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E.L. 12/78 - SCAMANDER

Progress Report on Exploration During the Period

1/9/83 to 1/8/84

OPEN FILE

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SUMMARY

This report outlines exploration activities in E.L. 10/80 Great Pyramid and E.L. 12/78 Scamander between 1/9/83 and 1/8/84.

During the past year E.L. 10/80 was amalgamated with E.L. 12/78.

Emphasis has been placed on regional studies including stream sediment sampling, lineament analysis, geological mapping, prospect evaluation and fluid inclusion research.

Stream sediment sampling and followup work has outlined the Flagstaff Anomaly for detailed study. The Flagstaff Anomaly covers an area of 6 x 2 km which includes the Loila Tier prospect. Coarse grained, (2 - 3mm) angular, euhedral cassiterite has been panned in five separate stream systems which define this anomalous area.

Geological and fluid inclusion studies of the Great Pyramid prospect define temperature as the dominant control on cassiterite deposition.

A geological ore reserve estimate of the Great Pyramid deposit was completed using all the available drilling and adit sampling data compiled on computer facilities. A reserve of 3.3mt @ 0.2% Sn with a potential for 6 - 6.5mt within the deposit envelope was computed. A high grade area of 0.4mt @ 0.4% Sn was outlined on South Block.

Preliminary metallurgical testwork on a composite 2 tonne bulk sample from the Pyramid Hill adits defined a tin recovery of 65 - 70% with the use of a conventional tin treatment plant.

Deep drilling (SPG 1A) beneath Pyramid Hill failed to locate granite at 250m below North Block but established a metal zonation from Sn - Cu to Sn - WO_3 - Mo at depth.

Twelve angled percussion/reverse circulation holes were drilled to test a tin-in-soil anomaly on the Pinnacles Prospect. A fence of 9 holes across the kilometre wide zone failed to detect significant mineralization within 100m of the surface.

The Loila Tier prospect was gridded and geologically mapped. One line of soil samples failed to give encouraging tin assays.

The coincidence of stream sediment base metal leakage zones, metamorphic spotting and silicification of the Mathinna Beds, minor granite and granitic dyke outcrops, the location of most prospects, ENE trending lineaments, an increase in lineament density and aeromagnetic anomalies suggest that the central portion of the licence is underlain by stanniferous granite. Metal zonation of prospects within the Scamander Mineral Field indicate a decrease in hydrothermal fluid temperature to the SE which probably corresponds to an increase in granite depth.

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1.0 INTRODUCTION

The Great Pyramid Exploration Licence 10/80 was amalgamated with the Scamander Licence E.L. 12/78 in early 1984.

During the passed year exploration in both licences has been managed by Shell Metals/Billiton Australia under a joint venture agreement with BHP.

This annual report details exploration activities in E.L. 10/80 and E.L. 12/78 between 1/9/83 and 1/8/84 (summary of work completed - Table 1).

At the forthcoming renewal date (15/9/84) the Licence area is due for reduction from 273 sq km to 125 sq km. Figure 1 illustrates the ground earmarked for retention and relinquishment.

2.0 GREAT PYRAMID DEPOSIT

2.1 Geology

The Great Pyramid tin deposit consists of a NE trending closely-spaced sheeted vein/fracture system developed within silicified Mathinna Bed sediments lying directly above a (W)NW trending highly fractionated stanniferous granite ridge. Tin occurs as cassiterite associated with quartz and sulphides, tending to concentrate in open voids within intensely fractured sandstone units. Structural analysis indicates that the sheeted fracture system is related to regional stress patterns operative during Middle Devonian Tabberabberan deformation of the Mathinna Bed sediments. The enhancement of the NE trending regional fracture set on Pyramid Hill is attributed to additional stress produced by a) the release of hydrothermal fluids from the underlying granite and b) an irregularity on the subsurface NW trending granite ridge (i.e. cupola, flexture).

Three major controls on mineralization have been outlined (Ruxton, 1983a):

1) A gross (W)NW trend of Brocks, North and South Blocks - coincident with the trend of the Pinnacles - North Scamander silicified ridge and inferred granite ridge at depth.

2) NW trending sandstone/quartzite lithological units which fracture more easily than associated siltstones and shales.

and 3) Closely spaced, NE trending fractures (upto 180 per metre) which are normal to local fold axes.

A fourth more fundamental control is apparent when examining the distribution of tin in 3 dimensions.

Contoured level plans (Ruxton, 1983a : plans D/LH 01/144, 145 and 146) indicate a decrease in tin grade with depth, a vertical plunge to the mineralization in Brocks Block and a vertical to steeply NE plunge to North Block. The mineralization does not therefore plunge to the west as might be expected - on the intersection of NE (NW dipping) fractures and NW (SW dipping) bedding but appears to display horizontal and vertical boundaries. This evidence suggests a dominant physiochemical control on tin distribution. Cassiterite occurs in preferentially fractured silicified sandstone lithologies but the deposition of tin was controlled by physiochemical conditions of the hydrothermal fluids. The deposit can be considered to be a leakage system with tin nucleating at a specific temperature/pressure from streaming hydrothermal fluids released from the underlying granite.

Fluid Inclusion studies support this hypothesis. The construction of cross-sections showing homogenization temperatures of quartz in the mineralized fracture system indicates flat-lying to domal isotherms (Fig. 16, Section 3.5). A plot of homogenization temperature verses tin grade strongly suggests a temperature control on tin distribution with most of the tin depositing between 220°C and 260°C (Appendix 6).

The combination of geological and fluid inclusion data imply that temperature is the dominant control on tin distribution on Pyramid Hill. Cassiterite was deposited from hydrothermal fluids within a specific temperature range within "open" fractured sandstones a given distance above fluid source.

2.2 Geological Ore Reserve Estimate

An estimation of the insitu tin reserve of Great Pyramid was made. The study utilized Aberfoyle, Mines Department and BHP data compiled onto cross-sections and level plans using a computer. All the available geological data was drawn onto cross-sections and transferred to level plans. Due to the highly erratic tin distribution a broad envelope was found to be the best way of delineating the deposit boundary. Using a density of 2.65 g/cm^3 a reserve of 3.3 million tonnes at 0.2% Sn (0.1% Sn cut off used) with a potential tonnage of 6 to 6.5 million tonnes within the deposit envelope was defined. A high grade section of 400,000 tonnes at 0.4% Sn (0.3% Sn cut off used) was outlined near surface on South Block. These reserves are placed in the "Probable" category due to:

a) the uncertainty over true grade, - BHP drilling revealed a 50% discrepency between percussion and diamond drilling Sn assay results - Shell/Billiton outlined a 25% discrepency between channel sampling and bulk grade estimates (Section 2.3),

b) the erratic distribution of grade,

and c) errors inherent in the drill testing of the deposit.

A full report on the Geological Ore Reserve Estimate is currently being compiled.

2.3 Metallurgical Testwork

Metallurgical tests were made on a composite bulk sample from the Great Pyramid Deposit.

Details of sample collection and results are included in Appendix 1.

A 3 tonne bulk sample was collected from 3 adits on Pyramid Hill in areas included in channel sampling operations (Ruxton, 1983a). The aim was to collect a sample of average ore grade (0.22% Sn) with a representation mix of the lithologies present in the deposit.

Adit	Interval	Weight (approx)	Lithology	Channel Sample Grade (aver.)
North Adit	21.7 - 24.4m	(1.08t)	sst/stt/sh	0.16% Sn
C Adit	11.0 - 13.5m	(1.08t)	sst/stt/sh	0.32% Sn
1 SLL	48.6 - 51.1m	(0.8t)	sst/sh	0.28% Sn

The sample was collected using a compressor and jackhammer with every precaution taken to minimize sample loss. The 3 tonne sample was crushed and thoroughly mixed before 2 tonnes were submitted for metallurgical work at Mineral Deposits Ltd. laboratories in Bundall, Queensland.

The metallurgical report submitted by Mineral Deposits Ltd. is contained in Appendix 1. Major conclusions include:

a) a grade of 0.4% Sn was attained when 0.25% Sn was expected - this suggests a possible 25% grade increase during bulk sampling,

b) a concentrate grade of 65 - 70% Sn seems feasible with an initial gravity concentration and subsequent magnetic separation - the magnetic separation involves the removal of fine grained magnetite (trace pyrrhotite) recognized by Aberfoyle and BHP from petrological studies.

c) there remains scope for higher Sn recoveries with repeated use of gravity tables.

d) 50% of the feed reported as slimes indicating over-grinding - a better recovery will be possible with a multistage grinding and gravity separation option.

e) scope for improving the grinding process exists in:

1) improving gravity recovery,
2) minimizing energy costs,
3) a reduction in the amount of material requiring flotation.

The metallurgical work clearly indicates that a traditional tin plant is required (i.e. crush, grind, gravity, flotation).

The discrepency of 25% in Sn grade from channel sample to bulk sample if consistent through the deposit may result in a significant increase in tonnage estimates. Areas of 800 - 900 ppm Sn may be included in the deposit envelope.

A Sn recovery of 65 - 70% is a significant improvement on early work by BHP which suggested a figure of 40 - 60%.

2.4 Deep Drillhole SPG 1A

A vertical combined percussion/diamond drillhole SPG was collared at 288N 338E (R.L. 200m) on the Pyramid Grid (Fig. 2) to test the fracture-related tin mineralization at

depth. The hole was positioned in the centre of the tin system at the intersection of the gross (W)NW deposit trend and the NNW grade (lithological) trend of South Block. SPG 1 was planned to determine:

a) the continuity of Sn grade with depth,
b) the presence of mineral zonation from Sn/Cu to WO_3/Mo with increasing depth,
c) the source of a broad magnetic feature centred on the northwestern side of Pyramid Hill,
and d) the depth and nature of the postulated underlying granite beneath the Pyramid system.

SPG 1 was abandoned at 157.6m due to drilling problems and a new hole SPG 1A was collared at 294N 346E (Fig. 2). SPG 1A was completed at 348.3m with 120m percussion, 22.6m HQ and 205.7m of NQ coring (drill logs for SPG 1 and SPG 1A in Appendix 2).

Downhole camera surveys indicated that SGP 1A lifted 36° to the NE deviating 140m off target. The hole was completed in partly silicified Mathinna Bed sediments. A zone of intensely silicified highly spotted Mathinna sediments were encountered between 240m and 330m (Fig. 3) containing two vein sets -

a) sheeted quartz veining with associated muscovite selvages, pyrite, pyrrhotite, cassiterite, wolframite, molybdenite, sphalerite, galena and fluorite (veins upto 1cm width),
b) irregular veins of chlorite, magnetite, sphalerite, fluorite, pyrite and cassiterite (with magnetic susceptibilities of upto 90,000 x 10^{-5} cgs units).

Quartz veins may contain tourmaline and associated cassiterite (veins upto 2cm width).

This zone is considered to represent the NW extension of the root zone of North Block. The presence of wolframite/molybdenite, tourmaline and fluorite plus the intensity of silicification and spotting suggest that the hole passed close to the granite/sediment contact.

Assay results highlight 2 zones (see below) with the root zone region of North Block containing valves upto 300ppm WO_3, 250ppm Bi, 18ppm Mo, 8ppmAg, 0.1ppm Au, 0.3% As and 3.2% Zn (Drilllog Appendix 2).

Downhole Width (m) SPGIA	Interval (m)	Sn Assay (bulked) %
10m	30m to 40m	0.24% Sn
42.9m	236.7m to 279.6m	0.24% Sn

Due to the incompetency of the field geologist SPGIA didnot reach granite. However the hole gives us limited information:

a) depth to granite is in excess of 250m beneath North Block,
b) the near surface position of elevated Sn grade intervals in SPGI and SPGIA correspond well with previous drilling,
c) the Sn grades of Pyramid Hill tend to fall off with depth 100 to 150m below surface. Although there is further potential for 0.24% Sn material at depth,
d) the intensity of silicification and spotting are related to the passage of hydrothermal fluids. A zone of silicification/alteration appears to continue at depth probably to granite source,
e) the limited magnetite/chlorite/sphalerite veining present suggests that the aeromagnetic/ground magnetic anomaly located on the northwestern side of Pyramid Hill (Figs. 4 & 5) is related to "disseminated" veinlet/vein magnetite/chlorite/sphalerite with minimal cassiterite. These sulphide/oxide veins are probably late stage of similar origin to the North Scamander fault-related magnetite/pyrrhotite/chlorite mineralization.

3.0 REGIONAL EXPLORATION

3.1 REGIONAL GEOLOGY

3.1.1 Granite Mapping

Devonian granitoids of the Scamander licence have been mapped in an effort to:

a) define hardrock tin sources,
b) classify types,
c) define boundaries and
d) to determine the degree of fractionation.

Three main types have been identified (Fig. 6, Plan D/LHO2/527):

1) Hornblende/biotite granodiorites/adamellites:-
The Scamander Tier Dyke, Avenue River Dyke and St. Helens Pluton fall into this category. The rocks are generally mafic with less than 60% quartz containing hornblende and biotite plus two feldspars. They are generally texturally and mineralogically heterogenous. Sub-rounded inclusions of mafic microgranite and metasedimentary material (assimulated Mathinna Beds) are common. Minor biotite granites with large zoned megacrysts are associated with the Scamander Tier and Avenue River Dykes.

Hb/Bi granodiorites/adamellites are early stage non-stanniferous granitoids of the Blue Tier Batholith (Groves et al,1977).

2) Biotite adamellites/granites:-
Biotite adamellites are represented by the Mt. Pierson Pluton which includes the Echo and Loila Tier granites plus granite/pegmatite/aplite veining in Flagstaff Creek. In general the Mt. Pierson Pluton consists of coarse grained, equigranular biotite (up to 10%) granite with eutectic

quartz and two feldspars. Towards its upper contact fine grained and porphyritic variants occur. In the Wolfram Creek area biotite granite passes into the type (3) Wolfram Creek granite (see below). Fine grained contact phases of the Mt. Pierson Pluton are often cut by narrow (0.5m max.) quartz and greisen (muscovite, sericite, quartz) lodes which increase in width towards the granite contact. Greisen veins (upto 2-5m thick?) generally trend WNW or NW (Fig. 7) and are mineralized in the Echo granite at the Echo N (WO_3, Mo, Sn) and Echo S (WO_3, Mo) prospects at the granite /sediment contact (see Appendix 3). Drilling by Geophoto in the 1970's indicated sporadic low grade WO_3, Mo valves with a rapid decrease in grade with depth at both prospects.

3) Biotite/ muscovite/tourmaline fluorite granite:- The Wolfram Creek granite is a highly differentiated alkali granite which forms a contact phase of the Mt. Pierson Pluton, preserved in a shallowly SE dipping granite ridge structure. This granite ridge probably underlies the Pinnacles-Pyramid-North Scamander silicified ridge (Plan D/LHO2/527 & Fig. 8). Mapping has revealed a vertical zonation within this granite culmination from biotite granite to biotite plus coarse grained interstitial muscovite to biotite/muscovite/tourmaline to biotite/ muscovite/tourmaline with minor fluorite granite (Fig. 9). Pegmatitic clots of quartz/K.feldspar, quartz/K.feldspar/muscovite, quartz/K.feldspar/ tourmaline and tourmaline occur close to the granite/ sediment contact. A chronological sequence of events is tentatively defined (Table 2) to account for the features observed in this unusual granite. Drilling by Geophoto and observations by Groves (1972) suggest that cassiterite occurs along fractures and joints in the upper portion of the Wolfram Creek granite.

3.1.2 Mathinna Bed Sediments

Periodic mapping of the Mathinna Bed sediments has been done during prospect evaluation and stream sediment followup. A couple of new aspects have arisen:

a) Sandstone lithologies are fairly common in the sequence although the Mathinna Beds dominantly conform to the type C, D, E turbidite units of Bourma.

b) Metamorphism of the Mathinna sediments is generally recognised by silicification, recrystallization, argillitic alleration (?) and spotting. Silicification, argillitic alleration and spotting are also related to the movement of hydrothermal fluids through these rocks. Large areas of the licence contain altered rocks for example the silicified ridges of Loila Pinnacles (with associated tourmaline) and the Orieco Ridge, spotted shales are common around Dunns and Cramps Prospects. Iron staining and elevated base metal values are often associated with altered areas.
These features suggest that fairly large areas of the licence are underlain by shallow stanniferous granite (Section 6.0).

c) Structural analysis in the vicinity of the Cramps/ Orieco/Paul Beahr and Great Pyramid prospects has confirmed early work by Groves (1972) who suggested the presence of 2-4km wavelength folds with gentle SE plunges were dominant in the Scamander Mineral Field (Fig. 10). Tight superimposed folds are common in the Great Pyramid/Pinnacles prospect areas but rare around Cramps and Dunns (see Prospect Evaluation Appendix 3 for Stereonet plots - also Ruxton, 1983a for structure of Pyramid Hill).

The increase in intensity of deformation on the Pinnacles/North Scamander ridge may be due to forceful localized granite intrusion beneath this ridge structure which enhanced stress with resultant increased strain during middle or late stage Tabberabberan orogenic movements.

This structural study had defined a series of NW trending faults located at the fold axes of large scale structures (Pyramid - Pinnacles fault - faulted out antiform, Orieco - Paul Beahrs fault - faulted out synform - Fig. 10). Sulphide mineralization is common along these NW trending faults (Fig. 10) with associated facture-style cassiterite on Pinnacles and Great Pyramid. This relationship indicates a strong regional structural control on the mineralization of the Scamander Mineral Field.

3.1.3 Alluvial History

The complex alluvial history of the Scamander area has hampered the regional stream sediment sampling programme. Three periods of alluviation are recognized with one period of major incision:

RECENT — Drainage of present land surface. Alluvial build up Placer cassiterite.

———— Cessation of alluviation - minor incision.

