	1	3	-2	6	0.39	23	-10	-5	6	33	-3
3530109	-1	1	35	6	7	0.69	95	-10	-5	7	22	-3
3530110	-1	-1	4	-2	7	0.5	29	-10	-5	5	47	-3
3530111	-1	5	5	3	25	3.92	108	-10	-5	7	76	-3
3530112	-1	-1	33	8	15	0.61	54	-10	-5	7	41	-3
3530113	-1	3	44	9	9	0.56	51	-10	5	7	44	-3
3530114	-1	1	4	3	6	0.34	28	-10	-5	4	18	-3
3530115	-1	4	5	3	22	1.57	165	-10	-5	6	41	-3
3530116	-1	43	27	13	15	2.1	83	-10	5	5	63	-3
3530117	-1	6	9	9	17	0.83	67	-10	-5	5	51	-3
3530118	-1	2	5	-2	9	0.62	43	-10	-5	6	46	-3
3530119	-1	3	5	-2	4	0.52	22	-10	5	5	30	-3
3530120	-1	1	4	-2	12	0.47	30	-10	-5	5	31	-3

SAMPNO	Ag	As	Cu	Pb	Zn	Fe%	Mn	Bi	Mo	Ni	V	Co
3530121	-1	-1	4	-2	14	0.59	34	-10	-5	6	49	-3
3530122	-1	2	35	16	14	0.49	35	-10	-5	7	47	-3
3530123	-1	-1	4	3	4	0.3	17	-10	-5	5	10	-3
3530124	-1	1	3	-2	4	0.24	13	-10	-5	3	16	-3
3530125	-1	-1	4	-2	3	0.35	21	-10	-5	6	11	-3
3530126	-1	-1	4	-2	4	0.3	17	-10	-5	5	5	-3
3530127	-1	-1	3	-2	4	0.23	16	-10	-5	3	5	-3
3530128	-1	-1	4	3	6	0.89	23	-10	-5	5	18	-3
3530129	-1	-1	5	-2	6	0.37	20	-10	-5	5	14	-3
3530130	-1	-1	3	-2	5	0.29	15	-10	-5	6	10	-3
3530131	-1	-1	3	-2	7	0.43	25	-10	-5	3	41	-3
3530132	-1	6	3	-2	36	2.62	130	-10	-5	14	52	-3
3530133	-1	2	2	-2	42	4.66	221	-10	-5	12	61	4
3530134	-1	-1	5	5	11	0.82	31	-10	-5	7	44	4
3530135	-1	6	4	-2	15	1.17	76	-10	-5	5	57	-3
3530136	-1	13	14	16	36	3.68	258	-10	-5	14	52	6
3530137	-1	2	6	-2	28	2.03	195	-10	-5	7	55	-3
3530138	-1	4	4	5	29	1.95	114	-10	-5	7	46	-3
3530139	-1	6	12	-2	54	5.68	60	-10	-5	9	45	3
3530140	-1	4	5	3	24	1.52	58	-10	-5	8	46	4
3530141	-1	1	4	-2	46	2.43	104	-10	-5	12	55	3
3530142	-1	-1	5	-2	30	2.03	125	-10	-5	9	40	-3
3530143	-1	1	4	-2	8	0.57	21	-10	-5	6	36	-3
3530144	-1	4	4	-2	18	3.41	57	-10	-5	4	67	-3
3530145	-1	2	6	5	21	1.79	95	-10	-5	8	42	3
3530146	-1	1	6	4	23	2.07	320	-10	-5	10	30	-3
3530147	-1	2	4	3	23	1.56	210	-10	-5	9	35	-3
3530148	-1	2	4	-2	46	3.49	478	-10	-5	13	50	4
3530149	-1	10	7	6	19	1.35	148	-10	-5	8	29	-3
3530150	-1	1	5	11	22	1.41	125	-10	-5	9	63	-3
3530151	-1	-1	2	-2	7	0.43	22	-10	-5	4	41	-3
3530152	-1	-1	5	3	12	0.68	42	-10	-5	6	39	-3
3530153	-1	1	3	-2	11	0.5	64	-10	-5	3	33	-3
3530154	-1	-1	3	5	13	0.69	58	-10	-5	3	50	-3
3530155	-1	1	7	7	15	0.9	69	-10	-5	5	64	-3
3530156	-1	-1	4	5	12	0.52	74	-10	-5	9	37	-3
3530157	-1	-1	2	6	18	0.67	54	-10	-5	3	63	-3
3530158	-1	37	3	-2	15	1.22	37	-10	-5	3	98	-3
3530159	-1	3	6	6	18	1.66	114	-10	-5	12	53	-3
3530160	-1	1	11	7	17	1.65	147	-10	-5	7	60	-3
3530161	-1	13	9	4	18	1.83	159	-10	-5	5	54	-3

SAMPNO	Ag	As	Cu	Pb	Zn	Fe%	Mn	Bl	Mo	Ni	V	Co
3530162	-1	1	4	6	12	1.19	201	-10	5	5	38	-3
3530163	-1	2	3	-2	4	0.27	44	-10	-5	3	6	-3
3530164	-1	1	4	-2	4	0.39	32	-10	-5	5	16	-3
3530165	-1	-1	3	-2	3	0.23	12	-10	-5	4	7	-3
3530166	-1	-1	4	-2	5	0.53	31	-10	-5	8	14	-3
3530167	-1	-1	4	-2	4	0.4	25	-10	-5	7	6	-3
3530168	-1	-1	4	-2	4	0.34	22	-10	-5	6	6	-3
3530169	-1	-1	3	-2	4	0.26	15	-10	-5	4	8	-3
3530170	-1	-1	3	-2	4	0.25	12	-10	-5	5	7	-3
3530171	-1	-1	3	4	7	0.31	17	-10	-5	3	30	-3
3530172	-1	1	4	-2	6	0.3	15	-10	-5	3	9	-3
3530173	-1	-1	2	-2	8	0.49	50	-10	-5	3	42	-3
3530174	-1	4	3	-2	31	3.09	311	-10	-5	9	65	3
3530175	-1	4	3	3	59	3.81	465	-10	-5	17	52	9
3530176	-1	1	4	-2	29	2.26	282	-10	-5	7	49	3
3530177	-1	6	29	4	46	3.21	492	-10	-5	10	44	-3
3530178	-1	3	15	-2	56	3.96	412	-10	-5	11	55	4
3530179	-1	3	7	-2	38	1.89	130	-10	-5	11	41	3
3530180	-1	12	13	4	59	3.81	447	-10	-5	14	56	4
3530181	-1	4	6	-2	52	3.68	263	-10	-5	6	59	4
3530182	-1	7	7	13	159	7.73	302	-10	-5	238	288	4
3530183	-1	2	3	-2	11	0.41	17	-10	-5	5	38	-3
3530184	-1	15	3	7	16	1.77	33	-10	-5	5	109	-3
3530185	-1	1	3	3	10	0.4	16	-10	-5	3	40	-3
3530186	-1	11	2	5	53	8.91	459	-10	-5	13	77	0
3530187	-1	1	2	-2	72	4	493	-10	-5	14	36	5
3530188	-1	-1	2	-2	52	3.59	527	-10	-5	15	51	3
3530189	-1	2	4	-2	41	3.57	368	-10	-5	7	49	3
3530190	-1	2	5	-2	73	4.49	555	-10	-5	23	48	8
3530191	-1	2	3	-2	40	4.6	744	-10	-5	11	41	5
3530192	-1	5	3	-2	33	3.74	640	-10	-5	10	46	5
3530193	-1	4	12	5	37	2.2	410	-10	-5	8	45	3
3530194	-1	4	6	-2	42	3.12	375	-10	-5	12	51	3
3530195	-1	1	6	5	11	1	69	-10	-5	17	58	-3
3530196	-1	2	12	11	31	2.17	185	-10	-5	16	55	-3
3530197	-1	7	7	9	37	3.64	252	-10	-5	19	64	3
3530198	-1	3	9	10	29	2.39	243	-10	-5	26	64	4
3530199	-1	1	5	5	42	2.97	272	-10	-5	9	72	3
3530200	-1	3	4	-2	42	2.51	244	-10	-5	11	51	3
3530201	-1	3	17	135	34	2.04	164	-10	-5	9	47	3
3530202	-1	1	4	-2	35	1.93	181	-10	-5	9	46	3

SAMPNO	Ag	As	Cu	Pb	Zn	Fe%	Mn	Bi	Mo	Ni	V	Co
3530203	-1	2	5	3	18	0.96	109	-10	-5	5	52	-3
3530204	-1	2	6	-2	2	3.47	648	-10	-5	9	56	4
3530205	-1	-1	4	-2	2	0.25	14	-10	-5	4	16	-3
3530206	-1	-1	5	-2	2	0.27	15	-10	-5	6	18	-3
3530207	-1	-1	4	-2	5	0.31	19	-10	-5	4	34	-3
3530208	-1	-1	6	4	3	0.28	18	-10	-5	5	8	-3
3530209	-1	-1	4	-2	4	0.2	12	-10	-5	4	5	-3
3530210	-1	6	6	-2	2	0.28	20	-10	-5	5	-5	-3
3530211	-1	-1	5	-2	3	0.23	15	-10	-5	4	7	-3
3530212	-1	2	7	-2	6	0.49	36	-10	-5	12	49	-3
3530213	-1	-1	5	-2	3	0.25	16	-10	-5	4	18	-3
3530214	-1	-1	5	-2	4	0.37	26	-10	-5	6	24	-3
3530215	-1	-1	5	-2	2	0.32	22	-10	-5	5	21	-3
3530216	-1	-1	8	4	6	0.74	60	-10	-5	8	45	-3
3530217	-1	6	6	5	16	2.02	227	-10	-5	10	50	-3
3530218	-1	2	5	-2	13	1.48	149	-10	-5	6	30	-3
3530219	-1	4	32	7	5	0.75	211	-10	-5	5	28	-3
3530220	-1	-1	5	-2	3	0.35	21	-10	-5	7	-5	-3
3530221	-1	-1	5	-2	2	0.28	19	-10	-5	6	6	-3
3530222	-1	-1	5	-2	2	0.28	18	-10	-5	6	6	-3
3530223	-1	-1	4	-2	3	0.32	44	-10	-5	4	10	-3
3530224	-1	-1	4	-2	4	0.35	39	-10	-5	5	18	-3
3530225	-1	2	6	-2	39	2.52	545	-10	-5	8	51	3
3530226	-1	7	6	10	24	1.75	273	-10	-5	7	61	-3
3530227	-1	2	5	-2	33	3.01	284	-10	-5	8	41	3
3530228	-1	3	7	-2	54	3.56	311	-10	-5	8	54	3
3530229	-1	3	6	4	35	2.21	184	-10	-5	11	47	3
3530230	-1	2	6	3	17	1.12	87	-10	-5	5	43	-3
3530231	-1	2	3	3	19	1.27	82	-10	-5	4	48	-3
3530232	-1	2	11	21	37	2.1	212	-10	-5	9	38	-3
3530233	-1	2	9	6	58	3.79	323	-10	-5	10	40	-3
3530234	-1	3	15	34	37	2.07	172	-10	-5	11	39	-3
3530235	-1	2	6	4	49	4.51	246	-10	-5	11	65	-3
3530236	-1	2	2	-2	51	5	563	-10	-5	15	55	4
3530237	-1	-1	2	-2	38	3.28	401	-10	-5	11	50	3
3530238	-1	3	2	-2	70	3.53	477	-10	-5	15	60	9
3530239	-1	3	3	11	77	3.77	716	-10	-5	11	38	4
3530240	-1	4	5	7	18	0.95	111	-10	-5	7	28	-3
3530241	-1	2	3	-2	52	3.38	477	-10	-5	12	50	-3
3530242	-1	2	36	10	52	3.01	606	-10	-5	11	53	-3
3530243	-1	3	3	8	57	3.61	703	-10	-5	12	57	3

SAMPNO	Ag	As	Cu	Pb	Zn	Fe%	Mn	Bi	Mo	Ni	V	Co
3530244	-1	1	2	22	50	3.18	629	-10	-5	12	49	3
3530245	-1	9	3	6	48	3.83	578	-10	-5	12	65	-3
3530246	-1	2	2	5	42	3.36	542	-10	-5	8	58	-3
3530247	-1	2	2	8	62	3.29	535	-10	-5	13	63	3
3530248	-1	11	6	6	46	2.82	428	-10	-5	12	58	4
3530249	-1	2	8	11	85	3.73	567	-10	-5	15	55	9
3530250	-1	3	4	4	67	3.41	472	-10	-5	11	40	3
3530251	-1	7	3	3	62	2.92	362	-10	-5	12	55	3
3530252	-1	1	3	3	36	2.42	346	-10	-5	12	44	6
3530253	-1	1	2	5	38	3.44	308	-10	-5	12	63	6
3530254	-1	1	4	3	34	2.46	347	-10	-5	13	37	4
3530255	-1	5	11	9	47	2.27	326	-10	-5	13	41	3
3530256	-1	13	5	-2	43	2.97	315	-10	-5	10	55	-3
3530257	-1	1	3	3	9	0.48	52	-10	-5	8	54	-3
3530258	-1	-1	3	-2	2	0.17	14	-10	-5	5	17	-3
3530259	-1	15	47	90	39	2.11	239	-10	-5	12	59	3
3530260	-1	2	4	8	44	2.1	474	-10	-5	8	43	3
3530261	-1	41	62	16	29	6.35	31	-10	20	28	129	3
3530262	-1	20	54	28	23	1.68	28	-10	27	14	102	-3
3530263	-1	1	2	4	4	0.42	21	-10	-5	8	32	-3
3530264	-1	-1	3	-2	3	0.34	18	-10	-5	4	18	-3
3530265	-1	1	5	-2	3	0.49	29	-10	-5	7	23	-3
3530266	-1	-1	3	3	6	0.53	27	-10	-5	4	40	-3
3530267	-1	7	36	16	28	2.02	209	-10	-5	14	62	5
3530268	-1	-1	3	3	8	0.57	26	-10	-5	5	53	-3
3530269	-1	2	3	5	49	3.22	382	-10	-5	16	40	4
3530270	-1	1	2	-2	54	3.5	429	-10	-5	15	47	-3
3530271	-1	-1	11	-2	101	3.96	551	-10	-5	17	49	6
3530272	-1	15	4	11	63	3.75	346	-10	-5	11	48	-3
3530273	-1	7	5	7	76	3.87	475	-10	-5	14	53	4
3530274	-1	1	3	7	8	0.57	61	-10	-5	6	28	-3
3530275	-1	4	4	5	50	2.93	391	-10	-5	9	32	3
3530276	-1	4	4	3	24	1.79	231	-10	-5	11	27	-3
3530277	-1	2	6	11	43	2.49	191	-10	-5	14	41	-3
3530278	-1	1	3	-2	3	0.29	18	-10	-5	6	12	-3
3530279	-1	-1	4	3	4	0.35	35	-10	-5	4	18	-3
3530280	-1	-1	4	-2	3	0.3	21	-10	-5	9	8	-3

APPENDIX 3

ROCKCHIP LITHOLOGICAL CODES, SAMPLING LEDGERS AND GEOCHEMISTRY

APPENDIX 3.

965080

ROCKCHIP AND DRILLING CODES 17/2/93

BMRLITH

Rock code as per published geological map
For time designation use:-

Q	Quaternary	M	Permian	P	Proterozoic
T	Tertiary	C	Carboniferous	A	Archaean
		S	Silurian		
K	Cretaceous	D	Devonian		
R	Triassic	O	Ordovician		
J	Jurassic	E	Cambrian		

FIELD ID

Field term for rock type
Broad groupings are:-

S	Sedimentary	I	Intrusive	C	Surficial
M	Metamorphic	E	Extrusive	O	Others

SEDIMENTARY

Scg	Conglomerate	Sls	Limestone	Sw	Wacke
Sss	Sandstone	Sch	Chert	Sag	Agglomerate/mixtite
Ssi	Siltstone	Slf	BIF		
Ssh	Shale				
Sbs	Black shale	Sbx	Breccia		

METAMORPHIC

Msl	Slate	Mq	Quartzite	Mmg	Migmatite
Mph	Phyllite	Mm	Marble		
Msc	Schist	Ma	Amphibolite		
Mbs	Graphitic schist	Mcs	Calcsilicate	Msk	Skarn
Mgn	Gneiss	Mh	Hornfels		

INTRUSIVE IGNEOUS

If	Felsic undiff.	Ii	Intermed undiff.	Iu	Ultramafic
Ifp	Felsic porphyry	Iip	Intermed porph	Ius	Serpentinite
Iap	Aplite	Im	Mafic undiff.		
Igr	Granite	Ido	Dolerite	Ipg	Pegmatite
Igd	Granodiorite	Igb	Gabbro		

EXTRUSIVE IGNEOUS

Ery	Rhyolite	Ean	Andesite	Et	Tuff undiff
Edc	Dacite	Eb	Basalt	Eft	Felsic tuff
				Emt	Mafic tuff

SURFICIAL (COVER) MATERIAL

Ca	Alluvium	Clt	Laterite	Csg	Gossan
Cco	Colluvium	Csp	Pisolites		
Cs	Sand	Csf	Ironstone	Ccy	Clay
Cbs	Black soil	Csi	Silcrete		
Cg	Gravel	Ccl	Calcrete	Cv	Vegetation/peat

OTHERS

Ovq	Vein quartz	Omy	Mylonite	Oms	Massive sulphide
Ovc	Vein carbonate	Obx	Breccia		
Ovs	Vein sulphide	Of	Fault gouge	Ox	Unknown

TEXTURAL CODES

WEATHERING/SURFICIAL FEATURES

We	Weathered	Fe	Ferruginous
Bl	Bleached	Fo	Fe ox in fract
Le	Leached		

MINERALISATION/ALTERATION FEATURES

Gs	Gossanous	Vs	Vein sulphide	Al	Altered
Vn	Veined	Ds	Dissem sulph	Si	Silicified
Di	Disseminated	Fs	Fracture sulph		
		Bs	Banded sulph		

GEOLOGICAL FEATURES

Bd	Bedded	Fr	Fractured	Po	Porphyritic
Bn	Banded	Ib	Interbedded	Sc	Schistose
Bx	Brecciated	Lm	Laminated	Sh	Sheared
Fi	Fissile (slatey)	Ma	Massive	Vu	Vuggy

DIAGNOSTIC MINERALOGY

PRIMARY MINERALISATION

Ga	Galena	Py	Pyrite	Ni	Ni sulphides
Sp	Sphalerite	Po	Pyrrhotite		
Cp	Chalcopyrite	Su	Unknown sulph		

SECONDARY MINERALISATION

Ls	Lead secondaries	Cs	Copper sec.	Nl	Nl secondaries
Zs	Zinc "	Us	Uranium "		

ALTERATION/DIAGNOSTIC MINERALS

Cy	Clay	He	Haematite	Gt	Garnet
Ep	Epidote	Mt	Magnetite	Ky	Kyanite
Cc	Carbonate	Js	Jarosite	To	Tourmaline
Sd	Siderite	Mn	Manganese mins		

COLOUR CODES

L	Light	A	Banded	M	Mottled
D	Dark				
N	Black	P	Purple	V	Green
G	Grey	R	Red	K	Pink
B	Brown	O	Orange	E	Blue
W	White	Y	Yellow	S	Silver