QUATERNARY — Main unroofing of stanniferous granites. Generally a granitic alluvium - quartz sand-rich. Alluvial cassiterite common well rounded. Maximum thickness of 5m in Ruby Flats/Argonaut area - Thureau's Lead. Worked for alluvial tin in Thureau's Lead, Transit Flats, Constables Creek.

~~~ Uplift of the land surface - major alluvial incision - erosion.

TERTIARY Fluviatile and Marine days, sands and gravels - upto 80m thick in Thureau's Lead.
Erosion of Mathinna Beds - No alluvial tin.

The source of alluvial cassiterite within Thureau's Lead Quaternary sediments is not known. The presence of pebbles of Mathinna Beds (often veined and metamorphosed) suggests derivation from the roof zone of the Mt. Pierson Pluton (generally now removed).

3.2 Lineament Studies

A comprehensive lineament survey of the Scamander licence has been completed involving detailed studies of 1:15 000 scale B/W aerial photographs with the results compiled onto a 1:20 000 scale base sheet (refer plan D/LH 02/525). Both lineaments and the limits of alluvial cover have been defined by this study.

Areas of Mathinna Bed cover were found to contain very prominent lineaments in contrast to granite terrains. NW and NE trending lineaments are dominant with sub-ordinate WNW and ENE features (Fig. 11). On a local scale NW features can be related to bedding/fold axial trends/fractures and faults and NE features to faults and fractures with associated Devonian basic dyke intrusives.

There appears a strong correlation between the margins of the Mt. Pierson Pluton and lineaments suggesting regional fracture/tectonic control on grante emplacement. ENE to E trending lineaments appear to characterize the Mt. Pierson Pluton and extend into Mathinna covered areas. These areas are predicted to contain shallow subsurface biotite granite (Section 6.0).
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3.3 Prospect Evaluation

Each prospect of the Scamander Mineral Field in E.L. 12/78 was visited and geologically/geochemically redefined. Maps, stereonets and short notes were made and are enclosed in Appendix 3. The metallic characteristics of each prospect were determined by rock chip sampling (Appendix 3).

A distinct metal zonation is apparent in the Scamander Mineral Field from WO_3/Mo, WO_3, Sn, Cu, Pb/Zn/Ag and associated Au (Fig. 12). The association of a gold-bearing halo is a new development from the initial work of Groves (1972).

The relative vein widths, mineralogy and metal zonation sequence of the Scamander Mineral Field are remarkably similar to the sheeted vein-style tungsten deposits of the JIANGXI Province in China. (A generalized summary of the Chinese Vein deposits is shown in Fig. 13). Few but thick (0.2 - 1.0m) WO_3 - Mo bearing quartz veins form at the base of the system, closest to the host granite (Baden Powell, Carson de Beers, Lutwyche), passing to narrower (0.1 - 0.2m) WO_3/quartz veins (E. Lutwyche), to numerous thin (0.001 to 0.005m)Sn/sulphide veinlet/fracture fills (Pinnacles, Pyramid), to fine fractures and stringers (0.005m) of Sn/quartz/carbonate (North Scamander) (Fig. 14). Lower temperature, fault-related sulphide-rich mineralization represents the latter phase of hydrothermal activity and overprints earlier deposits (Pyramid, North Scamander, Orieco, Dunns, Cramps, Paul Beahrs, Scamander Mine, Scamander Bell, Beulah, Yarmouth). Fluid inclusion work has related metal zonation to a decrease in temperature of the original hydrothermal fluid (Section 3.5).

The economic potential of the Scamander Prospects is summarized in Appendix 4.

The zoned metal deposits are strongly related to regional structures (fractures/faults) which formed ideal leakage paths for hydrothermal fluids released from subsurface biotite granite. (Section 6.0).

3.4 Stream Sediment Survey

A detailed regional stream sediment sampling programme of the Scamander licence was initiated in February, 1983 and completed in April, 1984. A total of 764 samples were collected an average of 2.8 samples per square kilometre. 148 stream samples and 84 rock chip samples were taken during followup operations.

One significant anomaly, the Flagstaff Anomaly has been delineated.

Orientation Survey

A limited orientation survey was completed prior to the sampling programme (details in Ruxton, 1983b -Appendix 1). The results indicated that the -20# fraction gave the most consistent assay results although there was the possibility of sieving out coarse grained cassiterite close to tin source.

Sampling Method

Samples were collected from active stream sediment in the best possible heavy mineral catchment site, sieved to -20# and assayed by Comlabs (South Australia) for Sn, WO_3, Mo, As (XRF), Cu, Pb and Zn (AAS). In addition an on site description was made of each sample site and a panned concentrate retained for microscopic examination. During the main survey samples were collected from alluvial covered and areas of outcrop to fully define the distribution of cassiterite in the licence area. All assay data was stored on magnetic tape and transferred to the Prime Computer in SCOA Head Office, Melbourne.

Results

Sample locations are shown on Plan D/LH02/502 and assay results on Plans D/LH02/504 - Sn, WO_3, Mo; D/LH02/503 - As and D/LH02/505 - Cu, Pb and Zn.

- Tin Distribution

Using a background value of 50ppm Sn a total of 141 anomalous samples were defined and grouped into 12 anomalous areas (Fig. 15). Tin values of anomalous samples varied upto a maximum of 1.2% Sn.

- Tungsten Distribution

An initial background value of 15ppm WO_3 was too low with anomalous samples over the licence. Some problems with tungsten contamination during sample preparation are suggested by fluctuating WO_3 background values for different sample batches.

- Base Metal Distribution

Anomalous base metal values fall into an area between the Great Pyramid and Silver Echo prospects N-S and the Wolfram Creek and Arm River E-W. This zone encompasses the Pyramid-N. Scamander, Wolfram Creek, Nevada Creek, Arm Creek, Flagstaff and Mt. Echo anomalous areas (Fig. 15). The distribution of anomalous As and Zn samples best define this base metal leakage zone using background values of 20ppm As and 50ppm Zn. Highest values of 2.85% As and 455ppm Zn are recorded. Highly anomalous samples characterize the Flagstaff and Pyramid-N. Scamander anomalies.

Copper and lead anomaly patterns follow those of As and Zn but are sporadic and less pronounced. Both

elements have a background value of 30ppm with maxim of 420ppm and 960ppm respectively.

Followup

Followup and infill stream sampling involved the same sample method as the initial survey with a total of 148 samples taken plus 84 rock chips. Each anomalous area was visited and individual amonalous sites resampled. Outcrop was sampled and mapped with alluvium panned. Details of the 12 anomalous areas are contained in Appendix 5. Table 3 lists the 12 anomalous areas and anomaly causes.

During the course of followup investigations a laboratory error was uncovered which had resulted in the mislocation of 205 samples, 12 of which were anomalous. As a consequence of this the Catos and Scamander River Anomalies were found to be non-existant and were infact part of the Pyramid-N. Scamander and Wolfram Creek Anomalies.

Synopsis

A total of 141 anomalous samples were defined belonging to 12 Anomalous areas. Elevated values of tin have been attributed to :

a) drainage from known prospects (eg. Pyramid-N. Scamander),

b) alluvial cassiterite related to Quaternary and Recent river alluvium (eg. Launceston Anomaly),

c) contact granite phases with associated minor greisen veining and tin along fractures (eg. Wolfram Creek granite, Constable Creek granite area),

d) undefined hardrock sources (eg. Flagstaff Anomaly).

Four areas require further work/followup :-

High Priority

1) Flagstaff Anomaly - A ridge and spur soil sampling programme has been initiated. The Flagstaff anomaly is 6km by 2km in area and requires further definition prior to gridding and drilling. Details of followup, geology, lineaments, bedding/cleavage/fracture/ joint orientations are included in Appendix 5.

Low Priority

2) Wolfram Creek Anomaly - three areas.

   a) Samples 11004 (7653), 10998 (7651,7652) - N of Baden Powell Prospect,

   b) Samples 11011 (7818,7819), 11013 (7817) - S of Lutwyche Prospect,

   c) Sample 11050 - S of the Lutwyche Prospect.

These anomalies are probably alluvial related or from the drainage of minor quartz veining associated with the Baden Powell, Lutwyche and Carson de Beers Prospects.

3) Pyramid - N. Scamander Anomaly - Two anomalous samples (7631,7650) draining the S side of the Orieco Ridge. A close examination of B.H.P. and Shell rock chip sampling on the Orieco Ridge is required to explain this anomaly.

4) Mt. Echo Anomaly - Samples 10888 (7826), 10889 (7825) and 7835 draining the S and E sides of Mt. Echo. These anomalous samples probably relate to minor vein mineralization.

3.4.6 Statistical Analysis

A short time was spent manipulating the Scamander Stream sediment data on a Prime computer. Rough histogram plots of log ppm verses frequency percent and cumulative frequency percent were produced in an effort to apply concepts outlined by Sinclair (1974, 1976). The results indicated that a threshold value of 50ppm is statistically too high with 15 to 20ppm closer the mark. However the problems of alluvial tin contamination made the 50ppm background value more realistic thus eliminating low order features.

A correlation between Sn, As and Zn was noted in hardrock drainage anomalies - not present in areas of alluvial Sn accumulation. This could be an effective method of distinguishing hardrock and alluvial Sn sources.

Due to the strong geological control in the Scamander Licence the use of statistical methods in stream sediment followup was considered of little advantage.

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3.5 Research - Fluid Inclusions

Research into the fluid inclusion history of the Scamander Mineral Field continues. Gavin Plummer (La Trobe University, Melbourne) will complete this study for his MSc towards the end of 1984/beginning of 1985. Progress reports submitted by Gavin are enclosed in Appendix 6.

Several interesting conclusions have arisen from Gavins research.

a) Great Pyramid

Homogenization temperatures of quartz fluid inclusions in the NE trending mineralized fracture set on Pyramid Hill lie between 220°C and 350°C. Formation temperatures increase with depth. Cross-sections through the deposit indicate flat-lying to dome-shaped isotherms (Fig. 16). At depth the mineralized fracture set is topaz-bearing. Topaz is associated with homogenization temperatures greater than 300°C and is generally accompanied by a decrease in tin grade.

Horizontal tin grade boundaries were recognized during completion of the ore reserve estimate of the Great Pyramid prospect. The coincidence of flat-lying isotherms and tin grade cut offs implies a temperature control on tin deposition.

A plot of tin grade against homogenization temperature for quartz fluid inclusions on Pyramid Hill indicates high grade between 220°C and 260°C (Appendix 6 - Fig. 3). Experimental data indicates that in the absence of geochemical sinks SnO_2 is precipated from hydrothermal solutions in the 220° to 260°C range.

In a gross sense the Pyramid deposit has an elliptical or egg shape - defined by tin grade and superimposed on fracture/vein and bedding controls (Section 21). This 3rd shape reflects a major temperature (and pressure?) control on tin deposition. This is further bourne out by the fact that the plunge of each mineralized block at depth bares no relationship to the dip of the bedding, dip of the fractures or the plunge of the bedding/fracture intersection.

Higher temperatures of formation are given by quartz in the central NW trending fault zone on Pyramid Hill relative to the surrounding values. This probably reflects greater porosity/permeability allowing higher fluid flow and hence higher fluid inclusion temperatures during quartz formation. Sandstone and shale units also display this character with impermeable shale units inhibiting fluid flow and yielding lower formation temperatures than adjacent relatively porous sandstone beds. Since Great Pyramid deposit is hosted by a turbitite sequence of rapidly intercalated sandstones and shales fluid inclusion temperatures and tin grade are highly erratic.

The high porosity/permeability of the control fault zone has resulted in a later overprinting of sulphide-bearing lower temperature deposits on Pyramid Hill.

Freezing data indicate low salinities 10% NaCl equivalent in the mineralizing fluids. Two gas and one liquid phase suggest boiling during metal deposition. Several stages of fluid introduction are implied by zoned cassiterite crystals and a mineral zonation in fractures from muscovite, quartz, cassiterite to sulphides - decreasing temperature towards the centre of the fracture.

Pressure estimates can be made in hydrothermal systems if the salt content and homogenization temperature are known and evidence for secondary boiling exists. Preliminary work suggests that the Pyramid system formed at a shallow depth approximately 1km below the earth's surface. This figure is consistent with deductions made by Groves (1972).

b) Pinnacles

Two cross-cutting fracture/vein sets are recognized on the Pinnacles ridge:

1) quartz/sericite/cassiterite fracture-fills NE trending with homogenization temperatures of 170°C to 360°C and

2) quartz/tourmaline/cassiterite veins cross-cutting the early fractures trending NNE with temperatures of 280°C to 400°C in quartz.

The overprinting of tourmaline-rich higher temperature veins on pyramid-style fractures may indicate a position closer to source - closer to granite.

Petrological and freezing data indicate that the Pinnacles system is synchronous/identical to the Pyramid system.

c) Regional

More work is required on the regional aspects. However preliminary data indicate that the metal zonation of the Scamander Mineral Field is indeed related to hydrothermal fluid temperature.

4.0 PINNACLES PROSPECT

The Pinnacles ridge was gridded, soil sampled and geologically mapped (Ruxton, 1983 b). Drilling commenced in late 1983.

a) Reverse Circulation/Percussion Drilling

Twelve reverse circulation/percussion holes were drilled to test Sn-in-soil Anomaly A on the Pinnacles Grid (Plan D/LH01/526, Fig. 17). Severe problems were encountered during the inclined reverse circulation drilling resulting in all holes being completed with open hole hammering. Drilling results are summarized:

Hole No.	Co-ords.	Elevat.	Inclinat.	Azimuth	Total Depth
PPH 1	1346W 200S	288m	-60°	120°	120m
PRC 1	1433W 477S	204m	-60°	120°	98m
PRC 2	1766W 267S	159m	-60°	120°	120m
PRC 3	1654W 214S	193m	-60°	120°	120m
PRC 4	1615W 220S	214m	-60°	120°	120m
PRC 5	1505W 207S	272m	-60°	120°	120m
PRC 6	1440W 200S	298m	-60°	120°	120m
PRC 7	1349W 200S	288m	-60°	120°	50m
PPH 1	1346W 200S	288m	-60°	120°	121m
PRC 8	1268W 199S	280m	-60°	120°	120m
PRC 9	1191W 195S	263m	-60°	120°	120m
PRC 10	1596W 100S	182m	-60°	120°	120m
PRC 11	1769W 127S	324m	-60°	120°	120m

Samples were collected at 2m intervals and sent to Analabs, Burnie for assay Sn, WO_3, Mo, As, Bi (XRF), Cu, Pb, Zn, Ag (AAS).

Lithological cross-sections are shown in Plans D/LH01/603, 607,606,605, Sn geochemistry Plans D/LH10/604,607,606,605, WO_3 geochemistry Plan D/LH01/612, As geochemistry in Plans D/LH01/608,615,617,613, Pb geochemistry in Plans D/LH01/609,615,617,613 and Zn geochemistry in Plans D/LH01/610, 616,618,614.

Tin assay results were disappointing with average values well below 500ppm Sn, spothighs of upto 0.38% Sn over 2ms, with one zone in PPH1 of 20m (48m to 68m depth) at 0.08% Sn representing the best interval. A zone of slightly elevated Sn values between PRC 6, 7, PPH 1 and PRC 8 suggests a horizontal control on tin mineralization similar to the temperature control on Pyramid Hill (Plan D/LH01/604). Arsenopyrite and pyrite were common but tourmaline rare.

WO_3 values were low generally less than 20ppm, Mo values less than 10ppm and Ag less than 5ppm.

A nine hole angled fence from PRC 2 to PRC 9 effectively tested the Sn-in-soil zone A to a depth of 100m. Sn values are low thus downgrading the potential for near surface Pyramid-style mineralization on the Pinnacles Grid.

032

5.0 LOILA TIER PROSPECT

A 4.45km grid was placed over the Loila Tier Prospect using a theodolite and chain, compass and topolite. The grid was geologically mapped and rock chip sampled. One line of soil samples (-10# fraction, 25m spacing, assayed for Sn, WO_3, As, (XRF) Cu, Pb, Zn (AAS)) - line 1500E - was collected. Tin values all fell below 85ppm in soils with selected rock chips recording upto 3.95% Sn, 0.1% Cu, 8% Pb and 3.9% As.

Geological data is presented on Plans D/LHO2/540 and 539 and geochemical information on Plan D/LHO2/544.

The grid is entirely Mathinna Bed covered with siltstones and shales dominant. Bedding strikes NNW with tight, gently SE plunging folds recorded. Shales are intensely spotted and cleaved. Minor silicified sandstones occur. Two alteration zones are outlined consisting of silicified sediment with ubiquitous gossanous staining, quartz/tourmaline veins generally trend WSW-ENE with fractures in WSW and NNE directions (Plans D/LHO2/540,539).

The Loila Tier prospect lies on a WSW-ENE trending fault and related fractures which contain quartz/tourmaline and minor cassiterite material. It is located within the western portion of the Flagstaff Anomaly.

6.0 GEOLOGICAL MODEL

Regional data compilation has led to the construction of a geological model to explain the varied mineral prospects of the Scamander Mineral Field and the regional metal zonation. The model postulates shallow subsurface granite of the Mt. Pierson/Constable Creek Sheet-type beneath the central portion of the licence. Mineral prospects lie within regional structural features (faults-fractures) and suggest leakage of hydrothermal fluids from an underlying granitic source. The metal zonation from the NW - WO_3-Mo, Sn, Cu, Pb/Zn/Ag, Au-to the SE suggests a decrease in formation temperature (to the SE) and implies a corresponding increase in granite depth.

The model is directly supported by fluid inclusion measurements which indicate a decrease in temperature associated with metal zonation and a shallow (10° to 20°) dip on the Constable Creek granite sheet in the Wolfram Creek area.

Indirectly several other more subtle lines of evidence support this hypothesis. These include stream sediment base metal leakage zones, metamorphic spotting and silicification of the Mathinna Beds, minor granite and granitic dyke outcrops, the location of most mineral prospects, lineament density and ENE trending features and the distribution of aeromagnetic anomalies. Compilation of this data has led to the definition of an area of shallow sub-surface differentiated granite (Fig. 18). The Pinnacles - North Scamander granite ridge is superimposed on this shallow sub-surface granite structure. Granite mapping is the Wolfram Creek area (Section 3.1.1) suggests that the most fractionated granites of the Scamander area are associated with this ridge structure. Consequently the Pinnacles - North Scamander ridge is the most prospective area for Sn mineralization.

The next section outlines the geological evidence for shallow sub-surface granite in more detail.

1) Shallow Fractionated Granite in the Flagstaff Creek area is suggested by:

   a) outcropping granite - Loila Tier granite and the Echo granite plus pegmatite/aplite dykes in the Flagstaff Creek (Figs. 19 & 20, Plan D/LHO2/527),

   b) intense spotting of shales and promenant silicified ridge structures suggest contact metamorphism and hydrothermal fluid leakage.
   Spotting and silicified ridge structures occur in the Orieco/North Scamander areas also.

   c) the density of lineaments and ENE lineament features which are associated with the intrusion of the Mt. Pierson Pluton and fractionated roof contact phases (Plan D/LH 02/525, Fig. 11) (Section 3.2), ENE lineaments also extend into the Orieco/Dunns/North Scamander/Pyramid areas and are not restricted to the Flagstaff Anomaly area.

2) Major leakage of hydrothermal fluids from subsurface fractionated granite into the overlying Mathinna Bed sediments is suggested by,

   a) all but two of the prospects in the Scamander Mineral Field fall within the suggested shallow subsurface granite zone (Fig. 18). Prospect evaluation defines mineralization related to regional structures (i.e. NE fractures on Pyramid Hill, NW trending faults Orieco, N. Scamander, Dunns etc.) (Section 3.3). Structural features

form preferential zones of hydrothermal leakage in the Mathinna Beds and Scamander Tier dyke.

b) ubiquitous gossanous staining in the rocks between the Flagstaff Anomaly, Cramps, Dunns, Paul Beahrs and Pinnacles prospects.

c) the location of base metal stream anomalies (particularly Zn and As - also Cu and Pb) associated with this zone of intense gossanous staining (Section 3.4).

3) Distribution of aeromagnetic anomalies

Aeromagnetic trends in the Scamander licence are related to three main sources: (see Fig. 21),

a) Devonian dolerite/diorite dykes trending NE,

b) massive magnetite/pyrrhotite fault-style mineralization (e.g. North Scamander),

c) disseminated magnetite in the Mathinna Bed sediments related to silicification during the introduction of hydrothermal fluids - part of the contact metamorphic episode related to the intrusion of the Mt. Pierson Pluton and associated contact phases.

The only anomaly type of possible economic significance is the North scamander fault-related type. Metal values at North Scamander reach in excess of 10% Zn, 6% Pb and 1% Sn. Grades are however patchy and tonnage severely limited. Similar style deposits are not considered prospective due to restricted tonnage potential.

Type c) anomalies are spacially related to the shallow area of subsurface granite (Fig. 21). Petrological investigations on Pyramid Hill suggest fine grained magnetite associated with pervasive sandstone/ sediment silicification. In fact metallurgical test-work defines a magnetic separation necessary to remove magnetite (Appendix 1). Irregular veinlets of magnetite/chlorite/sphalerite/trace cassiterite were located in the deephole SGP 1A on Pyramid Hill (magnetic susceptibilities of upto 90,000 x 10^{-5} cgs units). These veins crosscut the main mineralized fracture set and appear later than the main tin mineralization event. This evidence is supported by the fault-related nature of the North Scamander mineralization which overprints fine fracture/stringer cassiterite/quartz/carbonate deposits.

Aeromagnetic anomalies in the Yarmouth prospect/ Scamander area are hitherto unexplained. The NE trends on magnetic high (Fig. 21) in this area suggest a diorite/dolerite source. The NNW trend is probably related to fine grained magnetite in Mathinna Bed sediments.

7.0 CONCLUSIONS & RECOMMENDATIONS

Emphasis during 1983 and 1984 has been placed on regional studies to define geological controls and the potential for further mineralization in the Scamander Licence.

A model tying together the various aspects of the Scamander Mineral Field has been defined. This work has outlined the Pinnacles - North Scamander ridge structure as the most prospective portion of the E.L. for tin mineralization.

Regional stream sediment work has located the Flagstaff Anomaly for further detailed study. Several low priority anomalies remain to be discounted.

The Great Pyramid deposit has been redefined with a comprehensive geologically based ore reserve estimate made and metallurgical parameters re-evaluated. Further work will involve the definition of grade reliability (probably involving bulk sampling) and the delineation of the deposit envelope to determine a reliable tonnage figure.

Drilling on the Pinnacles prospect grid failed to locate surface cassiterite mineralization of the Great Pyramid type. Deep drilling is warranted to determine potential at depth.

Regional evidence suggests that the Loila Tier prospect is underlain by shallow granite ($\bar{+}$ 100m). Despite the lack of encouragement from soil sampling a short hole would be beneficial to test and geologically define this mineralization-style.

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REFERENCES

CRAIGIE, R.C., (1983). Great Pyramid Tin Prospect. (1) Statistical study of drillhole data (2) Estimation of Ore Reserves. Unpubl. Shell Co. of Aust. Rep. Jan, 1983.

GROVES, D.I., (1972). The Zoned Mineral Deposits of the Scamander - St. Helens District. Tas. Dept. of Mines. Geol. Surv. Bull. 53.

GROVES, D.I., COCKER, J.D. & JENNINGS, D.J. (1977). The Blue Tier Batholith. Tas. Dept. Mines Geol. Surv. Bull. 55.

HINE, R. (1980). Progress report on exploration of E.L. 12/78, Scamander, Tasmania - between 15th Sept. 1979 and 15th Mar. 1980. Unpubl. Rep. BHP Co.

HINE, R. (1981). North Scamander prospect. Report on drilling - July to September, 1980. Unpubl. BHP Co. Rep.

HINE, R. & GOODE, A.D.T (1980). Specification for exploration of the Great Pyramid Mine E.L. 10/80, North East Tasmania. Unpubl. BHP Rep. May 1980.

RUXTON, P.A. (1983a). Progress Report on Exploration of E.L. 10/80, Great Pyramid 3/8/82 to 1/9/83. Unpubl. Shell Rep. No. 08.2065.

RUXTON, P.A. (1983b). Progress report on Exploration of E.L. 12/78, Scamander 3/8/82 to 1/9/83. Unpubl. Shell Rep. No. 08.2067.

STEELE, D. (1981). Exploration licence 10/80, Great Pyramid, Tasmania Progress Report on Exploration to 21st July, 1981 including report for the six months ended 21st July, 1981. Unpubl. BHP Co. Rep.

STEELE, D. (1981). Progress report on exploration for the six months ending 15th Sept. 1981. Unpubl. BHP Co. Rep. E.L. 12/78.

STEELE, D. (1982). Exploration Licence 10/80 Great Pyramid, Tasmania. Report on Exploration from the six months ended 21st Jan. 1982. Unpubl. BHP Co. Rep.

STEELE, D. (1982). Progress report on exploration for the six months ending 15th Mar. 1982. Unpubl. BHP Co. Rep. E.L. 12/78.

STEELE, D. & HINE, R. (1981). Report on the 1980-1981 First phase drilling programme, Great Pyramid Prospect, E.L. 10/80 Tasmania. Unpubl. BHP Rep. Oct. 1981.

TAYLOR, C.P. (1964). Ground magnetic survey of the Great Pyramid tin prospect, Tasmania. Unpubl. BHP Co. Rep. Aug. 1964.

RANSON, D. (1980). Notes on the Great Pyramid Tin Prospect, Scamander, Tasmania. Prepared for the BHP Co. Ltd. BHP Co. Unpubl. Rep. Sept. 1980.

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TABLE 1

SUMMARY OF WORK COMPLETED (1/9/83 - 1/8/84)

SCAMANDER E.L. 12/78

Great Pyramid Deposit

1. Manual Geological Ore Reserve Estimate - defining a tonnage of 3.2mt at 0.22% Sn with 2.6 mt of potential but untested ground. High grade zone of 400,000t at 0.42% Sn in South Block.

2. Metallurgical testing on 2 tonne bulk sample.

3. Drilled a deep hole beneath Pyramid Hill - SPG 1A.

4. Refined geological model.

Regional

5. Geological mapping/structural analysis - geological synthesis.

6. Lineament study - from aerial photographs.

7. Prospect Evaluation - all prospects were visited and geologically defined.

8. The regional stream sediment survey was completed and followed up. The major success of this survey was the definition of the Flagstaff Anomaly.

9. Fluid Inclusion Research by Gavin Plummer LaTrobe University progressed.

10. 11 reverse circulation/percussion holes were drilled on the Pinnacles Prospect.

11. The Loila Tier Prospect was gridded, geologically mapped with one line of soil samples.

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TABLE 2

Vertical Zonation in the Wolfram Creek Granite - Chronology

1. Crystallization of the granite
   (quartz, feldspars (2), biotite ± muscovite(?))
   - fine grained contact phases
   - voids/pockets of gas due to 2° boiling in the magma
   - recrystallization/hornfelsing of the Mathinna sediments

2. Filling of large voids in roof zone of the granite with K-feldspar and quartz - pegmatitic development.
   - many voids only partially filled.

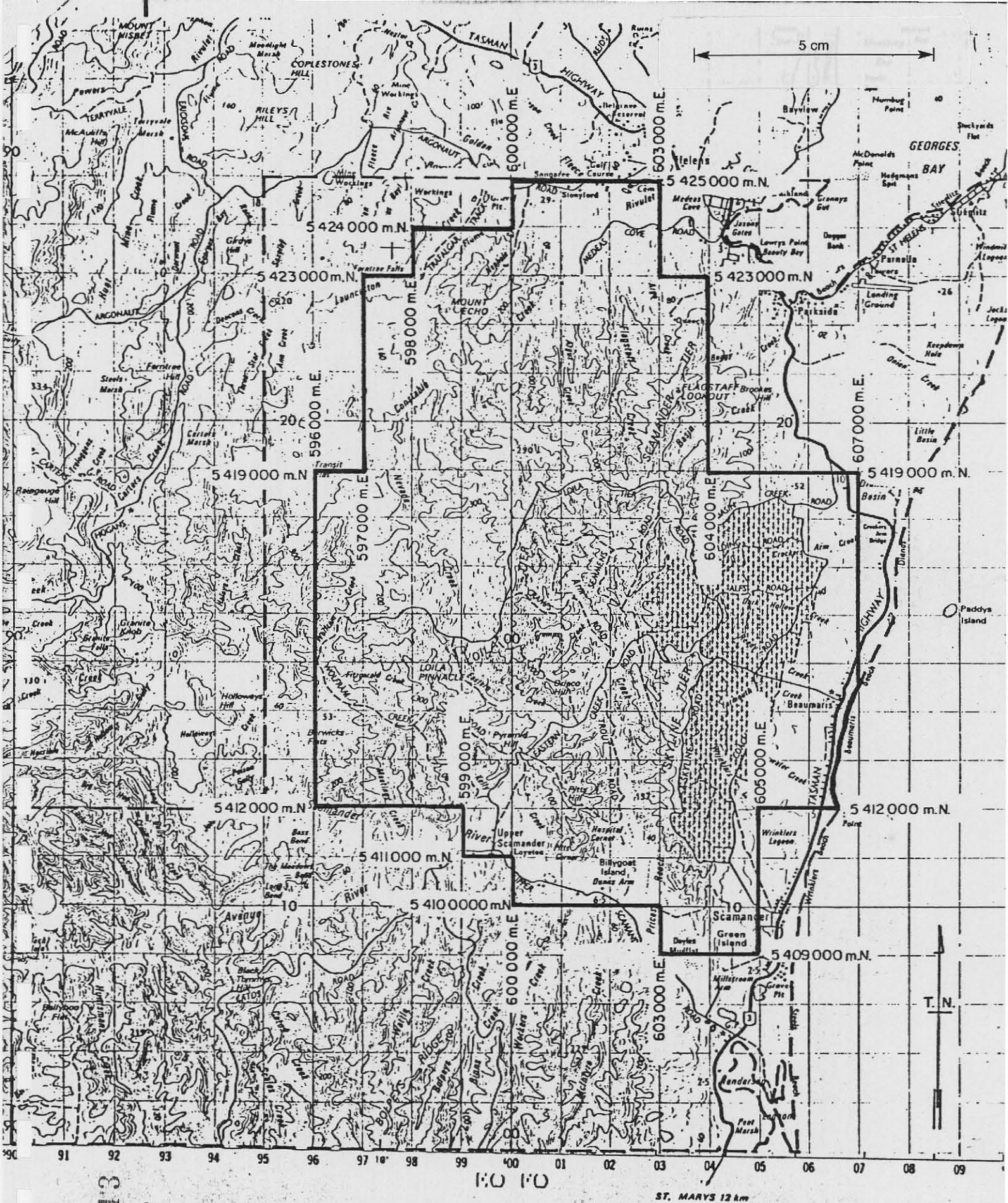
3. Formation of interstitial muscovite and tourmaline.
   - tourmaline involved in pegmatitic growth in miarolitic cavities (muscovite involved in this phase away from the granite culmination)
   - interstitial euhedral tourmaline crystals (stage 1?)
   - development of muscovite both throughout the granite and later along joints/fractures in the roof zone of the granite
   - development (patchy) of fluorite in the very roof of the granite ridge only
   - chloritization of biotites
   - muscovitization of biotites (continues from stage 1?)

4. Cross-cutting quartz veins in granite joints and fractures
   - quartz, sulphide plus fluorite E-W
   - related development of greisen veins - muscovite/sericite development along joints/fractures.

TABLE 3

SCAMANDER STREAM SEDIMENT ANOMALIES

		No. of Samples
4	LAUNCESTON (ALLUVIAL) ANOMALIES (Sources - alluvial tin - minor contact granite)	38
5	MT. ECHO ANOMALIES (Sources - Silver Echo Prospect - hardrock unknown)	8
6	ST. HELENS ANOMALIES (Source - Alluvial Sn)	2
2	FLAGSTAFF ANOMALIES (Source - hardrock unknown Sn + base metals)	35
8	NEVADA CREEK ANOMALIES (Source - Alluvial?)	2
7	ARM CREEK ANOMALIES (Source - Alluvial Sn)	8
9	WOLFRAM CREEK ANOMALIES (Sources - Prospects - contact granite - alluvial Sn - unknown hardrock)	16
1	PYRAMID - N. SCAMANDER ANOMALIES (Sources - prospects - minor alluvial Sn - Orieco ridge unknown)	23
3	UPPER SCAMANDER ANOMALIES (Source - Alluvial Sn)	3
10	SKYLINE TIER ANOMALIES (Source - Alluvial Sn)	4
11	AVENUE RIVER ANOMALY (Source - Alluvial Sn)	1
12	BARK CREEK ANOMALY (Source - Alluvial? undefined)	1
	TOTAL ANOMALOUS SAMPLES	141



Original licence boundary

Area to be retained (125km.)

1:100,000

0 2 4 6 km.

This map is a photo-copy of part of Georges Bay 1:100,000 topographic sheet

Fig. 1

Centre	THE BROKEN HILL PROPRIETARY CO. LTD.	Project No
Melbourne	E.L. 12/78-SCAMANDER, TAS.	9-T610-8
Date	APPLICATION FOR REDUCTION OF E.L.	Drawing No
June 84		A4-2463

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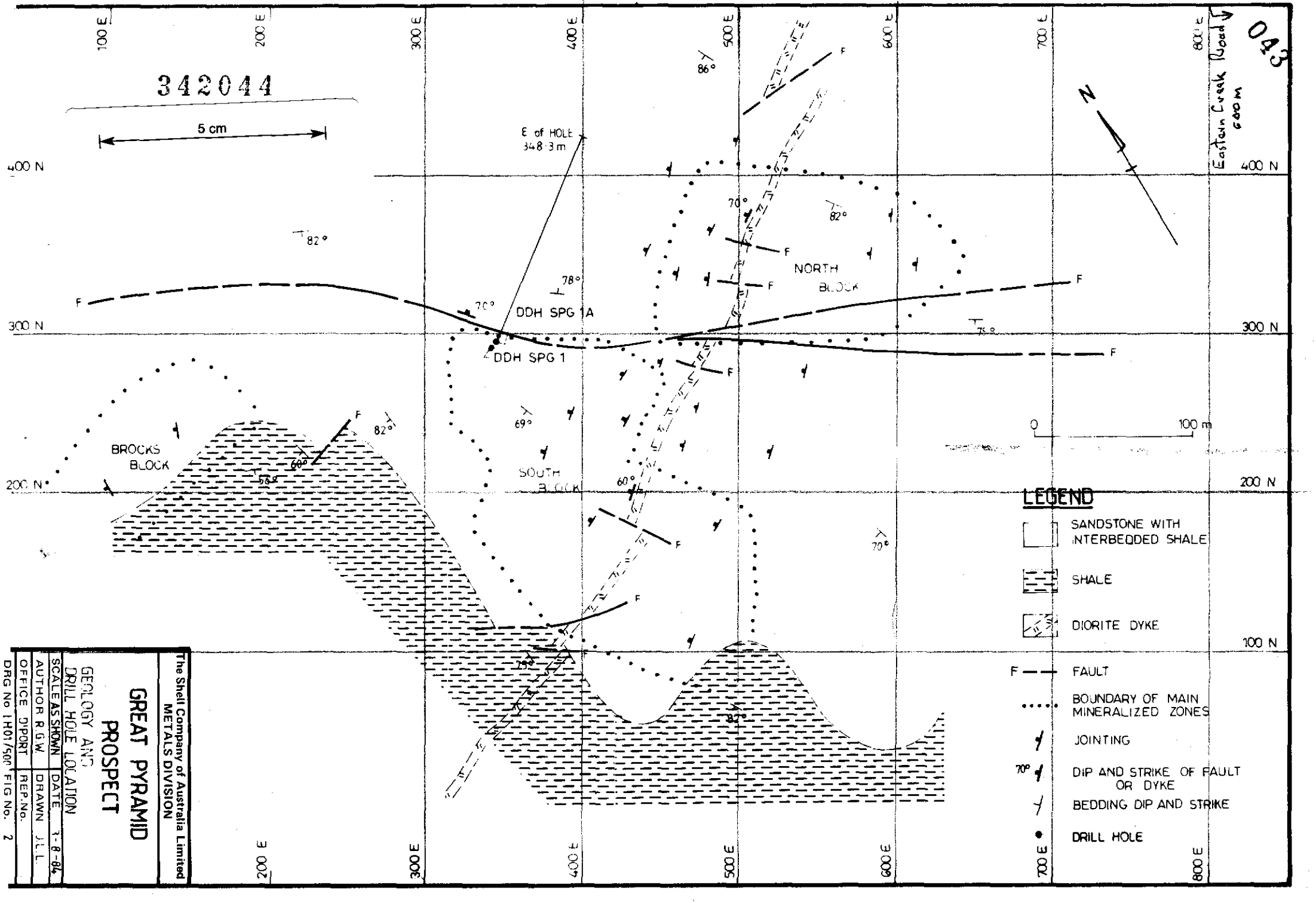
342044
5 cm
043
Eastern Creek Road
600m
E of HOLE
348·3m
DDH SPG 1A
DDH SPG 1
NORTH
BLOCK
SOUTH
BLOCK
BROCKS
BLOCK
0
100 m
100 E
200 E
300 E
400 E
500 E
600 E
700 E
800 E
400 N
300 N
200 N
100 N
LEGEND
SANDSTONE WITH INTERBEDDED SHALE
SHALE
DIORITE DYKE
FAULT
BOUNDARY OF MAIN MINERALIZED ZONES
JOINTING
DIP AND STRIKE OF FAULT OR DYKE
BEDDING DIP AND STRIKE
DRILL HOLE
GREAT PYRAMID
PROSPECT
GEOLOGY AND
DRILL HOLE LOCATION
The Shell Company of Australia Limited
METALS DIVISION
SCALE AS SHOWN
DATE 3-8-84
AUTHOR R.G.W.
DRAWN J.L.L.
OFFICE DPORT
REP.No.
DRG No. 1H01/500
FIG No. 2

S.W.

PYRAMID HILL

N.E.
(054°)

SPG 1A

210 –
200 –
190 –
180 –
170 –

f

20 m

30m

10m @
0·24% Sn

60m

?
f

100 m

sp SP
135 m

sp

sp

sp

sp

sp

sp

sp SP

sp

175 m

sp

sp

sp SP

sp

225 m

Bed

236·7 m

sp

sp SP

SP

sp

SP

275m SP

Veins over
40° to C A

42·9 m @
0·24% Sn

279·6 m

sp

sp

SP

SP

sp

322m

Sediments

348·3 m
E. of H

140 m

Mathinna

E ADIT DUMP

3 NLL ADIT

KEY.

sp *Minor spotting*

SP *Major Spotting*

Magnetite
Fluorite
Mo
WO3
Gal.
Sph
Sn

5 cm

23-9-83

The Shell Company of Australia Limited
METALS DIVISION

E.L. 10/80 GREAT PYRAMID
SPG 1A
GEOLOGY

SCALE	1 100
AUTHOR	PA R
OFFICE	DEVONPORT
DRG.No.	D/LH01/547
DATE	3-8-84
DRAWN	J.L.L
REP.No.	
FIG.No.	3

3420/5

04A

045

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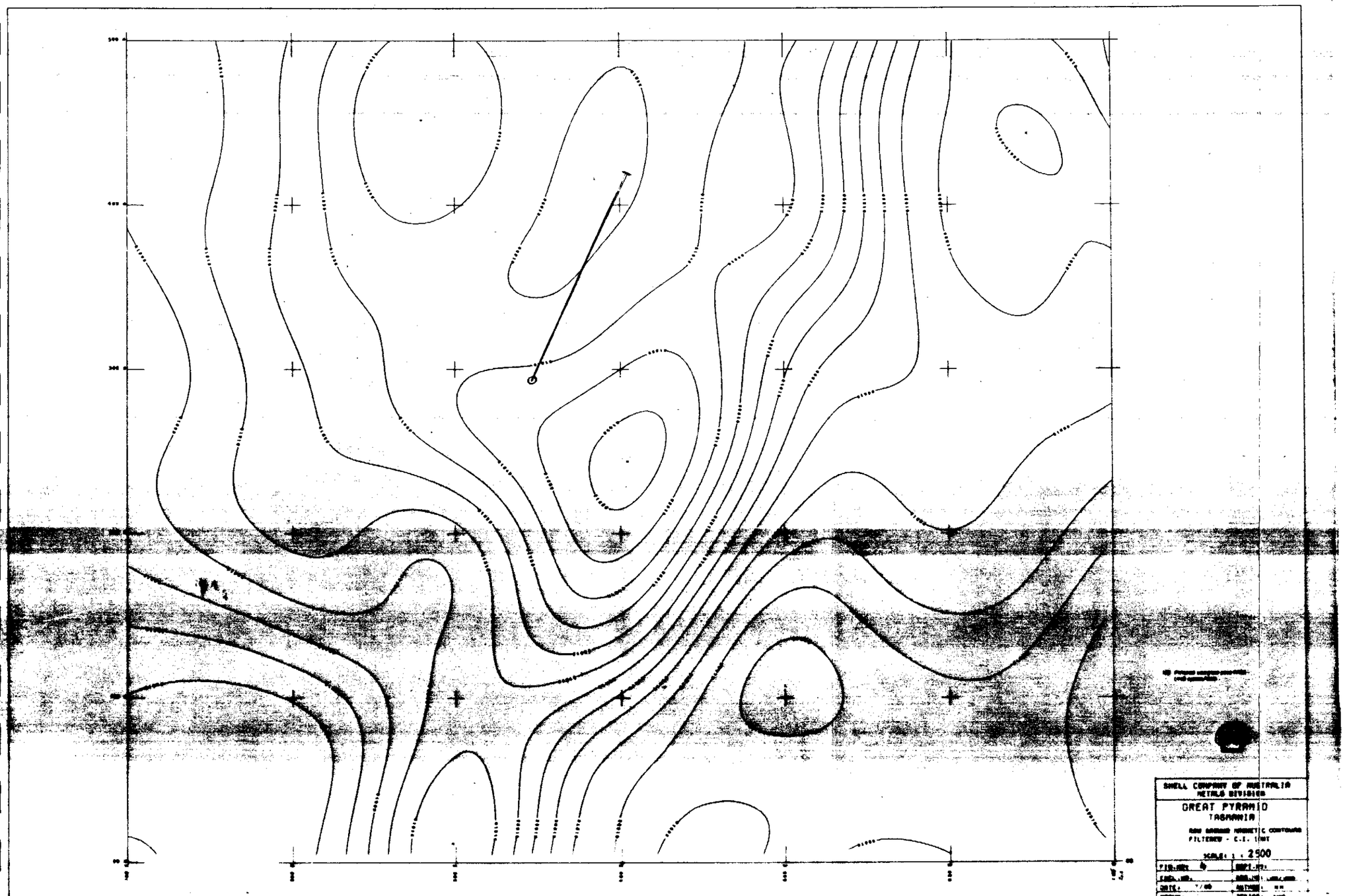
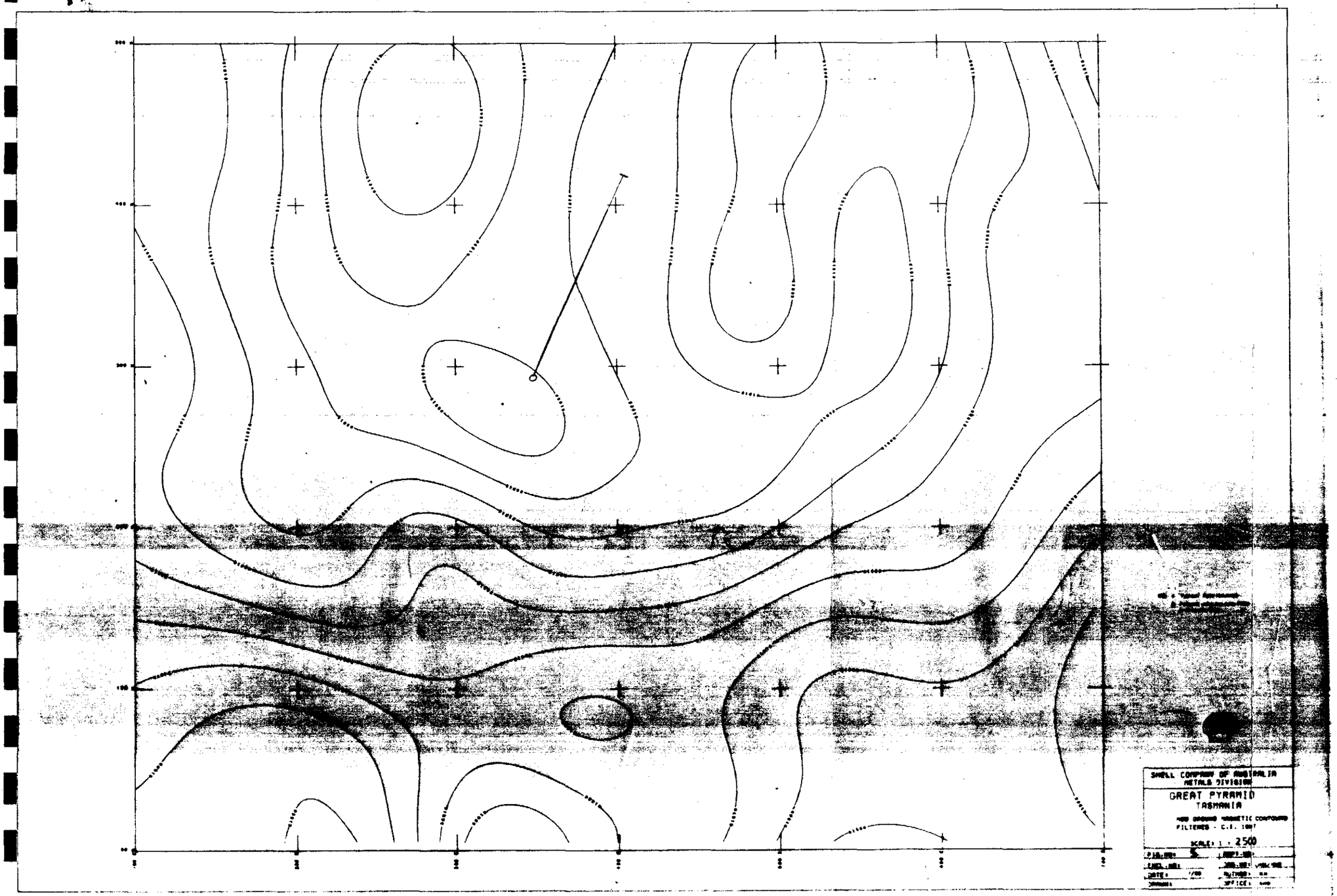


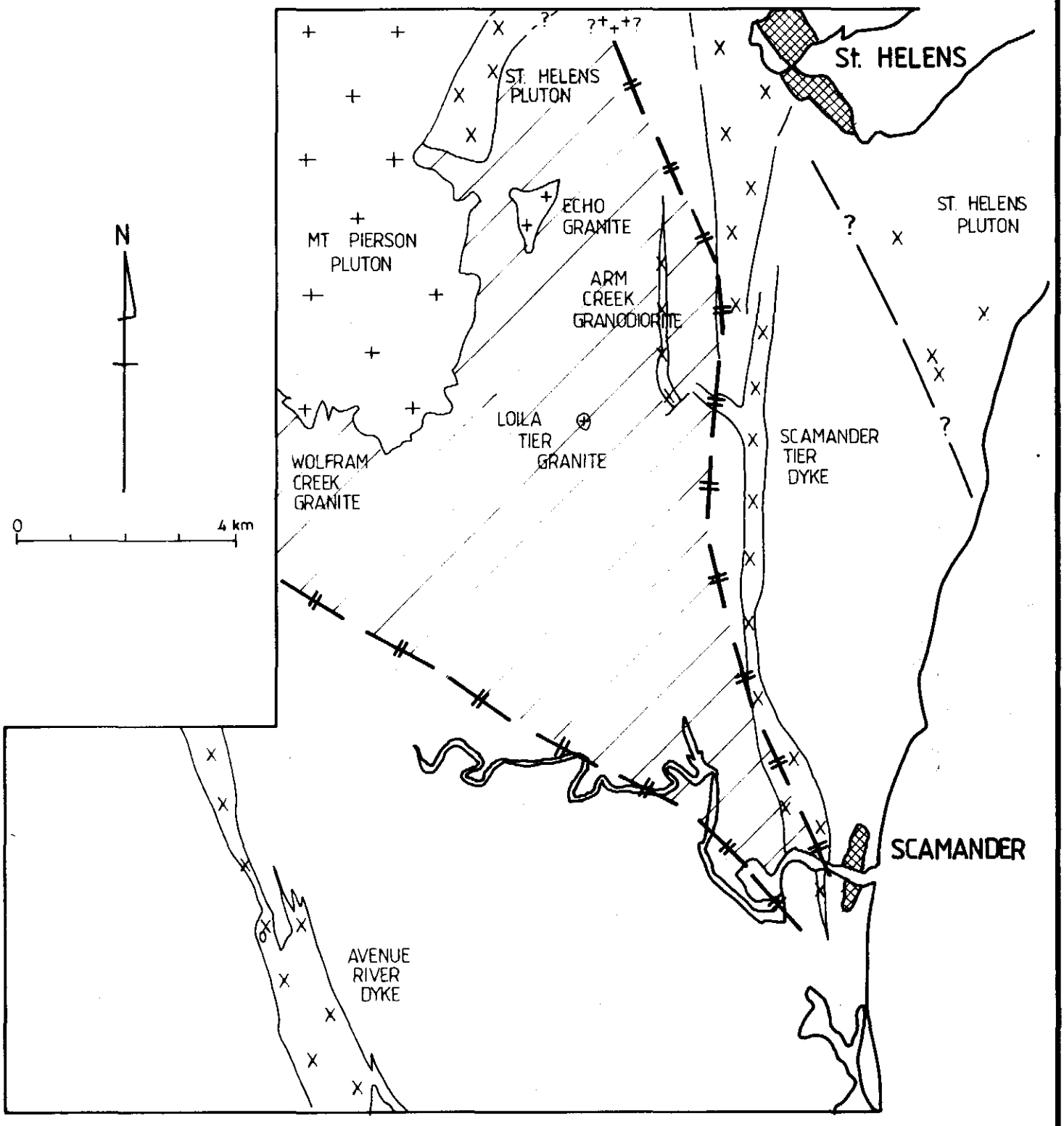
5 cm

046


SHELL COMPANY OF AUSTRALIA
METALS DIVISION
GREAT PYRAMID
TASMANIA
FILTERED - C.I. 1997
SCALE: 1 : 2500
5 cm

047

342048



LEGEND

- GRANODIORITE
- GRANITE
- AREA OF SHALLOW BIOTITE GRANITE

5 cm

The Shell Company of Australia Limited
METALS DIVISION

E.L. 12/78 SCAMANDER

OUTCROPPING GRANITE AND PREDICTED SHALLOW BIOTITE GRANITE

SCALE 1:100 000	DATE 30-7-84
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE D'PORT	REP.No.
DRG No D/LH02/555	FIG No 6

342049 048

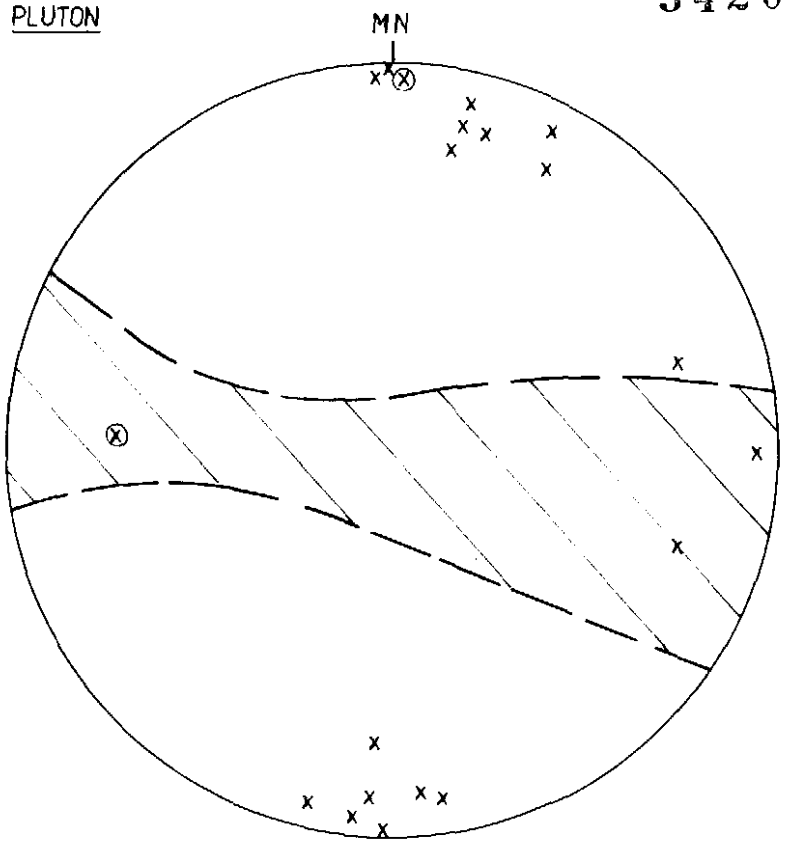
WOLFRAM CREEK GRANITE
MARGINAL MT. PIERSON PLUTON
LOILA TIER GRID

27/3/84

x greisen veins
quartz / sulphide veins
quartz veins

(x) granite dykes

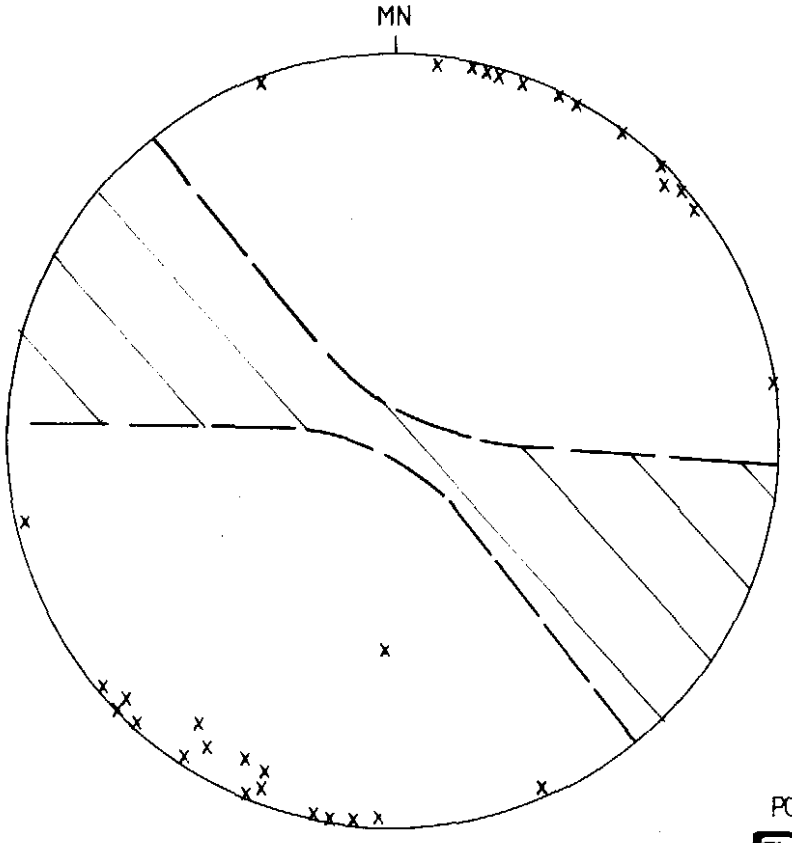
x n = 17
(x) n = 2



ECHO PROSPECT
LODE VEINS IN GRANITE

x n = 17

24/10/83
(Appendix)



POLES TO VEINS / DYKES

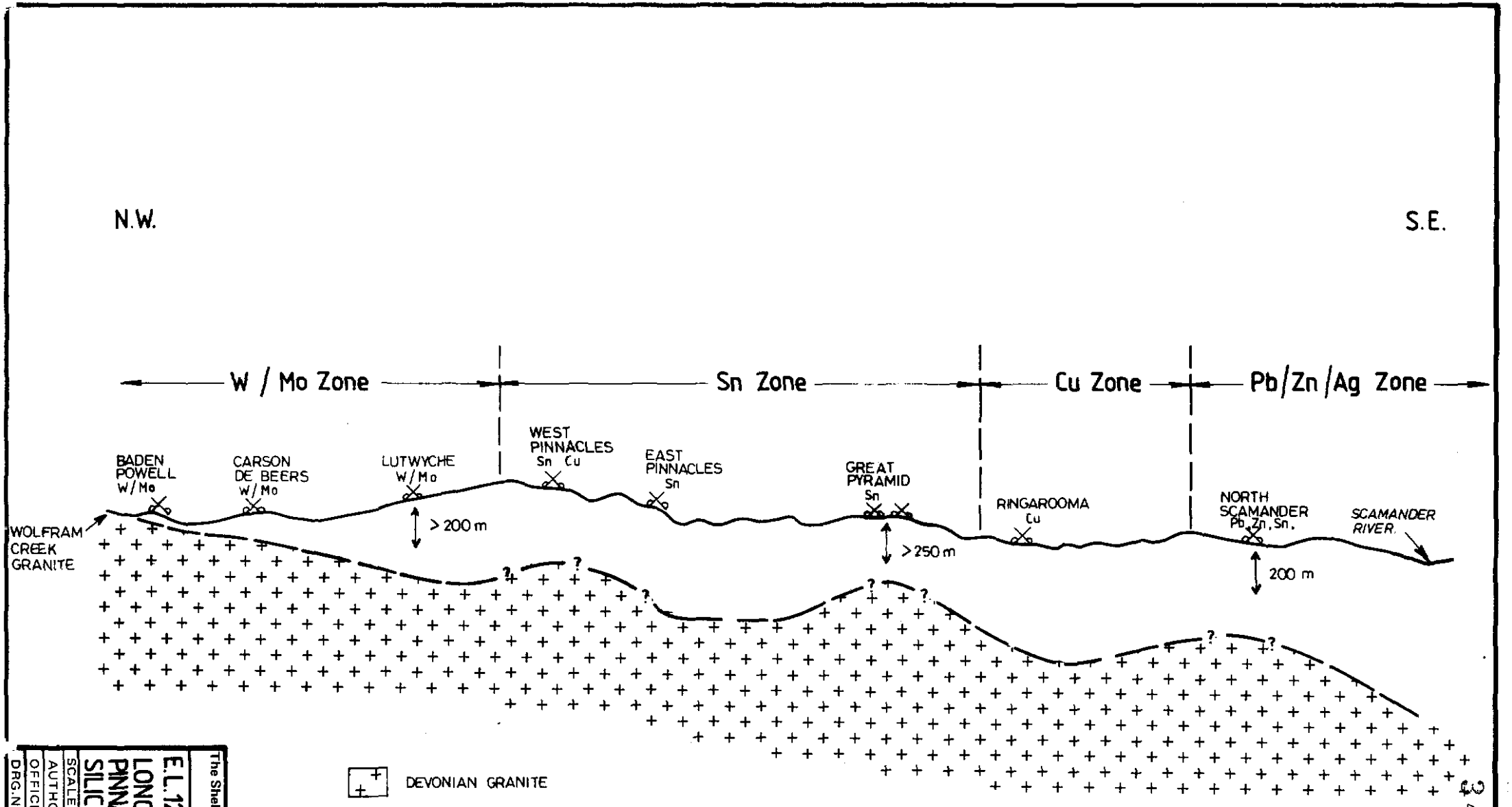
5 cm

LAMBERT EQUAL AREA NET

The Shell Company of Australia Limited
METALS DIVISION

E.L. 12/78 SCAMANDER
STERONETS
GRANITE HOSTED
GREISEN / QUARTZ VEINS

SCALE	DATE 30-7-84
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE D'PORT	REP.No.
DRG No D/LH02/559	FIG No 7



The Shell Company of Australia Limited
METALS DIVISION

E.L. 12/78 SCAMANDER
LONG. SECTION –
PINNACLES - N. SCAMANDER
SILICIFIED RIDGE

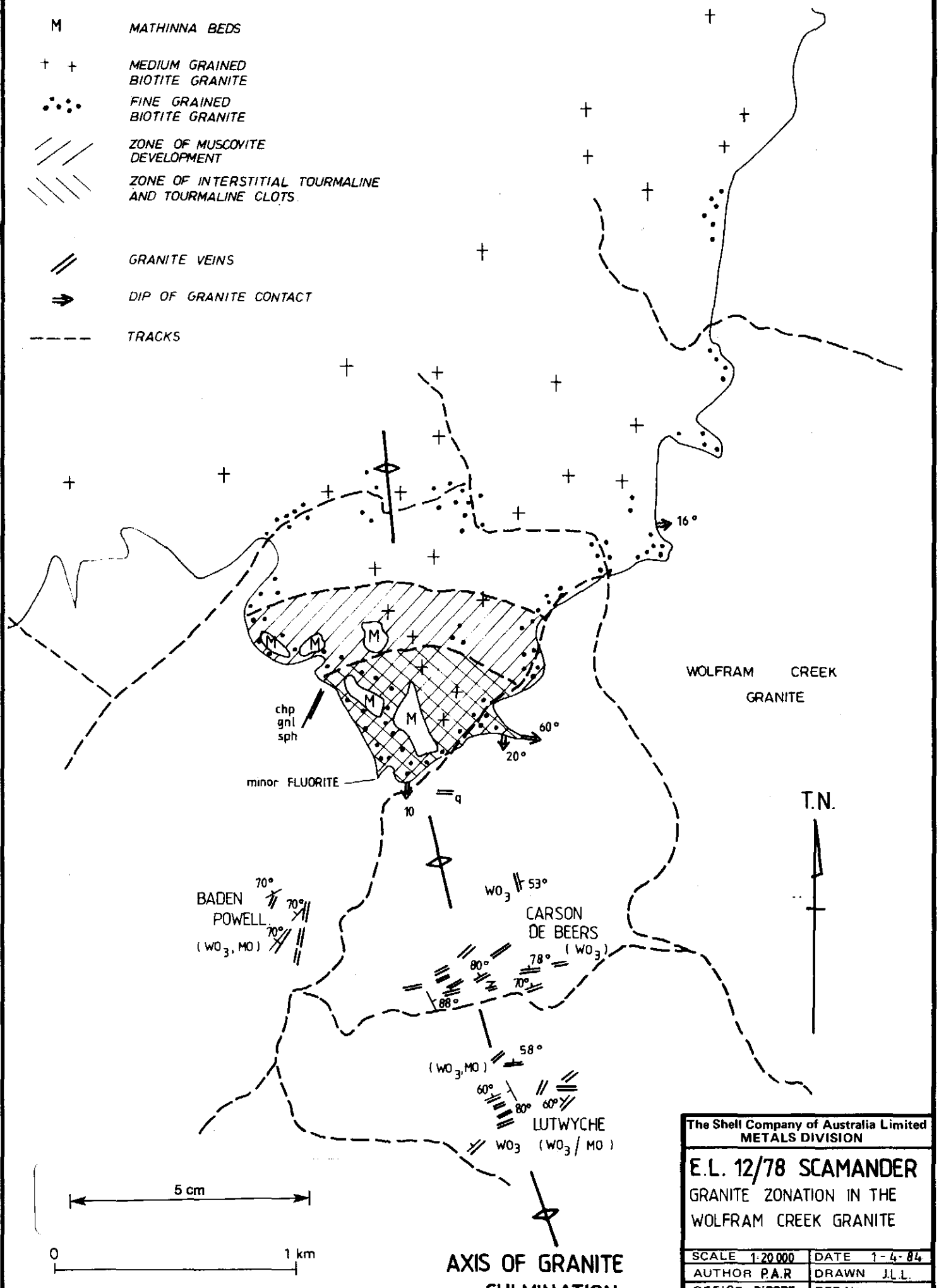
SCALE AS SHOWN	DATE 13-4-83
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE D'PORT	REP. No.
DRG. No. LH02/501	FIG. No. 8

342050 049

342051 050

LEGEND

- M — MATHINNA BEDS
- + + — MEDIUM GRAINED BIOTITE GRANITE
- FINE GRAINED BIOTITE GRANITE
- ZONE OF MUSCOVITE DEVELOPMENT
- ZONE OF INTERSTITIAL TOURMALINE AND TOURMALINE CLOTS
- GRANITE VEINS
- DIP OF GRANITE CONTACT
- TRACKS

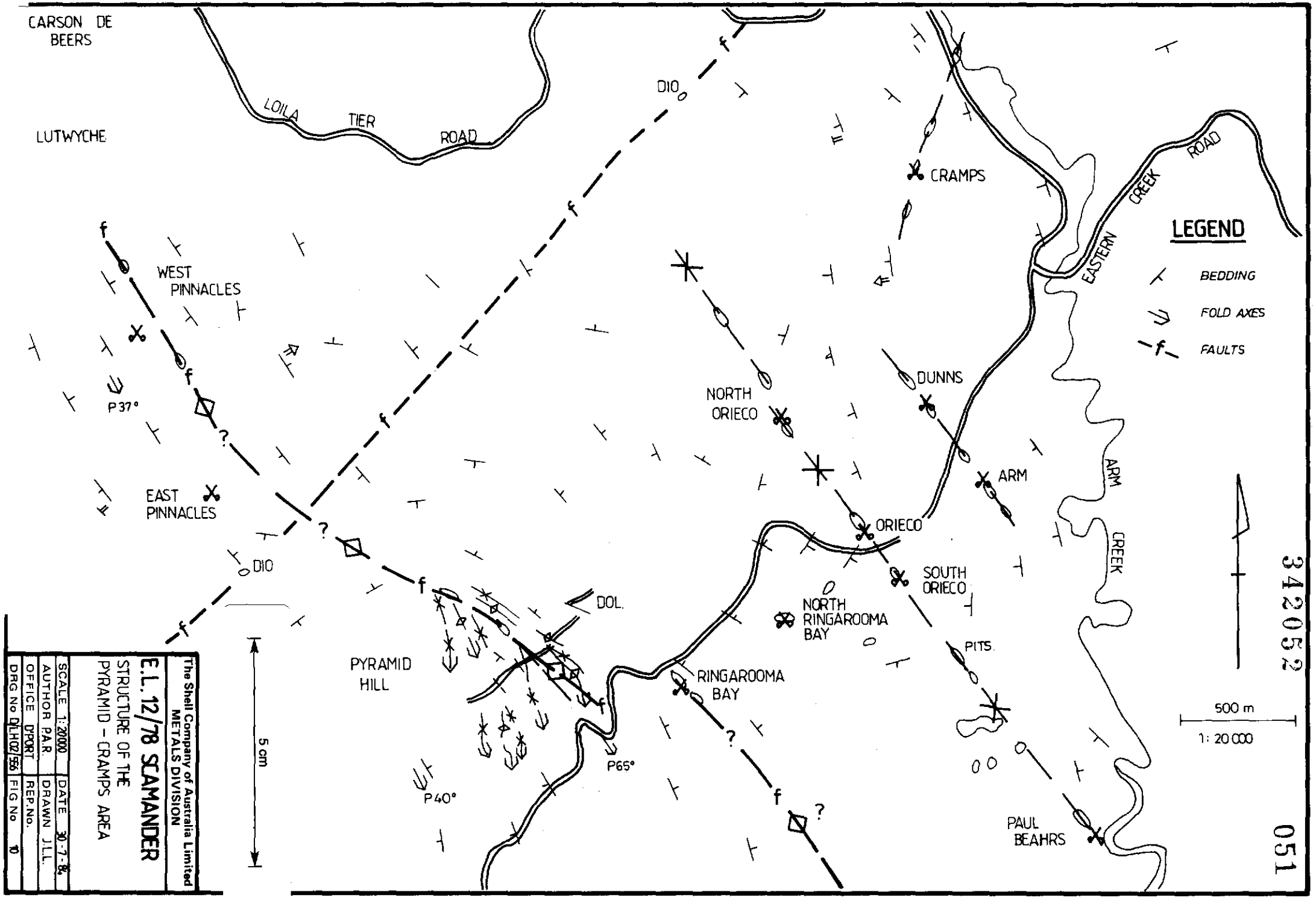


The Shell Company of Australia Limited
METALS DIVISION

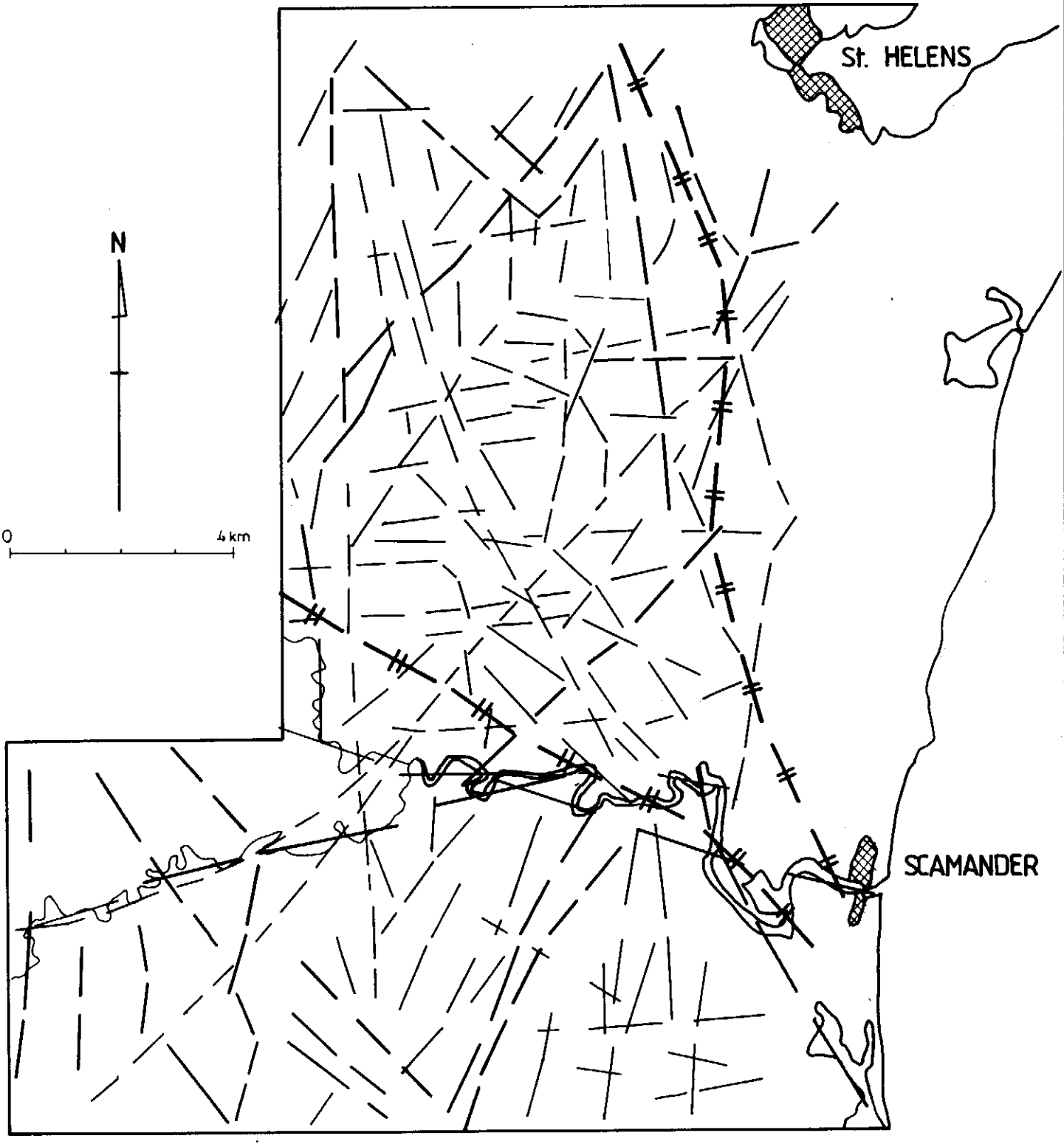
E.L. 12/78 SCAMANDER

GRANITE ZONATION IN THE WOLFRAM CREEK GRANITE

SCALE 1:20 000	DATE 1-4-84
AUTHOR P.A.R	DRAWN J.L.L.
OFFICE D'PORT	REP.No.
DRG No D/LH02/543	FIG No 9


CARSON DE BEERS
LUTWYCHE
LOILA TIER ROAD
DIO
WEST PINNACLES
P37°
EAST PINNACLES
DIO
PYRAMID HILL
DOL.
P40°
P65°
NORTH ORIECO
CRAMPS
DUNNS
ARM
ORIECO
SOUTH ORIECO
NORTH RINGAROOMA BAY
RINGAROOMA BAY
PITS.
PAUL BEAHRS
EASTERN CREEK ROAD
ARM CREEK
LEGEND
BEDDING
FOLD AXES
FAULTS
500 m
1: 20 000
5 cm
342052
051
E.L. 12/78 SCAMANDER
STRUCTURE OF THE PYRAMID - CRAMPS AREA
The Shell Company of Australia Limited
METALS DIVISION
SCALE 1: 20000
DATE 30-7-86
AUTHOR P.A.R.
DRAWN J.L.L.
OFFICE DPORT
REP.No.
DRG No DLH02/156
FIG No 10

342053 052



LEGEND

LINEAMENTS

INFERED ZONE OF SHALLOW STANNIFEROUS GRANITE

5 cm

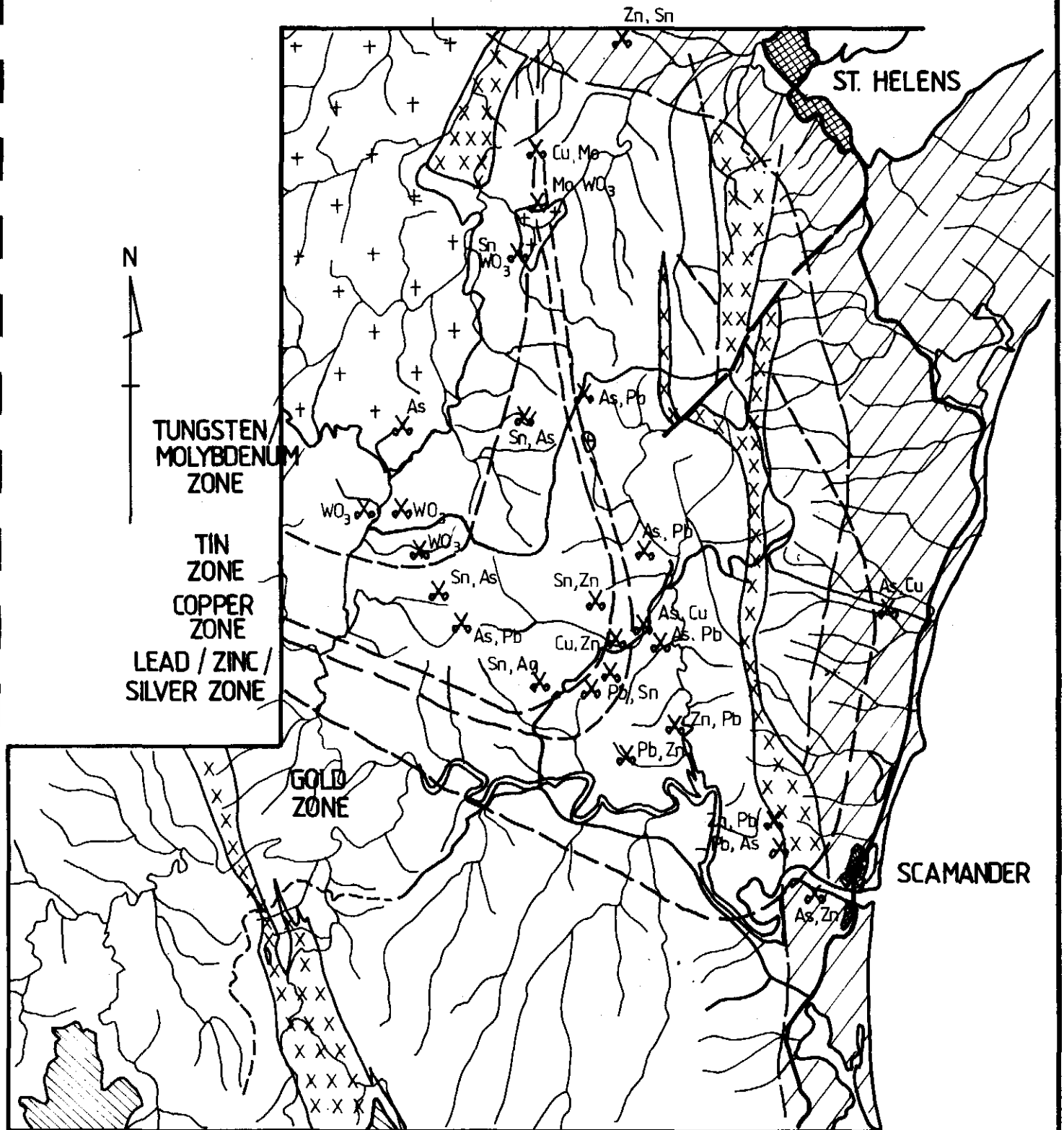
The Shell Company of Australia Limited
METALS DIVISION

E.L. 12/78 SCAMANDER LINEAMENTS

SUMMARY

SCALE 1:100000	DATE 20-7-84
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE	REP.No.
DRG No D/LH02/554	FIG No 11

342054 053



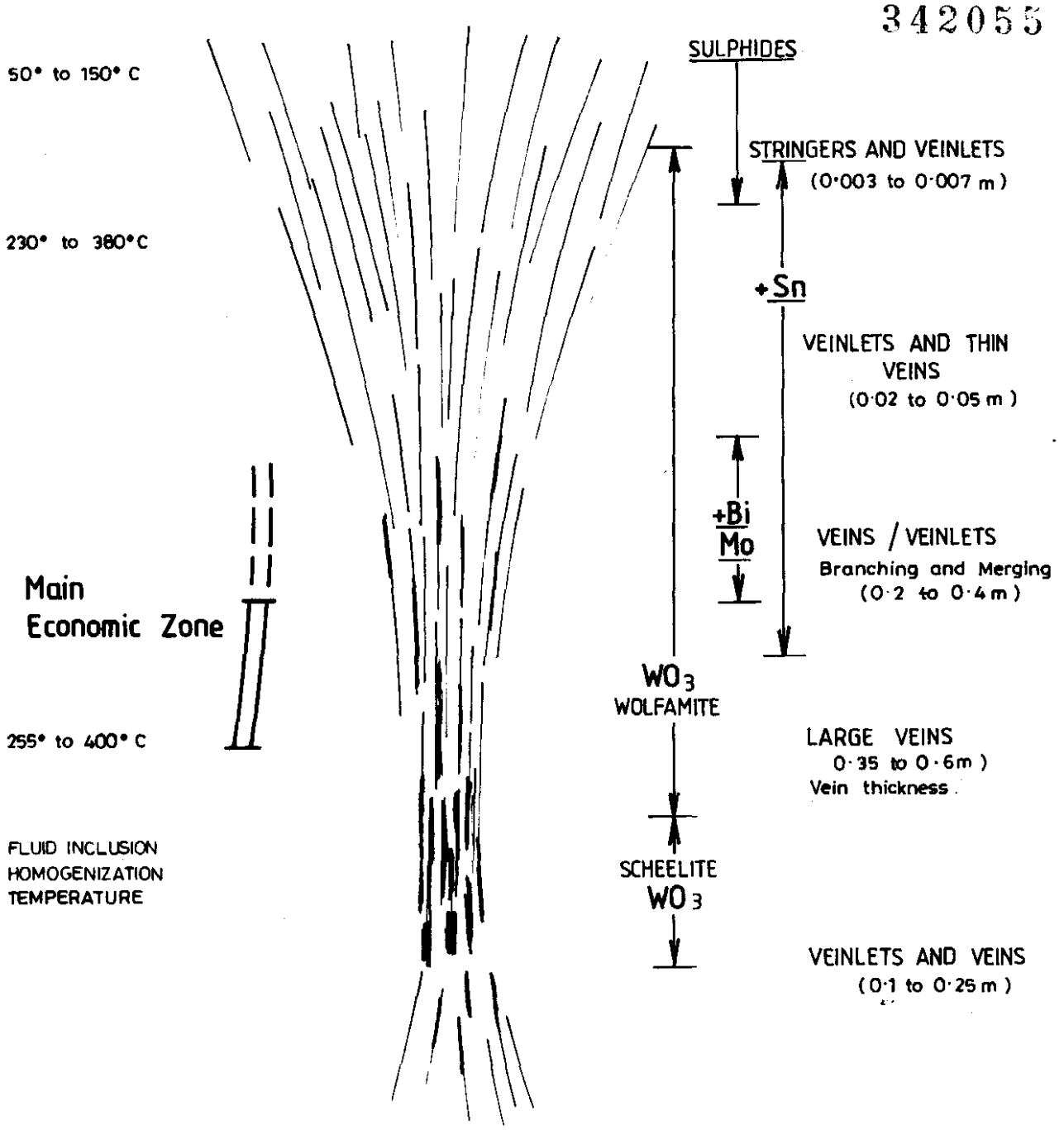
The Shell Company of Australia Limited
METALS DIVISION

E.L. 12/78 SCAMANDER

METAL ZONATION

SCALE 1: 100 000	DATE 3-8-84
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE D'PORT	REP. No.
DRG No. [illegible]	FIG No 12

342055 054



CHINESE VEIN MODEL

(Simplified) JIANGXI PROVINCE, CHINA.

FROM A.M.F. COURSE NOTES - KWAK & TAYLOR 1983

REFERENCES CHEN & HU, 1983
ZHU et. al., 1983

5 cm

The Shell Company of Australia Limited
METALS DIVISION

CHINESE VEIN DEPOSITS GENERALIZED

SCALE	DATE 22-11-83
AUTHOR P.A.R.	DRAWN
OFFICE D'PORT	REP.No.
DRG No	FIG No 13

5 cm

342056

SCAMANDER MINE Pb / Ag
SCAMANDER BELL Pb / Ag
BEULAH Pb / Ag
YARMOUTH Pb / Ag

CRAMPS Cu
DUNNS / ARM Cu
ORIECO PAUL / BEAHRS Cu / Pb / Ag
(Sulphides)

NORTH SCAMANDER
(Sn / Sulphides)

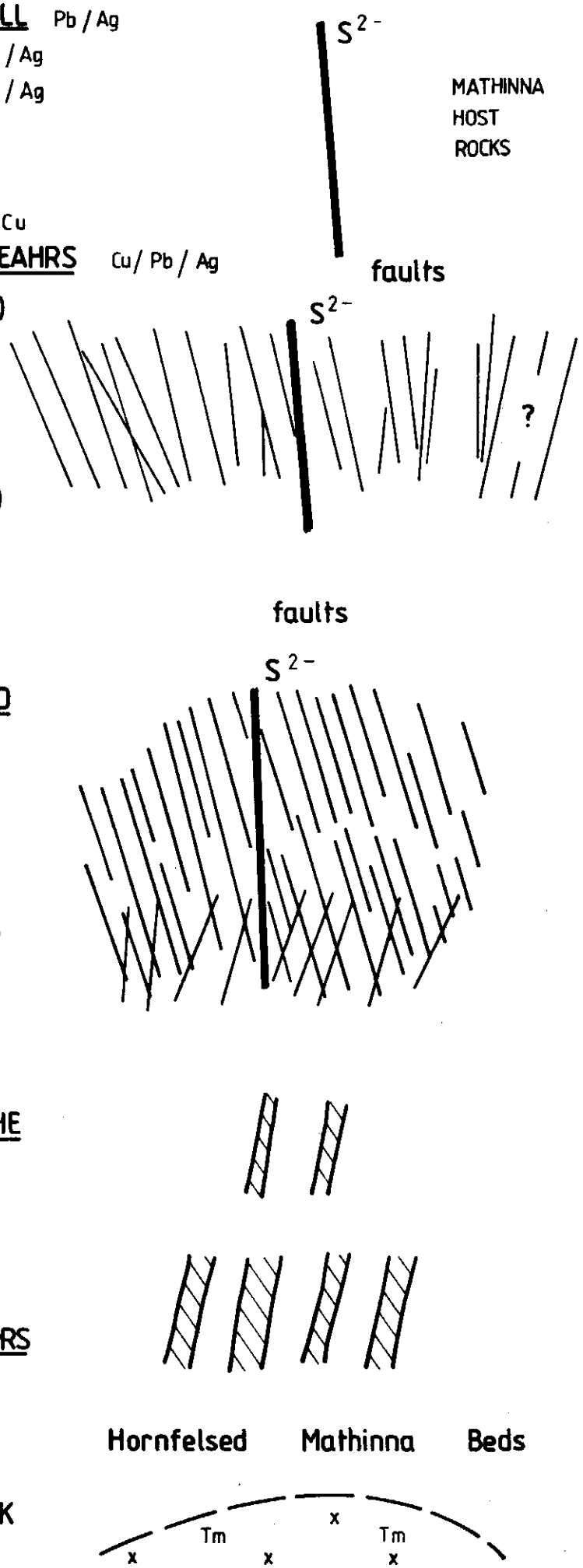
GREAT PYRAMID
(Sn)

? PINNACLES ?
(Sn)

EAST LUTWYCHE
(WO_3)

LUTWYCHE
BADEN POWELL
CARSON DE BEERS
(Mo / WO_3)

WOLFRAM CREEK GRANITE



Fracture - fills
Veinlet / Stringers
Chl / Sulphides
Cass / Carbonate
(≤ 0·005 m)
(spacing > 100 fractures/m)

Fracture - fills
Qtz / Cass
± tourm
(0·001 - 0·005m)
(spacing 180 fractures / m)

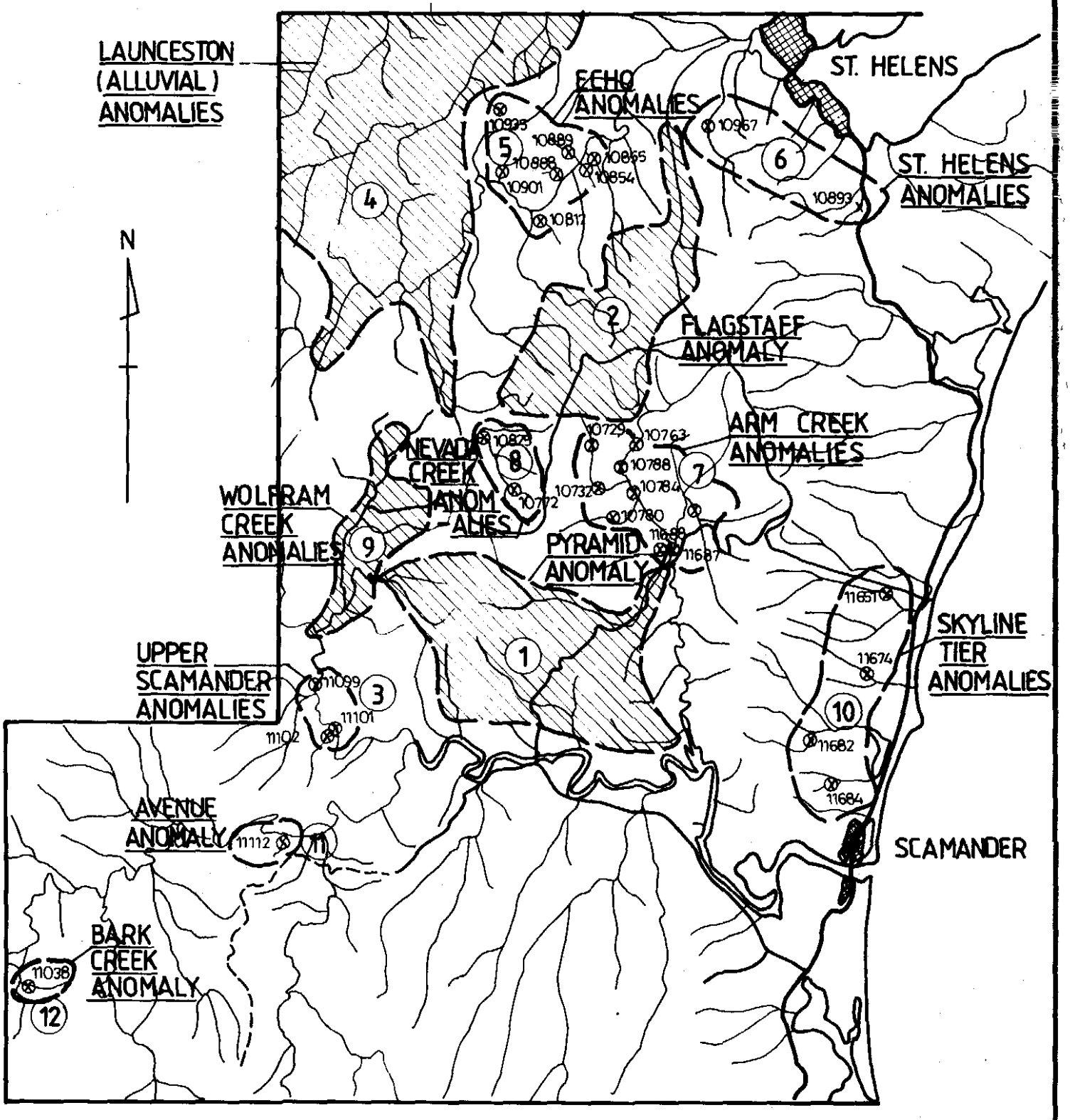
Overprinting Veins
Qtz / tourm / cass
(0·001 - 0·005 m)
(spacing 1-3 m)

Qtz. Veins
Tourm. / WO_3
(0·1 - 0·2 m)
(spacing unknown)

Qtz. Veins
Tourm / WO_3 / Mo
(0·2 - 1·0 m)
(spacing 10m - 20m)

The Shell Company of Australia Limited METALS DIVISION	
E.L. 12/78 SCAMANDER METAL ZONATION OF MINERAL FIELD (STYLE) N.E. TASMANIA	
SCALE	DATE 24-11-83
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE D'PORT	REP.No.
DRG.No. D/LH02/514	FIG.No. 14

342057



The Shell Company of Australia Limited
METALS DIVISION

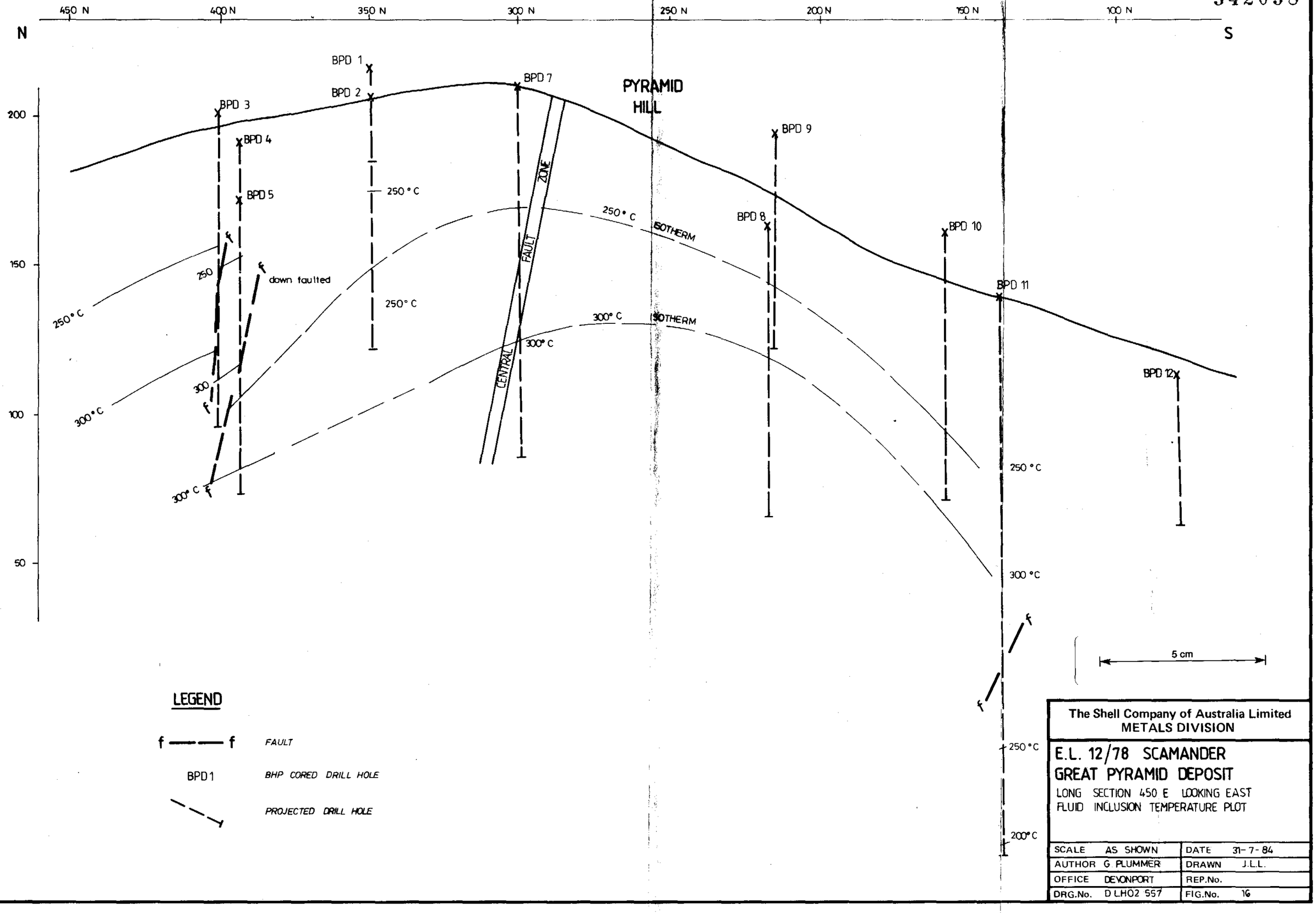
E.L. 12/78 SCAMANDER

STREAM SEDIMENT ANOMALIES IN THE SCAMANDER LICENCE

SCALE 1:100 000	DATE 17-7-84
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE D'PORT	REP.No.
DRG No D/LH02/548	FIG No 15

057

342058



LEGEND

f —— f FAULT

BPD1 BHP CORED DRILL HOLE

PROJECTED DRILL HOLE

The Shell Company of Australia Limited
METALS DIVISION

E.L. 12/78 SCAMANDER
GREAT PYRAMID DEPOSIT

LONG SECTION 450 E LOOKING EAST
FLUID INCLUSION TEMPERATURE PLOT

SCALE	AS SHOWN	DATE	31-7-84
AUTHOR	G PLUMMER	DRAWN	J.L.L.
OFFICE	DEVONPORT	REP.No.	
DRG.No.	D LH02 557	FIG.No.	16

058

342059

PINNACLES
GRID
HAND AUGERED
-10# FRACTION

PYRAMID
GRID
SURFACE SAMPLES
-40# FRACTION

ZONE A

ZONE B

ZONE C

LOILA
PINNACLES

WEST PINNACLES
ADIT

PRC 1
PRC 2
PRC 3
PRC 4
PRC 5
PRC 6
PRC 7
PRC 8
PRC 9
PRC 10
PRC 11
RPH 1

SPG 1
SPG 1A

100
300
500
0·1%
0·3%
0·5%

5 cm

T.N. M.N.

0 500 m

Location of Reverse Circulation Drillholes
PRC 1-11 Pinnacles Grid

Contour Values :

> 0·5 %
0·5 %
0·3 %
0·1 %
500 p.p.m.
300 p.p.m.
100 p.p.m.

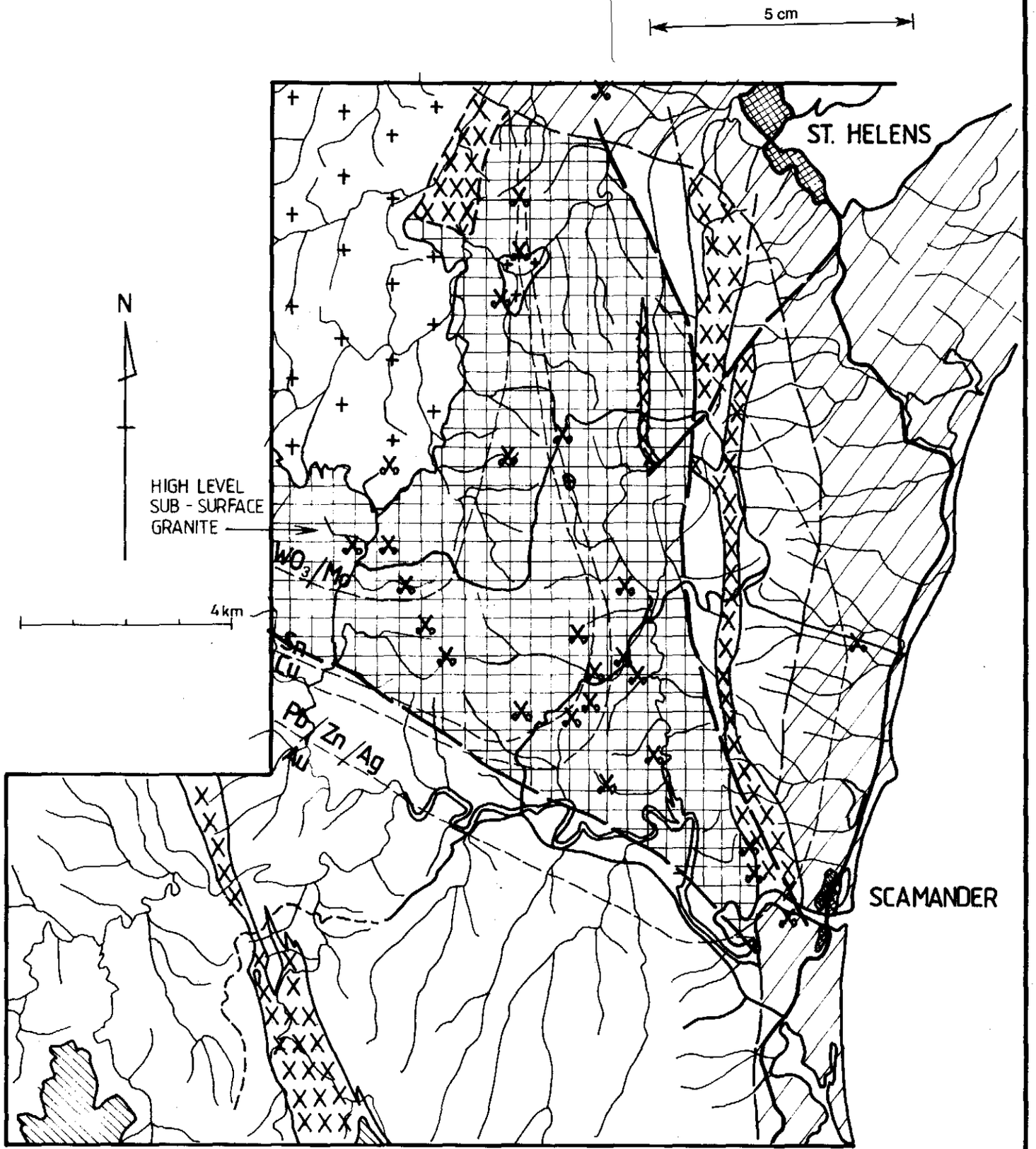
The Shell Company of Australia Limited
METALS DIVISION

PINNACLES / PYRAMID GRIDS
Sn in SOILS
DRILL HOLE LOCATIONS

SCALE 1:10000	DATE 22-9-83
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE DEVONPORT	REP.No.
DRG No D/LH02/506	FIG No 12

059

342060



LEGEND

- ALLUVIAL
- PERMIAN
- MATHINNA
- GRANODIORITE
- GRANITE
- PROSPECT

The Shell Company of Australia Limited
METALS DIVISION

E.L. 12/78 SCAMANDER

AREA OF HIGH LEVEL SUBSURFACE GRANITE

SCALE 1:100 000	DATE 3-8-84
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE D'PORT	REP No

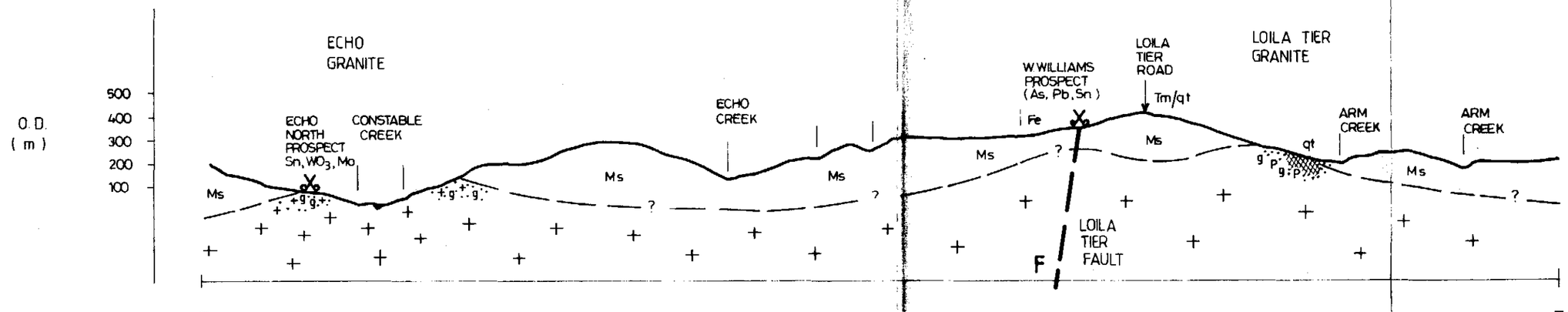
DRG No D/LH02/549 FIG No 18

060

342061

NNW

SSE



LEGEND

	ALLUVIUM	CREEK	
DEVONIAN BIOTITE GRANITE	P P PORPHYRITIC GRANITE	RIVER	
	+ + FINE GRAINED GRANITE	Fe	IRON
	+ + + MEDIUM GRAINED GRANITE	Tm	TOURMALINE
	Ms MATHINNA BEDS	qt	QUARTZ
		g	GREISEN VEIN
		F	FAULT
			PROSPECT

500 m

1000 m

SCALE

HOR. = VERT
(1:20000)

5 cm

The Shell Company of Australia Limited
METALS DIVISION

E.L. 12/78 SCAMANDER
NNW. - SSE CROSS SECTION THROUGH THE FLAGSTAFF ANOMALY

SCALE	1:20000	DATE	24/7/8
AUTHOR	P.A.R.	DRAWN	J.L.L.
OFFICE	DEVONPORT	REP.No.	-
DRG.No.	D/LH02/550	FIG.No.	19

061

342062

WEST

EAST

LOILA PINNACLES

LOILA TIER PROSPECT (Sn)

LOILA TIER ROAD

ARM RIVER DYKE

SCAMANDER TIER DYKE

contact dip 16°

O.D. (m)

500
400
300
200
100

LOILA TIER FAULT

A

B

WEST

EAST

ECHO GRANITE

PEGMATITIC/ APLITIC DYKES

SCAMANDER TIER DYKE

Pegmatite

Ms

CONSTABLE CREEK

CONSTABLE CREEK

ARGUS CREEK

FLAGSTAFF CREEK

O.D. (m)

500
400
300
200
100

C

D

LEGEND

- ALLUVIUM
- Hb / Bi GRANODIORITE
- PORPHYRITIC GRANITE
- FINE GRAINED GRANITE
- MEDIUM GRAINED GRANITE
- MATHINNA BEDS

BIOTITE GRANITE

DEVONIAN GRANITOIDS

- CREEK
- RIVER
- GREISEN VEIN
- SYNFORM
- ANTIFORM
- FAULT
- PROSPECT

500 m

1000 m

SCALE

HOR = VERT

(1:20000)

5 cm

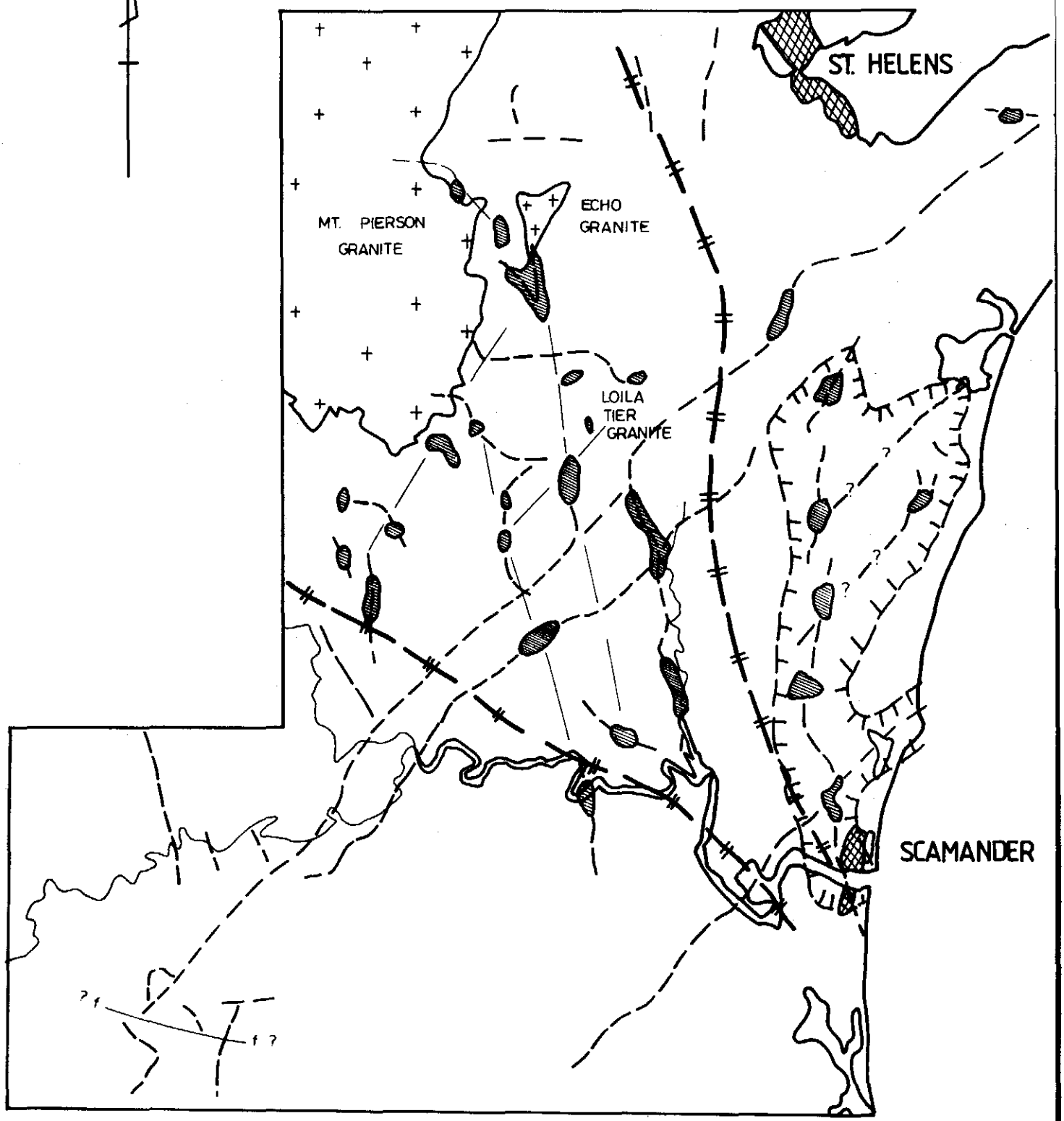
The Shell Company of Australia Limited
METALS DIVISION

E.L. 12 78 SCAMANDER E-W CROSS SECTION THROUGH THE FLAGSTAFF ANOMALY

SCALE	1:20000	DATE	24-7-84
AUTHOR	P.A.R	DRAWN	J.L.L.
OFFICE	DEVONPORT	REP.No.	
DRG.No.	D/LH02/551	FIG.No.	20

062

342063



LEGEND

AEROMAGNETIC TRENDS.

AEROMAGNETIC HIGHS

BROAD AEROMAGNETIC FEATURE

SHALLOW SUB-SURFACE BIOTITE GRANITE

4 km

5 cm

The Shell Company of Australia Limited
METALS DIVISION

E.L. 12/78 SCAMANDER AEROMAGNETIC ANOMALIES

SCALE 1:100000	DATE 16-7-84
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE D'PORT	REP.No.
DRG No D/LH02/55	FIG No 21

063

342064

APPENDIX 1

Great Pyramid

Bulk Sample Locations & Metallurgical Report

Mineral Deposits Limited

061

342065

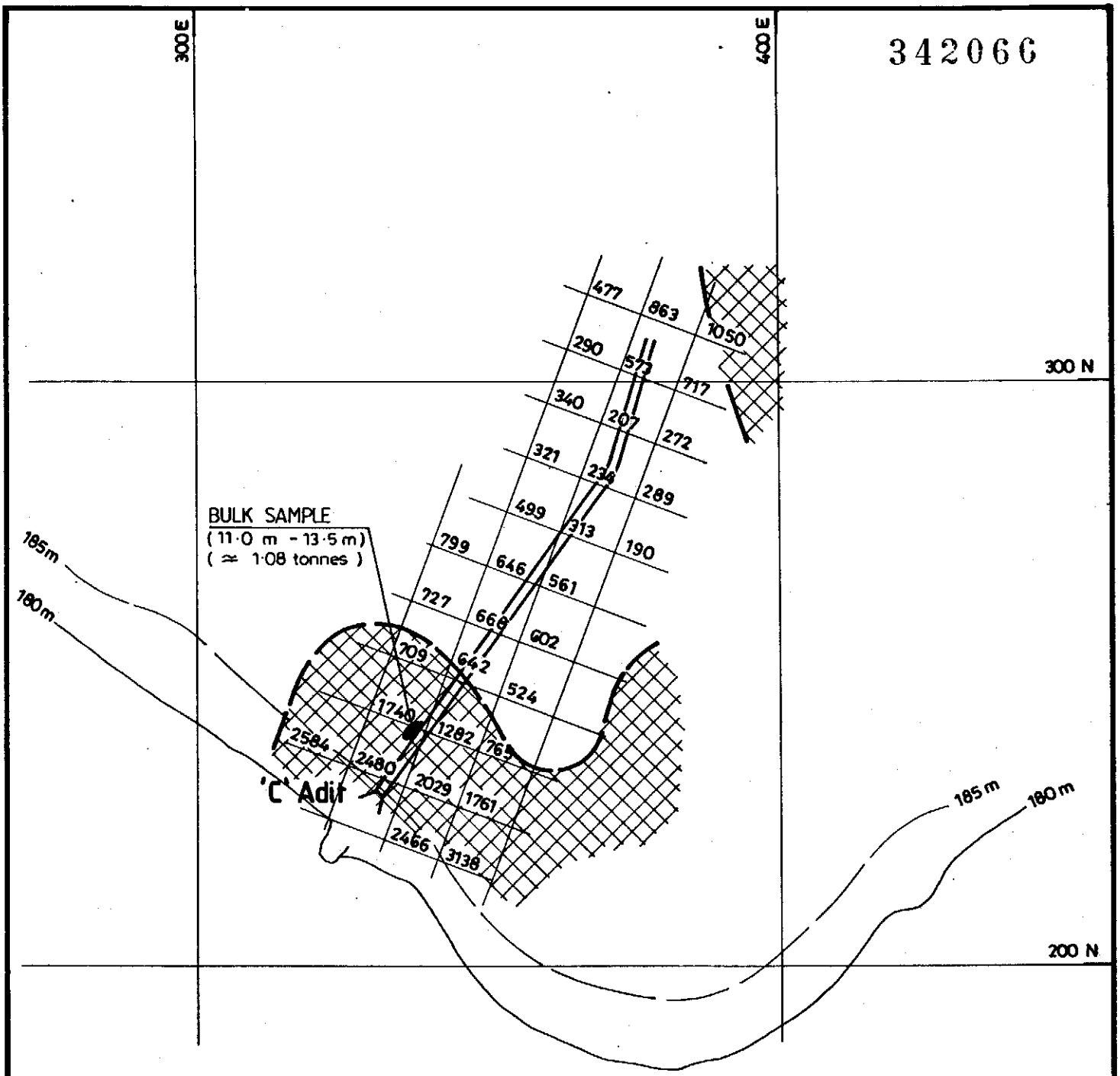
BULK METALLURGICAL SAMPLE

Composite Bulk Sample from 3 Adits

Adit	Interval	Approx. Weight	Lithology	Channel Sample Grade (aver.)
NORTH ADIT	21.7 - 24.4m	1.08t	sst/stt/sh	0.16% Sn
C ADIT	11.0 - 13.5m	1.08t	sst/stt/sh	0.32% Sn
1 SLL	48.6 - 51.1m	0.8t	sst/sh	0.28% Sn

066

342066



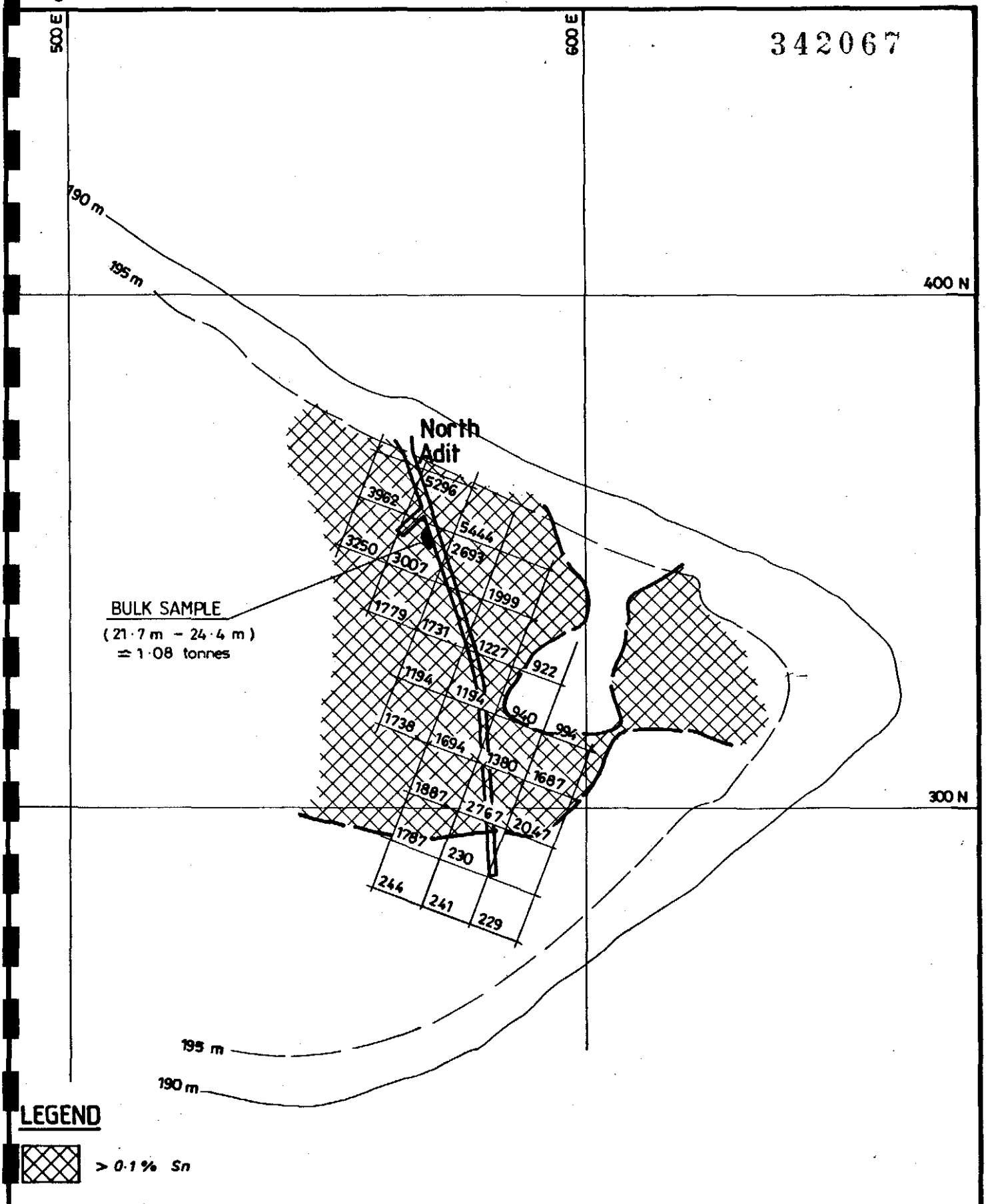
LEGEND

> 0·1% Sn

5 cm

The Shell Company of Australia Limited METALS DIVISION	
E.L. 10/80 GREAT PYRAMID CALCULATED BLOCK GRADES (CRAIGIE LEVEL 4) SUPERIMPOSED ON C. ADIT	
SCALE 1:1000	DATE 3-8-84
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE D'PORT	REP.No.
DRG.No. D/LH01/541	FIG.No.

342067



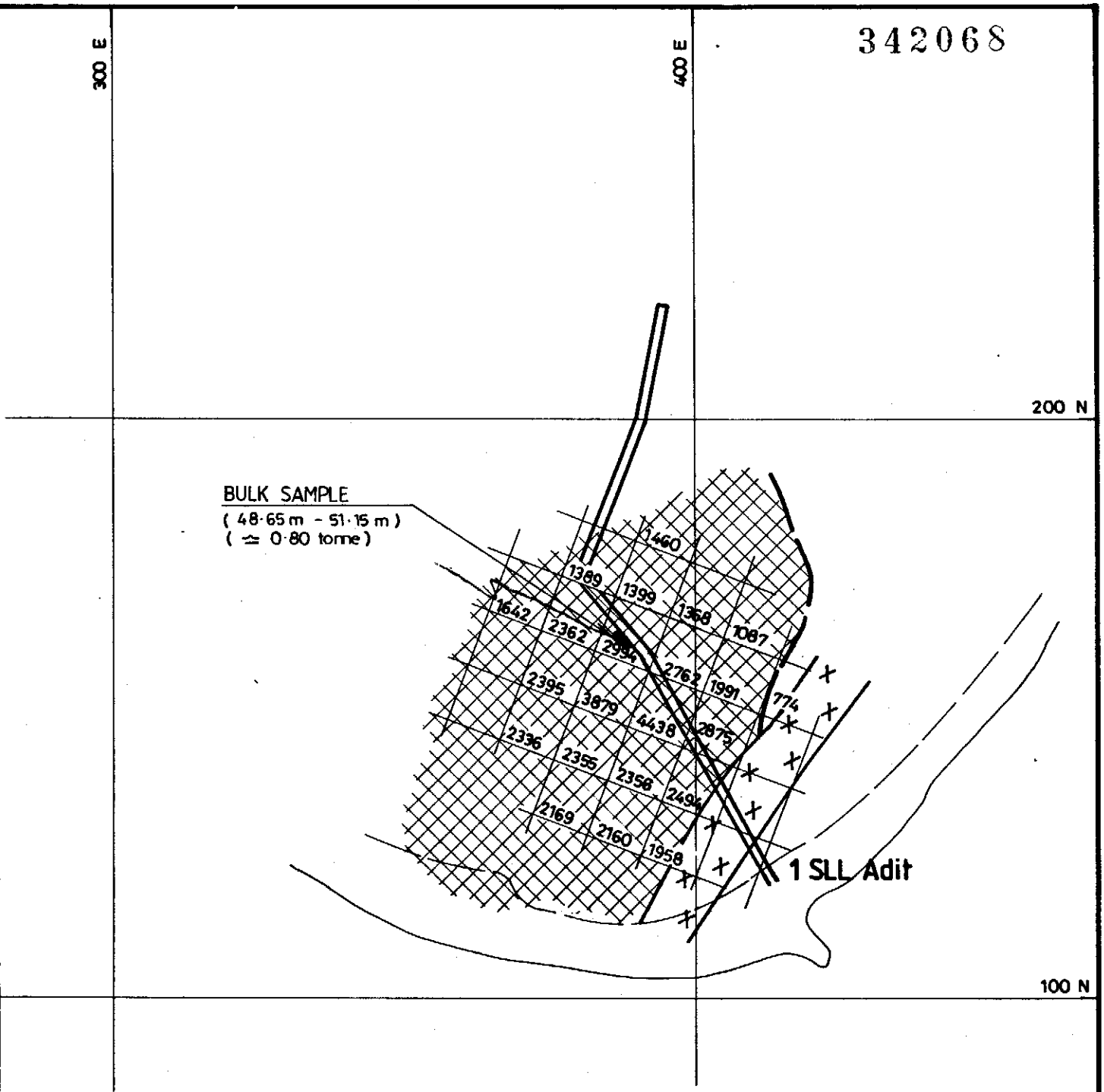
The Shell Company of Australia Limited
METALS DIVISION

E.L. 10/80 GREAT PYRAMID
CALCULATED BLOCK GRADES
(CRAIGIE LEVEL 3)
SUPERIMPOSED ON NORTH ADIT

SCALE 1:1000	DATE 3-8-84
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE D PORT	REP.No.
DRG.No. D/LH01/542	FIG.No.

065

342068



LEGEND

> 0·1 % Sn

DOLERITE DYKE

5 cm

The Shell Company of Australia Limited
METALS DIVISION

E.L. 10/80 GREAT PYRAMID
CALCULATED BLOCK GRADES
(CRAIGIE LEVEL 8)
SUPERIMPOSED ON 1 SLL ADIT

SCALE 1:1000	DATE 3-8-84
AUTHOR P.A.R	DRAWN J.L.L.
OFFICE D'PORT	REP.No.
DRG.No. D/LH01/543	FIG.No. -

068

342069

BXH/Devonport

13 JUL 1984

	INFO	ACT	COPY
BXG			
BXHE			
BXHW			
BXP			
BXR			
BXN			
BXT			
BXH/Tas.			✓
DATE RECD:	13 JUL 1984		
FILE:			

MEMORANDUM

TO: BXHE

FROM: AHO BOM:JC:YP

DATE: July 12, 1984

SUBJECT: **Great Pyramid Metallurgical Test**

Attached is a copy of the report of the metallurgical study completed recently by Mineral Deposits Ltd.

Grade of sample 0.4% Sn when 0.25% Sn was expected.

The major outcomes from this report are:-

- About 30% of the feed can be rejected with acceptable tin losses by using gravity methods.
- A concentrate grade in the range 65% - 70% Sn appears quite feasible by using magnetic separation.
- There would seem scope to obtain higher recoveries from gravity process middlings making over all resource metallurgical recovery of about 65%.
- The study results showed that 50% of the feed reported as slimes indicating overgrinding and significant scope for improvement in the grinding process
  (a) to improve gravity recovery
  (b) to minimise energy cost
  (c) to reduce amount of material requiring flotation
- It is quite clear from the work that the traditional tin plant is required i.e. crush, grind, gravity, flotation which has the implication of not being able to have simple cheap plant.

On the basis of this work the SCOA economic model will be upgraded and reported on in due course.

J. Collins

Report No. 08·2374

069

342070 Indexed

THE SHELL COMPANY OF AUSTRALIA LIMITED
METALS DIVISION

PRELIMINARY METALLURGICAL INVESTIGATION

OF TIN ORE DEPOSIT

FROM TASMANIA

Report No. 16.020.1/1

MINERAL DEPOSITS LIMITED
MINERAL TECHNOLOGY DIVISION
BUNDALL - QUEENSLAND
AUSTRALIA

08-2374

070

342071

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	1.3	Terms of Reference	1
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	2.4	Spiral Tests	5
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1. INTRODUCTION

1.1 Test Material

Eleven drums of tin ore were submitted by the Shell Company of Australia, Metals Division, from a deposit in Tasmania. The sample weighed 3.17 tonnes dry, and was nominally -100mm. The tin content was expected to be 0.2-0.25% Sn.

1.2 Objective

The objectives of the testwork were to:

1.2.1 Derive an estimate of the mass and metallurgical balances for the elements in the programme.

1.2.2 Produce a concentrate by gravity methods assaying greater than 30% Sn and a rejectable gravity tailing.

1.2.3 Upgrade the tin gravity concentrate to a saleable product.

1.3 Terms of Reference

1.3.1 Correspondence from Mr. Bruce Spiers of Shell Metals Division (SMD) outlining the test programme requirements, dated March 16, 1983.

1.3.2 Initial verbal communications between Mr. Bruce Spiers of SMD and Dr. Roger Richards of Mineral Deposits Limited (MDL) on February 21, 1984.

1.3.3 Letter of confirmation from Mr. Bruce Spiers, SMD, to Dr. Roger Richards, MDL, dated February 22, 1984.

1.3.4 A quotation, dated March 1 1984, from Dr. Roger Richards, MDL, for testwork as outlined.

1.3.5 Correspondence from Mr. Stan Kaleta, SMD, accepting the test proposal and submitting SMD's Order No. 48214.

1.4 Conclusions

The data produced from the testwork suggests the following:

1.4.1 A gravity concentrate of greater than 30% Sn content is achievable, using classification and wet gravity techniques.

1.4.2 A significant proportion of the feed, possibly as high as 30% or better, could be rejected as a final gravity tailing.

1.4.3 Liberation of over 20% of the total tin content of the feed in a size suitable for gravity concentration is achievable by grinding to less than 400 microns.

1.4.4 Improvements in recovery of tin by gravity concentration in a production plant over the results achieved by the testwork carried out are possible by regrinding select middling products, recirculation of various product streams within the flowsheets, and better operating techniques achievable on a continuous operating basis.

1.4.5 Introducing different size feeds to the separate gravity circuits may improve separation efficiency although this was not confirmed in this test programme.

1.4.6 Upgrading the gravity concentrates to saleable product by magnetic separation techniques appears possible.

1.4.7 No other valuable mineral was upgraded to any significant degree.

M. V. ATFIELD,
CHIEF METALLURGIST.

P. A. BUTLER,
SNR. PROJECT TECHNICIAN.

G. F. BALDERSON,
MANAGER - TECHNICAL SERVICES.

2. TEST EQUIPMENT AND PROCEDURES

2.1 Sample Preparation

The total sample was initially weighed and then thoroughly mixed. Approximately two tonnes were then split out by cone and quarter techniques for feed for the pilot test circuit. A further representative sample was obtained by coning and quartering and later ground and riffled to obtain a head assay.

2.2 Grinding and Screening

The sample was initially crushed in a jaw crusher and then screened on a vibrating screen fitted with a 13mm aperture punch plate screen cloth. The screen oversize was recirculated to the jaw crusher for further reduction. The screen undersize constituted feed to the rod mill for grinding.

The rod mill product was screened on a 1m diameter Kason vibrating screen fitted with a 400 microns aperture screen cloth. The oversize was returned to the rod mill (for further grinding) and the undersize flowed through a series of four hoppers to allow dewatering. Overflow from the fourth hopper which carried some fine slime was not retained.

The total rod mill ground product was then placed on a concrete pad to drain the excess water. The ground material was then thoroughly mixed and a sample was obtained by a coning and quartering procedure for moisture, head assay and screen analysis.

2.3 Hydrosizing

The Hydrosizer (of similar design to a Concenco three-cell model constricted plate classifier) was fed at approximately 60% solids w/w at 2tph. The aim was to produce three products: i.e. coarse, medium and slimes fractions. The three classifier underflow fractions were collected in 200 litre drums and the classifier overflow fines fraction was collected in a large tank. The classifier underflows were then sampled and weighed, and moisture determinations and size assays were performed on representative samples. The data indicated that the products from cells 1 and 2 could be combined to give three fractions; i.e. coarse, medium and fine. The fine fraction was grab-sampled during classifier operation. The grab sample was size analysed and assayed for tin.

2.4 Spiral Tests

The coarse and medium fractions were passed separately over a Reichert type LG7 single-start spiral separator in open circuit. The spiral was fed at approximately 2.5 tph and 40% solids. Three spiral products (concentrate, middling and tailing) were produced. The spiral splitters were set by eye to obtain good tin recoveries to concentrate. All products were weigned, sampled and assayed. The concentrate was also size analysed and the size fractions assayed for tin.

2.5 Table Tests

Tne spiral concentrates were individually passed over a laboratory-scale wet shaking table, adjustments being made by eye to produce acceptable performance. Splitters were set below the cassiterite line for the concentrate take and just into the silica line for middling/tailing take. All products (concentrate, middling, tailing) were weighed, sampled and assayed.

2.6 Mineralogical Examination

The table concentrates were individually passed over a laboratory-scale Carpco induced-roll magnet to further upgrade the tin concentrate. Three fractions were produced: highly susceptible magnetics, 0.35 amp magnetics, and a non-magnetics fraction. The fractions from the magnetic separation were weighed, assayed for tin, and subjected to microscopic examination to determine the degree of liberation of tin and also identify other minerals present.

2.7 Tin Assays

Samples of less than 10% Sn were assayed for tin by volatilising the samples in ammonium iodide and subsequent reading against standards using an Atomic Absorption Spectrophotometer. The test products greater than 10% Sn were titrated (following a peroxide fusion and nickel reduction) against iodine with starch as tne indicator.

2.8 Sizing Analysis

Sizing analysis was performed using Britisn Standard sieves. Samples were wet screened at 38 microns prior to being dry screened at tne coarser sizes.

3. RESULTS AND DISCUSSION

3.1 Sample Processing Flowsheet

Table 1 shows the weight distribution and tin assay and distribution to the various stage final products. The sample processing flowsheets (Appendices 4.1.1, 4.1.2, 4.1.3) show each stage of the processing as well as the weight splits and tin grade and distribution

3.2 Head Assay

3.2.1 The head assayed 0.385% Sn, which was significantly higher than the expected 0.2-0.25% Sn. This figure is confirmed by the other assays in the flowsheet.

3.2.2 The head tin assays for most stages calculated back from the stage products gave reasonable agreement - considering the number of tin assays involved.

3.2.3 The final ground product assayed 0.414% Sn,. which was a little higher than the head assay; the increase being due mainly to the upgrading effect of the lower tin content slime rejected in the storage hopper overflow.

3.3 Ore Crushing and Milling

The finisned ground product size and tin analysis data is tabulated in Appendix 4.2. The fines content of this data is lower than true mill output, as it does not include the fines lost as overflow from the final settling bin in the series of four bins. The size fractions had only small variations in tin content.

TABLE 1: Overall Flowsheet Performance

	Wt. %		% Sn	Sn Dist
FINAL TIN CONCENTRATES				
Coarse size magnetic non-mags	<0.1%		70.85	14.33
Medium size magnetic non-mags	<0.1%		66.63	5.94
Combined	<0.2%	(Calc)	69.10	20.27
FINES FRACTIONS				
Fine slime ex ground product	22.8%		0.286	16.96
Hydrosizer overflow	28.8%		0.220	19.00
Combined	51.6%	(Calc)	0.250	35.96
REJECTABLE FRACTIONS				
Coarse size spiral tailing	23.7%		0.110	6.96
Medium size spiral tailing	12.6%		0.070	1.66
Combined	36.3%	(Calc)	0.096	8.62
HIGH GRADE TIN GRAVITY PRODUCT				
Coarse size wet shaking table concentrate	0.1%		47.92	15.65
Medium size wet shaking table concentrate	<0.1%		42.36	6.51
Combined	<0.2%	(Calc)	45.70	22.16
MIDDLING FRACTIONS				
Coarse size spiral middling	4.6%		0.34	3.97
Medium size spiral middling	3.4%		0.28	1.78
Coarse size shaking table mid	0.4%		17.50	19.44
Medium size shaking table mid	0.2%		20.80	6.28
Coarse size shaking table tail	1.7%		0.28	1.28
Medium size shaking table tail	1.6%		0.18	0.51
Combined	11.9%		--	33.26

3.4 Hydrosizing

The Hydrosizer produced four products, of which the two coarser fractions were combined to give an approximate split of 35:30:35 by weight.

Hydrosizer performance was retarded due to problems with the initial operation and the presence of some undispersed slime particles in the feed, which tended to report to cell No. 1 underflow; thus increasing the fine slimes content to underflow.

The results recorded in Appendix 4.8 show, however, that even under the previously described operating conditions, upgrading of the tin content of cell Nos. 1 and 2 combined product did occur with 56.95% of the tin in the feed to the classifier reporting in 39.38% of the original feed weight, resulting in the combined 1 and 2 cell product assaying 0.51% Sn; whereas the original feed assayed 0.41% Sn. The medium size fraction, or No. 3 cell product, assayed 0.31% Sn; somewhat below headfeed grade, due to depletion of recoverable tin by cell Nos. 1 and 2. This fraction did, however, contain significant liberated tin as shown by later testwork.

The slime or overflow fraction was downgraded to 0.22% Sn, with a -38 micron rejection to overflow of approximately 80% despite the initial operational problems.

It is interesting to note that the finer fractions recovered in the underflow products were much higher in tin content than similar size fractions in the overflow.

Appendix 4.3 is a graph of size vs. cumulative weight for the products and head.

In Appendix 4.4 the Hydrosizer separation efficiency is plotted.

Appendices 4.5 - 4.7 are the size analysis and tin assays of the size fractions for the three final products which includes also dry weight and tin distribution calculated on a feed basis.

3.5 Spiral Tests

3.5.1 The results of both the coarse and medium size spiral tests are summarised in Appendix 4.9. The spiral concentrate size analysis and tin assays for the size fractions are tabulated in Appendix 4.10.

3.5.2 The test data revealed that reasonable results were achieved, particularly as there was only sufficient material for one test run. Further adjustment should improve performance.

3.5.3 The coarse size test data showed that 85.69% of the tin in the feed could be recovered in 22.16% of the original feed weight. The size analysis data on the concentrate and the feed showed significant tin upgrading was achieved on all size fractions.

3.5.4 The medium size test data showed that 90.11% of the tin in the feed could be recovered in 29.43% of the original feed weight. The size analysis data on the concentrate and the feed indicated significant tin upgrading on each size fraction. Recovery of tin in the -38 micron fraction was also being achieved.

3.5.5 The combined spiral test data indicated that 36.3% of the original feed weight could be discarded for a loss of 8.62% of the Sn in the original feed.

3.6 Wet Table Testwork

3.6.1 The wet table performance data for both the coarse and medium fractions are summarised in Appendix 4.11.

3.6.2 The coarse size test data showed that a concentrate grade of 47.92% Sn could be achieved. The recovery to the concentrate was 42.78% of the total tin in the feed, in 5.43% of the original feed weight.

3.6.3 The data from the medium size testwork showed similar results to the coarse size testwork. Slightly lower concentrate grade was produced (42.36% Sn), but a slightly higher recovery was achieved. Overall tin loss to tailing was low.

3.6.4 In an operating situation, table middling would circulate back to the head feed or be reprocessed in a separate circuit. Wet table performance would, therefore, be improved.

3.6.5 Chemical analysis of both wet table concentrates (Appendix 4.13) indicates only minor quantities of most contaminants present, with the exception of iron-bearing minerals which are readily rejected by magnetic separation.

3.7 Magnetic Separation

3.7.1 The results of the magnetic separation of both table concentrates are summarised in Appendix 4.12.

3.7.2 The data from the coarse size testwork indicated that high grade concentrates (70.85% Sn) could be produced at high recoveries (91.23%) of the tin in the feed using magnetic separation.

3.7.3 The medium-size test data showed that a high grade concentrate (66.63% Sn) could be produced at high recoveries (91.23%) of tin.

3.7.4 The magnetic separation testwork on both table products showed that a significant proportion of the tin recovered from the gravity flowsheet was in a liberated form. The data also showed that the concentrates contained high proportions of other heavy minerals which were mainly magnetic in nature.

3.7.5 A dry induced roll type magnet was used for the test programme. In an operating circuit, a wet high intensity magnet would most likely be selected for the duty.

3.8 Recommendations

Sufficiently encouraging results have been produced from the testwork to justify a recommendation for a further larger scale test programme which could be approached in two ways:

(1) Produce either one or a number of bulk samples of 20 - 30 tonnes, the number depending on the variability of the metallurgical characteristics of the ore body, and processing the samples on a more detailed basis at our Bundall laboratory.

(2) Design and construct a pilot plant which could operate on a continuous basis on-site, processing large bulk samples from various areas of the ore body.

The most satisfactory approach on a metallurgical basis is the pilot plant proposal, which would produce much more accurate data for full-scale flowsheet development. However, some factors which may influence a decision on the scope of additional work are:

(a) Availability of large bulk samples;

(b) Magnitude of the full-scale operation envisaged;

(c) Timing of the project;

(d) Variability of the metallurgical characteristics of the ore body.

Determine from small samples first.

4. APPENDICES

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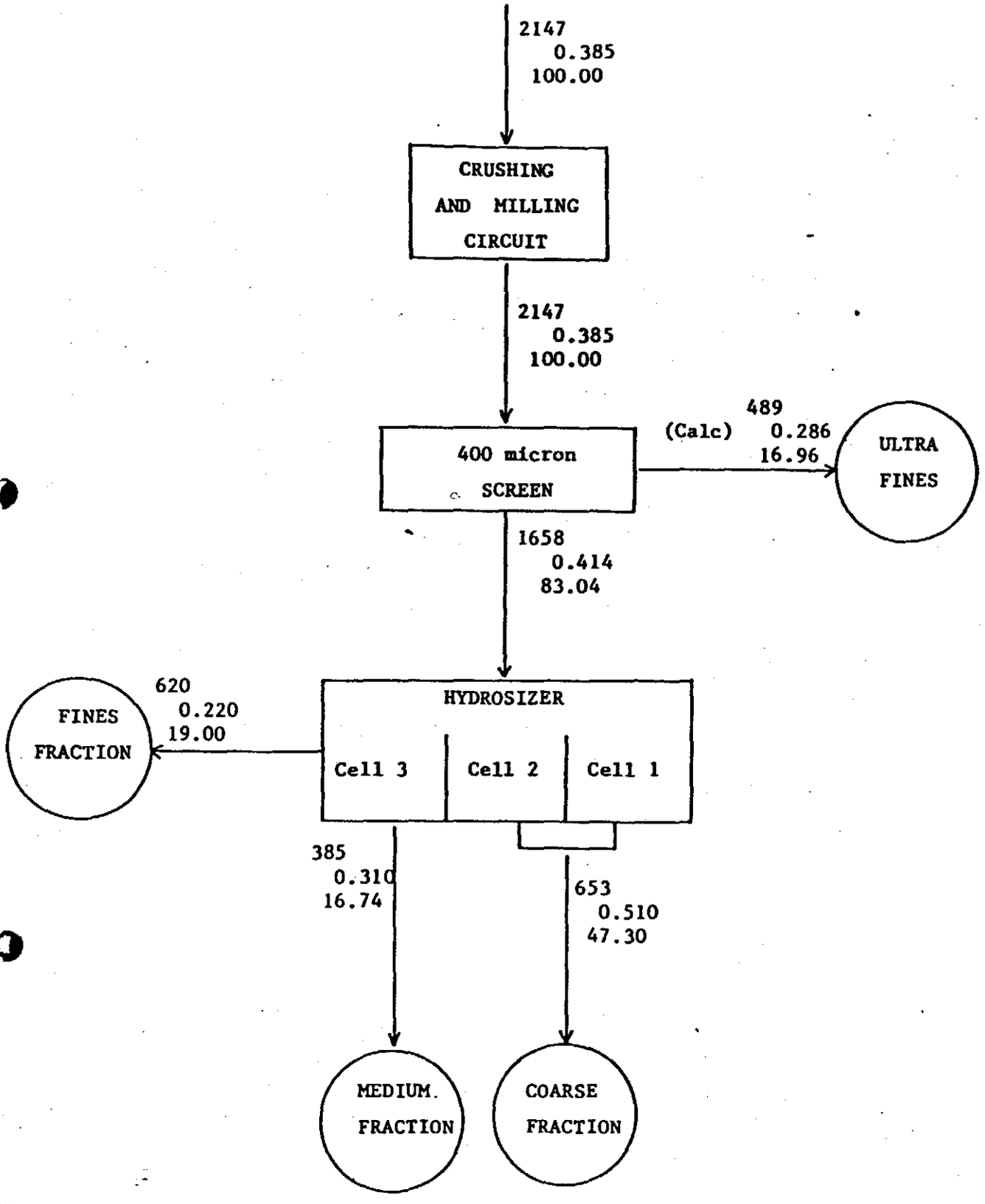


Key

Weight (kg)
% Sn
Mineral dist. to head feed (%)

RESEARCH AND ENGINEERING DEPARTMENT
MINERAL DEPOSITS LTD.—SOUTHPORT, QUEENSLAND

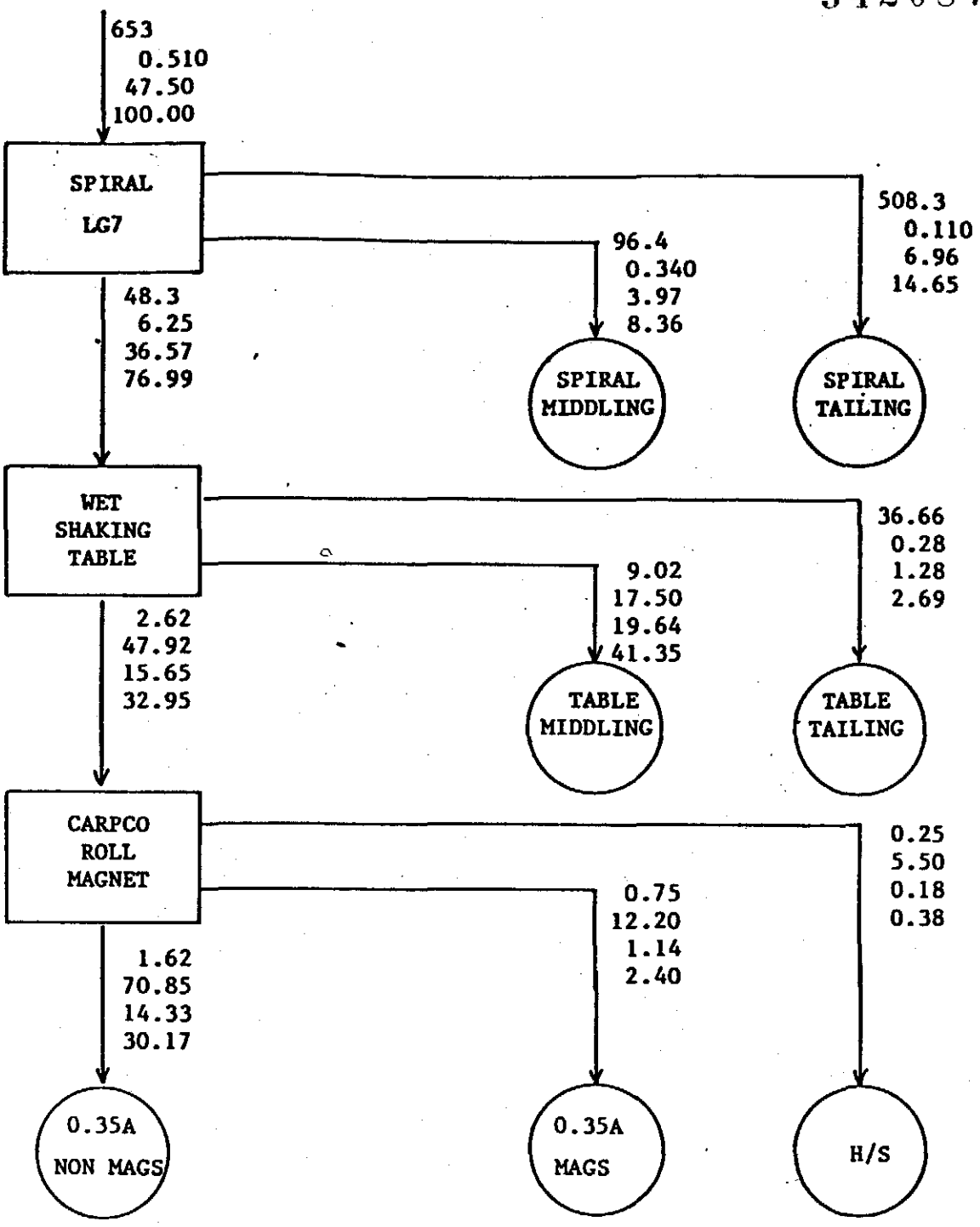
APPENDIX 4.1.1

SHELL METALS - TIN ORE FLOWSHEET
COMMINUTION STAGE

DRAWN PAB:PJY
DATE 28.6.1984
SCALE NTS

086

342087

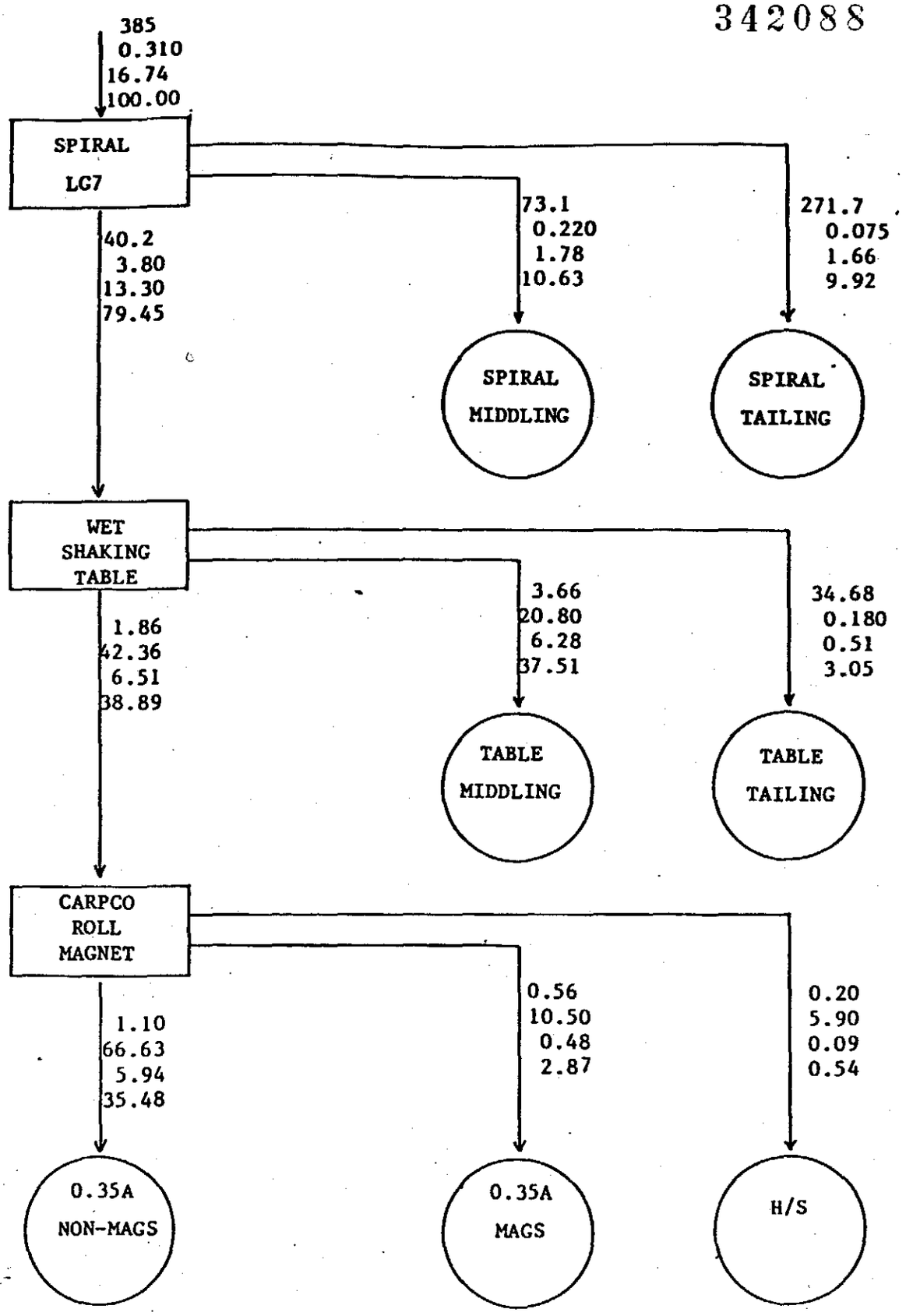


KEY

Weight (kg)
% Sn
Mineral dist. to head feed (%)
Mineral dist. to stage feed (%)

RESEARCH AND ENGINEERING DEPARTMENT MINERAL DEPOSITS LTD.—SOUTHPORT, QUEENSLAND	APPENDIX 4.1.2
SHELL METALS - TIN ORE FLOWSHEET CONCENTRATION STAGE, COARSE FRACTION	DRAWN PAB:PJY DATE 28.6.1984 SCALE NTS

342088



KEY

Weight (kg)
% Sn
Mineral dist. to head feed (%)
Mineral dist. to stage feed (%)

RESEARCH AND ENGINEERING DEPARTMENT
MINERAL DEPOSITS LTD.—SOUTHPORT, QUEENSLAND

APPENDIX 4.1.3

SHELL METALS - TIN ORE FLOWSHEET

CONCENTRATION STAGE, MEDIUM FRACTION

DRAWN PAB:PJY

DATE 28.6.1984

NTS

342089

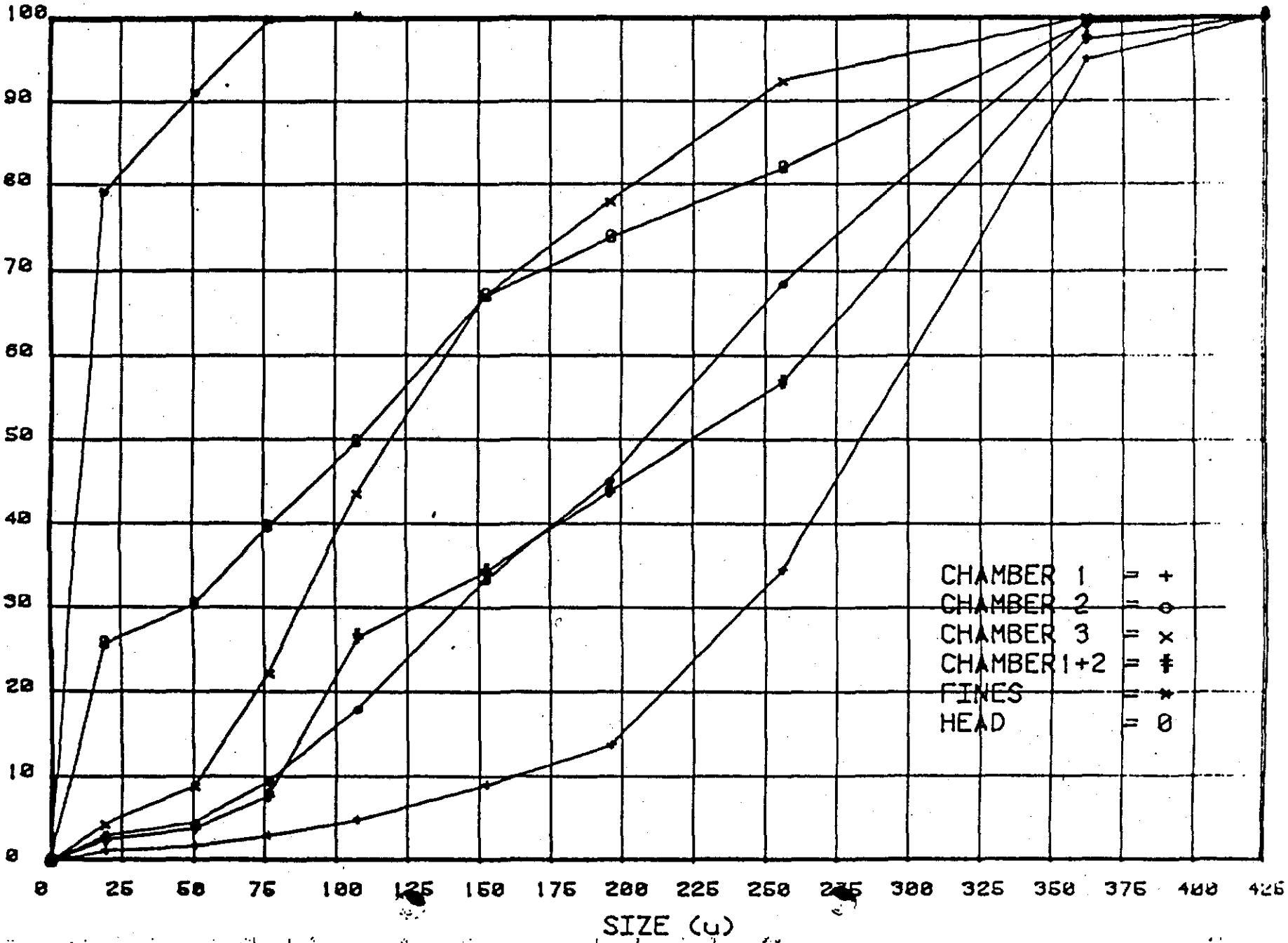
APPENDIX 4.2: FINISHED GROUND PRODUCT

SHELL MINERALS TIN ORE.

SIZE (um)	WT. %	CUM WT%	ASSAY %Sn	CUM ASSAY	DISTN %	CUM DISTN
425	0.81	0.81	0.515	0.515	1.03	1.03
300	17.21	18.02	0.486	0.487	20.69	21.72
212	14.80	32.82	0.425	0.459	15.56	37.28
125	17.45	50.27	0.418	0.445	18.04	55.32
90	10.07	60.34	0.400	0.437	9.96	65.28
63	9.42	69.76	0.362	0.427	8.43	73.72
38	4.48	74.24	0.388	0.425	4.30	78.02
-38	25.76	100.00	0.345	0.404	21.98	100.00
TOTAL	100.00	0.00	0.404	0.000	100.00	0.00

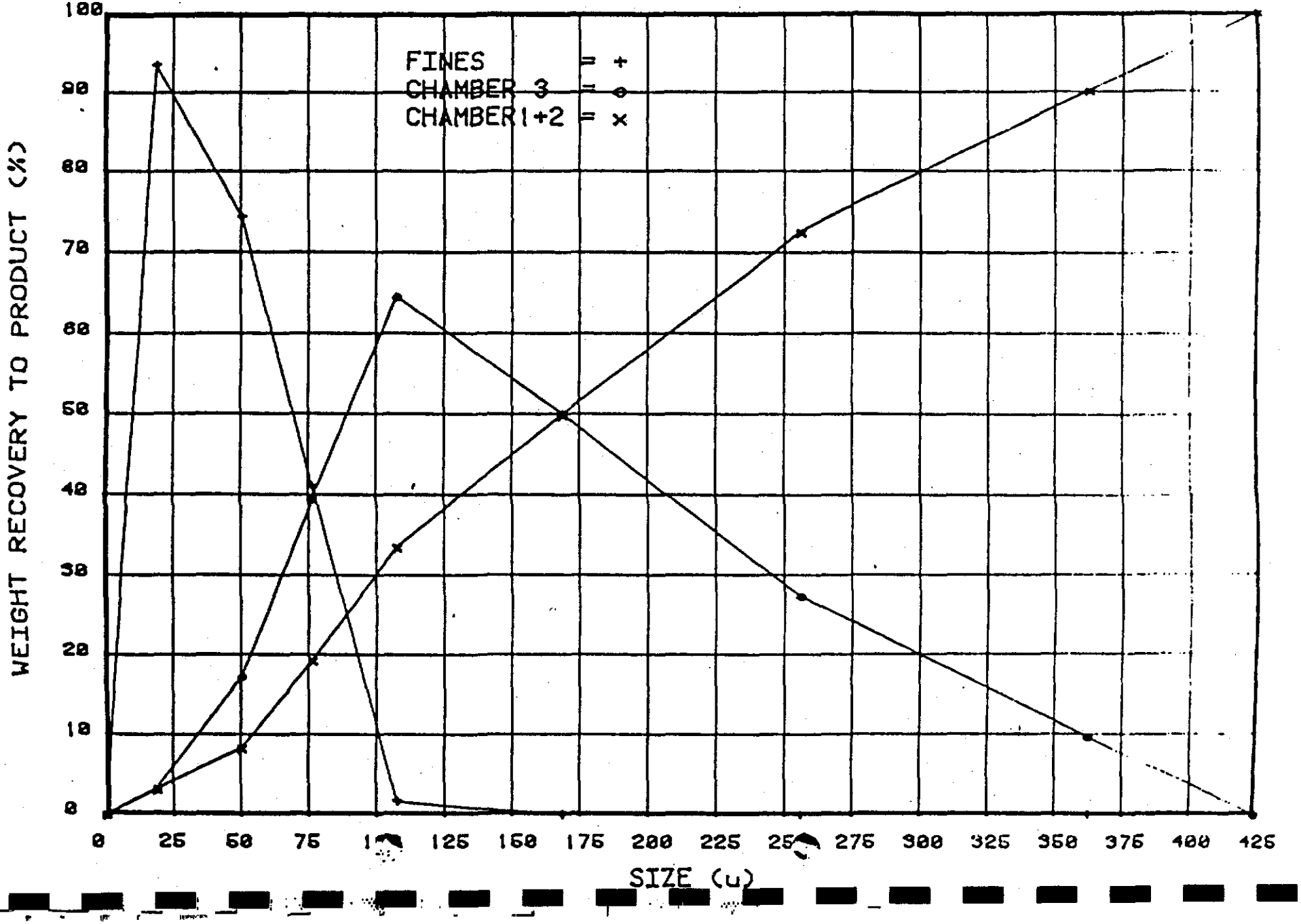
APPENDIX 4.3

HYDROSIZER PERFORMANCE FOR SHELL MINERALS TIN ORE.



APPENDIX 4.4

HYDROSIZER PERFORMANCE FOR SHELL MINERALS TIN ORE.



APPENDIX 4.5: HYDROSIZER CELLS NOS. 1 & 2 UNDERFLOW

SHELL METALS TIN ORE. C 1+2

SIZE (um)	WT. %	CUM WT%	ASSAY %Sn	CUM ASSAY	DISTN %	CUM DISTN
425	2.64	2.64	0.32	0.32	1.65	1.65
300	40.46	43.10	0.35	0.35	27.95	29.60
212	22.50	65.60	0.42	0.38	18.62	48.22
125	20.13	85.73	0.65	0.44	25.54	73.76
90	6.56	92.29	0.87	0.47	11.11	84.87
63	3.86	96.15	1.02	0.49	7.68	92.56
38	1.27	97.42	1.32	0.50	3.27	95.83
-38	2.58	100.00	0.83	0.51	4.17	100.00
TOTAL	100.00	0.00	0.51	0.00	100.00	0.00

SHELL METALS TIN ORE. C 1+2 FEED BASIS

SIZE (um)	WT. %	CUM WT%	ASSAY %Sn	CUM ASSAY	DISTN %	CUM DISTN
425	1.04	1.04	0.32	0.32	0.94	0.94
300	15.93	16.97	0.35	0.35	15.92	16.86
212	8.86	25.84	0.42	0.38	10.61	27.47
125	7.93	33.76	0.65	0.44	14.55	42.01
90	2.58	36.35	0.87	0.47	6.33	48.34
63	1.52	37.87	1.02	0.49	4.38	52.72
38	0.50	38.37	1.32	0.50	1.86	54.59
-38	1.02	39.38	0.83	0.51	2.37	56.96
TOTAL	39.38	0.00	0.51	0.00	56.96	0.00

APPENDIX 4.6: HYDROSIZER CELL NO. 3 UNDERFLOW

SHELL METALS TIN DRE. C 3

SIZE (um)	WT. %	CUM WT%	ASSAY %Sn	CUM ASSAY	DISTN %	CUM DISTN
425	0.00	0.00	0.00	0.00	0.00	0.00
300	7.45	7.45	0.15	0.15	3.63	3.63
212	14.42	21.87	0.14	0.14	6.38	10.01
125	34.35	56.22	0.16	0.15	17.76	27.77
90	21.43	77.65	0.25	0.18	17.42	45.18
63	13.40	91.05	0.50	0.23	21.65	66.84
38	4.49	95.54	1.06	0.26	15.47	82.31
-38	4.46	100.00	1.22	0.31	17.69	100.00
TOTAL	100.00	0.00	0.31	0.00	100.00	0.00

SHELL METALS TIN DRE. C 3 FEED BASIS

SIZE (um)	WT. %	CUM WT%	ASSAY %Sn	CUM ASSAY	DISTN %	CUM DISTN
425	0.00	0.00	0.00	0.00	0.00	0.00
300	1.73	1.73	0.15	0.15	0.73	0.73
212	3.35	5.08	0.14	0.14	1.29	2.02
125	7.99	13.05	0.16	0.15	3.58	5.60
90	4.98	18.03	0.25	0.18	3.51	9.11
63	3.11	21.14	0.50	0.23	4.37	13.48
38	1.04	22.19	1.06	0.26	3.12	16.60
-38	1.04	23.22	1.22	0.31	3.57	20.16
TOTAL	23.22	0.00	0.31	0.00	20.16	0.00

APPENDIX 4.7: HYDROSIZER SLIME OVERFLOW

SHELL METALS TIN ORE. FINES

SIZE (um)	WT. %	CUM WT%	ASSAY %Sn	CUM ASSAY	DISTN %	CUM DISTN
425	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	0.00	0.00
212	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.00	0.00	0.00
90	0.35	0.35	0.10	0.10	0.15	0.15
63	8.65	9.00	0.06	0.06	2.47	2.64
38	11.91	20.91	0.09	0.08	4.67	7.31
38	79.09	100.00	0.25	0.22	92.69	100.00
TOTAL	100.00	0.00	0.22	0.00	100.00	0.00

SHELL METALS TIN ORE. FINES FEED BASIS

SIZE (um)	WT. %	CUM WT%	ASSAY %Sn	CUM ASSAY	DISTN %	CUM DISTN
425	0.00	0.00	0.00	0.00	0.00	0.00
300	0.00	0.00	0.00	0.00	0.00	0.00
212	0.00	0.00	0.00	0.00	0.00	0.00
125	0.00	0.00	0.00	0.00	0.00	0.00
90	0.13	0.13	0.10	0.10	0.04	0.04
63	3.23	3.37	0.06	0.06	0.57	0.60
38	4.45	7.82	0.09	0.08	1.07	1.67
38	29.58	37.39	0.25	0.22	21.21	22.88
TOTAL	37.39	0.00	0.22	0.00	22.88	0.00

APPENDIX 4.8: HYDROSIZER PERFORMANCE DATA

Product	Wt. %	% Sn	Sn Distn.
No. 1 & 2 Cell U/F (Coarse Size)	39.4	0.510	56.6
No. 3 Cell U/F (Medium Size)	23.2	0.310	20.2
No. 3 Cell O/F (Slime Fines)	37.4	0.220	23.2

APPENDIX 4.9

SHELL METALS TIN ORE, COARSE FRACTION SPIRAL TEST.

PRODUCT	TPH	%WT.	%SOL	% Sn	UGR	DIST
CON	0.00	7.40	100.00	5.25	10.446	77.30
MID	0.00	14.76	100.00	0.34	0.568	8.39
TAIL	0.00	77.84	100.00	0.11	0.184	14.31
Feed	0.00	100.00	100.00	0.60	1.000	100.00
Prd.1-2	0.00	22.16	100.00	2.31	3.867	85.69

SHELL METALS TIN ORE, MED. FRACTION SPIRAL TEST.

PRODUCT	TPH	%WT.	%SOL	% Sn	UGR	DIST
CON	0.00	10.44	100.00	3.80	7.611	79.46
MID	0.00	18.99	100.00	0.28	0.561	10.65
TAIL	0.00	70.57	100.00	0.07	0.140	9.89
Feed	0.00	100.00	100.00	0.50	1.000	100.00
Prd.1-2	0.00	29.43	100.00	1.53	3.062	90.11

APPENDIX 4.10

SHELL METALS TIN ORE. COARSE FRACTION SPIRAL CON.

SIZE (um)	WT. %	CUM WT%	ASSAY %Sn	CUM ASSAY	DISTN %	CUM DISTN
25	0.98	0.98	4.97	4.97	0.78	0.78
00	15.08	16.06	9.43	9.16	22.76	23.54
212	13.36	29.42	10.16	9.61	21.73	45.27
80	7.42	36.84	8.02	9.29	9.52	54.79
25	24.48	61.32	4.71	7.46	18.45	73.25
90	22.00	83.32	4.41	6.66	15.53	88.77
63	11.78	95.10	3.89	6.31	7.33	96.11
38	3.52	98.62	4.24	6.24	2.39	98.50
38	1.38	100.00	6.80	6.25	1.50	100.00
TAL	100.00	0.00	6.25	0.00	100.00	0.00

SHELL METALS TIN ORE. MED.FRACTION SPIRAL CON.

SIZE (um)	WT. %	CUM WT%	ASSAY %Sn	CUM ASSAY	DISTN %	CUM DISTN
00	8.45	8.45	0.40	0.40	2.45	2.45
212	8.64	17.09	0.58	0.49	3.63	6.09
80	5.18	22.27	0.62	0.52	2.33	8.42
25	15.91	38.18	0.75	0.62	8.66	17.07
90	23.28	61.46	0.77	0.67	13.00	30.07
63	24.22	85.68	1.36	0.87	23.89	53.97
38	9.59	95.27	2.82	1.06	19.62	73.58
38	4.73	100.00	7.70	1.38	26.42	100.00
TAL	100.00	0.00	1.38	0.00	100.00	0.00

APPENDIX 4.11

SHWELL METALS TIN ORE, COARSE FRACTION TABLE TEST.

PRODUCT	TPH	%WT.	%SOL	% Sn	UGR	DIST
CN	0.00	5.43	100.00	47.92	7.879	42.78
MID	0.00	18.67	100.00	17.50	2.877	53.72
TAIL	0.00	75.90	100.00	0.28	0.046	3.49
Feed	0.00	100.00	100.00	6.08	1.000	100.00
Prd.1-2	0.00	24.10	100.00	24.35	4.004	96.51

SHELL METALS TIN ORE, MED. FRACTION TABLE TEST.

PRODUCT	TPH	%WT.	%SOL	% Sn	UGR	DIST
CON	0.00	4.63	100.00	42.36	10.560	48.89
MID	0.00	9.11	100.00	20.80	5.185	47.24
TAIL	0.00	86.26	100.00	0.18	0.045	3.87
Feed	0.00	100.00	100.00	4.01	1.000	100.00
Prd.1-2	0.00	13.74	100.00	28.07	6.996	96.13

APPENDIX 4.12

SHELL METALS TIN ORE, COARSE FRACTION MAG SEP.

PRODUCT	TPH	%WT.	%SOL	% SN	UGR	DIST
MAGS	0.00	61.69	100.00	70.85	1.484	91.57
MID	0.00	28.63	100.00	12.20	0.256	7.32
NON-MAGS	0.00	9.68	100.00	5.50	0.115	1.12
Feed	0.00	100.00	100.00	47.73	1.000	100.00
Prd.1-2	0.00	90.32	100.00	52.26	1.095	98.88

SHELL METALS TIN ORE, MED.FRACTION MAG SEP.

PRODUCT	TPH	%WT.	%SOL	% Sn	UGR	DIST
MAGS	0.00	59.22	100.00	66.63	1.541	91.23
MID	0.00	30.17	100.00	10.50	0.243	7.32
NON-MAGS	0.00	10.61	100.00	5.90	0.135	1.45
Feed	0.00	100.00	100.00	43.25	1.000	100.00
Prd.1-2	0.00	89.39	100.00	47.69	1.103	98.55

APPENDIX 4.13: QUANTITATIVE XRF SCAN OF TABLE CONCENTRATES

A. COARSE SIZE FRACTION TABLE CONCENTRATES

Assay Range	Elements Detected
>5	Sn
0.05% - 0.5%	Ti, Cr, Mn, Zr
50 - 500 $g.t^{-1}$	Ni, Cu, Zn, Y, Nb
50 $g.t^{-1}$	As, Rb

b. MEDIUM SIZE FRACTION TABLE CONCENTRATES

Assay Range	Elements Detected
>5	Sn
0.05% - 0.5%	Ti, Cr, Mn, Zr
50 - 500 $g.t^{-1}$	Ni, Cu, Zn, Y, Nb
50 $g.t^{-1}$	As, Rb

100

342101



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APPENDIX 2

Great Pyramid

Drill Logs SPG 1 and SPG 1A

The Shell Company of Australia Limited
METALS DIVISION

342103

102

DRILL LOG SHEET

Hole No : SPG 1

PROJECT : GREAT PYRAMID J.V.

LOCATION CODE : LH01

COLLAR CO-ORDINATES : 288·5 N 337·6 E

COLLAR R.L. : 200 m R.L.

LOCATION : GREAT PYRAMID - PYRAMID HILL

MAP/PHOTO REFERENCE :

HOLE SURVEY DATA

INSTRUMENT :

DEPTH	INSTRUMENT INCL.	INSTRUMENT AZ.	ACID ETCH INCL.	ACID ETCH AZ.	REMARKS
COLLAR	VERTICAL HOLE				
HOLE STOPPED DUE TO BAD GROUND					

DATE STARTED	19-7-83	HOLE SIZE		FROM	TO	TOTAL	CORE STORAGE	
DATE FINISHED	4-8-83	NON CORE	6 1/2 HAMMER 5 1/2 HAMMER	0 32 m	32 m 148·6 m	32 m 116·6 m	No OF TRAYS	
TOTAL DEPTH	157·6 m						SAMPLE STORAGE	SCAMANDER
LOGGED BY	P.A. RUXTON	CORE	NQ	148·6 m	157·6 m	9·0 m	ASSAY LAB.	COMLABS
CONTRACTOR	STACKPOOLE DRILLING						ASSAY REPORTS	DEVONPORT
RIG								SCAMANDER
DRILL CREW	WAYNE BALD	CASING	PW STEEL	0	32 m	32 m	MIN. & PET. LAB.	
	JACK BOWEN						MIN. & PET. REPORTS	
	PETER DUBBELD	CASING LEFT						

GRAPHIC / LETTER SYMBOL LOGGING KEY

	> 90 % SANDSTONE/QUARTZ		
	50 % - 90 % SANDSTONE		
	INTERBEDDED SANDSTONE/ SILTSTONES SHALES		
	50 % - 90 % SHALES SILTSTONES		
	90 % SHALES		

STRUCTURE / ALTERATION CODE

B BEDDING	O OXIDATION
J JOINTING	Sil SILICIFICATION
C CLEAVAGE	2°Sil SECONDARY SILICIFICATION
F FOLIATION	Fe IRON STAINING
sh SHEARING	± GOSSANOUS FILL
q QUARTZ VEINS	

DRILLING SUMMARY : *Drilled to test the fracture - related tin mineralization on Pyramid Hill at depth. To elucidate ① the continuity of grade with increasing depth, ② mineral zonation from Sn/Cu to WO_3/Mo with depth (?) ③ to test a broad aeromagnetic/ground magnetic anomaly at depth (≃ 200m) ④ to determine the nature of granite below such a system and mineralization if any associated with this granite source. The hole was sighted on the northern end of the Southern Mineralized block at the intersection of the gross WNW. mineralization trend of the system and the N.N.W. trend of South Block.*

PROJECT : GREAT PYRAMID SCALE : 1:100 HOLE No : SPG 1.

From	To	Inter'l (m)	Core Rec'd	% Rec'd	Sample No	Grap'c Log	Assays Sn	WO_3	Mo	Cu	Pb	Zn	Ag	Au	Weighted Assays/Ratios Mag Sus	% Estimates cass	assy	Mg	Core Angles	Alt.	T.S. P.S.	Description
0	6.0				12101		8	<10	<4	55	55	140	<1		34	Tr				Fe		0-6m Sandstone (50%), Siltstone (40%) - shale - staining and impreg of Fe. Trace Sn in pan. 1st metre fill on drill pad. Set up Cyclone.
6.0	8.0				12102		220	10	4	50	640	130	<1		25	?				Fe		6.00 - 8.00 m. fg sst. (85%) Fe staining + gossanous. (lumonite, geothite, haematite) fills, some amorph. black qtz. - minor cass. (?) with Fe.
8.0	10.0				12103		550	15	4	38	630	140	1		26	Tr				Fe		8.00 - 10.00 m. fg. sil. sst (quartzite) brown (60%) white/grey qtz. (20%) stt. Fe staining common + gossaneous fills Tr. Sn in pan.
10.0	12.0				12104		16	10	<4	50	90	270	<1		27					Fe		10.0 - 12.0 m fg. sst. (75%) Fe staining, 5% white/grey sst. No vis Sn in pan.
12.0	14.0				12105		14	10	<4	42	60	210	1		22	Tr				Fe		12.0 - 14.0m stt. (70%) fg sst (15%) + grey cleaved sst (10%) stt. generally purple colour - Fe staining common. Poss 1-2 grains cass in pan.
14.0	16.0				12106		2200	15	<4	150	155	120	<1		38	Min				Sil Fe		14.0 - 16.0 m M.g. sil sst (55%) Qtz vein material. 40% assoc. Fe staining dark brown cassiterite visible on fract. planes. Cass. panned red/brown (1-2 mm).
16.0	18.0				12107		145	15	4	70	170	50	<1		36					Fe		16.0 - 18.0 m Mg/fg sst (80%) - slightly purple Fe stained amorphous qtz. veining, no viz Sn in pan.
18.0	20.0				12108		90	15	<4	155	60	70	1		27					Fe		18.0 - 20.0 m fg. sst (60%) stt (35%) Fe staining rocks light purple or pale grey colour, no viz cass. in pan
20.0	22.0				12109		75	<10	<4	155	70	85	1		32	Tr				Fe		20.0 - 22.0 m fg. sst (80%) purple to light brown colour cleaved. Fe staining. Mm + Lim in fracts. Tr. cass in pan.
22.0	24.0				12110		920	10	<4	120	90	150	1		35	Min				Fe		22.0 - 24.0 m fg. sst (90%) brown + deep purple colours latter due to Fe. - fracture planes with dark brown cass. not uncommon. Fe staining. Tr cass in pan
24.0	26.0				12111		125	<10	<4	165	40	270	<1		35	Min				Fe		24.0 - 26.6 m fg. greenish sst (75%) red fg. sst (20%) Fe staining, minor fine cass in

5 cm

342104

HOLE No :

PROJECT : GREAT PYRAMID SCALE : 1:100 HOLE No : SPG 1

342105

From	To	Inter'l (m)	Core Rec'd	% Rec'd	Sample No	Grap'c Log	Assays Sn	WO3	Mo	Cu	Pb	Zn	Ag	Au	Weighted Assays/Ratios Mag Sus	% Estimates	Core Angles	Alt.	T.S. P.S.	Description
																				pan.
26.6	28.0				12112		95	10	<4	190	38	360	1		35	Tr		Fe		26.0 - 28.0 m fg. to mg. greenish sst. (90%) stt green minor smokey amorphous qtz. Fe staining Tr. Sn in pan
28.0	30.0				12113		125	25	4	160	70	310	<1		61	V Tr		Fe		28.0 - 30.0 m fg. to mg. greenish sst (90%) fracture planes at least 2 with gossanous, Fe staining. Some amorphous qtz. (black) veins V. Tr. Sn in pdn
30.0	32.0				12114		100	<10	<4	110	14	500	<1		35	Tr		Sil Fe		30.0m - 32.0m fg. to mg greenish sst/quartzite minor stt. Fe + gossanous filled fract planes -- pass. cass + Qtz fract. fills Tr. cass. in pan. fg.
32.0	34.0				12115		2050	10	<4	110	14	290	<1		35	Min & G.		Fe		32.0 - 34.0 m - mg. green/yellow sst (80%) Qtz. vein (18%) Fe staining (mainly limonitic). Euhedral and amorphous. Qtz. vein material. Min. Tin in pan - good tail.
34.0	36.0				12116		470	10	4	60	10	270	<1		64	Qtz Min		2°Sil Fe		34.0 - 36.0m. mg. green/yellow sst (90%) Qtz. vein (5%) Some degree of 2° silicification. Fe + gossanous material along fracture planes. Minor to good tin in the pan.
36.0	38.0				12117		220	15	<4	90	8	480	<1		40	Tr		Fe		36.0 - 38.0 m stt (65%) mg. sst (25%) Shales, Fe all chips - a green/grey colour.
38.0	40.0				12118		3400	20	4	360	700	270	1		115	Min & G.		Fe		38.0 - 40.0 m fg. sst (60%) shales (30%) sst grey/green shales green + amorphous black qtz. veins. Gossanous Fe along fractures.
40.0	42				12119		270	20	4	380	100	210	3		71			Fe		40.0 - 42.0 m purple/red shale/stt (65%) mg sst grey/green (10%) + Qtz vein material Pile of chips purple - gossanous impregnation, no tin in the pan.
42.0	44.0				12120		2400	35	4	260	250	125	7		115	Min & G.		Fe Sil		42.0 - 44.0 m fg. sil. sst. - diff. qtzite. (90%) minor shales gossanous staining (dem. limonite) Good to minor Sn in pan - good tail.
44.0	46.0				12121		950	25	4	430	36	80	3		64	Min		Fe		44.0 - 46.0m fg. sil. sst. green/clear (60%) stt, red (10%) green (10%) shales, Fe staining on fract. planes Minor tin in pan.
46.0	48.0				12122		630	10	4	430	26	95	1		74			Fe Sil		46.0 - 48.0 m fg. stt./stt. purple + brown in colour (80%) fg. sil sst grey/green (15%) Qtz. vein material (<1%) Fe on joint planes.
48.0	50.0				12123		70	<10	<4	320	42	170	1		95			?Sil Fe.		48.0 - 50.0 m mg. sst green/grey (60%) purple (40%) Minor Fe staining, some 2° silicification.

5 cm

SHEET 2 OF 7 SHEETS

HOLE No :

PROJECT : GREAT PYRAMID SCALE : 1:100 HOLE No : SPG 1

105

342106

From	To	Inter'l (m)	Core Rec'd	% Rec'd	Sample No	Grap'c Log	Assays Sn	W03	Mo	Cu	Pb	Zn	Ag	Au	Weighted Assays/Ratios Mag. Sus.	% Estimates Cass	Py	Fl	Core Angles	Alt.	T.S. P.S.	Description
50.0	52.0				12124		26	<10	<4	520	14	310	1		67					Fe		50.0 - 52.0 m. mg. green/grey sst. (40%) Black/grey stt cleaved (35%) + 20% green/grey stt. minor qtz vein, minor Fe along fractures.
52.0	54.0				12125		55	<10	4	260	10	300	1		75	Tr ?				Fe		52.0 - 54 m, mg grey sst. (90%) Qtz. black amorphous veins common, Fe along fractures Trace cass (?) in pan
54.0	56.0				12126		195	<10	4	280	130	400	1		97	Tr		Tr		2° Sil. Fe		54.0 - 56.0 m, fg. grey sst (60%) mg. grey sst/brownish 35% 2° Sil also present, minor qtz. veins, minor Fe in fractures Tr. Tin + Tr. py in pan.
56.0	58.0				12127		95	<10	4	160	70	300	1		102	Tr				Fe		56.0 - 58.0 m, mg sst grey/green (90%) some brown mg. sst. Fe in fract. some Euh. qtz + poss. cass. A few grains of cass. in the pan only.
58.0	60.0				12128		430	<10	<4	130	140	360	2		60	Tr		v.Tr		Fe		58.0 - 60.0 Grey cleaved shales (90%) mg/fg sst (10%) sst grey/green + Fe in fractures. Tr. cass + one grain of pyrite in the pan.
60.0	62.0				12129		80	20	<4	95	22	670	<1		60					Fe		60.0 - 62.0 m. Cleaved grey shales/stt 90%. 10% mg sst green/grey only Fe staining on sst may be contamination. No vn. cass in pan.
62.0	64.0				12130		24	<10	<4	30	18	580	<1		44	v.Tr		v.Tr				62.0 - 64.0 m. Grey sh/stt (90%) (No Fe or Qtz.) cleaved - soft 2 or 3 grains of cass and Py in pan
64.0	66.0				12131		14	20	<4	22	48	480	<1		49			v.Tr		Fe		64.0 - 66.0 m. Grey/blue sh/stt cleaved 80% brown stt/fg sst (15% - latter has Fe staining Traces of sulphide in the pan.
66.0	68.0				12132		10	10	<4	22	28	580	<1		53			Tr				66.0 - 68.0 m., Blue/grey cleaved shale (98%) Tr. pyrite in the pan.
68.0	70.0				12133		100	<10	<4	24	30	700	<1		86					Fe		68.0 - 70.0 m, fg grey sst/stt (80%) grey shales (15%) Some Fe staining. No visible cass in the pan.
70.0	72.0				12134		400	15	<4	280	200	720	4		88		Tr.			Fe		70.0 - 72.0 m grey sh/stt (90%) Some brown shale/stt, Fe along fractures + minor scorodite staining. Tr sulphides in pan (as py)
72.0	74.0				12135		55	<10	<4	50	220	800	1		69					Sil Fe		72.0 - 74.0 m, grey/blue, sh/stt, cleaved (75% fg. sil. sst (20%) + Fe stainings in both units.
74.0	76.0				12136		145	15	4	28	390	850	2		60			Tr.				74.0 m - 76.0 m grey/blue sh/stt (95%) cleaved + slight crenulation cleav.

5 cm

HOLE No :

PROJECT: GREAT PYRAMID SCALE: 1:100 HOLE NO: SPG 1

From	To	Inter'l (m)	Core Rec'd	% Rec'd	Sample NO	Grap'c Log	Assays Sn	W03	Mo	Cu	Pb	Zn	Ag	Au	Weighted Assays/Ratios Mag. Sus.	% Estimates Cass	aspy	Py	Core Angles	Alt.	T.S. P.S.	Description
																						342107
																						Tr. py in pan.
76.00	78.0				12137	—• •—	55	20	<4	14	60	600	<1		103					Fe		76.0 - 78.0 m; blue/grey fg. sst (20%) grey/blue shale/stt. 50% Fe staining + gossanous fills. No Trace of cass. in pan.
78.0	80.0				12138	—|— —| |—| —|—	200	10	<4	46	50	680	<1		67			Min		Sil. Fe		78.0 - 80 m; Grey/blue stt/sh (65%) fg. sil sst. limonite brown staining (30%) Tr. Pyrite + Some larger pyrite grains in pan.
80.0	82.0				12139	|— —| |— —|	200	20	<4	260	100	420	2		60		1%			Fe		80.0 - 82.0 m; Grey/Green fg. sst (30%) Blue/grey shale/stt cleaved Fe staining in fracts - minor qtz. vein material Approx. 1% as py in pan.
82.0	84.0				12140	•— —• •— —•	680	20	6	550	410	300	10		110			3%		Fe Sil		82.0 - 84.0 m; light grey stt/sh (50%) grey silicified fg sst/ stt (40%) Qtz. vein 5% visible arsenpyrite too (3%) Fe staining in fract. In pan aspy common.
84.0	86.0				12141	• • o o • • o	970	15	6	70	75	360	1		110			Min		Fe		84.0 - 86.0 m; fg grey sst (75%) grey shales (15%) Minor Fe staining along fracts. Minor aspy in pan.
86.0	88.0				12142	• • • • • •	1700	15	<4	770	270	500	5		220			Tr	Tr	Fe		86.0 - 88.0 m; Grey stt (80%) fg. sst grey (15%) minor Qtz vein + Fe in fractures Trace aspy and py in pan
88.0	90.0				12143	• • • •	1600	30	<4	530	95	140	1		270			Min		Fe Sil		88.0 - 90 m; fg sst grey (light grey) (80%) Qtz. vein 5% Fe staining in fracts. Min aspy in pan.
90.0	92.0				12144	•— —• •— —•	150	15	<4	220	38	260	<1		118					Fe Sil		90.0 - 92.0 m; fg mg sst grey (40%) grey stt (50%) minor Fe - staining on fractures. No vis cass. in pan
92.0	94.0				12145	o o • • o	410	10	4	410	95	190	1		116		Min	Tr		Fe Sil		92.0 - 94.0 m; mg grey sst (65%) dark grey cleaved stt (30%) Fe staining in fracts and gossanous fills minor Qtz. vein. Minor cassiterite in pan - Trace sulphide.
94.0	96.0				12146	—| |— —| |—	270	<10	<4	85	80	970	<1		220		Tr		Tr	Fe Sil		94.0 - 96.0 m; grey stt. (60%) mg-fg sst (35%) Minor Fe fract - fills/staining. Traces of cass + py in pan
96.0	96.0				12147	• • • • • •	290	10	<4	65	210	800	1		210		Tr		Min	Sil.		96.0 - 98.0 m: Sil fg. sst (quartzite) (75%) mg sst (15%) both grey/light grey colour Min Pyrite in the pan, Tr. cass
96	100.0				12148	• • • •	820	25	4	340	130	400	3		320			Tr	1%	Sil.		98.0 - 100.0 m; Sil mg/fg. sst light grey/clear (90%) Traces of pyr. + aspy. Large Chunks of Py in Pan 7mm across - = 1%.

5 cm

HOLE NO:

PROJECT : GREAT PYRAMID SCALE : 1:100 HOLE NO : DPG 1

342108

From	To	Inter'l (m)	Core Rec'd	% Rec.	Sample No	Grap'c Log	Assays Sn	W03	Mo	Cu	Pb	Zn	Ag	Au	Weighted Assays/Ratios Mag Sus.	% Estimates Cass	sulph	Py	Core Angles	Alt.	T.S. P.S.	Description
100.0	102.0				12149		240	10	4	40	260	700	1		340			Min				100.0 - 102.0 m fg. to mg. grey/clear sst (95%) Fracture planes with pyrite + chl. (?). Minor Py in pan - some large grains (4 mm).
102.0	104.0				12150		330	10	<4	80	190	1200	1		370			Tr				102.0 - 104.0 m fg. to mg. grey sst (65%) darker grey sltt (30%) fg. cass. on greyer chl. veins fractures? no vis. cass Tm py in pan.
104.0	106.0				12151		1050	10	4	130	100	1200	1		390		Tr	Min	Min		Sil	104.0 - 106.0 m fg. grey silicified sst (95%) Greenish grey chl. in fractures minor grey sltt. Aspy + py in the pan + Tr cass.
106.0	108.0				12152		400	15	<4	280	80	620	3		300		?		Tr		Sil	106.0 - 108.0 m fg. medium grey sil sst (80%) grey sltt (18%) Some qtz. vein with green chl ? assoc cass ? Tr. Py in pan, nos vis cass!
108.0	110.0				12153		270	<10	<4	190	50	510	2		200			Min			Sil	108.0 - 110.0 m; sil fg sst grey greenish 90%, 10% grey sltt. Minor Qtz./chl. vein material. Some large grains of Py in Pan.
110.0	112.0				12154		260	20	<4	210	32	660	1		240		Tr	Tr			Sil	110.0 - 112.0 m; Sil. fg. sst grey greenish (55%) grey cleaved sltt (40%). minor opaque / greenish Qtz vein. Py + aspy in pan.
112.0	114.0				12155		440	15	<4	140	44	690	2		260		Tr	Tr			Sil	112.0 - 114.0 sil fg sst (85%) minor grey sltt. grey colour some chips greenish (Chl ?) Tr. Py on fract planes. Tr aspy + py in pan
114.0	116.0				12156		1050	<10	<4	280	90	1700	3		200		Tr	Min			Sil	114.0 - 116.0 grey/greenish sil sst. v. hard (95%) Traces of Py disp ? along fracture planes as veinlets. Min. py + Tr. aspy in pan.
116.0	118.0				12157		560	<10	<4	130	140	1900	2		270		Tr	1%				116.0 - 118.0 fg. grey sst (95%) some white + green fg. sst chips. minor Qtz. vein too. Trace Py. 1% py in pan + Tr aspy.
118.0	120.0				12158		440	25	<4	270	330	1500	3		220		Min	Tr			Sil	118.0 - 120.0 m. fg. sst. grey/white/pale brown - silicified traces of Py (90%) Qtz. vein (5%) some greenish vein material Py + aspy. in pan
120.0	122.0				12159		290	10	<4	135	175	910			160			Tr				120.0 - 122.0 m. fg. sst/sltt. - cleaved (in parts). Some fractures with py. + qtz. fills. (latter uncommon) + Qtz. vein slightly greenish. Tr Py. in pan.
122.0	124.0				12160		100	<10	<4	50	44	470	1		210		Min	Tr			Sil	122.0 - 124.0 m. mg. sst. light grey/brown (40%) fg. (m.g) silicified sst (dark grey) (45%) grey cleaved sltt. 10% minor Qtz. vein material Tr. Py. + minor aspy in pan.
124.0	126.0				12161		420	<10	4	140	220	1600	2		250		Tr	Tr			Sil	124.0 - 126.0 m. fg. light grey sst (80%) some reddish fg sst - block amorphous qtz.

5 cm

HOLE NO :

PROJECT : GREAT PYRAMID SCALE : 1:100 HOLE No : SPG 1

342109

108

From	To	Inter'l (m)	Core Rec'd	% Recd	Sample No	Grap'c Log	Sn	WO3	Mo	Cu	Pb	Zn	Ag	Au	Mag Susc.	cass	aspy	py	sph	B	V	F	Alt.	T.S. P.S.	Description
																									veins Py. along fractures + chl. ? Tr. Aspy + py in pan
126.0	128.0				12162		200	15	4	130	80	1150	2		240		Tr	Tr					sil.		126.0 - 128.0 sil. fg. sst grey/green (95%) Minor qtz. vein material - Py in fractures. Tr Py + As Py in pan
												(WATER TABLE 130 m.)													130 m Hammer clogged up - lost circulation.
128.0	130.0				12163		280	10	4	170	90	630	2		260		Tr	Tr.					sil		128.0 - 130.0 m. fg. grey/green sst silicified (90%) Minor dark grey stts. Py along fractures + green mineral minor qtz. vein. Tr Py + aspy in pan
130.0	132.0				12164		690	<10	6	190	120	910	2				Tr	Tr					sil		130.0 - 132.0 m. Silicified fg. sst/quartzite light grey/clear 90% Minor dark grey cleaved stt chops (8%) Diff. to see individual grains in qtzite. (- almost vein qtz.) Chl. + py in sil. sst. Tr. Py + aspy in pan
132.0	134.0				12165		770	<10	4	150	120	1500	2		360		Min	Min					sil		132.0 - 134.0 Silicified fg. sst./quartzite v. hard light grey green (95%) Pyrite in veins + assoc. qtz. chl. + topaz.? Min Aspy, Py in pan.
134.0	136.0				12166		570	20	<4	110	210	1600	1		190	?	Tr	Tr					sil		134.0 - 136.0 m. fg. light brown silicified sst - extremely silicified (95%) chl. veinlets, minor Py + red mineral (cass ?). Tr Py + aspy panned cass ?
136.0	138.0				12167		260	25	<4	110	150	600	1		210		Tr	Tr					v. sil		136.0 - 138.0 m v. silicified fg. light brown sst/quartzite (95%) Pyrite veins + chl/Qtz. py veins + purple/pink. mineral. Tr Py + aspy in pan
138.0	140.0				12168		200	10	<4	70	140	650	1		116		Min	Min					sil.		138.0 - 140.0 m. fg. grey silicified sst. (60%) with chl./Py veins - fine stt cleaved dark grey (35%) Minor Qtz. vein material. Minor Py. + aspy in pan.
140.0	142.0				12169		160	<10	<4	90	70	470	1		260								sil		140.0 - 142.0 m. fg. light grey silicified sst (80%) + minor grey silicified cleared stt. Tr. Py + aspy in pan.
142.0	144.0				12170		350	15	4	150	100	850	2		340		Tr.						sil		142.0 - 144.0 m fg. grey silicified sst (80%) silicified dark grey stt. greenish colour too. Minor chl. veins Tr. py. + aspy. in pan.
144.0	146.0				12171		430	20	4	130	90	1300	2		250		Tr	Tr					sil.		144.0 - 146.0 m. fg. light grey sil. sst (40%) grey dark stt silicified - some evidence of cleavage (58%) Grain veins - veinlets - chl. Minor Qtz. vein. Tr. py + aspy in pan
146.0	148.6				12172		410	10	4	130	65	970	1		320		Tr.	Min					sil.		146.0 - 148.0 m. fg. light grey sil. sst (40%), dark grey fg. sil. sst/stt (55%) minor chl. veining. Min. py. + tr. aspy. in pan.
148.6	150.6				12172 1										150			Tr	Tr.		30°	30°			148.6 N.Q. Coring 148.6. fg. to mg. silicified sst/Quartzite - spotted rock. Minor faulted shale units.

5 cm

HOLE No :

PROJECT : GREAT PYRAMID. SCALE : 1:100 HOLE NO : SPG 1

From	To	Inter'l (m)	Core Rec'd	% Rec'd	Sample No	Grap'c Log	Assays Sn	W03	Mo	Cu	Pb	Zn	Ag	Au	Weighted Assays/Ratios Mag Sus.	% Estimates Sn	Mal	Py	Sph	Core Angles B	V	F	Alt.	T.S. P.S.	Description
																		Tr	Tr		40				Qtz./chl. + sphalerite ± galena/chp veining common cross-cuts earlier qtz. veins; 40° and 30° to C.A. respectively 150 magn. susc. related to shale + chl. veins.
150.6	153.4	2.8	0.9		121722										65										
153.4	156.6	3.2	2.4		121723										60			Tr	Tr		25				150.6 - 153.4 Zone of core loss - broken core intense chl./sph/gal/Py/chp veins - fracture - fills silicified fg./mg. grey ssts.
																					35°				153.4 - 156.6 fg. ssts with common dark grey/black shale/sltst units - generally faulted contacts. Colour grey/green - chl. disseminated + qtz./chl./sph/chp/gal. in fractures + veins.
																					40				Hole terminates in qtz vein material + silicified dark grey/green ssts.
156.6	E. of Section																								156.6 End of Section.
	PARALLEL HOLE DRILLED FROM 151.3 m to 157.6 m E. of H.																								
PART 2																									