APPENDIX 3: MOUNT FRANKLAND EL18/92 ROCKCHIP LEDGERS AND ASSAYS											
Results in ppm (Fe in %).											
Database last updated on 17/7/93											
SAMPNO	DPO	EAST	NORTH	EL	PROSPECT	BMRLITH	FIELD ID	TEXTURE	ALT/MIN	COLOUR	COMMENTS
3307855	71511	322100	5439000	EL18/92	MT FRANKLAND	P	Ssi	Lm		LV	Funny green spots.
3307856	71511	321500	5438300	EL18/92	MT FRANKLAND	P	Ssi	LmDi	He	LV	Pyjama rock with 0.5% He.
3307857	71511	321500	5438300	EL18/92	MT FRANKLAND	P	Ssi	LmDI	He	LV	Pyjama rock with 0.5% He.
3307858	71511	321500	5438300	EL18/92	MT FRANKLAND	P	Ssi	LmDi	He	LV	Pyjama rock with 0.5% He.
3307859	71511	321500	5438300	EL18/92	MT FRANKLAND	P	Ssi	LmDi	He	LV	Pyjama rock with 0.5% He.
3307860	71511	320750	5437700		CLUMP	P	Sbs	ShFe		MVGO	Extension of Clump prospect?
3307861	71511	330900	5422750		LINDSAY R	P	Ssh	LmFe		ANW	Silicious shale, 5% FeOx after Py?.
3307800	71514	321500	5438300	EL18/92	MT FRANKLAND	P	Ssi	LmDs	Qs	LV	Dup. of 3307859. Petrology.
3308062	71517	326800	5421600	EL18/92	GAFFNEY CK		OvqOvs	Vs	Py	MWY	Py 40%.
3308063	71517	326800	5421600	EL18/92	GAFFNEY CK	Pd?	Ido?	MaDs	PyCp	DV	Chl rock, dolerite?
3308064	71517	326800	5421600	EL18/92	GAFFNEY CK	P	Ssi	Lm		ABW	
3529801	71536	321320	5437345		THE CLUMP	Prq	Sss	Fe	Py	YR	125/55NE
3529802	71536	321360	5436980		THE CLUMP	Prq	Ssh	Lm			125/55NE Limonite
3529803	71536	321360	5436980		THE CLUMP	Prq	Ssh	LmBl		G	Qtz veinlets
3529804	71536	321410	5436900		THE CLUMP	Prq	SshOvq		PyCp		Tailing/Covellite
3529805	71536	326725	5421490	EL18/92	SOUTH MINE	Prq	SshSss	Ib			Tailing
3529806	71536	326725	5421490	EL18/92	SOUTH MINE	Prq	SshSss	AIIb	PyHe		Chlorite alt.
3529807	71536	326725	5421490	EL18/92	SOUTH MINE	Prq	OvsOvq		PyCp		
3529808	71536	325865	5424110	EL18/92	HOGBACK RIDGE	Prq	OvqOvs	VnFr	Py	Y	Tailing/Limonite coated
3529809	71536	325845	5424150	EL18/92	HOGBACK RIDGE	Prq	OvqOvs		PyHe		10-20%Hematite
3529810	71536	326850	5420800	EL18/92		Prq	SshSss	LmBd			165/70E/Limonite stained
3529811	71536	326620	5420965	EL18/92		Prq	Sss	DISI	HePy		Tailing
3529812	71536	325395	5425230	EL18/92	ML3802	Prq	OvqSsh	BdVn	Py	G	Tailing
3529813	71536	325395	5425230	EL18/92	ML3802	Prq	OvqOvs		Py		10-20%Py/Strike 145 Dip E
3529814	71536	325475	5425110	EL18/92	ML3802	Prq	SshCsg	Cs			170/40E/10%Sulphide cavities
3529815	71536	325420	5425530	EL18/92		Prq	SshSss	IbFe			145/35SW/Limonite stained
3529816	71536	327685	5422335	EL18/92		Prq	Mq	Bl?FoLm	Py		5%Fe oxidised pyrite
3529817	71536	327815	5421990	EL18/92		Prq	Mq	LeWe	Py	G	3-5%Pyrite/Trace covellite
3529818	71536	328960	5421030	EL18/92	DOHERTYS PIMPLE	Prq	SshSls	Dilb	PyHe		130/58W
3529819	71536	329215	5420695	EL18/92	DOHERTYS PIMPLE	Prq	SshSls	WeBd	Py		110/20N/Clev070/80S,102/70S
3529820	71536	329425	5420780	EL18/92	DOHERTYS PIMPLE	Prq	Ssh		Py	LV	Chloritic155/80WJoint035/90
3529821	71536	330110	5421485	EL18/92	DOHERTYS PIMPLE	Prq	SshSss	LmBdVn	Py		082/60S,Limonite coated
3529822	71536	325010	5424150	EL18/92		Prq	SshSsi	LmSIBd			040/37SE,Limonite
3529823	71536	326550	5424150	EL18/92		Prq	SshSss	LmGsAlVn	HeSu		Chlorite alt,Limonite,10%Sulphides
3529824	71536	324655	5424150	EL18/92		Prq	SshSss	SI			

SAMPNO	DPO	EAST	NORTH	EL	PROSPECT	BMRLITH	FIELD ID	TEXTURE	ALT/MIN	COLOUR	COMMENTS
3529901	71536	325280	5425660	EL18/92		Prq	Ssi	lbLm	Py	DG	
3529902	71536	325290	5425650	EL18/92		Prq	Ssi	lbLm			
3529903	71536	325320	5425540	EL18/92		Prq	Ssi	Lm	Py	G	<30%Py
3529904	71536	326030	5425450	EL18/92		Prq	Ssh	Lm	Py	LDG	
3529905	71536	346325	5425450	EL18/92		Prq	Mq		Py		
3529906	71536	325500	5426150	EL18/92		Prq	Ssi	WeFl	Py	BV	Location uncertain
3529907	71536	325300	5426060	EL18/92		Prq	SshSsi		Py	N	1-5%Py
3529908	71536	325300	5426060	EL18/92		Prq	Ssh	Vn	Py	N	Qtz-Py veins. Locn uncertain
3529909	71536	324900	5427000	EL18/92		Prq	SsiSsf	WeLmVn	Py	G	
3529910	71536	324950	5427200	EL18/92		Prq	SshOvq	Fi	Py	N	
3529911	71536	324950	5427200	EL18/92		Prq	Ssh			N	
3529825	71538	328305	5424665	EL18/92		Prq	Mq	VnVu	Su		091/28S
3529826	71538	329185	5424845	EL18/92		Prq	SshSss	Fe	HePy		092/8S,Limonite
3529827	71538	329440	5424940	EL18/92		Prq	Sls?	WeLm			
3529828	71538	329420	5425295	EL18/92		Prq	Sss	SlVn	Su	RO	Limonite coating
3529829	71538	328910	5425770	EL18/92		Prq	OvqSsh	Lm	PyHe	YR	10%Py/Red oxide(cuprite?)
3529830	71538	328910	5425770	EL18/92		Prq	Ssh	SlAl	Py		Chlorite alt.
3529831	71538	327990	5427230	EL18/92		Prq	SshSss	SlDiVnFo	Py		
3529832	71538	328390	5425700	EL18/92		Prq	SssSsh	BdFoDi		O	
3529833	71538	325810	5424270	EL18/92		Prq	SshSss	LmGsVn	Py		170/35E
3529834	71538	325330	5424805	EL18/92		Prq	SshOvs	WeVn	Py		Possibly sulphidised shale
3529835	71538	324215	5426960	EL18/92		Prq	SshSss		Py	N	155/70E,Clev.000/75W
3529836	71538	319000	5431300	EL18/92	LITTLE FRENCHMAN	Prq	SssSsh	LmSl			120/17E
3529837	71538	325745	5423540	EL18/92		Prq	SshSsi	LmVn	Py		176/62E
3529838	71538	326125	5423465	EL18/92		Prq	SshSsi	Lm	Py		170/45E,Fract.145/80W
3529840	71538	320735	5437335			Prq	Sss	Gs	Py	V	132/85W,Dip130/48E
3529841	71538	322845	5427655	EL18/92		Prq	SshSss	LmSlFo	Py	GW	078/42S,Joint095/60S
3529842	71538	323365	5426545	EL18/92		Prq	Sss	WeLm	Py		010/55E
3529843	71538	324175	5425820	EL18/92		Prq	OvqSshSss	VnAl	Py		Weak chlorite alt
3529844	71538	325160	5425690	EL18/92		Prq	SshSss	lbAlVn	Py		Chlorite alt165/80E,Fault150/80W
3529845	71538	326095	5426010	EL18/92		Prq	Msc			LV	Sericite3%Devils dice144/85W
3529846	71547	324960	5426360	EL18/92	THE GAP	Pr	Ssi?	DsSl?	Py	DV	Py 5-10% Float in drain.
3529847	71547	324675	5425920	EL18/92	THE GAP	Pr	Ssi	Lm		ALGDG	
3529846	71547	324085	5425900	EL18/92	THE GAP	Pr	Ssi			DGN	Micaceous
3529847	71547	324990	5425900	EL18/92	THE GAP	Pr	Ssi	Ds	Py	MYOG	Euhedral Py 5%
3529848	71547	324100	5425850	EL18/92	THE GAP	Pr	Ssi	Lm	Py	OG	Voids after Py 5%
3529849	71547	324300	5425850	EL18/92	THE GAP	Pr	Ssi	Lm		ALGDG	
3529850	71547	324855	5426100	EL18/92	THE GAP	Pr	Ssi	Lm		ALGDG	Euhedral voids after Py 5%

	Ag	As	Au	Bi	Co	Cu	Fe%	Mn	Mo	Ni	Pb	V	Zn
55	-1	4	-0.005	-10	6	9	3.07	355	5		20	35	75
	-1	-1	-0.005	-10	10	7	2.95	375	-5		13	28	120
	-1	-1	-0.005	-10	12	10	2.42	150	-5		25	28	95
	-1	-1	-0.005	-10	13	13	3.36	140	-5		18	33	120
57	-1	4	-0.005	-10	14	46	3.36	485	-5		13	31	125
	-1	31	-0.005	-10	-3	18	5.81	290	-5		13	87	36
	-1	2	-0.005	-10	5	18	2.45	140	-5		60	34	115
60													
62	2	8000	1.05	30		1200	21	34	10		4		-2
	3	200	0.082	-10		23000	22.5	1200	-5		5		90
64	-1	34	-0.005	-10		68	3.4	220	5		3		22
9801	-1	500	0.009			1808	54.1	30			71		70
	-1	-50	-0.005			38	4.5	462			-3		34
	-1	53	-0.005			8	0.64	83			-3		13
9804	1	1500	0.106			3458	12.19	123			13		11
	-1	-50	-0.005			79	2.61	288			8		36
	-1	-50	0.007			1583	14.93	938			-3		70
	3	1200	0.3			8700	7.66	89			17		23
	-1	1450	0.215			633	13.3	36			54		18
	-1	1375	0.069			279	10.4	37			8		5
	-1	50	-0.005			17	2.06	83			-3		32
	-1	54	-0.005			111	2.52	76			-3		14
	-1	-50	0.006			7	0.58	42			-3		9
	-1	-50	-0.005			21	1.69	44			-3		6
	-1	3100	0.044			208	20.6	8400			-3		55
	-1	-50	0.005			21	2.24	287			12		13
	-1	-50	-0.005			12	1.69	151			9		22
	-1	-50	-0.005			8	0.97	103			14		40
	-1	-50	-0.005			7	1.41	43			53		27
	-1	-50	-0.005			6	2.58	74			24		19
	-1	-50	0.008			12	3.06	96			8		40
	-1	-50	-0.005			26	2.83	181			5		20
	-1	-50	-0.005			7	1.48	99			4		20
	-1	-50	-0.005			30	4.64	154			-3		14
	-1	-50	-0.005			5	0.42	37			-3		4

Ag	As	Au	Bi	Co	Cu	Fe%	Mn	Mo	Ni	Pb	V	Zn
-1	-50	-0.005			7	1.34	72			-3		21
-1	-50	-0.005			10	1.64	89			-3		22
-1	-50	0.008			18	1.9	753			5		9
-1	-50	-0.005			4	1.63	117			-3		20
-1	-50	-0.005			70	1.49	202			9		33
-1	-50	-0.005			3	0.88	44			-3		19
-1	-50	-0.005			16	0.77	119			4		9
-1	-50	-0.005			51	4.11	37			10		21
-1	-50	-0.005			10	1.59	142			-3		16
2	140	0.036			122	8.06	55			45		8
-1	-50	0.006			25	0.54	58			5		6
-1	1	-0.005			6	0.74	185			-3		4
-1	3	-0.005			8	1.56	79			-3		25
-1	1	0.008			5	1.51	43			-3		35
-1	2	-0.005			3	1.25	36			58		3
-1	300	0.005			295	13.5	73			24		18
-1	27	-0.005			92	13.2	725			13		115
-1	1	-0.005			5	1.79	34			4		5
-1	1	-0.005			3	4.33	74			-3		10
-1	8	0.006			58	2.13	41			4		6
-1	24	-0.005			135	14.9	61			9		8
-1	4	-0.005			13	1.39	240			14		8
-1	-1	0.005			4	0.82	98			-3		3
-1	3	-0.005			14	2.25	100			-3		20
-1	3	0.005			46	1.75	175			13		14
-1	290	0.005			2000	31.5	285			46		9
-1	2	-0.005			5	0.86	48			6		3
-1	3	-0.005			13	3.96	355			3		7
-1	120	-0.005			165	7.23	315			7		17
-1	3	-0.005			4	2.76	320			-3		40
-1	2	-0.005			5	1.76	71			-3		11
-1	3		-10	3	4	4.83	580	-5	11	19	21	67
-1	2		-10	-3	4	2.64	203	-5	9	-2	45	32
-1	-1		-10	-3	3	0.7	50	-5	4	5	43	11
-1	130	0.013	-10	3	111	15.1	466	-5	19	105	60	119
-1	14		-10	-3	49	7.19	288	7	-3	-2	35	16
-1	12		-10	-3	55	0.97	49	7	10	8	35	16
-1	17		-10	-3	20	4.13	184	-5	5	13	49	40

APPENDIX 4

PETROLOGICAL REPORTS

965086

APPENDIX 4.

Central Mineralogical Services

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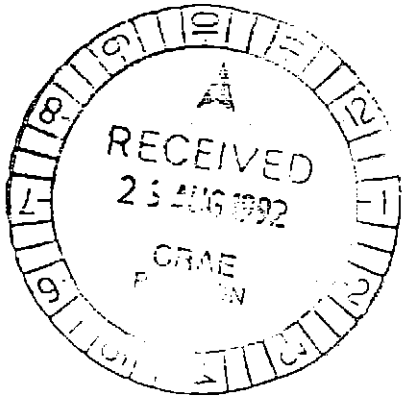
20 August 1992

Mr R Parkinson
CRA Exploration Pty Ltd
P O Box 8093
NORTHLAND CENTRE VIC 3072



REPORT CMS 92/8/14

YOUR REFERENCE: DPO 71514

DATE RECEIVED: 10 August 1992

SAMPLE NO'S: 3397800 MT FRANKLAND EL 321500E 5438250N

SUBMITTED BY: R. Parkinson

WORK REQUESTED: Petrography
Mineragraphy

Copies to:

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MANUKA ACT 2603
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H.W. Fander, M.Sc.

965087

CENTRAL MINERALOGICAL SERVICES

Date 20 August 1992

SAMPLE REPORT (Mineralogy, Petrology, Ore Microscopy)

Job No CMS92/8/14 Date Received: 10 August 1992

Reference DPO 71514

Sample No: 3307800

Nature of Sample: Hand Specimen

DESCRIPTION SECTION No. 62873

IDENTIFICATION
3307800
Laminated Metasiltstone

a. Hand Specimen:

Greenish, finely laminated rock with iridescent dark spots.

b. Microscopic:

This is a chloritic, laminated metasiltstone; evidence for mild metamorphism is the formation of new minerals and the development of secondary cleavage.

The rock consists of thin (1/2 - 2mm) laminations of quartzose silt showing poorly-defined graded bedding and composed mainly of angular quartz grains with subordinate sericite and chlorite flakes; these laminations alternate with thicker (2 - 6mm) layers of matted sericite flakes with minor fine quartz and chlorite; these layers have developed a slaty cleavage at about 40° to the laminations, due to the alignment of the mica flakes. There are occasional grains of zircon, and authigenic tourmaline crystals.

In polished section it is seen that the black, sometimes iridescent grains are hematite, pseudomorphous after pyrite (probably via goethite, i.e. pyrite oxidised to goethite, then recrystallised to hematite).

The chlorite in the rock is a product of recrystallisation of Mg-clays and is indicative of mild or incipient metamorphism, as is the hematite.

APPENDIX 5

AIRBORNE MAGNETIC AND RADIOMETRIC SURVEY LOGISTICS REPORT

LOGISTICS REPORT

AIRBORNE GEOPHYSICAL SURVEY

CRA EXPLORATION PTY LIMITED

MOUNT FRANKLAND PROJECT

Flown and Processed By

Kevron
Geophysics Pty. Ltd.

965090

LOGISTICS REPORT

AIRBORNE GEOPHYSICAL SURVEY

KEVRON GEOPHYSICS JOB NUMBER 1188

FOR

CRA EXPLORATION PTY. LTD.

KEVRON GEOPHYSICS PTY LIMITED
Hangar 106, 10 Compass Road
JANDAKOT AIRPORT WA 6164
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LOGISTICS REPORT

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1. LOGISTICS

1.1 OPERATING BASE AND DATES OF FLYING

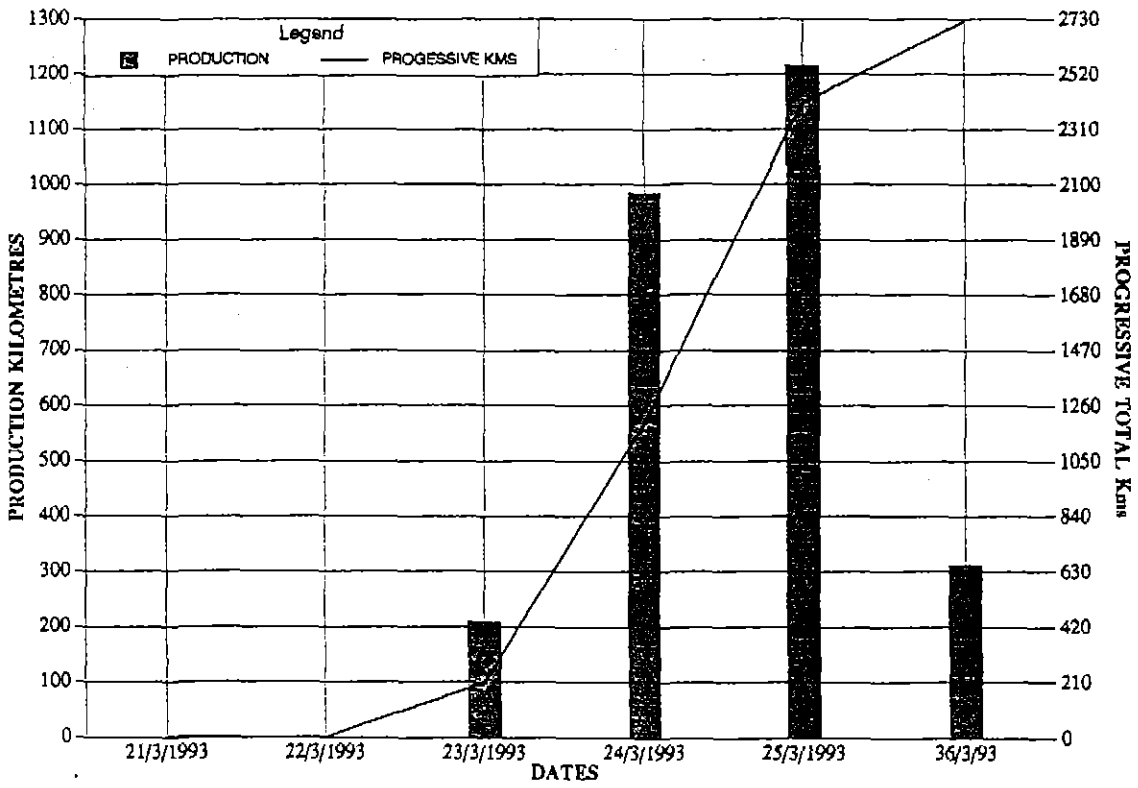
1.1.1 Operating Base

The crew and aircraft were based at Wynyard Tasmania. The crew stayed at the Englis River Hotel for the duration of the survey.

1.1.2 Dates of Flying

DATE	AIRCRAFT	FLT	REMARKS	KMS FLOWN
21/03	VH-KAC	01	no flight bad weather	-
22/03	VH-KAC	02	flight aborted due severe turbulence	-
23/03	VH-KAC	03	short flight low cloud	208.6
24/03	VH-KAC	04 05	operations normal operations normal	702.4 282.2
25/03	VH-KAC	06 07	operations normal operations normal	912.2 304.0
24/03	VH-KAC	08	operations normal	312.8
			Total Kilometres Flown	2722.2

DAILY PRODUCTION CHART



1.2 AIRCRAFT DETAILS AND NAMES OF FIELD CREW

1.2.1 Aircraft

Twin engine Rockwell Commanders 500S "Shrike", registration VH-KAC

1.2.2 Field Crew

Pilots	G Wornes
Operators	R Gardner
Field Assistant	G Patterson

2. OPERATION MANAGEMENT

2.1 QUALITY MANAGEMENT

The normal procedure for collecting airborne geophysical data requires the operation of sophisticated electronic equipment on board the aircraft, and subsequent checking of the data collected, both in the air and on the ground. The responsibility for collecting the data rests with the Navigator/Operator on board. He is trained to do this by the technical engineer who installs and maintains such equipment.

During a flight, the data is constantly being monitored by means of the analogue chart recorder and various digital displays. The monitoring techniques used are beyond the scope of this document but are the result of many years of research and practical experience. The Navigator/Operator has before him a visual display of the magnetometer signal and recorded data, altitude, off line distance, line number and direction, ground speed etc. This equipment has been designed so that unacceptable data is either very obvious or flagged to trigger an alarm.

At the end of each day's flying, the analogue charts are further inspected for data quality, and the recorded flight path is plotted in the field to ensure it meets the specifications laid down. Unacceptable flight paths can thus be re flown the next day.

Collected data is then sent to the Company's office where it is immediately loaded into the processing computers and its statistics are inspected. If all channels are considered satisfactory, processing is then commenced. If it is not, then instructions are sent to the field crew for re-flying of specific portions.

The Navigator/Operator keeps a running log of each flight known as the "flight log" on which is recorded details of all lines flown, flight number, date etc, and any comments which

may be required.

The training of Navigator/Operator is carried out initially on the ground and then in the air. Operators are not permitted to work on their own until both the Senior Operator and the Technical Engineer are satisfied as to their competency. The Navigator/Operator is also responsible for the correct installation and operation of the ground base station magnetometer and for making the final decision as to whether the base station data is within specifications. Base station data is recorded in both digital and pseudo-analogue form and is closely re-examined after each days flying before being returned for processing. Many years of experience and several million line Km of survey have proved these methods adequate.

2.2 SAFETY MANAGEMENT

The overall responsibility for Safety and Health rests with the General Manager/Operations Manager.

Flying safety in general results from the conscientious application of the Air Navigation Regulations in regard to Rules of the Air and Maintenance requirements.

The Company is required by law to have an Operations Manual approved by the Civil Aviation Authority before any flying operation can be carried out and this document is available for inspection at the Company's Office. Routine checks by the Civil Aviation Authority ensure that all operations and maintenance meet the requirements of the law.