151.3	153.1	1.8	1.8		121724										11				Tr						151.3 - 154.5 Mixed sequence of fg. sst/sltt/sh. — generally fg. dark grey/greenish colouration chl. disseminations + Chl/Sph./galena Trace py/chp veining common chl over 66% of vein/fract. fills. slight spotting.
																					45				
153.1	154.5	1.4	1.4		121725										750		Tr	Min	Min		35°				153.1 - 154.5 m; galena/sphalerite veins common + Py/sph/gal/chp/as py/ vein 153.4 m. 750 magn. Susc.
154.5	156.2	1.7	1.7		121726										32				Tr.						154.5 - 156.2 spotted fg. sst. v. highly silicified minor dark grey/black shale units.
156.2	157.6	1.4	0.3		121727	VOID									20				Tr.						156.2 - 157.6 m: 1m + void (cavity) 0.3 m of qtz. chl. vein material - minor py + dark green/silicified ssts.
157.6	E. of H.																								

5 cm

SHEET 7 OF 7 SHEETS

342110

HOLE NO : 103

The Shell Company of Australia Limited
METALS DIVISION

342111

110

DRILL LOG SHEET

Hole No : SPG 1A

PROJECT : GREAT PYRAMID J.V.

LOCATION CODE : LH01

COLLAR CO-ORDINATES : 294 N 346 E

COLLAR R.L. : 200 m R.L.

LOCATION : PYRAMID HILL

MAP/PHOTO REFERENCE :

DATE STARTED	5 - 8 - 83	HOLE SIZE		FROM	TO	TOTAL	CORE STORAGE	SCAMANDER
DATE FINISHED	15 - 9 - 83	NON CORE	$5\frac{1}{2}$ HAMMER	0	120m	120	NO OF TRAYS	
TOTAL DEPTH	348·3						SAMPLE STORAGE	SCAMANDER
LOGGED BY	P.A. RUXTON	CORE	HQ	120m	142·6 m	22·6 m	ASSAY LAB.	COMLABS
CONTRACTOR	STACKPOOLE DRILLERS		NQ	142·6 m	348·3 m	205·7 m	ASSAY REPORTS	DEVONPORT
RIG	FOX B/80 + B/40							SCAMANDER
DRILL CREW	MAX HARVEY	CASING					MIN. & PET. LAB.	
	WAYNE BALD						MIN. & PET. REPORTS	
	JOHN BOWEN	CASING LEFT	NONE					

HOLE SURVEY DATA

INSTRUMENT :

DEPTH	INSTRUMENT INCL.	INSTRUMENT AZ.	ACID ETCH INCL.	ACID ETCH AZ.	REMARKS
COLLAR	VERTICLE HOLE				90
40 m	84·5°				taken inside steel casing
80 m	78 °				taken inside steel casing
121 m	66°				
150 m	61·5°	057 °			EASTMAN CAMERA
200 m	60 °	054°			(checked)
250 m	58·5°	053°			
307 m	56·5°	054°			
345 m	54°	053°			

GRAPHIC / LETTER SYMBOL LOGGING KEY

>90 % SANDSTONE QUARTZITE	Q	QUARTZITE
50 % - 90 % SANDSTONE		
INTERBEDDED SANDSTONE SILTSTON / SHALES		
50% - 90% SHALES/SILTSTONES		
>90 % SHALES		

STRUCTURE / ALTERATION CODE

B BEDDING
J JOINTING
C CLEAVAGE
F FOLIATION
sh SHEARING
q QUARTZ VEINS
O OXIDATION

DRILLING SUMMARY : The Second attempt to drill a vertical combined percussion/diamond drillhole to test the Great Pyramid mineralization at depth. The hole lifted 36° travelling 140 m. along the surface to 054°. Root zone mineralization of the North Block was intersected between 230m and 330 m. However the last 20 m of drill core suggest a very confined mineralized system passing into relatively unsilicified and unspotted siltstones and shales. The presence of molybdenite, Wolframite topaz and fluorite combined with intense silicification and spotting between 230 m and 330 m suggest the hole passes close to granite.

PROJECT : GREAT PYRAMID SCALE : 1:100 HOLE No : SPG 1A

From	To	Inter'l (m)	Core Rec'd	% Rec'd	Sample No	Grap'c Log	Assays Sn	WO_3	Mo	Cu	Pb	Zn	Ag	Au	Weighted Assays/Ratios Magnetic Susceptibility	% Estimates Sn	Core Angles	Alt.	T.S. P.S.	Description 342112
0	6	6			12201		360	<10	<4	80	32	50	1		17	Min				0-6m. Silicified f.g. to m.g. sst 80% with qtz. veins - amphorous + qtz. and gossanous fracture fills. 2° silicification along fracts. Fe staining. Minor slt/sh grey. Pan - dark/brown cassiterite (-2mm grains.
6	8	2			12202		430	20	<4	100	180	75	1		42	Min				6-8m f.g silicified sst 80% mg sil sst 15% Fe staining prolific + Fe gossanous fracture fills, smokey qtz veins. Pan - f.g. (1-1.5mm) dark brown Sn.
8	10	2			12203		28	15	<4	55	50	36	1		280	Min				8-10m. f.g. silicified sst (-brown & purple in colour) 80% f.g. sst/slt 15% Fe staining + gossanous fills - Smokey qtz. veins Pan - f.g. dark brown cassiterite
10	12	2			12204		310	10	4	120	90	80	1		37	G				10-12m f.g silicified sst 75% f.g. sst/slt 20% - purple/brown coloration. 2° silification + Fe staining. Pan - f.g. cassiterite (dark brown)
12	14	2			12205		700	10	<4	70	70	50	1		32	Min				12-14m f.g silicified sst 85% 2° sil + Fe staining and fract-fill - cass. along fractures. Grey sh/slt cleaved 10% Pan - f.g. cassiterite (brown)
14	16	2			12206		110	10	<4	90	70	44	<1		22	Min				14-16m Purple/pale blue slt 60% f.g sil sst dark reddish/brown Fe staining and gossanous fills, minor qtz veins Pan - f.g. brown cassiterite.
16	18	2			12207		270	10	<4	100	32	80	<1		23	Min				16-18m f.g. sil. sst. purple 55% cleaved slt/f.g sst 40% Fe staining common, amphorous qtz veining Pan - fg - m.g. cass. dark brown.
18	20	2			12208		240	10	<4	110	24	60	<1		26	Min				18-20m f.g purple sst (60%) slt purple (35%). Impregnated with Fe, Fe staining common, black amorph. qtz veins. Pan - f.g. brown cassiterite.
20	22	2			12209		50	15	<4	155	50	160	1		21	Tr				20-22m slt purple - slightly cleaved (70%) f.g. sil. sst. (25%) Fe staining minor qtz vein Pan - trace brown cassiterite
22	24	2			12210		75	15	<4	145	18	450	<1		42	Tr				22-24m Green (dark) slts./+ shales (80%) f.g. sst. light brown (10%) Fe staining common Pan - trace cassiterite.
24	26	2			12211		340	15	<4	100	8	290	1		49	G				24-26m Green/brown m.g to f.g. sst. - minor 2° sil (80%) Fe staining Grey cleaved shales/slt (10-15%)

HOLE No :

PROJECT : GREAT PYRAMID SCALE : 1:100 HOLE NO : SPG 1A

From	To	Inter'l (m)	Core Rec'd	% Rec'd	Sample No	Grap'c Log	Assays Sn	WO_3	Mo	Cu	Pb	Zn	Ag	Au	Weighted Assays/Ratios Magnetic Susceptibility	% Estimates Sn	Core Angles	Alt.	T.S. P.S.	Description 342113
																				Pan – good f.g. to m.g. cassiterite (2-3mm)
26	28	2			12212		410	15	<4	280	46	370	<1		41	Min				26-28m light brown/green f.g. sst (80%) m.g. sst (10%) Shales + slts Fe staining plus fractured related Fe + Qtz. Pan – minor cassiterite dark brown.
28	30	2			12213		850	10	<4	280	6	220	<1		46	V.G.				28-30m green/clear silicified f.g. sst (65%) partly cleaved green slt (30%) Fe staining Pan – c.g. + f.g. cassiterite, deep brown.
30	32	2			12214		2150	20	<4	250	8	170	1		55	Excel				30-32m mg to fg sil sst (70%) cleaved green sst (25%) Fe staining minor amorphous Qtz. Pan – Excellent Sn in pan dark brown.
32	34	2			12215		4050	20	4	330	500	90	6		60	Excel				32-34m fg to mg sil sst (90%) colour varies from greenish/clear to purple/red. Vis. cass. assoc. with vein Qtz. Pan – Excellent Sn, dark brown.
34	36	2			12216		1750	40	4	420	110	105	9		47	Tr				34-36m fg sil clear/green sst (35%) red/purple mg to fg sil sst (35%) cleaved slt (20%) + Qtz vein and Fe staining. Pan – Tr tin
36	38	2			12217		2050	30	4	220	70	65	6		48	V.G.				36-38m mg/fg clear/grey silicified sst (some purple/red) (90%) Fe staining + some Qtz in fractures. Pan – v. good dark brown tin.
38	40	2			12218		1850	15	4	430	110	120	5		60	G				38-40m fg/mg sil sst grey/clear + purple/red colouration, minor Qtz vein + chl? staining Pan – good tin dark brown.
40	42	2			12219		740	10	<4	540	90	210	1		43	Mod				40-42m fg sil sst clear/grey (30%) red/purple sil sst (35%) cleaved siltstone (30%) purple Fe impregnation + staining + black qtz vein Pan – cassiterite dark brown.
42	44	2			12220		44	15	<4	530	34	300	1		112	Tr				42-44m mg silicified green/grey/clear sst (75%). Purple cleaved slt/fg sst (20%) Black Fe/Mn (?) staining Fe impregnation Pan – Trace cassiterite + black oxide
44	46	2			12221		115	15	<4	190	50	300	<1		103	Tr				44-46m mg silicified green/grey sst (90%) 2° Sil gives darker quartzite, Fe staining along fractures. Pan – Trace cassiterite
46	48	2			12222		24	15	<4	70	16	500	<1		63					46-48m fg sil sst/slt grey/green (60%) Grey slt/fg sst cleaved (35%) Minor Fe staining. Pan – No vis. tin.
48	50	2			12223		230	10	<4	60	48	660	<1		91	Tr				48-50m mg to fg sst silicified green/brown (80%) Fe staining minor + Qtz veins Green cleaved slt (15%) Pan – Trace dark brown tin

5 cm

112

HOLE No :

PROJECT : GREAT PYRAMID SCALE : 1:100 HOLE No : SPG 1A

342114

From	To	Inter'l (m)	Core Rec'd	% Rec'd	Sample No	Grap'c Log	Assays Sn	WO_3	Mo	Cu	Pb	Zn	Ag	Au	Weighted Assays/Ratios Magnetic Susceptibility	% Estimates Sn	As Py	Py	Core Angles	Alt.	T.S. P.S.	Description
50	52	2			12224		850	15	4	120	28	560	1		79	Tr						50-52m Mg green silicified sst (65%) fg sst/slt brown (25%) Qtz. vein sst spotted. Minor Fe staining. Pan - Minor to Tr cassiterite.
52	54	2			12225		100	<10	<4	40	8	330	<1		65	VTr	Min					52-54m Silicified fg grey sst - minor fracts. + 2° sil at margins (some slt) (90%) Minor Fe staining. Pan - V Tr tin + minor arsenopyrite.
54	56	2			12226		1450	10	<4	160	14	240	<1		92	Min	Tr					54-56m Mg grey sst silicified (90%) minor chl + sulphide veining. Minor Fe staining on fractures Pan - brown cassiterite - one gr. of arpy
56	58	2			12227		350	<10	<4	70	28	350	<1		63	Tr		Min				56-58m mg/fg grey sil sst (40%) darker grey cleaved slt (55%) Minor Fe staining and qtz veins. Pan - Minor py - trace cassiterite.
58	60	2			12228		460	10	<4	50	70	380	<1		67	Tr	Tr					58-60m Cleaved grey slt/shale (80%) fg sil grey/green sst (10%) Minor Fe staining and fracture fills. Pan - Trace cassiterite, trace arsenopyrite
60	62	2			12229		34	10	<4	30	26	200	<1		44		Tr	Tr				60-62m Dark grey cleaved slt (85%) mg to fg grey/brown ssts (10%) Minor Fe staining. Pan - Traces of arsenopyrite and py? v. minor.
62	64	2			12230		16	15	<4	24	16	200	<1		89		Tr					62-64m Dark grey cleaved slt (70%) Grey mg/fg ssts (20%). Minor Fe. staining along fractures Pan - Trace arsenopyrite.
64	66	2			12231		14	<10	<4	30	42	390	<1		57		Tr					64-66m Dark grey cleaved slt/shale (85%) fg/mg light brown/grey sst + Fe staining. Minor Fe staining generally on ssts. Pan - Trace arsenopyrite.
66	68	2			12232		70	15	<4	80	60	610	<1		69							66-68m Dark grey cleaved shale/slt (65%) light brown fg slt/quartzite (30%) + Qtz. vein material. Minor Fe staining on fracts. Pan - Naught
68	70	2			12233		150	10	<4	70	80	780	1		103			Tr	Min			68-70m fg sst dark grey (20%) brown (20%) grey slt cleaved (55%) Fe staining along fractures. Minor chl fractures. Pan - pyrite + minor arpy.
70	72	2			12234		105	15	<4	30	70	630	<1		75			Tr	Tr			70-72m Dark grey sst partly cleaved (75%) fg sil slt (20%) Minor Fe staining. Pan - Tr py + Tr arpy
72	74	2			12235		1150	20	4	380	80	300	2		160	G	Min	Tr				72-74m Light brown/clear sil. fg sst/quartzite (90%) (10%) dark grey cleaved slt/fg sst. Fe staining common. Pan - red/brown Sn, minor py + Tr aspy.
74	76	2			12236		1000	<10	4	170	90	340	1		140	Min		Tr				74-76m mg to fg silicified pale brown sst. Minor Fe staining (80%) dark grey cleaved slt (15%) + Qtz vein material

5 cm

HOLE No :

PROJECT : GREAT PYRAMID SCALE : 1:100 HOLE No : SPG 1A

114

From	To	Inter'l (m)	Core Rec'd	% Rec'd	Sample No	Grap'c Log	Assays Sn	WO_3	Mo	Cu	Pb	Zn	Ag	Au	Weighted Assays/Ratios Magnetic Susceptibility	% Estimates Sn	Aspy	Py	Core Angles	Alt.	T.S. P.S.	Description
																						Pan - reddish brown tin. Tr. py.
76	78	2			12237		38	10	<4	36	16	580	1		64	Tr		Tr				76-78m Dark grey cleaved slt (95%) Tr. chl. in veins. Pan - Tr. pyrite + tr. cassiterite.
78	80	2			12238		170	15	<4	60	36	460	1		130	Tr		Tr				78-80m Dark grey cleaved slt (40%) Grey fg/mg sandstones (55%) fe staining on silicified sst + 2° sil along fracts. Pan - Tr. f. cassiterite + Py
80	82	2			12239		1300	15	4	150	110	180	2		150	Min	Min					80-82m Sil. fg grey & light brown sst/quartzite (15%) Minor qtz veining chl. on fractures & fe staining. Pan - Min Sn red/brown, minor aspy
82	84	2			12240		3650	15	<4	200	34	140	2		160	G						82-84m Silicified grey/brownish fg sst. (90%) Fe staining common + Qtz vein (5%) Shales (5%) - Chl. in fracts. Pan - Good red/brown tin, trace sulphides
84	86	2			12241		1000	20	<4	300	230	320	4		200	G	Tr	Tr				84-86m Grey/clear fg sil sst (+ minor mg grey sst) (85%) grey cleaved shales/slt (10%) Fe staining + Qtz vein, chl. in fracts. Pan - Good red/brown Sn, Tr. aspy Py
86	88	2			12242		195	25	<4	85	80	260	2		180	Tr?		Tr				86-88m fg grey sil sst (light grey) (60%). Dark grey cleaved slt/sh. (35%) - Qtz vein, minor chl. material + min Fe staining Pan - Trace Py, tr. cass?
88	90	2			12243		70	20	4	55	48	300	1		160			Tr				88-90m Light grey fg silicified sst (95%) chl along fractures, Trace Fe staining. Pan - tr py.
90	92	2			12244		100	15	<4	80	48	360	<1		150			Tr				90-92m fg grey sil sst (minor mg material) (70%) dark grey cleaved slt (25%) minor Fe staining. Pan - Tr Py + a couple of grains of cass
92	94	2			12245		460	15	4	850	120	180	4		210			Min				92-94m Sil mg to fg sst. light to medium grey colour (95%) + Qtz vein material. Fe staining. Minor chl + vis Py on fracts/veins. Pan - Min py, upto 2mm across
94	96	2			12246		330	20	<4	145	150	400	2		180			Min				94-96m light grey/clear silicified fg ssts/qtzites (90%) Qtz vein (5%) Fract/veins of chl + pyrite Pan - lots of pyrite upto 3.5mm across.
96	98	2			12247		300	10	4	270	120	480	2		210		Excell	Min				96-98m light grey/clear silicified fg sst (92%) cleaved dark grey slt (5%) Qtz vein + chl/qtz vein & visible Py aspy Pan - Excell. aspy - upto 5mm across + minor Py.
98	100	2			12248		430	30	4	1500	120	240	13		270		G	Excell				98-100m Light grey highly silicified fg sst (95%) Visible Py + aspy upto 5mm across assoc. with more intensely silicified areas Pan - Pyrite common (8mm max) + aspy

5 cm

HOLE No :

PROJECT : GREAT PYRAMID SCALE : 1:100 HOLE NO : SPG 1A

115

From	To	Inter'l (m)	Core Rec'd	% Rec'd	Sample No	Grap'c Log	Assays Sn	WO_3	Mo	Cu	Pb	Zn	Ag	Au	Weighted Assays/Ratios Magnetic Susceptibility	% Estimates Sn	Asly	Py	Sph	Core Angles B	Y	Alt.	T.S. P.S.	Description 342116
100	102	2			12249		210	20	<4	330	75	280	1		99		Min	Min						100-102m Light grey/clear sil fg sst (65%) Greenish cleaved slt + fg sst (30%) Qtz vein material + thin Py veinlets. Pan - min Py + aspy.
102	104	2			12250		125	10	4	125	36	320	1		95		Tr	Tr						102-104m Light grey sil fg sst (60%) Greenish/grey sst/fg sst cleaved (35%) + Qtz vein. Min chl along fractures. Pan - Traces of py + aspy.
104	106	2			12251		185	10	<4	80	60	340	<1		77		Tr	Tr						104-106m Light grey/green fg silicified ssts (80%) Greenish cleaved fg ssts/slt (15%) Minor Fe staining - contamination. Traces of py. Pan - Tr py + aspy
106	108	2			12252		610	15	4	90	60	430	<1		190		Tr	Tr						106-108m Green(pale) silicified mg to fg sst (90%) Green slt cleaved (5%) + Qtz vein material. Qtz + chl. veins. Pan - Traces of py + asp + Sn? (sph?)
108	110	2			12253		220	20	<4	110	70	400	1		210		Min	Min						108-110m Light grey + green silicified fg sst (98%). Qtz vein (2%) + pyrite + chl/Qtz. veins. Pan - Min. py + aspy.
110	112	2			12254		300	10	4	80	410	700	1		240		Tr	Min						110-112m Silicified fg grey/greenish sst (95%) Pan - Minor Py trace aspy.
112	114	2			12255		630	55	4	70	130	960	1		300		Tr	Tr						112-114m Grey fg silicified sst (55%) Dark grey cleaved (40%) slt + Qtz vein - minor chl. Pan - Trace sulphides.
114	116	2			12256		250	10	<4	130	100	590	1		310		Tr	Tr						114-116m Dark grey fg sst/slt slightly cleaved (95%) greenish - Minor Qtz vein. Pan - Trace py + aspy.
116	118	2			12257		165	10	<4	90	70	500	1		230		Tr	Tr						116-118m Dark grey fg sst/slt cleaved - (95%). Minor Qtz vein. Trace py on fracts. Pan - Trace py + aspy.
118	120	2			12258		170	20	<4	100	60	480	1		220		Tr	Min						118-120m Dark grey fg sst/slt partly cleaved (95%) Minor Qtz vein. Pan - Minor py, Trace aspy.
120	121	1			122581	Q	280	15	<4	90	120	1800	1	ppm	42		Tr	Tr	30°	30° 60°		sil		120.0 HQ Coring
121	122.5	1.5			122582	Q	440	15	<4	60	130	1300	1	ppm	20		Tr	Tr				sil chl		120.0 - 125.3 Highly silicified sh/slt/ssts - quartzite generally - minor spotting. Bedding rare. Veins of chl/qtz. + sphalerite/chalcopyrite pyrite (upto 1% sphalerite in places) Rocks grey/greenish colouration - green due to disseminated chl.
122.5	123.4				122583		730	45	<4	210	95	2500	2	ppm	33		Tr	Tr		50°				120.0 - 121.0 Bedded slt/sh - load structures - beds young up the hole.
123.4	125.0				122584	Q	790	25	10	150	230	3000	4	ppm	25		Tr	Tr		20° 80°		sil chl		121.0 - 122.5 Highly broken core - fg sst/sh chl disseminations. Spotting common. 122.5 - 123.4 Silicified sst/slt chl veins v. common - assoc. py + sph + ch - spotting. Core broken - highly fractured

5 cm

HOLE NO.

PROJECT : GREAT PYRAMID SCALE : 1:100 HOLE Nº : SPG 1A

342117

From	To	Inter'l (m)	Core Rec'd	% Rec'd	Sample Nº	Grap'c Log	Assays Sn	WO_3	Mo	Cu	Pb	Zn	Ag	Au	Weighted Assays/Ratios Magnetic Susceptibility	Gal	% Estimates Sn	AsPy	Py	Sph	Core Angles B	Y	F	Alt.	T.S. P.S.	Description
125·0	125·3				122585		450	20	<4	32	60	630	2	<0·05	20				Tr	Min						123·4 - 125·0 Highly broken/fractured/veined. Mathinna Beds silicified. chl/Qtz/sph/chp/py veins common
125·3	127·5				122586		370	20	<4	60	75	1600	<1	<0·05	65				Tr	Min						125·4 - 125·3 - 0·15m oxidized quartzite (fractured) 0·15m of Qtz/chl veining
																							10°			125·3 - 129·5 Green silicified mudstone/shale brecciated by qtz/chl/sph veins/fractures. Minor spotting.
																					40°					126·0 - 126·6 highly broken zone - brecciated - veined
127·5	129·5				122587		790	10	4	260	180	1050	3	<0·05	27			Tr	Tr	Min						129·3 large shalerite - bearing brecciated zone (1cm across) also with chp/py + gal?/aspy?
																Tr					40°				
129·5	130·8				122588		620	15	<4	110	22	1150	2	<0·05	32				Tr	Min						129·5 - 130·8 Grey/green quartzite - extremely silicified fg ssts - spotting common - fractured py fills + chl/Qtz/sph + py veining
130·8	132·6				122589		1850	10	8	230	24	2600	1	<0·05	60			Tr	Tr	Min						130·8 - 132·6 Light green silicified shale/slt - spotted & brecc/veined. 132·4 Vein of Qtz/Aspy/chp (0·5mm) 60° to CA
																					60°					
132·6	134·1				122601		880	10	4	260	116	1500	2	<0·05	22				Tr	Tr	10°	10°				132·6 - 135·5 Grey quartzite - silicified fg ssts + chl veins & fracture fills + py/sph slight spotting
134·1	135·5				122602		850	25	8	320	85	1000	7	<0·05	54				Tr	Tr						
135·5	137·5				122603		1750	40	<4	640	38	1200	10	<0·05	40				Tr	Tr						135·5 - 137·5 Light grey quartzite (silicified mg sst) - minor spotting, diss. + vein chl. - minor faulted shale units - irregular; Py + sph assoc. with chl. veining 135·5 - 136·0 broken core
137·5	139·7				122604		520	20	10	220	130	710	3	<0·05	45				Tr	Tr	50°					137·5 - 139·7 Grey/green silicified fg sst - Quartzite minor spotting, v. hard chl/py/sph veining/fracture fills.
																					10°					
																					65°					
139·7	140·9				122605		340	35	4	190	65	1300	2	<0·05	24				Tr	Tr						139·7 - 141·7 Light grey/green silicified fg sst. Qtz/sph/+chl & chl. veins.
																					30°					140·9 - 141·7 Qtz veining common assoc. chl + sph. Py common at 141·0
140·9	141·7				122606		700	35	8	660	630	5500	13	<0·05					Min	Min						and sph at 141·2 V. fractured + kaolinitic clay fills.
141·7	142·6				122607		450	20	<4	520	160	1000	7	<0·05	87											141·7 - 141·6 Mixed sandstone/shales dark grey - spotted highly fractured. chl/kaol/qtz. fills + Py common
142·6	143·8				122608		660	30	6	1250	160	890	14	<0·05	160	(Py/sph vein)		Tr	G	Tr	50°					minor sphalerite - trace pyrrhotite. 142·6 N.Q. Coring.
					122609		760	15	<4	200	38	1100	3	<0·05	54						45°					142·6 - 153·1 Intercalated highly silicified f.g. sst/quartzite
143·8	144·2				122610		1100	20	4	75	85	560	1	<0·05	55						10°					light grey + dark grey black shales/siltstones silicified. Quartz/chl.
144·2	145·0																				50°					veining + sph. and pyrite. Traces of Topaz (?) Minor spotting.
145·0	145·7				122611		130	15	4	70	90	540	2	<0·05	150	(Py assoc)										in finer units.
145·7	146·4				122612		210	20	<4	50	70	140	1	<0·05	20					Tr						142·6 - 143·0 Py rich section trace as. py + chp.
146·4	147·4				122613		48	<10	<4	36	26	230	1	<0·05	37					Tr						143·8 - 144·2 Dark grey silicified shales - fractured and spotted.
																										145·0 - 145·7 Light grey sst. dom. seems to be reverse graded to black shales - sharp contacts minor spotting
147·4	148·5				122614		70	15	4	26	60	100	<1	<0·05	19						55°					145·4 Massive Py. (Topaz (?).
																					30°					
148·5	150·2				122615		460	20	4	65	420	910	3	<0·05	74				Tr	Tr						146·3 Peculiar dendritic veining (of Py + black mineral) v. fine veins in quartzite.

5 cm

SHEET 6 OF 14 SHEETS

HOLE Nº :

PROJECT : GREAT PYRAMID SCALE : 1:100 HOLE No : SPG 1A

342118

From	To	Interv'l (m)	Core Rec'd	% Rec'd	Sample No	Graph'c Log	Assays Sn	WO_3	Mo	Cu	Pb	Zn	Ag	Au	Weighted Assays/Ratios Magnetic Susceptibility chp. Gal.	% Estimates Sn	As_2S_3	Py	Sph	Core Angles B	V	P	Alt.	T.S. P.S.	Description
150·2	150·7				122616		610	<10	<4	130	1700	1700	4	<0·05	74				Tr						148·5 - 150·2 Highly veined/altered zone. Qtz/chl. + Sph - minor
150·7	153·1				122617		90	15	<4	75	75	500	<1	<0·05	32								sil		CO_2 - silicified Kaolinite ?, Minor spotting, broken core.
																Tr.		Tr	Min	15°					160·2 - 150·7 Black shale - highly veined. Kaol/clay, Qtz + chl. and Sph. spotting. Minor quartzite.
																									150·7 Py/sph/galena vein 35° to CA (Topaz (?).
																					90°		chl		151·6 Kaol vein 15° to C.A. Intercolated shales - irregular margins
153·1	155·0				122618		44	15	<4	28	12	600	<1	<0·05	21		Tr		Tr	30°			sil chl.		Minor, red, mg, sst. units.
																				35°	20°				153·1 - 156·6 Interbedded sst/slt/shales on a scale of several cms.
																									Shales spotted. Qtz/chl. veins. Tr. Sph. Veining less intense.
																Tr.									Shales greenish/grey, sandstones pinkish red.
155·0	156·6				122619		790	20	<4	40	12	820	<1	<0·05	20		Tr.		Tr	25	40°				154·8 Load structure, Younging up the hole
																									155·0 - 155·4 Qtz/chl. veins common + Tr. sph + chp.
																							chl		155·6 - 156·4 Broken Core, Qtz/chp/chl veining, 10° to C.A.
156·6	158·1				122620		110	<10	8	34	10	160	<1	<0·05	10		Tr		Tr		10°	5°	Q		156·6 - 164·5 Red/Pink ssts/stts + greenish stt/shales.
																					20°				bedding not readily apparent. Minor Qtz/chl. veining.
																									156·6 - load casts, suggests beds overturned. (?)
158·1	158·6				122621		22	15	<4	16	8	230	<1	<0·05	12					10					156·6 - 158·1 Pinkish cg. sst slightly spotted.
158·6	159·8				122622		18	<10	<4	26	8	220	<1	<0·05	25										158·1 - 158·6 sst/shales + Qtz/chl. vein 2cm thick.
																				20					158·6 - 159·8 Greenish stt/fg. sst. minor Qtz/chl. veins
159·8	162·6				122623		36	<10	<4	50	60	400	<1	<0·05									sil		159·8 - 162·6 Qtz. veins 1cm thick, 50° to C.A. - Veins of
															20						50°				Qtz/sph + minor Fluorite 25° to CA.
																					25°				
																							sil		
162·6	164·5				122624		670	30	<4	260	170	1100	3	<0·05	20				Tr						162.6 - 164·5 Silicified stts with intercalated shales/irregular shales & irregular chlorite - brecciated.
164·5	167·1				122625		95	20	<4	300	190	1400	3	<0·05	34		Tr		Min		40°		sil.		164·5 - 167·1 Dark greenish/grey recrystallized/silicified stt/sh.
																									Spotting common. 164·6 Qtz/chl. + sphalerite + chalcopyrite -
																									irregular vein (10 cm. blow) 40° to CA.
167·1	169·8				122626		145	10	4	80	30	570	<1	<0·05	10				Tr.				sil		167·1 - 171·3 Light green/red stt/sst. minor spotting - minor
																									shales to 170·8 → chl./Qtz. veining + Chl. impregnation
																									(-perhaps in shale units) Chl/Qtz irregular veins/blows
																									upto 10cm across. Trace sph.
169·8	171·3				122627		110	25	<4	30	75	1200	1	<0·05	45			Tr.		Tr.			chl		169·8 - 171·3 chl.-rich zone assoc. with Qtz veining - minor
																					40°				Sphalerite + galena. Minor Vugs.
																									45 susc. due to chl/Qtz. veins.
171·3	174·3				122628		75	<10	<4	36	65	1100	<1	<0·05	47			Tr		Tr	60°				171·3 - 182·3 Dark grey/blue/green mixed sst/stt + shales
																					35°				infrequent bedding Qtz veining - minor spotting.
																					40°		sil		Qtz/chl/sph. veins too Tr. Gal. + Fluorite.
																				50°					some brecciation and silicification.
																									172·1 chl. vein 15 cm thick + light green yellow mineral.
174·3	176·2				122629		75	20	<4	65	26	570	<1	<0·05	30						50°		sil		

5 cm

HOLE No.

PROJECT : GREAT PYRAMID SCALE : 1:100 HOLE No : [redacted] 1A

342119

From	To	Inter'l (m)	Core Rec'd	% Rec'd	Sample No	Grap'c Log	Assays Sn	NO_3	Mo	Cu.	Pb	Zn	Ag.	Au.	Weighted Assays/Ratios Mag. Susc.	chp.	Gal.	% Estimates Sn	As.fg	Py	Sph	Core Angles B.	V.	F.	Alt.	T.S. P.S.	Description
																									Sil		
176·2	179·8				122630		290	15	6	26	50	260	<1	<0·05	18						Tr	50°			Sil		
																											178·0 – 178·5 Broken Core.
																											179·8 – 180·0 Sphalerite - rich zone - sph related to Qtz/chl + dom. chl. veins 35° to CA.
179·8	182·3				122631		230	10	<4	44	240	1400	2	<0·05	30						Min	30°	35°		Sil	
																											181·0 Bedding 40° to CA.
																						40°					
																						30°					
182·3	185·2				122632		220	30	12	42	100	230	1	<0·05	42												182·3 – 187·2 Light green/red/grey sandstone/siltstone. Colour changes may be due to alteration along veins and fractures. Qtz./chl. veins common - minor fractures with euhedral qtz. fills. + minor Py/sph/gal.
																							15°		Sil		
																								65°			182·4, 182·6, 183·4, 183·5, 184 fractures + qtz. fills.
																									Sil		
185·2	187·2				122633		1400	20	4	360	260	510	3	<0·05	105					Tr	Tr		10°		chl		185·2 – 186·1 Core broken
																							30°				185·6 – Py veins 30° to CA. in oxidized vuggy portion of the core. 187·1 – Vein sph + gal. py. chp. – Qtz/chl. gounge 3cm across irregular. 30° to CA. (105 M. Susc.).
																Tr	Tr			Tr	Tr						
187·2	190·8				122634		80	15	<4	36	120	350	<1	<0·05	22						Tr				Sil		187·2 – 194·1 Dark grey bluish stt/fg. sst, Qtz. veins common + chl. veins. Minor Spotting. Tr. sph. in Q/chl. vens.
																						40°					
190·8	194·1				122635		105	20	<4	48	310	630	1	<0·05	28								45°		Sil		
																						40°					191·0 Bedding 40° to CA.
																				Tr							192·4 Qtz. + Bl veins + hairline pyrite fracture fills.
																									Sil		192·6 Py/Qtz. + Gal, sph. fluorite - irregular
																	Tr				Tr	40°					194·1 – 198·2 Light Brown silicified/recrystallized stt/sh grainsize (actually a quartzite) – v. finely spotted. + qtz + fg. Tm Veining 40° to CA (5°)
194·1	198·2				122636		70	10	<4	38	200	450	1	<0·05	46										Sil		
																							5°				
																						40°					197·4 Minor chl. veining + sph. + Qtz.
198·2	200·6				122637		2050	30	<4	210	86	1150	4	<0·05	40		Tr				Min				chl		198·2 – 200·6 Light brown/green zone of silicified chloritized siltstone (quartzite) Qtz/chl. veins with assoc. sphalerite + gal.
																									Sil		
																				Tr					Sil/chl		199·1 Qtz – Py + Minor Qtz.

5 cm

118 HOLE No :

PROJECT : GREAT PYRAMID SCALE : 1:100 HOLE NO : 84-1A

342120

From	To	Inter'l (m)	Core Rec'd	% Rec'd	Sample No	Grap'c Log	Assays Sn	WO_3	Mo	Cu	Pb	Zn	Ag	Au	Weighted Assays/Ratios Mag. Susc.	chp	Gal	% Estimates Sn	As	Py	sph	Core Angles B	V	F	Alt.	T.S. P.S.	Description
																				Tr			50°	sil		pyrrhotite veining. 200.3m ½cm euh. qtz. fracture fill + py and black sphalerite (sph. generally dark brown colour)
200.6	202.6				122638		115	15	<4	130	200	790	2	<0.05	26								35°			200.6 - 202.6 finely spotted stt/sh light brown qtz + chl veining - Minor black shale bands.
																Tr				Tr			5°			201.6 5cm qtz. vein 201.9 Qtz py + chp vein (2mm).
202.6	204.7				122639		320	30	<4	100	18	1050	1	<0.05	120						Tr			sil		202.6 - 204.7 Dark grey/green intercalated stt/sh highly spotted. minor assoc. sph.
																						45°				204.4 Graded beds (6cm thick) young up hole (beds the right way up) 45° to CA.
204.7	206.1	2.1	1.2		122640		450	30	4	80	6	770	1	<0.05	66								60°			204.6 Siliceous zone Qtz/Py vein 60° to CA.
																								chl		204.7 - 206.1 Silicified dark green/grey stt - silicified and
																								sil		chloritic. Core loss between 204.7 - 205.1
206.1	207.1				122641		1560	1750	22	2600	60	480	30	<0.05	2000					Min	Tr		50°			206.1 - 207.1 Qtz vein material with associated fine chl.
																								Qtz		+ Py (Tr. sph + Fluorite) + Magnetite.
207.1	211.1				122642		480	15	<4	330	28	650	3	<0.05	320									Qtz		207.1 - 211.1 Dark green fg. sst/stt. with qtz. and chl veins
																Tr				Tr	Tr		50°	chl.		+ assoc. sph. Chp. veining also.
																							20°			207.1 - 207.3 sph rich zone vein related
																								chl.		207.4 - 1cm Qtz/felds/Pb vein 50° to CA (320 M.S.)
																							90°			Sp. Veins 20° to CA
																										Qtz/fluorite/py/sph. veins.
																								chl.		
211.1	213.7				122643		260	30	<4	42	14	110	<1	<0.05	63							35°			sil.	211.1 - 213.7 Dark grey/blue stt/sh. finely spotted. Contact sharp 35° to CA Chloritic veining present.
213.7	216.0				122644		300	10	<4	380	50	1250	10	<0.05	160								20	sil.		213.7 - 217.5 Dark grey stt/sh - Qtz + chl. veining common.
																					Tr		10			215.8 Qtz vein/breccia zone - chl/sph.
216.0	217.5				122645		270	30	<4	40	16	460	<1	<0.05	50											
217.5	219.7				122646		195	135	10	960	14	620	4	<0.05	140					Tr	Tr			chl.		217.5 - 219.7 Extensively chloritized and silicified dark
																							30°	sil		green/grey stts. Chl. veins common assoc. fluorite/sph/
																								chl.		pyrite. (Fluorite fairly common.)
																								sil		
219.7	220.7				122647		270	510	4	2300	16	1050	10	<0.05	80000		Tr			Min	Tr		35°	chl		219.7 - 220.7 Zone of Magnetite/chl. alteration + sph and
																								Mt.		minor Py/chp/br./fluor. alteration of dark grey/green sst.
220.7	222.0				122648		80	20	6	1350	14	420	5	<0.05	62									chl.		220.7 - 222.0 Chloritic alteration zone: Dark green
																							25°	chl.		silicified/chloritized stt. Minor amorphous qtz./pyrite
																								sil		veining.
222.0	225.4				122649		320	25	<4	410	22	870	1	<0.05	34											220.0 - 225.4 Dark green/grey silicified stt. minor spotting + chl/Qtz. veining.
																								sil		
																										225.1 - 225.4 Qtz/chl. vein.

5 cm

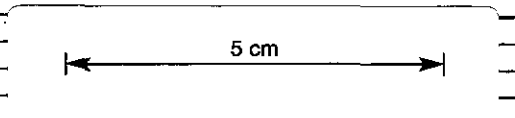
HOLE No :

SHEET 9 OF 14 SHEETS

PROJECT : GREAT PYRAMID SCALE : 1:100 HOLE No : SP6-11

120

From	To	Inter'l (m)	Core Rec'd	% Rec'd	Sample No	Grap'c Log	Assays Sn	WO3	Mo	Cu	Pb	Zn	Ag	Au	Weighted Assays/Ratios Mag. Sus.	WO3	Chp.	gal.	% Estimates Sn	Asp.	Py	Sph	Core Angles B	V.	F.	Alt.	T.S. P.S.	Description 342121
225.4	228.8				122650		90	10	<4	50	16	190	<1	<0.05	33								30°			Sil.		225.4 to 236.7 Dark grey sltst/sh/sst - finely spotted veining minimal reduced to small chl veins and minor qtz. veining. Bedding apparent in places.
																								20°				
																								35°		Sil		225.4 Contact sharp 30° to CA. probably faulted - chloritic round qtz. clasts.
228.8	232.5				122651		34	<10	<4	24	22	130	<1	<0.05	42													
																								40°		Sil		
232.5	236.7				122652		720	25	<4	70	100	540	2	<0.05	35									30°		Sil		
																							35°					234.2 Bedding Sandstone/Shales 5cm beds
																								20°		Sil		35° to C.A.
																												234.8 - 235.0 Extremely silicified sandstone - Qtz. chl. veins.
236.7	239.3	2.6			122653		1200	25	8	240	38	1500	2	0.10	32				Tr				Tr.			Sil		236.7 - 247.0 Light grey to dark grey extremely silicified fg. sst/sltt. minor spotting and chl./qtz. alteration.
																								25				Bedding apparent, minor sulphides associated with veins - sph/py.
																												236.8 - 237.0 Silicified/chlorite zone - irregular network of veins - + 1.5 cm. Qtz + fg dravite vein and minor sph. assoc.
239.3	240.5	1.2			122654		2050	85	12	160	16	780	1	<0.05	1500													
																												237.1 - 237.2 Sulphide rich zone - sph + py + fluorite assoc. chl. veining.
240.5	242.7	2.2			122655		1400	300	14	160	120	240	2	<0.05	24													
																Tr.			Tr			Tr.		40				237.4 - 237.6 1 - 2 cm Qtz. veins + fg. tourmaline? - black v. fg. mineral - Cross Cuts. hairline Qtz.
																										Sil		fracture vein with chl. + euhedral cassiterite - light brown
242.7	243.8	1.1			122656		1550	25	10	26	8	640	<1	<0.05	35													Cass. crystal up to 5 mm. accross euh. Also Tm. impregnation of sediment at 237.5 m.
243.8	244.2	0.4			122657		4150	10	4	280	36	680	1	<0.05	37													239.3 - 240.5 Chl. alteration zone + qtz. minor fluorite
244.2	247.0	2.8			122658		1100	25	6	100	140	270	1	<0.05	32				Tr		Tr				25			sph (cass.?) - alteration of mg. Silicified sst.
																												241.0 5mm Qtz vein + Wolframite/cass.?/sph/topaz and fluorite 40° to C.A.
																					Tr			60	30			243.8 - 244.2 Intensely silicified zone - fluorite/chl./cass/Py.
247.0	249.9	2.9			122659		2400	135	12	480	24	1900	3	<0.05	15000													
																	Tr		Tr?		Tr	Tr			20		Sil/chl/sil/chl/sil	245.1 Tm/Qtz. vein + fg. cass. + Po/Qtz. vein 246.0 Tm/Qtz. vein 0.5 cm Tr. Py/Po. Bedding 50° to C.A. - Youngs up the hole 247.0 - 249.9 Intense Chl/Qtz. veining silicified sst/sltt assoc. sulphides sph. py chl/bn + Tr. cass? fluorite minor
249.9	250.8	0.9			122660		3350	25	6	130	16	1200	1	<0.05	42													Spotting: 249.6 - 249.9.



HOLE No :

PROJECT : GREAT PYRAMID. SCALE : 1:100 HOLE No : SPG 1A

From	To	Inter'l (m)	Core Rec'd	% Rec'd	Sample No	Grap'c Log	Assays Sn	WO_3	Mo	Cu	Pb	Zn	Ag	Au	Weighted Assays/Ratios Mag. Sus.	WO_3	chp	gal.	% Estimates Sn	Asp	Py	Sph	Core Angles B	γ	F	Alt.	T.S. P.S.	Description 342122
																							40			Sil		sulphide rich zone 247.8 m Ht/chl/sph. vein (15000 ms)
250.8	253.7	2.9	2.9	100	122661		1850	75	12	120	120	620	8	0.05	42						Tr.	Tr.		30				249.9 - 250.8 Extremely silicified stt. - spotting v. common
																Tr.			Tr.		Tr.	Tr.		25				Minor chlorite veining 250.6 Qtz./Tm. vein
																						Tr.	50	30				1cm. 30° to C.A. irregular 250.6 . Tr. sph in minor
																										Sil		chl. veins. (+ Py) Bedding. 40° to C.A.
																									40			250.8 - 256.7 Extremely silicified stt. /fg. sst. spotting
253.7	256.7	3.0	3.0	100	122662		2000	30	12	90	28	600	2	0.05	20						Tr	Tr.	Tr.	30°				common. Dark grey/greenish colouration. - Greenish
																								20				due to chl. veins. /veinlets. also minor Qtz. /fg.
																										Sil		tourmaline veins common.
																												251.0 Qtz. vein 3cm across Cass. /WO_3 /chl./Molybdenite/
																												sph./py. 251.1 Qtz (2cm) cass./chl./sph. 251.2. cass/Qtz
																					Tr.		Tr.	20				vein. 251.3 Qtz. felds. - Py. (chp/Mo). cass vein.)
																												251.8 chl/Fluorite vein + Qtz. sph. (3cm) 30° to C.A.).
256.7	258.6	1.9	1.9	100	122663		8300	125	18	360	22	3.20%	2	0.10	2100	(Vein)												252.1. 7mm. Qtz./cass. vein. 253.5 Qtz fracture fill.
																										Sil		253.6 Qtz./Cass./chl./sph 1cm. 30° to C.A.
																												Qtz./Tm vein 253.5 Veins - void filled.
																												254.1 Qtz./chl./sph./py/fluorite vein irregular. + Tr. Cass.
258.6	260.3	1.7	1.7	100	122664										320	(vein)												255.6 Qtz/Fluor./cass! vein + musc/chl. selvage. 1cm
																												256.7 - 260.3 As Above with sph/chl. veins common
																										Sil		sph/chl/fluorite/fg. cassiterite/magnetite (Tr.)/Tr Py + Po + chp.
260.3	261.6	1.3	1.3	100	122665		4450	25	8	190	66	5500	3	0.10	150					Min.	Min.	Tr.		30				258.6 - 260.3 less sph chl veining.
																												260.3 - 264.4 light grey/white extremely silicified stt minor
																												spotting. Chl./Sph/py veins + minor. Qtz/Tm veining -
261.6	264.4	2.8	2.8	100	122666		2900	35	10	200	80	240	3	0.05	32													chl. veins with fluorite, Py assoc. with
																										Sil		As Py Fluorite greenish.
																			Tr.		Tr.			40				264.2 2 qtz. veins 1cm thick assoc. chl/muss/cassiterite +
264.4	266.9	2.5	2.5	100	122667		1450	55	8	340	55	140	2	0.10	250	(vein)												Py 40° to C.A.
																Tr.			Tr.		Tr.	Tr.		35		Sil		264.4 - 279.6 Alternating units of dark and light grey
																				Tr.				50				extremely silicified stt. Qtz/Tm veins, Chl./sph alternative minor
																												spotting common, fine veinlets of sulphides + cass./Qtz comm
																												264.5 Qtz. vein 1cm - Tm/Cass./WO_3/Py/musc./sph.
266.9	270.0	3.1	3.1	100	122668		1850	15	8	250	70	390	1	0.05	620						Tr.	Tr.	Tr.	60				264.6 As Py vein 0.5 cm / irregular.
																										Sil		265.1 2mm Qtz/Fld. vein 50° to C.A.
																								30				266.6 Qtz/feld vein + Po/AsPy/Py/Sph.
																							50					267.0 2cm Qtz; perthitic felds vein.
																					Tr	Tr		25				267.6 Py/Qtz./calcite vein 1cm 30°
																					Tr	Tr						268.9 Sulphide vein. Py/Po/As Py/fluor. 3mm 25°
																					Tr	Tr		25		Sil		269.8 Sulphide vein. Sph/musc/fluor./Po/as py/
270.0	271.6	1.6	1.6	100	122669		1500	20	8	530	370	640	6	0.05	270													cass. Mo. 0-5 cm.
																												(From 265 m - 279.6 m general core susceptibilities up to
271.6	273.8	2.2	2.2	100	122670		1200	30	8	480	110	240	3	0.05	260													200 - 300 x 10^{-6} cgs units fg. magnetite in veinlets ?)
																					Tr	Tr	Tr	40		Sil		271.8 Sulphide vein Po/Py/sph/aspy/fluorite 7mm
																								40				272.6 Qtz/cass veinlet 2mm 40° to C.A. narrow
																						Tr	Tr	50				qtz/chl/sulphide/cass veinlets (2mm max) common -
273.8	276.0	2.2	2.2	100	122671		2100	40	8	1000	120	400	4	0.05	2500	(vein)												spotting related to veinlets too.
																										Bil.		

5 cm

HOLE No :

SHEET 11 OF 14 SHEETS

PROJECT : GREAT PYRAMID SCALE : 1:100 HOLE NO : JPG 1A

342123

From	To	Inter'l (m)	Core Rec'd	% Rec'd	Sample NO	Grap'c Log	Assays Sn	WO3	Mo	Cu	Pb	Zn	Ag	Au	Magn Susc.	Weighted Assays/Ratios WO3	chp.	Gal	% Estimates Sn	As/Ag	Py	Sph	Core Angles B	V	F	Alt.	T.S. P.S.	Description
	276.0															Tr	Tr		Tr	Tr	Tr			50		sil		275.0 1cm sulphide vein - Po/Py/aspy/chp ?/Cassiterite +
276.0	276.5	0.5	0.5	100	122672		7150	260	16	440	50	110	3	0.05	370		Tr		Tr	Tr	Tr	Tr		35				Wolframite (small) fluorite - Qtz. matrix. 50° to C.A.
276.5	279.6	3.1	3.1	100	122673		2450	35	8	180	75	530	2	0.05	70				Tr	Tr	Tr	Tr		40				275.2 Qtz. Tm vein + sulphide veinlets + cass. 1cm 35°
																												275.6 Qtz. Tm 1cm vein + Aspy/chp/Po/sph + cass. 40°
																Tr			Tr.					40		sil		275.9 Qtz. Tm + chl/Qtz/Cass veins 40° to C.A. < 1cm.
																												276.0 - 276.5 light grey silicified fg. sst - Cass veinlet + WO_3
																												at 276.3 5mm. 40°.
																												277.5 Tm/Qtz. as py/sph/cass. vein 2cm 30° fine veinlets
																								10				up to 80/m similar to fractured quartzites on
279.6	281.0	1.4	1.4	100	122674		135	15	<4	46	70	140	<1	0.05	26											sil		Surface of Pyramid Hill.
																												<0.5cm Tm/Qtz musc. veins at 277.8, 278.0, 279.1 - Qtz.
																												veins + cassiterite not uncommon. 40° < 1cm (< 0.5cm)
281.0	283.3	2.3	2.3	100	122675		550	105	<4	120	1800	2600	3	0.05	62	Tr.			Tr.	Tr.	Tr.	Tr.		35				279.6 - 291.8 Dark grey silicified sst/sltt - v. little spotting
																												less silicified than above. Bedding visible. Veining far
																												less common
																												281.0 - 283.3 Qtz/chl. veining common + brecciation assoc.
283.3	285.6	2.3	2.3	100	122676		90	70	<4	26	170	500	<1	0.05	42	Tr.			Tr.				40					sulphides - As Py/sph/Py/Po + cass, WO_3, Mo. 281.0
																								50				assoc. of aspy/cass/py/WO_3, Qtz vein 2cm 35° and 282.9
																												sph/chl/py/po + Mo brecciated zone
																												283.3 - 285.6 Minor chl/sph veining/brecciation Tm/Qtz.
285.6	288.5	2.9	2.9	100	122677		65	<10	<4	18	20	90	<1	0.05	26													veins at 283.9, 285 minor musc/assoc/WO_3 50°
																								50				285.6 - 288.5 Qtz./musc. veins 2cm max. 285.6
																												286.1, 286.3, 50° to C.A.
																								30				
																							20					288.0 Qtz./Tm./bi vein + musc. 3cm. 30°
																					Tr	Tr		35				288.3 Qtz./musc. vein 1cm Tr. py/sph.
288.5	291.8	3.3	3.3	100	122678		65	<10	4	20	14	90	<1	0.05	27									40				288.5 Qtz./musc. vein. Tr. py./sph. 1cm 40° to C.A.
																							25					also 288.9 + Tm ?
																								20				
																					Tr			30				290.0 Qtz./Po/Py vein 8mm across 2mm musc. selvage
																												+ dark halo (Silicified.) 1cm thick 30° to C.A.
																							25					291.4 - 291.8 minor chl. veining/breccia fill + Qtz. acicular brown mine
291.8	294.5	2.7	2.7	100	122679		2300	145	12	110	65	720	1	0.045	320									20				291.8 - 294.5 Extremely silicified light brown sst/sltt Qtz. musc.
																										sil		veins and chl. irregular fracture/breccia fills.
																			Tr			Tr		40				Minor cass. sph. Tm. assoc. with Qtz. veins.
																												291.8 - 292.2 Mixed sst. sil + grey sltt/sh chl/Fault vein
																					Tr	Tr		40				8cm 292.0 20° to C.A.
																			Tr									292.8 Qtz/cass. vein 40° to C.A. + Qtz/Tm vein + sph/chl
294.5	294.7	0.2	0.2	100	122680		540	35	16	320	60	1100	2	0.05	180											chl.		294.0 hairline Qtz./Py/Po/Mo/sph vein 40° to C.A.
294.7	295.1	0.4	0.4	100	122681		880	45	24	1300	38	2800	7	0.05	550	(Vein)	Tr					Tr.	Mn	40		sil		294.2 7mm Qtz vein 30° to C.A. musc./po./cass.
295.1	297.8	2.7	2.7	100	122682		1450	75	18	270	180	360	3	0.05								Tr.		40				294.5 7mm Qtz/white felds vein 40° to C.A. + 1cm Qtz. vein
																								40				294.5 - 297.8 Grey Silicified sst/sltt + Qtz veins. (musc + cass.)
																Tr								40				and chl. veins irregular/breccia fills (sph/py/chp) Spotted.
																												294.7 - 295.1 Chl. irregular veinlets + breccia fills common
297.8	299.7	1.9	1.9	100	122683		810	155	14	120	90	185	2	0.05	990									40		sil		assoc. magnetite/sph./fluorite.
																												295.6 Cass. assoc. with hairline Qtz. veins also
																								35				chl + sph. in veinlets 45° to CA.
																												296.1 Qtz. folds py/po/mo vein 6mm 296.7 Qtz/WO_3 vein 1cm
299.7	301.00	1.3	1.3	100	122684		850	40	14	250	65	155	1	0.05	200									30	35			297.8 - 299.7 Light grey/brown silicified.

5 cm

HOLE NO :

PROJECT : GREAT PYRAMID SCALE : 1:100 HOLE NO : JPG 1A

342124

From	To	Inter'l (m)	Core Rec'd	% Rec'd	Sample No	Grap'c Log	Assays Sn	W03	Mo	Cu	Pb	Zn	Ag	Au	Weighted Assays/Ratios Mag. Susc.	WO3	Chp.	gal.	% Estimates Sn	Asp	Py	Sph	Core Angles B	V	F	L	Alt.	T.S. P.S.	Description
																			Tr.		Tr.						sil.		stt/sst Qtz/Tm veins 298·5 (5 mm) 299·7 (2cm) minor Po/Py.
																								35					299·5 Bedding - load structures. Youngs down hole.
301·00	302·0	1·0	1·0	100	122685		1750	20	12	160	220	1400	4	0.05	35		Tr.?				Tr	Mn.					chl		299·7 - 303·8 Extremely silicified grey/dark grey sst/stt.
																					Tr	Tr					chl		spotted. chl. fracture/breccia fills irregular + Qtz/Tm
302·0	303·8	1·8	1·8	100	122686		540	30	12	160	36	180	<1	0.05	250	(vein)													veins. Qtz/feld veins 299·9 (5 mm.)
																													299·7 - 301·0 irregular reddish/black veinlets - breccia fills
																			Tr					30			sil		contain Pb/Py + fg. magnetite also cass.
303·8	305·6	1·8	1·8	100	122687		210	35	8	100	46	115	1	0.05	200	(vein)			Tr.		Tr								301·0 - 302 Chl. alteration zone assoc. sph./Py.
																			Tr.		Tr	Tr		40					Qtz/Tm veins 302·6, 303·2 (2 cm) 303·5 (1 cm) + Cass.
																							30				sil		303·6 Qtz./Po/Py + cass. in cross-cutting vein (5mm).
																													303·0 - 305·3. Extremely Silicified brown/grey sst/stt -
305·6	307·8	2·2	2·2	100	122688		48	<10	6	20	26	120	<1	0.05	22														bedded - Spotting common + Qtz/Tm veins
																							45						303·5 - 304·1 V silicified sst. veins of Q/Tm/cass/Po +
																													Q/Py/Po/sph/Mn (later) Py/Po cubes in Sil. Sed. 40°
																													304·4 Qtz./Tm vein 3cm + Po.
307·8	308·2	0·4	0·4	100	122689		105	10	18	46	22	470	<1	0.05	22														304·8 Bedding youngs uphole load casts graded beds 30°
308·2	310·7	2·5	2·5	100	122690		65	10	6	22	24	185	<1	0.05	22									15					305·3 - 310·7 Well bedded dark grey sst/stt - load casts -
																								50					youngs uphole - minor chl. + Qtz/Tm veins + Tr. cass. Spotted
																							50						307·8 - 308·2 Sil grey sst chl/Py veins irreg. minor sph.
																											sil		
310·7	313·7	3·0	3·0	100	122691		310	20	14	46	32	175	<1	0.05	260	(vein)											70		310·7 - 319·0 Extremely silicified grey/brown sst/stt.
																							10						Qtz/Tm + chl veins common. Bedding uncommon
																					Tr	Tr		80					only minor spotting.
																								60					310·9 fault 70° to C.A. 310·9 - 311·0 Bedding 10° to C.A.
																						Tr		50					311·5 Qtz/sph/py vein 4 mm thick 80°.
																Tr.			Tr.		Tr			40					312·8 chl/sph/stt veining irregular + Po/Py.
313·7	316·3	2·6	2·6	100	122692		145	10	16	200	65	165	1	0.05	210	(vein)													313·3 Musc/Q/Py/WO3/Cass/Tm vein 30°.
																													313·9 Tm/chl. Po/Py irregular veinlets.
																											sil		315·2 B/musc/Py/fluor vein 1cm 35°
																					Tr			35					315·7 Tm/musc/bi/qt/sph/Py/gal ? 1cm 30°
																		Tr.?			Tr	Tr.		30					
316·3	319·0	2	2·7		122693		55	30	12	42	28	110	<1	0.05	67														
																							40						316·7 Bedding 40° to C.A.
																								45			sil		317·2 Tm/Qtz veins 6mm 15° to C.A.
																							40						
															25									40					318·6 - 318·9 Broken core, chl veins + Qtz.
319·0	320·4	1·4	1·4	100	122694		65	<10	6	22	10	310	<1	0.05									36				sil		319·0 - 322·8 Grey/brown/green extensively silicified,
																													sst/stt/sh fine spotting. Qtz., Qtz./Tm./chl. veins
320·4	321·4	1·0	1·0	100	122695		940	<10	12	80	8	2500	<1	0.05	60				Tr.			Tr.					chl		Bedding Common.
																			Tr.		Tr	Mn		30					319·4 1cm Qtz/Tm vein 40° to C.A.
321·4	322·8	1·4	1·4	100	122696		60	20	6	16	12	115	<1	0.05	18														320·4 - 321·4 Qtz./chl. fracture/veining common.
																													chl/fluorite/sph/cass veins + py spotting large (Fluor. common.)
																							40				sil		322·0 Bedding 40° load casts. Upungs uphole
322·8	325·7	2·9	2·9	100	122697		105	15	10	32	14	145	<1	0.05	46	(vein)													322·0 - 346·8 Grey/brown/green silicified stt/sst
																					Tr	Tr		25					no spotting - minor veining
																													323·3 1cm Qtz./Tm vein minor sph/chl 25° to C.A.
																					Tr.								324·6 Coarse grit (40cm) irregular distrib beds 40° to C.A.
																							40	35			sil		load/flute casts. youngs uphole.

5 cm

HOLE NO

123

PROJECT : GREAT PYRAMIDS SCALE : 1:100 HOLE NO : SPG 1A

From	To	Inter'l (m)	Core Rec'd	% Rec'd	Sample No	Grap'c Log	Assays Sn	W03	Mo	Cu	Pb	Zn	Ag	Au	Weighted Assays/Ratios magn susc.	WO_3	Chp	Gal	% Estimates Sn	Msfy	Py	Sph	Core Angles B	V	F	Fa	Alt.	T.S. P.S.	Description
325·7	328·9	3·2	3·2	100	122698		670	30	12	250	24	210	1	.005	160	(vein)			Tr		Tr		10	15					Qtz/musc./chl. to py. vein 1cm. 35° to C.A.
																								40					325·4 Bedding 40° to C.A. load casts Youngs uphole.
																							15	40					325·7 5cm Qtz/feld. vein 45° to C.A. + Cass/chl./Qtz/py
																													vein 40° to C.A. (46 magn Susc.)
																			Min		Tr		10	35					326·0 1·3 cm. Qtz/chl vein 40° to C.A.
																								30					326·5 Cass/Qtz/chl./fluorite tr. py/po vein 4mm 35°
																							10	40					+ Tm/Qtz vein 4mm 30° to C.A.
328·9	331·8	2·9	2·9	100	122699		590	25	14	310	26	210	1	.005	240	(vein)								50					326·9 Qtz/Chl. vein 1·5 cm 40° to C.A.
																							45						327·3 5mm Qtz./felds., Po/Py/sph. + Mo. 50° +
																								30					Chl. veins ≤ mm 6° to C.A.
																			Tr.		Tr.			40					328·3 Bedding 40° to C.A. Youngs uphole. 328·4 Qtz/chl/
																													Po/Py vein - surrounding irregular halo of Tm. in sed
331·8	334·7	2·9	2·9	100	122700		430	35	14	80	32	230	1	.005	150														329·0 1cm Tm vein 30° to C.A.
							↑ No Q.														Tr.			40					329·8 1·5 cm chl./Qtz./fluorite vein 30° to C.A.
																								90					330·4 2cm Qtz./chl./py + Cass (5mm) fluorite vein 40° to C.A
																													331·3 2cm Qtz./chl./py/sph/fluorite vein 50°.
																													331·9/332·0 Chl./fluorite/py/po veins ≤ 1cm 40°
																													332·4 Qtz./Tm vein irregular 60° to C.A.
																													332·6 + 333·2 Qtz/chl./fr. sph veins irregular
334·7	336·4	1·7	1·7	100	122701		160	25	10	95	14	185	<1	.005	24														
																							40						335·1 Bedding 40° to C.A. + Chl. veining 1cm 50° to C.A.
																								30					335·6 1cm Qtz/chl./sph/py 30° to C.A.
336·4	338·6	2·2	2·2	100	122702		890	25	10	300	48	200	2	.005	630	(vein)								50					336·9 Tm/Qtz/chl. 50 to C.A. 1cm.
																					Tr	Tr		60					337·4 Qtz/sph/Po/Py/Mo veins 6mm 60° to C.A.
																													337·6/337·8 Qtz/sph veins 1cm 50° to C.A.
338·6	341·4	2·8	2·8	100	122703		520	15	4	200	34	200	<1	.005	90	(vein						Tr		45					338·6 Calcite/chl. vein 5mm + Py veinlets 45° to C.A.
																								45					338·6 Broken Core to
																						Tr							339·3 Calcite fract fill 2mm 45° to C.A.
																								40					340·2 Qtz vein irreg. + chl.
																								20					341·0 Py/Po/Qtz. veins 40° to C.A. 0·5 cm.
341·4	344·0	2·6	2·6	100	122704		120	15	<4	80	10	125	<1	.005	22														
																			Tr		Tr			40					342·4 Qtz./Py/Po/musc. Cass
																							25						
344·0	345·9	1·9	1·9	100	122705		32	<10	4	16	18	95	<1	.005	22								20						
345·9	346·8	0·9	0·9	100	122706		500	20	20	260	12	80	<1	.005	310														345·9 - 346·8 more silicified + chl/py veins.
																								50					346·3 Qtz/feld vein 50° to C.A. 7mm.
346·8	348·3	1·5	1·5	100	122707		95	15	14	90	10	100	<1	.005	45														346·8 - 348·3 Extremely silicified stf/sst grey/white/green
																								40					346·6 Qtz/chl. + py/Po.
																								50					347·8 Qtz./Py/Po/sph chl. vein + Po/Py in Silicified sediment 40°
348·3	E. of H.						E. of H.																						348·0 Musc./fluorite/Py. Po. Qtz. 5mm 50° to C.A.
																													348·3 END OF HOLE.

5 cm

342125

124

HOLE NO.

SHEET 14 OF 14 SHEETS

APPENDIX 3

Prospect Evaluation - Scamander Licence

126

342127

PROSPECTS GEOCHEMISTRY (in ppm) 15/2/84

ANOMALOUS VALUES

PROSPECTS (Number)	Sn	WO_3	Mo	Bi	As	Cu	Pb	Zn	Ag	Au
Granite-Hosted										
Stoney Ford (6)	2350			16		3000		1.9%	5	
Echo N. (2)		2650	1.06%	1400	2050		700		173	
Echo S. (9)	1.41%	1550	210	480	410			250		
Silver Echo (9)	65	60	120	32		5700			5	
Sediment-Hosted										
Baden Powell		⊖	⊖							
Carson de Beers		⊖	*							
Lutwyche		⊖	*							
Pinnacles E. (7)	440	100		195	7.1%	1350	1.7%	450	350	
Pinnacles W. (3)	9450			55	550					
Pyramid	⊖					*			*	
Loila Tier Sn(9)	3.95%		34	110	290					
S^{2-}(4)				110	3.9%	1050	8.05%	220	60	
Williams W.(4)	1650	80	40	38	5.25%	230	2.45%		76	
Williams E.(8)	1850		60		10.2%	520	1700	280	10	
North Scamander	*						⊖	⊖	*	
Orieco (10) N.	2300(spot)			36	360	870	770	1350	3	
(10) S/cent.	2050		46	180	990	1.4%	1600	5300	350	
Ringarooma (6)	1400				160	160	2700	260	4	
Dunns (10)	5400			1100	27%	7.4%	4800		540	0.35
Arm (6)	1250			36	4150	400	1800			
Cramps (10)	350			1100	7.2%	7000	1.0%	370	380	0.35
Paul Beahrs (11)	670			36	2700	800	6500	5900	61	
Scamander Mine (6)	200				23.8%	780	2.6%	4.7%	500	1.0
Beulah (4)		105			6900		1.1%		530	0.65
Scamander Bell (6)					1100		800	4100	560	1.0
Yarmouth (4)					12.6%	610			4	0.45

PROSPECTS SPECIFIC GEOCHEMISTRY

Stoney Ford	Zn, Sn, Cu
Echo N.	Mo, WO_3, Bi
Echo S.	Sn, WO_3, Bi
Silver Echo	Cu, Mo, Bi
Baden Powell	WO_3, Mo
Carson de Beers	WO_3
Lutwyche	WO_3
Pinnacles E.	As, Pb, Ag, Cu
Pinnacles W.	Sn, As
Pyramid	Sn, Ag, Cu
Loila Tier	Sn, As, Pb, As, Cu
Williams W.	As, Pb, Sn, Ag
Williams E.	As, Sn, Pb, Cu
North Scamander	Pb, Zn, Ag, Sn
Orieco N.	Sn, Zn, Cu, Pb
Orieco S/Cent.	Cu, Zn, Sn, Ag
Ringarooma	Pb, Sn, Zn, Cu
Dunns	As, Cu, Sn, Ag
Arm	As, Pb, Sn, Cu
Cramps	As, Pb, Cu, Ag, Bi
Paul Beahrs	Zn, Pb, Cu, Ag
Scamander Mine	As, Zn, Pb, Ag
Beulah	Pb, As, Ag, Au
Scamander Bell	Zn, Pb, Ag, Au
Yarmouth	As, Cu, Au, Ag

STONEY FORD PROSPECT 31/10/83

1) General Description

a) Style of Mineralization

Altered/greisenized medium grained equigranular biotite granite.

b) Host Rocks

Equigranular medium grained biotite granite of the Mt. Pierson Pluton.

c) Geography/Location

Located three kilometres due west of St. Helens with the prospect sited to the north of road 500m passed the Golden Fleece Rivulet Bridge crossing.

d) Old Workings

Two shafts/prospect pits on the northern side of a small creek. Top soil sluiced for cassiterite. 30m apart shafts trend 043° (NE).

2) Host Rocks

Granite

Medium grained equigranular biotite granite of the Mt. Pierson Pluton.
Leucocratic - white granite.
Quartz crystals anhedral upto 8mm across.
Feldspars milky/white upto 5mm across.
Biotite occurring as clots - chloritiсed in area of prospect (outside prospect area biotite more disseminated through the rock).

3) Mineralization

Altered chloritic granite occurs in two shafts 30m apart trending 043° NE - confined.

Altered granite - dark green colour - phenocrysts of white feldspar (and sometimes quartz) in chloritic matrix. Tourmaline may be associated with the chlorite. Eastern shaft generally contains more phenocrysts than the western shaft. West shaft altered rocks consist of fine grained chlorite/quartz greisen.

Pink/red stained mineral probably altered quartz and Fe oxides.
No economic minerals visible (possibly some sphalerite?).

Minor quartz vein float at west shaft.

Soil sluiced to a depth of 1m around the prospect.

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342131

STONEY FORD PROSPECT

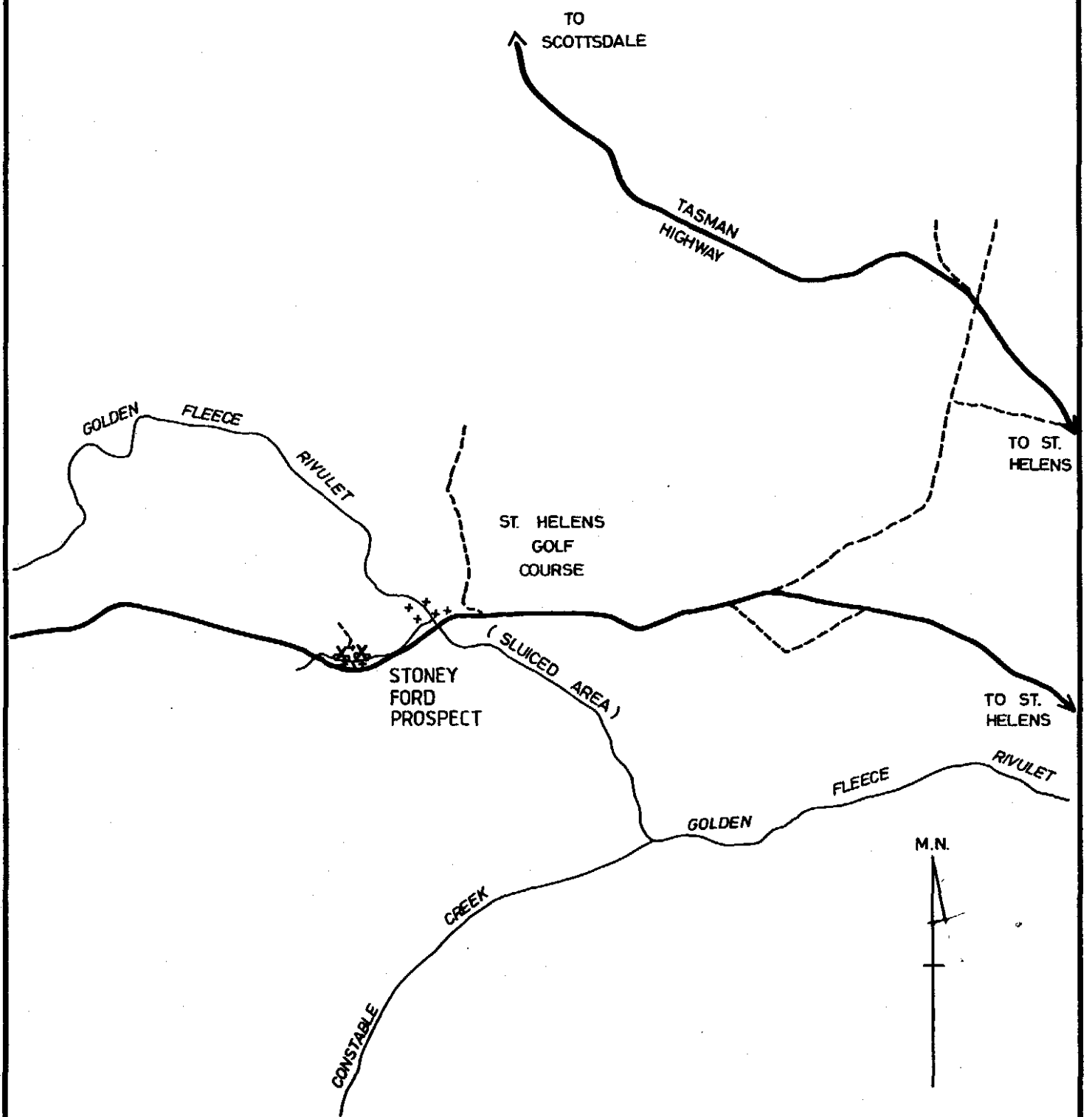
ROCK CHIPS

ROCK NO./LOCATION TYPE	Au	Sn	WO_3	Mo	As	Cu	Pb	Zn	Bi	Ag
12465 East Shaft/pit Altered granite	<0.05	390	30	<4	20	48	24	1.05%	6	<1
12466 East pit Altered granite	<0.05	400	20	<4	20	55	16	1.9%	<4	<1
12467 East pit Altered granite	<0.05	340	<10	<4	20	16	20	3600	<4	<1
12468 Prospect Host granite	<0.05	8	20	<4	14	2	18	70	<4	<1
12469 West pit Altered granite & Py	<0.05	2350	25	<4	2	3000	20	130	16	5
12470 West pit Altered granite	<0.05	610	<10	<4	3	75	24	390	<4	1

Sn	Cu	Zn
2350	3000	1.9%

342132

131



5 cm

The Shell Company of Australia Limited METALS DIVISION	
E.L. 12/78 SCAMANDER STONEY FORD PROSPECT	
SCALE 1:15000	DATE 31-10-83
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE SCAMANDER	REP.No.
DRG.No. D/LH02/522	FIG.No.

342133

ECHO PROSPECT 25/10/83

1) General Description WO_3, Mo

a) Style of Mineralization

Quartz veins with siliceous and muscovite greisenized granite margins. Veins contain Wolframite and molybdenite. Mineralization occurs in granite immediately beneath the granite/sediment contact.

b) Host Rocks

Medium grained biotite granite - minor porphyritic and fine grained variants close to the granite/Mathinna sediment contact. Granite outcrops in a window within the Mathinna Beds. Granite here forms a local structural high on the granite surface - a ridge structure which trends N-S (NNE to SSW).

c) Geography/Location

Located on Constables Creek 6km SW of St. Helens. Granite well exposed in Constables Creek and N-S tributary on the South side of creek.

Access is by Medeas Cove Road from St. Helens and bush track which runs along the Constables Creek river course about 1-2km.

Tracks bulldozed by Geophoto - now inaccessible mostly - washed away in places and overgrown.

d) Old Workings

Quartz veins at Echo North trenched and pitted - on vein traceable for approximately 160m, E-W - trench 5m deep, 2m wide. Workings here 100m long, 50m wide.

South Echo minor pits on lodes.

Five diamond drillholes drilled by Geophoto 1974, 2 on North Echo, 3 on South Echo. One costean on Western side of North Echo.

Recce soil sample lines by BHP - inconclusive.

Geophoto radiometric airbourne anomaly.

2) Host Rocks

Granite Hosted

Dominant granite-type grey/white medium grained equigranular granite - leucoratoc.

White feldspars (pinkish on south side of the granite window). Milky

well cleared, perthitic and enclose books of biotite - crystals subhedral 1cm across.

Quartz clear, fractured generally anhedral - size variable upto 8mm across.

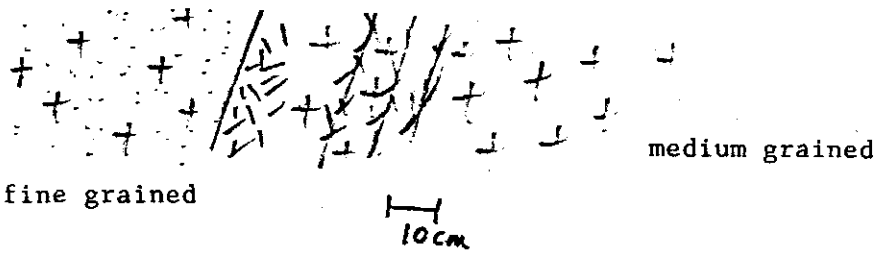
7-8% mafics all biotite.

Minor alteration of feldspars to greenish/yellow day minerals.

No tourmaline or muscovite!!

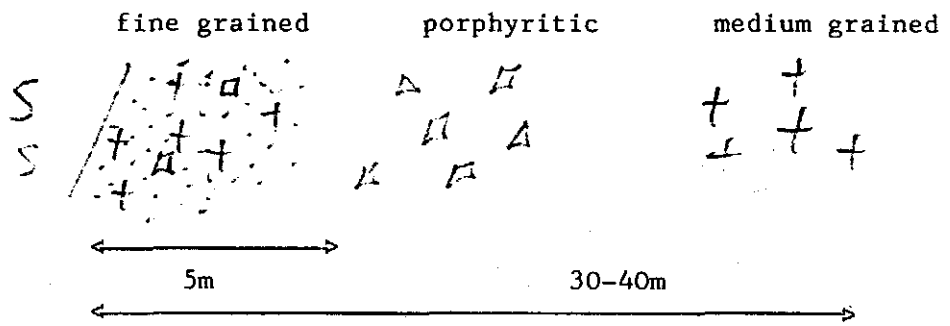
Towards the margins of the granite get porphyritic variant. Phenocrysts of quartz and feldspar upto 1cm across - groundmass fine grained biotite granite.

Very close to contact with sediments fine grained granite variant seen. Generally quartz/feldspar few mafics - some areas contain phenocrysts of biotite. Sharp contact zone between fine grained granite and medium grained equigranular granite (in S tributary of Constables Creek contact between fore grained granite and medium grained granite very sharp and biotite rich).



biotite rich 10 cm

Sequence of medium grained to porphyritic to fine grained granite observed in S. tributary of Constables Creek within 50m of sediment contact.



Granite well jointed with dominant directions NE trending (dipping steeply NW) and WNW trending (dipping steeply NE). See stereonet attached. (Minor NW trending joints).

Greisenized granite lodes and associated quartz (plus minor tourmaline) veining trends NW and WNW (NOT associated with the NE direction).

Groves (1972) reports joints in granite and sediments coated with euhedral crystals of cassiterite (not observed by the author).

Mathinna Beds

Mathinna sediments surrounding the granite are hornfelsed. Recrystallized - very hard and may contain large "leopard-lite" spots. Spotting not always present in contact sediments.

Original lithologies siltstones and shales - bedding fairly common striking NW and dipping to the SW. Joints simmilar orientation to those in the underlying granite (see stereonet).

Granite/sediment contact - locally steeply dipping. S tributary of Constables Creek contact trends 137° 86° SW dip. On the Western arm of Constables Creek contact between 50° to 60° dip.

Axis of the granite ridge infered to be NNE to SSW since:

1) Granite window elongate NNE - SSW.
2) Greisenization is common in the apical zones of granite cupolas - sparce elsewhere - at Echo the trend is NNE - SSW from North to South prospects.
3) Granite exposed in the western arm of Constables Creek shows little variation towards the sediment contact. Varies from medium grained to fine/medium grained granite.

3) Mineralization

Gross Setting/Dimensions

Two dominant zones of Mineralization.

North Echo - WNW trending greisen lodes - zone of about 160m to 200m long and 50m wide close to the top of the granite. Individual lodes traceable for 160m upto 8m deep (Groves 1972) with widths upto 2m across.

Wolframite and molybdenite distribution is very patchy. Mineralization occurs in quartz veins which are bounded by siliceous and muscovite granitic lode margins.

South Echo - Series of shallow pits - pretty spaced out, largest pit about 15 to 20m long and 1 to 1.5m across. Dominantly wolframite - very patchy. Mineralization in central quartz veins flanked by muscovite granite lode margins - siliceous lodes not common here.

Lode veins consisting of muscovite (some siliceous alteration) and central quartz veins upto 30cm across (some upto 1m across - rare) occur in the granite window. Generally thin and not mineralized away from the granite contact. All lode veins trend NW or WNW.

Veins/lodes thin rapidly with depth below the granite contact. 50m below contact veins very confined - no depth potential.

Greisenized fluids pooled/ponded at the granite sediment contact.

Mineralogy

Muscovite Lode - Quartz/muscovite greisen - may contain biotite in places - muscovite replaces feldspar (and biotite) - quartz is primary.

Siliceous Lode - Dominantly quartz - primary crystalline quartz plus a siliceous matric of granular quartz - minor muscovite. Grades into the muscovite lode.

Central Quartz Vein - Dominantly vein quartz with minor muscovite. Contains bladed wolframite and molybdenite.

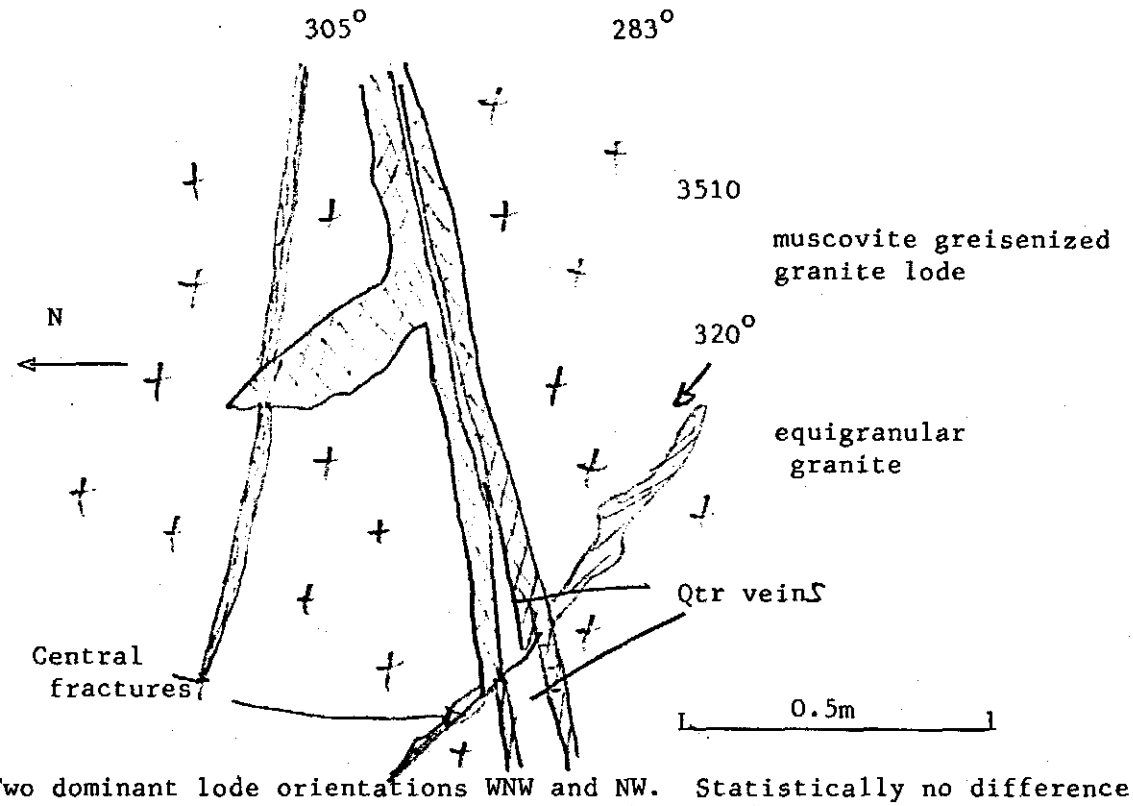
Occassionaly a central tournaline fill is present generally <2cms across.

Some lode veins may contain marginal shearing of the host granite (rare).

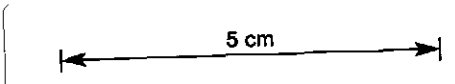
Quartz centre and sheared margin.

Horizontal/gently dipping stickensides on quartz veins also.

Distribution of lode very irregular - always related to fractures or joints. ⊕ Lode veins therefore altered joint surface! ⊕



Two dominant lode orientations WNW and NW. Statistically no difference (see stereonet).



Drilling Results

North Echo - DDH1 - 138m depth assays low - rockchips from dump upto 15.1% WO_3, 0.1% Mo and 0.58% Bi.

DDH2 - 65m depth maximum values of 0.1% WO_3, Sn maximum 0.1%, Mo 750ppm.

Narrow vein in DDH1 0.7m at 0.29% Sn depth of 130m - only intersection

South Echo - DDH3 - (-45° to 041°) 90m. Vein of 0.2% WO_3, 0.18% Bi - assay values generally low. Obtained WO_3 values from the greisenized granite.

DDH4 - (-45° to 185°) 130m depth, drilled to test soil anomaly Mo upto 90ppm. Granite kaol mize, Fe rich near surface. Minor Py, chalcopyrite on joints. Maximum values Mo 40ppm, 0.08% Sn, 20ppm Bi.

DDH5 - (-45° to 007°) 135m depth. Drilled from Mathinna Beds. (Previous Cobra Rock drilling gave results of 0.65% WO_3, 0.18% Bi).

5m of fg granite - siliceous too passes into biotite granite secondary chloritic alteration of biotite.

Peak rock assays 0.08% Sn, 70ppm Mo. Very patchy.

342138

ECHO PROSPECT

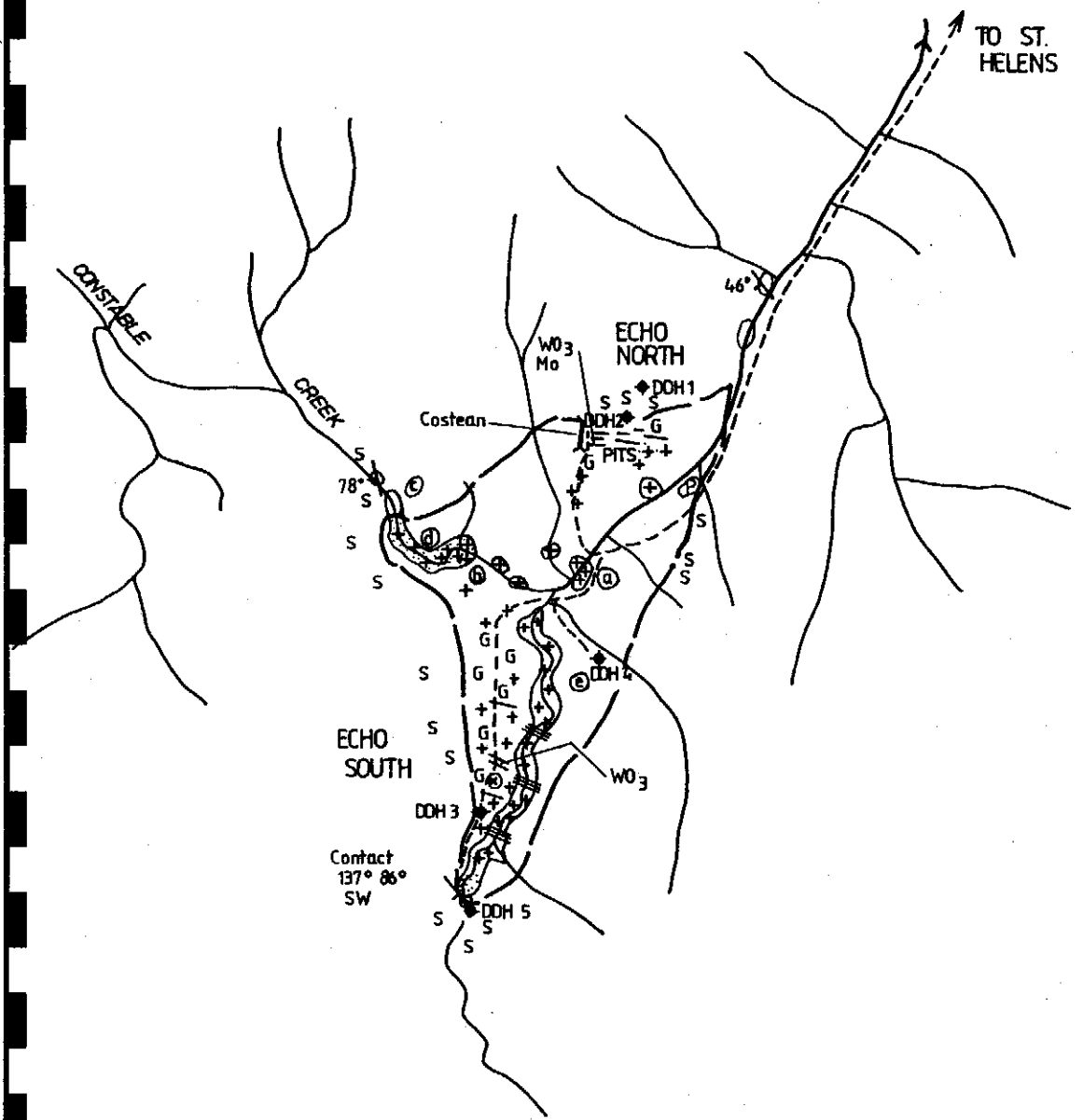
ROCK CHIP

ROCK NO./LOCATION TYPE	Au	Sn	WO_3	Mo	As	Cu	Pb	Zn	Bi	Ag
6818 East side of granite window Greisenized granite	< 0.05	55	25	14	410	46	20	12	160	<1
6817 E. side of granite window Fresh granite, Equig. Bi	< 0.05	8	<10	16	24	8	<4	6	6	<1
6818 E. side of granite window. Greisen vein & Qtr vein, cass?	< 0.05	1.41%	35	16	140	12	12	6	6	<1
6819 E. side of granite window. Greisen & Qtz vein	< 0.05	38	30	210	28	10	<4	32	170	<1
6820 E. side of granite window. Greisen vein.	< 0.05	22	1550	40	< 2	6	4	10	480	<1
6821 South Echo. Chl/Im rock - greisenized.	< 0.05	340	25	< 4	44	10	8	250	26	<1
6853 South Echo. Qtz/fg tourm vein & Greisen.	< 0.05	950	40	< 4	70	48	8	38	10	<1
6854 South Echo. Greisen & Qtz vein siliceous.	< 0.05	24	910	4	5	8	8	16	120	<1
6855 North Echo Pits. Greisen and Qtz veins siliceous.	< 0.05	26	180	125	90	20	10	22	360	2
6856 North Echo Pits. Qtz vein & Mo.	< 0.05	< 4	2650	1.06%	2050	14	700	4	1400	173
12451 Western Creek. Qtz vein & greisen minor Fe.	< 0.05	580	30	4	230	36	20	70	12	2

	Sn	WO_3	Mo	Bi	Ag
South Echo	1.41%	1550	210	480	
North Echo		2650	1.06%	1400	173

138

342139



LEGEND

S S	*MATHINNA BEDS*
+ +	*MEDIUM GRAINED GRANITE*
P	*PORPHYRITIC GRANITE*
	FINE GRAINED GRANITE
	MINERALIZED LODES
G	*GREISENIZATION*
DDH 1	*DRILL HOLES*
⑥	*FIELD NUMBER*

N

5 cm

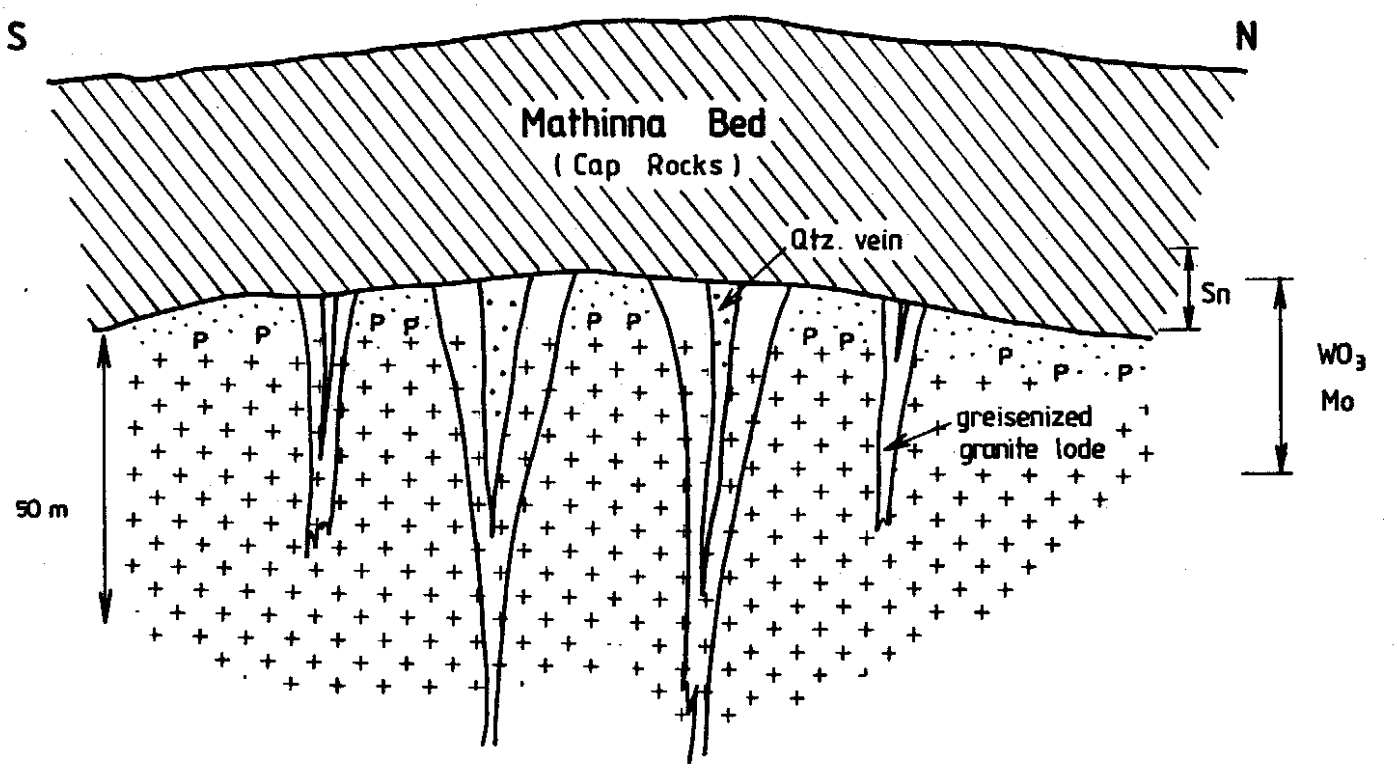
The Shell Company of Australia Limited
METALS DIVISION

E.L. 12/78 SCAMANDER
ECHO PROSPECT
(RUN 7 No. 146)

SCALE 1:15000	DATE 24-10-83
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE D'PORT	REP.No.
DRG No DL H02/55A	FIG No

342140

ECHO PROSPECT



LEGEND

FINE GRAINED GRANITE

PORPHYRITIC GRANITE

— CHILL PHASES

MEDIUM GRAINED EQUIGRANULAR
BIOTITE (MINOR MUSCOVITE) GRANITE

5 cm

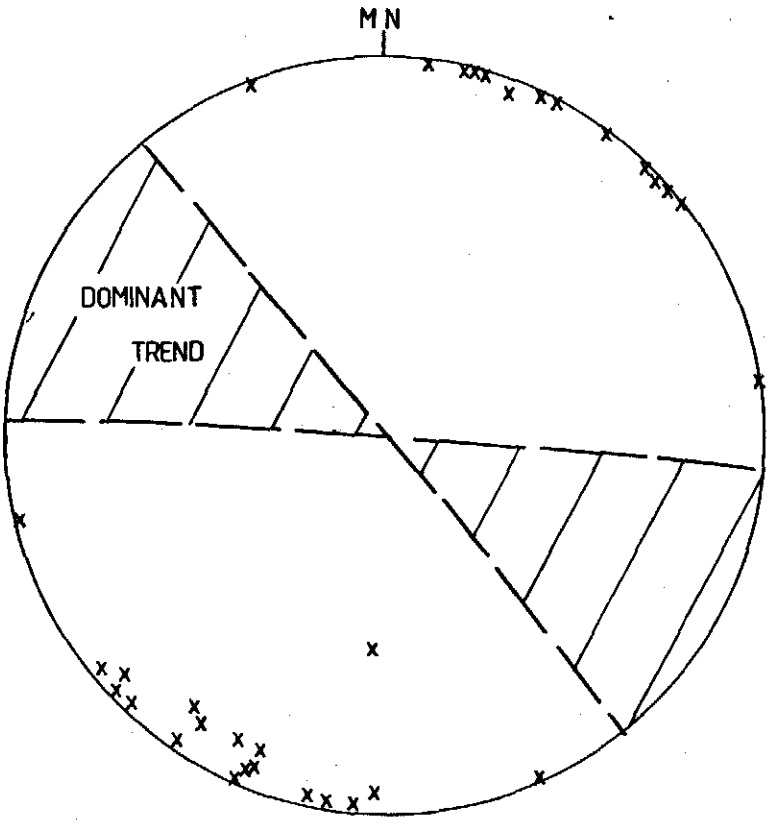
The Shell Company of Australia Limited METALS DIVISION	
E.L. 12/78 SCAMANDER ECHO PROSPECT DIAGRAMMATIC SECTION	
SCALE	DATE 24-11-83
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE D'PORT	REP.No.
DRG.No. D/LH02/515	FIG.No. 2

140

342141

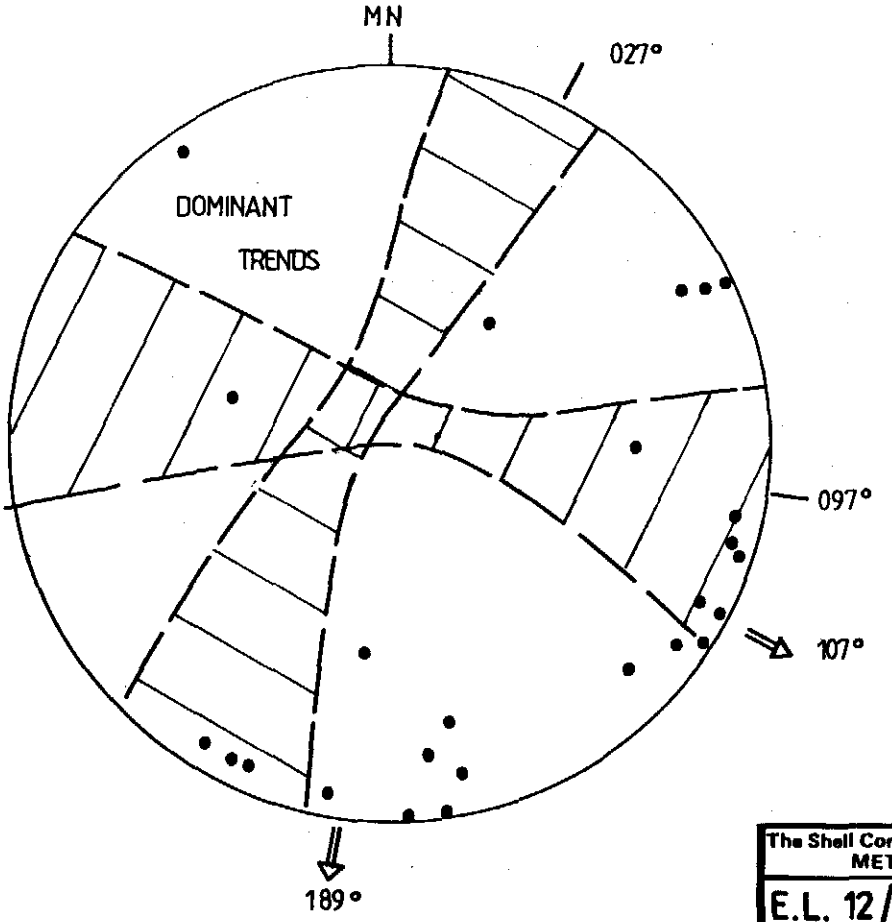
24/10/83

LODE VEINS IN GRANITE



x n = 17

JOINTS IN GRANITE



• n = 24

5 cm

LAMBERT EQUAL AREA NET

The Shell Company of Australia Limited
METALS DIVISION

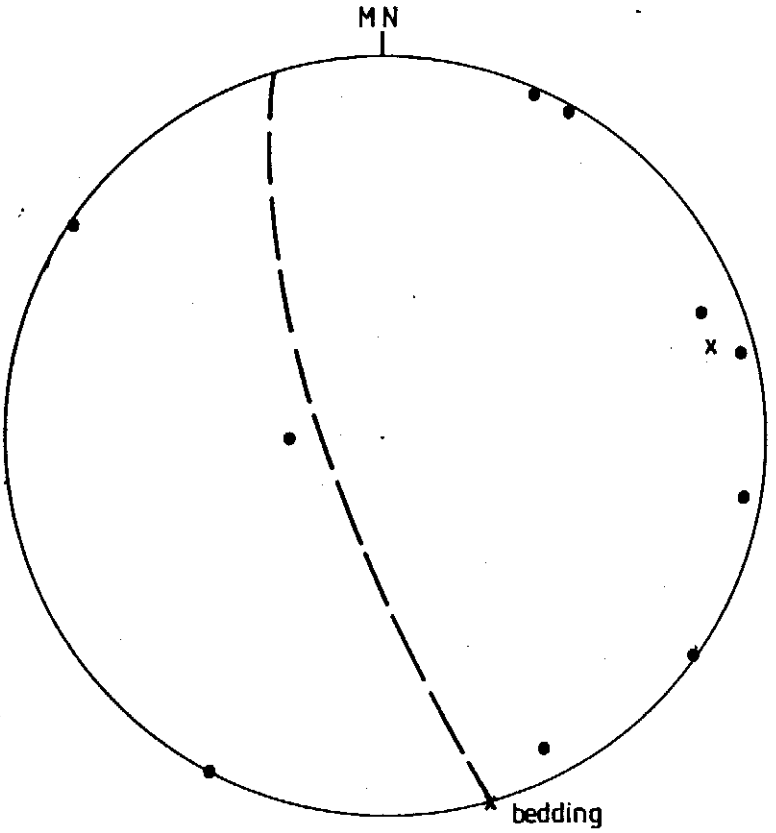
E.L. 12/78 SCAMANDER
ECHO PROSPECT
STEREO NETS.

SCALE	DATE 25-7-84
AUTHOR P.A.R	DRAWN J.L.L.
OFFICE D'PORT	REP.No.
DRG No. D/LH02/540	FIG No

141

342142
24/10/83

JOINTS IN
MATHINNA BEDS



• n = 7

5 cm

LAMBERT EQUAL AREA NET

The Shell Company of Australia Limited METALS DIVISION	
E.L. 12/78 SCAMANDER ECHO PROSPECT STERO NET	
SCALE	DATE 25-7-84
AUTHOR P.A.R.	DRAWN I.L.L.
OFFICE D'PORT	REP.No.
ORG No D/LH02/567	FIG No

SILVER ECHO PROSPECT 28/10/83

1) General Description

a) Style of Mineralization

Sulphides (dominantly pyrrhotite) related to a NNW trending quartz vein blow with associated marginal greisenized granite. Host rocks silicified/recrystallized Mathinna sediments.

b) Host Rocks

Mathinna Bed sediments - dominantly sandstones - recrystallized and silicified. Very hard. Bedding generally strikes NW dipping SW.

c) Geography/Location

Located 5km SW of St. Helens on the edge of a small mineral lease for building stone. Prospect occurs in the stream bed of the Eastern Tributary of Nephele Creek.

d) Old Workings

Adit 44m long driven to test extensions of the quartz blow. Small shaft in the creek bed sunk on south (sulphide rich end) of quartz blow.

2) Host Rocks

Mathinna Beds

Lithology Mixture of sandstones and shales although sandstones dominate. Rocks recrystallized and silicified.

Bedding Beds strike NW and dip gently to the SW. No clearage in shales. Minor bedding visible only.

Fractures/veins/faults Sandstones highly fractured. Fracture sets trend: 1) WNW - ESE, 2) WSW - ENE, 3) NW (to WNW) -SE.

In adit fractures trending WNW - ESE contain pyrite and quartz. Upto 30 to 40 fractures per metre - some fractures upto 1cm wide with euthedral quartz fills. WNW trend SSW dip-steep.

Two sets of quartz veins recognized 5m S of prospect further up Nephele Creek trending: a) NNW (to N-S) and dipping east, b) WNW dipping SW. Main quartz blow/lode trends NNW.

Metamorphism/alteration Sandstones/shales extremely silicified. In some areas silicification clearly related to fractures but then generally pervades the whole rock.

Spotted shales seen in float close to the prospect in addition to quartz and quartz/tourmaline veining.

Greisenized Granite

Possibly a granite dyke? - granite forms a margin to the NNW trending quartz lode/blow.

Bluish/grey rock - white milky fledspars - rounded quartz phenocrysts (4mm maximum diameter). Biotite mica 3-3.5mm maximum diameter (generally less). Quartz bluish, minor day mineral alteration of fledspars. Disseminated purite.

Other samples quartz - sericite greisen with a faint relic granite texture - vugs - feldspar absent in this specimen - sulphides.

Conclusion greisenized porphyritic biotite granite - may be totally replaced by massive sulphide.

4) Mineralization

Gross Setting/Dimensions

Pod-like quartz vein which trends NNW. Greisenized granite and quartz vein material 25m long and 8m wide - quartz blow itself is 14m long and 6m wide. The NNW direction is parallel to a regional fracture/quartz vein direction suggesting the mineralized lode is a tension gash feature.

Sulphide-rich portion 2m by 2m or less.

Origin - 1) could be a dyke or pipe of granite and associated quartz vein or
2) a tension gash feature.

Mineralogy

Sulphide-rich lode occurs at the margin of the quartz blow and greisenized granite. Massive sulphide samples with quartz eyes indicating a relic granite texture. Massive sulphide samples suggest coencident formation with the quartz blow.

Disseminated sulphides in the greisenized granite dominantly pyrite.

Away from sulphide-rich area quartz blow generally barren of sulphide.

Dominant sulphide in lode is pyrrhotite - unusual - associated chalcopyrite/pyrite plus marcasite.

Anastomosing veins of pyrite/pyrrhotite.

Groves (1972) recognized intergrown muscovite and tourmaline in lode material.

Note Ferricrete formed downstream of the prospect - of irregular thickness and occurs beneath alluvial/colluvial concentration ie. may be Tertiary Blocks of lode material and Mathinna Beds enclosed.

342145

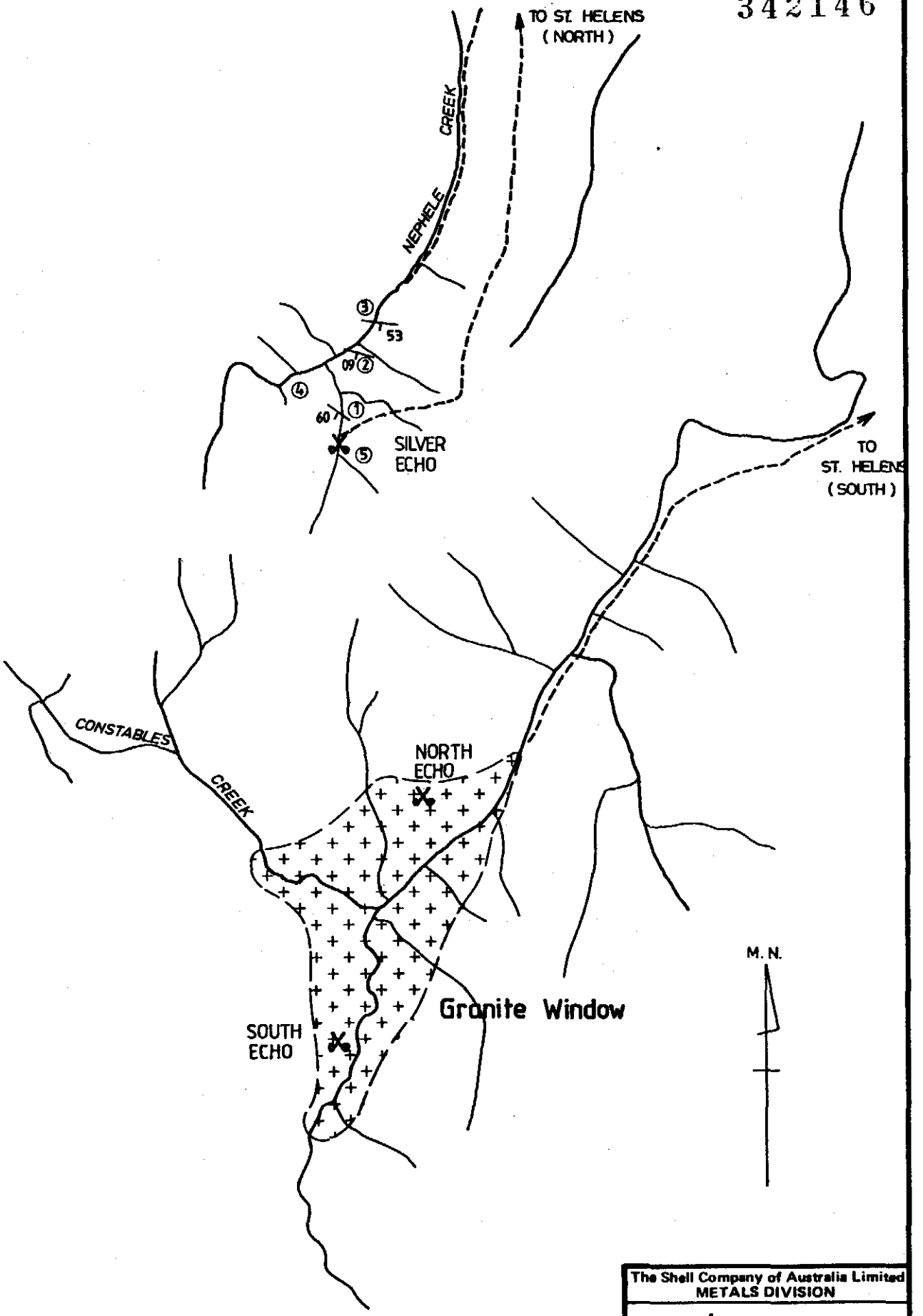
SILVER ECHO PROSPECT

ROCK CHIPS

ROCK NO./LOCATION TYPE	Au	Sn	WO_3	Mo	As	Cu	Pb	Zn	Bi	Ag
12456 Prospect Greisenized granite	<0.05	8	10	< 4	75	90	22	16	8	< 1
12457 Prospect Greisenized granite	<0.05	65	45	4	55	135	26	10	4	1
12458 Prospect Qtz/sercite Minor Fe	<0.05	6	10	< 4	60	34	24	34	8	< 1
12459 Adit entrance Massive Po/Py	<0.05	< 4	30	60	90	5700	30	24	< 4	5
12460 Adit entrance Py veins in granite	<0.05	< 4	<10	8	36	2500	24	12	10	4
12461 Adit entrance Massive Po/Py & chip	<0.05	< 4	15	120	85	5700	28	46	8	4
12462 Adit Sil.mg.sst, Py fract.	<0.05	6	55	< 4	20	120	24	24	12	< 1
12463 Adit Sil.mg.sst. Qtz/Py veins	<0.05	< 4	60	6	44	130	12	16	< 4	1
12464 Float in Creek Massive Po & chp minor	<0.05	< 4	<10	16	46	1300	32	10	32	4

Sn	WO_3	Mo	Cu	Bi	Ag
65	60	120	5700	32	5

342146



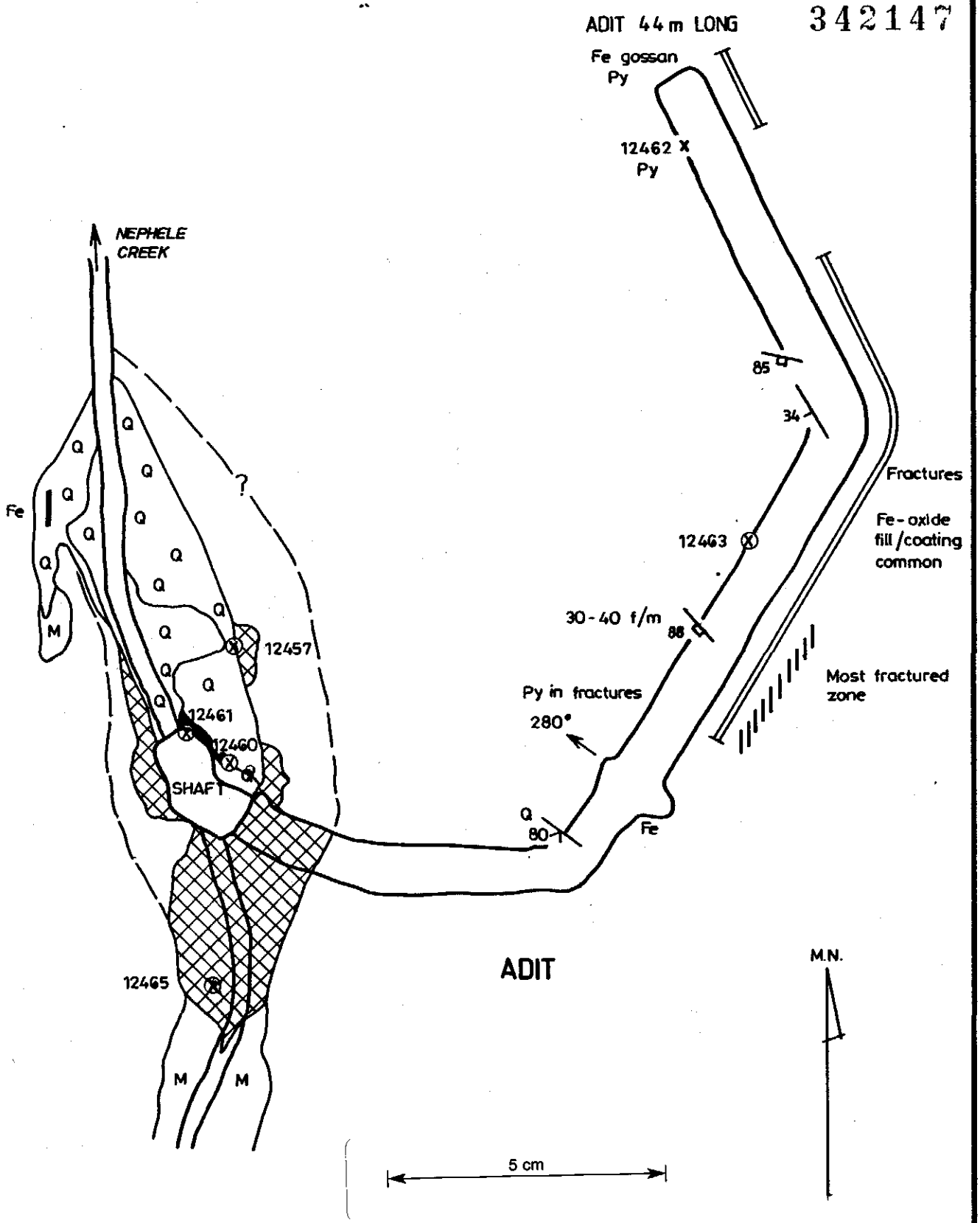
The Shell Company of Australia Limited
METALS DIVISION

E.L. 12/78 SCAMANDER

SILVER ECHO PROSPECT

SCALE 1:15000	DATE 28-10-83
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE SCAMANDER	REP.No.
DRG.No. D/LH02/521	FIG.No.

342147



LEGEND

Q	QUARTZ VEINS		BEDDING
	SULPHIDE ZONE		FRACTURE
	GREISENIZED GRANITE	Q	VEIN
	SANDSTONE SHALE	12640	ROCK CHIP SAMPLE
	SANDSTONE		

The Shell Company of Australia Limited
METALS DIVISION

E.L. 12/78 SCAMANDER
SILVER ECHO PROSPECT
GEOLOGY

SCALE 1:200	DATE 28-10-83
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE SCAMANDER	REP.No.
DRG.No. 0/LH02/523	FIG.No.

BADEN POWELL PROSPECT 6/12/83

1.0 General Description

a) Style of Mineralization

Large 20-75 cm wide quartz veins containing irregularly distributed wolframite and molybdenite mineralization.

b) Host Rocks

Host rocks are Mathinna Beds. Here they are dominantly very highly metamorphosed shales with minor intercalated fine grained sandstone beds.

c) Location

Baden Powell prospect is located on the western side of Wolfram Creek Road and is on the north facing side of a low E-W trending ridge. The prospect is 600m from the nearest exposure of the Constable Creek Granite.

d) Old Workings

At Baden Powell there are numerous small exploratory pits and large trenches. The larger trenches are upto 90m long and up to 5-6m deep. These trenches are located on the 6 major mineralized veins. Here mineralized quartz vein material has been selectively mined. Groves (1972) reports that about 1 tonne of wolframite has been removed from the prospect.

2.0 Host Rocks

a) Lithology

Host rocks to the Baden Powell prospect are highly metamorphosed shales and fine grained sandstones of the Mathinna Beds. Sandstone beds are rare and are less than 0.5m thick. Shale lithology is dominant.

b) Bedding/Cleavage/Folds

Poor exposure limits the number of bedding orientations that can be measured. The sterio plot and field observation shows low buckling and folding about an axis which plunges 52° - 275, which is almost perpendicular to regional folding in the Mathinna Beds. Small scale buckling can be observed in the west wall of the main pit. Here the buckle in bedding is about 1m in size.

Cleavage orientation is consistent throughout the prospect. It can be found both parallel, and at a high angle to bedding. Sterio plot of cleavage in shale shows that it has a NNW trend with near vertical dips. Cleavage is parallel to the regional fold axial plane and is not related to local small scale buckles and folds.

c) Faults

A breccia zone is located 3m west of the main pit. This is a clastic breccia of angular fragments of Mathinna rocks upto 5cm long, held by a euhedral vuggy quartz matrix. Quartz forms as perfect euhedral crystals upto 5mm long. Rare fine wolframite blades can be found associated with vuggy quartz.

No evidence of shearing has been found at the prospect.

Mineralized veins pinch and swell along strike and down dip. They have an elongate lensoid shape. Groves (1972) suggests they may be Tension Gash filling perhaps associated with regional structures.

A slight, but definite strike change can be observed in the largest of the mineralized veins.

d) Metamorphism

Host Mathinna group rocks are metamorphosed to a high grade. Hand specimen inspection of fine grained sandstones indicate that they locally approach cordierite hornfels facies grade of metamorphism. Shales are also highly metamorphosed. Contact metamorphism having caused accentuation of the cleavage so that in isolated occurrences shales are best described as white mica schists.

Spotting in shales is extremely intense. Dark coloured spots are individually 2mm in diameter. In isolated samples spots cover 30-40% of a freshly broken surface.

e) Alteration

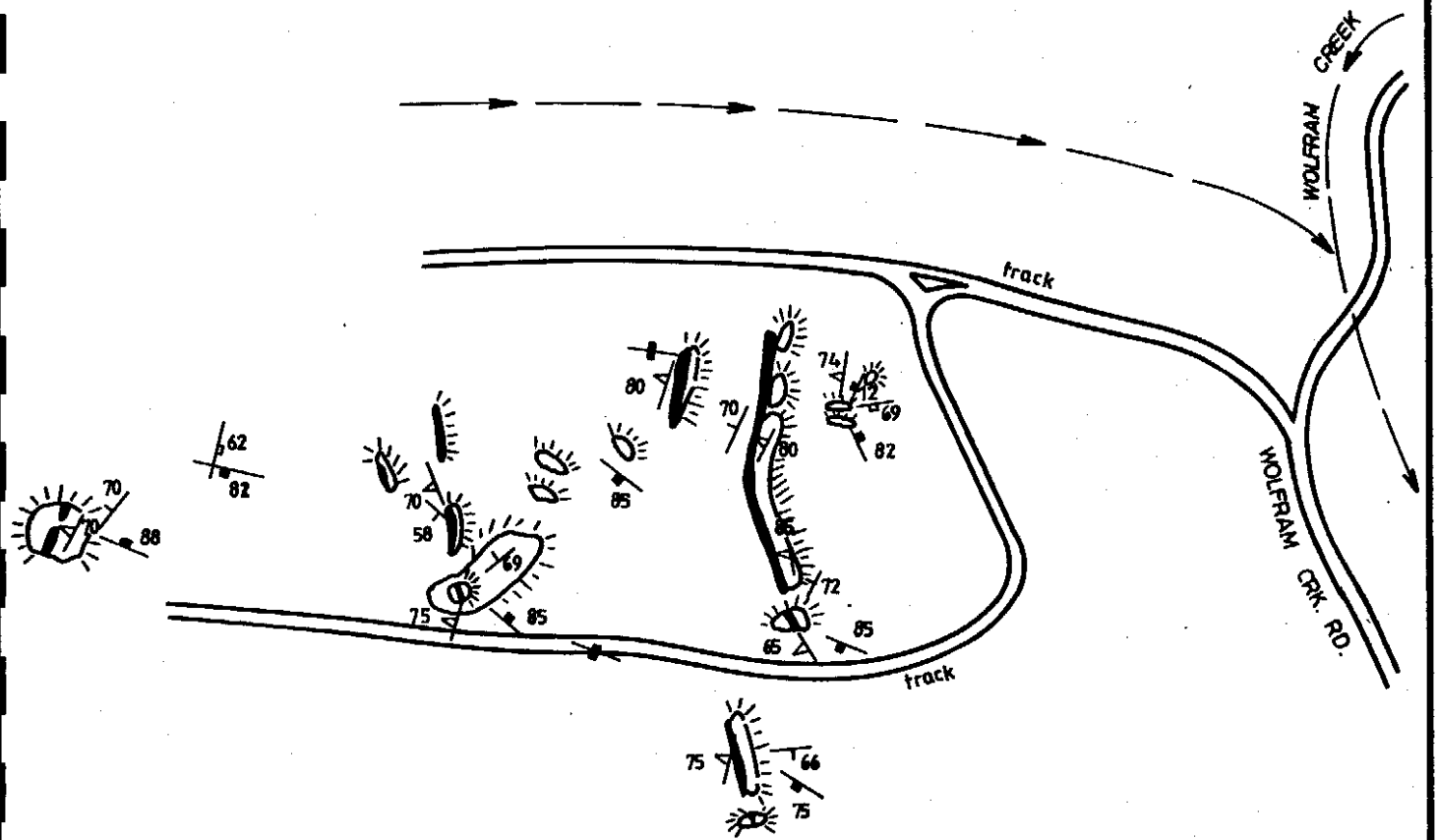
Small isolated occurrences of fine grained sandstone are cut by swarms of fine quartz veins. Associated siliceous alteration has resulted in the formation of small irregular patches of quartzite.

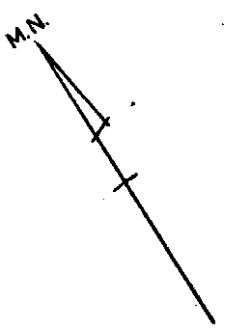
3.0 Gross setting/Type/Style

Mineralization is confined to NNE-NE trending quartz veins. Veins are 20-75 cm thick and pinch and swell along strike. Curved sides and lensoid shape indicate that the veins may be tension gash fills. Veins are subparallel with a spacing of about 20m. The veins are perpendicular to the regional fold axis and crosscut local small folds, buckles and the cleavage.

These veins at Baden Powell are parallel to the mineralized veins at Pyramid and could possibly be feeders to a Pyramid style deposit. WO_3 bearing veins at Baden Powell are very similar to the WO_3 bearing veins of documented Chinese deposits.

342150





LEGEND

- WO_3 - Mo - QTZ. VEIN IN PIT
- PIT WITH DUMP
- STRIKE / DIP BEDDING
- STRIKE / DIP JOINTING
- STRIKE / DIP QTZ. VEIN (WO_3 - Mo)
- STRIKE / DIP CLEAVAGE

5 cm

0 50 m

APPROXIMATE SCALE

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METALS DIVISION

E.L. 12/78 SCAMANDER

BADEN POWELL PROSPECT

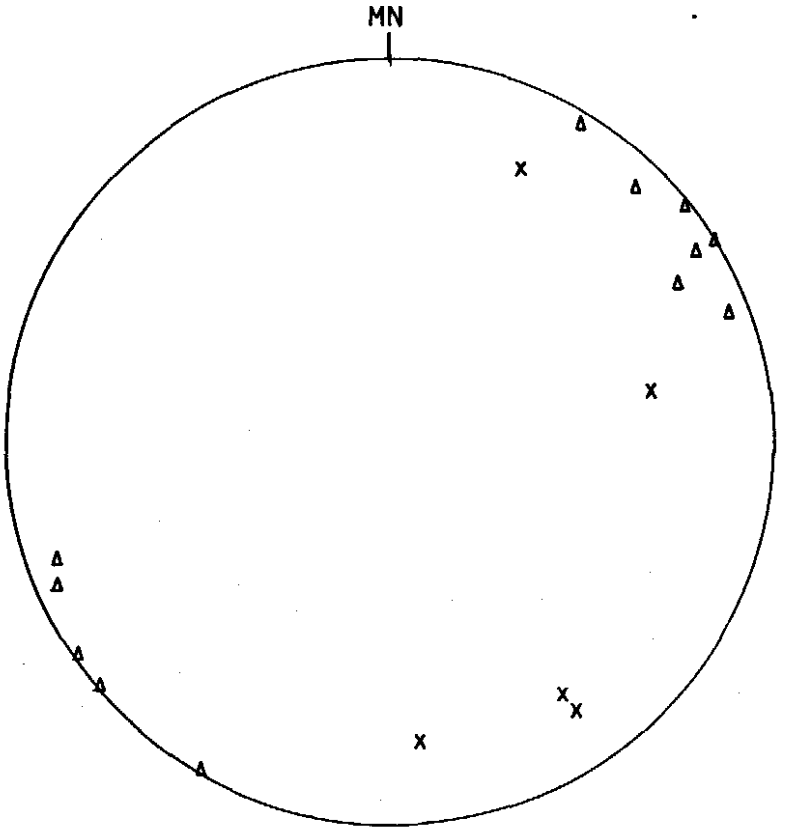
SKETCH MAP

SCALE 1:1500	DATE 6-12-83
AUTHOR G.J.P.	DRAWN J.L.L.
OFFICE SCAMANDER	REP.No.
DRG.No. D/LH02/517	FIG.No.

150

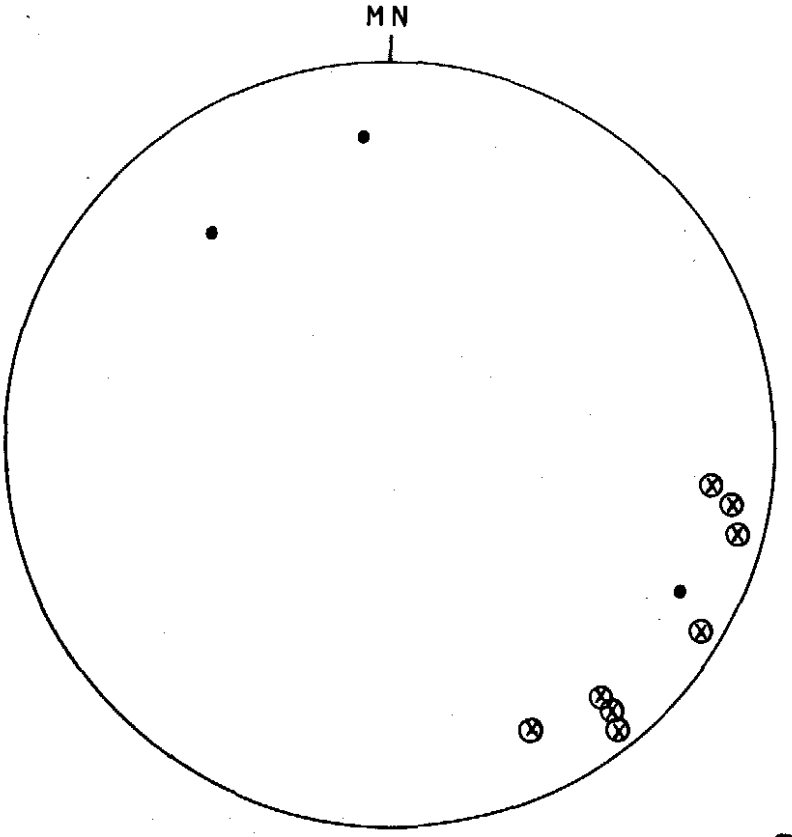
342151

DDING
LEAVAGE IN SHALES



x n = 5
Δ n = 10

INERALIZED VEINS



⊗ n = 8
● n = 3

x bedding

cleavage

⊗ mineralized veins.

fractures.

5 cm

LAMBERT EQUAL AREA NET

The Shell Company of Australia Limited
METALS DIVISION

E.L.12/78 SCAMANDER
BADEN POWELL
STEREO NETS

SCALE	DATE 25-7-86
AUTHOR P.A.R.	DRAWN I.L.L.
OFFICE D'PORT	REP.No.
DRG No D/LH02/562	FIG No

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CARSON DE BEER'S (PRICE'S) PROSPECT

1.0 General Description

a) Style of Mineralization

Large 20-40 cm wide quartz-tourmaline veins containing irregular distributed wolframite and minor molybdenite mineralization. Wolframite occurs in crystals upto 75mm in length. Minor pyrite and chalcopyrite mineralization is reported by Groves (1972).

b) Host Rocks

Mathinna Beds - Host Mathinna beds consist almost entirely of shale lithologies in the eastern part of the prospect. These grade westerly into intercalated sandstones, siltstones and shale and then into quartzites in the western most part of the prospect.

c) Location

Carson de Beers prospect is located just north of Loila Tier Road about 600m east from the intersection of Wolfram Creek Road. The prospect is 900m from the nearest exposure of the Constable Creek granite located to the northwest.

d) Old Workings

There are numerous small pits scattered across the prospect. These are unmarked on the accompanying map. 5 large pits have mineralized veins exposed within them. Some of the pits have been extended and opened up by use of a bulldozer by a later exploration company.

2.0 Host Rocks

Mathinna Beds

a) Lithology

Lithologies in the eastern half of the prospect are unmetamorphosed pink-mauve shales. They have a fairly well developed cleavage and no spotting.

Spotting appears and progressively increases towards the west. To the west the shale lithology grades into interbedded sandstone/siltstone/shale lithologies and then into quartzites at the western end of the prospect.

b) Bedding/Cleavage/Folds

Bedding in host sediments in the prospects strikes consistently NNW and dips steeply to the east. The prospect is located in the limb of a regional fold. A few bedding measurements give NE strikes with steep NW dips. These readings probably take in the limb of a small buckle fold oriented parallel to buckle folds at Baden Powell prospect.

Cleavage consistently strikes NNW and has steep dips to the east. This is axial plane cleavage to regional folding.

c) Joints/Veins

There are four principal joint directions in host sediments at Carson de Beers prospect. One set has variable strikes and is flat lying. A second set strikes E-W and dips steeply to the north. Two other sets have a NNE strike and steep west dips and NNW strikes and steep easterly dips.

Mineralized veins tend to strike NE and dip steeply towards the NW. This is parallel to the mineralized veins at Baden Powell prospect and Great Pyramid. These could be source veins for Pyramid-style mineralization. The anomalous mineralized veins strike NNW with vertical dip.

d) Metamorphism

Metamorphism at Carson de Beers is strictly low grade. Shale lithologies in the east are virtually unmetamorphosed. No spots are visible. Low grade metamorphism is evident in the western part of the prospect. Metamorphic spotting becomes visible.

e) Alteration

In the western part of the prospect sandstone units are cut by swarming of irregular quartz veins. Silic alteration associated with these vein swarms has caused formation of small irregular patches of quartzite. The larger mineralized veins occur in brittle sandstone/siltstone/shale and quartzite lithologies. Tourmaline reaches high concentrations in the mineralized veins and strong tourmaline alteration of host rocks is evident in this area.

3.0 Gross Setting/Type/Style

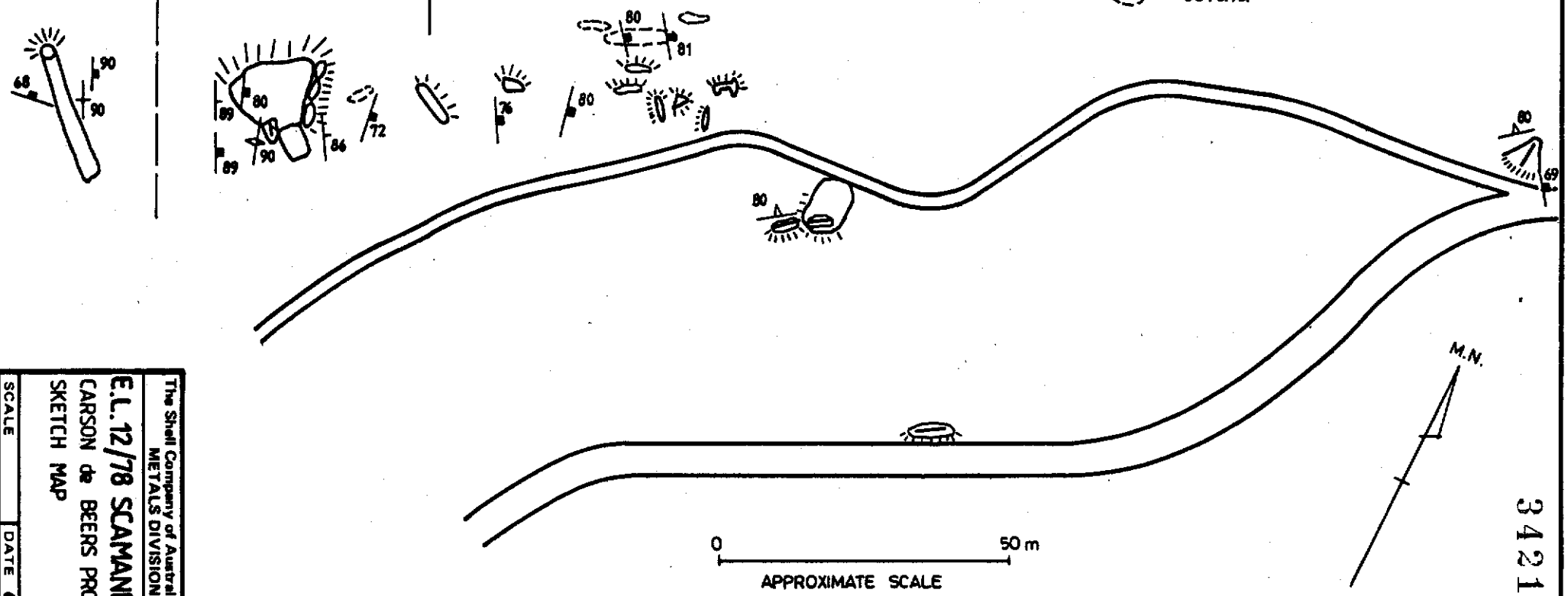
Mineralization is confined to large 20-40 cm wide quartz-tourmaline veins. The veins generally have NE strikes and steep NW dips with one anomalous NNW striking vein with vertical dip. The veins are irregular, pinching and swelling along strike. The veins crosscut the regional fold axis and small buckle folds. These veins are probably feeder veins for a Pyramid-style deposit located higher in the hydrothermal sequence.

5 cm

LEGEND

- WO_3 MINERALIZED QTZ. VEIN IN PIT.
- PIT WITH DUMP
- 80 STRIKE / DIP BEDDING
- STRIKE / DIP JOINTING
- STRIKE / DIP WO_3 MINERALIZED QTZ VEIN
- STRIK / DIP CLEAVAGE
- OUTCROP

QUARTZITES ← | SANDSTONE / SILTSTONE / SHALE | → SHALE



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METALS DIVISION

E.L. 12/78 SCAMANDER

CARSON de BEERS PROSPECT
SKETCH MAP

SCALE	DATE 6-12-69
AUTHOR G.J.P.	DRAWN J.L.
OFFICE SCAMANDER	REP. No.
DRG. No. D/LH02/516	FIG. No.

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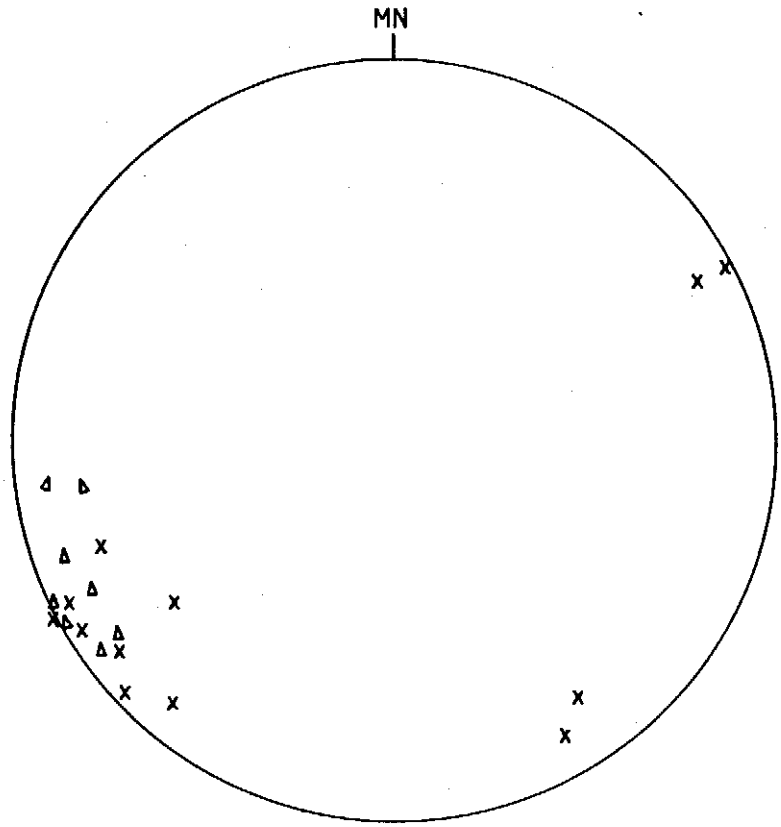
BEDDING

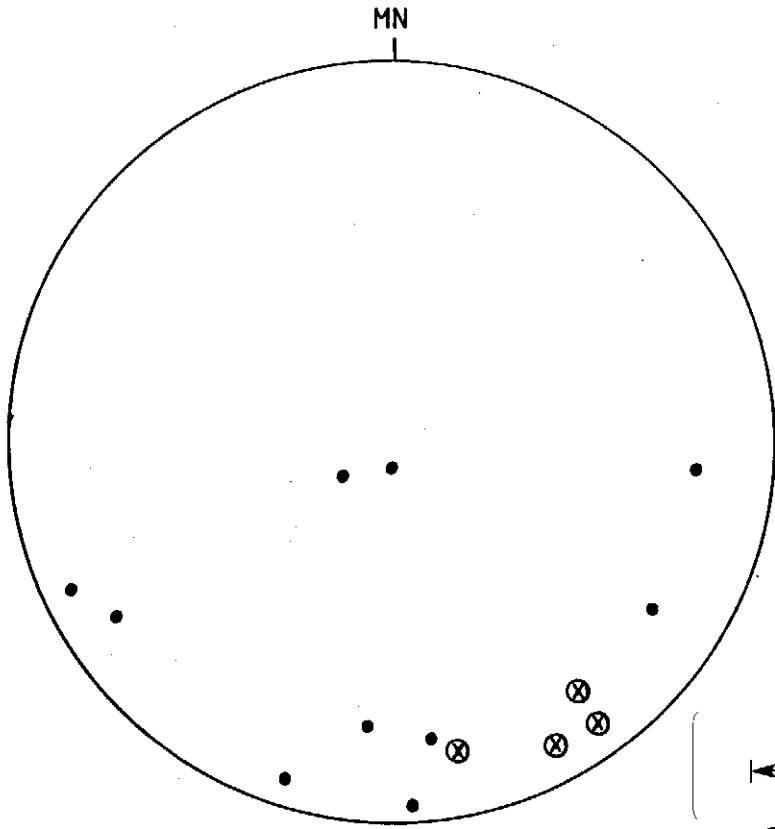
CLEAVAGE



x n = 11

Δ n = 8

MINERALIZED VEINS



x n = 4

● n = 10

x bedding

Δ cleavage

⊗ mineralized veins

● joints

5 cm

LAMBERT EQUAL AREA NET

The Shell Company of Australia Limited
METALS DIVISION

E.L. 12/78 SCAMANDER

CARSON DE BEERS

STEREO NETS

SCALE	DATE 25-7-84
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE D'PORT	REP. No.
DRG No D/LH02/563	FIG No

LUTWYCHE PROSPECT

1.0 General Description

a) Style of Mineralization

Large 10-40 cm wide quartz veins containing irregularly distributed wolframite and molybdenite mineralization.

b) Host Rocks

Host rocks to mineralization are Mathinna Beds. There they are interbedded sandstones, siltstones and shales with minor irregular patches of quartzite.

c) Location

Lutwyche prospect is located about 700m south of Carson de Beers prospect and is about 900m east of Wolfram Creek Road. The nearest exposure of the Constable Creek Granite is located 1.5m to the north.

d) Old Workings

At Lutwyche there are numerous small exploration pits and larger trenches. Trenches are upto 20m long and 4-6m deep. The trenches are located on large mineralized veins which have been selectively mined. Old workings are shown on the Geophoto Resources 1" = 100' map of the area.

2.0 Host Rocks

a) Lithology

Host Rocks to Lutwyche Prospect are interbedded sandstones, siltstones and shales. Shales tend to dominate. Irregular patches of quartzite are developed in sandstone units. Metamorphism is of a low grade.

b) Bedding/Folds

Bedding at Lutwyche prospect strikes NNW with steep easterly dips. This is obviously a limb of a regional fold. One measurement shown on the sterio plot shows bedding to strike ENE and dip steeply to the north. This could be caused by a local buckle. Note that this is also observed at Baden Powell and Carson de Beers prospects.

c) Faults

Small ferruginous shear zones have been found within the prospect. These frequently have many small exploratory pits along their length. No major fault is observed. The possibility of the mineralized vein being tension gash fills as mentioned in the Baden Powell prospect fill must be considered. At Lutwyche exposure is too sparse to affirm this.

d) Metamorphism

Host Mathinna group sediments at Lutwyche are metamorphosed to a low grade. Spotting can be observed in some shale specimens. Frequently shales can be found which are virtually unmetamorphosed.

e) Alteration

Small isolated occurrences of quartz vein swarms cutting sandstones can be found. Here sitic alteration associated with these veins has resulted in the formation of quartzites.

3.0 Gross Setting/Types/Style

Mineralization is confined to NNE-NE trending quartz veins. The veins are 10-40 cm thick, are subparallel and are spaced at about 20m intervals. The veins are perpendicular to the regional fold axis. The mineralized veins at Lutwyche are parallel to the mineralized vein set at Great Pyramid. Lutwyche veins could be feeders for Pyramid-style mineralization higher in the sequence. Lutwyche WO_3 - Mo veins are very similar to documented WO_3 bearing veins in China.

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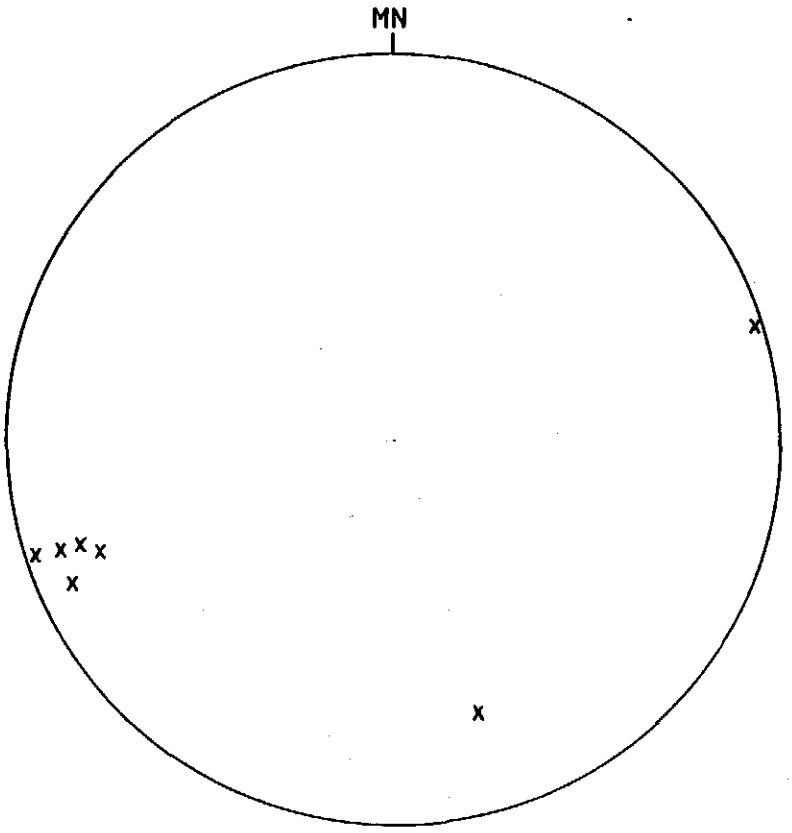
342158

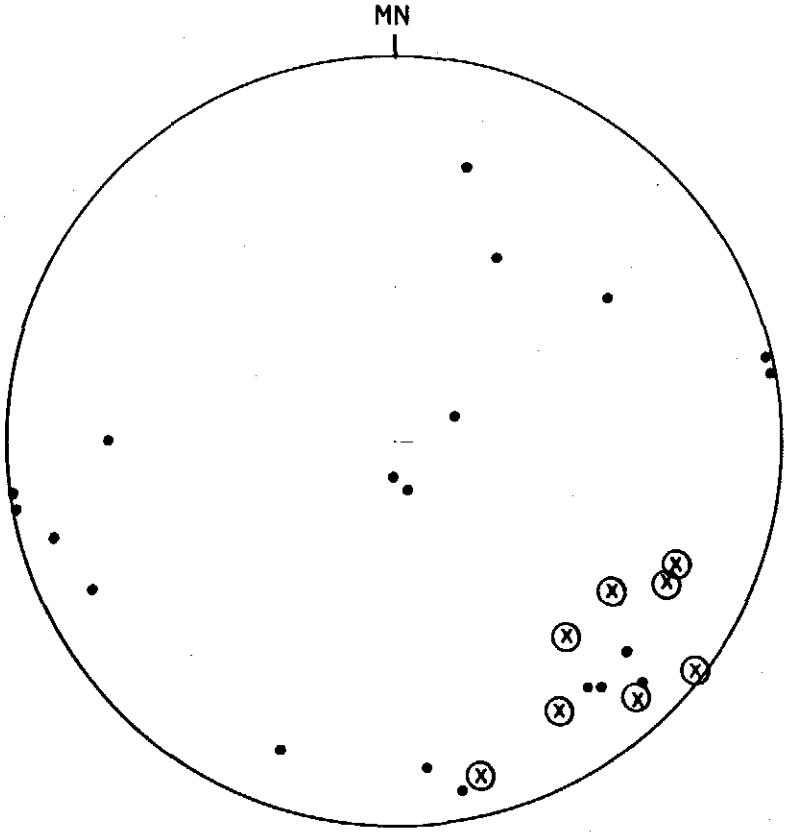
BEDDING



x n = 6

MINERALIZED VEINS

JOINTS



x n = 8

● n = 18

x bedding

⊗ mineralized veins.

● joints.

5 cm

LAMBERT STEREO NET PLOT

The Shell Company of Australia Limited METALS DIVISION	
E.L. 12/78 SCAMANDER LUTWYCHE PROSPECT STEREO NETS	
SCALE	DATE 25-7-84
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE D'PORT	REP.No.
DRG No D/LH02/561	FIG No

158
158

342159

EAST PINNACLES PROSPECT

1.0 General Description As py minor Py

a) Style of Mineralization

Silicified mg sandstone with associated arsenopyrite and pyrite, quartz/chlorite in fractures.

b) Host Rocks

Mathinna Bed sediments - intercalated sandstones, silicified and fractures with cleaved shales and siltstones - gossanous staining common (generally in trenches)

c) Geography/Location

Situated on the southern peak of the Pinnacle Ridge - within the PINNACLES GRID (close to line 900W 100S). Close to top of the peak - 250m RL. OD (peak 3200D).

d) Old Workings

Short adit dug on bearing 260° - approximately 6-8m deep. Two trenches 15m up hill - see diagram.

2.0 Host Rocks

Mathinna Beds

Lithology - Intercalated silicified medium to fine grained sandstone units (≏40cm thick) with stt and cleaved shales. Generally mixed rocks in the whole area.
Adit 50:50 sandstone//sh/stt
Trench 1 - silicified mg sandstones
Trench 2 - silicified fg sandstone/stt

Bedding - Beds strike 296° 81° NE dip - slight variation in dip direction (i.e. strike).

Cleavage - in rocks close by cleavage is running 131° 82° SW



antiform to West

- also measured at c) 304° 76°N with bedding at 310° 77° N on line 900W 100S



bedding //to cleavage

Fractures/faults/veins - Silicified sandstones fractured 240° 77° NW 40 - 50 or 215° 68° NW minor fractures lined with gossaneous material.