Further, every pilot has been extensively trained in low level flying and instrument flying and pilots are only employed after assessment of experience and ability.

Vehicle usage and driving habits are constantly under review by the Management and particular attention paid to off-road 4WD work and remote area survival techniques. The Company believes there is no substitute for experience, and no inexperienced staff are used in any phase of the operations unless they are accompanied by an experienced equivalent.

Emergency procedures in regard to aircraft are according to the Operations Manual and would normally be under the direction of Civil Aviation Authority.

In regard to vehicles, these are equipped with adequate radio equipment to enable two way communication with any aircraft and/or the RFDS. Sartimes for vehicles in remote areas are a Company requirement.

2.3 ENVIRONMENTAL MANAGEMENT

The aircraft operations are generally non-polluting. Ground operations are minor, as only two (2) vehicles are used. Commonsense rules apply to these tasks with particular reference to the use of camp sites, beacon sites, sacred sites

etc. Any staff responsible for destroying property or land are liable for dismissal.

3. SURVEY DETAILS

3.1 DESCRIPTION OF AREA FLOWN

The Mount Frankland cover parts of the Sandy Cape 1:100,000 topographic map sheet. The exact survey boundary is shown in Appendix 1. The survey distance was approximately 2704.8 Line Kms.

3.2 SURVEY SPECIFICATIONS

Flight line direction		: 090 - 270 Degrees AMG
Flight line spacing		: 100 Metres
Tie line direction		: 000 - 180 Degrees AMG
Tie line spacing		: 2000 Metres
Mean Terrain Clearance		: 60 Metres
Time Base	Magnetics	: 0.10 Second
	Radiometrics	: 1.00 Second
Sample Interval (in still air)		
	Magnetics	: 7 metres or less
	Radiometrics	: 70 metres or less

3.3 NAVIGATION

The primary navigation method was by GPS Satellite Receiver (Ashtech). This equipment fixes the aircraft position every second and records the information on the acquisition tape.
At the same time the on board navigation computer produces a steering signal for the pilot's guidance and this is also updated once per second.

A second Ashtech receiver used as a base station, is located on a known position and this unit constantly records its position once per second. The difference between the calculated and measured pseudo ranges produces corrections which are then transmitted to the aircraft by a radio link, in real time. The aircraft receiver uses these corrections to adjust its own position prior to recording on the acquisition tape, as well as to produce an accurate steering signal to enable the aircraft to be flown on any pre-planned flight path. This technique is known as " Real Time Differential " GPS.

3.3.1 GPS Base Station Position

The base station was situated at the Wynyard Airport Tasmania.
For a full report of the GPS Base Station position refer to Appendix 2.

3.4 FLIGHT PATH RECOVERY

The flight path was plotted from the recorded GPS/Doppler data. If the GPS data was unusable for short distances, the Doppler data is used to infill the gaps.

3.5 MAGNETOMETER

The magnetometer used was an optically pumped Caesium Vapour model VIW 2321 - H8 manufactured by Scintrex. The magnetometer sensor was mounted in a stinger on the aircraft. The magnetometer sensor is coupled to a RMS Instruments Automatic Aeromagnetic Digital Compensator (AADC) to produce a measurement of the earth's magnetic field. The AADC compensates the total magnetic field data in real time for the effects of the aircraft's motion, changes in attitude and heading. To do this the AADC uses a set of interference coefficients calculated from a compensation flight carried out before the survey commenced.

The AADC outputs digital data with a resolution and sensitivity of 0.001 nT at a sampling rate of ten (10) times per second. This data was recorded digitally. This data was also recorded in analogue form.

Magnetometer summary:

Time base	0.100 seconds
Sample interval	7m approx.
Resolution	0.001 nT
Sensitivity	0.001 nT

Analogue chart full scale deflection:

Mag Fine	200 nT
Mag Coarse	2000 nT
Mag Coarse	10000 nT

3.6 SPECTROMETER

A Geometrics GR-800D double buffered, multi-channel gamma ray spectrometer was used with a downward crystal array volume of 33.6 lt and upward array volume of 4.2 lt. A Geometrics GR-900 controlled the gains and temperature of the crystal packs. The GR-800D produced both digital and analogue data and was recorded every 1.0 seconds.

3.6.1 Digital Recording

Digital data from the GR-800D spectrometer are as follows:

1. Accumulation time
2. Total number of counts during Accumulation time for downward array
3. Total count 0.40 - 3.00 MeV

4. K40	1.37 - 1.57 MeV
5. BI - 214	1.67 - 1.89 MeV
6. TL - 208	2.42 - 2.82 MeV
7. Cosmic	3.00 - 6.00 MeV
8. Total number of counts for upward array	
9. Total count	0.40 - 3.00 MeV
10. BI-214	1.67 - 1.89 MeV

3.6.2. Analogue Recording

Four channels of data was recorded in analogue form. The analogue data was corrected for dead time and normalised and were stripped for compton scatter.

The channels recorded were:

Total count	5000 counts fsd
K 40	500 counts fsd
BI-214	500 counts fsd
TL-208	500 counts fsd

3.7 ALTIMETER

3.7.1 Radar Altimeter

A Sperry AA-210 Radar Altimeter system was used, this being a high resolution, short pulse radio altitude system designed for automatic continuous operation over a wide variation of terrain, target reflectivity, weather and aircraft altitude. The radar altimeter indicator provides an absolute altitude display from 0 - 750 metres (0 - 2,500 feet). The output of the equipment was 4 mV/ft.

3.7.2 Analogue Barometric Altimeter

A Rosemount 1241 m Barometer, a capacitive capsule device with high repeatability and accuracy, was used. The output of this equipment was 0.666 mV/ft.

Data from both altimeters were recorded on digital tape and recorded on the analogue chart.

3.8 BASE STATION MAGNETOMETER

A recording base station magnetometer, incorporating an Epson PX-8 Computer, P-40 Printer and Geometrics G-856 Magnetometer with analogue and digital recording was used as the primary base station magnetometer and run continuously throughout the survey flying period with a sampling interval of 6 seconds and a sensitivity of 0.1 nt.

The base station was established at the Wynyard Airport in a area of low gradient and away from man-made influences.

3.9 DATA ACQUISITION

A RMS Instruments DAS-8 Data Acquisition System was used to record all data in digital format on DC-300 data cartridges in a RMS Instruments TCR-12 Tape Cartridge Recorder.

A RMS Instruments GR-33 printer-plotter was used to record the analogue information.

3.10 FLIGHT TRACK RECORDING SYSTEM

A VHS video tracking system with a wide angle lens was used to record the flight path of the aircraft. The system used a National ccd video camera and a video recorder. Recorded on the video image is the line number and fiducial number.

4. CALIBRATIONS

4.1 MAGNETICS

4.1.1 Magnetic Noise Envelope

The noise envelope was less than 0.1 nT standard deviation for the entire aircraft flight envelope. (Refer Appendix 5).

4.1.2 Heading Error Checks

The aircraft was compensated using the RMS AADC. This is achieved by flying a series of pitch, roll and yaw manoeuvres in each of the four cardinal headings. A mathematical model was used to calculate the effects due to permanent, induced and eddy currents on the magnetometer in real time. The heading error was less than 1.0 nT. (Refer Appendix 5)

4.1.3 Parallax

Parallax was resolved by flying over a suitable anomaly in opposite directions within each area. The parallax for the system was resolved to 8 fiducials or 70 m approximately.

4.2 RADIOMETRICS

4.2.1. Background Correction Plots and Equations

The following is the processing scheme for computing aircraft background and cosmic radiation: (Appendix 6)

A. Fly a stack of seven (7) lines over water, west of the Perth coast with the altitudes from 1,000 ft to 10,000 ft. with increments of 500 feet.

B. The radiometrics ie. Potassium, Uranium, Thorium, Total Count and Cosmic were corrected for dead time (8 x 10[- 6] seconds) and scaled to counts per second for all lines.

C. The mean value of each line, for each element, was used for computing the background and cosmic.

D. Each radiometric element (K. U, Th) and Total Count were independently processed through a curve fitting program, using cosmic versus each radiometric variable. Thus producing a best linear (Y = mx + b) fit for Potassium, Uranium, Thorium and Total Count.

E. The curve-fitting program displays the parameters to produce the linear fit, where b is aircraft background and mx is the cosmic radiation correction.

4.2.2 Constants Derived From Background Tests

Channel	Background cps	Cosmic	Alt. coefficient
Total Count	199	1.918	0.00574
K	18	0.108	0.00713
U	9	0.092	0.00730
Th	5	0.112	0.00581

4.2.3 Pre and Post Flight Checks

A statistical summary of the pre and post flight hand sample checks is enclosed at the rear of this report (see Appendix No: 4).

4.2.4 Hand Samples

The following sources were used:

Thorium sample
Uranium sample
Caesium 137 sample

4.2.5 Test Line

A test line was chosen inside the survey area. The start and end coordinates are as follows

-41° 15.60' 144° 52.46' to -41° 11.59' 144° 51.73'

Some variation was noticeable in the total count and uranium levels due to daily radon variations. These variations showed some correlation with wind condition, windy days lower than calm days.

The day to day response from the test line is considered a satisfactory indication that the system was performing well.

4.2.6 Analogue Stripping Coefficients

These coefficients were obtained using point source Thorium and Uranium samples placed to give a uniform irradiation of the crystal pack, while the GR-800 subtraction switches were adjusted to give minimum observable contribution into the other channels.

The following stripping coefficients were used:

alpha	0.24	(Tl-208 from Bi-214)
beta	0.14	(Tl-208 from K-40)
gamma	0.78	(Bi-214 from K-40)

4.2.7 Data Reduction

The data reduction of the 256 channel spectrometry data is undertaken to 4 channels (raw data) in the GR-800D Spectrometer.

5. DATA PROCESSING

Three types of data were required for data processing:

1. Raw field data tapes
2. Flight path recovery information
3. Digital diurnal data.

5.1 Data Reduction and Checking

The first step in processing the raw data was to read into the Computer system and check for steps, spikes, noise and missing or duplicate data. If errors were detected, the data containing these errors were automatically displayed for evaluation and correction. The barometric and radar altimeter data were calibrated to convert them from millivolts to metres. The radiometric data were also dead time corrected and normalised.

The differentially corrected GPS data was then converted to UTM co-ordinates using the Australian National Spheroid.

The data are in grid UTM Zone 55 with a central meridian of 147 degrees East, with an x-bias of 500 kilometres and a y-bias of 10,000 kilometres. Reference spheroid used was the Australian National spheroid.

5.2 Magnetic Processing

The digitally recorded diurnal data from the base station were edited to keep only samples taken during actual flight time and to remove spikes and check data quality. The diurnal data was low-pass filtered using a spatial domain filter with a cut-off at 20 terms. This cut off all data with periods of less than thirty (30) seconds. The filtered data were then subtracted from the aircraft data, one sample at a time. After subtraction, the mean diurnal value was added back to the airborne data for each line, producing diurnally corrected data. The data were then tie line levelled.

The location data was then merged with the corrected airborne data to produce located airborne data.

The geomagnetic field was measured by fitting a second order poly-normal surface to thirteen coefficients computed from the IGRF model. The IGRF 1990 model was used, updated to 1992.92. The IGRF model for the survey had the approximate following values:

Magnetic Declination	12.71 Degrees
Magnetic Inclination	-71.91 Degrees
Total Field Strength	62079.05 nT

5.3 Radiometric Processing

The radiometric data was corrected for cosmic and aircraft background, altitude attenuation and corrected for Compton Scatter. The stripping coefficients used were:

Alpha:	0.283
Beta:	0.435
Gamma:	0.718
Eta:	0.050

5.4 Deliverable Items

A total of six (06) maps were delivered on high quality mylar film, they were as follows :

2 x	Total Magnetic Intensity Contour	1 : 25,000
2 x	Flight Path	1 : 25,000
2 x	Total Magnetic Intensity Profiles	1 : 25,000

One located data tape was delivered on 9 track tape in ASCII format.

APPENDIX 1

SURVEY AREA

DESCRIPTION OF SURVEY AREA

The survey area boundaries are shown on the following map. The co-ordinates of the corners, beginning at the North-West corner and proceeding clockwise, are as follows:

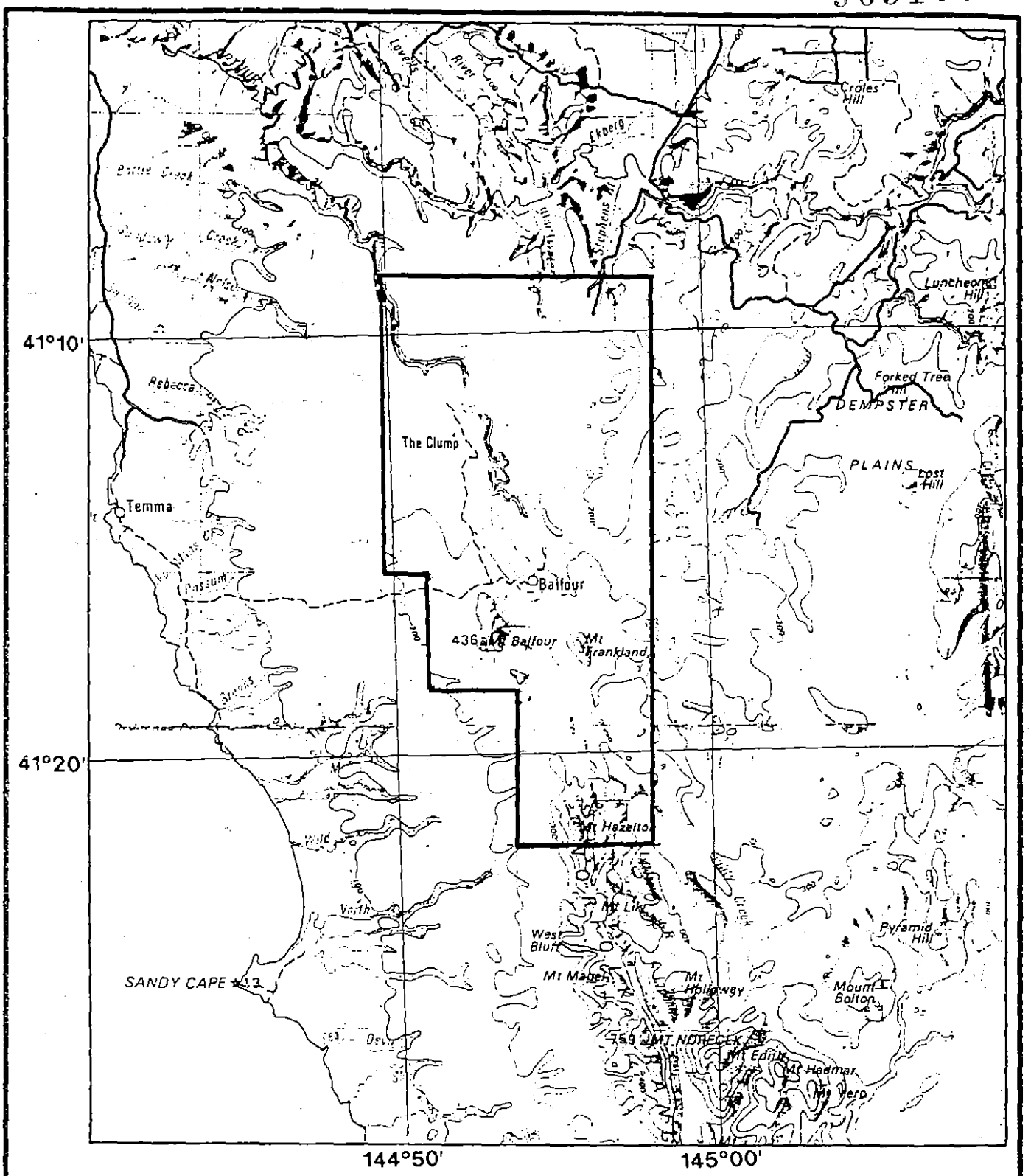
Coordinates are in AMG Zone 51

AMG mE	AMG mN
318000.0	5443000.0
330000.0	5443000.0
330000.0	5418000.0
324000.0	5418000.0
324000.0	5425000.0
320000.0	5425000.0
320000.0	5430000.0
318000.0	5430000.0

SURVEY LINE BREAKDOWN

Line Type	Direction (degrees)	Spacing	Shortest Line Km	Longest Line Km	Number of Lines	Total Kms
Traverse	090 - 270	100.0m	6.2	12.2	252	2554.4
Tie	000 - 180	1000.0m	13.2	25.2	7	150.4
Total					259	2704.8

965105



LINE DIRECTION: 090 - 270
LINE SPACING: 100 m
SURVEY HIEGHT: 60 m

1:250,000 MAP REFERENCE.
TASMANIA N/W

CRA EXPLORATION LIMITED.
AIRBORNE GEOPHYSICAL SURVEY

MOUNT FRANKLAND PROJECT

JOB No	1188	DATE	MARCH 1993

APPENDIX 2

GPS BASE STATION

965107

GPS BASE STATION LOCATION REPORT

JOB NUMBER 1188 AREA Mount Frankland DATE MAR 93

LOCATION OLD FIRE STATION, WYNYARD AIRPORT

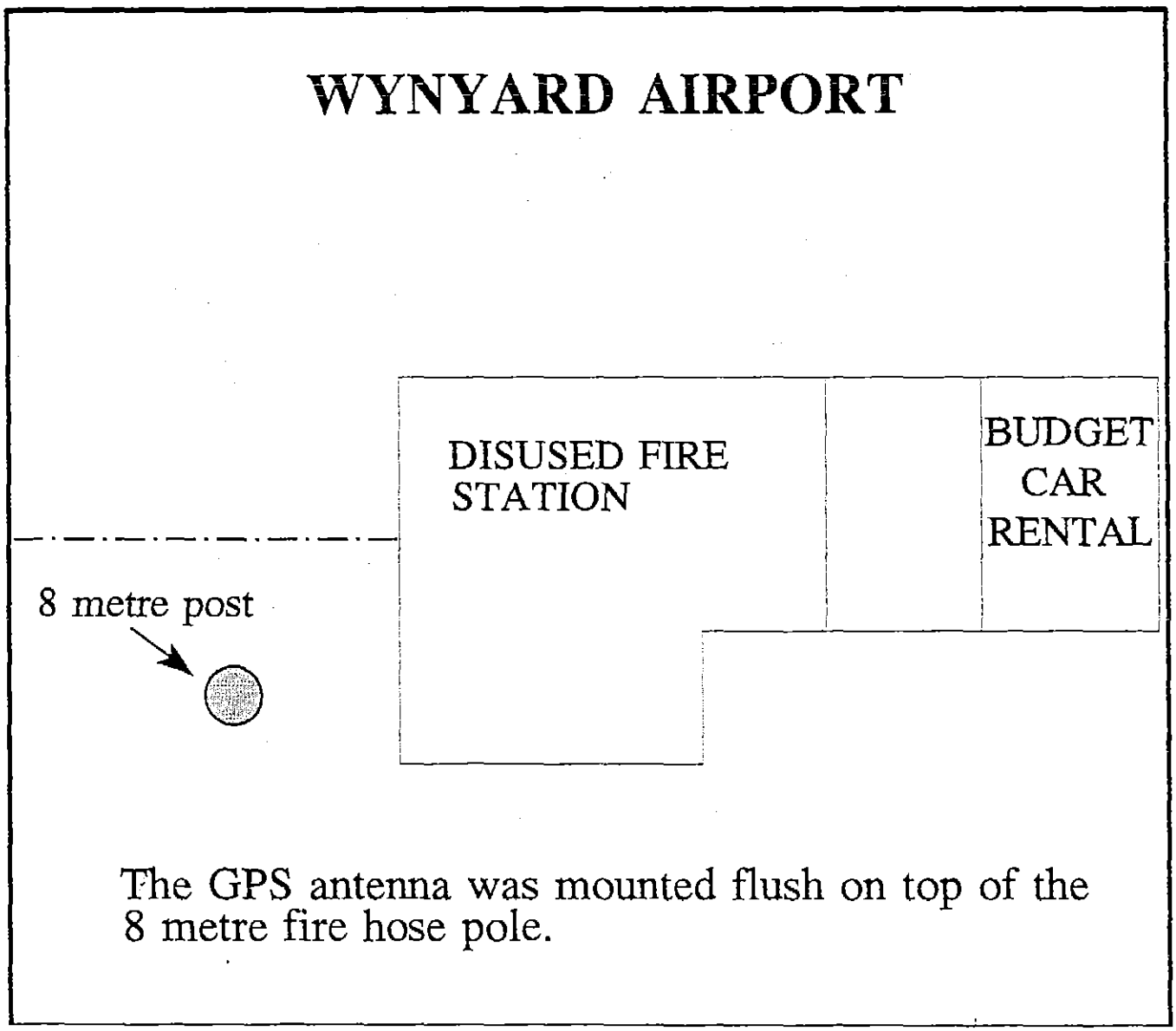
SAMPLE INTERVAL 5 secs. PDOP LIMIT SET AT < 3

NUMBER OF POINTS IN STATISTICS 10000 APPROX

MEAN POSITIONS

WGS-84	AGD-84	AMG
LAT. 40°59'36.7769	LAT. 40°59'42.14901	E. 392584.476
LON.145°43'27.3992	LON.145°43'22.45026	N. 5460992.221
ALT. 27.000	ALT. 45.728	Zone. 55

MUD MAP WITH DESCRIPTION.



The GPS antenna was mounted flush on top of the 8 metre fire hose pole.