Irregular smokey and amorphous quartz veins deformational features.

Fractures also contain quartz and chlorite fills chlorite impregnates surrounding mg and fg sandstones.

Metamorphism - Metasomatic silicification of the rocks

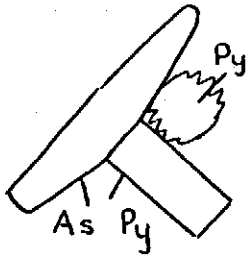
Alteration - Silicification of sandstones. Gossaneous staining on fractures, bedding and cleavage features - minor brecciation of shales forming voids (euhedral qtz fills + Fe fills).
Many of the sandstones contain chlorite impregnation - greenish colouration from the adit itself.

3.0 Mineralization

a) Gross Setting - Difficult to discern from the outcrop - mineralization probably fracture or fault-related. Orientation unknown.

b) Dimensions - Not clear - width or length exceeds 15m in Trenches 1 and 2 - arsenopyrite/pyrite silicified rock.

c) Mineralogy - Sulphide minerals include euhedral arsenopyrite laths upto 1.5cm long (blade-like growths) or may occur as dense clusters. Upto 40% arsenopyrite in some rocks. Pyrite cubes + irregular patches occur related to arsenopyrite lathe (i.e. later).



Interstitial
Py 2nd after As Py

Sulphides embedded in silicified material - looks to be a silicified mg/fg sandstone.

Identified outcrops of As, Py + Py restricted to trenches 1 and 2.

Minor Py and aspy along fractures in the Adit dump.

Fractures in adit contain chl + qtz and minor gossaneous fill (f. trend 056° 81°S) (Difficult to see why adit dug). Adit was not inspected due to insect swarm.

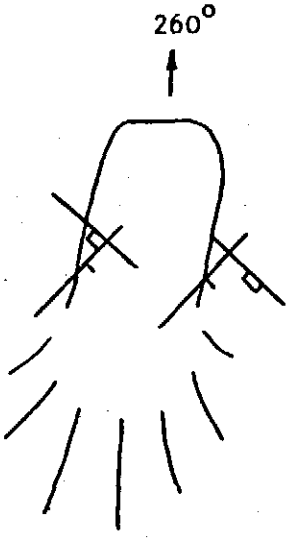
Minor muscovite recognized in fractures.

d) General

The East Pinnacles adit lies within the Pinnacles Grid. Soil values indicate low order values maximum of 80 ppm Sn in the area. 900W 100S 920 ppm As and 470 ppm Zn + minor associated Pb at 900W 150S at 300 ppm.

Low order Sn and elevated Zn/Pb and As close by (however Pb/Zn/As values isolated highs).

Quick recce around the workings - no sign of sulphide in the rocks (apart from the usual gossaneous staining) - rock sequence mixed sst + lots of cleaved shales. Trend of mineralization not discernable.



Samples

Adit 10035 - 10038

Trench 2 10034, 10039, 10040

342162

EAST PINNACLES PROSPECT — ROCK CHIP

ROCK NO/LOCATION TYPE	Au	Sn	WO_3	Mo	As	Cu	Pb	Zn	Bi	Ag
10034 Trench S of adit mg sil sst - fract. + aspy/py	<0.05	440	90	<4	7.1%	650	2600	110	105	340
10035 Dump mg sil sst euh qtz	<0.05	50	15	<4	130	26	20	100	<4	<1
10036 Dump mg sil sst chl/Fe	<0.05	155	10	<4	240	55	36	450	<4	1
10037 Dump mg sil sst green + Py	<0.05	48	15	<4	16	220	160	230	10	3
10038 Dump mg sil sst + Qtz	<0.05	250	25	<4	240	65	65	140	<4	7
10039 Trench 2 fg sil sst + aspy	<0.05	420	100	<4	6.9%	310	1.7%	50	50	95
10040 Trench 2 mg sil sst aspy/py	0.2	350	90	<4	7.0%	1350	6800	120	195	350
Maximum Values		440	100		7.1%	1350	1.7%	450	195	350

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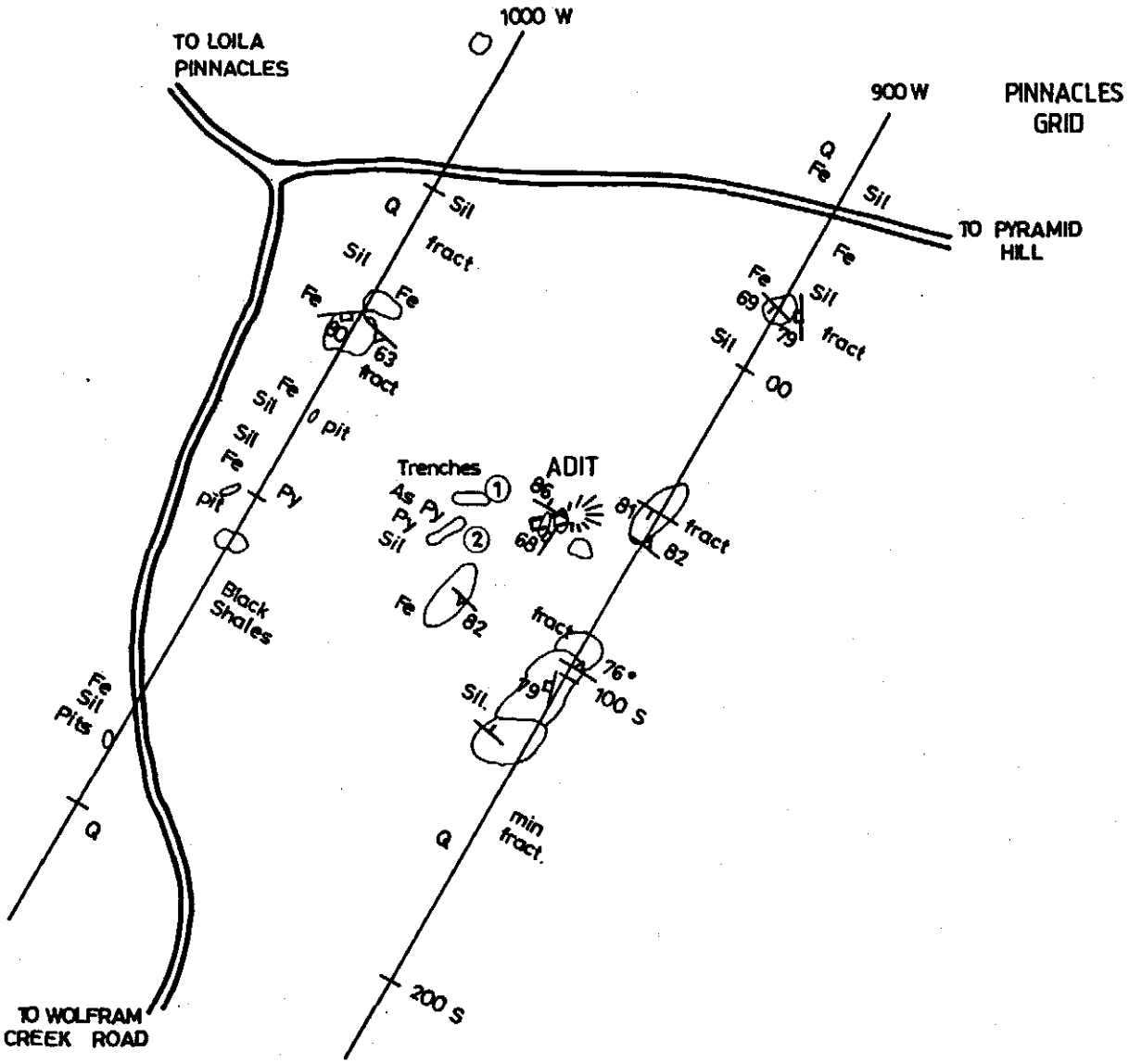
342163

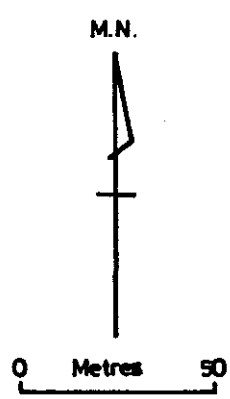


LEGEND

80° — BEDDING

82° — CLEAVAGE

40 — FRACTURE



5 cm

The Shell Company of Australia Limited METALS DIVISION	
E.L. 12/78 SCAMANDER EAST PINNACLES PROSPECT	
SCALE 1: 2000	DATE 10-8-83
AUTHOR P.A.R	DRAWN J.L.L.
OFFICE D'PORT	REP.No.
DRG.No. D/LH02/513	FIG.No.

WEST PINNACLES PROSPECT

1.0 General Description — Sn minor Cu

a) Style of Mineralization

Cassiterite in euhedral quartz + Fe oxide fracture fills associated with silicified/fractures mg/fg sandstones. Minor chalcopyrite and muscovite.

b) Host Rocks

Mathinna Bed Sediments - intercalated sandstones, cleaved shales and siltstones. Cassiterite-bearing veins appear restricted to sandstone units in hand specimens.

c) Geography/Location

Located on the south-side of the Pinnacles Ridge approx. 150m SE of the Loila Pinnacle Peak - within the PINNACLES GRID (on Line 200N 1600W, RL 315 OD - Loila Tier Peak 365 OD.

d) Old workings

54m adit dug on bearing 360° and bends to 040° at completion. Numerous shallow pits on the surround hill.

2.0 Host Rocks

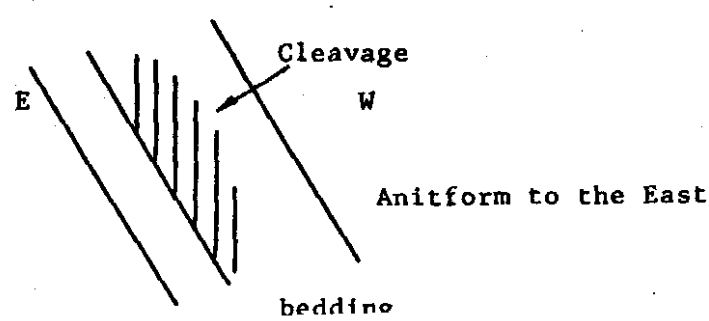
Mathinna Beds

Lithology - Intercalated silicified fractured mg to fg sandstones (units of variable thickness upto 1m + across) with cleaved siltstones and shales (attached diagram) Rocks generally mixed on the finer grained side of stt/fg sst.

Adit - lithologies summarized in attached plan.

Bedding - Beds generally strike NW and dip steeply to the NE and SW - no fold closures seen in the adit walls - change of dip attributed to overturning of the strata due to flexturing of steeply dipping strata. Slight variation in bedding direction.

Cleavage - Found in siltstone and shale units generally parallel to bedding but may indicate antiform to the East.



Fractures/faults/veins - Silicified sandstones fractured with a trend from 203° to 263° all dipping steeply NW - contain gossaneous material and also euhedral qtz, cassiterite/ chalcopyrite/muscovite and Fe oxides.

Irregular smokey/amorphous quartz veins common in sandstone units.

Fractures flat-lying - perhaps joints? related to flextural slip-style folding?

Metamorphism - Metasomatic silicification of rocks - some spotted shales close to adit (attached location plan).

Alteration - Intense silicification of mg and fg sandstones - silicification is associated in places with relic pyrite cube structures (pyrite removed by oxidation).

Gossanous staining ubiquitous plus shales Fe impregnated (purple colouration).

Kaolinitic and clay mineral gauge in fractures (especially towards the end of the adit).

3.0 Mineralization

a) Gross Setting

Cassiterite associated with Pyramid-style fractures which trend NE (203° to 263° strike) and dip steeply NW - similar trend to the Pyramid-style fracture sets but more variable in their strike orientation here (probably caused by rapid lithological variation - fractures straighter and more continuous in large sandstone units).

Fractures attain 40-60 fractures/metre density (-small concentration when compared to Pyramid Hill).

Rocks generally most fractured and widest - more filling - qtz Fe oxides + cass and cho at between 13.1m - 22.3m and 24.2m and 27.8m in the West Pinnacles adit.

b) Dimensions

The West Pinnacles Adit occurs on the northern margin of the Zone A Sn in soil anomaly on the Pinnacles Grid. In this area Zone A anomaly and Zone B anomaly are coincident (1600W 200N soil sample yields 180 ppm Sn). It's clear from mapping on the Pinnacles grid that a large area contains cassiterite in fractures (Zone B) and cassiterite in tourmaline/qtz veins (Zone A). The adit tests one part of this area - further potential is evident particularly to the SW of the adit itself. 11 reverse circulation drill holes will test this zone in September, 1983.

Zone A 1000m x 600m area Sn in soil anomalies

Zone B 1200m x 300-400m area

Cassiterite mineralization in the adit itself is localized (apparently) to mg and fg silicified sandstone units. No tin was found in the adit - only on samples from the dump.

Clearly the Sn distribution is erratic and low grade.

c) Mineralogy

Cassiterite - pale brown/pink may also be greenish - euhedral upto 1cm across in one sample - generally upto 5mm across pretty rare too. (Groves, 1972) reports no record of tin production from both W and E Pinnacles adits. Trace chalcopyrite observed with Sn in fracture fills.

Pyrite cube structures in silicified mg/fg sandstones.

Gauge minerals, euhedral quartz fills fractures. Maximum fracture/vein width 3-5cm generally thinner. Qtz fills voids + cassiterite void filling (and pyrite occassionally) Fe oxides later fractures filling and pervasive rock alteration - related to recent oxidation of sulphides.

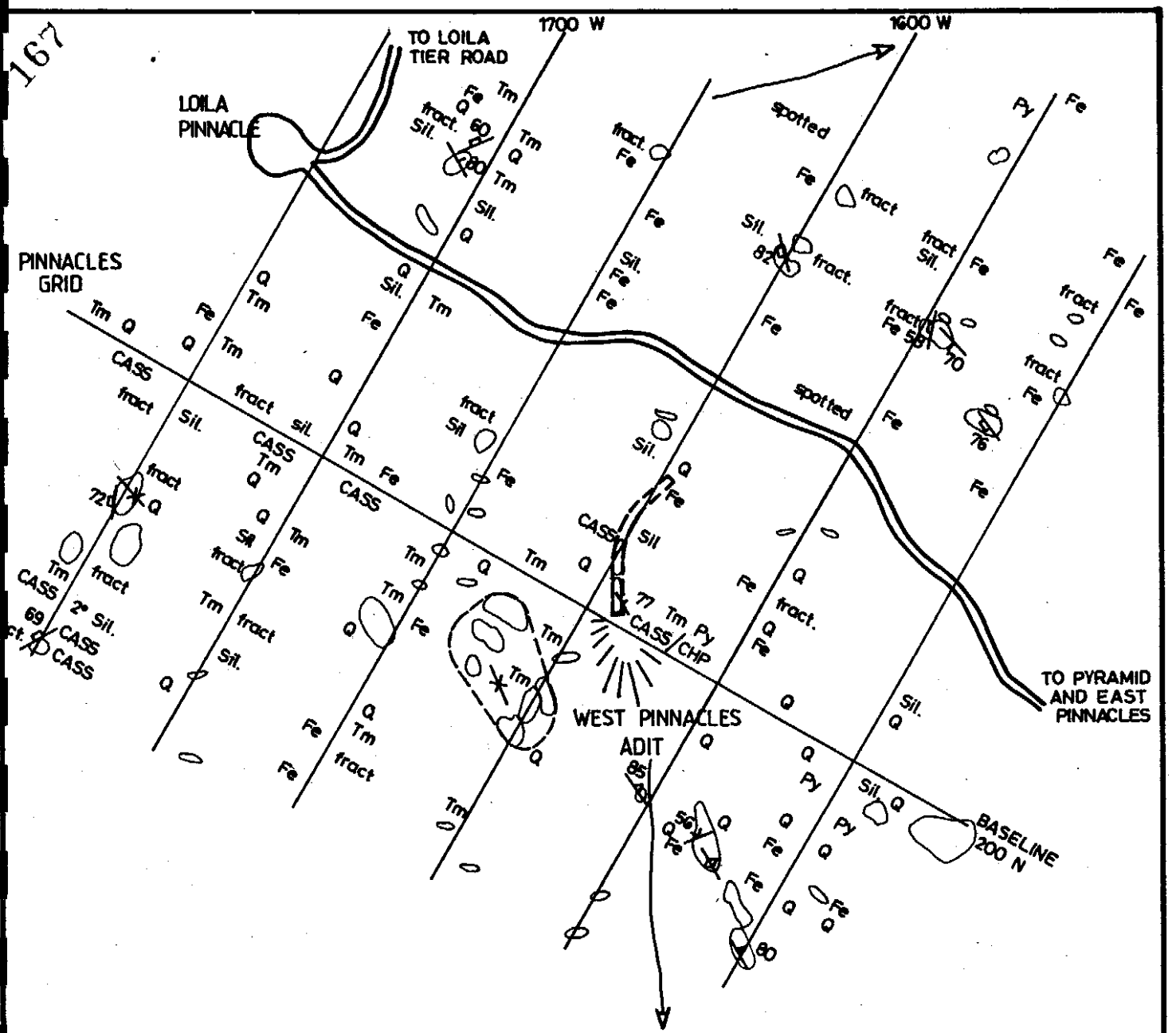
Muscovite tourmaline (fine grained amorphous mass) seen as fracture/vein fill in this area.

Rock samples 10041 - 10043.

342167

WEST PINNACLES PROSPECT

ROCK NO/LOCATION TYPE	Au	Sn	WO_3	Mo	As	Cu	Pb	Zn	Bi	Ag
10041 Dump sil mg sst Qtz/Fe + cass	< 0.05	5450	15	< 4	550	36	48	10	18	< 1
10042 Dump sil fg sst Qtz/fract/musc	< 0.05	8850	10	4	500	120	48	14	55	< 1
10043 Dump sil mg sst Qtz/cass?/Fe	< 0.05	9450	15	< 4	125	26	18	6	16	< 1
Maximum Values		9450			550	120			55	



LEGEND

- 80° — BEDDING
- 82° — CLEAVAGE
- 40 — FRACTURE
- VERTICAL VEINS
- VERTICAL CLEAVAGE

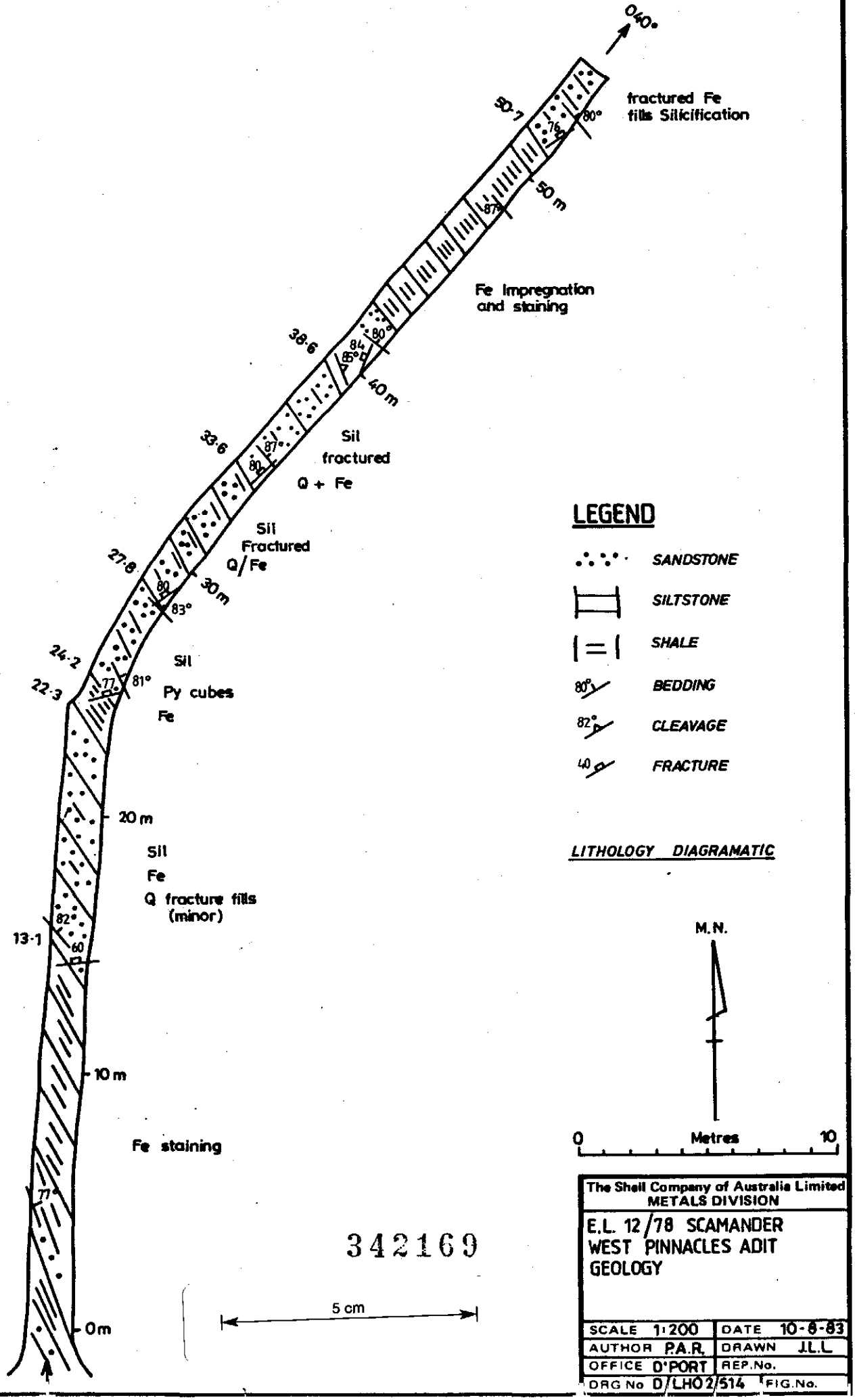
M.N.

0 Metres 50

342168

5 cm

The Shell Company of Australia Limited METALS DIVISION	
E.L. 12/78 SCAMANDER WEST PINNACLES PROSPECT	
SCALE 1:2000	DATE 10-8-83
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE D'PORT	REP.No.
DRG.No. D/LH02/512	FIG.No.



The Shell Company of Australia Limited METALS DIVISION	
E.L. 12/78 SCAMANDER WEST PINNACLES ADIT GEOLOGY	
SCALE 1:200	DATE 10-8-83
AUTHOR P.A.R.	DRAWN J.L.L
OFFICE D'PORT	REP.No.
DRG No D/LHO2/514	FIG.No.

342170

LOILA TIER PROSPECT 19/10/83

(& EAST AND WEST WILLIAMS PROSPECTS)

1) General Description

a) Style of Mineralization

Fault-related cassiterite/tourmaline at Loila Tier and quartz sulphides at Williams Prospects. Mineralization associated with silicification plus gossanous capping and Fe staining in Mathinna sediments.

b) Host Rocks

Mathinna Bed sediments - intercalated sandstones/siltstones/shales - sandstones predominate around the actual Loila Tier Prospect. - Siltstones and shales more common around the Williams Prospects. Shales wouthwest of Loila Tier pits are spotted.

c) Geography/Location

Loila Tier/Williams Prospects 7km due N of Upper Scamander. Access is by forestry road - Loila Tier Road.

Loila Tier Prospect lies 700m west of Loila Tier peak down a steep forestry track - pits located 200m SW of this road.

Williams Prospects located either side of the Loila Tier Road 500m N of Loila Tier Peak (on Loila Tier Road).

d) Old Workings

Two prospect pits dug on Loila Tier Prospect. Small shaft sunk on quartz/tourmaline vein by the forestry access road (N of Loila Tier). Five costeans placed by Consolidated Goldfields. A further costean placed between E and W Williams prospects - shaft on W Williams 3m deep plus two pits on E Williams prospect.

2) Host Rocks

Mathinna Beds

Lithology - Outcrop in the Loila Tier area is poor - rocks crop out in creeks and on steep ridge slopes. Mixture of sandstone/siltstone/shale. Siltstones and shales may be finely bedded. Sandstones generally massive. Shales cleared and often spotted - black shales SW of the Loila Tier Prospect.

Bedding/clearage/folds - Beds generally strike NNW and dip to the west (probably young to the west also). Variable dip from steep to gentle.

Beds form a fold structure on stereonet with poles indicating a bipole girdle - fold axis plunging 14° to 170°. This distribution suggests cylindrical folding - no minor folds observed in this area.

Two measured cleavage traces are related to the fold hinge and therefore were probably formed during this SSE folding phase.

Faults/fractures/veins

Faults - NE trending Loila Tier fault is the dominant fault (060°) - this is the only mineralized fault direction in the area.

Fractures - Variable orientation Urquhart (1968) suggests 050° to 070° fractures in the vicinity of Loila Tier. Measurements taken by the author indicate NE - ENE trending joints/fractures common - generally contain Fe oxide staining - close to Loila Tier Prospect may also contain Fe oxide fills.

Veins - Around Loila Tier Prospect quartz/tourmaline veining is common - generally in sandstone beds. Two vein directions probably orthagonol - see attached stereonet plot.

1) E - W (ENE - WSE) trend is the dominant measured trend. Well exposed in pit by forestry road 200m N of Loila Tier Prospect (see plan). One sample assays 1500ppm Sn from this pit. This particular vein (vein swarm) can be traced up the ridge to the top of Loila Tier Peak.

2) NE trending quartz/tourmaline veins parallel to the Loila Tier fault - not very common. Tourmaline rock breccia occurs on the fault-line at Loila Tier Prospect.

Several random tourmaline/quartz veins seen and measured. Quartz/tourmaline float can be observed along the NE strike of Loila Tier fault.

Quartz veins have a fairly random distribution - Urquhart (1968) suggests they are dominantly parallel to Loila Tier fault.

Metamorphism

Strong to faint spotting visible in the black shales SW of Loila Tier Prospect. Granite fairly close to the surface here. Spotting not observed up by the Williams Prospects.

Alteration

Fe oxides in fractures and surfaces common close to the Loila Tier fault zone - also present on the Loila Tier Peaks.

Silicification generally confined to the vicinity of the Loila Tier fault - also occurs on the Loila Tier Peaks.

Secondary silicification related to fractures in sandstone units observed in Williams costean.

3) Mineralization

Gross Setting/Dimensions/Types

Mineralization is essentially associated with the Loila Tier Fault.

Mineralogy and style of mineralization changes along the fault from

a) Cassiterite/tourmaline/quartz around Loila Tier Prospect to

b) Quartz vein plus sulphides at the Williams Prospect and in costean 200m N of Loila Tier Prospect.

Fault zone in excess of 1.5km long - trends NE (060°).

Loila Tier and Williams Prospects lie on the fault line which can be traced by gossanous cappings and quartz vein material. Several pits and trenches occur along this strike length with quartz sulphide veins exposed in a creek and on a ridge (see plan).

Loila Tier Prospect - 2 pits located on the fault zone which is estimated at 8m wide and dips steeply to the SE.

Urquhart (1968) suggests fault a wrench fault due to the presence of near-horizontal slicken sides in tourmaline veins.

Mathinna Beds silicified and brecciated - tourmaline and chlorite breccia fills. Cassiterite occurs as encrustations, crystals and dissemination in vugs and within the silicified and tourmaline material. NO sulphides associated with this cassiterite. The presence of prolific spotting in black shales suggests granite close to the surface. Fe staining in Mathinna Beds may indicate some sulphides present.

W Williams Prospect - Shaft 3m deep sunk on quartz vein material. Arsenopyrite the common sulphide (upto 10%).

Quartz veins very vuggy with euthedral crystal fills. Fault approximately 2m wide here.

Traces of covellite (?) plus sconodite staining. Fe oxide staining of Mathinna Beds very common. Gossanous capping common surrounding this prospect.

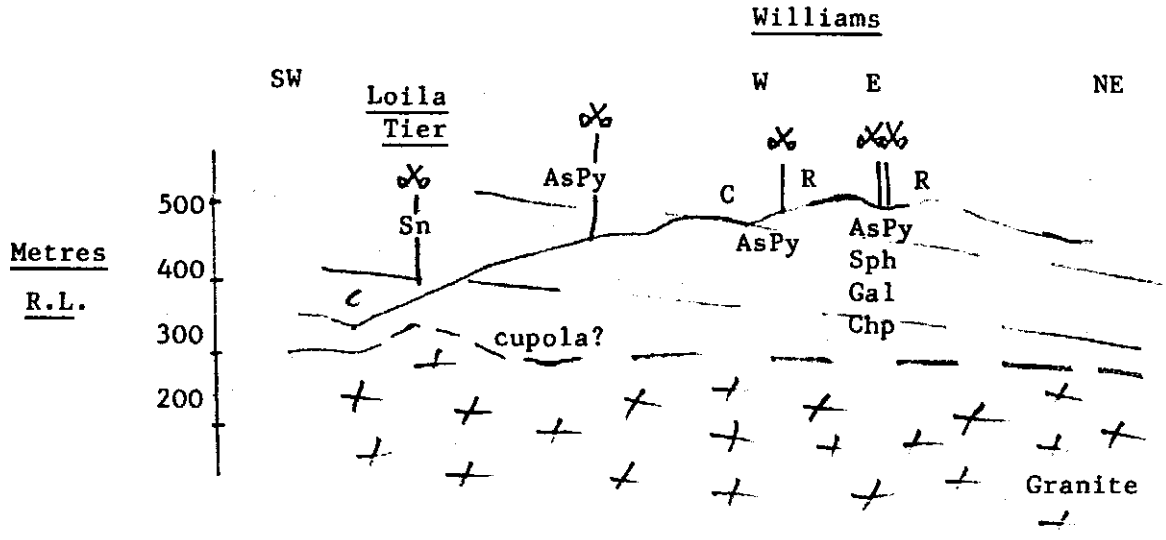
E Williams Prospect - Two pits dug on quartz veins. (E of Loila Tier Road).

Western pit - 1m quartz vein with arsenopyrite common also galena and pyrite recognized.

The easterly pit contains dominant arsenopyrite with covellite (1m wide).

Sphalerite, galena, chalcopyrite and minor pyrrhotite have also been observed at these prospect pits.

Quartz/sulphide vein occurs 200m N of Loila Tier prospect in costean. Contains arsenopyrite and high assayed Pb values. This vein occurs on the Loila Tier fault zone.


Williams
SW
Loila
Tier
W
E
NE
Sn
AsPy
C
R
R
AsPy
AsPy
Sph
Gal
Chp
C
cupola?
Granite
Metres
R.L.
500
400
300
200

342174

LOILA TIER PROSPECT

ROCK CHIPS

ROCK NO./LOCATION TYPE	Au	Sn	WO_3	Mo	As	Cu	Pb	Zn	Bi	Ag
6851 Old Workings Pit Tourm. breccia in Mathinna Beds & cass.	<0.05	3.95%	70	26	290	14	12	4	65	<1
6852 Old Workings Pit Tourm. breccia in Mathinna Beds.	<0.05	1.25%	45	34	240	16	12	4	110	<1
6859 Shaft by Road Qtz & Tourm. vein	<0.05	65	<10	<4	105	6	60	6	6	<1
6860 Shaft by Road Qtz & Tourm. vein	<0.05	1500	<10	<4	65	6	55	10	20	<1
6861 Close to Shaft Qtz & Tourm. vein	<0.05	75	30	<4	28	6	150	8	12	<1
6862 Costean by Road Qtz (euh) & aspy	<0.05	70	<10	4	2.45%	230	610	200	10	5
6863 Costean by Road Qtz (euh) & aspy	<0.05	28	<10	4	7250	155	5000	22	8	2
6864 Costean by Road Qtz vein & gossan boxwork	<0.05	60	50	4	3.9%	1050	8.05%	220	110	60
6865 Close to above Costean Qtz/tourm. vein float	<0.05	70	10	<4	600	12	1100	6	6	<1
6866 E Antler Creek Meta^{m} shale & minor py	<0.05	4	<10	<4	120	16	100	55	<4	<1
6867 N-S trending ridge between Loila Tier & Williams Qtz/troum. vein & gossan	<0.05	100	15	<4	190	14	26	28	24	<1
6868 Loila Tier fault trend Sil. fgsst qtz & Fe fract fills	<0.05	6	15	< 4	2550	14	34	18	12	< 1
6869 Loila Tier trend costean Sil fgsst/stt & qtz veins & Fe	<0.05	8	40	< 4	60	12	24	38	20	< 1

342175

WEST WILLIAMS PROSPECT

ROCK CHIPS

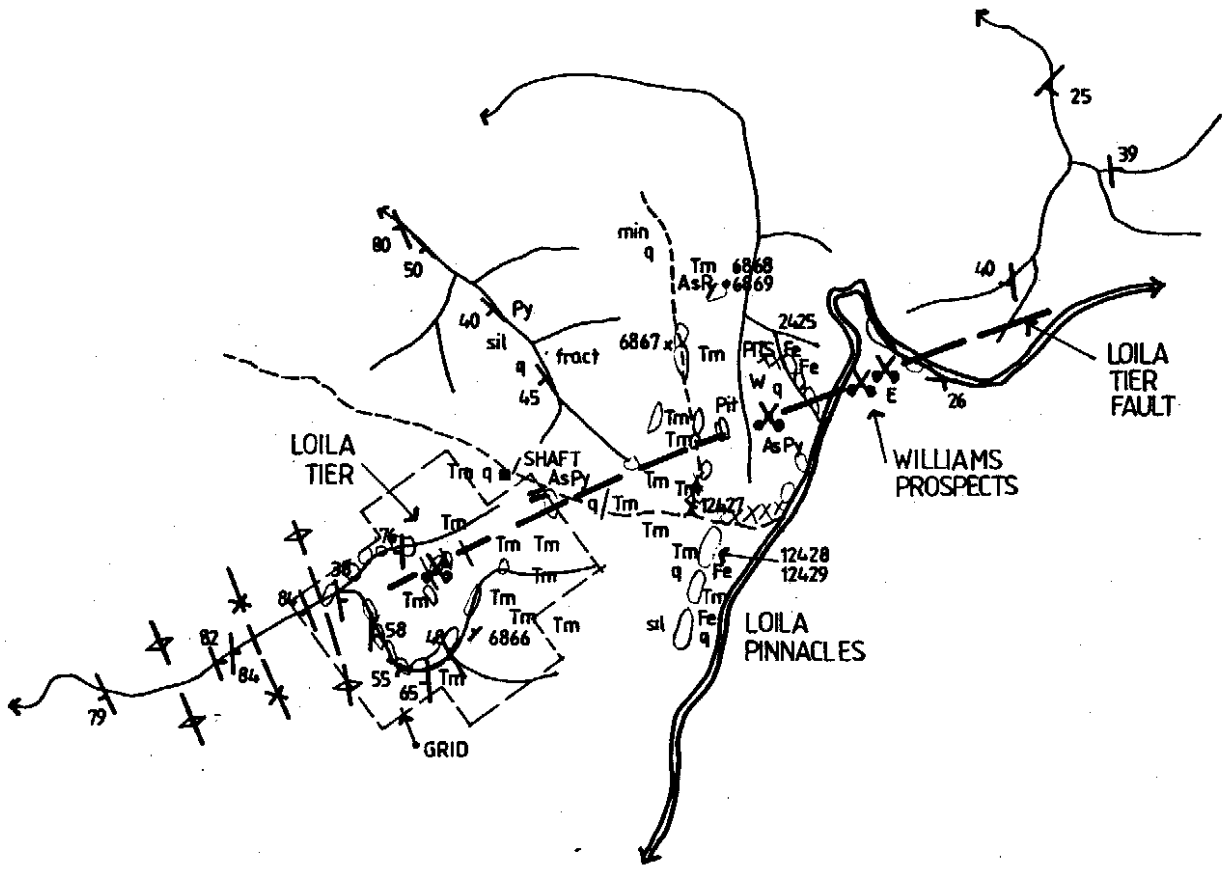
ROCK NO/LOCATION TYPE	Au	Sn	WO_3	Mo	As	Cu	Pb	Zn	Bi	Ag
6834 Shaft dump qtz vein & gossan	<0.05	1400	35	40	3.05%	230	4200	36	14	66
6835 Shaft dump qtz vein & aspy	<0.05	660	10	26	5.25%	190	2500	24	10	18
6836 West of shaft gossan & qtz vein	<0.05	1650	20	18	2.4%	200	2.45%	30	38	76
6837 East of shaft	<0.05	600	80	14	2300	160	3000	34	24	20

EAST WILLIAMS PROSPECT

6838 just W of East William Gossan	<0.05	60	10	12	320	44	520	100	16	1
6832 East pit qtz vein & aspy, Cov? Py	<0.05	1850	20	42	3.65%	520	1700	190	6	10
12425 Costean by Williams Gossanous shale	<0.05	80	20	<4	1800	170	60	110	8	1
6833 West Pit qtz vein & aspy, gal	IS	650	25	60	10.2%	16	800	280	12	2
12426 Ridge between LT and WW qtz vein & Fe oxides	<0.05	20	40	4	1550	100	220	38	240	11
12427 Top of Loila Tier qtz/tourm vein/breccia	<0.05	165	50	<4	50	12	8	6	20	< 1
12428 Top of Loila Tier (N) sil sst & qtz/Fe fracts	<0.05	6	35	< 4	840	34	20	100	8	< 1
12429 Loila Tier (N) sil sst & tm breccia, Fe	< 0.05	105	50	4	46	6	6	6	20	< 1

175

342176



LEGEND

Tm	*TOURMALINE*
Py	*PYRITE*
Sil	*SILICIFIED*
fract	*FRACTURE*
q	*QUARTZ*
Fe	*IRON OXIDE*
AsPy	*ARSENOPYRITE*

G.N.

0 1 km

5 cm

The Shell Company of Australia Limited
METALS DIVISION

E.L. 12/78 SCAMANDER

LOILA TIER, WEST AND EAST WILLIAMS PROSPECTS.

SCALE 1:20 000	DATE 27-7-84
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE D'PORT	REP.No.
DRG No 11 402 571	FIG No

ORIECO PROSPECT (Cu) 30/9/83

1.0 General Description Py, Aspy, Chp

a) Style of Mineralization

Fault-related pyrite/arsenopyrite and copper sulphides plus associated sphalerite and galena. Sulphide lenses form pods in NW trending fault-zone. Surface expression - Fe rich gossans of the North and South Orieco Prospects. Silicification related to faulting/mineralization.

b) Host Rocks

Mathinna Bed sediments - intercalated sandstone/siltstone/shale - silicified sandstone float dominant on top of the Orieco Ridge. Bedding strikes NW and dips west (on east side of ridge) and east (on west side of ridge). Orieco fault zone may be close to and parallel to a form hinge. (Faulted form - structural mineralization zontrol).

c) Geography/Location

Located 2 km east of Pyramid Hill on the Eastern Creek Road. Mine opening and dump clearly visible - disused powerline from Upper Scamander to the mine site.

d) Old Workings

Adit driven NW into the Orieco Hill for approximately 275m. 2 shafts sunk on the SE side of the fault-zone. Workings described by Groves (1972), Twelvetrees (1911). Main adit now closed 5m from entrance. 2 holes drilled by the Mines Dept.

2.0 Host Rocks

Mathinna Beds

a) Lithology

Rocks surrounding the Orieco Prospect are dominantly intercalated shales, siltstones and sandstones. Finer sediments predominate. Spotted black shales are present. Float on the Orieco Ridge dominantly silicified sandstone/siltstone - few shales. Outcrops also silicified sst/stt.

b) Bedding/Folds

Beds generally strike NW with dips of 61° to 21° to southwest between Dunns and Orieco Prospects. Between Orieco and Pyramid Hill along the Eastern Creek Road section beds dip west and east indicating folding with fold amplitudes 1km. The Orieco fault-zone falls close to a synformal hinge zone. Younging criteria indicate the sequence is the correct way up and generally westward younging.

c) Cleavage

Noticably not apparent on the forestry road to the east of Orieco Prospect. Shales however highly cleaved west of Orieco prospect.

This suggests cleavage spacially related to fold hinge zones and zones of structural disturbance.

d) Fractures/Faults/Veins

Fracturing trends NE and NW (+ minor N-S trend) - consistent with Pyramid and Pinnacles trends (ie. regional). Silicified sandstones on Orieco Ridge show Pyramid-style fractures in places - closely spaced dense fracturing with associated (2°) secondary silicification and fills euhedral quartz plus gossanous Fe oxides.

Fractures away from ridge - more widely spaced and may contain Fe-oxide fills. Faults trend NW parallel to the Orieco fault zone - seem to be several parallel sets.

Veins minor Qtz veining.

e) Metamorphism/Alteration

Spotting occurs in black shales close to the Orieco Fault and near the Dunns Prospect.

The Orieco Ridge is a silicified ridge structure. Silicification associated with the central fault (and mineralization?) Zone of silicification narrow in North Orieco area - 50 - 100m forming a narrow ridge. To the south near South Orieco prospect silicification and Fe-oxide gossanous zone seems to coincide with the North Scamander/Pinnacles silicified ridge structure.

Fe-oxides - gossanous staining is probably secondary associated with oxidation of sulphides. The presence of a Fe-oxide halo around the Orieco Ridge is noted - several 100m across - Fe along fractures and bedding surfaces.

3.0 Mineralization

a) Gross Setting - Dimensions

Mineralization occurs in a NW trending fault zone. The zone has a width of 1.5 to 6m and consists of 2 main NW trending SW dipping fault surfaces and numerous sub-parallel, sub-ordinate fracture planes. (Faults probably parallel to major axial planes of the folding events).

Fault surfaces covered with clay, Kaolin mica and fine quartz grains. Several podiform - lensoidal shoots of ore occur in the fault-zone.

Two sulphide lenses have been exploited in the past. (Groves, 1972; Henderson, 1941). Main shoot 46m long with grades of 1.82% Cu over 18.3m values upto 5.39% Cu, over 2.26m interval 439 tons of ore have been removed from the mine with ore assays of 15 to 28% Cu (mostly prior to 1911).

The ore shoots consist of quartz-sulphide and sulphide veins with replacement of copper sulphides oxides and carbonates. Oxides and carbonates are recent and relate to primary sulphide phases.

The Orieco fault zone strikes in excess of 3 km and has been linked with the Paul Beahrs Prospect.

Gossanous cappings occur at the North and South Orieco prospects The Tasmanian Mines Department drilled beneath the North and South Orieco prospects. The fault zone was intersected at about adit level but in both cases was barren.

b) Mineralogy

Detailed mineralogy is outlined in Ford et al (1970) and Groves (1972). Primary sulphides include arsenopyrite pyrite, sphalerite, chalcopyrite, galena, marcasite, pyrrhotite, cubanite, bornite and tetrahedrite. Supergene sulphides include chalcocite, covellite and pyrite.

Weathering has produced a host of secondary oxide and carbonate minerals (Groves, 1972).

342180

ORIECO PROSPECTS

ROCK CHIPS

ROCK NO/LOCATION TYPE	Au	Sn	WO_3	Mo	As	Cu	Pb	Zn	Bi	Ag
6822 Dump sil shale, chl & py	<0.05	300	45	8	450	3600	310	530	28	12
6823 Dump sil sh trace py & Fe	<0.05	450	40	4	55	4900	580	65	14	7
6824 Dump sil sh trace py & Fe	<0.05	135	55	8	60	1250	80	5300	24	5
6825 Dump Euh qtz vein & Fe/ aspy/py	<0.05	250	20	46	1900	2300	250	2300	14	152
6826 Dump	<0.05	2050	15	6	990	1.4%	1600	55	180	350
NORTH ORIECO AREA										
6891 Close to EL 10/80 boundary Pyrammid style fract mg sst	<0.05	100	45	4	24	10	26	36	< 4	< 1
6892 Close to EL 10/80 boundary sil mg sst qtz & Fe	<0.05	50	20	4	50	32	110	430	8	1
6893 Offshoot of Orieco Ridge gossan & qtz	< 0.05	22	30	4	46	28	70	24	6	< 1
6894 Offshoot of Orieco Ridge sil mgsst & Fe	< 0.05	22	35	4	38	24	55	20	< 4	< 1
6895 Orieco Ridge sil mg sst & Fe	< 0.05	95	15	< 4	360	60	250	470	36	< 1
6896 Orieco Hill gossan	< 0.05	14	40	< 4	145	20	170	210	6	< 1
6897 Oriceo Ridge qtz & Fe fills sil mg sst	< 0.05	44	25	4	6	< 2	145	80	10	< 1
6898 Orieco Ridge gossan-fault breccia	< 0.05	28	<10	< 4	42	6	740	200	< 4	< 1

342181

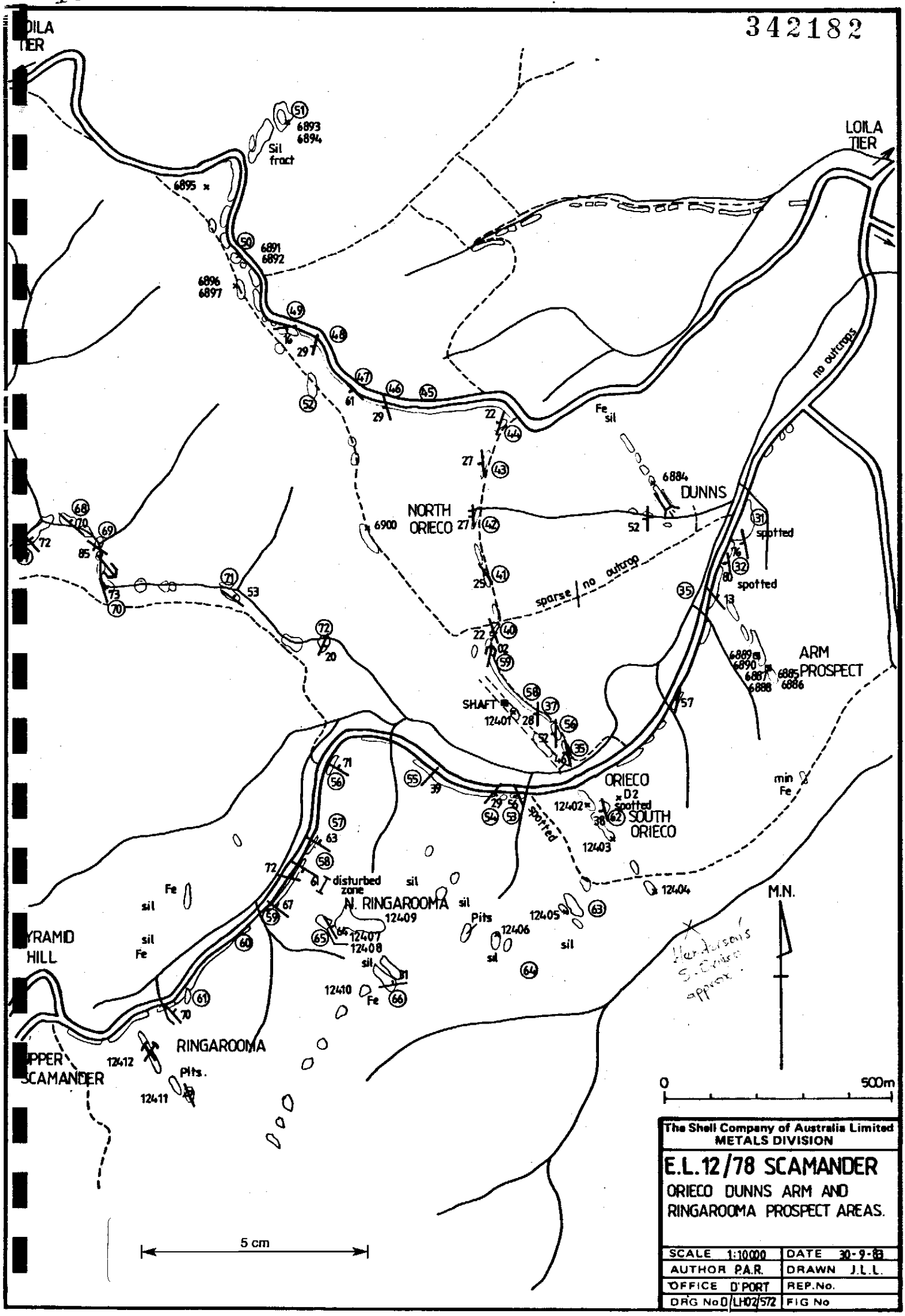
North Orieco Area cont.

ROCK NO/LOCATION TYPE	Au	Sn	WO_3	Mo	As	Cu	Pb	Zn	Bi	Ag
6899 Orieco Ridge Gossan-fault breccia	<0.05	12	15	<4	36	18	360	550	<4	1
6900 North Orieco Prospect Gossan-fault breccia	<0.05	2200	20	<4	150	620	770	1350	<4	2
12401 Orieco shaft qtz fract-fill & Fe oxides	<0.05	28	45	4	200	48	80	20	6	3
12402 Orieco South Gossanous shale	<0.05	230	55	<4	95	870	70	95	<4	1
12403 Orieco South Gossan	<0.05	95	30	<4	46	200	60	14	6	1
12404 Orieco South Gossan & qtz	<0.05	8	10	<4	110	240	570	1000	<4	2
12405 Orieco South	<0.05	175	20	<4	42	100	810	190	<4	1

	Sn	As	Cu	Pb	Zn
North Orieco	2200		870	810	1350
Orieco	2050	1900	1.4%	1600	5300

101

342182



The Shell Company of Australia Limited
METALS DIVISION

E.L. 12/78 SCAMANDER

ORIECO DUNNS ARM AND RINGAROOMA PROSPECT AREAS.

SCALE 1:10000	DATE 30-9-88
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE D'PORT	REP.No.
DRG No 0 LH02/572	FIG No

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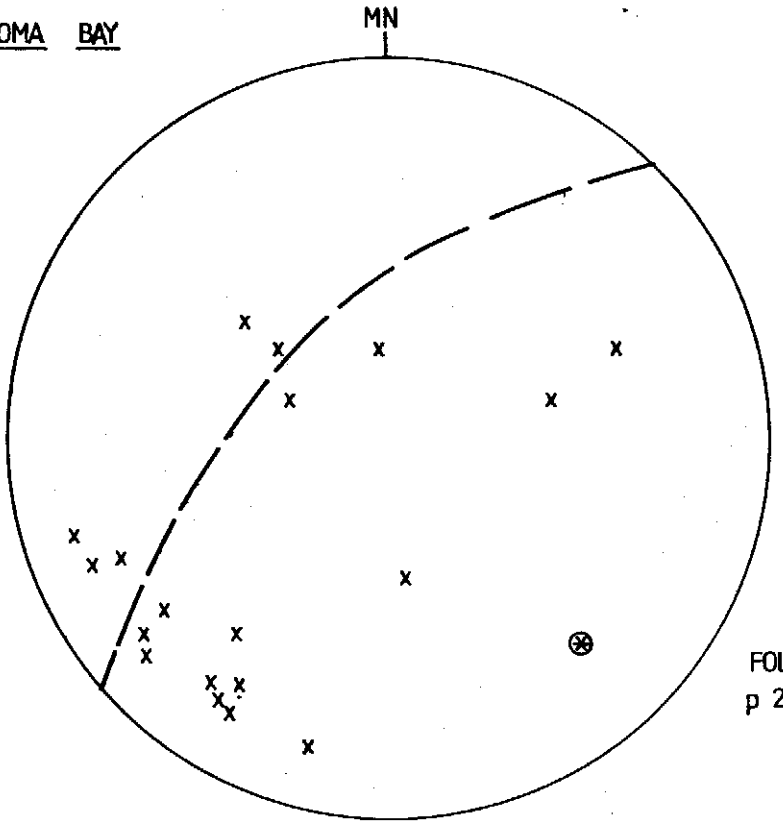
342183
29/9/83
30/9/83
10/10/83

SOUTH ORIECO RINGAROOMA BAY AND PYRAMID HILL

BEDDING

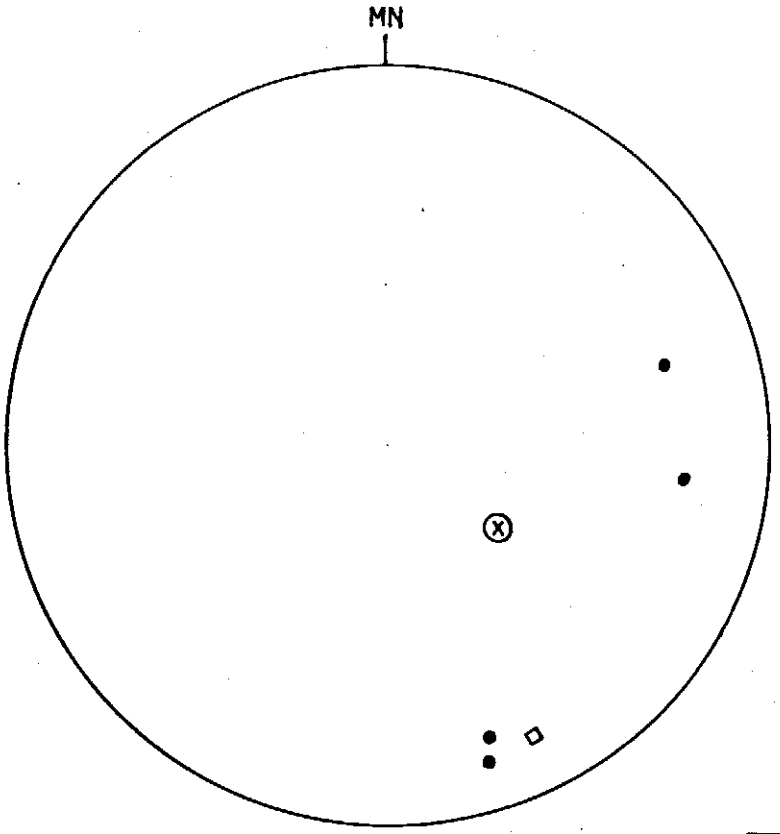
x n = 22



FOLD AXIS ⊛
p 26° to 40°

FRACTURES
QTZ. VEINS
FAULTS

• n = 4
⊗ n = 1
□ n = 1



x bedding
• fractures
⊗ quartz veins
□ faults

5 cm

LAMBERT EQUAL AREA NET

The Shell Company of Australia Limited
METALS DIVISION

E.L.12/78 SCAMANDER
SOUTH ORIECO
S.W. OF ORIECO FAULT
STEREO NETS

SCALE	DATE 24-7-84
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE D'PORT	REP.No.
DRG No D/LH02/566	FIG No

183

342184

RINGAROOMA BAY PROSPECTS 10/10/83

1.0 General Description

Two prospects Ringarooma and North Ringarooma.

a) Style of Mineralization

Gossan cappings - veins/fault - fracture fills. Fe oxides dominantly haematite. Associated with NW trending and E-W trending faults. Host - Mathinna Bed sandstones/siltstones/shales.

b) Host Rocks

Mathinna Bed sediments - silicified and gossanous.

c) Geography/Location

Situated 1 and 1.5 km east of Pyramid Hill. The Ringarooma prospect is located on the Pinnacles - North Scamander ridge. The Ringarooma Prospect is covered by the North Scamander Extended grid.

d) Old Workings

Pits and trenches. Shaft (- deep trench) on the Ringarooma Prospect.

2.0 Host Rocks

Mathinna Beds

a) Lithology

North Ringarooma: - associated with silicified, gossanous fg/mg sandstones.
Ringrooma: - dominantly associated with cleaved shales and siltstones.

b) Bedding

Beds in this area strike NW and dip to the NE. Graded bedding indicates beds young to NE and are the correct wayup.

c) Cleavage

Minor cleavage at North Ringarooma, strong cleavage at Ringarooma. Only shales cleaved. Roughly parallel to bedding.

d) Fractures/Faults/Veins/Folds

Mineralized areas (gossan caps) associated with faults - Ringarooma fault is subparallel to the Orieco fault-zone (310°), North Ringarooma - Fe oxides associated with bedding but gross trend suggests an E-W (090°) feature along a narrow ridge.
Veins - qtz veins associated with the N. Ringarooma prospect in sandstone units.

e) Alteration/Metamorphism

Spotted black shales occur at the South Orieco and Orieco prospects less than 1 km east of North Ringarooma.

Alteration consists of gossanous material and silicification + quartz veins. Minor fracture-related euhedral quartz and Fe-oxides - Probably part of the Pinnacles - North Scamander ridge complex.

3.0 Mineralization

a) Gross Setting/Dimensions

Fault-related gossan cappings - no associated sulphides found.

Ringarooma strike length 200m - 2 zones each 2-4m thick on surface.

North Ringarooma 250m length - 10 - 20m thick zone.

Gossan cappings in the area are numerous.

b) Mineralogy

Fe oxide staining in faults/fractures and bedding planes. At Ringarooma and N. Ringarooma Fe impregnates shales. At N. Ringarooma Fe concentrated preferentially along bedding (trends NW - SE) but gross control a fault zone which strikes E-W.

342186

RINGAROOMA BAY PROSPECTS — ROCK CHIPS

ROCK NO/LOCATION TYPE	Au	Sn	WO_3	Mo	As	Cu	Pb	Zn	Bi	Ag
12406 Close to N. Ringarooma. Gossan capping.	<0.05	1400	25	<4	20	60	2700	260	10	1
12407 N. Ringarooma Qtz/Fe oxide vein	<0.05	100	15	<4	12	38	1400	200	4	2
12408 N. Ringarooma Gossan Fe vein	<0.05	6	15	<4	50	42	670	190	8	4
12409 N. Ringarooma Gossan + Mathinna clasts	<0.05	14	<10	<4	18	70	910	120	4	1
12410 S of N. Ring. Gossan + Mathinna shales	<0.05	220	40	<4	160	160	105	240	<4	1
12411 Ringarooma Gossan + shales	<0.05	38	25	<4	28	12	70	80	<4	<1
12412 N Scam. Ridge Gossan Fe + Qtz vein	<0.05	8250	30	<4	100	110	160	700	8	1
Highest Values		1400					2700			
N. Scamander Ridge		8250						700		

342187

DUNNS PROSPECT (+ Arm Prospect) 28/9/83

1.0 General Description AsPy, Py

a) Style of Mineralization

Fault-related arsenopyrite/pyrite plus gossanous gauge with silicified Mathinna Beds Fault trends NW.

b) Host Rocks

Mathinna Bed sediments - in the adit area - cleaved shales - surrounding prospect - intercalated sandstones/siltstones and shales - host rock gossanous close to the fault. Bedding generally westerly dipping.

c) Geography/Location

Situated on the western side of Eastern Creek Road 0.75 km from the Orieco Mine opening Adit driven in just above creek level. Located within the Cramps grid close to the 2100W 3500N peg.

d) Old Workings

Adit 29.6m long driven to 315°. Shaft sunk at the entrance - 7.5m deep (Groves, 1972). Along strike to NW pits and trenches (shallow) along and across the trend of the fault-zone.

2.0 Host Rocks

Mathinna Beds

a) Lithology

In the adit itself soft cleaved grey/black shales - one band of sandstone recognized. In adjacent pits and trenches silicified sst/stt and intercalated shales. Beds generally dipping W and striking N to NW. Qtz veining common in sandstone units. On Eastern Creek road outcrop black shales show dense spotting.

b) Bedding

Beds generally striking 170° to 190° and dipping to the west fairly steeply here. Graded bedding plus load cast structures recognized on Eastern Creek Road outcrop - beds young to the West - correct way up.

c) Cleavage

Apparently parallel or closely parallel to bedding - difficult to measure since often loose. Only shales cleaved.

d) Fractures/Faults/Veins/Folds

Surrounding the fault zone sandstones fractures - gossanous fills plus euhedral quartz veins. Fractures trend approximately E-W dipping steeply North. Fractures and veins not recognized

in shale units. Fractures also trend NE dipping SE. Appears to be an oxidation halo around the prospect - fractures with Fe oxides. Bedding folded and faulted in the area of the mineralized fault - seen on Eastern Creek Road road cut - small folds and distortion of bedding - faults across a zone of about 30m.

Main fault zone trends 310 - 315° - a series of parallel faults closely spaced.

e) Metamorphism

Spotting observed in black shales exposed on Eastern Creek Road. Fairly dense spotting.

Sandstone units silicified - gossanous staining too.

f) Alteration

Oxidation halo around the main fault - zone depicted by Fe staining in fractures. 50m + wide (100 - 200m?)
Silicification of sandstone/siltstone units - quartz veining.

3.0 Mineralization

a) Gross Setting/Dimensions

Confined to a NW trending fault zone (310° to 315°) strike length of 1000m plus - shown by periodic Fe gossanous veins plus silicification of Mathinna Beds and quartz veins.
To the SE traced across the Eastern Creek Road to the Arm Prospect.

Arm Prospect - Two pits one with extensive gossanous alteration in a zone 1-3m wide the other 10m to the W with qtz vein material - Qtz lode 2-3m across traces of pyrite cubes.

Main fault zone width of disturbance 30m + actual mineralization generally 0.3 - 1.5m wide.

b) Mineralogy

Rocks in fault zone silicified with supergene gossan material common - fills + encrustations. Colliform scorodite-stained quartz may be associated with the Fe gauge - 2° in origin.

Intermitten occurrence of silicified arsenopyrite-bearing rock - as py fine grained generally with corss-cutting veins of coarser grained pyrite. Rare malachite staining in this rock. Fe-oxides dominated by limonite.

In Adit - fault zone well exposed in the roof zone and end of the adit.

342189

DUNNS PROSPECT

ROCK CHIPS

ROCK NO/LOCATION TYPE	Au	Sn	WO_3	Mo	As	Cu	Pb	Zn	Bi	Ag
6875 Dump Gossan	<0.05	280	25	4	1.28%	2000	160	210	26	22
6876 Dump Gossan & as,py, py siliceous	<0.05	2000	10	6	20.6%	3100	810	140	380	460
6877 Dump Silicified, qtz, aspy & py	<0.05	230	20	<4	21.8%	8600	2500	38	330	135
6878 Dump Silicified, aspy common	<0.05	3400	45	<4	24.9%	1.75%	2800	100	1100	540
6879 Dump Silicified gossan aspy Cu?	<0.05	460	15	<4	7.1%	3600	4800	95	250	520
6880 Dunns fault Gossan	<0.05	530	20	<4	4650	490	100	85	10	75
6881 Dunns fault Fract sst & qtz & Fe	<0.05	95	<10	<4	2550	160	120	12	8	6
6882 Dunns fault Silicified Py, Po, & qtz F	0.35	5400	<10	4	24.7%	7.4%	160	12	1050	370
6883 Dunns fault Silicified Py, Po, aspy & Fe & qtz	0.25	2950	75	<4	27.0%	2.65%	220	12	940	480
6884 Dunns fault Mathinna, sil & Fe oxides qtz	<0.05	640	25	4	21.9%	3200	75	170	100	82

ARM PROSPECT

6885 Pits east Sil Mathinna Beds & qtz/Fe	<0.05	710	35	<4	2400	400	1800	140	22	2
6886 Pit east Gossan silicified	<0.05	630	40	<4	4150	270	1750	90	12	1
6887 Pit east Mathinna Fe gossan	<0.05	1250	<10	<4	780	320	920	140	36	< 1

Arm Prospect cont.

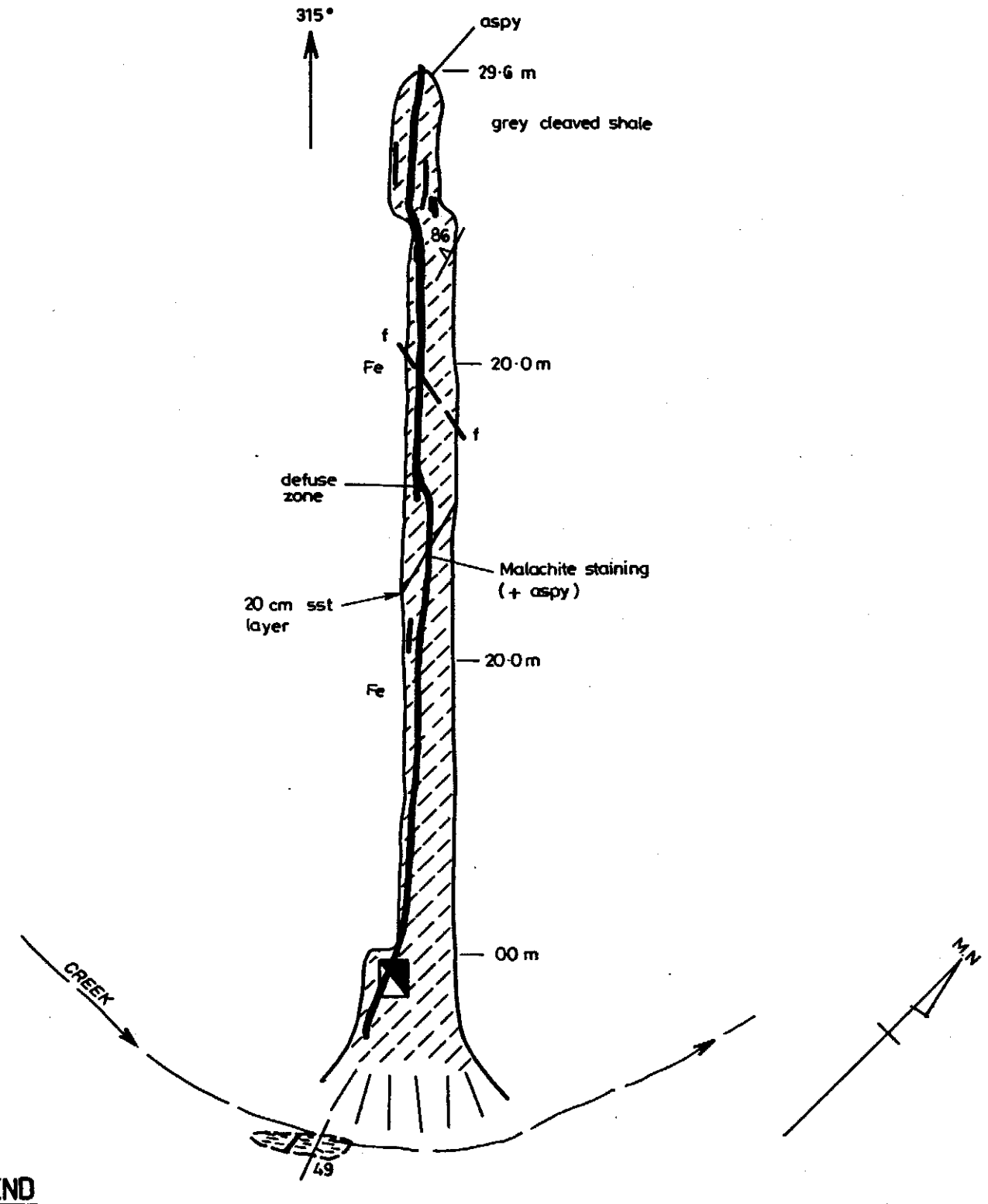
ROCK NO/LOCATION TYPE	Au	Sn	WO_3	Mo	As	Cu	Pb	Zn	Bi	Ag
6888 Pit east Gossan	<0.05	170	35	4	540	160	510	6	6	<1
6889 Pit west Qtz vein & minor Fe	<0.05	28	50	6	65	16	150	6	<4	<1
6890 Pit west Qtz vein euthedral	<0.05	18	65	6	90	4	32	<2	<4	<1

High Sn values associated with high As (; Ag, Bi, Cu, Pb)

	Au	Sn	As	Cu	Pb	Bi	Ag
Dunns	0.35	5400	27%	7.4%	4800	1100	540
Arm	-	1250	4150	400	1800	36	-

190

342191



LEGEND

- BEDDING
- CLEAVAGE
- SHALES
- SILTSTONE
- Fe, aspy FAULT GAUGE

0 5 10m

5 cm

The Shell Company of Australia Limited
METALS DIVISION

E.L. 12/78 SCAMANDER

DUNNS ADIT
GEOLOGY

SCALE 1:200	DATE 26-8-83
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE SCAMANDER	REP.No.
DRG.No. D/LH02/520	FIG.No.

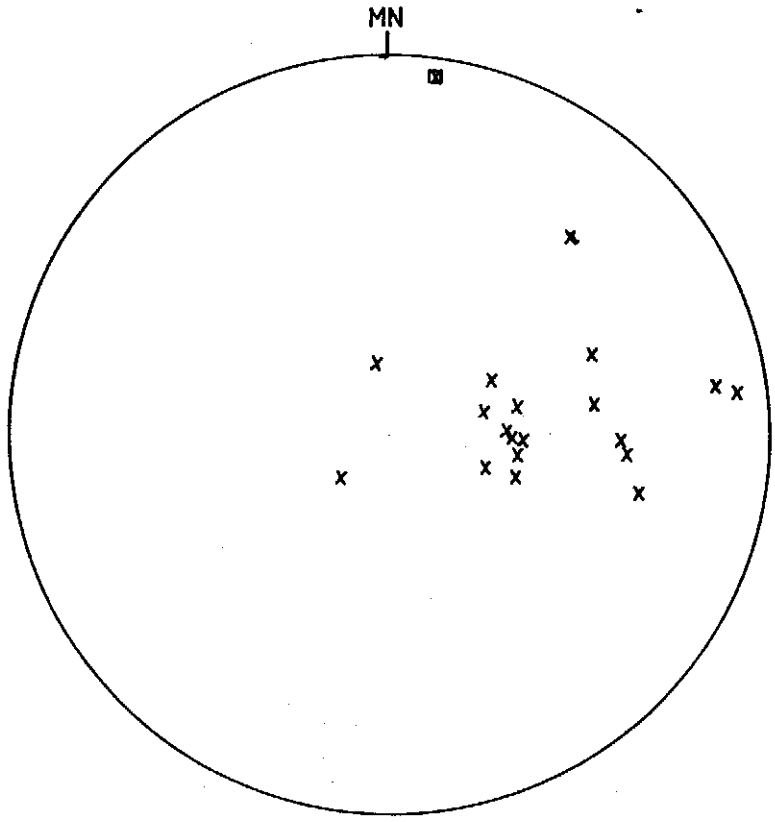
191

342192

24/8/83
28/9/83
29/9/83

DUNNS AREA

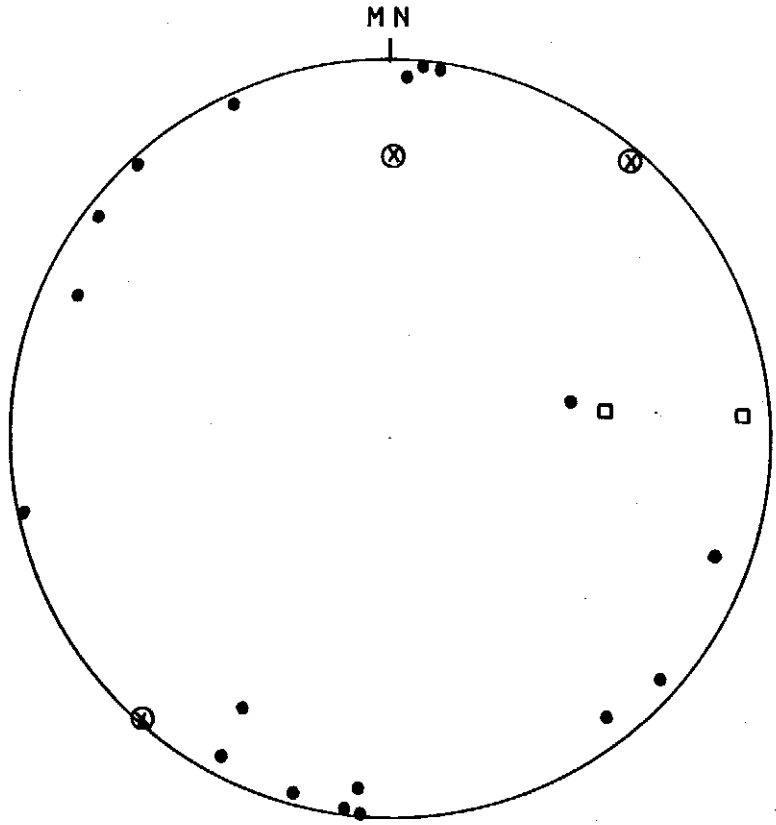
BEDDING



x n = 19

⊠ n = 1

FRACTURES
QTZ. VEINS
FAULTS



● n = 16
⊗ n = 2
◇ n = 2

x bedding
⊠ minor fold axes
o fractures
⊗ qtz. veins
□ faults

5 cm

LAMBERT EQUAL AREA NET

The Shell Company of Australia Limited
METALS DIVISION

E.L. 12/78 SCAMANDER
DUNNS AREA
N.W. OF ORIECO FAULT
STEREO NETS

SCALE	DATE 25-7-84
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE D'PORT	REP.No.
ORG No DLH02565	FIG No

CRAMPS PROSPECT

1.0 GENERAL DESCRIPTION As Py, Py

a) Style of Mineralization

Fault-related Fe oxides, silicification with minor scorodite staining at surface. The similarity of rocks from this prospect with those from Dunns Prospect suggest the occurrence of Cu/Pb/Zn sulphides at depth.

b) Host Rocks

Mathinna Bed sediments - generally a fine grained sequence of cleaved shaels and siltstones with minor sandstone units - the latter are silicified in the shaft area.

c) Geography/Location

Located west of Cramps Road/Arm Creek and north of the Orieco Road in plantation of radiolarian pines. Outcrop generally poor - minor outcrop in the creeks situated within the Cramps Grid (BHP). Shaft sunk on fault zone in low hill RL 75m.

d) Old Workings

Two shafts dug adjacent to each other - one of 30m depth (Groves, 1972) the adjacent shaft 5m to the east (unknown depth).

2.0 HOST ROCKS

Mathinna Beds

Lithology - Intercalated cleaved dark grey shales and siltstones - minor intercalated sandstone units (20cm thick). Mathinna Beds in the surrounding area generally graded ssts to stt/shales. Beds generally dip west and young to the west. Minor silicified sandstones on the shaft dump.

Bedding - Beds generally strike 120° - 150° (SE) dipping to the SW. Graded bedding and load cast features suggest younging to the west. Beds the correct way up.

Cleavage - Variable - related to bedding and SE trending folding. May be parallel to bedding also.

Antiform to the east suggested (NW of Cramps prospect).

Fractures/veins/faults - Minor fracturing in the surrounding sediments (273° trend minor). Sandstones contain amorphous and smokey quartz veins. Veins adjacent to fault-zone in Arm Creek exposure - trend 024° 83°E - 5mm wide max. die out 2-3m from fault zone.
Fe-oxides concentrated in faults trending NNE.

Metamorphism - Minor spotting observed in one outcrop. Gossanous staining - localized.

Alteration - Silicification of sst in area of the fault-zone + qtz veining. Fe-oxide staining and gossanous fills/coatings.
Alteration confined to fault zones.

3.0 MINERALIZATION

Gross Setting/Dimensions

Confined to a NNE trending fault zone (-bearing of 020°) strike length of 700m plus, width 10m - in Arm Creek outcrop width if approx. 3m.

Mineralogy

Rocks in fault zone are silicified and contain Fe gossanous fills, encrustations. At the Cramps shaft no sulphides evident - only minor scorodite staining. Essentially a supergene enrichment zone where metals could have been scavenged by Fe oxides.

Muscovite/qtz vein fills/fracture-fills - quartz veining is common.

Fe oxides generally dominated by haematite in fault-zone - also limonite/geothite.

Arm Creek exposure - minor pyrite in silicified fg sandstones - from within the zone of disturbance - faulting restricted to a few shear planes with Fe oxide staining.

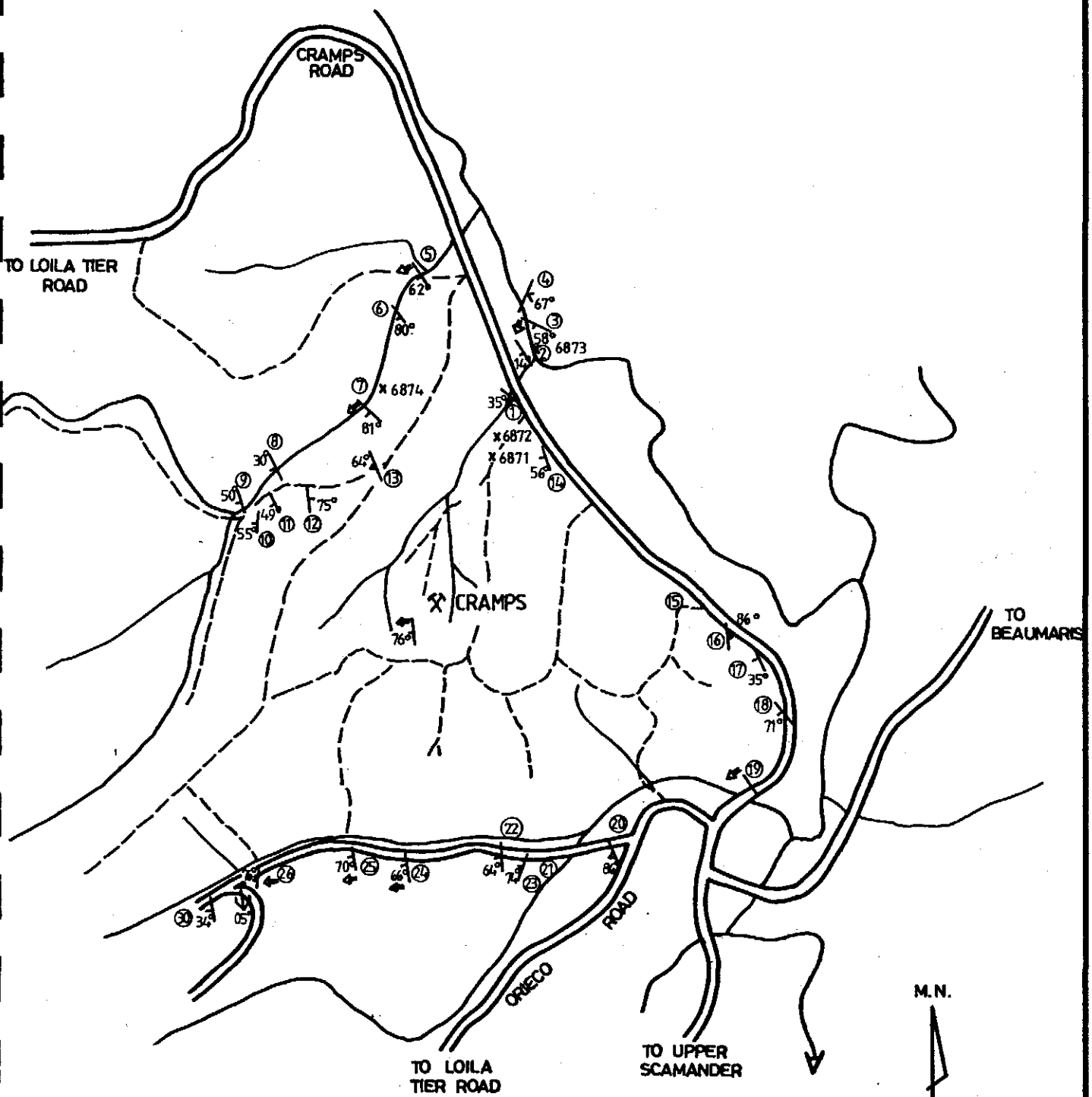
342195

CRAMPS PROSPECT ROCK CHIP

ROCK NO/LOCATION TYPE	Au	Sn	WO_3	Mo	As	Cu	Pb	Zn	Bi	Ag
6827 Dump Sil sst + aspy Fe oxide	0.35	44	40	14	7.2%	7000	9800	16	1100	380
6828 Dump Sil sst, Qtz veins + Fe	<0.05	80	20	16	1100	390	500	22	10	4
6829 Dump Sil sst + Qtz vein musc + Fe	<0.05	65	15	10	120	230	290	70	10	2
6830 Dump Sil sst + Qtz vein & Fe	I.S.	55	10	16	330	390	1800	50	8	14
6831 Dump Fe gossan	<0.05	350	10	10	6500	1300	2400	70	65	10
6870 Dump Sil sst + Qtz vein + Fe	<0.05	120	15	<4	1250	450	770	60	40	<1
6871 NNE of Cramps Gossan capping	<0.05	310	10	<4	280	55	270	250	4	<1
6872 NNE of Cramps Sil fg sst - Fe oxides + Qtz	<0.05	200	10	<4	130	34	660	270	6	<1
6873 NNE of Cramps/ Arm Road. Sil fg sst py + Fe oxides	<0.05	250	10	<4	85	75	1.0%	370	14	23
6874 N of Cramps Fe gossan vein	<0.05	65	20	<4	140	150	120	32	85	10
Maximums		350		16	7.2%	7000	1.0%	370	1100	380

195

342196



- > 50% SANDSTONE
- SANDSTONE/SILTSTONE/SHALE
- > 50% SHALES
- GOSSANONS OUTCROP (FAULT ZONE)

- FOLD AXIS AND PLUNGE
- YOUNGING DIRECTION
- 80° BEDS
- 82° CLEAVAGE
- 40 FRACTURE / JOINTS
- ⑫ STATION No. (See Note Book)
- x 6872 ROCK CHIP SAMPLES

5 cm

The Shell Company of Australia Limited
METALS DIVISION

E.L. 12/78 SCAMANDER
CRAMPS PROSPECT
AND ENVIRONS

SCALE 1:10000	DATE 11-8-83
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE D'PORT	REP.No.
DRG No D/LH02/511	FIG No

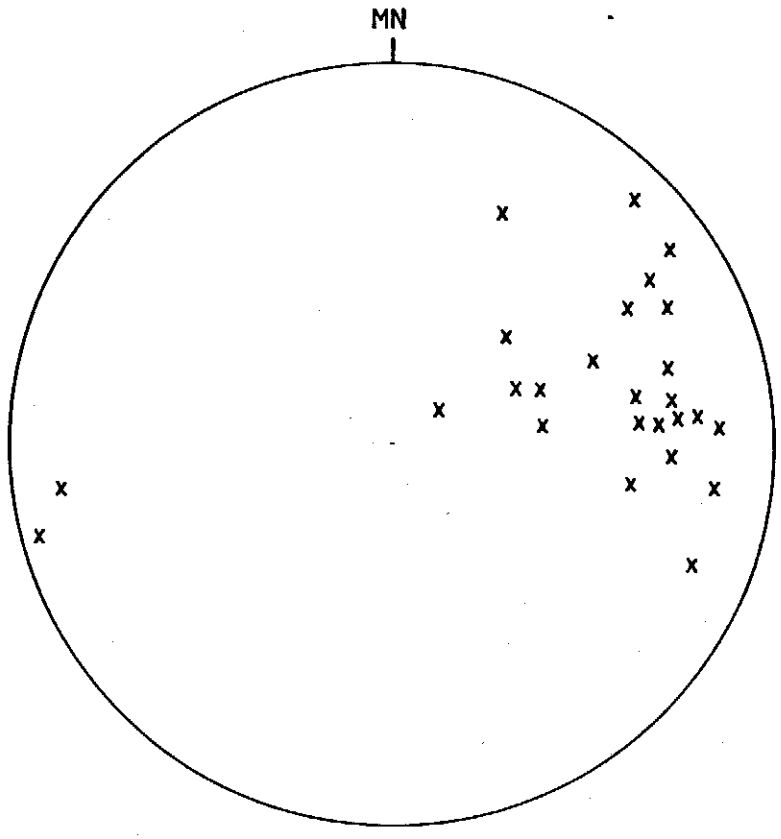
196

342197

11/8/83
12/8/83

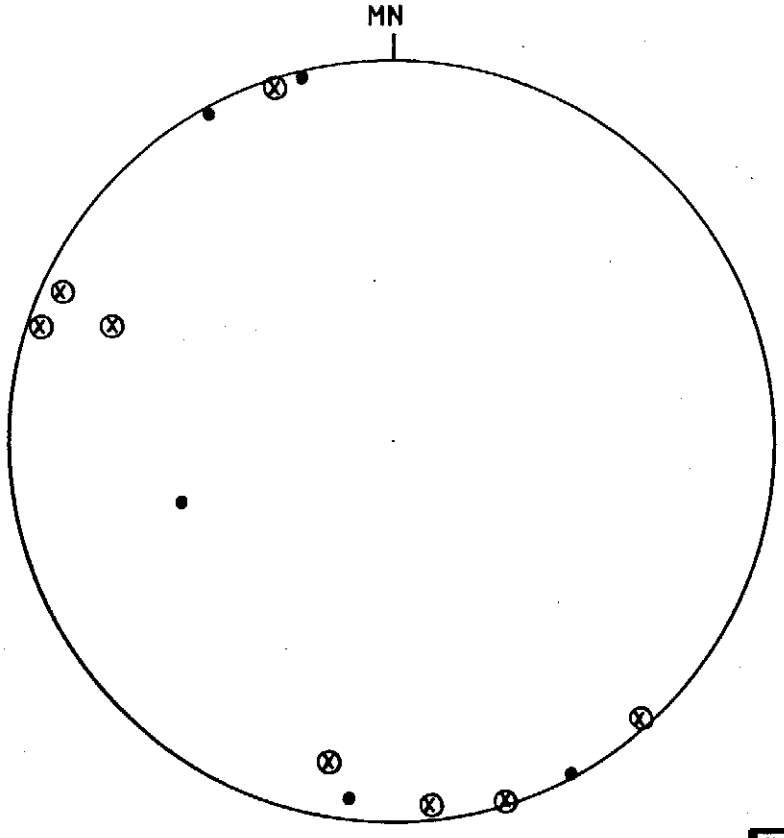
CRAMPS AREA
BEDDING

x n = 26



FRACTURES
QTZ. VEINS

• n = 6
x n = 8



x bedding
• fractures
⊗ qtz. veins

5 cm

LAMBERT EQUAL AREA NET

The Shell Company of Australia Limited
METALS DIVISION

E.L. 12/78 SCAMANDER
CRAMPS AREA
N.W. OF ORIECO FAULT
STERO NETS

SCALE	DATE 25-7-84
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE D'PORT	REP.No.
DRG No D/LH02/568	FIG No

PAUL BEAHRS PROSPECT 17/10/83

1.0 General Description As Py; Py

a) Style of Mineralization

Fault-related sulphide mineralization - gossanous material common - associated silicified sediments. SE end of the Orieco Fault (trends NW).

b) Host Rocks

Mathinna Bed sediments - intercalated shales/siltstones and sandstones. Beds dipping SW striking NW generally.

c) Geography/Location

Located on the west side of the Arm River, 4 km NE of Upper Scamander bridge. Topographically low area.

d) Old Workings

Originally an adit was dug at the Paul Beahr prospect - filled in during the construction of Trout Road. Part of the adit dump remains.

2.0 Host Rocks

Mathinna Beds

a) Lithology

Exposed along the road (Trout Road). The fault zone outcrops just above the road with minor expression in the road cut. Dominantly intercalated shales/siltstones and sandstones. Thixotropic mixing of stt and shales + shale ripup clasts in stt/sst beds. Sandstone units also seem to thin laterally and pass into shales.

b) Bedding

Beds strike NW generally and dip plus young to the southwest. (Strike parallel to the road - dipping away from it). Beds the right way.

c) Cleavage

Shales cleaved - parallel to bedding where visible - shales also very fractured often broken up in outcrop.

d) Faults/Veins/Folds

Several faults recognized. Main mineralizing faults striking NW. Minor faults not mineralized trending NE. Faults may be transgressive.

Sandstones show fractures/joints trending 020°, 270° and 350° - associated Fe staining.

Quartz veining qpparent in sst units close to the Orieco Fault.

Folding apparent by bedding oreintation changes - minor fold visible at (79) station. Trends 160° with a gentle plunge. Small isoclinal fold observed at approximately (75) station on Trout Road.

e) Metamorphism

Faint spotting apparent N of the Orieco fault zone in black shales - not ubiquitous.

Alteration

Oxidation halo around the Orieco fault - irregular and really undefined. Dominant Fe alteration confined to fault zone.

Silicification appears associated with the fault occuring dominantly on the S side. Pervasive silicification in sandstones with also thin Qtz veins and veinlets.

3.0 Mineralization

a) Gross Setting/Dimensions

NW trending fault zone - Orieco fault. Paul Beahrs forms the last mineralization/gossan on this line. Orieco Fault almost 6 km long - gossan outcrops actually traced to the Orieco zone. Width probably varies - about 5-8m at Trout Road outcrop. May be wider or splits close to Orieco Prospect - 2 pits/trenches seen 20m apart both on Fe gossan.

b) Mineralogy

Rocks in fault zone silicified - vuggy with a supergene enrichment of gossanous material. Box work textures. Kaolinite common. Fe oxides impregnate shales and siltstones (also sandstones in the fault) tend to occur in fractures and veins in sandstones. Dominant sulphides on the dump arsenopyrite plus pyrite - galena, chalcopyrite also recognized. Groves reports sphalerite - marcasite - pyrrhotite. Oxide zone contains sconodite.

c) Geochemistry