APPENDIX 3

FLIGHT LOGS

965109

KEVRON GEOPHYSICS

A.C.N. 009 190 925

OPERATORS FLIGHT REPORT

Date 21 / 3 / 19 93

FLIGHT No. 01

JOB No. 1188

Area BALFOUR TAS
Aircraft VH-KAC
Pilot G. WORNES
Operator R. GARDNER
Dataman G. PATERSON
Airport WYNYARD
Take off ..... Land .....
Flying time ..... hours

MAGNETOMETER

Sample Rate 1.0
Mag. F.S.D. Fine 200 nT
Mag. F.S.D Coarse 2000 nT

ALTIMETER

Survey Altitude 60 metres
Radar 200 FT/CM
Baro. 200 FT/CM

SPECTROMETER

Sample Rate 1.0
Crystal Size 16.8L/33.6 L

GND. CALLS (FSD) IN FLIGHT

K40	200	200
Bi214	200	200
TL208	200	200
Total Count	2000	2000

Hdg	LINE	FIDUCIAL Start	FIDUCIAL End	TIME Start	TIME End	LINE LIMITS Start	LINE LIMITS End	Kms	VIDEO No.	TAPE No.	COMMENTS
		UNC	CMP	IR	NRM	BIAS			01	01	
		1.048	0.069	15.2	32.2	-0.300 E-05					
				SLOT #3							
N	0060.0	0		11.49							Comp Box
E	0061.0										
S	0062.0										
W	0063.0		6279		12.00						
	0010.0	0									Cs 137
	0011.0										Uranium
	0012.0										Thorium
	0013.0		1600								Background
	0030.0	0	969	17.35	17.37						H/L Background
	0001.0	970	2219	18.01	18.07						Test Line
S	1901.0	2210									
				FLIGHT ABORTED DUE STRONG WINDS							

965110

KEVRON GEOPHYSICS

A C N 009 190 925

OPERATORS FLIGHT REPORT

Date 22 / 3 / 19 93

FLIGHT No. 02

JOB No. 1188

Area BALFOUR TAS
Aircraft VH-KAC
Pilot G. WORNES
Operator R. GARDNER
Dataman G. PATERSON
Airport WYNYARD
Take off ..... Land .....
Flying time ..... hours

MAGNETOMETER

Sample Rate 1.0
Mag. F.S.D. Fine 200 nT
Mag. F.S.D. Coarse 2000 nT

ALTIMETER

Survey Altitude 60 metres
Radar 200 FT/CM
Baro. 200 FT/CM

SPECTROMETER

Sample Rate 1.0
Crystal Size 16.8L/33.8 L

GND. CALLS (FSD) IN FLIGHT

K40	200	200
Bi214	200	200
TL208	200	200
Total Count	2000	2000

Hdg	LINE	FIDUCIAL Start	FIDUCIAL End	TIME Start	TIME End	LINE LIMITS Start	LINE LIMITS End	Kms	VIDEO No.	TAPE No.	COMMENTS
	0010.0	0							01	02	Cs 137
	0011.0										Uranium
	0012.0										Thorium
	0013.0		4720								Background
	0030.1	779	1719	10.19	10.21	200'	over water				H/L Background
	0001.0	1720	3180								Test Line
	0001.0	3181	4329	10.44	10.46						
			FLIGHT ABORTED DUE SEVER TURBULENCE								

KEVRON GEOPHYSICS

A.C.N 009 190 925

OPERATORS FLIGHT REPORT

Date 23 / 3 / 19 93

FLIGHT No. 03

JOB No. 1188

Area BALFOUR TAS
Aircraft VH-KAC
Pilot G. WORNES
Operator R. GARDNER
Dataman G. PATERSON
Airport WYNYARD
Take off ..... Land .....
Flying time ..... hours

MAGNETOMETER

Sample Rate 1.0
Mag. F.S.D. Fine 200 nT
Mag. F.S.D. Coarse 2000 nT

ALTIMETER

Survey Altitude 60 metres
Radar 200 FT/CM
Baro. 200 FT/CM

SPECTROMETER

Sample Rate 1.0
Crystal Size 16.8L/33.8

GND. CALLS (FSD) IN FLIGHT

K40	200	200
Bi214	200	200
TL208	200	200
Total Count	2000	2000

Hdg	LINE	FIDUCIAL Start	FIDUCIAL End	TIME Start	TIME End	LINE LIMITS Start	LINE LIMITS End	Kms	VIDEO No.	TAPE No.	COMMENTS
	0010.0	0							01	03	Cs 137
	0011.0										Uranium
	0012.0										Thorium
	0013.0		4000								Background
	0030.0	0	989	09.21	09.23						H/L Background
	0001.0	990	2109	09.42	09.44	Recorded as 0030.0					Test Line
N	1901.0	2110	4559	09.47	09.51	Spec Scales					500/5000
S	1902.0	4260	7759	09.57	09.57						"
N	1903.0	7760	10109	09.59	10.04						"
S	1904.0	10110		10.05	10.12						"
			RETURN TO WYNYARD DUE LOW CLOUD								
W	1001.1	0	2109	15.03	15.06		Spec Scales				200/2000
E	1016.0	2110	4019	15.03	15.10						"
W	1002.0	4020	6229	15.07	15.15						"
E	1017.0	6230	8169	15.11	15.19						"
W	1003.0	8170	10659	15.16	15.23						"
E	1018.0	10660	12119	15.20	15.27						"
W	1004.0	12120	14179	15.24	15.32						"
E	1019.0	14180	16059	15.28	15.35						"
W	1005.0	16060	18109	15.32	15.40						"
E	1020.0	18110	19969	15.40	15.43						"
W	1006.0	19970	22019	15.44	15.48						"
			FLIGHT ABORTED DUE LOW CLOUD AND RAIN								
	0002.0	22020	23289	16.10	16.12						Test Line
	0031.0	23290	24359	16.17	16.19						H/L Background
	0014.0	0									Background
	0015.0										Thorium
	0016.0										Uranium
	0017.0		4370								Cs 137

PRODUCTION 028.6 Km

KEVRON GEOPHYSICS

A.C.N. 009 190 925

OPERATORS FLIGHT REPORT

Date 24 / 3 / 19 93

FLIGHT No. 04

JOB No. 1188

Area BALFOUR TAS
Aircraft VH-KAC
Pilot G. WORNES
Operator R. GARDNER
Dataman G. PATERSON
Airport WYNYARD
Take off ..... Land .....
Flying time ..... hours

MAGNETOMETER

Sample Rate 1.0
Mag. F.S.D. Fine 200 nT
Mag. F.S.D. Coarse 2000 nT

ALTIMETER

Survey Altitude 60 metres
Radar 200 FT/CM
Baro. 200 FT/CM

SPECTROMETER

Sample Rate 1.0
Crystal Size 16.8L/33.6 L

GND. CALLS (FSD) IN FLIGHT

K40	200	200
Bi214	200	200
TL208	200	200
Total Count	2000	2000

Hdg	LINE	FIDUCIAL Start	FIDUCIAL End	TIME Start	TIME End	LINE LIMITS Start	LINE LIMITS End	Kms	VIDEO No.	TAPE No.	COMMENTS
	0010.0	0							02	05	Cs 137
	0011.0										Uranium
	0012.0										Thorium
	0013.0		3720								Background
	0030.0	0	979	09.06	09.08						H/L Background
	0001.0	980	2259	09.19	09.21						Test Line
S	1905.0	2260	6669	09.27	09.34			25.2			
N	1906.2	6770	10299	09.40	09.46						
S	1907.0	10300	14739	09.48	09.55			25.2			
W	1252.0	14740	15429	09.57	09.55			6.2			
E	1232.0	16400	17699	10.03	10.06						
W	1251.0	18270	19409	10.10	10.12						Recorded as 1251.0
E	1231.0	19410	20610	10.13	10.15			6.2			
W	1250.0	20610	21909	10.16	10.18			6.2			
E	1230.0	21910	23209	10.20	10.22			6.2			
W	1249.0	23210	24459	10.23	10.25			6.2			
E	1229.0	24440	25749	10.26	10.28			6.2			
W	1248.0	25750	26989	10.29	10.31			6.2			
E	1228.0	26990	28319	10.33	10.35			6.2			
W	1247.0	28320	29679	10.36	10.38			6.2			
E	1227.0	29680	30859	10.39	10.42			6.2			
W	1246.0	30860	32409	10.42	10.45			6.2			
E	1226.0	32410	33789	10.47	10.49			6.2			
W	1206.0	33790	34909	10.50	10.51			6.2			
E	1225.0	34910	36209	10.52	10.55			6.2			
W	1205.0	36210	37329	10.56	10.57			6.2			
E	1224.0	37330	38589	10.58	11.00			6.2			
W	1204.0	38570	39649	11.01	11.03			6.2			
E	1223.0	39650	41089	11.04	11.07			6.2			
W	1203.0	41090	42109	11.08	11.10			6.2			
E	1222.0	42110	43459	11.10	11.13			6.2			
W	1202.0	43460	44529	11.14	11.15			6.2			

965112

KEVRON GEOPHYSICS

A.C.N. 009 190 925

OPERATORS FLIGHT REPORT

Date 24 / 3 / 19 93

FLIGHT No. 04

JOB No. 1188

Area BALFOUR TAS
Aircraft VH-KAC
Pilot G. WORNES
Operator R. GARDNER
Dataman G. PATERSON
Airport WYNYARD
Take off ..... Land .....
Flying time ..... hours

MAGNETOMETER

Sample Rate 1.0
Mag. F.S.D. Fine 200 nT
Mag. F.S.D. Coarse 2000 nT

ALTIMETER

Survey Altitude 60 metres
Radar 200 FT/CM
Baro. 200 FT/CM

SPECTROMETER

Sample Rate 1.0
Crystal Size 16.8L/33.6 L

GND. CALLS (FSD) IN FLIGHT

K40	200	200
Bi214	200	200
TL208	200	200
Total Count	2000	2000

Hdg	LINE	FIDUCIAL Start	FIDUCIAL End	TIME Start	TIME End	LINE LIMITS Start	LINE LIMITS End	Kms	VIDEO No.	TAPE No.	COMMENTS
E	1221.0	44530	45059	11.16	11.18			6.2			
W	1201.0	45060	47079	11.19	11.22			6.2			
E	1220.0	47080	48389	11.22	11.24			6.2			
W	1200.0	48390	49499	11.25	11.27			6.2			
E	1219.0	49500	50019	11.29	11.32			6.2			
W	1199.0	50020	51890	11.32	11.34			6.2			
E	1281.0	51890	53299	11.35	11.37			6.2			
W	1198.0	53300	54009	11.38	11.40			6.2			
E	1217.0	54010	55669	11.41	11.43			6.2			
W	1197.0	55670	56829	11.44	11.46			6.2			
E	1216.0	56830	58229	11.47	11.49			6.2			
W	1196.0	58230	59359	11.50	11.52			6.2			
E	1215.0	59360	60729	11.52	11.55			6.2			
W	1195.0	60730	61829	11.55	11.57			6.2			
E	1214.0	61830	63079	11.58	12.00			6.2			
W	1194.0	63080	64139	12.01	12.03			6.2			
E	1213.0	64140	65389	12.04	12.06			6.2			
W	1193.0	65390	66449	12.07	12.08			6.2			
E	1212.0	66450	67659	12.09	12.11			6.2			
W	1192.0	67660	68769	12.12	12.14			6.2			
E	1211.0	68770	69949	12.15	12.17			6.2			
W	1191.0	69950	71049	12.18	12.20			6.2			
E	1210.0	71050	72239	12.21	12.23			6.2			
W	1190.0	72240	73279	12.24	12.25			6.2			
E	1209.0	73280	74549	12.26	12.28			6.2			
W	1189.0	74550	75759	12.29	12.31			6.2			
E	1208.0	75760	76949	12.32	12.34			6.2			
W	1188.0	76950	78039	12.35	12.37			6.2			
E	1207.0	78040	79229	12.38	12.40			6.2			
W	1187.0	79230	80389	12.41	12.43			6.2			
E	1167.0	80310	82269	12.45	12.48			10.2	03	05	Rec. as 1187.0
W	1186.0	82270	83309	12.49	12.51			6.2			
E	1166.0	83310	85149	12.53	12.56			10.2			
W	1185.0	85150	86259	12.57	12.59			6.2			

965113

KEVRON GEOPHYSICS

A C N 009 190 925

OPERATORS FLIGHT REPORT

Date 24 / 3 / 19 93

FLIGHT No. 04

JOB No. 1188

Area BALFOUR TAS
Aircraft VH-KAC
Pilot G. WORNES
Operator R. GARDNER
Dataman G. PATERSON
Airport WYNYARD
Take off ..... Land .....
Flying time ..... hours

MAGNETOMETER

Sample Rate 1.0
Mag. F.S.D. Fine 200 nT
Mag. F.S.D. Coarse 2000 nT

ALTIMETER

Survey Altitude 60 metres
Radar 200 FT/CM
Baro. 200 FT/CM

SPECTROMETER

Sample Rate 1.0
Crystal Size 16.8L/33.6 L

GND. CALLS (FSD) IN FLIGHT

K40	200	200
Bi214	200	200
TL208	200	200
Total Count	2000	2000

Hdg	LINE	FIDUCIAL Start	FIDUCIAL End	TIME Start	TIME End	LINE LIMITS Start	LINE LIMITS End	Kms	VIDEO No.	TAPE No.	COMMENTS
E	1165.0	86260	87949	13.00	13.30			10.2			
W	1184.0	87950	89099	13.04	13.06			6.2			
E	1164.0	89100	90049	13.08	13.14			10.2			
W	1183.0	90050	92639	13.12	13.14			6.2			
E	1163.0	92640	93759	13.15	13.18			10.2			
W	1182.0	93760	95429	12.19	13.22			10.2			
e	1162.0	95430	97269	13.23	13.26			10.2			
W	1181.0	97270	98989	13.27	13.31			10.2			
E	1161.0	98990	100899	13.32	13.34			10.2			
W	1180.0	100900	102559	13.35	13.38			10.2			
E	1160.0	102560	104529	13.39	13.42			10.2			
W	1179.0	104530	106229	13.42	13.45			10.2			
E	1159.0	106230	107979	13.46	13.49			10.2			
W	1178.0	107980	109689	13.50	13.53			10.2			
E	1158.0	109690	111449	13.54	13.57			10.2			
W	1177.0	111450	113119	13.57	14.00			10.2			
E	1157.0	113120	114839	14.01	14.04			10.2			
W	1176.0	114840	116569	14.05	14.08			10.2			
E	1156.0	116570	118119	14.08	14.11			10.2			
W	1175.0	118120	119949	14.12	14.15			10.2			
E	1155.0	119950	121629	14.16	14.18			10.2			
W	1174.0	121630	123369	14.19	14.22			10.2			
E	1154.0	123370	125069	14.23	14.26			10.2			
W	1173.0	125070	126759	14.27	14.30			10.2			
E	1153.0	126760	128429	14.30	14.33			10.2			
W	1172.0	128430	130129	14.34	14.37			10.2			
E	1152.0	130130	131829	14.37	14.40			10.2			
				PRODUCTION 702.4 Km							

965114

KEVRON GEOPHYSICS
A.C.N. 009 190 925

OPERATORS FLIGHT REPORT

Date 24 / 3 / 19 93

FLIGHT No. 05

JOB No. 1188

Area BALFOUR TAS
Aircraft VH-KAC
Pilot G. WORNES
Operator R. GARDNER
Dataman G. PATERSON
Airport WYNYARD
Take off ..... Land .....
Flying time ..... hours

MAGNETOMETER

Sample Rate 1.0
Mag. F.S.D. Fine 200 nT
Mag. F.S.D. Coarse 2000 nT

ALTIMETER

Survey Altitude 60 metres
Radar 200 FT/CM
Baro. 200 FT/CM

SPECTROMETER

Sample Rate 1.0
Crystal Size ..... 16.8L/33.8 L

GND. CALLS (FSD) IN FLIGHT

K40	200	200
Bi214	200	200
TL208	200	200
Total Count	2000	2000

dg	LINE	FIDUCIAL Start	FIDUCIAL End	TIME Start	TIME End	LINE LIMITS Start	LINE LIMITS End	Kms	VIDEO No.	TAPE No.	COMMENTS
W	1171.0	0	1739	16.11	16.16			10.2	03	06	
E	1151.0	1740	3489	16.17	16.20			10.2			
W	1170.0	3490	5289	16.21	16.24			10.2			
E	1150.0	5290	7219	16.25	16.28			10.2			
W	1169.0	7220	9069	16.29	16.32			10.2			
E	1149.0	9070	10809	16.33	16.36			10.2			
W	1168.0	10810	12709	16.37	16.40			10.2			
E	1148.0	12710	14439	16.41	16.44			10.2			
W	1148.0	14440	16689	16.45	16.49			10.2			
E	1147.0	16690	18489	16.50	16.53			10.2			
W	1127.0	18490	20709	16.54	16.58			12.2			
E	1146.0	20710	22569	16.59	17.03			10.2			
W	1126.0	22570	24929	17.04	17.07			12.2			
E	1145.0	24930	26729	17.08	17.11			10.2			
W	1125.0	26730	28959	17.12	17.16			12.2			
E	1144.0	28960	30769	17.17	17.20			10.2			
W	1124.0	30770	33119	17.21	17.25			12.2			
E	1143.0	33120	35139	17.26	17.30			10.2	04		
W	1123.0	35140	37379	17.30	17.34			12.2			
E	1142.0	37380	39239	17.35	17.38			10.2			
W	1122.0	39240	41349	17.39	17.43			12.2			
E	1141.0	41350	43219	17.44	17.47			10.2			
W	1121.0	43220	45319	17.48	17.51			12.2			
E	1140.0	45320	47139	17.52	17.55			10.2			
W	1120.0	47140	49189	17.56	18.00			12.2			
E	1139.0	49190	51029	18.01	18.04			10.2			
	0002.0	51030	52309	18.09	18.11						Test Line
	0030.0	52310	23249	18.16	18.17						
	0014.0	0								07	Background
	0015.0										Thorium
	0016.0										Uranium
	0017.0		4120								Cs 137

PRODUCTION 282.2 Km

965115

APPENDIX 4

RADIOMETRIC CALIBRATIONS

PREFLIGHT & POSTFLIGHT CALIBRATIONS
BALFOUR SURVEY - JOB 1188

FLT: 1 DATE: 21.3.93	PREFLIGHT				POSTFLIGHT			
SMPLE	K	U	Th	T/C	K	U	Th	T/C
Cs	140	30	30	4700				
U	280	220	45	5450				
Th	400	240	730	13150				
BkGrd	130	30	30	1360				

FLT: 3 DATE: 23.3.93	PREFLIGHT				POSTFLIGHT			
SMPLE	K	U	Th	T/C	K	U	Th	T/C
Cs	140	30	30	4800	140	30	35	4800
U	280	220	45	5500	280	220	45	5500
Th	420	250	730	13100	420	240	720	13100
BkGrd	130	30	30	1450	130	30	30	1450

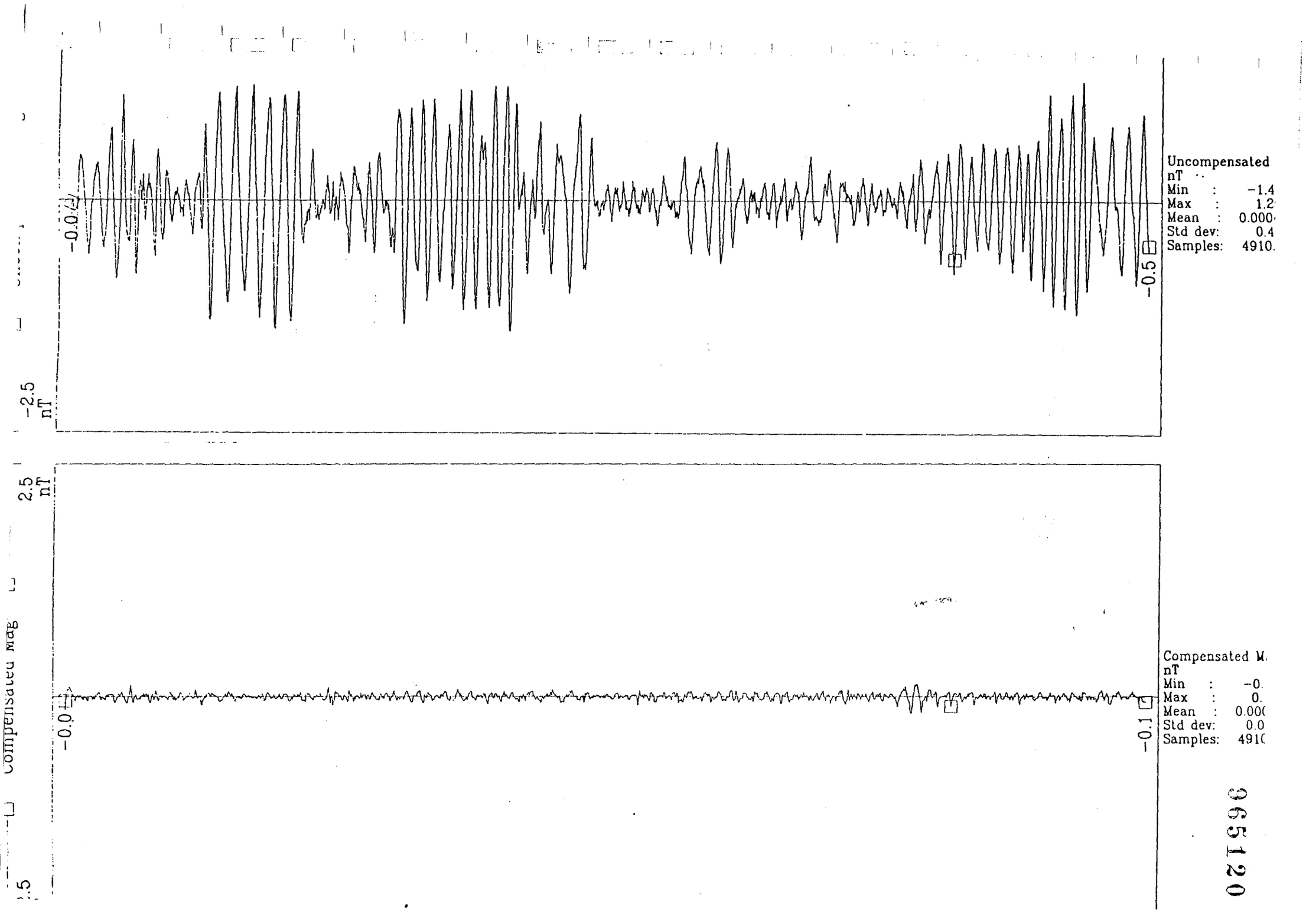
FLT: 5 DATE: 24.3.93	PREFLIGHT				POSTFLIGHT			
SMPLE	K	U	Th	T/C	K	U	Th	T/C
Cs137	140	30	30	4750	130	30	30	4750
U	280	220	40	5500	280	210	40	5500
Th	410	240	730	13250	410	240	730	13150
BkGrd	130	30	35	1460	130	30	30	1360

FLT: 6 DATE: 25.3.93	PREFLIGHT				POSTFLIGHT			
SMPLE	K	U	Th	T/C	K	U	Th	T/C
Cs137	135	30	30	4800	140	30	30	4800
U	280	230	45	5500	280	230	45	5500
Th	400	240	730	13100	400	240	740	13100
BkGrd	140	30	30	1450	140	30	30	1450

FLT: 8 DATE: 26.3.93	PREFLIGHT				POSTFLIGHT			
SMPLE	K	U	Th	T/C	K	U	Th	T/C
Cs137	130	30	30	4700	130	30	30	4850
U	280	230	45	5550	280	230	45	5500
Th	400	250	720	13150	400	245	730	13100
BkGrd	130	30	30	1450	140	30	30	1450

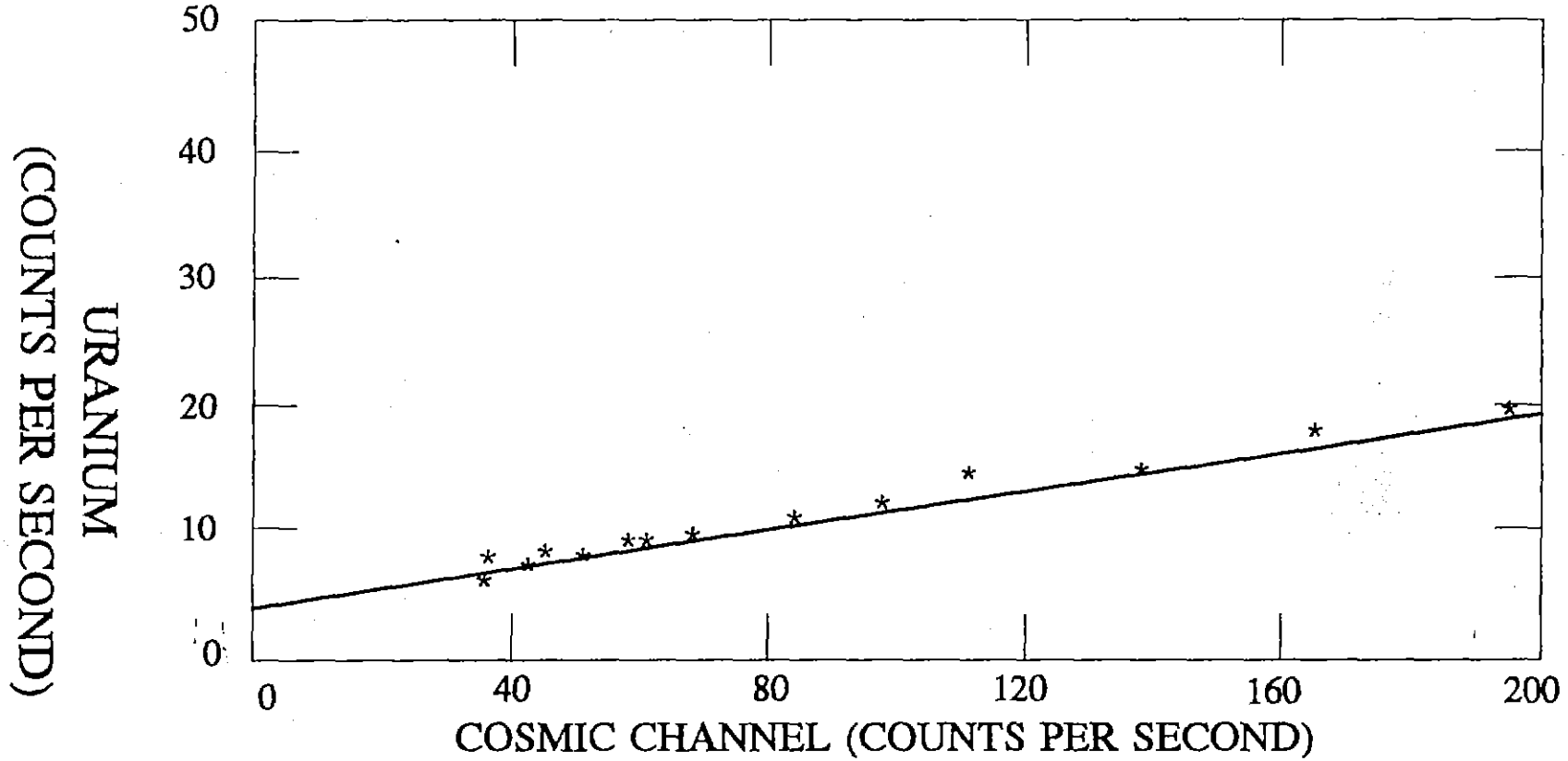
APPENDIX 5

HEADING/COMPENSATION CALIBRATIONS


Uncompensated
nT
Min : -1.4
Max : 1.2
Mean : 0.000
Std dev: 0.4
Samples: 4910.
-0.0
-0.5
-2.5
nT
Compensated Mag
2.5
nT
-0.0
-0.1
Compensated M.
nT
Min : -0.
Max : 0.
Mean : 0.000
Std dev: 0.0
Samples: 491(

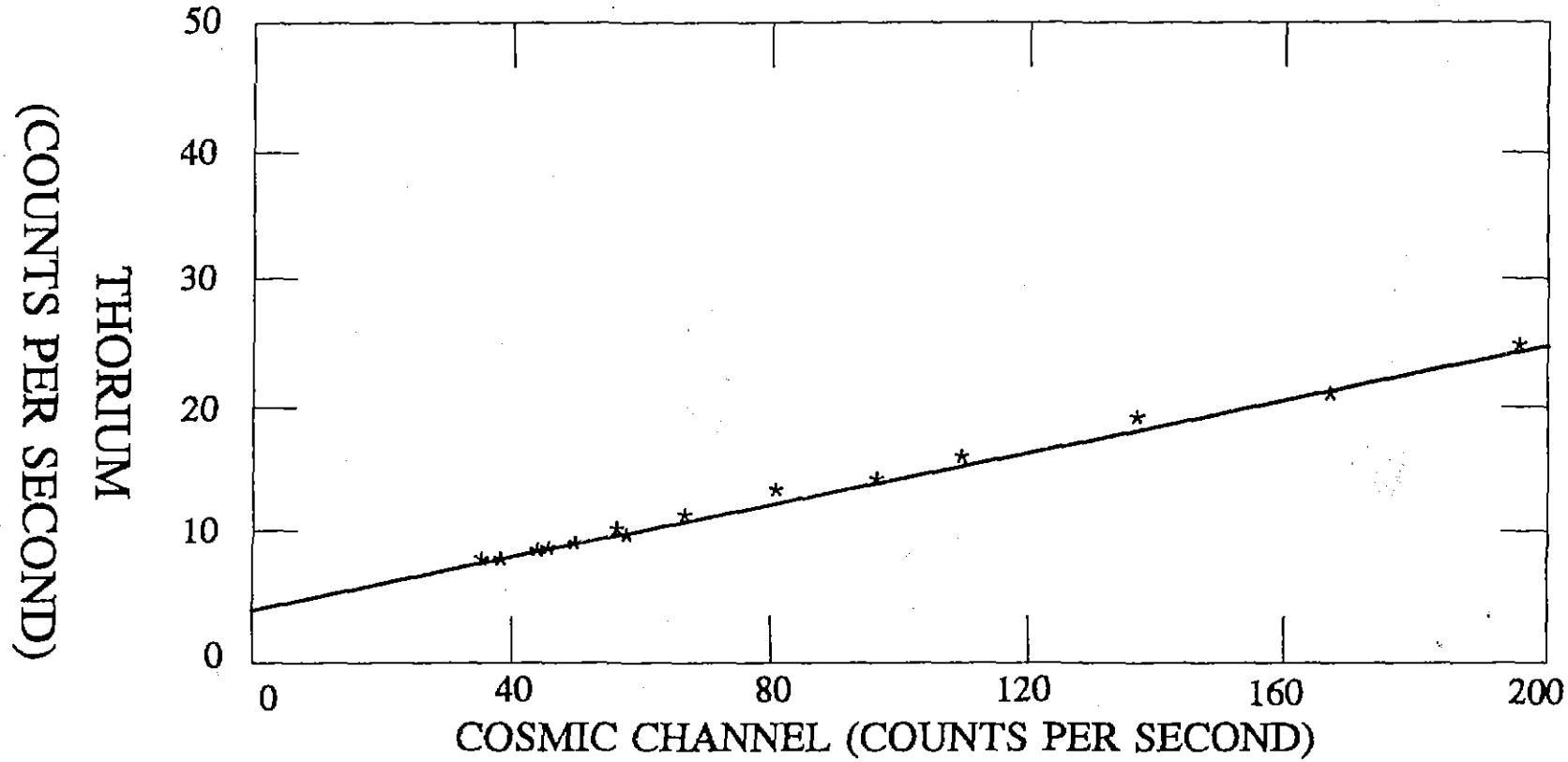
APPENDIX 6

RADIOMETRIC BACKGROUND PLOTS



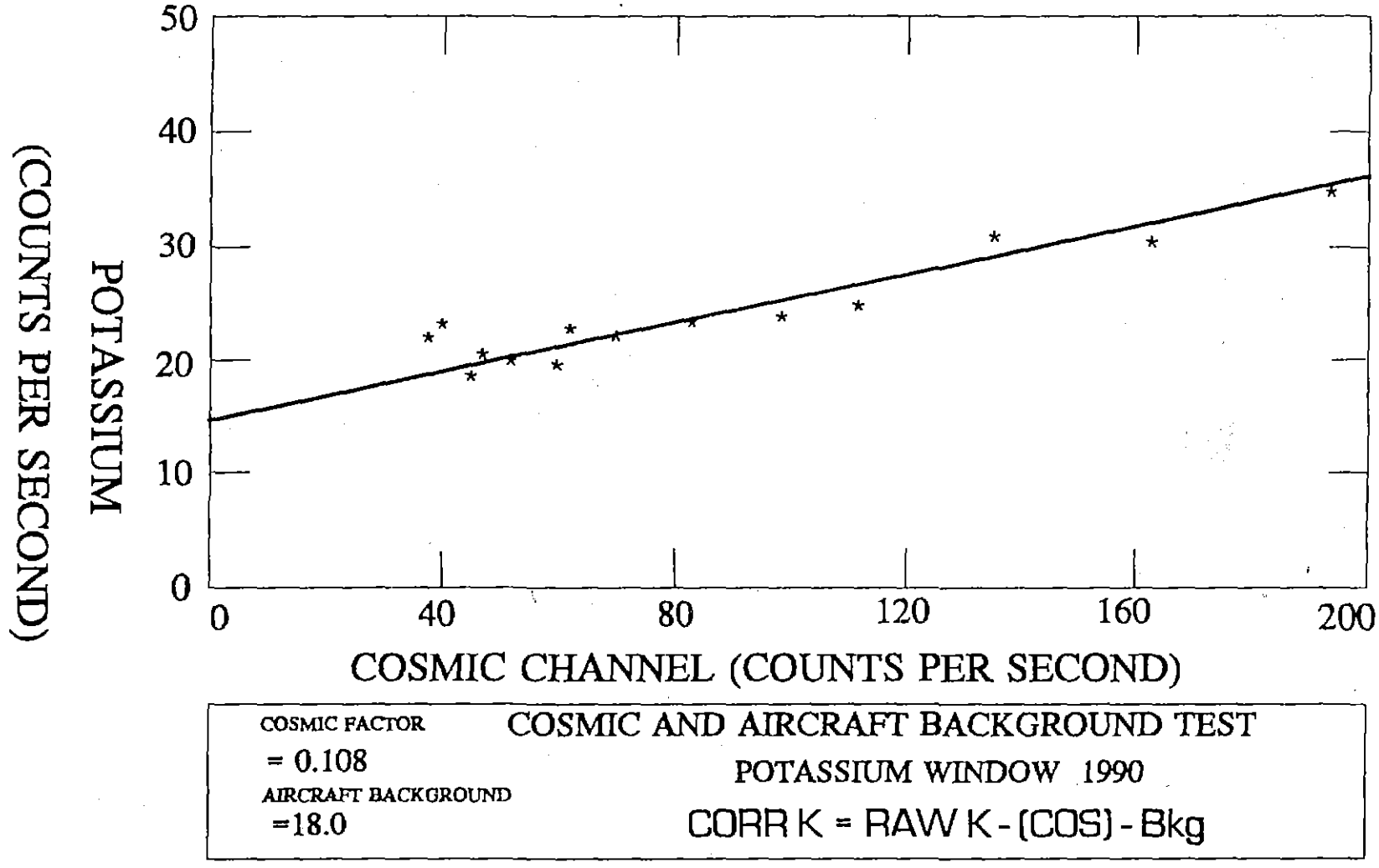
COSMIC FACTOR
= 0.092
AIRCRAFT BACKGROUND
= 9.0

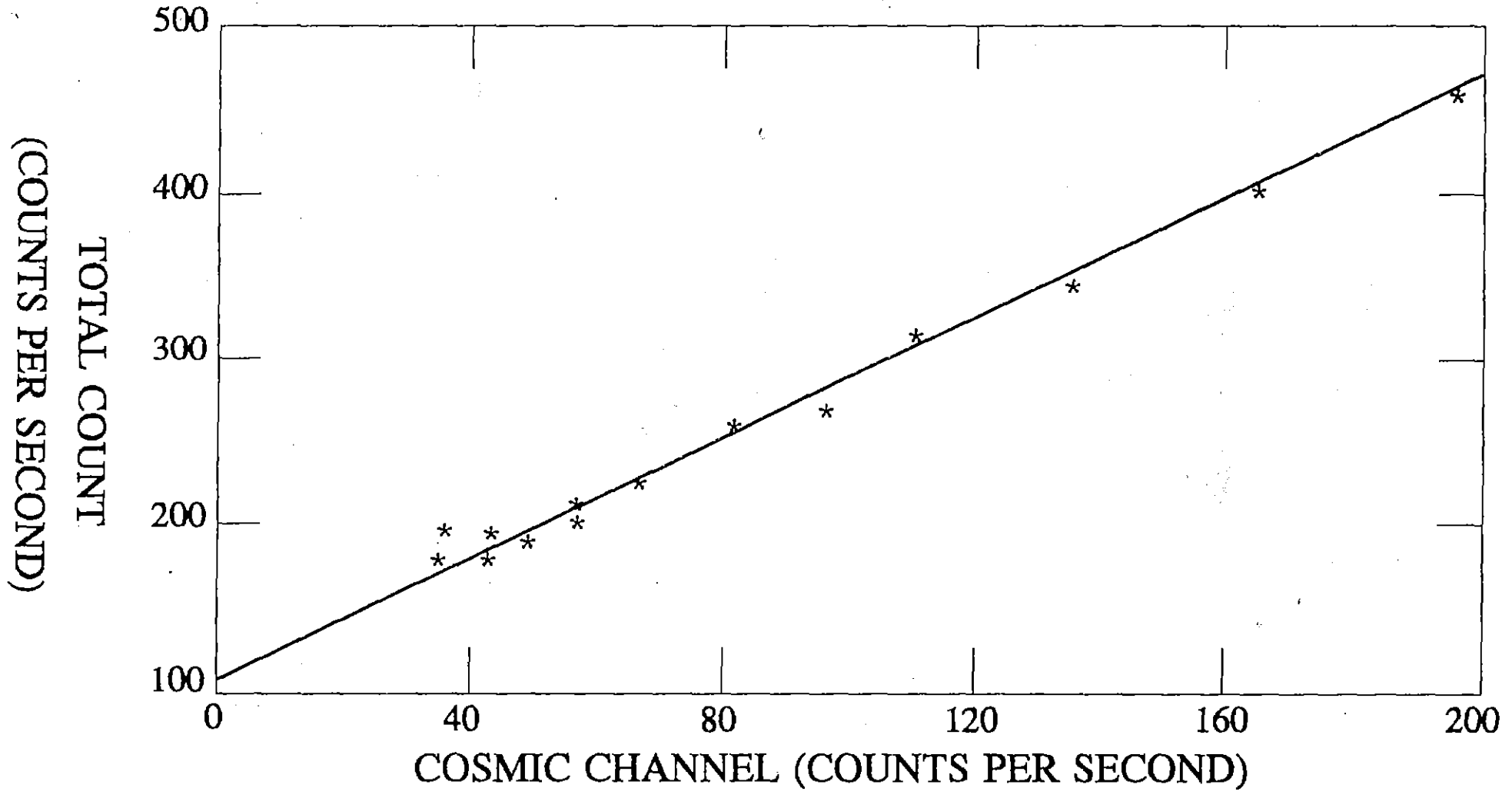
COSMIC AND AIRCRAFT BACKGROUND TEST
URANIUM WINDOW 1990
CORR U = RAW U - (COS) - Bkg



COSMIC FACTOR
= 0.112
AIRCRAFT BACKGROUND
= 5.0

COSMIC AND AIRCRAFT BACKGROUND TEST
THORIUM WINDOW 1990
CORR Th = RAW Th - (COS) - Bkg


POTASSIUM (COUNTS PER SECOND)
50
40
30
20
10
0
0
40
80
120
160
200
COSMIC CHANNEL (COUNTS PER SECOND)
COSMIC FACTOR
= 0.108
AIRCRAFT BACKGROUND
=18.0
COSMIC AND AIRCRAFT BACKGROUND TEST
POTASSIUM WINDOW 1990
CORR K = RAW K - (COS) - Bkg