Rocks from the dump elevated in Sn - 1.86% max., Cu 0.21%, Pb 5.25%, Zn 1.12%, Ag 123 ppm, As 8800 ppm and Au 40 ppm. Affinities with the North Scamander Prospect 1 km to the SE.

342200

PAUL BEAHRS PROSPECT — ROCK CHIP

ROCK NO/LOCATION TYPE	Au	Sn	WO_3	Mo	As	Cu	Pb	Zn	Bi	Ag
12413 300m NW of Paul Beahrs. Sil mg sst + Fe sconodite	0.05	290	45	4	2700	430	6500	360	18	25
12414 Above Trout Rd Sil sed + Qtz vein sconodite	0.05									
12415 Fault zone. Qtz/Tm breccia vuggy	0.05	540	65	4	12	6	28	6	4	1
12416 Orieco fault Z.. Gossanous shales	0.05	4	10	4	90	80	370	115	4	1
12417 Orieco fault Z. Gossan + shale(?)	0.05	10	10	4	730	175	400	380	4	2
12418 Orieco/Paul B. fault. sil sst - gossanous + Qtz	0.05	26	20	4	65	32	950	170	6	1
12419 Orieco fault pits. Gossan + shales	0.05	75	25	4	1050	100	440	430	20	2
12420 Orieco fault pits. Gossanous Shale	0.05	4	10	4	130	470	1300	1700	4	1
12421 Paul B. Dump sil stt/sh Fe + aspy/py	0.05	95	45	4	75	520	1550	5900	12	14
12422 Dump Qtz/aspy oxidized	0.05	670	90	6	1750	50	1950	1200	36	61
12423 Dump sil mg sst Py + Fe oxide	0.05	85	20	4	360	60	900	70	4	3
12424 Dump Fe gossan + shale	0.05	660	10	4	44	800	2900	440	6	3
Highest Values		670			2700	800	6500	5900		61

REGION: NE TAS PROJECT No.: T610 PROSPECT: Paul Bearbr GRID CO-ORDS.: LOCAL A.M.G.

DESCRIPTION Sample Type: Rock Rock Type: Sulphides/Gossan/Qtze Soil/Sediment Size Fraction:

PB1 Gossan — spongy red-yellow limonite; local boxworks; float near tails dump.
PB2 Silic'd qte and slate with lim., wth'd S^{2-} and fresh S^{2-} — dominantly galena
PB3 as for PB2 with more pyrite, minor galena, sphalerite
PB4 fractured, silic'd quartzite, grey slate, minor pyr, gal, sph; patches, with chlorite
PB5 as above with more massive sulphide py-te-galena-sph'd.
PB6 as above with more slate, rein qtz & chlorite; pyr dominant minor sph, gal

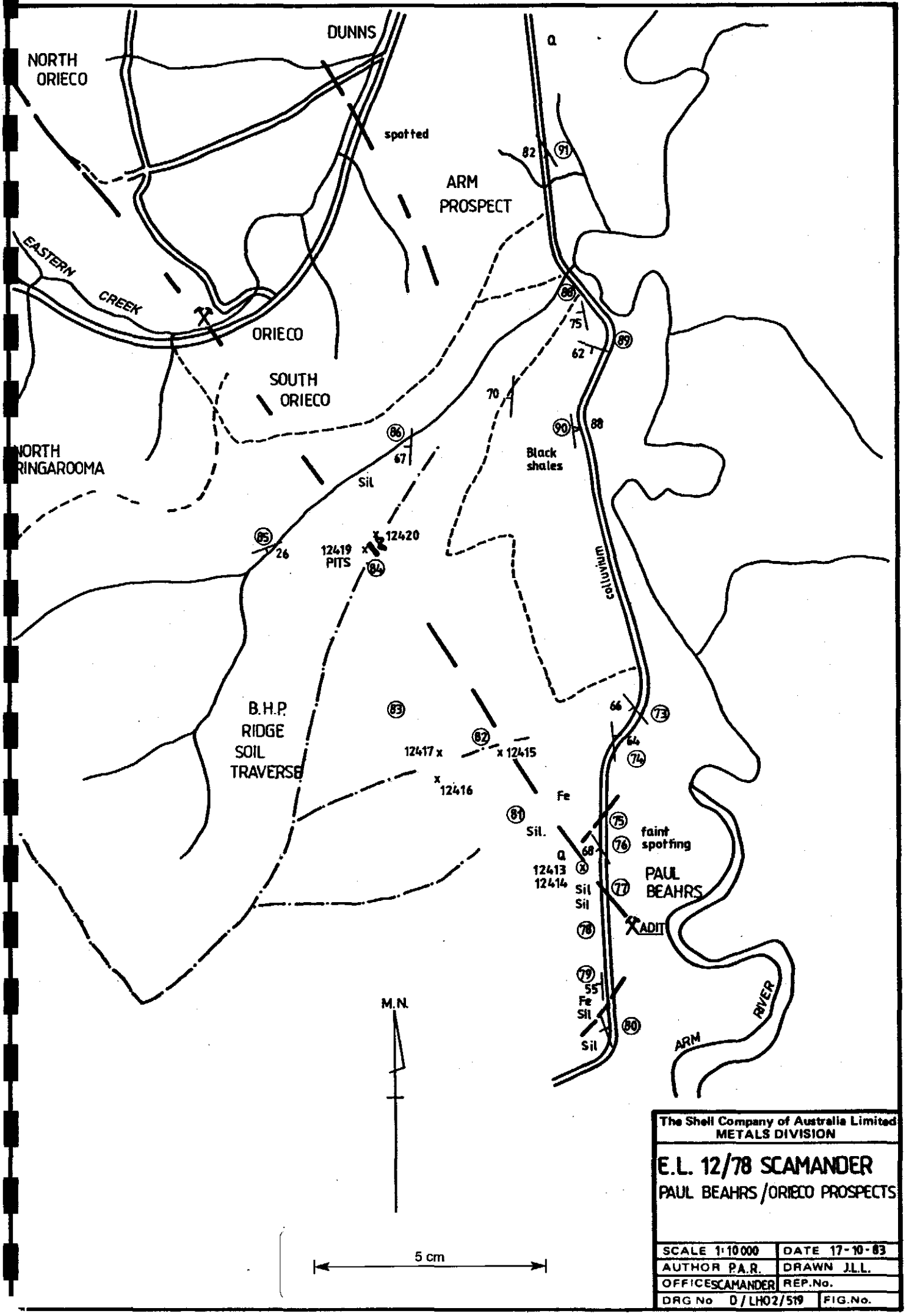
ANALYSIS Laboratory A.A.S. Batch No K133 Date Analysed 6/11/81

Element / Method / Sample No	Sn	W	Cu	Pb	Zn	Ag	Co	Ni	Mo	As	Au	Sb					
	X1A	X1A	1	1	1	1	1	1	X1B	5	120A	8					
PB 1	0.69%	20	2100	0.36%	0.05%	49	30	25	<4	200	5	<10					
2	0.73%	<10	440	4.50%	0.20%	93	15	25	"	8800	40	60					
3	1.86%	"	560	5.25%	0.6%	123	15	25	"	2.0%	30	110					
4	0.03%	"	70	0.06%	0.06%	4	15	25	"	120	<3	<10					
5	0.71%	"	540	1.37%	1.12%	36	25	30	"	2000	<3	<10					
6	0.11%	"	560	0.45%	0.94%	36	35	40	"	820	<3	<10					

REMARKS: High Sn, Ag, Pb in sulphide rich samples.; high Sn in gossan.

Logged or Sampled by: R. HINE Date: 25/11/81

342201



The Shell Company of Australia Limited
METALS DIVISION

E.L. 12/78 SCAMANDER

PAUL BEAHRS / ORIECO PROSPECTS

SCALE 1:10000	DATE 17-10-83
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE SCAMANDER	REP.No.
DRG No D/LH02/519	FIG.No.

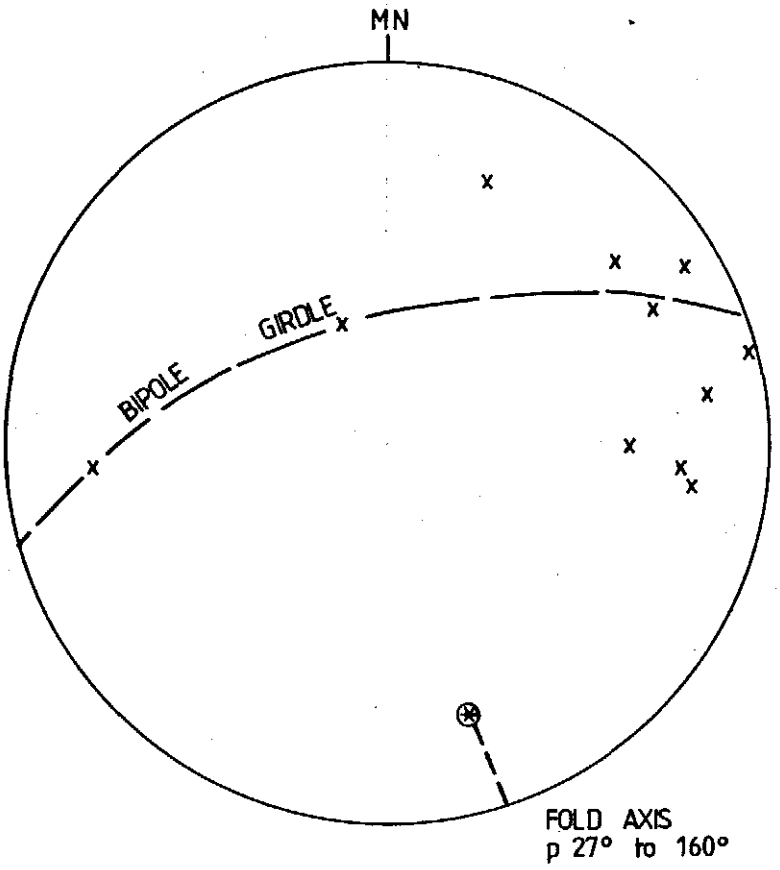
342203

202

17/10/83

PAUL BEAHRS

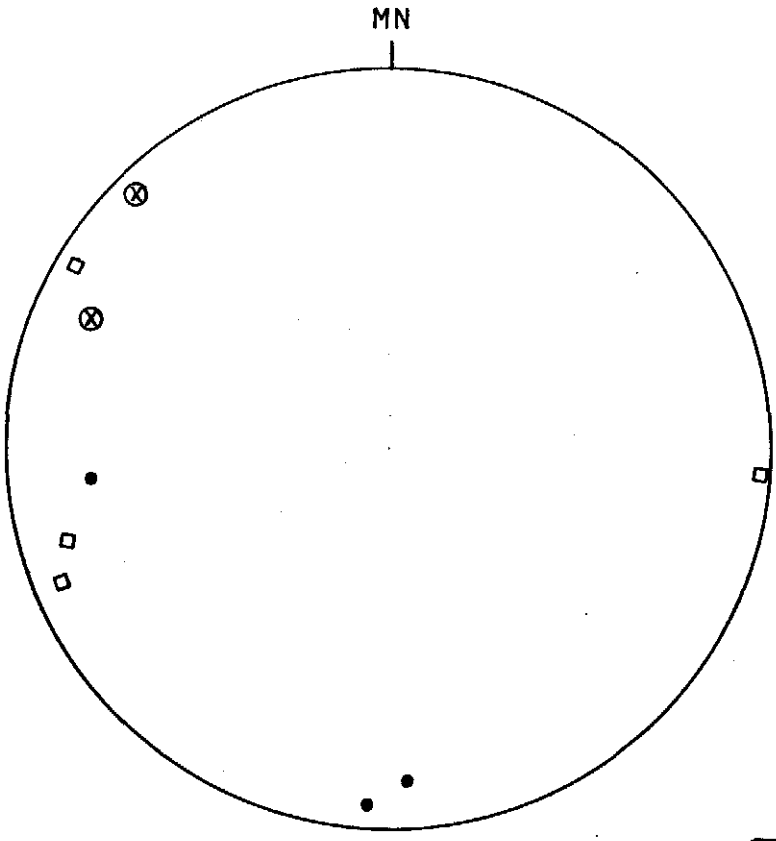
BEDDING



x n = 12

FOLD AXIS
p 27° to 160°

FRACTURES
FAULTS



● n = 3

⊗ n = 2

◇ n = 4

x bedding

● fractures

⊗ qtz. veins

◇ faults

5 cm

LAMBERT EQUAL AREA NET

The Shell Company of Australia Limited
METALS DIVISION

E.L. 12/78 SCAMANDER

PAUL BEAHRS

STEREO NETS

SCALE	DATE 25-7-84
AUTHOR P.A.R	DRAWN J.L.L.
OFFICE D'PORT.	REP.No.
DRG No CLH02/564	FIG No

SCAMANDER/SCAMANDER BELL/BEULAH PROSPECTS 21/10/83

1) General Description

a) Style of Mineralization

Sulphide-bearing quartz veins in altered (sericite/muscovite) granodiorite of the Scamander Tier Dyke. Many sulphides at the Scamander Mine few at Scamander Bell and Beulah.

b) Host Rocks

Scamander Tier Dyke - granodiorites and quartz/feldspar porphyries. Dyke 20m or less across on the south side of the Scamander River. Dyke intrudes Mathinna Bed sediments.

c) Geography/Location

Scamander Mine 1km west of the western edge of Scamander Township on the Scamander River. Scamander Bell and Beulah straddle a forestry track 1.5 to 2km NW of Scamander.

d) Old Workings

Scamander Mine - 2 shafts - 40m shaft on the top of the hill plus small adit.

Scamander Bell - shaft plus a series of NNW trending pits.

Beulah - small shafts and pits trend NNE.

Groves (1972) reports 51 tonnes of ore at 1.13 kg/tonne Ag from the Scamander Mine and 52 tonnes at 3.97 kg/tonne Ag from Beulah prospect.

2) Host Rocks

Scamander Tier Dyke

Scamander Mine - hornblende-rich granodiorite with quartz and milky feldspars, minor biotite. Some hornblende laths at 1-2cm long. Quartz and feldspars euhedral and slightly larger than the ground mass. (Quartz/feldspar porphyry)?

Scamander Bell/Beulah - typical Scamander Tier Dyke material - large feldspar crystals (twinned and zoned) in groundmass of quartz/feldspar/biotite and hornblende 15% mafics (9% biotite, 6% hornblende). Groundmass medium grained granite.

- Surrounding Mathinna Bed Sediments at the Scamander Mine generally strike NW (NNW) and dip to the east. Sandstones close to the granodiorite contact are silicified and contain numerous barren euhedral quartz veins. Also associated increase in iron oxide staining towards the granodiorite - (towards the sulphide veins).

Quartz veins trend dominantly 263° 67° N.

3) Mineralization

Gross Setting/Dimensions

Scamander Mine- NNE trending quartz veins and associated alteration. Shafts about 15m apart - potential strike length limited. Individual quartz veins less than 20cm across - width of zone unknown but probably less than 5m. Mineralized veins strike 015° 66° E.

Scamander Bell - shaft and pits/trenches indicate a strike length of 300 to 350m. Quartz float indicates further potential. Vein/zone width restricted to 1m.

Beulah - series of pits and shallow shafts trend NNE zone 10-15m wide and 100m long.

Mineralogy/Alteration

Scamander Mine - NNE trending muscovite/sericite alteration of granodionite - also some silicification close to quartz veining. Veins contain numerous sulphides namely arsenopyrite/galena and pyrite. Groves (1972) further reports sphalerite and chalcopyrite. Scamander Mine is the only one of the three to contain significant sulphides. Fe oxide staining and minor scorodite staining occur.

Scamander Bell - NNW (340°) trending quartz veins with associated sericitic and muscovitic alteration of host granodiorite. Euhedral quartz vein vuggy with negligible sulphide and Fe oxide material present. Greisenized granodiorite also weathered and oxidized.

Beulah - NNE (013°) trending quartz veins with associated greisenized granodiorite - similar to the Scamander Bell prospect.

The silver mineral cerargyrite is reported by Groves.

342206

SCAMANDER/SCAMANDER BELL/BEULAH PROSPECTS

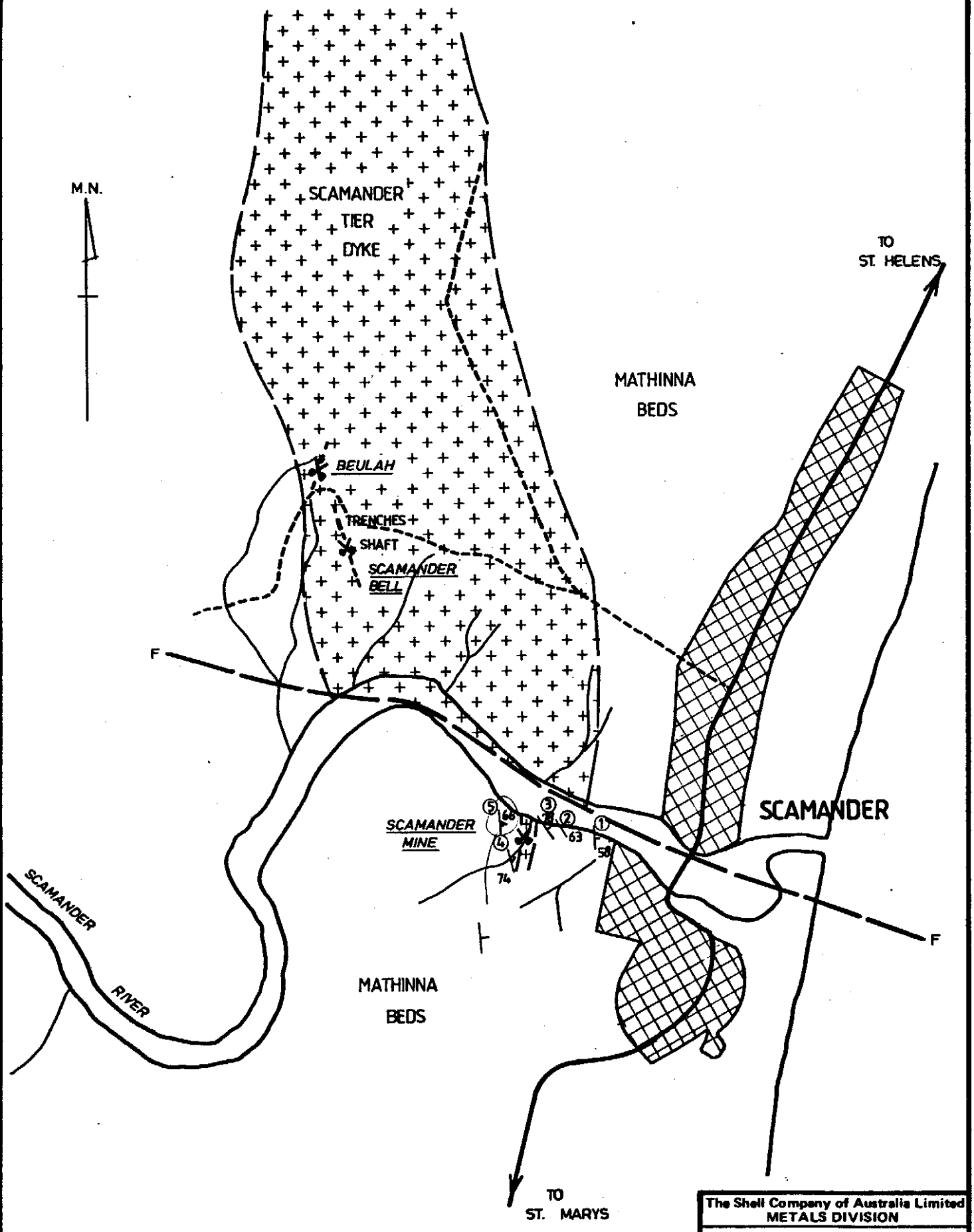
ROCK CHIPS

ROCK NO/LOCATION TYPE	Ag	Sn	WO_3	Mo	As	Cu	Pb	Zn	Bi	Au
Scamander Mine										
12435 Dump. Top shaft Sericitized granodiorite	33	55	35	< 4	195	280	1800	22	6	< 0.05
12436 Dump top shaft Sil/serc granodiorite	23	95	60	4	1.11%	40	960	65	4	< 0.05
12437 Dump top shaft fresh granodiorite	< 1	< 4	15	< 4	50	4	38	44	4	< 0.05
12438 Dump Qtz vein & aspy/pygal	500	200	60	< 4	15.7%	3300	2.25%	4.7%	< 4	0.6
12439 Dump top shaft Qtz vein gal/aspy/py	500	16	60	< 4	20.4%	760	4.5%	4.7%	< 4	0.3
12440 Dump top shaft Qtz vein aspy/gal/py	106	55	30	8	23.8%	780	2.6%	5100	< 4	1.0
Beulah Prospect										
12441 Dump Serc/musc granodiorite	4	4	60	4	2850	36	1500	100	6	< 0.05
12442 Dump Qtz vein & Fe & aspy	134 (?)	< 4	105	10	5850	10	460	40	6	< 0.05
12443 Dump Altered granodiorite	530	< 4	60	6	6900	140	1.1%	80	6	0.65
12444 Dump Qtz vein & Fe oxides	18	< 4	80	12	2850	4	300	4	< 4	< 0.05
Scamander Bell										
12445 Shaft Dump Greisenized granodiorite & Fe	2	4	45	< 4	710	8	60	14	6	< 0.05
12446 Shaft dump Qtz vein & Fe & qtz	3	< 4	55	6	390	4	630	12	< 4	< 0.05

Scamander Bell cont.

ROCK NO/LOCATION TYPE	Ag	Sn	WO_3	Mo	As	Cu	Pb	Zn	Bi	Au
12447 Trenches dump Greisenized granodiorite	7	<4	30	4	330	4	190	8	<4	<0.05
12448 Trenches dump Qtz vein & Fe oxides	170	<4	55	6	360	10	80	150	<4	<0.05
12449 Trenches dump Qtz vein/boxwork Fe	560	6	70	8	170	40	800	12	6	0.2
12450 Trenches dump Qtz vein & Py & qtz	115	<4	65	10	1100	40	600	410	<4	1.0 ppm

342208



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E.L. 12/78 SCAMANDER

Pb / Ag PROSPECTS

SCALE 1:15000	DATE 21-10-83
AUTHOR P.A.R.	DRAWN I.L.L.
OFFICE SCAMANDER	REP.No.
DRG No 0/LH02/518	FIG No

208

342209

YARMOUTH PROSPECT 26/10/83

1) General Description AsPy

a) Style of Mineralization

Quartz veins containing arsenopyrite and minor base metal sulphides E-W trend approximately.

b) Host Rocks

Mathinna Bed sediments exposed in the creek - very silicified - sandstones/siltstones and shales.

c) Geography/Location

Located 1km WNW of Beaumaris in Yarmouth Creek. Small BHP grid still remains.

d) Old Workings

Shallow pits or diggings into the side of the creek. Not very extensive - small dump - not easy to find if careless.

2) Host Rocks

Mathinna Beds

Lithology - Just up Yarmouth Creek from the prospect (200m) silicified fg ssts/quartzite v. hard. In the prospect area generally finely bedded siltstone/shales - minor sandstones.

Bedding/Cleavage - Beds generally strike North West dipping to the East. No cleavage recognized. Minor fissility parallel to bedding.

Faults/Veins/Fractures - Quartz veins in prospect strike WNW and ENE. Fractures measured 214° 80° W NE trending.

Metamorphism/Alteration - Rocks extremely silicified along the creek - alteration due to fault? Halo of Fe oxide staining around the prospect itself. Extent 50m +.

3) Mineralization

Gross Setting/Dimensions

One quartz lode zone seen $<$1.0m across. Groves (1972) reports 3 zones. Limited strike length less than 5m shown.

Veins trend 264° 84° N ENE and 281° 80° WNW.

Mineralogy

Quartz veins contain clasts of Mathinna Bed sediments. Fractures in veins and vugs filled with euhedral pyramidal quartz crystals some larger than 1cm long. Fe oxide and incrustatations common.

Dominant sulphide is euhedral arsenopyrite. Groves (1972) reports minor sphalerite, galena, pyrrhotite, pyrite and chalcopyrite.

210

342211

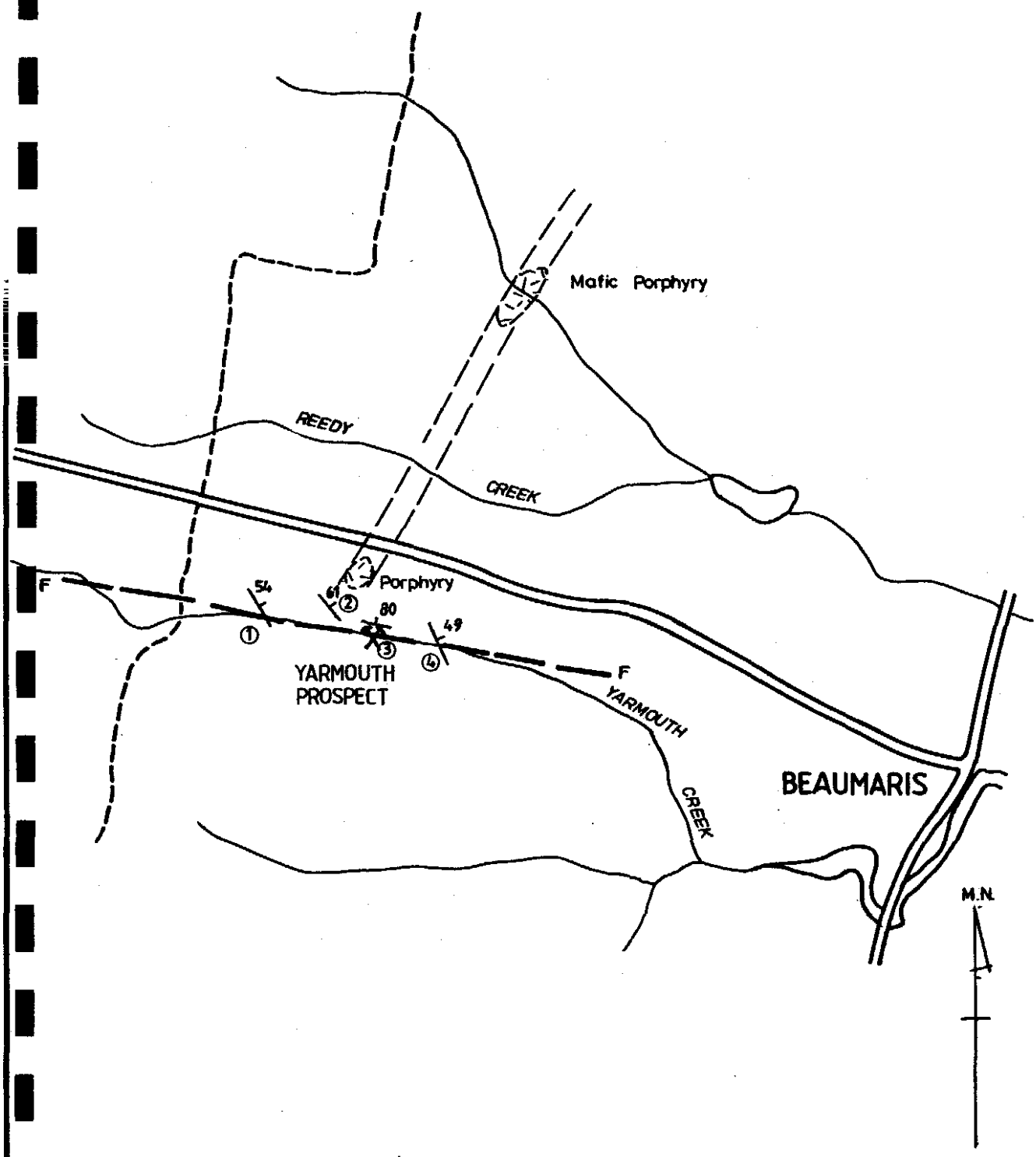
YARMOUTH PROSPECT

ROCK CHIPS

ROCK NO/LOCATION TYPE	Au	Sn	WO_3	Mo	As	Cu	Pb	Zn	Bi	Ag
12452 Dump Qtz vein & aspy common	0.45	10	70	8	12.6%	8	610	135	4	4
12453 Dump Qtz vein aspy common	0.05	10	70	8	3.1%	4	34	6	4	1
12454 Dump Sil stt/sh boxwork Fe	0.05	24	30	4	500	42	260	90	4	1
12455 Dump Sil stt & Fe minor qtz	0.05	18	10	4	80	80	42	24	4	1

Au	As	Pb	Ag
0.45	12.6%	610	4

342212



① Field note book number - description.

0 500m

5 cm

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E.L. 12/78 SCAMANDER

YARMOUTH PROSPECT

SCALE 1:10 000	DATE 26-10-83
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE SCAMANDER	REP.No.
DRG.No. D/LH02/524	FIG.No.

APPENDIX 4

Economic Potential of the Scamander Prospects

Memo : 29/11/83

LHOL 64 S

213

342214

29th November, 1983.

P.A. Ruxton

BXH/Devonport - Dick Wright

Re: ECONOMIC POTENTIAL OF THE SCAMANDER PROSPECTS.

Recommendations/Summary

1. The Loila Tier prospect should be investigated by drilling.
2. Following the results of the reverse circulation drill programme on Pinnacles this prospect should be carefully examinad with the aid of fluid inclusion data to establish the possibility of a Great Pyramid-style deposit at depth.
3. Investigation by gridding and soil sampling is warranted in the area around Pyramid Hill,
   a) closeose off the known soil anomaly,anand
   b) to define the extent and prospectivity of Pyramid-style cassiterite/fracture mineralization 500m to the south of the existing Pyramid Grid.

Comments are made on several prospects which are themselves related to a variation of the Chinese vein system model. The Chinese model appears to fit fairly well in this area.

Introduction

The relation between vein system and skarn mineralization and the applicability of the Scamander mineral field to Chinese-style vein deposits was discussed in my memo of 22/11/83.

This memo outlines thoughts developed during a regional prospect evaluation and assessment of the Scamander licence which to some extent were crystallized during discussions with Teunis Kwak, Bertus de Graaf, Gavin Plummer and Dick Wright in early November.

GREAT PYRAMID

The recent geological ore reserve estimate (GORE) has defined 3.2 mt at 0.22% Sn with a further 2.6 mt of potential but untested ground.

Future work depends on the viability of a deposit of approximately 6 mt at 0.22% Sn (13,000 of contained Sn) with the possibility of high grading 0.5 mt at 0.42% Sn. If the decision is made to go ahead two paths are open, 1) outline drill the deposit to establish the reserve (expensive), 2) bulk sample to accurately determine grade - both steps should include further metallurgical testwork.

If the tonnage figure is not adequately outlying areas should be fully explored for further reserves. Two areas spring to mind - a) the Pinnacles prospect (currently being drilled) and b) Pyramid-style fracturing south of Pyramid Hill. This later mineralization should be gridded and evaluated. There is also the possibility of reserves in the Loila Tier area - gridding(?) and drilling are suggested. Soil anomalies on the Pyramid Grid and southeastern Pinnacles Grid should be closed off and evaluated. This stage will probably involve drilling.

LOILA TIER

Localized extremely rich cassiterite mineralization (upto 5% in rock chip) occurs in a ENE trending fault zone. Surrounding quartz/tourmaline veins over an area of 200m x 400m + may contain cassiterite. The association of a fracture-related tourmaline breccia, silicification and cassiterite mineralization in the fault zone point to further tin occurrence at depth. The fault probably represents a better channel-way for mineralizing fluids rising from depth. The host rocks are a mixture of sandstones and shales - dominantly sandstones NE of the Loila Tier Prospect and spotted shales to the SW. Mineralized fluids may be ponded at the granite/sediment contact which by the degree of spotting in the shale units is probably close to surface (100 - 200m).

Loila Tier is considered the best prospect in the Scamander licence.

PINNACLES

The position of the Pinnacles Prospect in the regional sequence of deposits is not precisely known - it lies either above or below the Pyramid deposit (Fig. 1). Arguments for above Pyramid and hence the possibility of a Pyramid-style deposit beneath are:

a) the larger dispersion of vein/veinlets shown by the wider area of Zone A Sn-in-soil anomaly,

b) finer grained lithologies on the Pinnacles grid resulting in the inhibited passage of fluids and a degree of ponding (tight cap rock with ponding at depth),

c) it's slightly higher topographic positioning (but Pinnacles is closer to the shallow dipping granite contact), and arguments for a position beneath Pyramid include:

a) the cassiterite occurs in quartz/tourmaline veins/veinlets on Pinnacles as opposed to open fracture fills in the Pyramid deposit. The deep hole on Pyramid indicates a transition from open fracture fills to veins at depth,

b) the association of cassiterite and fine grained tourmaline. Tourmaline occurs on Pyramid in the fracture fills but is far less common. (This piece of evidence may be ambiguous),

c) cassiterite/tourmaline/quartz veins (Sn-in-soil Zone A) cross-cut a Pyramid-style NE fracture set on Pinnacles suggesting an over-printing event not recognised to the same extent on Pyramid Hill. This implies a deeper position,

d) it can be argued that the topographic level of Pinnacles suggests a deeper position than Pyramid since the deposit is closer to the granite both at surface and possibly at depth (ignoring cupola structures).

Fluid inclusion data would quickly resolve this dilemma – lower temperatures above Pyramid higher temperatures beneath Pyramid.

NORTH SCAMANDER

Some interesting points of regional significance arise from the North Scamander Prospect. Diamond drilling by BHP defined a tabular fault-related body of magnetite cross-cut be pyrrhotite and Pb/Zn sulphide stringers with dimensions of 300 – 400m length, 8 – 10m thickness (the main zone), intersected to a depth of 160m below surface. The distribution of Sn-in-soil although spacially related to this feature. Thin sulphide/carbonate/chlorite tin-bearing veinlets/stringers/fracture-fills occur in the Mathinna host rocks and probably give rise to the irregular Sn-in-soil anomaly. BHP drilled four shallow (50m max. depth) percussion holes to test the soil geochemistry with only low order Sn (0.1%) and elevated base metal values.

Petrological studies identified a fragile needle-like cassiterite phase occurring as radiating clusters – a low temperature form of tin.

The association of tin and carbonate/sulphides, the fine veinlets/stringers and the occurrence of a low temperature crystalline form of tin imply that the North Scamander Prospect is positioned above Great Pyramid in the regional mineralization sequence (Fig. 1).

The tin/sulphide system at North Scamander implies a Pyramid-style deposit at depth – probably of reasonable size. Drilling by BHP indicates that such a system must be below 100m depth. This downgrades further exploration at this prospect since Pyramid-style deposits are open-cut propositions only and must be located near surface.

ORIECO/PAUL BEAHRS/DUNNS/ARM/CRAMPS

These prospects consist of fault-related sulphide ($\pm$ tin) mineralization. They are generally confined in nature with sulphides forming in pods in the fault zone (Orieco) separated by barren fault gauge. The Orieco prospect represents the most interesting of these deposits because:

a) it is associated with a NW trending silicified ridge – parallel to the North Scamander – Pinnacles ridge (but is narrower),

b) it's proximity to the Pyramid deposit and inclusion in the Sn-Cu zone of the regional metal zonation sequence.

It consists of pods of copper-rich sulphide material confined to a fault zone which has been drilled to depths of 150m and 100m below surface with disppointing results. Surface rock chip samples and stream sediment samples have been and will be taken to determine if tin is being shed from the silicified Mathinna host rocks.

Fault-related mineralization reflects the difference in permeability of fault zones and surrounding Mathinna sediments and is not considered a good guide towards Pyramid-style deposits.

Prospects in the Orieco/Cramps/Paul Beahrs area are not considered prospective because:

a) the deposits occur too high in the system,

b) too far away (on surface and at depth) from stanniferous granite sources,

c) temperatures too few for the mineralizad fluids to contain tin.

When considering the Collingwood Model if the granite/sediment contact is too low beneath Pyramid Hill (250m below the hill top - there is thought to be a cupola beneath Pyramid too!) then the search for this mineralization style must be carried out closer to the granite - i.e. Loila Tier.

LUTWYCHE/BADEN POWELL/CARSON DE BEERS

Thick (1.0 - 2.0m) Mo - WO_3-bearing quartz veins typify these prospects. They have been thoroughly investigated by Geophoto who drilled 2 holes at Lutwyche. The deposits form the bottom of the Chinese-style zonation sequence and probably acted as feeder zones for the mineralized fluids. The open cut potential for WO_3/Mo is low due to limited vein density and highly erratic WO_3/Mo distribution.

SCAMANDER MINE/SCAMANDER BELL/BEULAH/YARMOUTH

The Scamander Mine, Scamander Bell and Beulah prospects consist of sulphide-bearing greisenized hornblende-biotite granodiorite located in the Scamander Tier Dyke. Hb - Bi granitoids in NE Tasmania have been defined as early stage granites which were fragmented during the intrusion of biotite adamellites and late stage alkali granites (Groves, 1972; McClenaghan et. al., 1982).

The mineralization is considered to be related to late stage fluid release from within the batholith. These deposits represent the latest, lowest temperature alteration and deposition of the mineralized fluids of the Scamander mineral field. No correlation between the granodiorite and Pb-Ag mineralization is drawn.

These deposits have no economic potential.

ECHO/SILVER ECHO

The Echo prospect illustrates ponding in the granite beneath Mathinna Bed cover rocks. WNW trending greisen lode veins with central quartz vein fills cross-cut a biotite adamellite (+minor muscovite) exposed in a window of Mathinna Beds. The lode veins increase in both width and density towards the sediment contact and contain WO_3/Mo mineralization. Minor cassiterite occurs immediately below and in veins in Mathinna sediments at the granite contact, North Echo. (Fig. 2).

Geophoto drilled 4 drillholes in the North (2) and South (2) Echo prospects with discouraging results. The mineralization is dominantly WO_3/Mo, is very patchy and severely depth constrained.

The granite at Echo is very different from the Wolfram Creek Granite (which probably projects under Pyramid Hill).

Silver Echo consists of a large quartz vein blow with a margin of greisenized granite in Mathinna Bed host rocks. Massive pyrrhotite with associated arsenopyrite and chalcopyrite occur but the deposit has no economic significance.

CONCLUSIONS

The regional study of the Scamander licence is close to completion. Preliminary results suggest that the following prospects are worthy of further work.

1. Pyramid - extend grid.

2. Pinnacles.

3. Loila Tier.

4. Check the Orieco Ridge.

Followup of the stream sediment survey may reveal further areas of interest close to the tin granite.

218

342219

5 cm

SCAMANDER MINE Pb / Ag
SCAMANDER BELL Pb / Ag
BEULAH Pb / Ag
YARMOUTH Pb / Ag

MATHINNA HOST ROCKS

CRAMPS Cu
DUNNS / ARM Cu
ORIECO PAUL / BEAHRS Cu / Pb / Ag
(Sulphides)

faults

NORTH SCAMANDER
(Sn / Sulphides)

?

Fracture - fills
Veinlet / Stringers
Chl / Sulphides
Cass / Carbonate

faults

GREAT PYRAMID
(Sn)

Fracture - fills
Qtz / Cass
± tourm

? PINNACLES ?
(Sn)

Veins
Qtz / tourm / cass

EAST LUTWYCHE
(WO_3)

Qtz. veins
Tourm. / WO_3

LUTWYCHE
BADEN POWELL
CARSON DE BEERS
(Mo / WO_3)

Qtz. veins
Tourm / WO_3 / Mo

Hornfelsed Mathinna Beds

WOLFRAM CREEK GRANITE

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METALS DIVISION

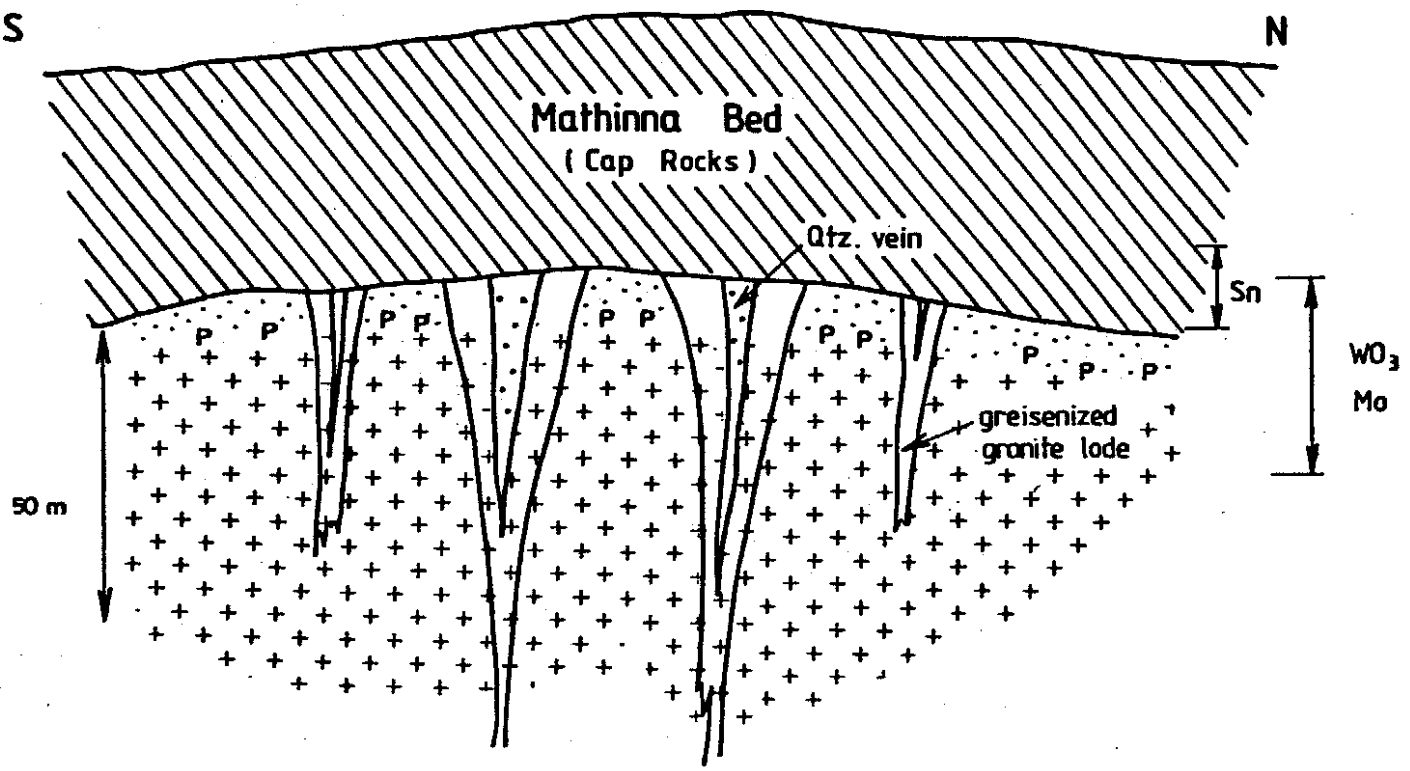
E.L. 12/78 SCAMANDER
METAL ZONATION OF
MINERAL FIELD
N.E. TASMANIA

SCALE	DATE 24-11
AUTHOR P.A.R.	DRAWN J.L
OFFICE D'PORT	REP. No.
DRG No. D/LH02/514	FIG No

219

342220

ECHO PROSPECT



LEGEND

FINE GRAINED GRANITE

P P PORPHYRITIC GRANITE

— CHILL PHASES

MEDIUM GRAINED EQUIGRANULAR
BIOTITE (MINOR MUSCOVITE) GRANITE

5 cm

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METALS DIVISION

E.L. 12/78 SCAMANDER
ECHO PROSPECT
DIAGRAMMATIC SECTION

SCALE	DATE 24-11-83
AUTHOR P.A.R.	DRAWN LLL
OFFICE DEPORT	REP No.
DRG No. D/1407/515	FIG No 2

APPENDIX 5

Scamander Stream Sediment Anomalies

TABLE 3

SCAMANDER STREAM SEDIMENT ANOMALIES

		No. of Samples
4	LAUNCESTON (ALLUVIAL) ANOMALIES (Sources - alluvial tin - minor contact granite)	38
5	MT. ECHO ANOMALIES (Sources - Silver Echo Prospect - hardrock unknown)	8
6	ST. HELENS ANOMALIES (Source - Alluvial Sn)	2
2	FLAGSTAFF ANOMALIES (Source - hardrock unknown Sn + base metals)	35
8	NEVADA CREEK ANOMALIES (Source - Alluvial?)	2
7	ARM CREEK ANOMALIES (Source - Alluvial Sn)	8
9	WOLFRAM CREEK ANOMALIES (Sources - Prospects - contact granite - alluvial Sn - unknown hardrock)	16
1	PYRAMID - N. SCAMANDER ANOMALIES (Sources - prospects - minor alluvial Sn - Orieco ridge unknown)	23
3	UPPER SCAMANDER ANOMALIES (Source - Alluvial Sn)	3
10	SKYLINE TIER ANOMALIES (Source - Alluvial Sn)	4
11	AVENUE RIVER ANOMALY (Source - Alluvial Sn)	1
12	BARK CREEK ANOMALY (Source - Alluvial? undefined)	1
	TOTAL ANOMALOUS SAMPLES	141

LAUNCESTON (ALLUVIAL) ANOMALIES (38) 16/5/84

Location - NW portion of the licence. Covering the Launceston, Constables and Nevada Creeks.

Anomalies - Numerous anomalies ranging upto 1.2% tin closely related to granitic alluvial cover of Quaternary age.

Followup Technique - Since most samples are related to tin-bearing alluvium detailed followup at each site was not considered necessary.

Attention was placed on streams/creeks draining low hills in the area to determine if cassiterite was being removed during present day erosion/transport.

Geological inspection of outcropping rock was used to determine the likelihood of mineralization in this granitic terrain.

Alluvial cassiterite in this area is black and red generally highly rounded plus often coarse grained.

Geology - Outcropping rocks include:

1. Mg to cg biotite adamellite with associated porphyritic and aplite contact (chill) phases. (- quartz veining and minor greisen vein development was noted in the Constables Creek close to the granite contact).

2. Hb-Bi granodiorite east of the Ferntree Falls. - fine grained contact phases are present.

3. Mathinna Bed sediments.

4. Alluvial cover (common).

No mineralization was observed in outcrop in this area. The biotite granite was generally unveined and homogenous.

Quaternary Alluvium

Granite derived Quaternary alluvium contains large amounts of alluvial tin in this area. Alluvial concentrations occur in the Transit Flats, Argonaut and Ruby Creek areas and along Launceston Creek.

It's clear that the level of alluvium was much higher in the past with current drainage incising Quaternary alluvium down to bedrock. This incision has led to residual tin-bearing alluvium quits some way up hillstopes and in pockets in youthful stage creeks/streams.

The residual granitic-derived Quaternary alluvium has complicated stream sediment followup all over the Scamander licence.

Examination of rock outcrop in the Launceston Anomaly area indicates that the cassiterite present in the alluvials is not locally derived (at least not recently).

Inspection of float associated with Quaternary alluvium indicates that the tin was derived from the roof zone of a granite - with:

1. Sericitic greisenized granite and associated tourmaline fracture-fills.

2. Tourmaline/quartz vein(?) material.

3. V. common Qtz vein material (with abundant evidence of open void filling).

4. Pegmatitic lumps of tourmaline/quartz/Kfeldspar.

5. V. minor Mathinna Bed float (in contrast to alluvium (Sn-bearing) in the Scamander River Anomaly area which contains Mathinna float with tourmaline veins etc).

The source of the alluvial tin and Quaternary granitic -derived gravels/sands is not known at present.

MT ECHO ANOMALIES (8) 22/5/84

Location - Creeks draining Mt. Echo in the north of the licence.

Anomaly - 8 anomalous samples

10901	290 ppm Sn
10888	60 ppm Sn
10889	130 ppm Sn
10854	100 ppm Sn
10855	390 ppm Sn
10817	60 ppm Sn
10907	75 ppm Sn
10935	70 ppm Sn

Associated anomalies:

As	10817/10888/10889/10854/10855/10901	(200 ppm)
Cu	10817/10888/10907	(220 ppm)
Pb	10901	(32 ppm)
Zn	10901/10817/10888	(100 ppm)
WO_3	10817	(20 ppm)

Followup sampling

7 stream sediment samples (7825, 7826, 7831, 7835, 7836, 7840, 7841)

Geology/anomalies

1. Alluvial anomalies related to Quaternary granitic - tin-bearing gravel. 10855, 10854 and possibly 10889/10888 and 10901.

   10855 is close to the old workings at the Argus prospect where a large area of surface granitic - derived alluvium was sluiced.

   Sample 10901 indicates a residual tin anomaly. Here the present day drainage has incised into alluvium and bedrock (the former of Quaternary age).

2. Related to the Echo Granite and prospects. Samples 10817 and 10819/10818/10816 are located on the Echo granite and incorporate drainage from the Echo N and S prospects.

3. Related to the Silver Echo prospect - 10907.

4. 10935 is located on the hornblende/biotite granodiorite (St. Helens Pluton) and is considered to be of alluvial origin.

ST. HELENS ANOMALIES (2) 18/4/84

2 Single sample anomalies occur in the St. Helens area of the licence - NE portion.

a) s/s 10893 Site

Location — On Boggy Creek 2km SE of St. Helens adjacent to the Tasman Highway.

Anomaly — Single sample anomaly 10893–115ppm Sn, 70ppm WO_3 8ppm Mo
No associated base metal anomaly.

Follow-up — No stream samples. 1 rock/alluvium sample. 7744

Tin — Rounded fine grained ruby tin associated with quartz sandy alluvium ontop (?) of Mathinna gravels.

Geology — No outcrop - all alluvial cover. Several stages of alluvial build up. On road cut on Tasman Highway banded conglomerate plus siltstone alluvium of tertiary age. Panned but doesnot contain tin - stream flow approximately N to S - clasts of Mathinna sediment plus weathered granite. Quaternary alluvium (?) (younger) occurs in present day drainage incised into the tertiary gravels - some 10 to 20m here. Granite derived containing ruby tin.
Recent alluvial buildup - Mathinna Beds.

Anomaly Cause

Tin-bearing sandy alluvium of Quaternary age causes anomaly.

b) s/s 10967 Site

Location — S of the Medeas Cove Road on Argus Creek 2km WSW of St. Helens.

Anomaly — Single sample anomaly. 10967 - 155ppm Sn, 30ppm WO_3, 4ppm Mo. No associated base metal anomaly.

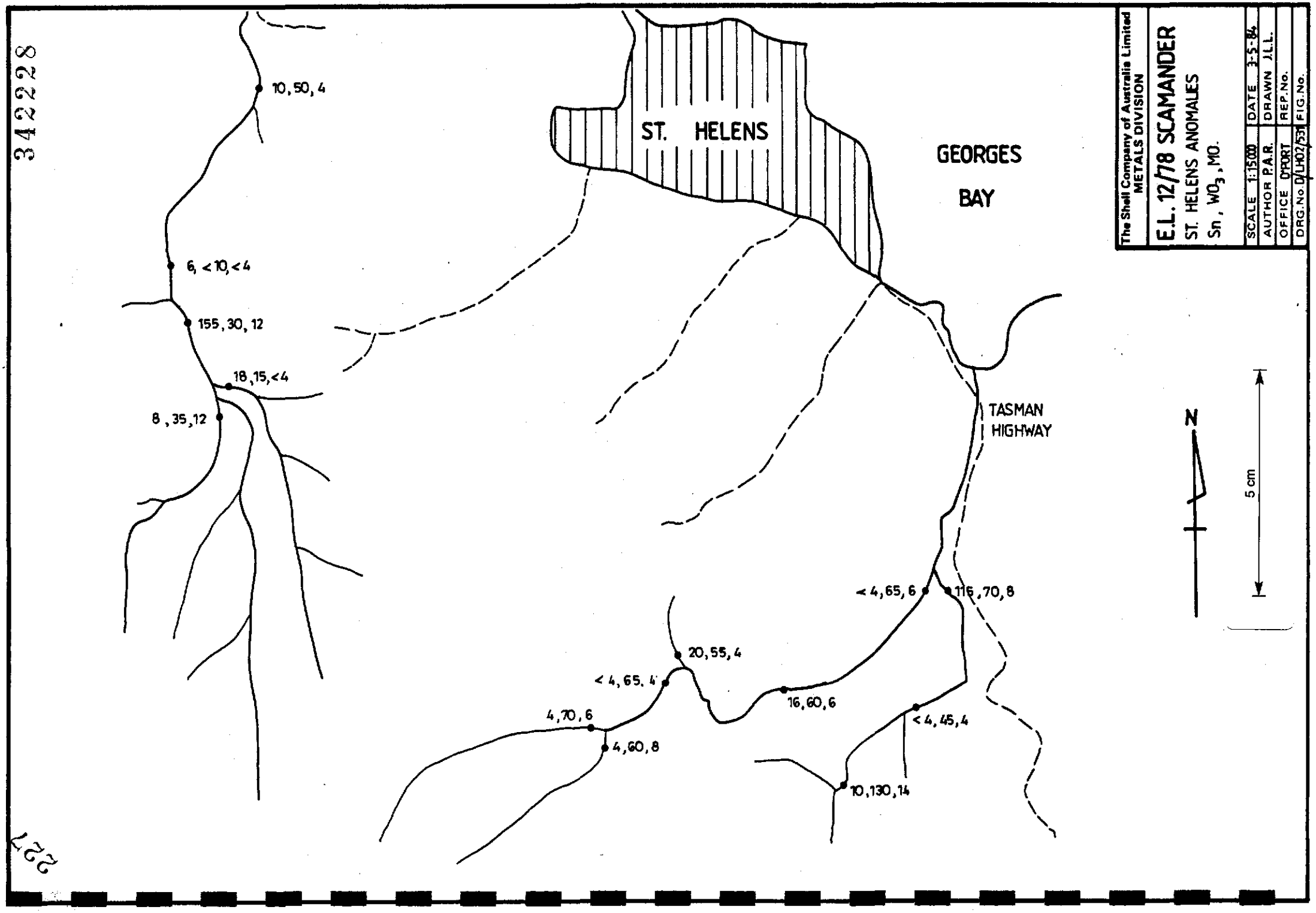
Follow-up — 1 stream sediment sample 7643
3 alluvial/rock chip samples 7745 to 7747

Geology — Outcrop of biotite/hornblende granodiorite a few metres upstream of the sample site. Medium grained cut by quartz veins and fractured. Inclusions of more mafic granodionite - mix diameter 0.3m usually 10 am accross and rounded.
Part of the Scamander Tier dyke.
Granodionite covered by alluvium - sample taken in pan/valley of alluvial build up.

Anomaly Cause

Ruby tin panned in all three alluvial samples 7745 to 7747 - ruby tin rounded and associated with quartz sand (granitic origin) - may not be related to the granodiorite - probably not.
Tin-bearing alluvium formed in pan/valley area - not seen further up the creek.

342228



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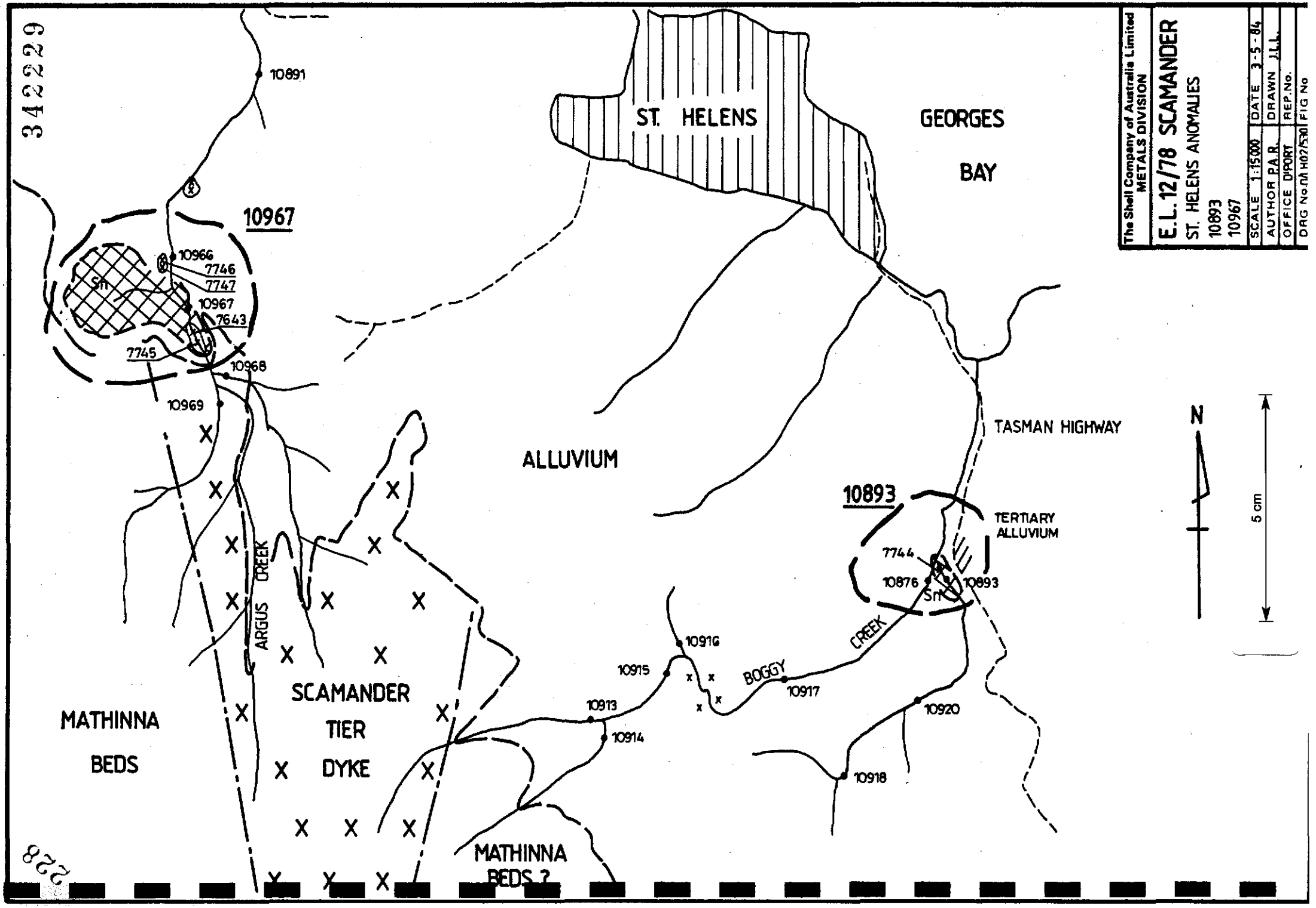
E.L. 12/78 SCAMANDER

ST. HELENS ANOMALIES
Sn, WO_3, MO.

SCALE 1:15000	DATE 3-5-84
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE TPORT	REP.No.
DRG.No. D/LH02/551	FIG.No.


342229
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METALS DIVISION
E.L. 12/78 SCAMANDER
ST. HELENS ANOMALIES
10893
10967
SCALE 1:15000
DATE 3-5-84
AUTHOR P.A.R.
DRAWN J.L.L.
OFFICE DPORT
REP.No.
DRG No.
FIG No
ST. HELENS
GEORGES
BAY
10891
10967
10966
7746
7747
10967
7643
7745
10968
10969
Sn
ALLUVIUM
TASMAN HIGHWAY
10893
TERTIARY
ALLUVIUM
7744
10876
10893
Sn
ARGUS CREEK
BOGGY CREEK
10916
10915
10917
10913
10914
10920
10918
SCAMANDER
TIER
DYKE
MATHINNA
BEDS
MATHINNA
BEDS ?
N
5 cm
228

FLAGSTAFF ANOMALY (35) 15/5/84

Location - Central portion of the licence.

Anomaly - 35 anomalous stream sediment samples included in the headwaters of the:

a)	Flagstaff Creek	(9 samples)
b)	Echo Creek	(10 samples)
c)	Argus Creek	(2 samples)
d)	Arm Creek	(6 samples)
e)	Tributaries of Nevada & Constables Creeks	(8 samples)

Values range from 60 ppm to a maximum of 0.2% Sn.
The anomalous area includes the Loila Tier, Williams prospects and the NE strike equivalent of this zone.

Associated Anomalies:

Anomalous Cu values associated with the western half of the zone (300 ppm max.).
A coincident Pb anomalous zone (960 ppm max)
A widely dispersed Zn and As halo with values of 350 ppm and 980 ppm max respectively.
A patchy WO_3 anomaly (max. value 135 ppm)

Sulphide leakage is clearly associated with this anomalous tin zone.
The most prominent base metal values are associated with the headwaters of Nevada Creek.

Followup sampling

59 stream samples (28 repeat samples)
17 rock samples

Tin - Panned concentrates were taken at all stream sediment sites. Coarse grained, angular, euhedral cassiterite was panned at several sites (attached plan).
Coarse grained, angular/euhedral tin is considered to represent a close proximity to tin source. Rounded cassiterite was panned in Echo and Arm Creeks representing tin transport. The main areas of interest include the Loila Tier fault/shear zone and an area between the Flagstaff and Argus Creeks (attached plan).

The roundness/angularity - euhedral nature and grainsize of the cassiterite panned was useful in this area in locating approximate tin source.

The colour of alluviual tin is highly variable from ruby, pink, brown, yellow, green, black to colourless.

Lineaments - A number of prominent lineaments occur in and pass through the Flagstaff anomalous zone (attached plan).

Positive feature (ridges) trending	a) N-S roughly b) WNW-ESE c) NW-SE
Negative features (creeks, rivers, gullies)	a) WNW-ESE b) NE-SW c) N-S approx.

WNW-ESE
NW-SE lineaments are related to fold axes and bedding directions.
NE-SW lineaments are parallel to (Pyramid - orientation) fracture sets which tend to form only negative features.
N-S (approx) lineaments are hither to unexplained. (Possibly related to fractures/veining).

Examination of the lineament and geology plans indicate a close relationship between lineament directions and patterns of granite intrusion. For example the Echo/Constable Creek Granite window is controlled by NW-SE, NE-SW and N-S (approx) fracture/lineament trends. Granite boundaries in the Nevada Creek area also appear to conform to lineament features.

Geology - The Flagstaff Anomaly is almost entirely covered by Mathinna Bed sediments.

- A N-S trneding, hornblende-biotite granodiorite dyke (the Arm Creek dyke) occurs in the eastern part of the anomalous area.

- An isolated outcrop of porphyritic biotite granite approx. 100m by 10m was recorded in the western tributory of Arm Creek. The southern margin of this granite is intensely silicified - narrow (10 cm) greisen veins (sericite/quartz) trending E-W or ESE-WNW crosscut the granite. (Loila Tier Granite).

- Veins of pegmatite and associated aplite in addition to a microgranite outcrop in Flagstaff Creek. These dykes are related to the biotite granitic type.

  Mathinna Bed sediments are dominated by siltstone and shale outcrops - folding is variable - beds and folds trend NW-NNW - folds plunging SE. (aver. p 16° to 162°).

  Variable fracturing occurs in these sediments - portions of Echo Creek display intensely fractured Mathinna Beds.

The degree of metamorphism is variable across the anomalous zone. Shales in the Loila Tier area are intensely spotted and siltstones/sandstone silicified and recrystallized.

Spotting if not restricted to shale units but is dependent on the chemistry of the sediment. (Aluminious-rich sediments spotted).

Anomaly Cause - The anomaly has a hardrock source - cassiterite occurring in fractures and faults which cross-cut the Mathinna Bed sediments.

No cassiterite mineralization was seen in outcrop although cassiterite was observed in a euhedral quartz-filled fracture in silicified Mathinna Bed sediment float in Echo Creek.

Tourmaline/feldspar/quartz minerals are associated with the granitic veins in Flagstaff Creek. Muscovite selveges are also present along fracture surfaces - these are quite common in places.

The Flagstaff Anomalous Zone is considered to represent a leakage halo from a shallow granite body at depth. This is supported by:

1. More intensely fractured zone (greater number of lineaments - also recognized on the Pinnacles - N. Scamander Ridge and Catos anomaly).

2. Leakage of sulphides Cu, Pb, Zn and As associated with cassiterite in the creeks.

   * Leakage halo.

3. Granite at shallow depth is implied by the biotite granite outcrop in the Arm Creek and granite veins in the Flagstaff Creek area.

   Good channelways or conduits (faults) are well mineralized suggesting good leakage in these zones. e.g. Loila Tier fault perpendicular to the regional fold axes.

   (Cramps/Dunns parallel to fold axes - faulting out fold hunges).

4. Enhanced metamorphism of Mathinna Bed sediments - spotting
   - silicification/recrystallization

The exact source of tin was not disclosed.

Proposed Work

a) Ridgetop soil traverses to locate zones of enhanced Sn geochemistry.

b) Gridding and drilling of interesting zones.

* Note the association of tourmaline with leakage in the western part of the anomalous zone - not seen in eastern portion.

232

342233

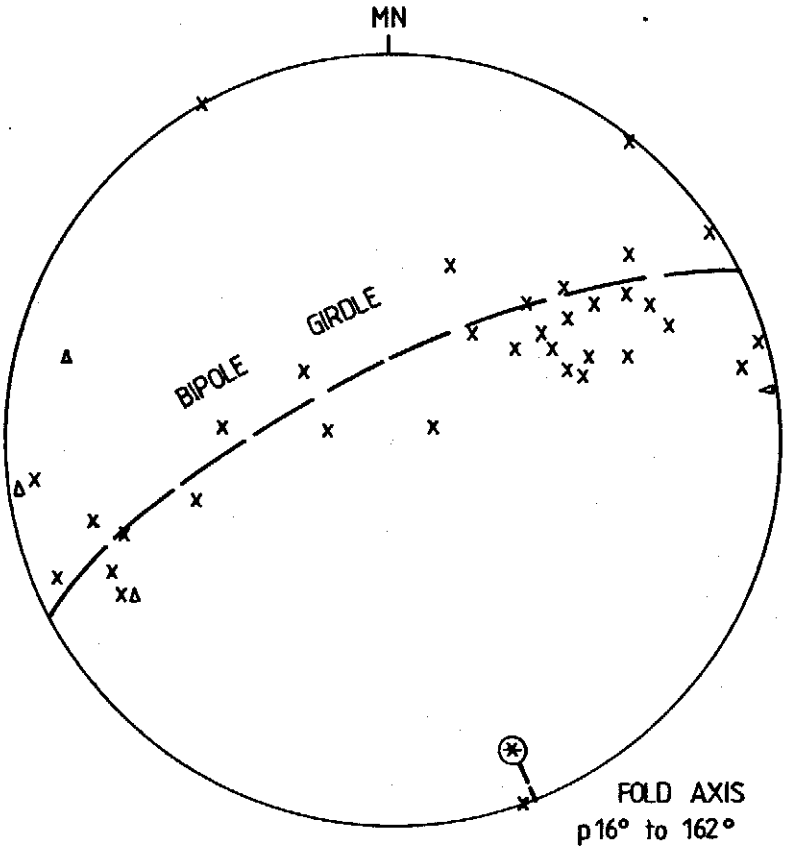
17/5/84

BEDDING

CLEAVAGE

x n = 34

Δ n = 4



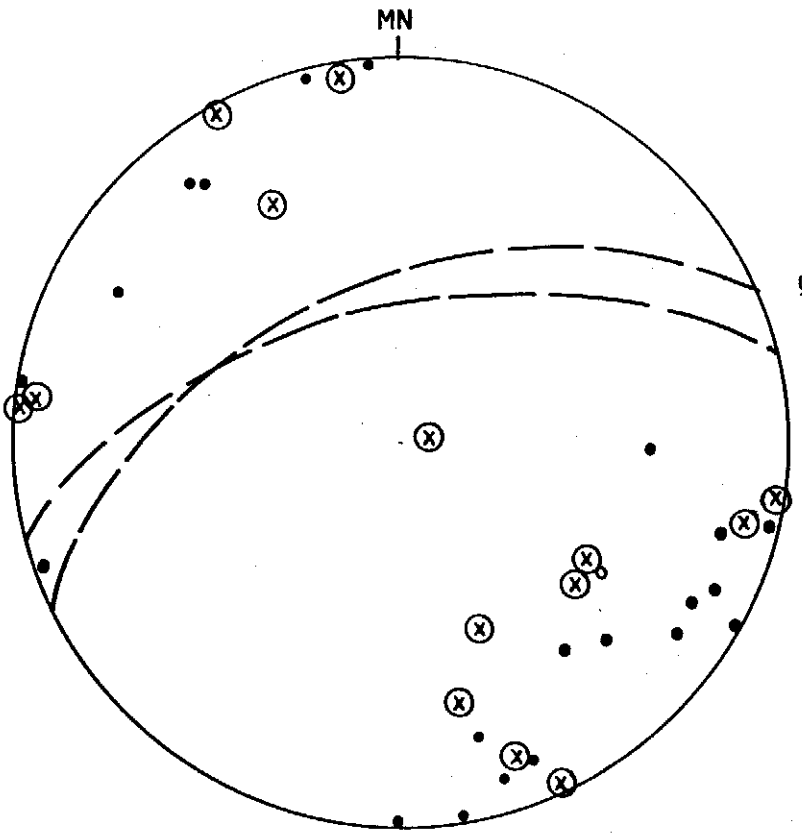
FOLD AXIS
p 16° to 162°

FRACTURES

VEINS

• n = 22

x n = 12
(dykes 2)



x bedding

Δ cleavage

• fractures

⊗ veins / dykes

5 cm

LAMBERT EQUAL AREA NET

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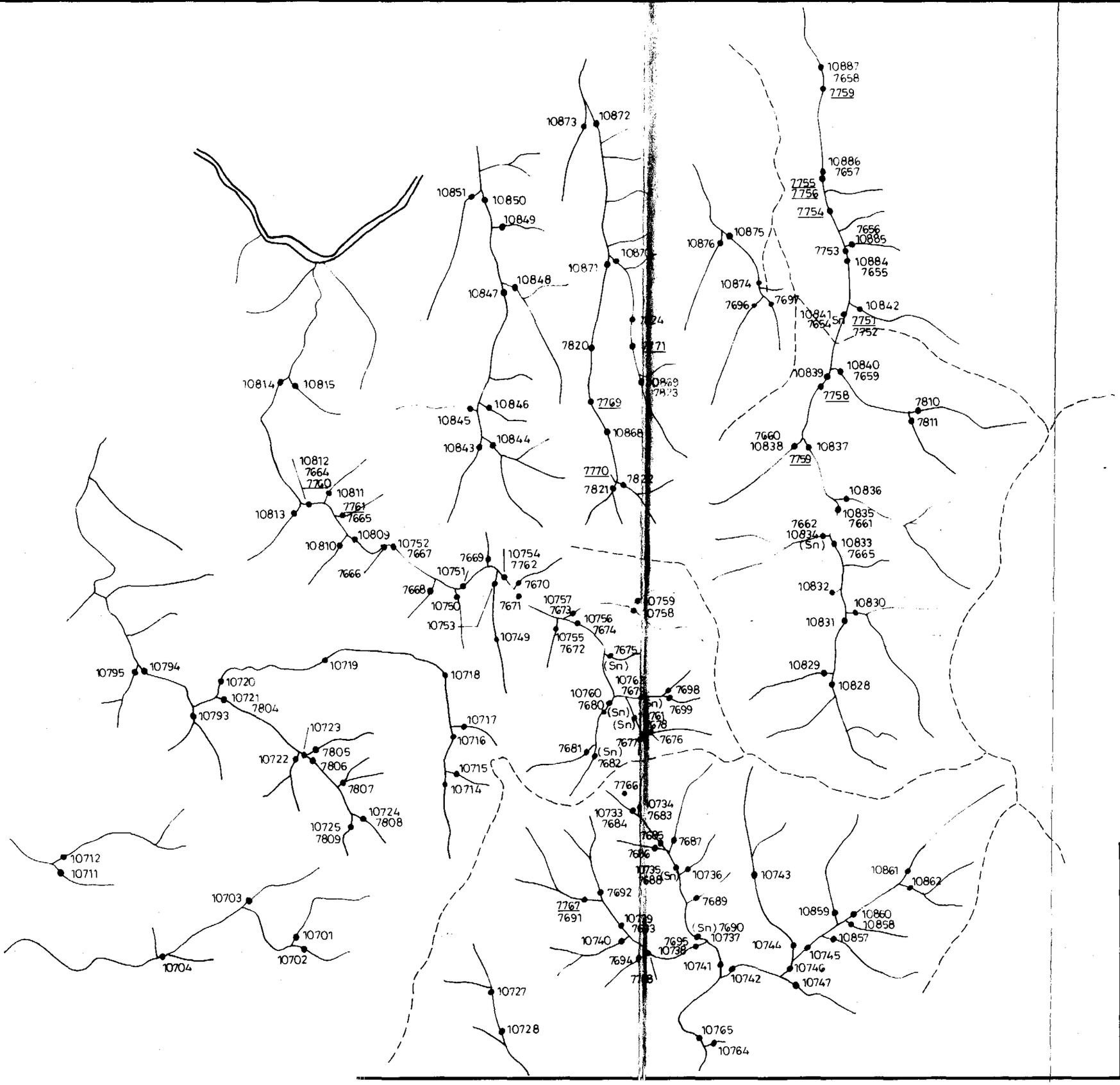
E.L. 12/78 SCAMANDER

FLAGSTAFF ANOMALY

STEREO NETS.

SCALE	DATE 25-7-84
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE DPORT	REP.No.
DRG.No DLH02/560	FIG.No.

342234



10814 STREAM SEDIMENT SURVEY

7674 REPEAT FOLLOW UP STREAM SAMPLES

7751 ROCK CHIP SAMPLES

5 cm

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E.L. 12/78 SCAMANDER
FLAGSTAFF STREAM SEDIMENT ANOMALY
SAMPLE LOCATIONS

SCALE	1:20000	DATE	2/5/84
AUTHOR	P.A.R.	DRAWN	J.L.L.
OFFICE	DEVONPORT	REP.No.	
DRG.No.	D/LHO2/545	FIG.No.	

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342235

LINEAMENTS

POSITIVE FEATURES

NEGATIVE FEATURES

\+ BIOTITE ADAMELLITE

X Hb/Bi GRANODIORITE

100 STREAM SEDIMENT RESULT

125 FOLLOW UP STREAM SEDIMENT RESULT

520 ROCK CHIP SAMPLE

St. HELENS

alluvium accumulation

intensely altered zone

grano.d float

grano.d float

N

5 cm

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E.L. 12/78 SCAMANDER FLAGSTAFF STREAM SEDIMENT ANOMALY

Sn in ppm. ; GEOLOGY, LINEAMENTS

SCALE	1:20000	DATE	1/5/84
AUTHOR	P.A.R.	DRAWN	J.L.L.
OFFICE	DEVONPORT	REP.No.	
DRG No	D/LH01/546	FIG No	

342236

ECHO NORTH

ECHO GRANITE

ECHO SOUTH

MT. PIERSON PLUTON

alluvial accumulation cg Sn r

INTENSELY ALTERED ZONE

E. WILLIAMS

W. WILLIAMS

LOILA TIER

LOILA TIER GRANITE

ARM CREEK GRANODIORITE

SCAMANDER TIER DYKE

GRANITE DYKES

alluvium

granodiorite float

grano. d. float

musc cg @ Sn

cg @ Sn

LEGEND

- YOUNGING DIRECTION
- 60 BEDDING
- 60 CLEAVAGE
- 60 FRACTURE
- 60 VEIN / DYKE
- FRACTURE DENSITY
- PROSPECT
- Fe IRON STAINING
- musc. MUSCOVITE SELVAGE
- Tm TOURMALINE
- Fd FELDSPAR
- Q QUARTZ
- Py PYRITE
- gr GRAPHITE DYKE
- \+ BIOTITE ADAMELLITE
- X HORNBLENDE/BIOTITE GRANDIORITE
- FOLD AXES
- cass CASSITERITE IN PANNED CONC.
- @ ANGULAR/ANHEDRAL
- cg COARSE GRAINED
- Sn TIN PRESENT (VISIBLE)
- r ROUNDED GRAINS

5 cm

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E.L. 12/78 SCAMANDER FLAGSTAFF STREAM SEDIMENT ANOMALY DETAILED GEOLOGY

SCALE 1:20000	DATE 3/5/84
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE DEVONPORT	REP.No.
DRG.No. D/LH01/547	FIG.No.

NEVADA CREEK ANOMALIES (2)

Location - West of the Loila Tier Road - drain the Loila Tier lineament - in the headwaters of Nevada Creek.

Anomalies - 2 anomalous samples - 10772 65 ppm Sn
10825 55 ppm Sn

Followup - 2 repeat samples - 7847; 7848 respectively

Anomaly Cause - Samples situated in an alluviated valley - very little outcrop close to 7847/10772 s/s site.

10825 sample on outcrop of Mathinna Bed sediments 336 80°E

No obvious anomaly cause.

Probably derived from leakage of minor tin from the Loila Tier lineament zone. Concentration took place in the alluviated valley.

ARM CREEK ANOMALIES (8) 22/5/84

Location - Upper reaches of the Arm River.

Anomaly - 9 anomalous samples

10729	65 ppm Sn
19732	105 ppm Sn
10764	90 ppm Sn
10788	80 ppm Sn
10784	590 ppm Sn
11640	60 ppm Sn
11688	130 ppm Sn
11687	85 ppm Sn

Associated anomalies

10729/10732 - associated Cu anomaly (100 ppm max) and WO_3 (135 ppm max)
10764/10788/10784 - associated Pb anomaly (38 ppm max).

All samples have anomalous As (180 ppm max) and Zn (150 ppm max).

Followup Sampling

9 stream samples (7644-7647 and 7827-7830, 7649)

Tin - The only cassiterite pan in the area is rounded fg to cg ruby tin. 11640 s/s site contains cg tin upto 1.5 mm across.

Geology - The anomalous area is Mathinna Bed covered. These rocks are well bedded and folded about SE plunging fold axes. The western tributary of the Arm Creek drains the Loila Tier granite. Gossanous staining is fairly common on outcrop and float in this area.

Anomaly Cause - All tin panned in the creeks of this anomalous area is rounded ruby cassiterite and hence probably alluvial in origin.

Granitic-derived alluvium containing cg and fg ruby tin was recognized in the areas of 11688 and 11687 samples. This is a Quaternary alluvium.

Minor cassiterite may be collecting from the drainage of a) the Flagstaff anomaly and b) greisen veins in the Loila Tier granite.

No hard rock source is postualted in this area.

WOLFRAM CREEK ANOMALIES (16)

Location - Wolfram Creek in the west/central part of the Scamander licence.

Anomalies - Numerous (14) anomalies were recorded in the Wolfram Creek area.

Followup - Followup has centred on resampling above alluvial levels with minor infill sampling.

Anomaly/Geology

1. Granite-related - several anomalies are related to the highly differentiated Wolfram Creek granite. A new prospect was discovered in the upper reaches of the Wolfram Creek. This prospect consists of two pits (one very deep) dug on a quartz/sulphide (dominantly arsenopyrite) vein. Rock chips have been assayed (6848 to 6850 - values of 125 ppm Sn and 2.9% As plus minor WO_3 (450 ppm) and Mo (44 ppm) + 0.38% Pb).

2. Prospects Related - many samples were related to known mineralization at Lutwyche, Carson de Beers, Baden Powell and Pinnacles(?).

3. Alluvium - alluvium built up in recent times contains anomalous values of Sn, WO_3, Mo and base metals from known prospects.

342240

UPPER SCAMANDER ANOMALIES (3) 10/7/84

Location — Upper reaches of the Scamander River west of the Scamander/Avenue River junction.

Anomalies — 3 anomalous samples on the main river (or close to) itself.
11099 - 340ppm Sn
11102 - 40ppm Sn
11101 - 75ppm Sn
The anomalies form a tail related to drainage of cassiterite bearing sediment laden waters from the Pinnacles prospect/Wolfram Creek granite.

Follow-up — Sample site 11099 was visited in the field. V cg cassiterite was panned - brown/ruby/ yellow/green/ grey-black varieties. Looked as though the value of 340ppm should have been higher. Panned from a granite-derived alluvium - derived from the Wolfram Creek prospect.
Similar alluvium at 11102 and 11101 is envisaged and observed further down stream at 11105 s/s site.

Geology — Mathinna Beds - bedded - dominantly alluvium though 2-5m of it.