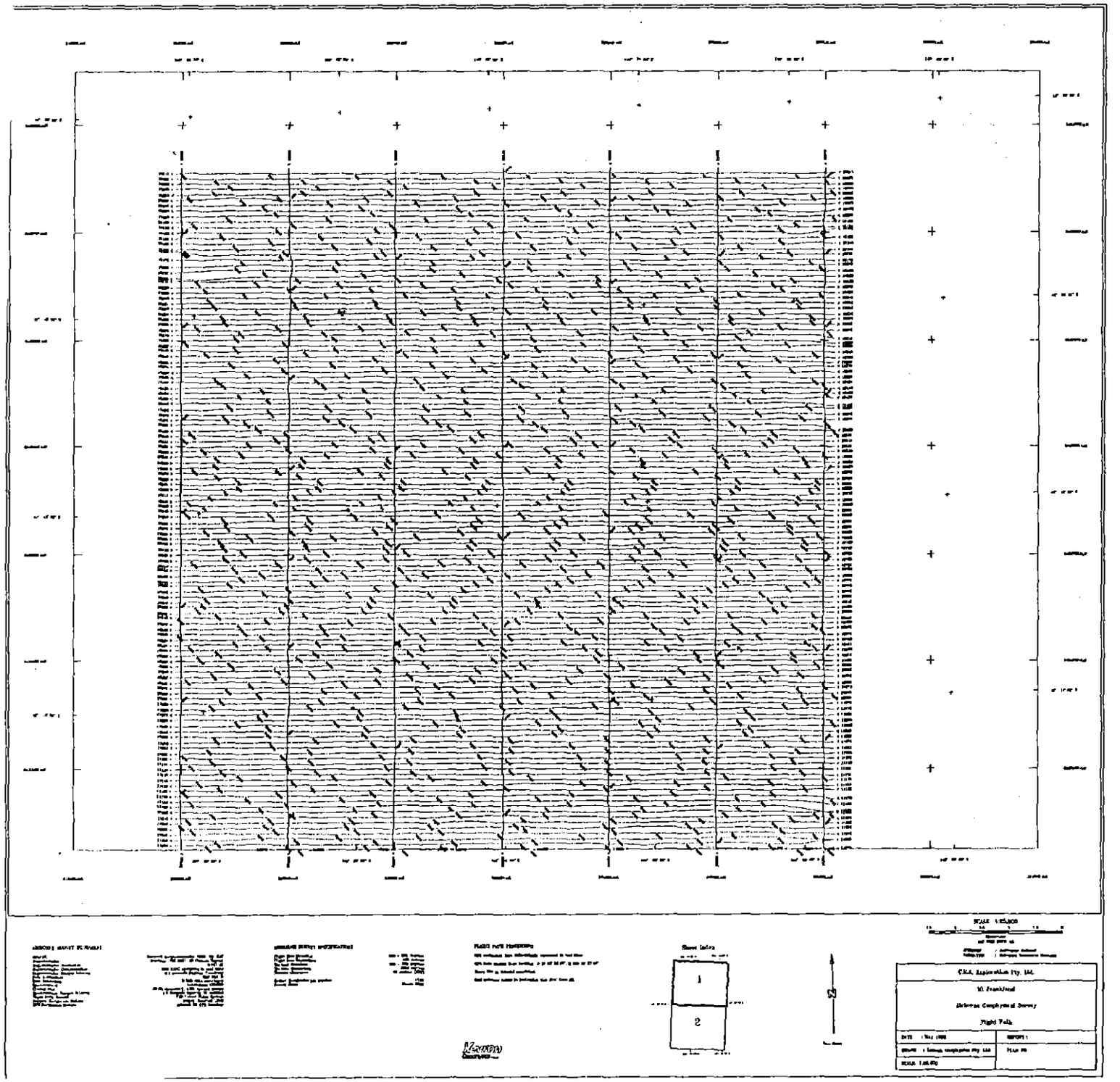


COSMIC FACTOR
= 1.918
AIRCRAFT BACKGROUND
= 199.0

COSMIC AND AIRCRAFT BACKGROUND TEST
TOTAL COUNT WINDOW 1990
CORR TC = RAW TC - (COS) - Bkg

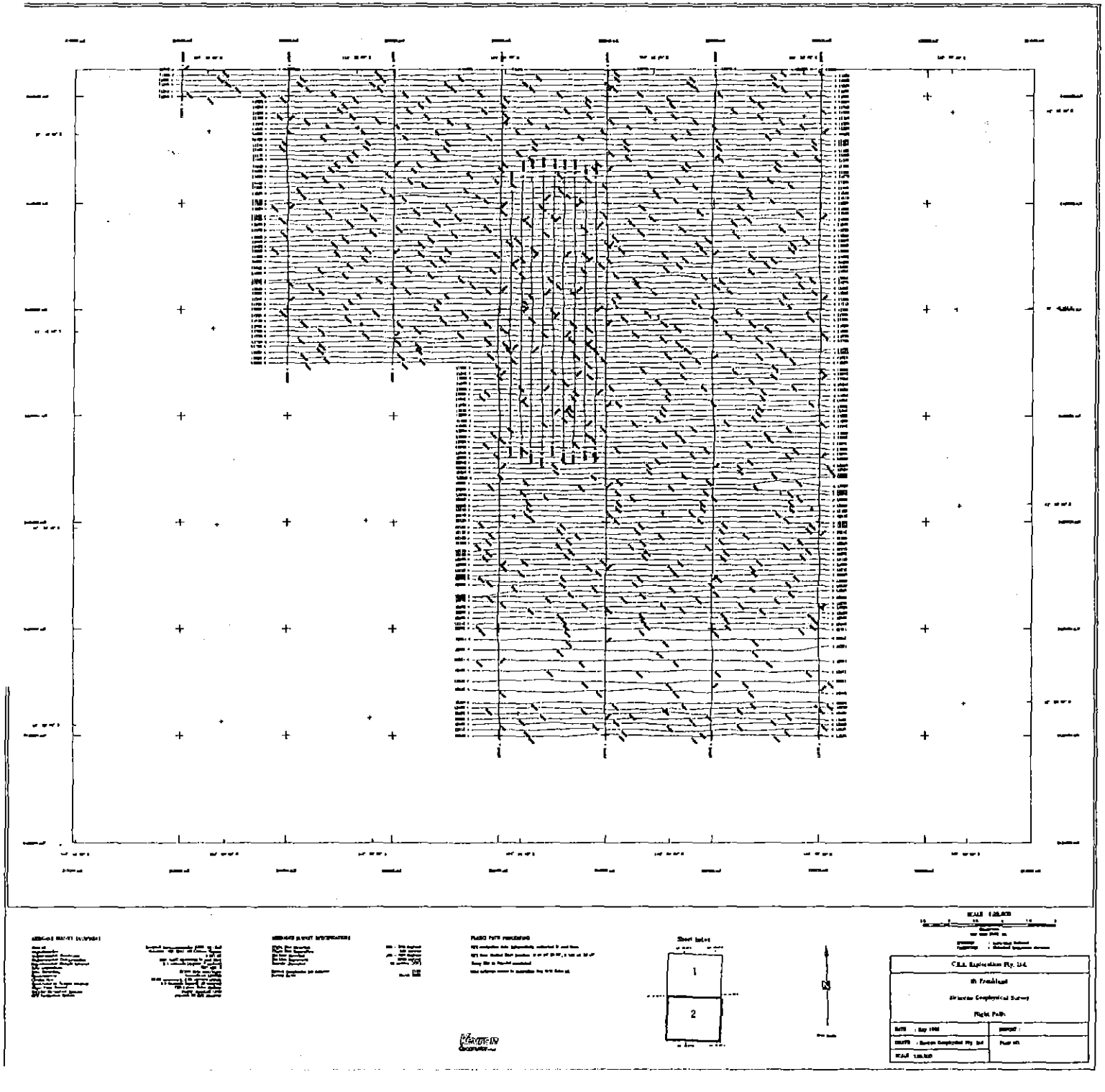
APPENDIX 7

MAPS DELIVERED



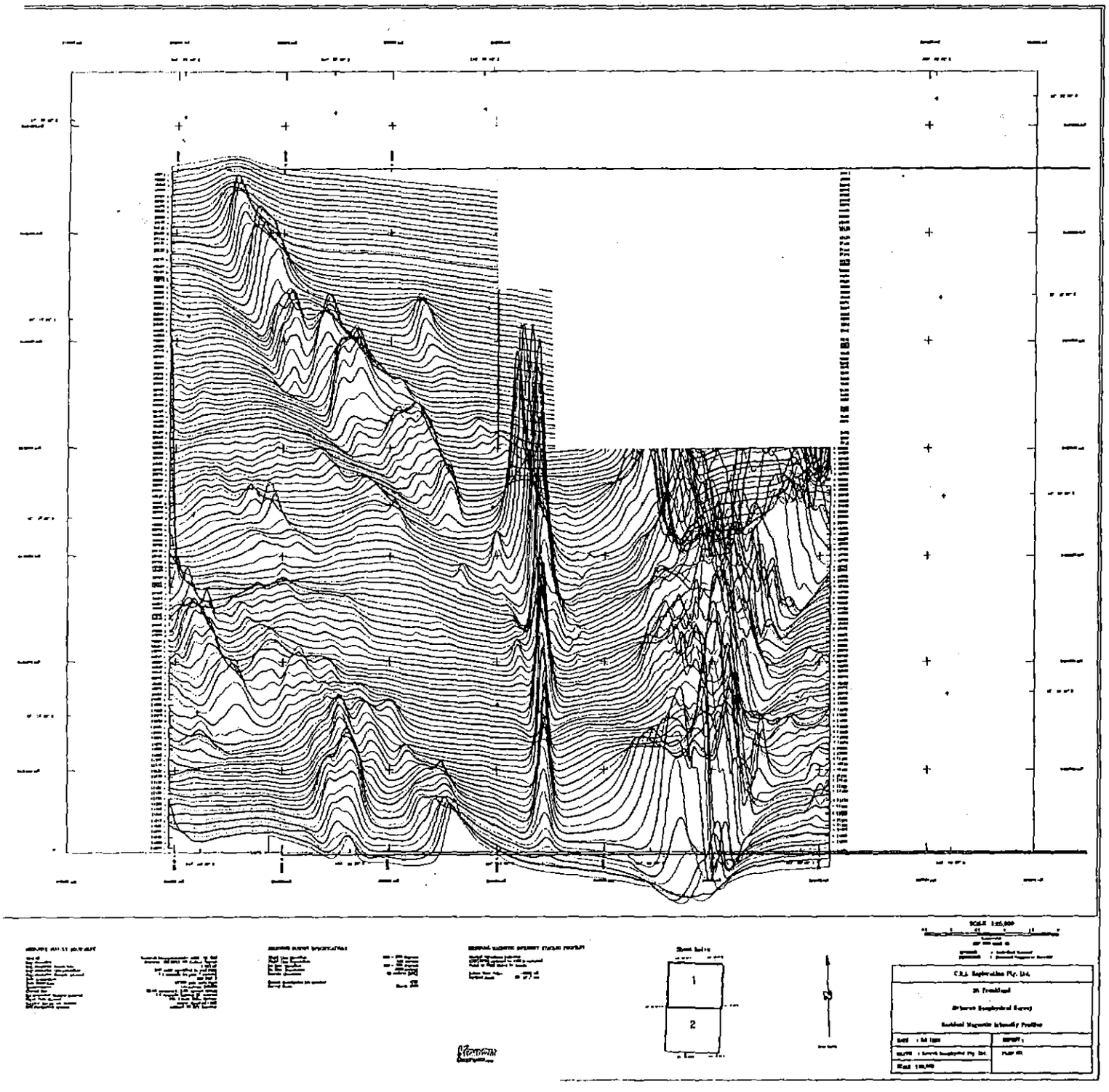
5 cm

965127

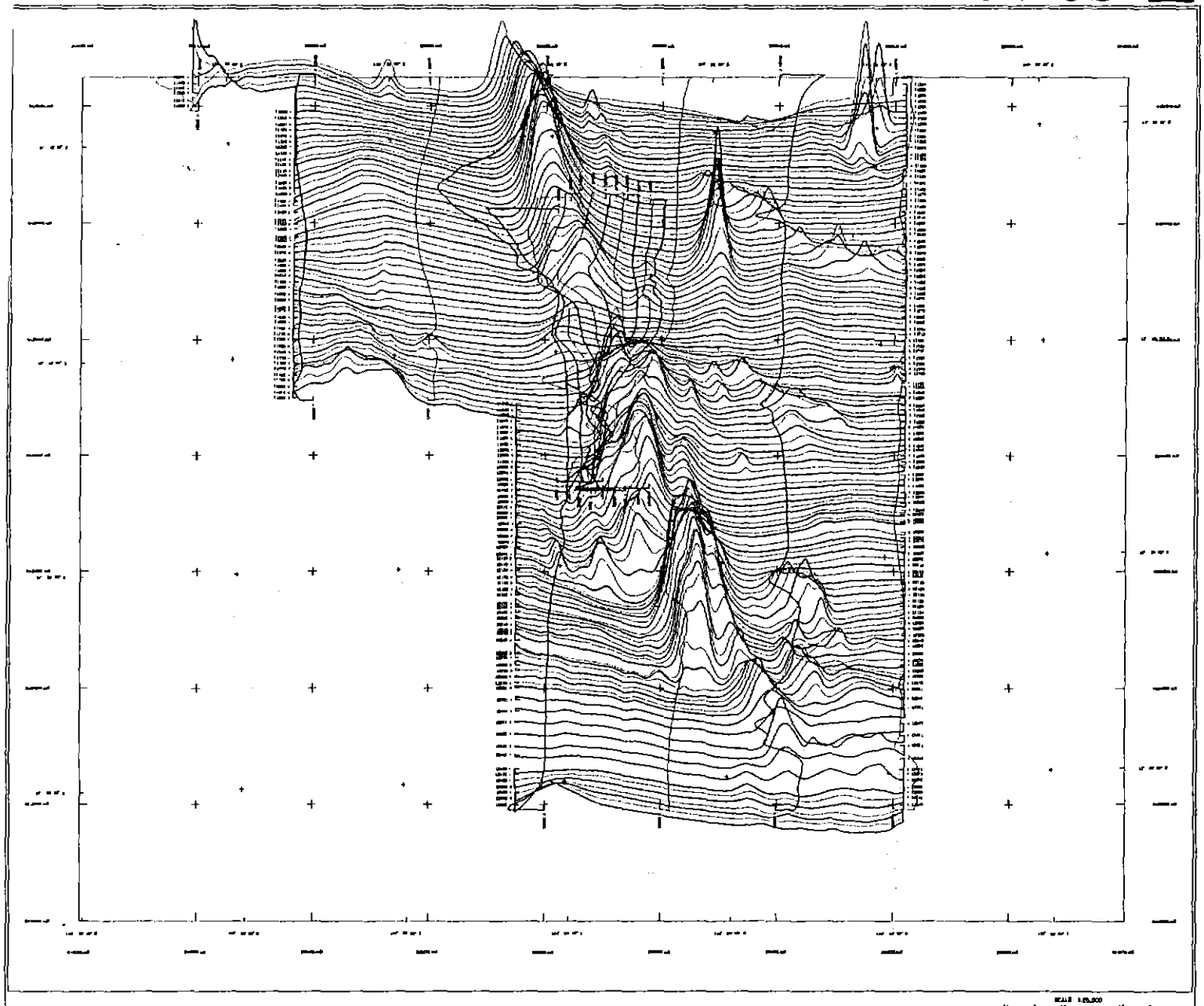


5 cm

965128

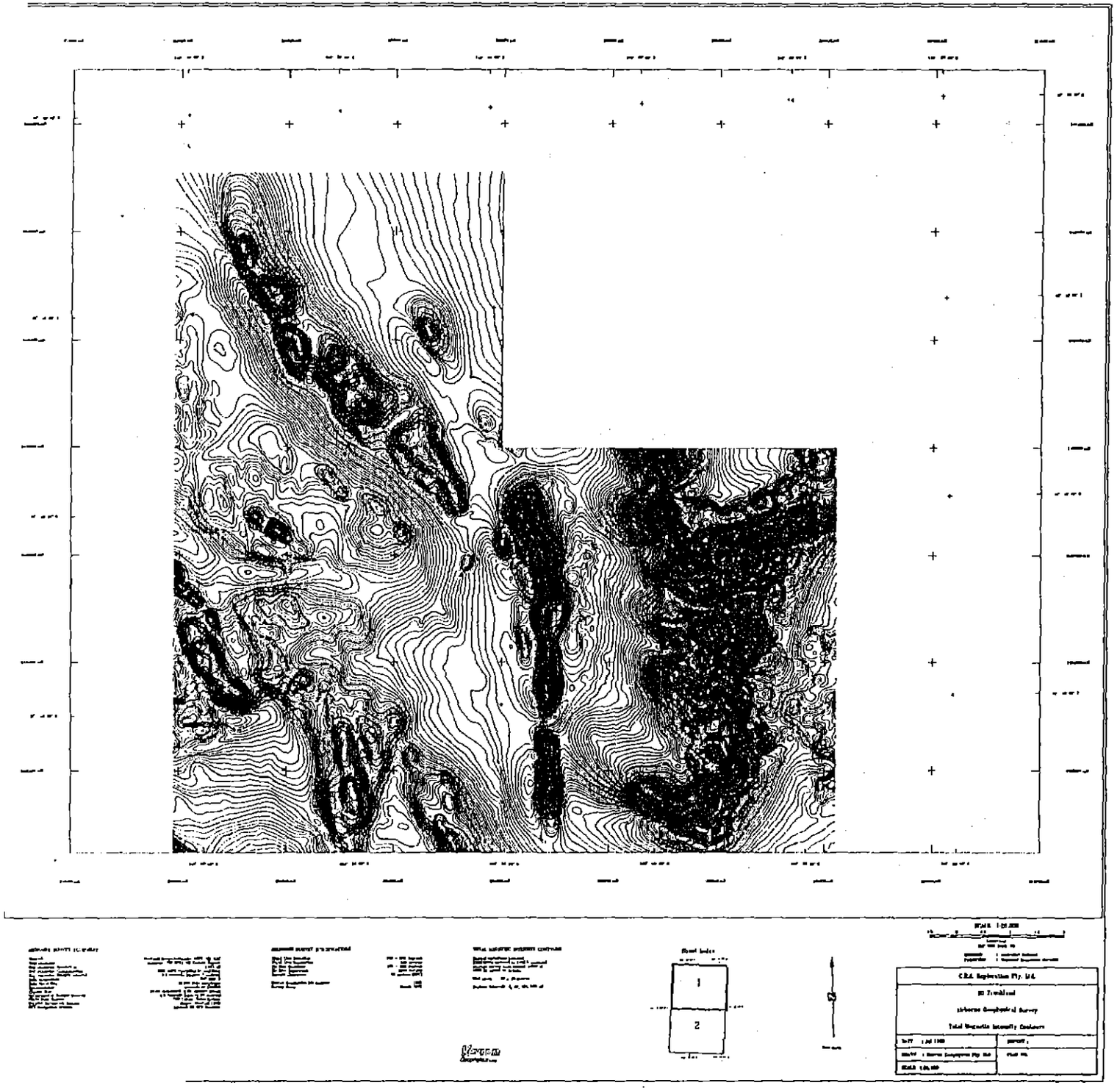


5 cm



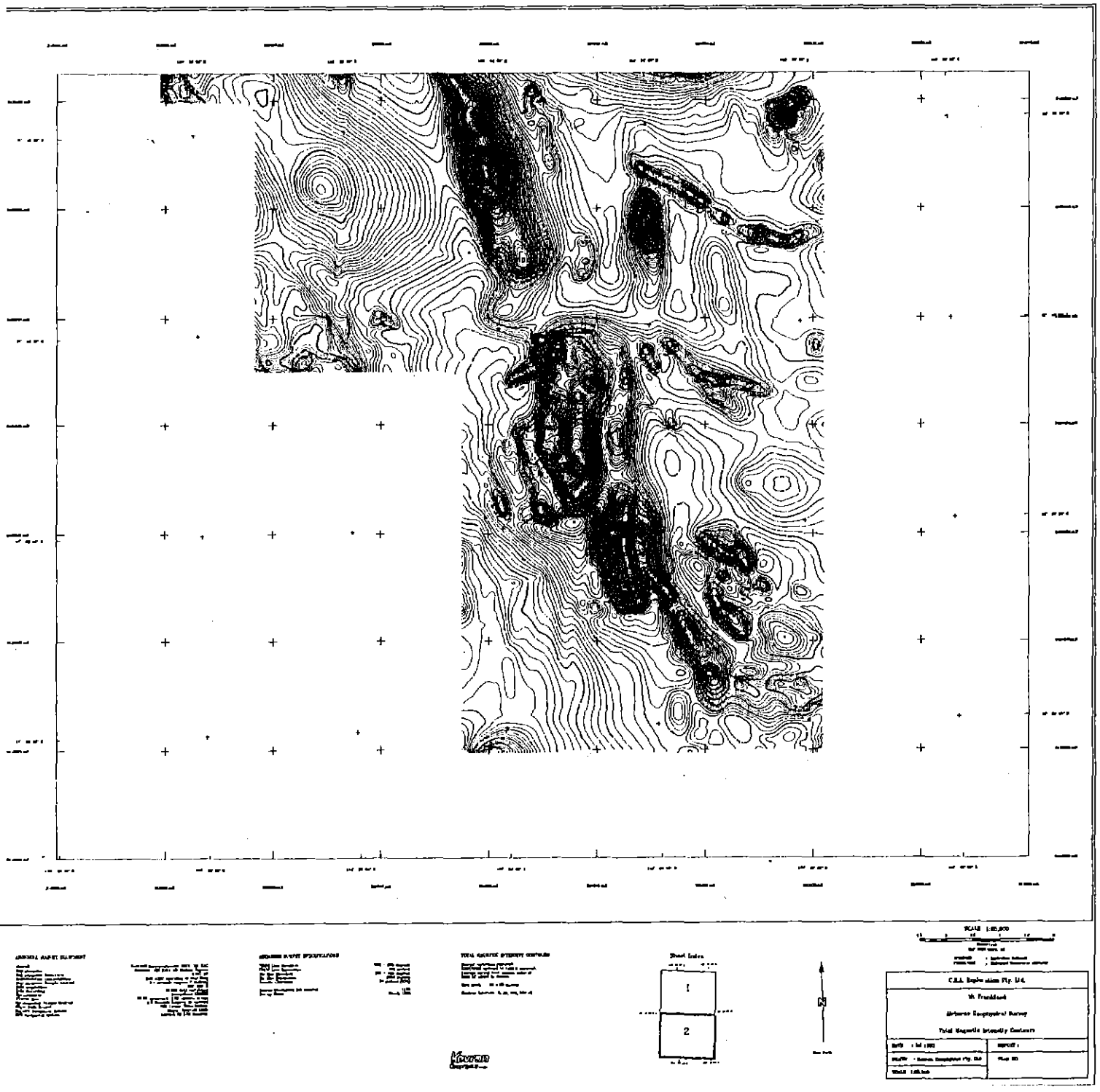
5 cm

965130



5 cm

965131



5 cm

965132

APPENDIX 8

LOCATED DATA TAPE FORMAT

LOCATED DATA TAPE FORMAT

Line	I8
Date	I8
FID	F10.0
East	F11.1
North	F11.1
Raw Mag	F9.2
Diurnal	F9.2
Level Mag	F9.2
Rad Alt	F6.1
Baro Alt	F6.1
Total Count	F6.0
Potassium	F5.0
Uranium	F5.0
Thorium	F5.0
Corrected total count	F6.0
Corrected potassium	F5.0
Corrected uranium	F5.0
Corrected thorium	F5.0
Cosmic	F5.0
Local time	F9.5
Space	1X

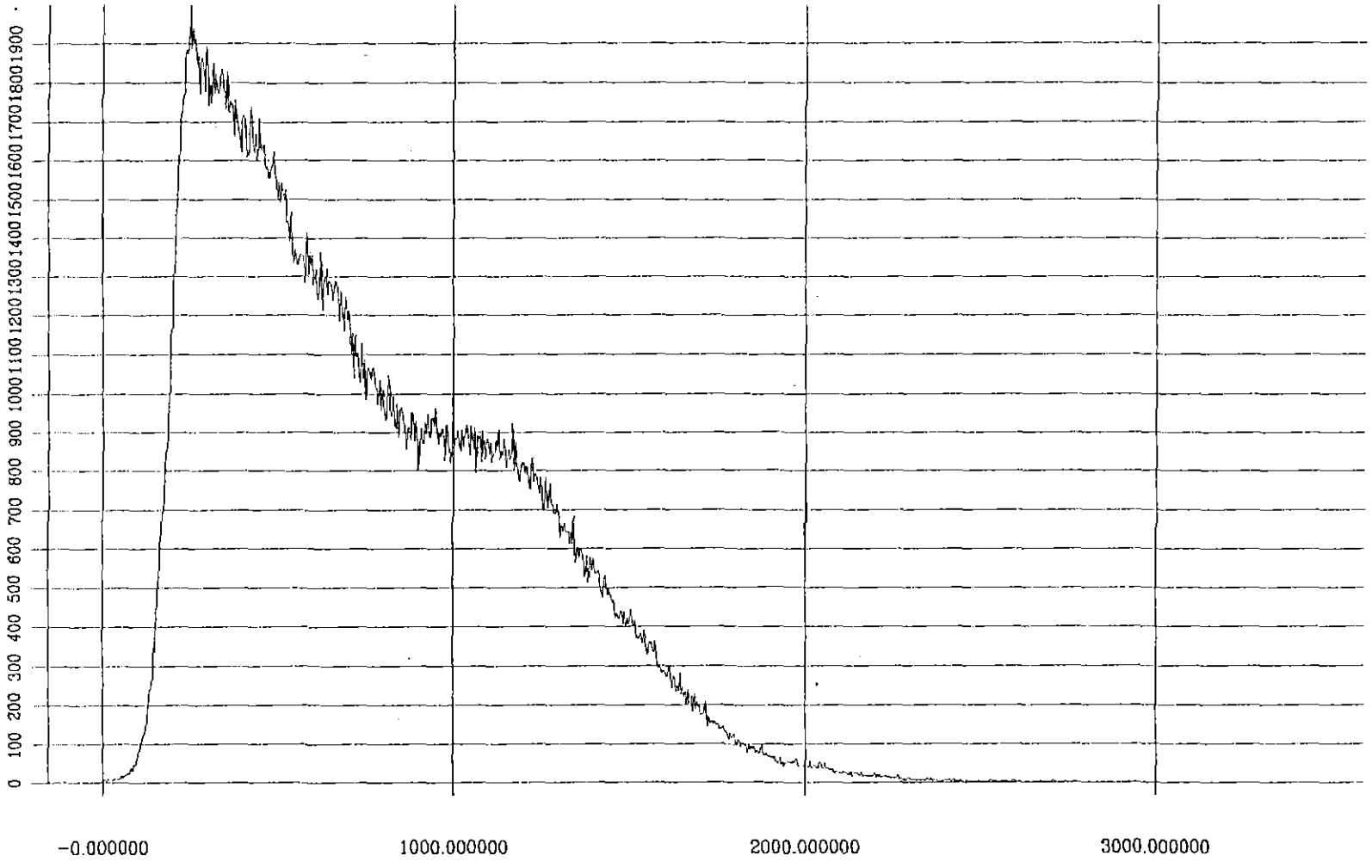
LREC = 144
BLOCK = 7200

APPENDIX 9

GRID INFORMATION

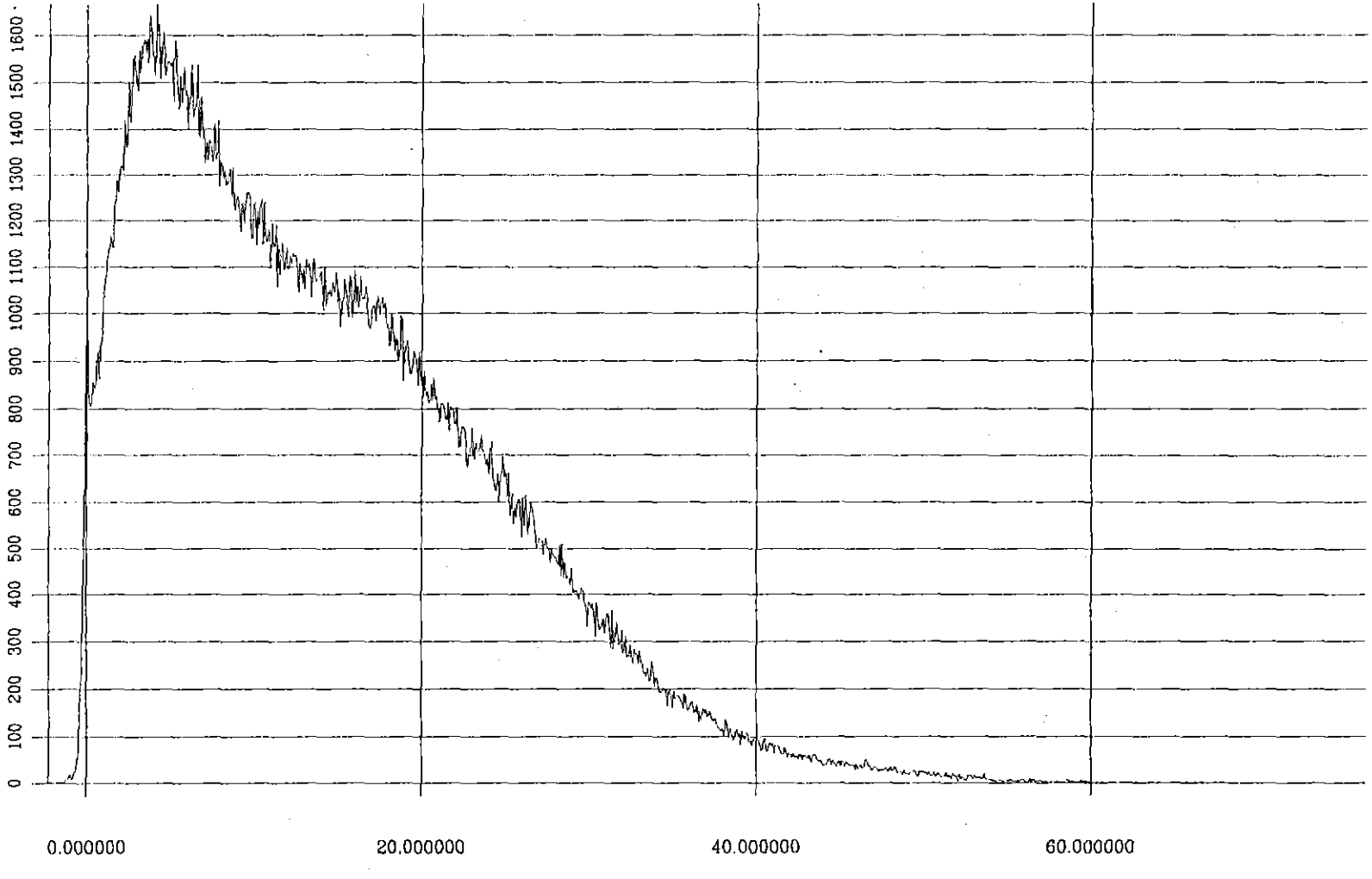
Grid statistics for : tot.grd

Minimum value	-153.909760	Corner 1 :	317500.00E,	5417500.00mN
Maximum value	3592.815920	Corner 2 :	330625.00E,	5417500.00mN
Mean value	758.377260	Corner 3 :	330625.00E,	5443625.00mN
Standard deviation	432.922560	Corner 4 :	317500.00E,	5443625.00mN
Grid columns	526	X Cell size :	25.00 metres.	
Grid rows	1046	Y Cell size :	25.00 metres.	
Percentage non null nodes	76.2			



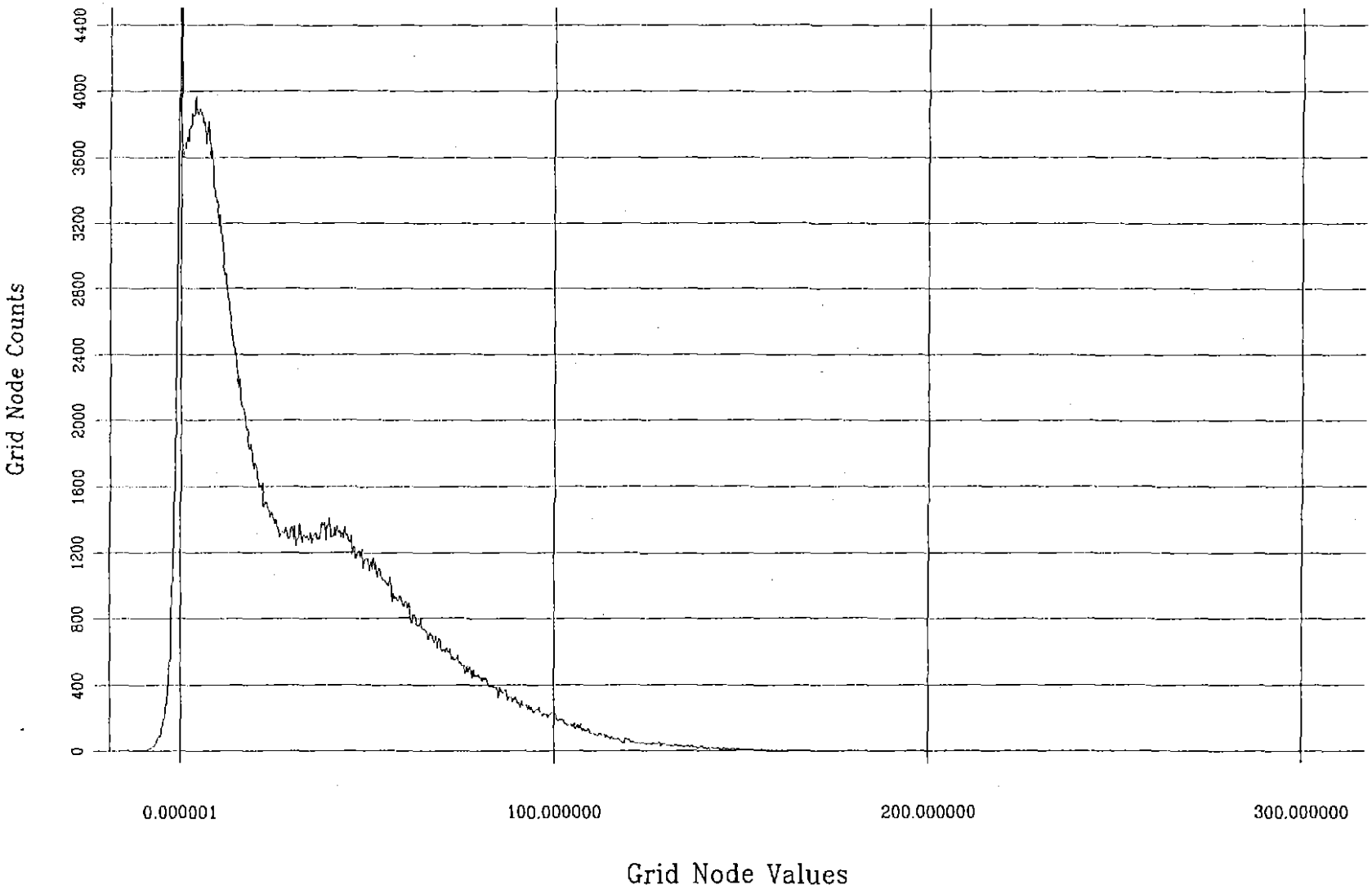
Grid statistics for : t1208.grd

Minimum value	-2.266680	Corner 1	:	317500.00E,	5417500.00mN
Maximum value	76.425460	Corner 2	:	330625.00E,	5417500.00mN
Mean value	14.269010	Corner 3	:	330625.00E,	5443625.00mN
Standard deviation	10.149130	Corner 4	:	317500.00E,	5443625.00mN
Grid columns	526	X Cell size	:	25.00	metres.
Grid rows	1046	Y Cell size	:	25.00	metres.
Percentage non null nodes	76.2				



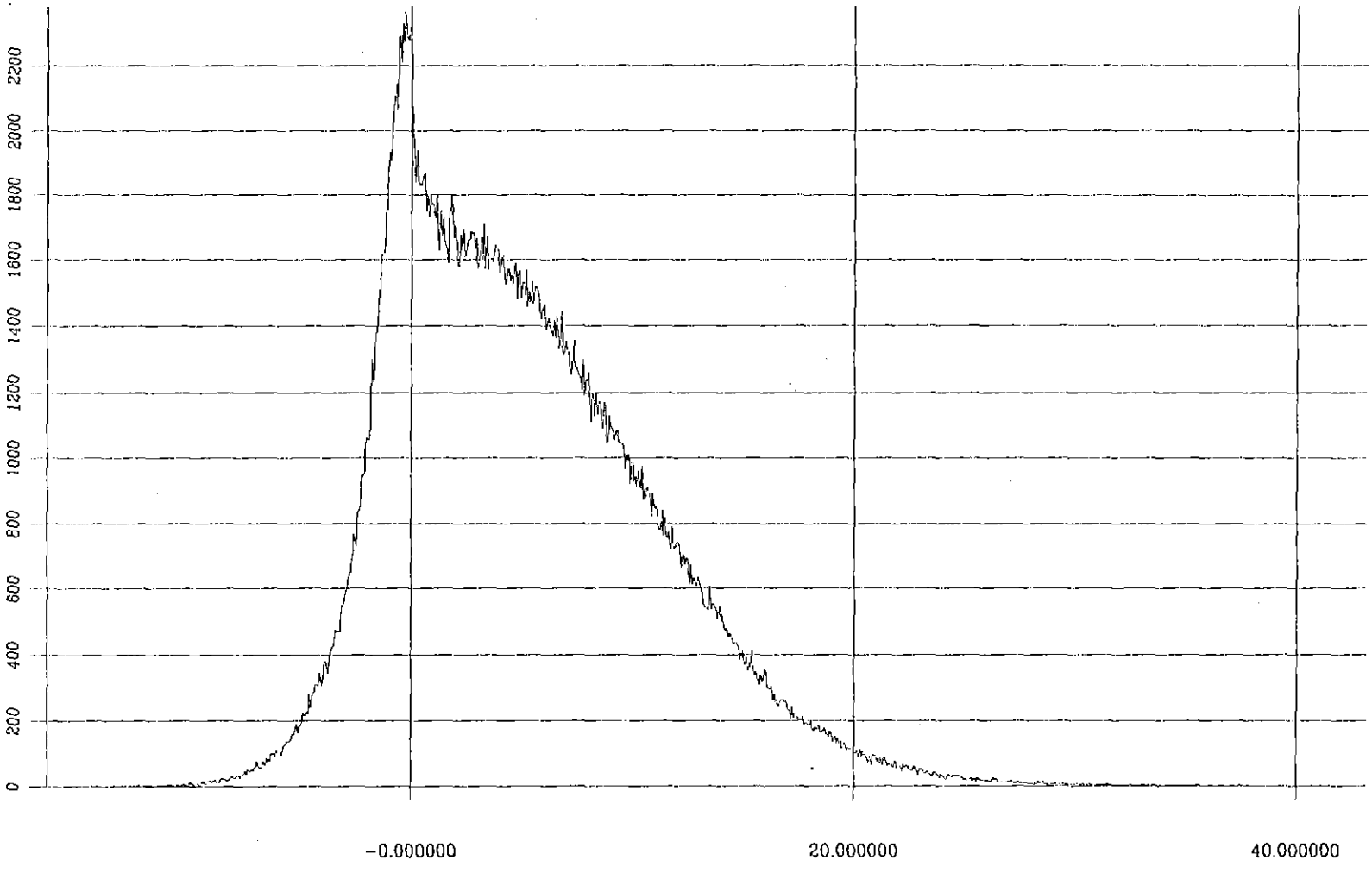
Grid statistics for : k40.grd

Minimum value	-18.827640	Corner 1 :	317500.00E,	5417500.00mN
Maximum value	316.929080	Corner 2 :	330625.00E,	5417500.00mN
Mean value	30.599840	Corner 3 :	330625.00E,	5443625.00mN
Standard deviation	28.554400	Corner 4 :	317500.00E,	5443625.00mN
Grid columns	526	X Cell size :	25.00 metres.	
Grid rows	1046	Y Cell size :	25.00 metres.	
Percentage non null nodes	76.2			



Grid statistics for : bi214.grd

Minimum value	-16.425240	Corner 1	:	317500.00E,	5417500.00mN
Maximum value	43.136660	Corner 2	:	330625.00E,	5417500.00mN
Mean value	5.038570	Corner 3	:	330625.00E,	5443625.00mN
Standard deviation	5.832030	Corner 4	:	317500.00E,	5443625.00mN
Grid columns	526	X Cell size :		25.00 metres.	
Grid rows	1046	Y Cell size :		25.00 metres.	
Percentage non null nodes	76.2				



Slide No.	Survey area	Date	Field	Description	
1	Mt. Frankland	1993	Magnetics	Total field	b & w
2	Mt. Frankland	1993	Magnetics	Total field - enhanced	b & w
3	Mt. Frankland	1993	Magnetics	Total field	colour
4	Mt. Frankland	1993	Magnetics	Total field - enhanced	colour
5	Mt. Frankland	1993	Magnetics	N derivative	b & w
6	Mt. Frankland	1993	Magnetics	NE derivative	b & w
7	Mt. Frankland	1993	Magnetics	E derivative	b & w
8	Mt. Frankland	1993	Magnetics	E derivative - enhanced	b & w
9	Mt. Frankland	1993	Magnetics	Total field on E derivative - enhanced	colour
10	Mt. Frankland	1993	Magnetics	SE derivative	b & w
11	Mt. Frankland	1993	Magnetics	N + E derivative	b & w
12	Mt. Frankland	1993	Magnetics	Vertical derivative	b & w
13	Mt. Frankland	1993	Magnetics	Second E/W derivative	b & w
14	Mt. Frankland	1993	Magnetics	Second N/S derivative	b & w
15	Mt. Frankland	1993	Radiometrics	Total count	b & w
16	Mt. Frankland	1993	Radiometrics	Total count	colour
17	Mt. Frankland	1993	Radiometrics	K	b & w
18	Mt. Frankland	1993	Radiometrics	K	colour
19	Mt. Frankland	1993	Radiometrics	U	b & w
20	Mt. Frankland	1993	Radiometrics	U	colour
21	Mt. Frankland	1993	Radiometrics	Th	b & w
22	Mt. Frankland	1993	Radiometrics	Th	colour
23	Mt. Frankland	1993	Radiometrics	K-Th-U composite	colour
24	Mt. Frankland	1993	Radiometrics	U-Th-K composite	colour
25	Mt. Frankland	1993	Radiometrics	Total count - Linear stretch	colour
26	Mt. Frankland	1993	Radiometrics	Total count - Linear stretch	colour
27	Mt. Frankland	1993	Radiometrics	K - Linear stretch	colour
28	Mt. Frankland	1993	Radiometrics	K - Linear stretch	b & w
29	Mt. Frankland	1993	Radiometrics	U - Linear stretch	colour
30	Mt. Frankland	1993	Radiometrics	U - Linear stretch	b & w
31	Mt. Frankland	1993	Radiometrics	Th - Linear stretch	colour
32	Mt. Frankland	1993	Radiometrics	Th - Linear stretch	b & w
33	Mt. Frankland	1993	Radiometrics	K-Th-U composite - Linear stretch	colour
34	Mt. Frankland	1993	Radiometrics	U-Th-K composite - Linear stretch	b & w

APPENDIX 6

IMAGES FROM AIRBORNE MAGNETIC & RADIOMETRIC SURVEY

CRA

MT. FRANKLAND TAS.

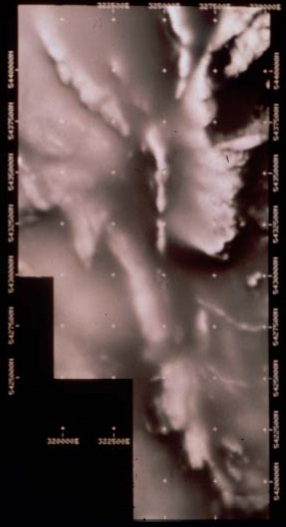
AIRBORNE MAGNETIC DATA

TOTAL FIELD

BURNIE SK55O3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993



CRA

MT. FRANKLAND TAS.

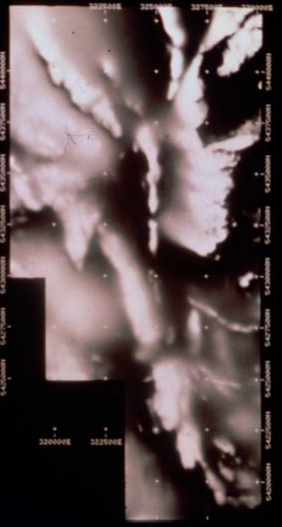
AIRBORNE MAGNETIC
DATA

TOTAL FIELD
-ENHANCED

BURNIE SK55Ø3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993



CRA

MT. FRANKLAND TAS.

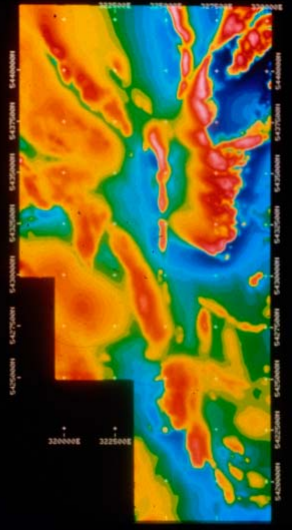
AIRBORNE MAGNETIC DATA

TOTAL FIELD

BURNIE SK55Ø3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993



CRA

MT. FRANKLAND TAS.

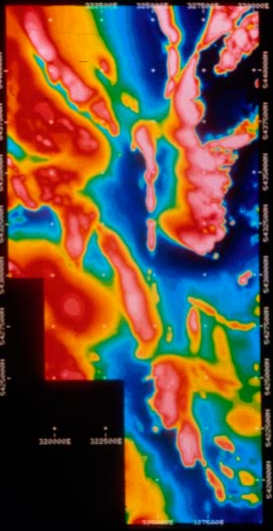
AIRBORNE MAGNETIC DATA

TOTAL FIELD
-ENHANCED

BURNIE SK55O3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993



CRA

MT. FRANKLAND TAS.

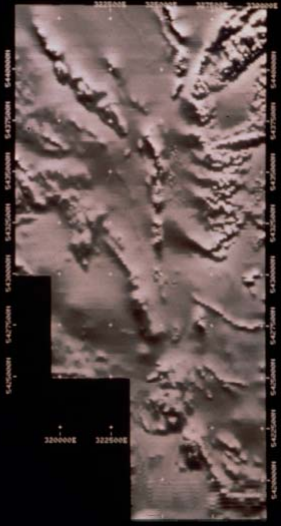
AIRBORNE MAGNETIC DATA

NORTH DERIVATIVE

BURNIE SK55Ø3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993



CRA

MT. FRANKLAND TAS.

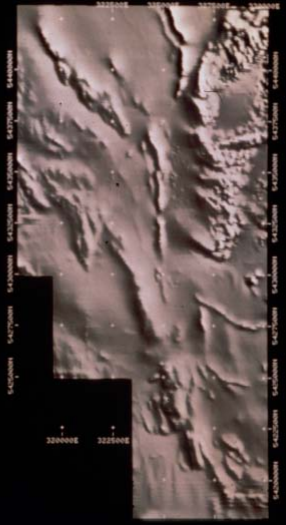
AIRBORNE MAGNETIC
DATA

NORTH EAST DERIVATIVE

BURNIE SK5503
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993



CRA

MT. FRANKLAND TAS.

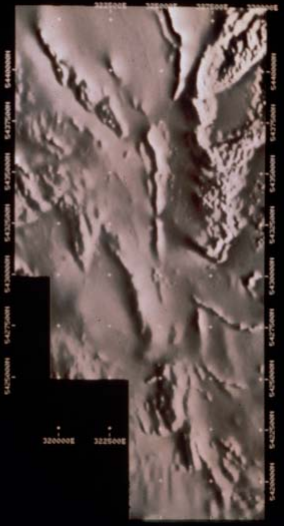
AIRBORNE MAGNETIC
DATA

EAST DERIVATIVE

BURNIE SK55Ø3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993



CRA

MT. FRANKLAND TAS.

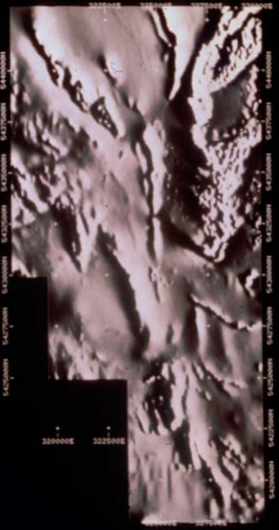
AIRBORNE MAGNETIC
DATA

EAST DERIVATIVE
-ENHANCED

BURNIE SK55O3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993



CRA

MT. FRANKLAND TAS.

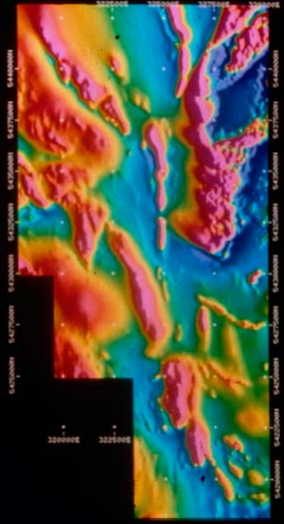
AIRBORNE MAGNETIC DATA

COLOURED TOTAL FIELD
ON EAST DERIVATIVE
RELIEF -ENHANCED

BURNIE SK55O3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993



CRA

MT. FRANKLAND TAS.

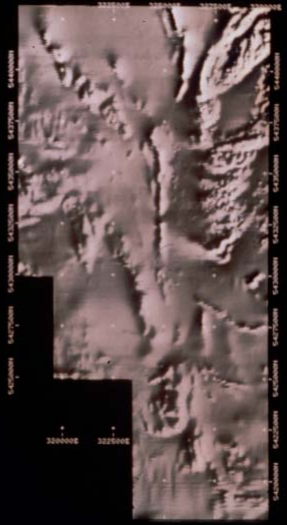
AIRBORNE MAGNETIC DATA

SOUTHEAST DERIVATIVE

BURNIE SK55Ø3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993



CRA

MT. FRANKLAND TAS.

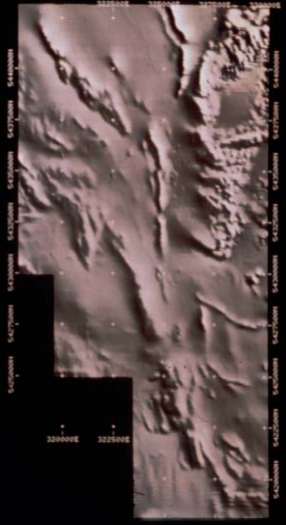
AIRBORNE MAGNETIC
DATA

NORTH + EAST
DERIVATIVE

BURNIE SK55Ø3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993



CRA

MT. FRANKLAND TAS.

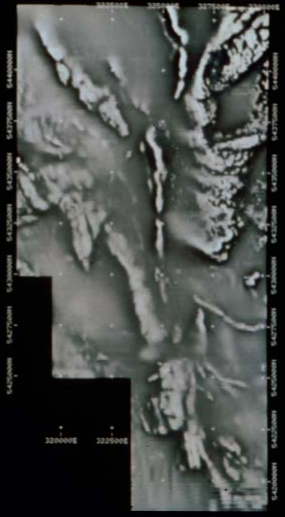
AIRBORNE MAGNETIC DATA

VERTICAL DERIVATIVE

BURNIE SK55Ø3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993



CRA

MT. FRANKLAND TAS.

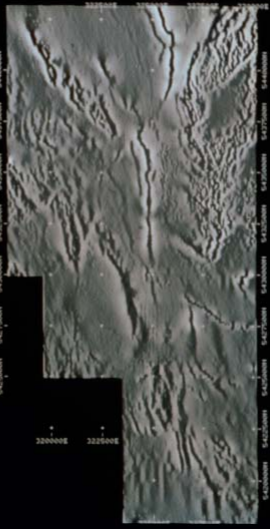
AIRBORNE MAGNETIC
DATA

SECOND E/W
DERIVATIVE

BURNIE SK55O3
SANDY CAPE 7815

GRID MESH SIZE
25 x 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993



CRA

MT. FRANKLAND TAS.

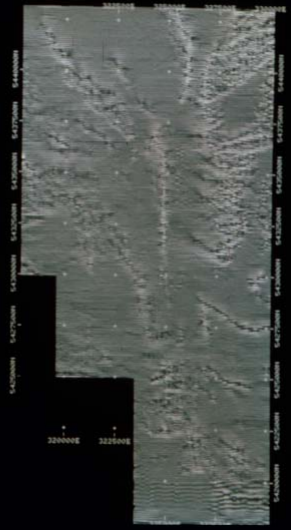
AIRBORNE MAGNETIC DATA

SECOND N/S
DERIVATIVE

BURNIE SK55@3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993



CRA

MT. FRANKLAND TAS.

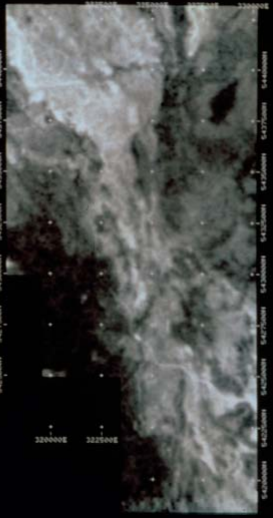
AIRBORNE RADIOMETRIC DATA

TOTAL COUNT

BURNIE SK55O3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993

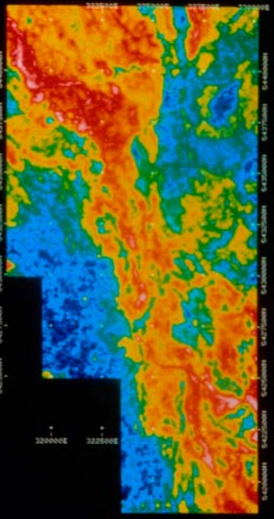


CRA

MT. FRANKLAND TAS.

AIRBORNE RADIOMETRIC DATA

TOTAL COUNT



BURNIE SK55B3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993

CRA

MT. FRANKLAND TAS.

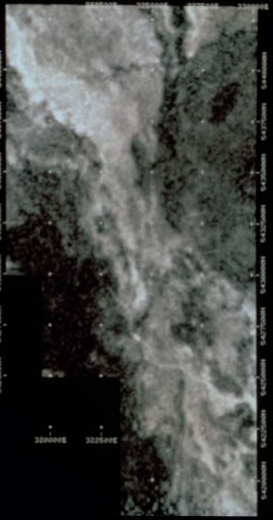
AIRBORNE RADIOMETRIC DATA

POTASSIUM

BURNIE SK5503
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993



CRA

MT. FRANKLAND TAS.

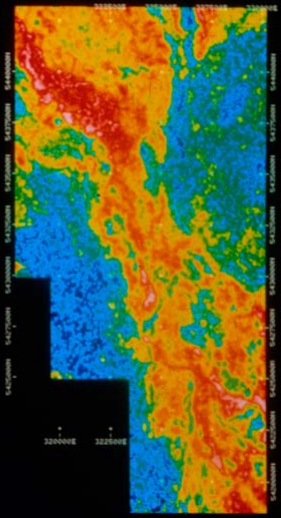
AIRBORNE RADIOMETRIC DATA

POTASSIUM

BURNIE SK5503
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993



CRA

MT. FRANKLAND TAS.

AIRBORNE RADIOMETRIC DATA

URANIUM

BURNIE SK55@3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993

CRA

MT. FRANKLAND TAS.

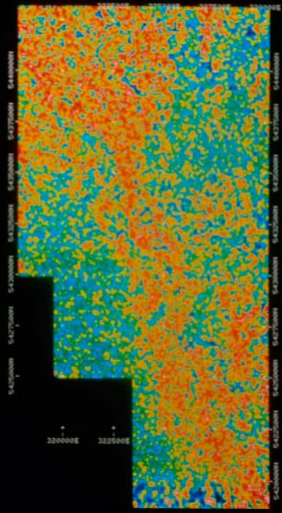
AIRBORNE RADIOMETRIC DATA

URANIUM

BURNIE Sk55@3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993



CRA

MT. FRANKLAND TAS.

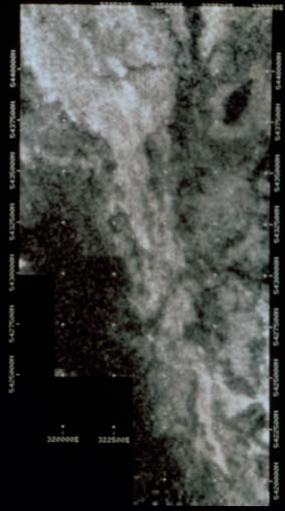
AIRBORNE RADIOMETRIC DATA

THORIUM

BURNIE SK55@3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993

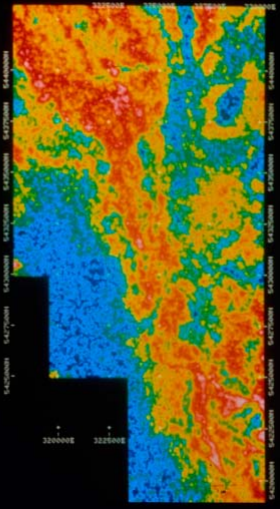


CRA

MT. FRANKLAND TAS.

AIRBORNE RADIOMETRIC DATA

THORIUM



BURNIE SK55O3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993

CRA

MT. FRANKLAND TAS.

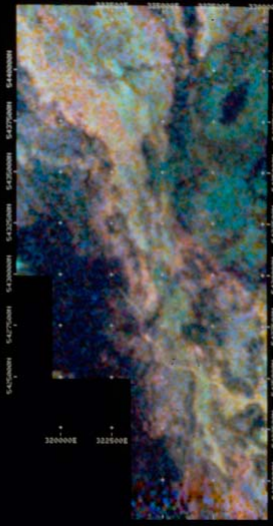
AIRBORNE RADIOMETRIC DATA

RED = POTASSIUM
GREEN = THORIUM
BLUE = URANIUM

BURNIE SK55O3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

CRAE BRISBANE
V. KISSITCH
JULY 1993

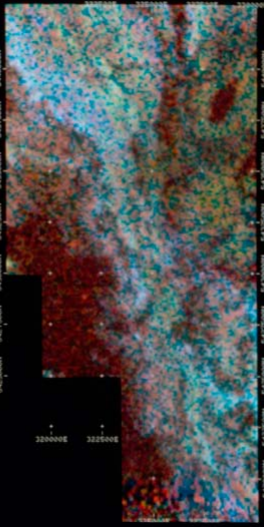


CRA

MT. FRANKLAND TAS.

AIRBORNE RADIOMETRIC DATA

RED = URANIUM
GREEN = THORIUM
BLUE = POTASSIUM



BURNIE SK55@3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES

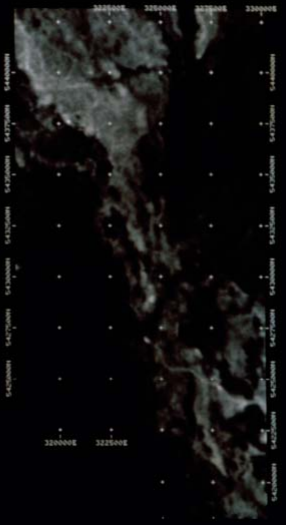
CRAE BRISBANE
V. KISSITCH
JULY 1993

CRA

MT. FRANKLAND TAS.

AIRBORNE RADIOMETRIC
DATA

TOTAL COUNT



BURNIE SK55Ø3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES
LINEAR STRETCH

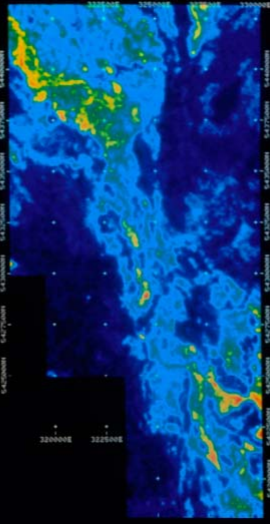
CRAE BRISBANE
V. KISSITCH
JULY 1993

CRA

MT. FRANKLAND TAS.

AIRBORNE RADIOMETRIC DATA

TOTAL COUNT



BURNIE SK55O3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES
LINEAR STRETCH

CRAE BRISBANE
V. KISSITCH
JULY 1993

CRA

MT. FRANKLAND TAS.

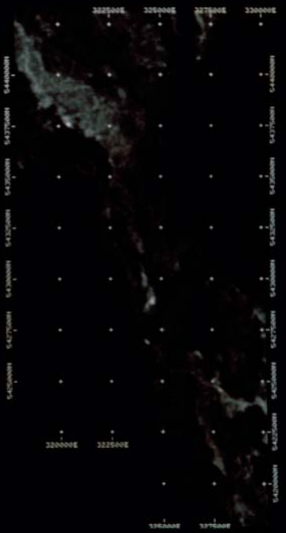
AIRBORNE RADIOMETRIC DATA

POTASSIUM

BURNIE SK55O3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES
LINEAR STRETCH

CRAE BRISBANE
V. KISSITCH
JULY 1993



CRA

MT. FRANKLAND TAS.

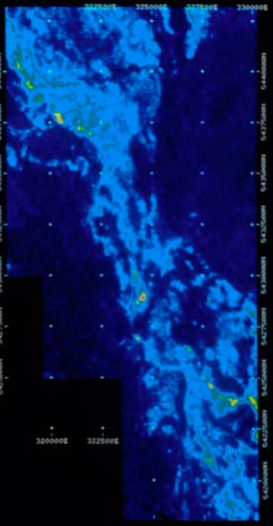
AIRBORNE RADIOMETRIC DATA

POTASSIUM

BURNIE SK5503
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES
LINEAR STRETCH

CRAE BRISBANE
V. KISSITCH
JULY 1993



CRA

MT. FRANKLAND TAS.

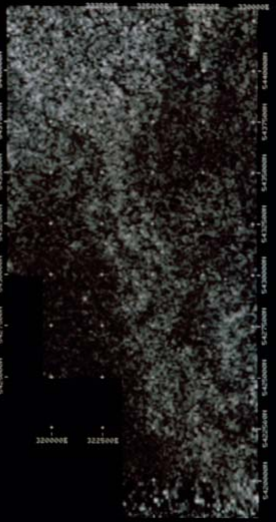
AIRBORNE RADIOMETRIC DATA

URANIUM

BURNIE SK55@3
SANDY CAPE 7815

GRID MESH SIZE
25 x 25 METRES
LINEAR STRETCH

CRAE BRISBANE
V. KISSITCH
JULY 1993



CRA

MT. FRANKLAND TAS.

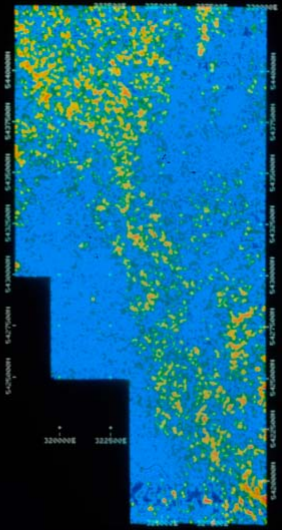
AIRBORNE RADIOMETRIC DATA

URANIUM

BURNIE SK55\03
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES
LINEAR STRETCH

CRAE BRISBANE
V. KISSITCH
JULY 1993



CRA

MT. FRANKLAND TAS.

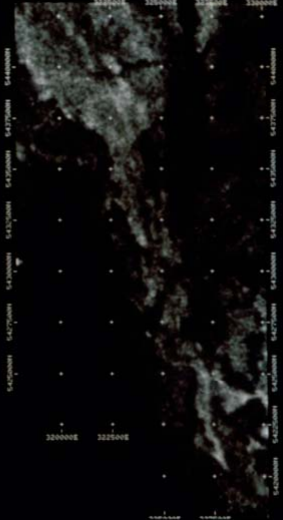
AIRBORNE RADIOMETRIC DATA

THORIUM

BURNIE SK55Ø3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES
LINEAR STRETCH

CRAE BRISBANE
V. KISSITCH
JULY 1993

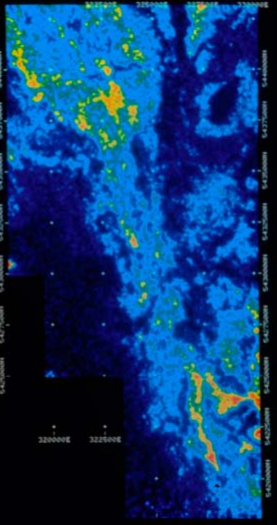


CRA

MT. FRANKLAND TAS.

AIRBORNE RADIOMETRIC
DATA

THORIUM



BURNIE SK55O3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES
LINEAR STRETCH

CRAE BRISBANE
V. KISSITCH
JULY 1993

CRA

MT. FRANKLAND TAS.

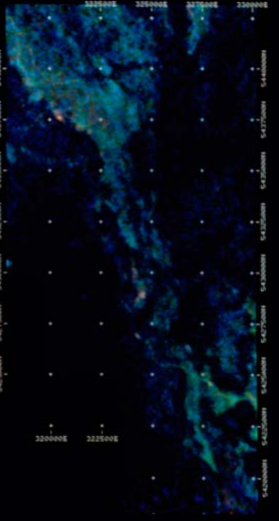
AIRBORNE RADIOMETRIC DATA

RED = POTASSIUM
GREEN = THORIUM
BLUE = URANIUM

BURNIE SK55O3
SANDY CAPE 7815

GRID MESH SIZE
25 X 25 METRES
LINEAR STRETCH

CRAE BRISBANE
V. KISSITCH
JULY 1993

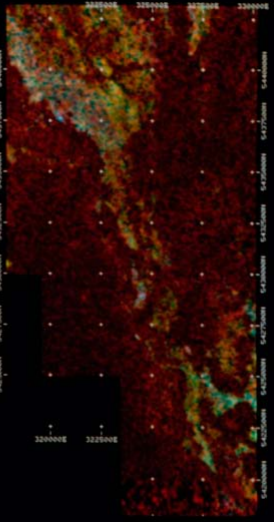


CRA

MT. FRANKLAND TAS.

AIRBORNE RADIOMETRIC DATA

RED = URANIUM
GREEN = THORIUM
BLUE = POTASSIUM



BURNIE SK55O3
SANDY CAPE 7815

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