Tin — Cassiterite was cg and fairly well rounded.

Anomaly Cause

Tin derived from Wolfram Creek granite and Pinnacles Prospect as a drainage tail.

SKYLINE TIER ANOMALIES (4) 18/4/84

4 isolated anomalous samples within a belt of alluvium between the Scamander Tier Dyke (Skyline Tier hills) and the Tasman Sea.

A) S/S 11661 Site

Location - On Yarmouth Creek 1-2 km NW of Beaumaris.

Anomaly Cause - Directly down stream from the Yarmouth Prospect.

70 ppm Sn, 10 ppm WO_3, 22 ppm Mo
10 ppm Cu, 30 ppm Zn, 16 ppm Pb, 9 ppm As

Rocks assay high 12.6% As
610 ppm Cu
0.45 ppm Au
4 ppm Ag

B) S/S 11684 Site

Location - Creek draining into the southern end of Wrinklers Lagoon 2.5 km NW of Scamander.

Anomaly - Single sample anomaly.

420 ppm Sn, 10 ppm WO_3, 32 ppm Mo
No associated base metal values.

Followup Samples - 4 stream samples: nos. 7623 to 7626
Closing up sample coverage.
4 rock alluvial samples: nos. 7731 to 7734

Tin - Rounded grains of ruby tin associated with a quartz-rich sand/gravel. Associated with surficial alluvium.

Geology - The area is generally covered by alluvium - minor outcrop of Mathinna Beds in creeks. Unaltered - bedded sediments striking NW dipping NE.

Anomaly Cause - Close to 11684 site area of old workings found - surface Quaternary sands sluiced. Soil profile dug at 11684 site yielded 1.0m of tin-bearing alluvium.

Anomalous sample related to this patch of Quaternary gravel. Surrounding sample results indicate that this patch of alluvium is localized.

C) S/S 11682 Site

Location - Tributary of Wrinklers Creek, 3 km NW of Scamander.

Anomaly - Single sample anomaly.

11682 - 120 ppm Sn, 15 ppm WO_3, 34 ppm Mo
No associated base metal values.

Followup Samples - 4 stream sediment samples (1 repeat) nos. 7637 to 7640

5 rock/alluvium samples nos. 7735 to 7737, 7739 to 7740

Tin - Ruby tin - rounded associated with a quartz gravel/sand. Some coarse grained tin - rounded 1-2mm across.

Geology - Mathinna Bed sediments with alluvial cover. Mathinna beds between 11682 (7637) and 7638 site fairly silicified with quartz veining common upto 10cm across.
Pyrite occurs in rocks (shear zone) at 7639 sample site. There is also a lot of Fe oxide - rich organic float in the creek - algae.

Alluvium generally Mathinna float beneath. Veneer of quartz sand - also recent granodiorite derived sand + boulders.

Anomaly Cause - Alluvium yields cg + fg ruby tin - granite derived quartz-rich sand probably Quaternary.

D) S/S 11674 Site

Location - On Freshwater Creek below Coach Road 4 km NW of Scamander.

Anomaly - Single sample anomaly.

11674 55 ppm Sn, 10 ppm WO_3, 28 ppm Mo
No associated basemetal anomaly

Followup Samples - 2 stream sediment samples (1 repeat) nos. 7641, 7642

3 rock chip/alluvium samples nos. 7738, 7741, 7742

Tin - Minor ruby tin in the stream sample 7641 - the repeat of 11674 sample. Sample of alluvium from upturned tree root system on the fire break yielded no Sn.

Geology - No outcrops seen - all alluvium sheet. Float of porphyry dyke seen at the end of the fire break 15m from the sample point.

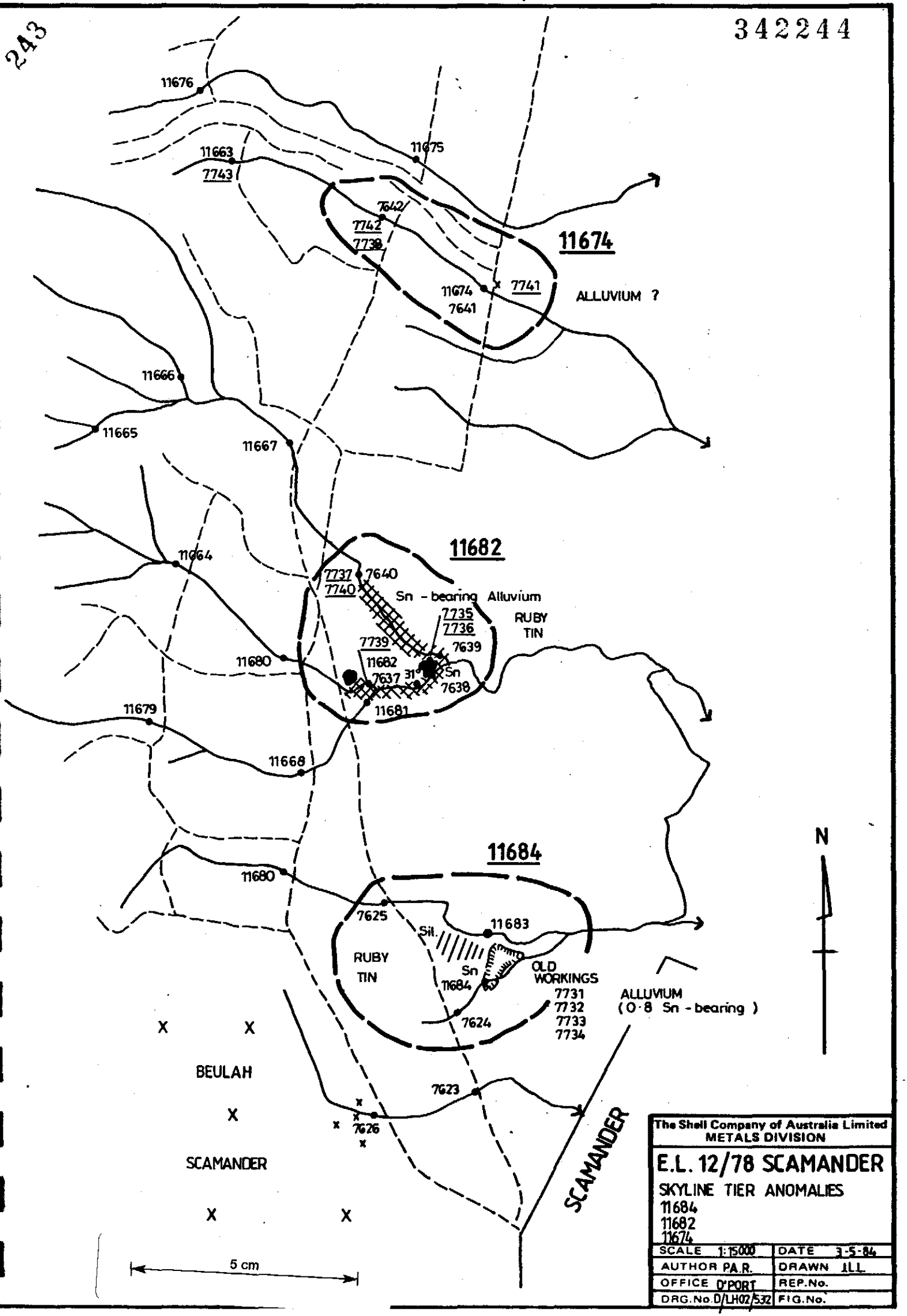
Anomaly Cause - No clear but possibly alluvial derived. Ruby tin at this sample site is associated with the quartz sand typical of alluvial tinin this area.

Conclusions

All anomalies bar the Yarmouth Prospect anomaly are related to granite derived quartz sand alluvium of Quaternary age(?) which contains minor rounded alluvial tin.

243

342244



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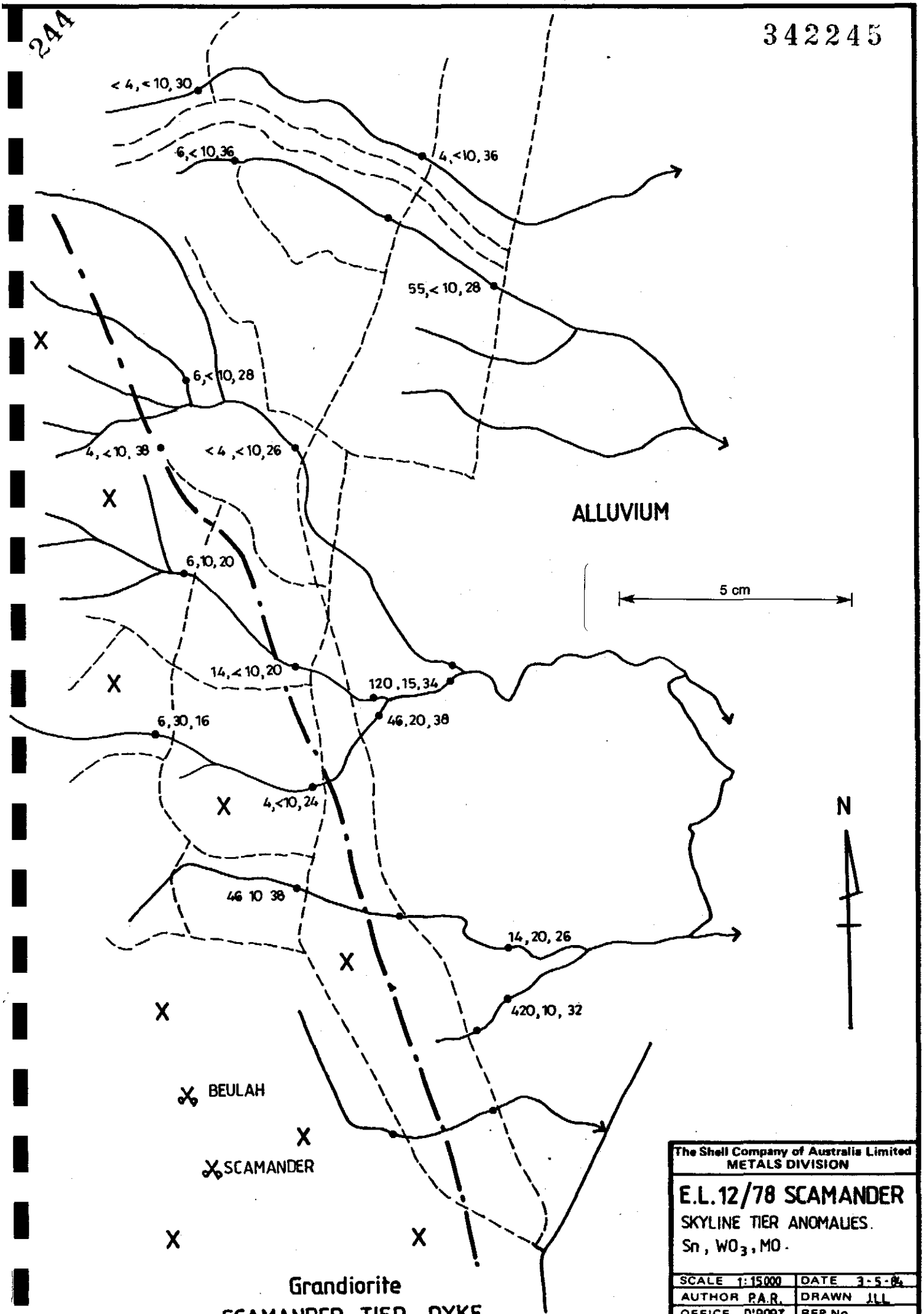
E.L. 12/78 SCAMANDER

SKYLINE TIER ANOMALIES
11684
11682
11674

SCALE 1:15000	DATE 3-5-84
AUTHOR P.A.R.	DRAWN I.L.
OFFICE D'PORT	REP.No.
DRG.No. D/LH02/532	FIG.No.

342245



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E.L. 12/78 SCAMANDER

SKYLINE TIER ANOMALIES.
Sn, WO_3, MO.

SCALE 1:15000	DATE 3-5-84
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE D'PORT	REP.No.
DRG.No. D/LH02/533	FIG.No.

AVENUE RIVER ANOMALY (1)

Location — Avenue River Northerly flowing, Tributary directly N of Black Tomny's Hill.

Anomaly — 1 Anomalous sample 11118 250ppm Sn.

Follow-up — 1 Repeat sample taken 20m upstream - 7846
Original sample taken close to a bank of 2m high alluvium in the Avenue River.

Geology — Creek has good continuous outcrop of bedded and cleared Mathinna Bed sediments - relatively unaltered - 132° 66° W
b/c/intersection pitches 11° to 132°. Current bedding indicate rightway up. Very little veining or Fe oxides.

Tin — A small amount of tin was panned in granitic alluvium in the main Avenue River close to the mouth of the 11118 tributary. V rounded ruby tin.

Anomaly Cause

Anomaly attributed to rounded alluvial-derived ruby tin.
- check s/s taken 20m up the creek well away from alluvium of the Avenue River.

246

342247

BARK CREEK ANOMALY (1) 10/7/84

Location Sample 11038 located on a westerly flowing tributary of Bark Creek - Close to the Avenue River/Bark Creek junction.

Anomaly 1 anomalous sample. 11038 50ppm Sn.

Follow-up 4 repeat stream samples (7842-7845)
1 rock chip alluvium sample 7781

Geology Tightly folded Mathinna Bed sediments. Siltstones/ shales plus sandstones - well bedded.
Shales cleared - sandstones silicified to quartzites- qtz veins.
004 57° E clearage steeper than bedding Minor Fe staining.

Tin 3 graines of Cassiterite (ruby tin) seen in the 7842 s/s repeat sample.
V rounded small grains. Look very alluvial.

Float Float in the main creek included - Permian sandstones and minor dolerite.

Anomaly Cause

Not really obvious - but rounded cassiterite grains suggest an alluvial source.
No obvious source in the Mathinna Beds.
0.5m alluvium occurs in the area.

342248

APPENDIX 6

RESEARCH - FLUID INCLUSION STUDIES

M.Sc. Student Gavin Plummer, LaTrobe Univ. Melbounre

Reports

Report for the Period 1st March 1983 to 1st March 1984

Introduction

Reports for the periods 1st March to 1st September and 1st September to 1st December 1983 have been provided and their content will not be repeated here.

The Scamander field area was revisited for a 6 week period during November and early December 1983. Follow up field work was undertaken during this time.

The Pinnacles area was sampled for petrological and fluid inclusion studies. The deep diamond drill hole SPG 1A at Great Pyramid was also sampled. Follow up fluid inclusion samples were taken from Great Pyramid B.H.P. drill core. All other outlying prospects were revisited and follow up mapping and sampling was undertaken.

Laboratory

Early in January laboratory work recomenced. Thin sections and fluid inclusion mounts of samples from the Pinnacles area have been prepared.

Data interpretation of Great Pyramid has been undertaken in a search for controls on mineralization. A short paper outlining techniques and results is appended.

RESULTS

Pinnacles Petrology

In the Pinnacles area mineralized veins contain predominantly quartz, tourmaline, cassiterite, sericite and limonite. Zoisite, adularia,

vermicular chlorite and topaz have been found in isolated occurances. Topaz is heavily altered to sericite.

Two sets of mineralized veins have been defined at the Pinnacles. An early formed set is similar to those at Great Pyramid and dominant mineralogy is quartz - sericite - cassiterite. A later crosscutting set has dominant mineralogy of quartz - tourmaline - cassiterite. Tourmaline wall rock alteration is strongly associated with the later vein set. Figure 1 shows the relationships of the two vein sets. These crosscutting relationships are best observed in the field.

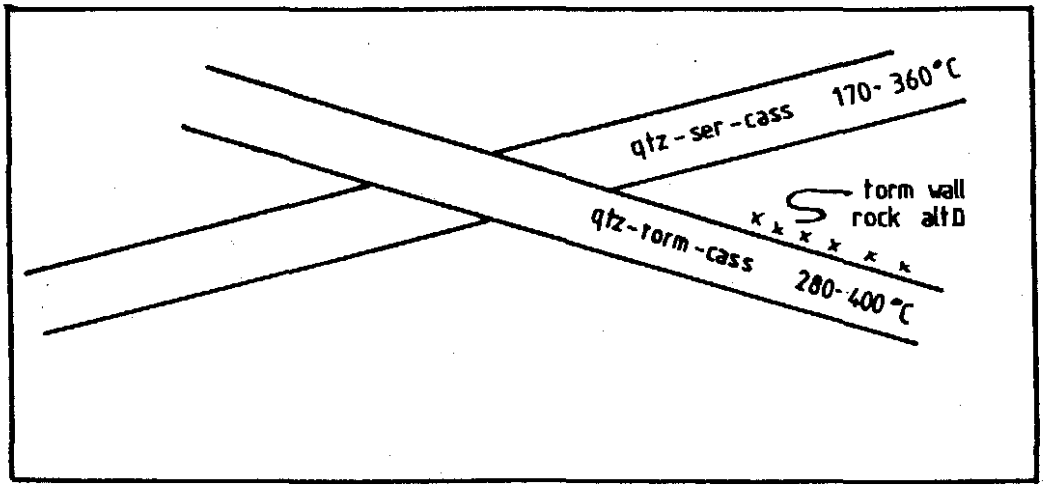


FIGURE 1: Schematic diagram showing crosscutting relationships of the two mineralized vein sets at Pinnacles. Formation temperatures are indicated.

The later quartz - tourmaline - cassiterite veins are zoned and a typical zonation is shown in Figure 2.

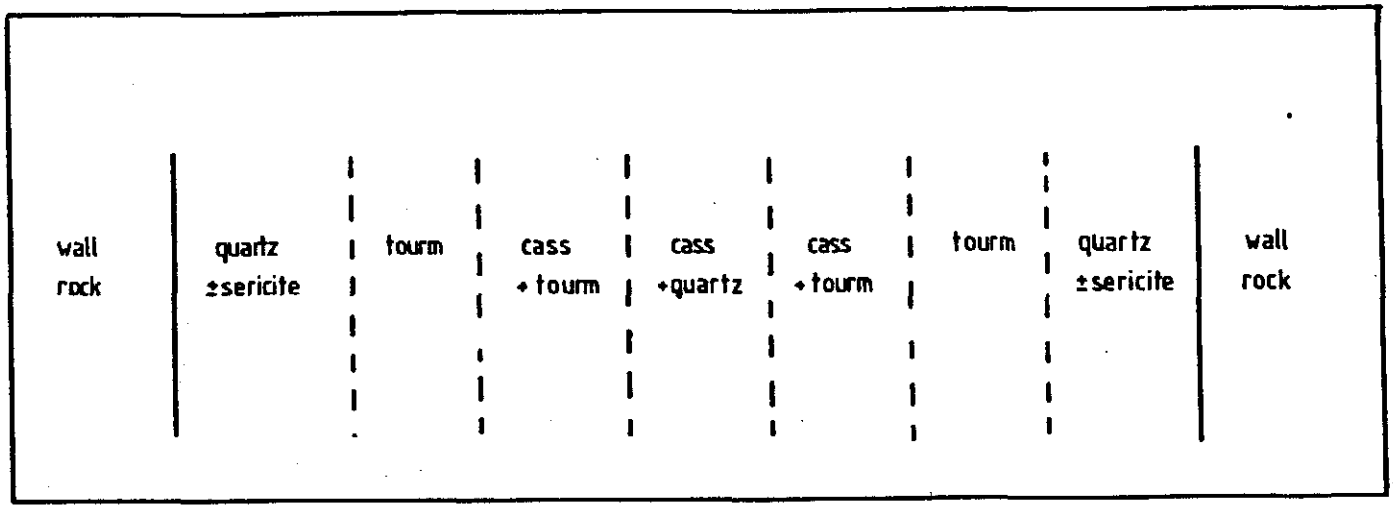


FIGURE 2: Mineral zonation in later quartz - tourmaline - cassiterite veins at Pinnacles.

The host rocks at Pinnacles are finer grained than at Great Pyramid. At Pinnacles they consist of rare fine grained sandstones and dominant silts and shales

Alteration

The development of tourmaline is strong in the Pinnacles area. It occures as vein and breccia fills and is extensively developed as a wall rock alteration product associated with later quartz - tourmaline - cassiterite veins. Silicification is also commonly found as a wall rock alteration type.

At the East Pinnacles prospect a strongly altered fine sandstone has been found. Alteration products are adularia, zoisite, sericite, and chlorite. Arsenopyrite and cassiterite mineralization ia developed in this sample.

FLUID INCLUSION STUDIES

Pinnacles

Due to a lack of suitable inclusions the data presented here are statistically inconclusive. From 32 prepared samples, suitable inclusions could only be found in 8 sections. The remaining 24 sections will now be studied in an effort to gain more data. Results presented here are therefor best regarded as preliminary

Both the Pyramid style quartz - sericite - cassiterite veins and the later quartz - tourmaline - cassiterite veins have been subject to fluid inclusion study.

Freezing data indicate that the fluid system in operation at the Pinnacles is virtually identical to that at Great Pyramid. Results show that the system is a H_2O - CO_2 fluid with a dissolved salt in low concentration. The salt is probably CaCl.

Homogenization temperatures have been measured for primary inclusions in both the mineralized vein sets. The earlier Pyramid style veins (quartz - sericite - cassiterite) contain inclusions which homogenize in the temperature range 170 to 360°C. Later quartz - tourmaline - cassiterite veins contain inclusions which homogenize in the range 280 to 400°C.

Interpretation

The early Pyramid style veins form at the very begining of the mineralization history as the isotherms rapidly move outwards. Peak mineralization occurs at about 250°C, although these veins form at as little as 170°C and can be found with fill temperatures as high as 360°C.

As the isotherms continue to move outwards during the prograde event, later quartz - tourmaline - cassiterite veins form. These form at temperatures as low as 280°C and the formation front may follow this isotherm. These later veins often have tourmaline alteration in wall rocks and they overprint the quartz - sericite - cassiterite (Pyramid style) veins. The later veins have a slightly different structural orientation.

Altjough temperatures of the vein formation overlap it is possible that a given vein can change fill temperature and mineralogy away from a fluid source. This means that a single quartz - tourmaline - cassiterite vein may change to a quartz - sericite - cassiterite vein away from the fluid source due to chemical and temperature changes.

At Great Pyramid I have demonstrated that cassiterite has precipitated in response to temperature drop in the quartz - sericite cassiterite veins. There is only minor chemical alteration of the rocks here. This still holds true in the Pinnacles area. However at the Pinnacles we also have cassiterite bearing quartz - tourmaline veins which form at a high temperature. Tourmaline alteration is strong in association with these veins and cassiterite has probably precipitated in response to chemical changes rather than temperature drop. Figure 3 is a schematic diagram which best shows the relationships between the deposits.

253

342254

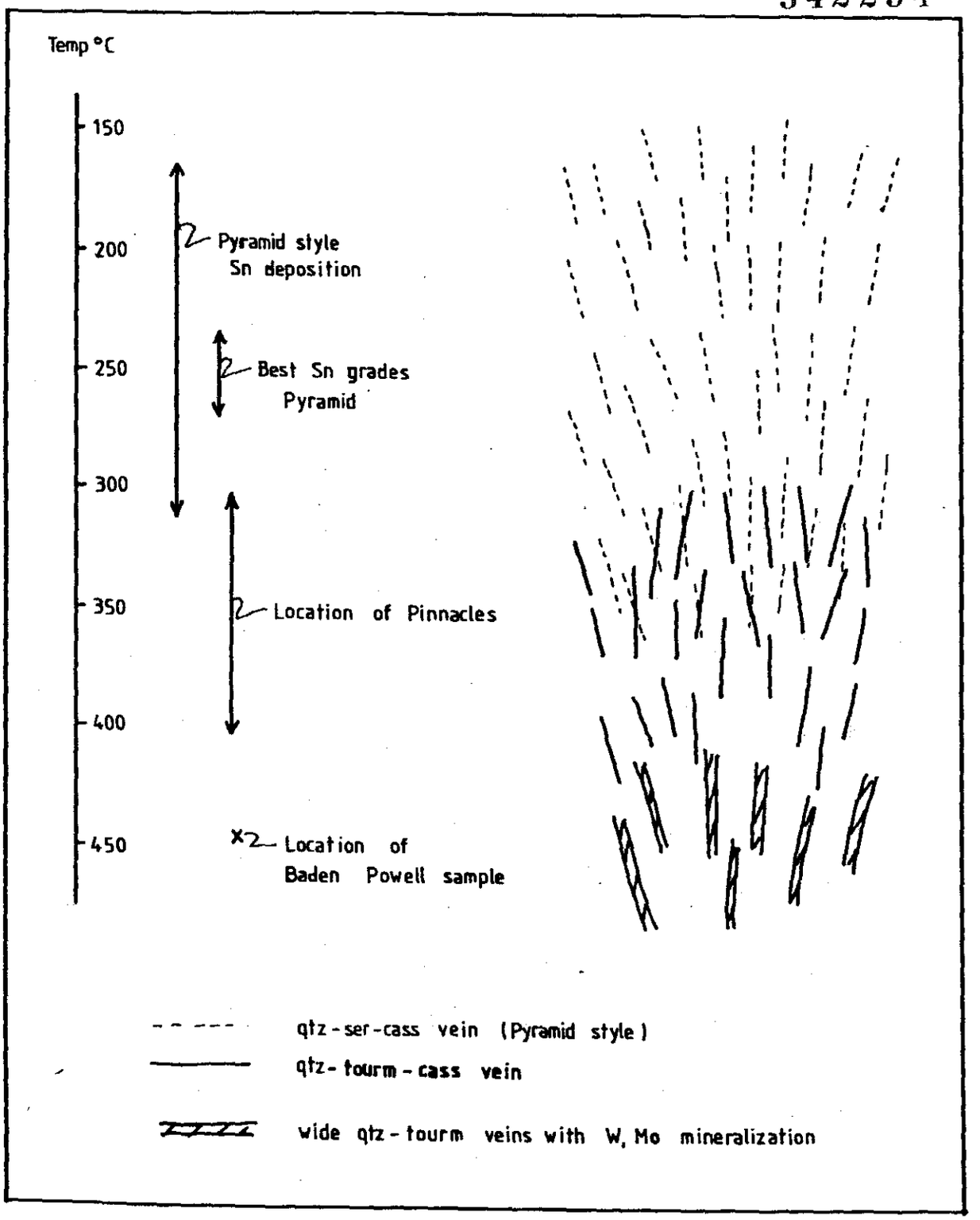


FIGURE 3: Schematic diagram showing the relationship between the 3 deposits. Approximate temperatures are indicated.

342255

Baden Powell

A single preliminary sample from the Baden Powell prospect has been measured. Freezing data indicate a fluid system the same as that in operation at Great Pyramid and Pinnacles. Homogenization temperature of inclusions at Baden Powell were high at about 430°C. This result is as expected.

Gavin J Plummer

GAVIN J PLUMMER

GJP:gjp

cc PAR
RGW
LdG

CONTROLS ON Sn MINERALIZATION AND GRADE AT GREAT PYRAMID

A search for controls on the mineralization at Great Pyramid has been undertaken. Data is available for the parameters of; mineralization temperature, (from fluid inclusion studies); vein density,(number of veins per metre); vein width; sample depth, (level above sea level of fluid inclusion sample); and the Sn grade of the 2m interval containing the relevant fluid inclusion sample.

With this data another parameter can be calculated. That is the relative volume of vein material as a volume percentage of the rock.

Methods

Fluid inclusion homogenization temperatures have been measured. Other drill core data was collected by B.H.P.

The relative volume of vein material as a percentage of the rock is given by:

$$\text{Vol \% Vein} = \frac{\text{No veins/metre x average width (m)}}{\text{Sample interval length (m)}}$$

This gives a figure expressing the relative proportion of vein material (fill) and host rock for any given sample. Various combinations of the above parameters have been plotted.

FIGURE 1 Vol % veins vs Sn grade

FIGURE 2 Sn grade vs vein density

FIGURE 3 Sn grade vs Temperature

FIGURE 4 Vein density vs Temperature

FIGURE 5 Vol % Veins vs Temperature

When isotherms from fluid inclusion data are plotted on crossections of Great Pyramid a temperature - depth relationship is apparent. The fault zone intersected in drill hole BPD 7 distorts the isotherms. It would therefor appear that permeability of the rocks has an effect on temperature at any given depth. Given that this is so a plot of: Temperature vs $\frac{\text{Vein density}}{\text{Sample depth (m above sea level)}}$ was constructed. No relationship between these parameters was found. Finally a plot of Sn grade vs $\frac{\text{Vein density}}{\text{Sample depth (m above sea level)}}$ was constructed. The result (Figure 6) is similar in shape to Figure 3

INTERPRETATIONS

Figure 1 indicates that there is a certain minimum requirement in the parameter of Vol % Vein material in the rock befor high Sn grades can be achieved. However large proportions of vein in the rock doesn't necessarily indicate high Sn grade.

Figure 2 shows that fracture density increases with grade, i.e. a high fracture density is required for a high Sn grade. However high fracture density doesn't indicate high Sn grade in all cases.

Figure 3 shows that highest grades are found in regions where homogenization temperatures are between 240 and 260°C. Above this temperature SnO_2 remains in solution, as temperatures drop SnO_2 precipitates so that by the time temperatures have dropped below 220°C virtually all SnO_2 has precipitated. Below 200°C Sn grades are very low.

Figure 4 shows that there is no relationship between fracture density and temperature. This means that the relative vein surface area/rock volume, has had no effect on fluid temperatures.

Figure 5 shows that Vol % of vein material in the rock is unrelated to fluid temperature.

Figure 6 shows that Sn grade is related to: $\frac{\text{No veins/m}}{\text{sample level(m above sealevel)}}$ an optimum density/level ratio would appear to give the best grades.

CONCLUSIONS

Sn grades are closely related to fluid temperature. Fluid temperature is a function of the height above sea level (and by inference the height above the source granite at depth).

Grade is also affected by the vein density, i.e high vein density and volumes are required for higher grades. Figure 6 is an attempt to combine the principal parameters.

At Pyramid, K-feldspar (adularia) and muscovite are found in veins. Muscovite selvages are however minor This indicates that mineralization has occured with K-feldspar and muscovite in equlibrium, on the K-feldspar - muscovite equilibrium curve of Eadington and Giblin (1979)

As muscovite selvages are minor and other alteration such as tourmaline and silica are minor, factors such as pH change have played a minor role in governing Sn deposition at Pyramid.

Muscovite alteration of K-feldspar, for example, uses H^+ from solution thus raising pH from about 4 to 6 or 7. This causes deposition of Sn.

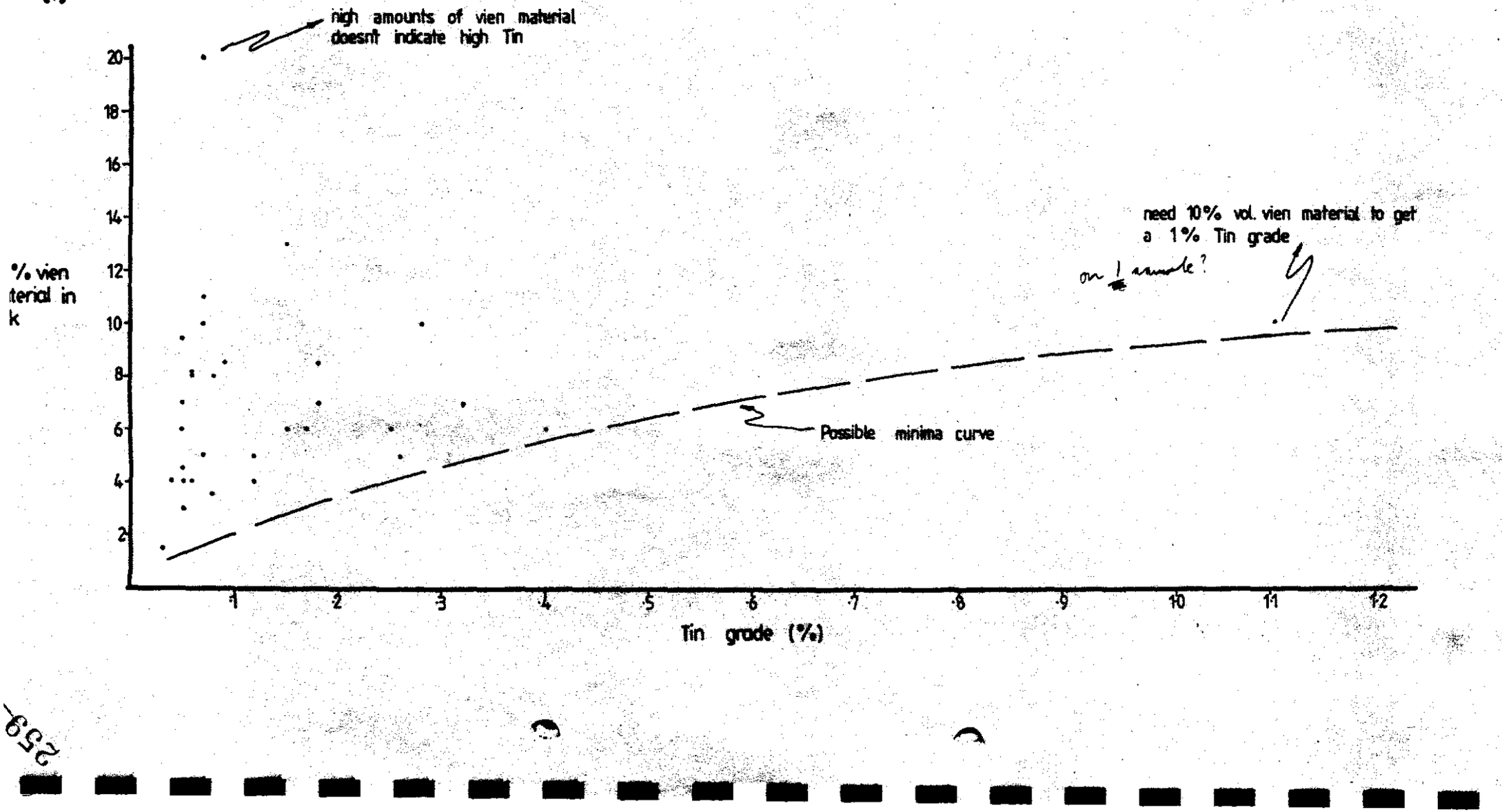
From Eadington and Giblin (1979) on the muscovite - K-feldspar curve, and when pH = 3, Log fO_2 = -30, and at 400°C, SnO_2 solubility is about 112 ppm. A temperature drop of 150°C to250°C will drop SnO_2 solubility to below 0.1 ppm even when all other parameters are held constant. This is what has occured at Pyramid.

In contrast the Pinnacles area is located closer to the granitic fluid source. Here a Pyramid style vein set has been first formed close to the granite early in the prograde event. Sn deposition in these veins has followed similar lines to those in operation at Great Pyramid. Later in the prograde event, as isotherms continued to move outwards, a later quartz - tourmaline - cassiterite vein set has overprinted the Pyramid style veins. These form in a higher temperature regime and have strong tourmaline alteration associated with them. In these veins Sn deposition is caused by chemical changes associated with tourmaline alteration rather that by temperature drop.

Similarly Rossarden has wide veins in which cassiterite is associated with wide muscovite selvages. Here formation of the muscovite has caused pH to rise from about 4 to 6 or 7. Thus depositing Sn as SnO_2 is almost insoluble at near neutral pH. Temperature plays a less important role in tin deposition at Rossarden.

FIG. 1.

342260



259

FIG. 2.

3422261

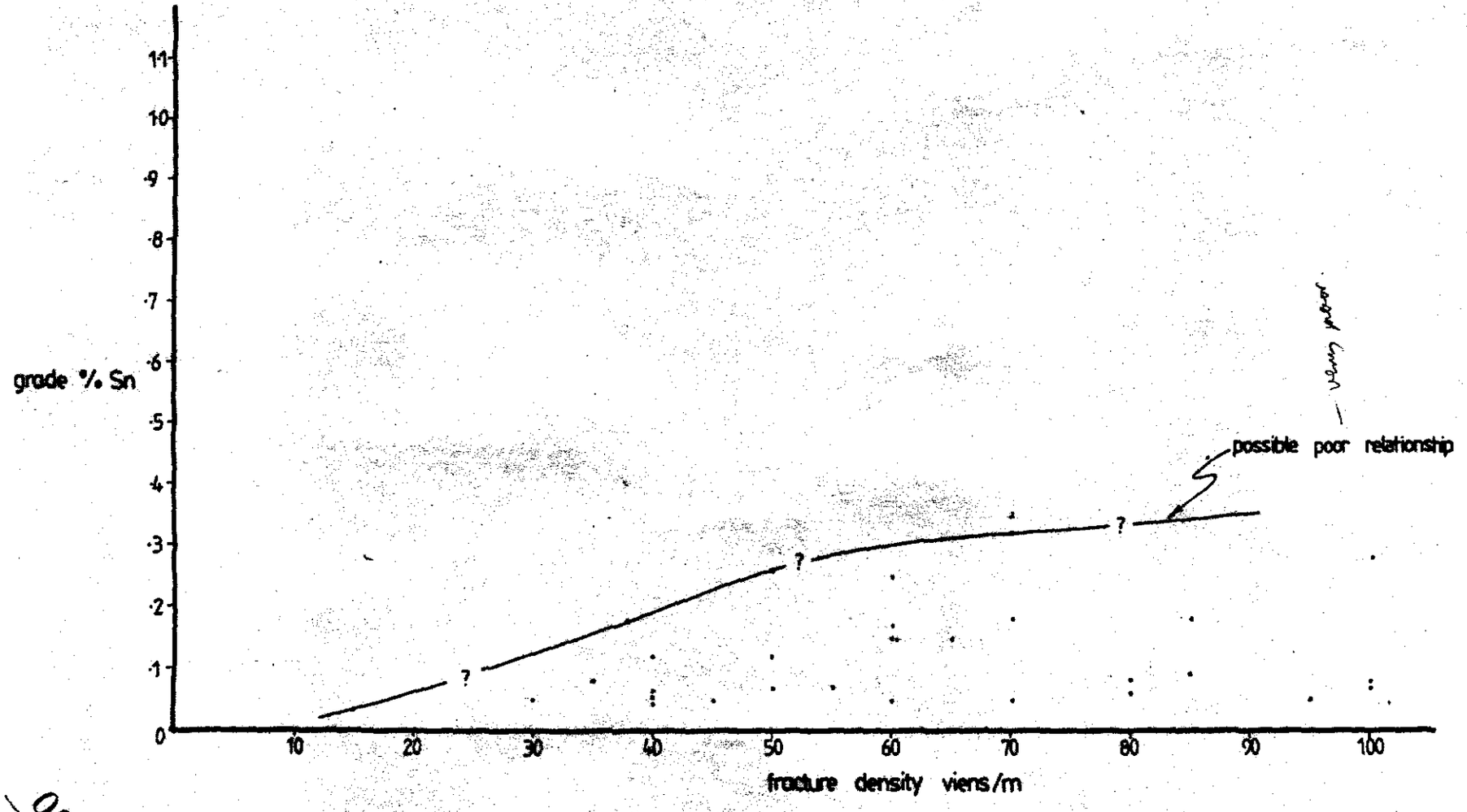
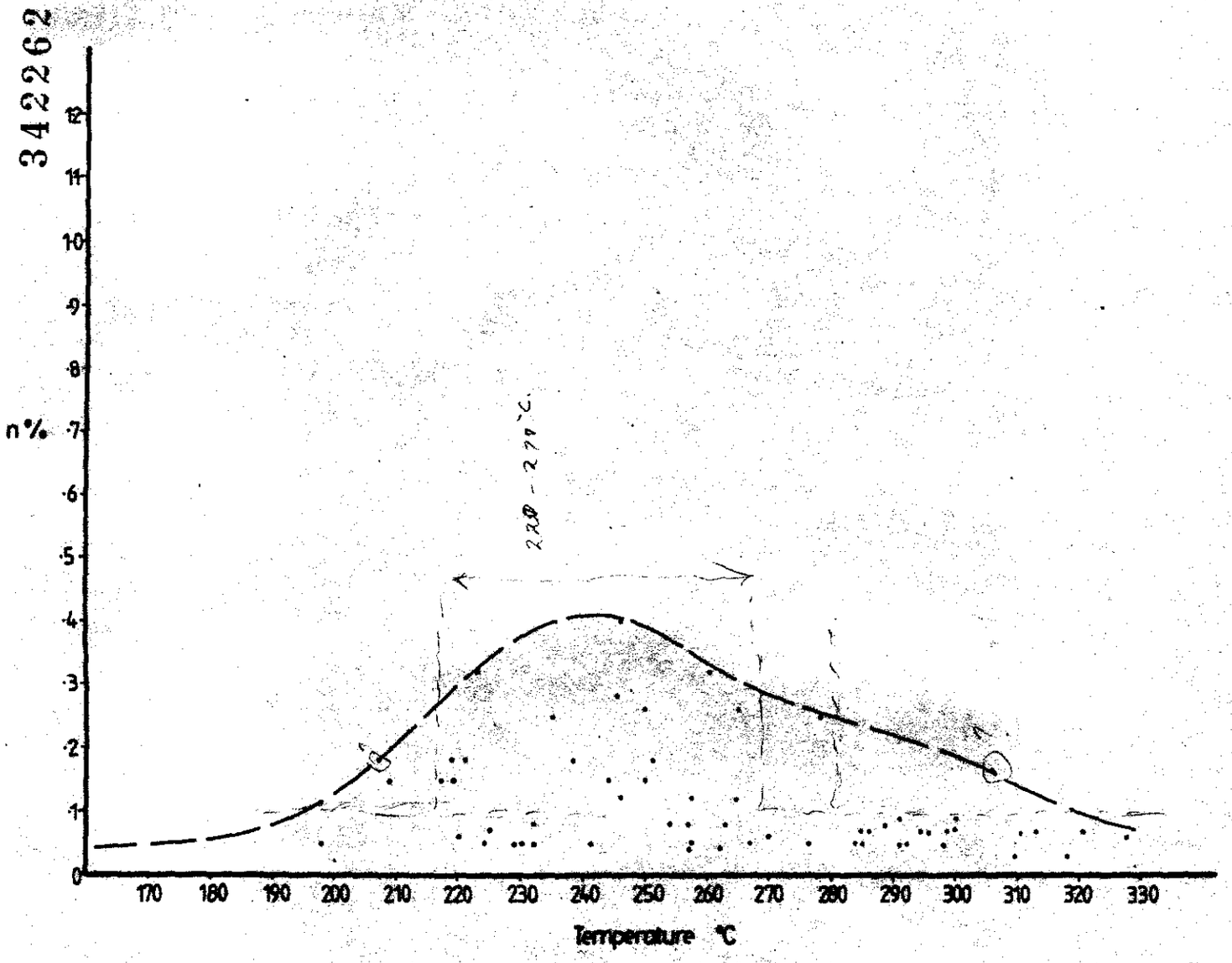
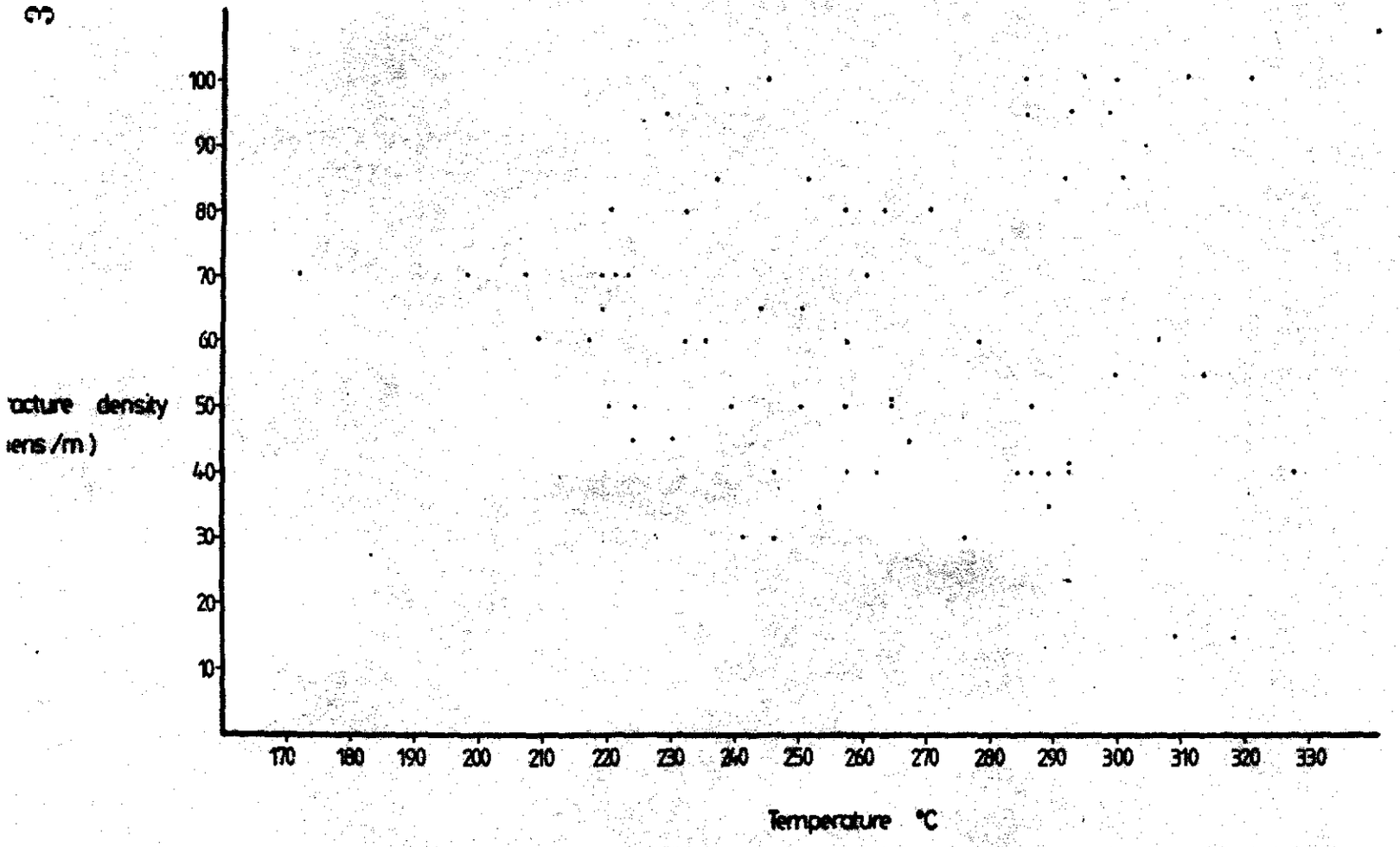


FIG. 3.


342262
n%
0
1
2
3
4
5
6
7
8
9
10
11
12
220 - 270 °C.
170
180
190
200
210
220
230
240
250
260
270
280
290
300
310
320
330
Temperature °C

342263

FIG. 4.



262

FIG. 5

3422264

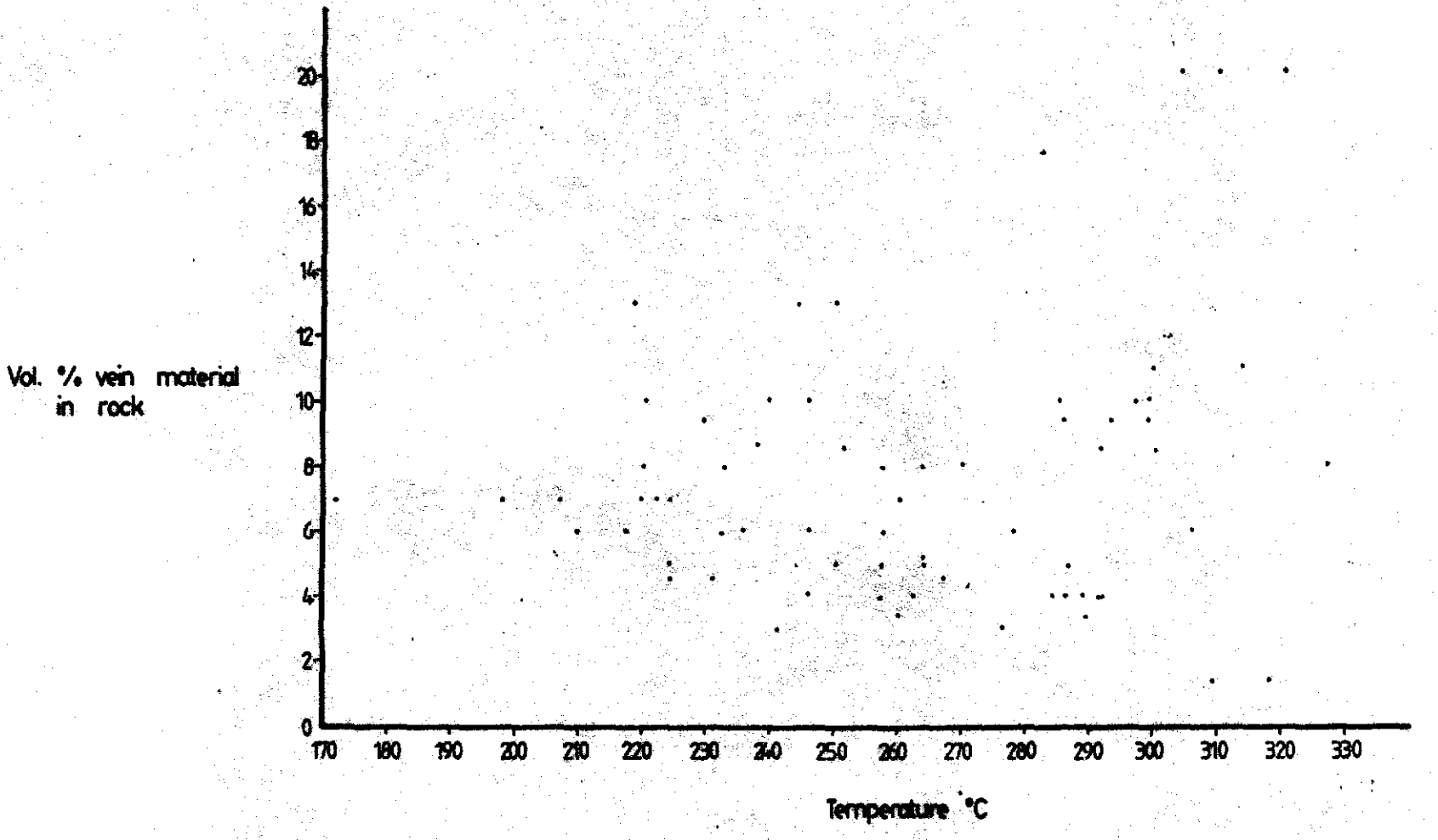
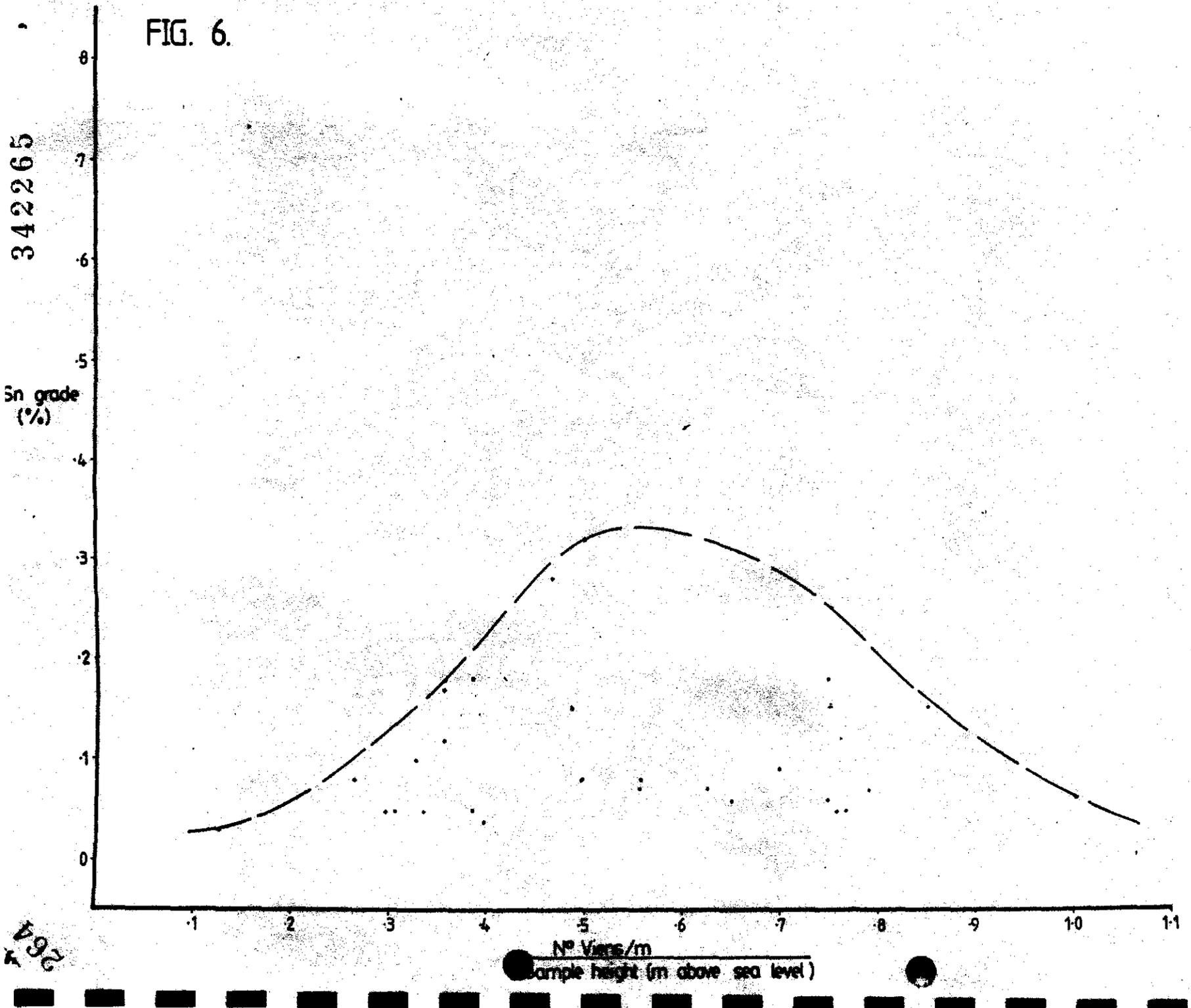


FIG. 6.

342265


Sn grade (%)
0
·1
·2
·3
·4
·5
·6
·7
·8
1·0
1·1
Nº Veins/m
Sample height (m above sea level)

Fluid Inclusion Studies of the Zoned Scamander Mineral Field & the Great Pyramid Tin Deposit - North Eastern Tasmania. by G. Plummer. 22/11/83.

INTRODUCTION

A fluid inclusion study of the Scamander mineral field is being undertaken as an M.Sc. thesis supervised by Dr. T.A.P. Kwak, at La Trobe University, Melbourne.

The mineral field is zoned with Mo, W mineralization found close to the source granite and Sn, Cu and Pb, Zn, Ag found at increasing distance. Fluid inclusion data will be used to define the hydrothermal system. Intense studies of inclusions from the Great Pyramid deposit will show how Great Pyramid fits into this hydrothermal system.

A long term objective is to develop an exploration model whereby further Great Pyramid style deposits can be found using fluid inclusion data.

WORK COMPLETED (9 months completed of a 2 year project)

1. 146 thin sections from drill core at Great Pyramid petrologically described.
2. Data from freezing and heating experiments has been obtained from approximately 100 individual fluid inclusions in 35 samples from Great Pyramid.
3. All data has been plotted on cross sections so as to define mineral and fluid inclusion zonations.

Results

At Great Pyramid fluid inclusions in quartz from cassiterite mineralized veins homogenise at temperatures between 220°C and 320°C. Freezing data indicate a fluid system rich in H_2O - CO_2 and a salt. Other minor components may also be present. Freezing data indicate the salt is most likely to be $CaCl_2$.

Convention in the literature is to express salinity as NaCl equivalents. Correlation of published salinity diagrams and Great Pyramid data indicates that salinities are low, being in the range between 0 and 10 wt% NaCl equivalent.

Co-existing liquid rich and gas rich primary fluid inclusions are found at Great Pyramid. These inclusions homogenise at the same temperature. This indicates a two phase gas and liquid fluid, i.e. the presence of boiling. Periodic boiling of hydrothermal fluids is indicated at Great Pyramid.

342267

Zonation

Temperatures of mineralization at Great Pyramid increase with increasing depth. Single temperature isotherms have a dome-like shape. A pre-mineralization fault zone at Great Pyramid shows elevated mineralization temperatures. This is probably due to increased porosity and therefore increased fluid flow in this region. Tin grades are higher here.

The occurrence of topaz at Great Pyramid appears to be controlled by fluid temperature. Topaz is only found in or near zones of above 300°C temperatures.

Further Work

There is a strong correlation between fracture density, lithology and tin grade at Great Pyramid. Competent sandstone units fracture more easily and contain more tin than intercalated siltstone and shale beds. Initial work has suggested that tin deposition is related to the temperature of the mineralizing fluid and implied a porosity/permeability control on fluid inclusion temperatures. Further work is necessary to define the relationship of lithological type and porosity/permeability to fluid inclusion temperature and tin distribution.

Further detailed fluid inclusion studies will be undertaken at Great Pyramid in an effort to closely define these relationships and zonations.

Fluid inclusion samples from the Mo, W, Cu and Pb, Zn, Ag occurrences in the region will also be studied. This will allow a model to be developed which will define the complete mineralizing system. The position of Great Pyramid in this system will be defined.

Definition of the fluid inclusion characteristics of the zoned Scamander Mineral Field may enable the location of Great Pyramid style tin deposits in similar environments elsewhere.

Gavin J. Plummer

Geology Dept.
La Trobe University,
Melbourne

SIX MONTHLY PROGRESS REPORT

FOR THE PERIOD 2 MARCH TO 1 SEPTEMBER 1983

G.PLUMMER MSc THESIS WORK

The MSc thesis is primarily a petrological and fluid inclusion study designed to delineate any mineralogical,hydrothermal alteration,mineralizing fluid temperature or compositional zonations within the deposits of the licence area.Initial emphasis is placed on the Great Pyramid deposit as it is here that most data is available.

From 1st March to 10th May field studies were carried out on Exploration Licences 12/78 and 10/80 in North Eastern Tasmania. During this time extensive mapping was under taken.Representative petrological and fluid inclusion samples were taken from all known prospects within the licence areas.This includs detailed sampleing of available drill core.

60 polished thin sections and 70 fluid inclusion mounts have been prepared from Great Pyramid and North Scamander drill core.Preliminary investigations at Great Pyramid show mineralized vein assemblages of quartz,cassiterite,fluorite,tourmaline,green biotite, brown biotite,muscovite,chlorite,vermiculite and sulphids.Tourmaline tends to occur as fine euhedral inclusions within quartz and fluorite associated with cassiterite.Muscovite tends to form vein selvages.

At North Scamander mineralized vein assemblages are similar to those at Great Pyramid,however an increase in sulphide content is observed.Rare topaz has been found associated with pyrrhotite.

.../2

Preliminary fluid inclusion homogenization (filling) temperatures are between 250°C and 350°C. As expected results show that temperatures of homogenization increase with depth. Further investigation shows the hydrothermal fluid system to be rich in H_2O and CO_2. Lack of daughter crystals in primary inclusions indicates low fluid salinities. The presence of gas and liquid rich primary inclusions coexisting indicates fluid boiling during mineralization.

Present work is directed at further detailing the petrological and fluid inclusion data on the Great Pyramid prospect so that zonations can be accurately defined.

G.J. Plummer

G.J. PLUMMER

OPEN FILE

342270

D.G.M. | A.G. | G. | E.O. | D.S.I.E.
D. DIR. | 25 SEP 1984 | Registrar | E & IL
DEPT. OF MINES
REF. No. 9836/84

LIST OF PLANS

PLAN NO.	TITLE	SCALE
D/LH 02/527	E.L. 12/78 Scamander - Geology	1:20 000
D/LH 02/525	E.L. 12/78 Scamander - Structural lineaments	1:20 000
D/LH 02/502	E.L. 12/78 Scamander - Sample No. Location Plan Stream Sediment	1:20 000
D/LH 02/504	E.L. 12/78 Scamander - Stream Sediment Geochemistry Sn, WO_3, Mo	1:20 000
D/LH 02/503	E.L. 12/78 Scamander - Stream Sediment Geochemistry As	1:20 000
D/LH 02/505	E.L. 12/78 Scamander - Stream Sediment Geochemistry Cu, Pb, Zn	1:20 000
D/LH 01/526	E.L. 10/80 Great Pyramid - Pinnacles Grid (N part of grid) Topography - drillhole Location	1:2 000
D/LH 01/603	E.L. 10/80 Great Pyramid - Pinnacles Grid PRC Drillhole traverse. Lithological cross section	1:10 000
D/LH 01/604	E.L. 10/80 Great Pyramid - Pinnacles Grid PRC Drillhole traverse. Sn geochemistry	1:10 000
D/LH 01/612	E.L. 10/80 Great Pyramid - Pinnacles Grid PRC Drillhole traverse. W geochemistry	1:10 000
D/LH 01/611	E.L. 10/80 Great Pyramid - Pinnacles Grid PRC Drillhole traverse. As geochemistry	1:10 000
D/LH 01/608	E.L. 10/80 Great Pyramid - Pinnacles Grid PRC Drillhole traverse. Cu geochemistry	1:10 000
D/LH 01/609	E.L. 10/80 Great Pyramid - Pinnacles Grid PRC Drillhole traverse. Pb geochemistry	1:10 000
D/LH 01/610	E.L. 10/80 Great Pyramid - Pinnacles Grid PRC Drillhole traverse. Zn geochemistry	1:10 000
D/LH 01/606	E.L. 10/80 Great Pyramid - Pinnalces Grid Cross Section PRC 10 Sn values - Lithology	1:10 000
D/LH 01/615	E.L. 10/80 Great Pyramid - Pinnacles Grid Cross section PRC 10 Cu, Pb geochemistry	1:10 000
D/LH 01/616	E.L. 10/80 Great Pyramid - Pinnacles Grid Cross section PRC 10 Zn, As geochemistry	1:10 000
D/LH 01/605	E.L. 10/80 Great Pyramid - Pinnacles Grid Cross section PRC 11 Sn values lithology	1:10 000
D/LH 01/617	E.L. 10/80 Great Pyramid - Pinnacles Grid Cross section PRC 11 Cu, Pb geochemistry	1:10 000
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PLAN NO.	TITLE	SCALE
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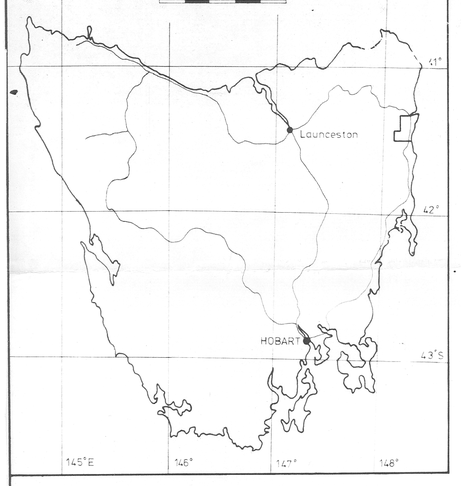
D/LH 02/539	E.L. 12/78 Scamander - Loila Tier Grid - Geology Alteration fractures, veins and stereonets	1:2 000
D/LH 02/544	E.L. 12/78 Scamander - Loila Tier Grid - Soil and rock chip sample results Sn, WO_3, Cu, Pb, Zn, As	1:2 000

100

TASMANIA
LOCALITY MAP
EL 12/78

0 20 40 60 80 100 Kms



5 cm

595 000 m E

600 000 m E

605 000 m E

5 900 000 m S

LEGEND

	FAULT (INFERRED)	sil.	SILICIFIED
	SYNFORM AXIS	q	QUARTZ
	ANTIFORM AXIS	musc. (selv.)	MUSCOVITE (SELVAGE)
	FOLD AXIS AND PLUNGE	pegm.	PEGMATITE
	BEDDING (⊥ FACING UNKNOWN)	Tm	TOURMALINE
	YOUNGING DIRECTION	WO_3	WOLFRAMITE
	JOINTS	Mo	MOLYBDENITE
	PROSPECTS	ap.	APLITE (DYKE)
	GRID LOCATIONS	gn. or Fe.	GOSSANOUS
RECENT & QUATERNARY TERTIARY	ALLUVIUM (QUATERNARY TO RECENT ALLUVIUM IS Sn BEARING)		
JURASSIC — Dol.	DOLERITE DYKES		
PERMIAN	PERMIAN SEDIMENTS (INCLUDING COALS)		
Dio.	DIORITE DYKES (AGE UNCERTAIN)		
p.p.	FINE GRAINED PORPHYRITIC GRANITE		
UPPER DEVONIAN	FINE GRAINED GRANITE		
+ +	BIOTITE GRANITE		
X X	GRANODIORITE (HORNBLENDE - BIOTITE) (INCLUDES SCAMANDER TIER DYKE)		
LOWER DEVONIAN / SILURIAN — m	MATHINNA SEDIMENTS		
	INFERRED SHALLOW STANNIFEROUS GRANITE		
A — B	CROSS SECTIONS		

ARGONAUT
RUBY FLATS
STONEY FORD (Zn, Sn, Cu)
MEDEAS COVE
Medeas Cove Road
GEORGES BAY
BEAUTY BAY
ST. HELENS
Tasman Falls
Dam
chilled margin
sheared contact
Trafalgar
Creek
SILVER ECHO (Cu, Mo, Bi)
MT ECHO
ARIOUS (Alluvial)
Tm/Fe/Q
ECHO (Mo, WO_3, Bi)
NORTH
ECHO SOUTH (Sn, WO_3, Bi)
qtz and serc in talus
alluvium
accumulated alluvium
TRANSIT FLATS
greisen
minor greisen
INTENSELY ALTERED ZONE
WILLIAMS (As, Pb, Sn)
grandiorite float
LOILA TIER (Sn, As)
no musc
minor musc on joints
LIMIT OF VISIBLE MUSCOVITE
LIMIT OF VISIBLE TOURMALINE
musc clots
greisen common
pegm.
BADEN POWELL (WO_3, Mo)
CARSON DE BEERS (WO_3)
LUTWYCHE (WO_3)
LOILA TIER
WEST PINNACLE (Sn, As)
EAST PINNACLES (As, Pb, Ag, Cu)
GREAT PYRAMID (Sn, Ag)
CRAMPS (As, Pb, Cu, Ag)
DUNNS (As, Cu, Sn, Ag)
NORTH ORICO (Sn, Zn, Cu)
ARM (As, Pb, Sn, Cu)
ORIECO (Cu, Zn, Sn, Ag,)
ORIECO SOUTH
NORTH RINGAROOMA
RINGAROOMA (Pb, Sn, Zn, Cu)
RAUL BEARS (Zn, Pb, Cu, Ag)
NORTH SCAMANDER (Pb, Zn, Sn, Ag)
YARMOUTH (As, Cu, Au, Ag)
BEULAH (Pb, As, Ag, Au)
SCAMANDER BELL (Zn, Pb, Ag, Au)
SCAMANDER
Upper Scamander
SCAMANDER
Doyles Mudflat
Henderson Lagoon
Tasman Highway
Brooks Creek
Beaco Creek
Waterhouse Creek
Boltons Bridge
Boltons Creek
Location Creek
Approximate
Peg m
INTENSELY FRACTURED ZONE
strong qtz veining
Dublin Road

Revisions:

The Shell Company of Australia Limited
METALS DIVISION

EL 12/78, SCAMANDER, TAS.
GEOLOGY

Drawn: PAR
Traced: JLL
Checked:
O.I.C.
Date: 2-3-84
Centre: DPORT
Project No:
Drawing No: 0/LH02/527

342272

001

SCALE

0 1

595 000m E

600 000m E

605 000m E

5425 000m N

5420 000m N

5415 000m N

5410 000m N

5405 000m N

5 cm

00 Kms

41°

42°

43°S

148°

sil. SILICIFIED

q QUARTZ

musc. (selv.) MUSCOVITE (SELVAGE)

pegm. PEGMATITE

Tm TOURMALINE

WO_3 WOLFRAMITE

Mo MOLYBDENITE

ap. APLITE (DYKE)

gn. or Fe. GOSSANOUS

ALLUVIUM IS Sn BEARING)

ALS)

)

TIER DYKE)

ANITE

ARGONAUT

RUBY FLATS

STONEY FORD (Zn, Sn, Cu)

MEDEAS COVE

Medeas Cove Road

STIEGLITZ

GEORGES BAY

St Helens Point

BEAUTY BAY

ST. HELENS

chilled margin

sheared contact

Tratalgon

Grey Falls Creek

MT ECHO

SILVER ECHO (Cu, Mo, Bi)

ARGUS (Alluvial)

ECHO (Mo, WO_3, Bi) NORTH

ECHO SOUTH (Sn, WO_3, Bi)

accumulated alluvium

TRANSIT FLATS

greisen

minor greisen

INTENSELY ALTERED ZONE

WILLIAMS (As, Pb, Sn)

grandiorite float

LOLA TIER (Sn, As)

LIMIT OF VISIBLE MUSCOVITE

LIMIT OF VISIBLE TOURMALINE

gossan

BADEN POWELL (WO_3, Mo)

CARSON DE BEERS (WO_3)

LUTWYCHE (WO_3)

LOLA NORTH

WEST PINNACLE (Sn, As)

EAST PINNACLES (As, Pb, Ag, Sn, Cu)

GREAT PYRAMID (Sn, Ag)

RINGAROOMA (Pb, Sn, Zn, Cu)

NORTH RINGAROOMA

ORIECO (Cu, Zn, Sn, Ag)

ORIECO SOUTH

NORTH ORIECO (Sn, Zn, Cu)

ARM (As, Pb, Sn, Cu)

DUNNS (As, Cu, Sn, Ag)

CRAMPS (As, Pb, Cu, Ag)

YARMOUTH (As, Cu, Au, Ag)

PAUL BEAMRS (Zn, Pb, Cu, Ag)

NORTH SCAMANDER (Pb, Zn, Sn, Ag)

SCAMANDER

BEULAH (Pb, As, Ag, Au)

SCAMANDER BELL (Zn, Pb, Ag, Au)

TASMAN SEA

Upper Scamander

Doyles Mudflat

Henderson Lagoon

Approximate Location of Ore Body

INTENSELY FRACTURED ZONE

Pegm

Pegm / musc

strong qtz veining

Dam

Road

Creek

Ridge

Point

Lagoon

N

SCALE 1:20,000

0 1 2 3 Kms

002

LEGEND

PROMINENT LINEAMENTS

LINEAMENTS

INFERED LIMIT OF SHALLOW STANNIFEROUS GRANITE

ORIECO PROSPECTS

5 cm

STONEY FORD

GEORGES BAY

ST. HELENS

SILVER ECHO

ECHO NORTH

ECHO SOUTH

WILLIAMS

LOLA TIER

BADEN POWELL

CARSON DE BEERS

LUTWYCHE

CRAMPS

WEST PINNACLES

ORIECO NORTH

DUNNS

ARMS

EAST PINNACLES

ORIECO

ORIECO SOUTH

PYRAMID HILL

RINGAROOMA BAY SOUTH

PAUL BEAHRS

NORTH SCAMANDER

YARMOUTH

SCAMANDER

N

342273

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METALS DIVISION

E.L. 12/78 SCAMANDER

STRUCTURAL LINEAMENTS

C02

SCALE	1:20,000	DATE	28-2-84
AUTHOR	P.A.R.	DRAWN	J.L.L.
OFFICE	TASMANIA	REP. No.	
DRG. No.	EL/12/78/52	FIG. No.	

STONEY FORD

GEORGES BAY

ST. HELENS

SILVER ECHO

ECHO NORTH

ECHO SOUTH

WILLIAMS

LOILA TIER

BADEN POWELL

CARSON DE BEERS

LUTWYCHE

CRAMPS

WEST PINNACLES

EAST PINNACLES

ORIECO NORTH

DUNNS

ARMS

ORIECO

ORIECO SOUTH

YARMOUTH

TASMAN

SEA

PYRAMID HILL

RINGAROOMA BAY SOUTH

PAUL BEAHRS

NORTH SCAMANDER

SCAMANDER

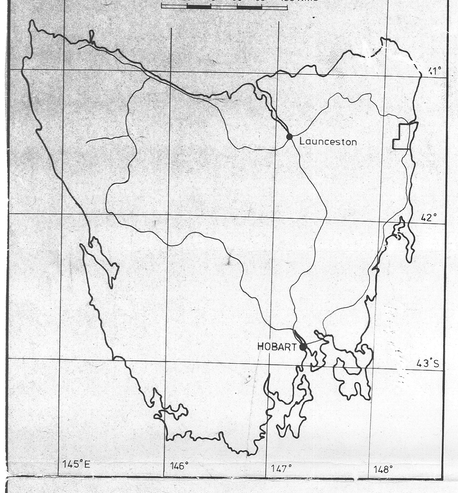
5 cm

N

E00

TASMANIA
LOCALITY MAP
EL 12/78

0 20 40 60 80 100 Kms



342274

5 cm

595 000m E

600 000m E

605 000m E

595 000m E



5 cm

LEGEND: 10 000 , 11000 STREAM SEDIMENT SAMPLES
7600 , 7800 ○ FOLLOW UP STREAM SEDIMENT SAMPLES
7700 ROCK CHIP SAMPLES

SAMPLE# NOS	DATA BASE NOS
7601–7699	0601–0699
7801–7847	0501–0547
10701–10999	0761–0999
11000–11200	11000–11200 } (same)
11501–11765	11501–11765 }

NB 11750 missing

N

SCALE 1:20

0 1

Revisions:

The Shell Company of Australia Limited
METALS DIVISION

EL 12/78, SCAMANDER, TAS.
SAMPLE No. LOCATION PLAN

84-2218

003

Drawn: P.A.R.	Date: 7-7-83	Centre: DEVONPORT	
Traced: J.L.L.			
Checked:	Project No:	Drawing No:	D/LH02/502
O.I.C.			

342274

595 000 m E

600 000 m E

605 000 m E

5425 000 m N

5420 000 m N

5415 000 m N

5410 000 m N

5405 000 m N

5 cm

Launceston

11°

42°

43'S

148°

0 Kms

ALLUVIAL

STIEGLITZ

MEDEAS COVE

Medeas Cove Road

GEORGES BAY

BEAUTY BAY

St Helens Point

ST. HELENS

Jocks Lagoon

Onion Creek

Ferntree Falls

Launceston Creek

Trafalgar Creek

Nepean Creek

MT ECHO

ECHO

ECHO SOUTH

ARGUS CREEK PROSPECT

Argus Creek

Brooks Hill

TASMAN HIGHWAY

Brooks Creek

Basin Creek

Mile Basin

PADDYS ISLAND

TASMAN SEA

LOLA PINNACLE

Upper Scamander

SCAMANDER

Scamander River

Dayles Mudflat

McIntyre Creek

Bolgers Ridge

Bolgers Only Creek

Approximate Creek

Steels Creek

Henderson Lagoon

Freshwater Creek

Brooks Creek

Dark Hollow Creek

Hogan Creek

Mt Elephant Creek

Mt Elephant Road

Mt Elephant Basin

Mt Elephant Beach

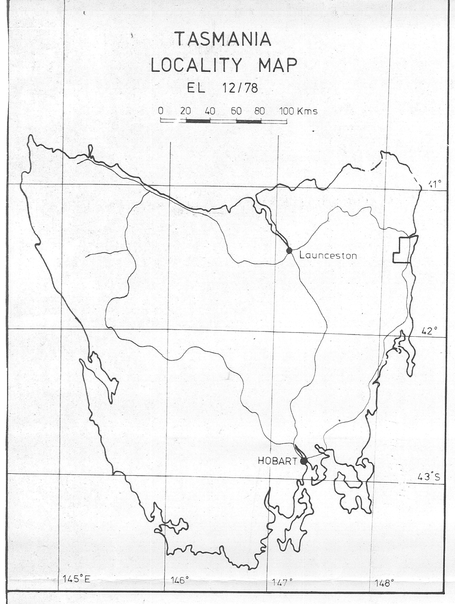
Mt Elephant Creek

Mt Elephant Road

Mt Elephant Creek

Mt Elephant Creek

Mt Elephant Creek



Sn/W/Mo

5 cm

595 000m E

600 000m E

605 000m E

59° 00m E

ALLUVIAL

Ferntree Falls

MT ECHO

ECHO SOUTH

ST. HELENS

MEDEAS COVE

Medeas Cove Road

BEAUTY BAY

GEORGES BAY

Grookes Hill

Creek

HIGHWAY

TASMAN

LOUIA PINNACLE

PITTS HILL

Upper Scamander

SCAMANDER

Doyles Mystiat

Henderson Lagoon

Beaumaris Beach

Sn/W/Mo

DATA ALSO SUPPLIED ON IBM DISC

342275

Sn/W/Mo

LEGEND :

8 , 14 , 44	STREAM SED SAMPLES
(6 , 20 , 36)	FOLLOW UP STREAM SED. SAMPLES
10 . 17 , 40	ROCK CHIP SAMPLES

Sn VALUES –
- > 200 ppm. – RED
- 150 – 200 ppm – ORANGE
- 100 – 150 ppm – YELLOW
- 50 – 100 ppm – YELLOW

5 cm

N

SCALE 1:

0 1

Revisions:

The Shell Company of Australia Limited
METALS DIVISION

EL 12/78 , SCAMANDER , TAS.

STREAM SEDIMENT SURVEY
GEOCHEMISTRY
Sn, W, Mo.

001

Drawn: P.A.R	Date: 7-7-83	Centre: DEVONPORT	
Traced: J.L.L			
Checked		Project N°:	Drawing N°: D/LH02/504
O.I.C			

Sn/W/Mo

595 000m E

600 000m E

605 000m E

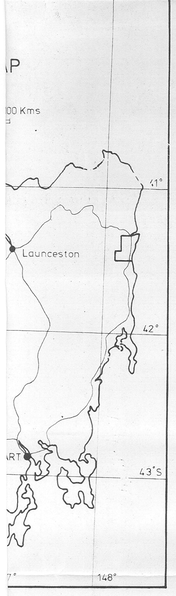
5425 000m N

5420 000m N

5415 000m N

5410 000m N

5405 000m N



ALLUVIAL

MEDEAS COVE

Medeas Cove Road

STIEGLITZ

BAY

GEORGES BAY

St Helens Point

BEAUTY BAY

ST. HELENS

Ferntree Falls

Trefalgar Creek

Nepean Creek

MT ECHO

ECHO

ECHO SOUTH

ARGUS PROCT

Jocks Lagoon

Onion Creek

TASMAN

Brooks Hill

Basin

Creek

HIGHWAY

Little Basin

Danas Basin

Danas Creek

Beach

Road

Duck Hollow

PADDYS ISLAND

TASMAN SEA

LOHA PINNACLE

PITTS HILL

Upper Scamander

SCAMANDER

Doyles Mudflat

Henderson Lagoon

Steels Beach

Beaumaris

Yuloumin

Reeds

Ridge

Boulders

Approximate Location

Sn/W/Mo

LEGEND :

8 , 14 , 44 — STREAM SED. SAMPLES

(6 , 20 , 36) — FOLLOW UP STREAM SED. SAMPLES

10 , 17 , 40 — ROCK CHIP SAMPLES

Sn VALUES:
- >= 200 ppm. — RED
- 150 - 200 ppm — ORANGE
- 100 - 150 ppm — GREEN
- 50 - 100 ppm — YELLOW

5 cm

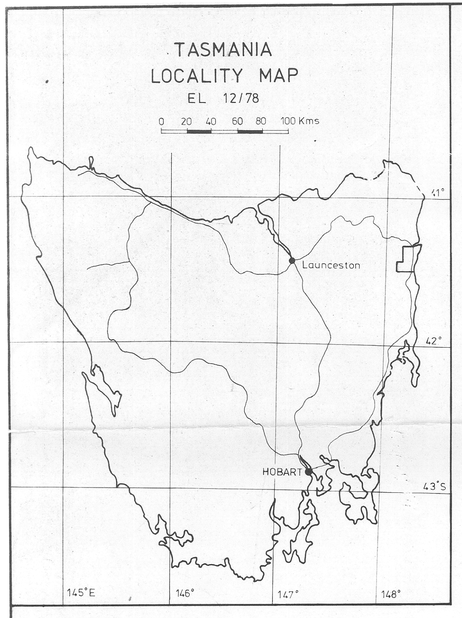
N

SCALE 1:20,000

0 1 2 3 Kms

004

342275



As

5 cm

595 000mE

600 000mE

605 000mE

595 000mE

As

As

As

DATA ALSO SUPPLIED ON IBM DISC

342276

5 cm

LEGEND:
8, STREAM SED. SAMPLE
(6) FOLLOW UP STREAM SED. SAMPLE
10 ROCK CHIP SAMPLES

SCALE
0 1

Revisions:

The Shell Company of Australia Limited
METALS DIVISION

EL 12/78, SCAMANDER, TAS.

STREAM SEDIMENT SURVEY
GEOCHEMISTRY
As

005

Drawn: P.A.R.	Date: 8-7-83	Centre: DEVONPORT	
Traced: J.L.L.		Project No:	Drawing No:
Checked			D/LH02/503
O.I.C.			

AP

100 Kms

Launceston

BART

147°

148°

11°

42°

43°S

As

5 cm

595 000mE

600 000mE

605 000mE

5425 000mN

5420 000mN

5415 000mN

5410 000mN

5405 000mN

STIEGLITZ

MEDEAS COVE

Medeas Cove Road

BAY

GEORGES BAY

St Helens Point

BEAUTY BAY

ST. HELENS

Jocks Lagoon

Onion Creek

TASMAN

Brooks Hill

Creek

Basin

HIGHWAY

Little Basin

Diana's Basin

Diana's Basin Road

Dark Hollow Creek

Alps Road

Reedy Creek

Eastern Creek

Yarmouth Creek Road

Freshwater Creek

Wrinklers Lagoon

Wrinklers Beach

Beaumaris

Steels Beach

Henderson Lagoon

Doyles Mudflat

PADDYS ISLAND

TASMAN SEA

SCAMANDER

SCAMANDER RIVER

Upper Scamander

Upper Scamander Road

Scamander River

Ferntree Falls

Launceston Creek

Trafalgar Creek

Nephele Creek

MT ECHO

ECHO

ECHO SOUTH

ARGUS PROJT

Argus Creek

Constable Creek

Flagstaff Creek

Bogan Creek

Tasman Highway

Medeas Cove Road

Scamander Road

Cramps Ridge

Roberts Ridge

Location Creek

Wrinklers Creek

Mcintyre Creek

Appleyards Creek

Boundary Creek

Sites Creek

Hut Creek

Quilts Creek

Black Tommys Hill

Pitts Hill

Loila Pinnacle

Upper Scamander River

ALLUVIAL

LEGEND: 8, STREAM SED. SAMPLE
(6) FOLLOW UP STREAM SED. SAMPLE
10 ROCK CHIP SAMPLES

N

SCALE 1:20,000

0 1 2 3 Kms

5 cm

As

As

As

34276

300

TASMANIA
LOCALITY MAP
EL 12/78

5 cm

0 20 40 60 80 100 Kms

Launceston
HOBART
41°
42°
43°S
145°E
146°
147°
148°

Cu/Pb/Zn

595 000m E
600 000m E
605 000m E

ALLUVIAL
Ferntree Falls
Launceston
Trafalgar Creek
Nerrena Creek
MT ECHO
ECHO
ECHO SOUTH
ARGUS PROCT
Constable Creek
Argus Creek
Flagstaff Creek
Medeas Cove Road
MEDEAS COVE
GEORGES BAY
BEAUTY BAY
ST. HELENS
Bobsy Creek
Brookes Hill
TASMAN HIGHWAY
Dans Basin
Arms Road
Dark Hollow Road
Eastern Creek
Tarmouth Road
Beaumaris Beach
Steels Creek
Winkleys Lagoon
Henderson Lagoon
Doyles Mudflat
Boltons Creek
Bolseys Ridge
Firebreak
Nerrena Creek
Constable Creek
Argus Creek
Flagstaff Creek
Bobsy Creek
Eastern Creek
Tarmouth Road
Steels Creek
Winkleys Lagoon
Doyles Mudflat
Boltons Creek
Bolseys Ridge
Firebreak Creek
Constable Creek
Argus Creek
Flagstaff Creek
Bobsy Creek
Eastern Creek
Tarmouth Road
Steels Creek
Winkleys Lagoon
Doyles Mudflat
Boltons Creek
Bolseys Ridge
Firebreak Creek
LOILA PINNACLE
LOILA TIER
SCAMANDER RIVER
Upper Scamander
SCAMANDER
SCAMANDER RIVER
Upper Scamander
SCAMANDER
PITTS HILL
BLACK TOMMYS HILL
SKYLINE TIER
Approximate W.F.
Cramps Ram
Cramps Ram
Dans Basin
Arms Creek
Dark Hollow Creek
Eastern Creek
Tarmouth Creek
Steels Creek
Winkleys Lagoon
Doyles Mudflat
Henderson Lagoon
Boltons Creek
Bolseys Ridge
Firebreak Creek
Constable Creek
Argus Creek
Flagstaff Creek
Bobsy Creek
Eastern Creek
Tarmouth Creek
Steels Creek
Winkleys Lagoon
Doyles Mudflat

5 cm

MAP

100 Kms

Launceston

HOBART

41°

42°

43°S

147°

148°

Cu/Pb/Zn

595 000m E

600 000m E

605 000m E

5425 000m N

5420 000m N

5415 000m N

5410 000m N

5405 000m N

MEDEAS COVE

Medeas Cove Road

STIEGLITZ

GEORGES BAY

St Helens Point

BEAUTY BAY

ST. HELENS

Ferntree Falls

MT ECHO

ECHO

ECHO SOUTH

ARGUS PROCT

Launceston

Trafalgar

Nephrite

Constable

Argus

Argus Creek

Highfield

Jocks Lagoon

Brooks Hill

Basin

Dianas Basin

Dianas Beach

TASMAN

HIGHWAY

Road

Creek

Cramps

Frami

LOILA PINNACLE

LOILA RIDGE

PITTS HILL

SCAMANDER RIVER

Upper Scamander

SCAMANDER

Doyles Mudflat

Henderson Lagoon

Steels Beach

Beaumaris

PADDYS ISLAND

BLACK TOMMYS HILL

Williams Creek

Eastern Creek

Yarmouth Creek

Winkleigh Creek

Dark Hollow Creek

Reedy Creek

Boggy Creek

Gnon Creek

Mundays Creek

Boulders Ridge

Boulders Creek

Approximate Creek

Scamander Beach

Winkers Beach

Cu Pb Zn

LEGEND :

8 , 14 , 44	STREAM SED. SAMPLES
(6 , 20, 36)	FOLLOW UP STREAM SED. SAMPLES
10 , 17 , 40	ROCK CHIP SAMPLES

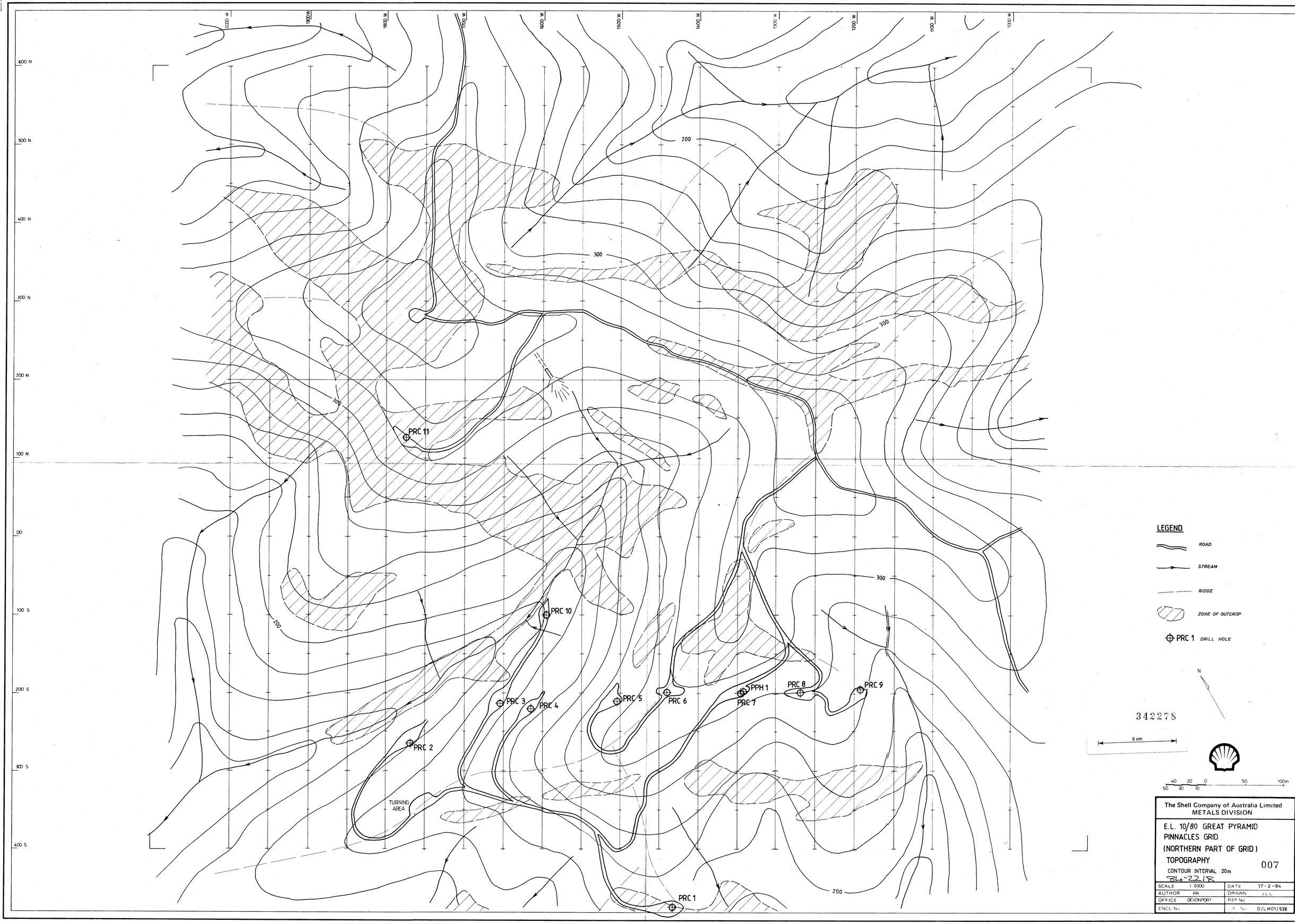
5 cm

N

SCALE 1:20,000

0 1 2 3 Kms

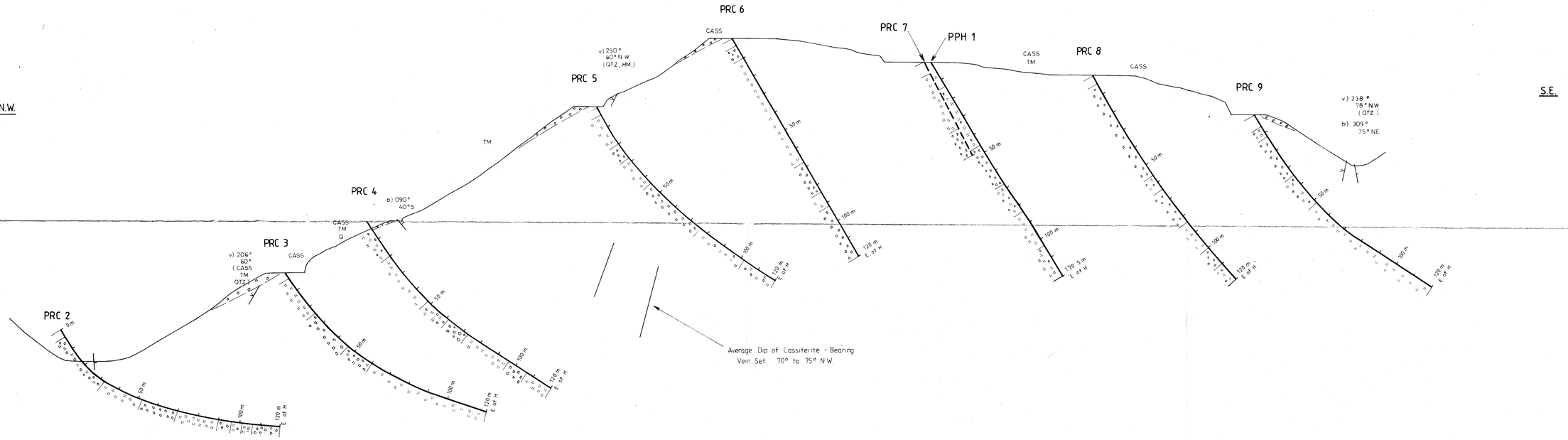
900



The Shell Company of Australia Limited
METALS DIVISION

E.L. 10/80 GREAT PYRAMID
PINNACLES GRID
(NORTHERN PART OF GRID)
TOPOGRAPHY 007
CONTOUR INTERVAL 20m

SCALE	1:2000	DATE	17-2-84
AUTHOR	PR	DRAWN	J.L.L
OFFICE	DEVONPORT	REP No	
ENCL No		R. No	D/LH01/526



342279

LINE 200 S (Bearing 120° to 300°)

5 cm

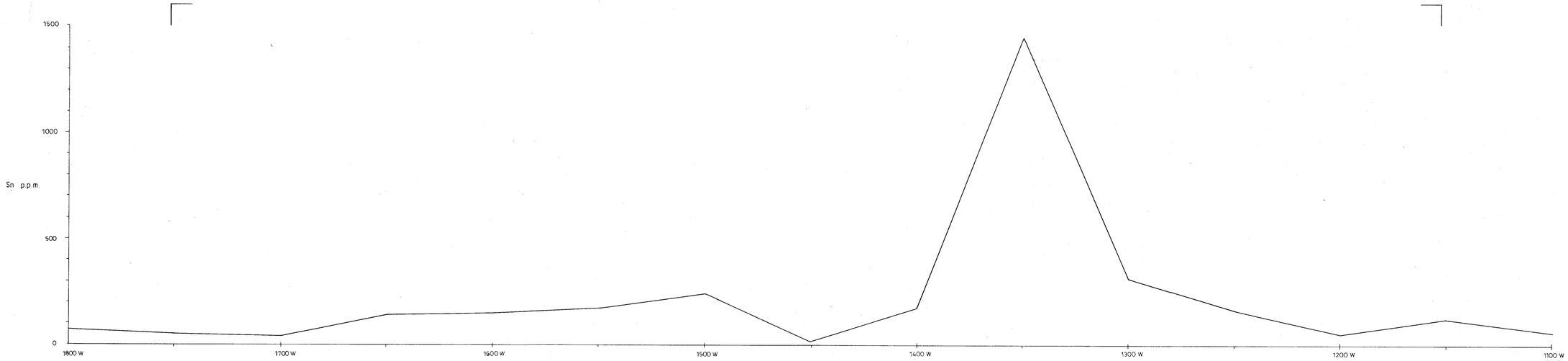
The Shell Company of [illegible] Limited
METALS DIVISION

E.L. 10/80 GREAT PYRAMID
PINNACLES GRID
PRC DRILL HOLE TRAVERSE
LITHOLOGICAL CROSS SECTION

008

84-22-18 Scale 1:10 000

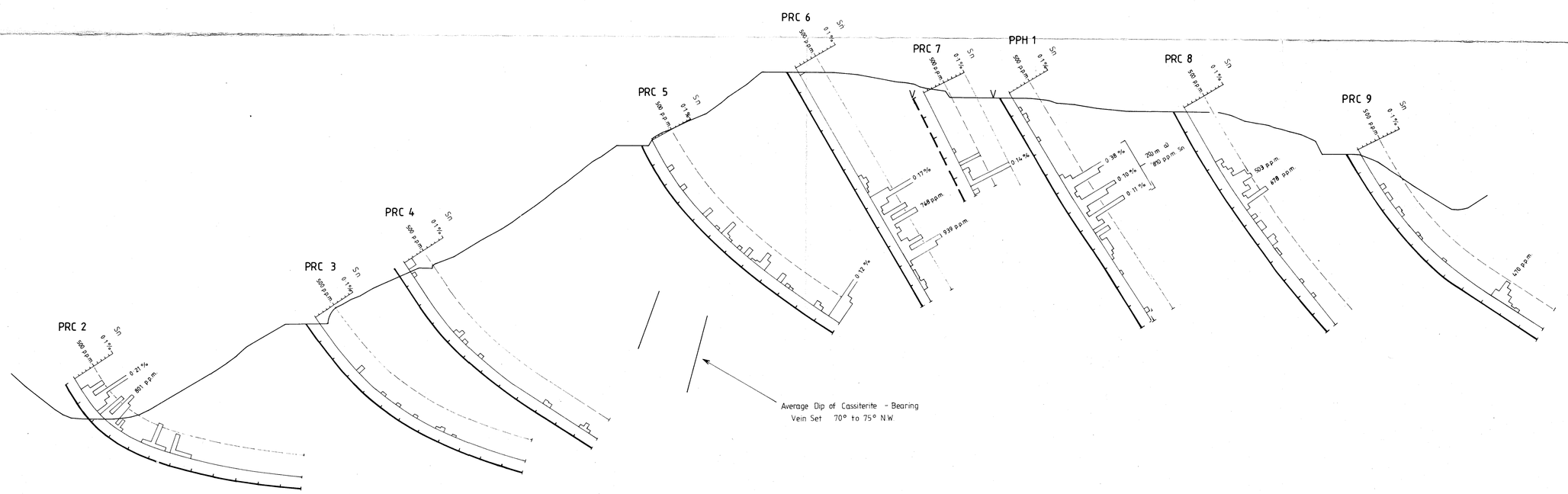
FIG. No.	REPORT No.
ENCL. No.	DRG. No. D/LH01/603
DATE 7-2-84	AUTHOR P.A. RUXTON
DRAWN J.L.L.	OFFICE



LINE 200 S ; Sn - in - soil anomaly

N.W.

S.E.



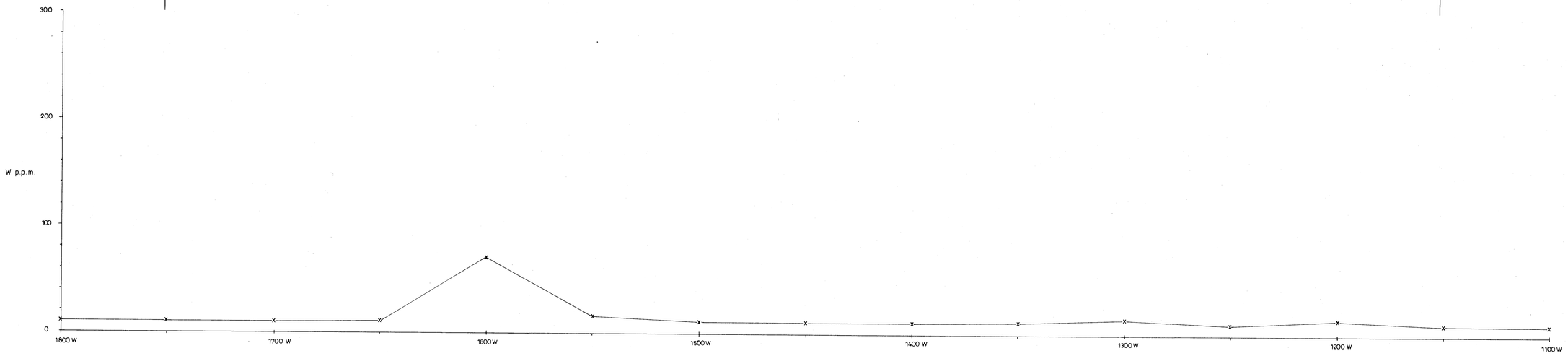
DRILL HOLE ; Sn GEOCHEMISTRY

342280

LINE 200 S (by 120°to 300°)

The Shell Company of Australia Limited METALS DIVISION	
E.L. 10/80 GREAT PYRAMID PINNACLES GRID PRC DRILL HOLE TRAVERSE Sn GEOCHEMISTRY	009
84-22.18	
SCALE 1:10000	DATE 27-2-84
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE DEVONPORT	REP.No.
ENCL No.	DRG No. D/LH01/604

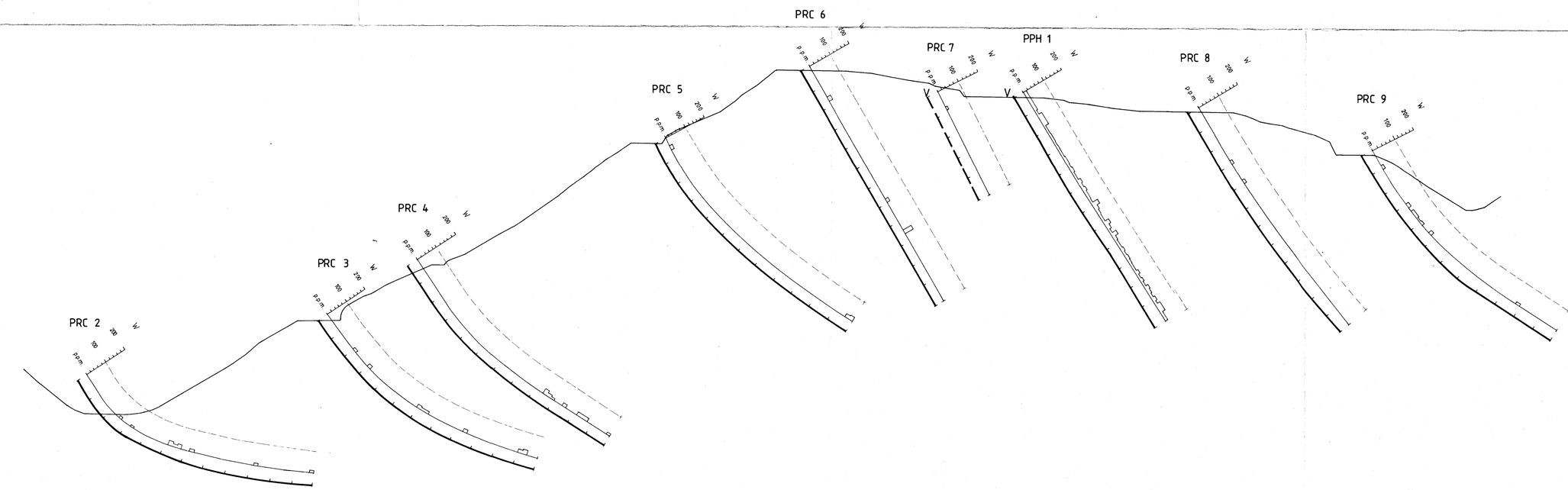
5 cm



LINE 200 S ; W in soil anomaly.

N.W.

S.E.

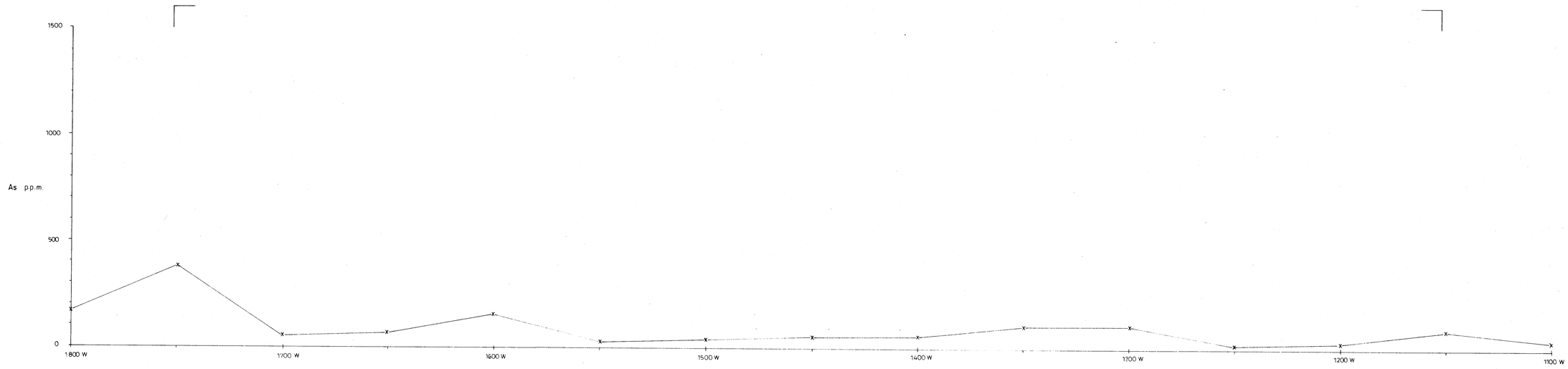


342281

LINE 200 S (by 120° to 300°)

The Shell Company of Australia Limited METALS DIVISION	
E.L. 10/80 GREAT PYRAMID PINNACLES GRID PRC DRILL HOLE TRAVERSE W GEOCHEMISTRY	010
84-2218	
SCALE 1:10000	DATE 19-4-84
AUTHOR P.A.R.	DRAWN J.L.L.
OFFICE DEVONPORT	REP. No.
ENCL No.	DRG No. D/LH01/612

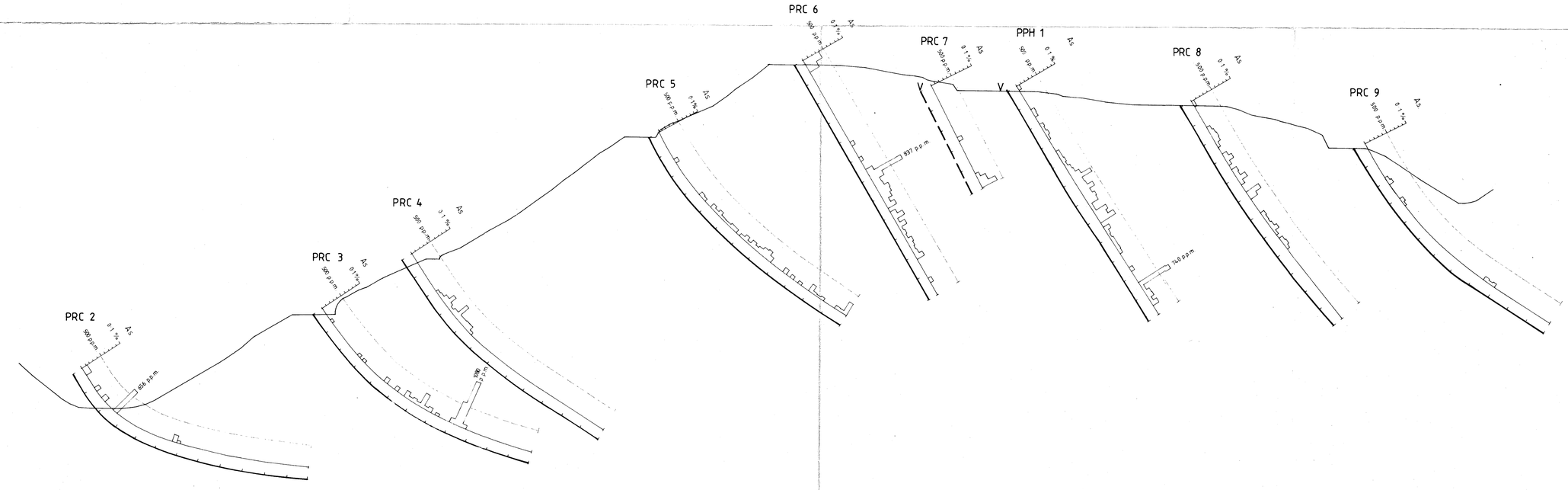
5 cm



LINE 200 S ; As - in - soil anomaly

N.W.

S.E.



DRILL HOLE ; As GEOCHEMISTRY

5 cm

342282

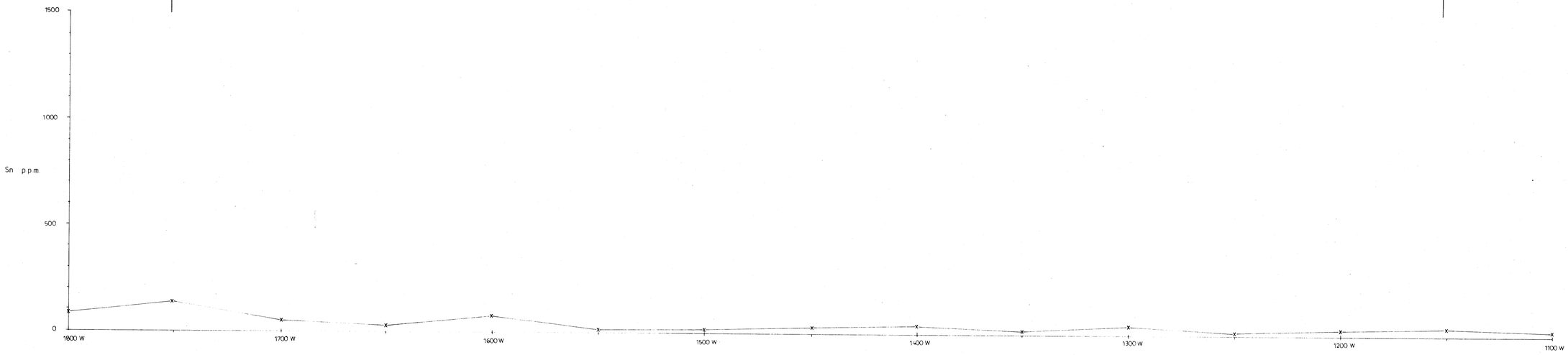
LINE 200 S (by 120° to 300°)

The Shell Company of Australia Limited
METALS DIVISION

E.L. 10/80 GREAT PYRAMID
PINNACLES GRID
PRC DRILL HOLE TRAVERSE
As GEOCHEMISTRY 011

84-2218

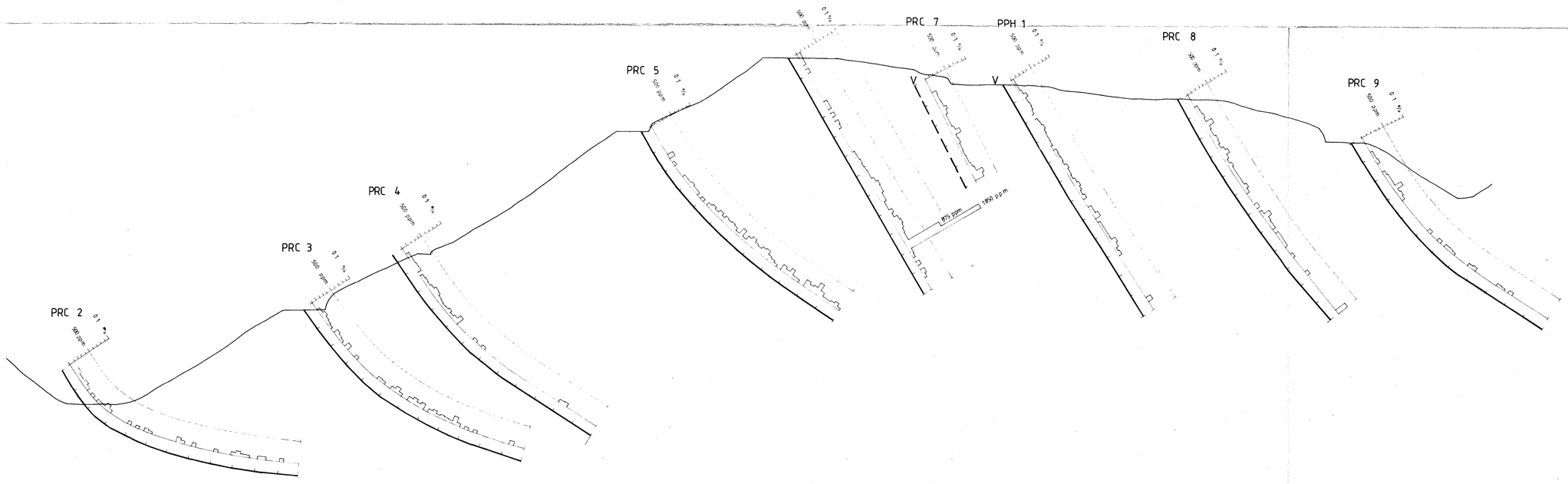
SCALE 1:10000	DATE 18-4-84
AUTHOR P.A.R	DRAWN J.L.L.
OFFICE DEVONPORT	REP. No.
ENCL No.	DRG No. D/LH01/611



LINE 200 S ; Cu - in - soil anomaly

N.W.

S.E.



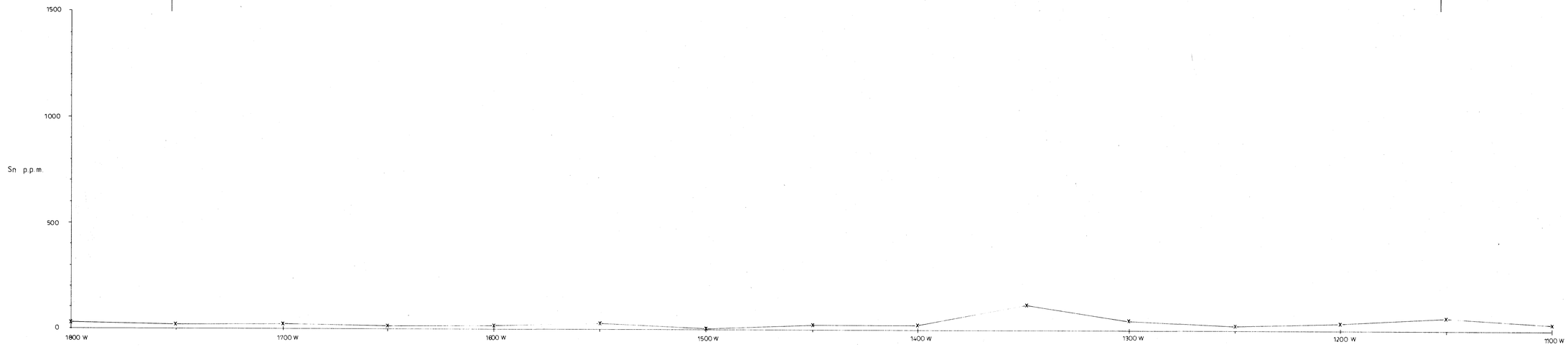
DRILL HOLE ; Cu GEOCHEMISTRY

342283

LINE 200 S (by 120° to 300°)

The Shell Company of Australia Limited METALS DIVISION	
E.L. 10/80 GREAT PYRAMID PINNACLES GRID PRC DRILL HOLE TRAVERSE Cu GEOCHEMISTRY	012
84-22-18	
SCALE 1:10 000	DATE 16-4-84
AUTHOR P.A.R	DRAWN J.L.L.
OFFICE DEVONPORT	REP.No.
DRG.No.	FIG.No. D/L.H01/608

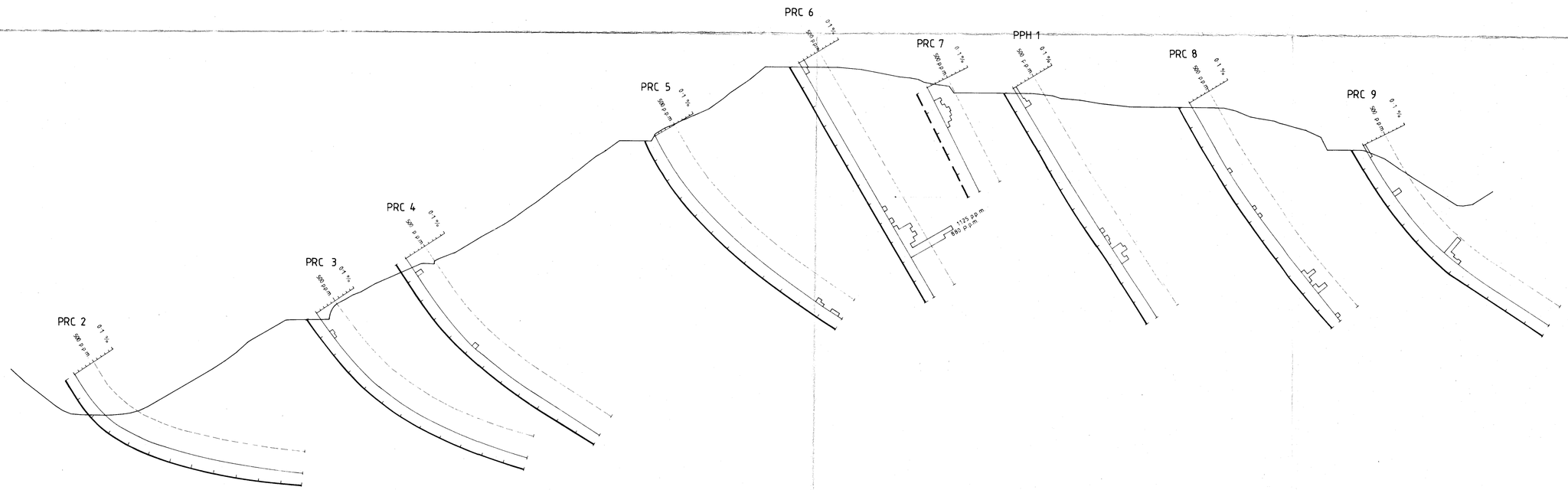
5 cm



LINE 200 S ; Pb - in - soil anomaly

N.W.

S.E.



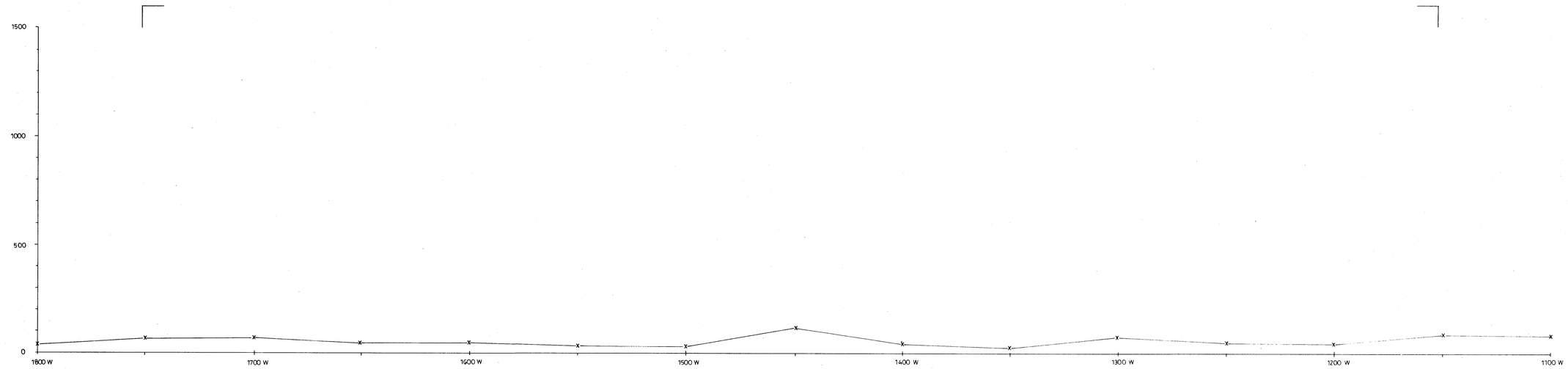
DRILL HOLE ; Pb GEOCHEMISTRY

342284

LINE 200 S (by 120° to 300°)

The Shell Company of Australia Limited METALS DIVISION	
E.L. 10/80 GREAT PYRAMID PINNACLES GRID PRC DRILL HOLE TRAVERSE Pb GEOCHEMISTRY	013 84-2218
SCALE 1:10 000	DATE 17 - 4 - 84
AUTHOR P.A.R	DRAWN J.L.L.
OFFICE DEVONPORT	REP. No.
ENCL No.	DRG No. D/LH01/609

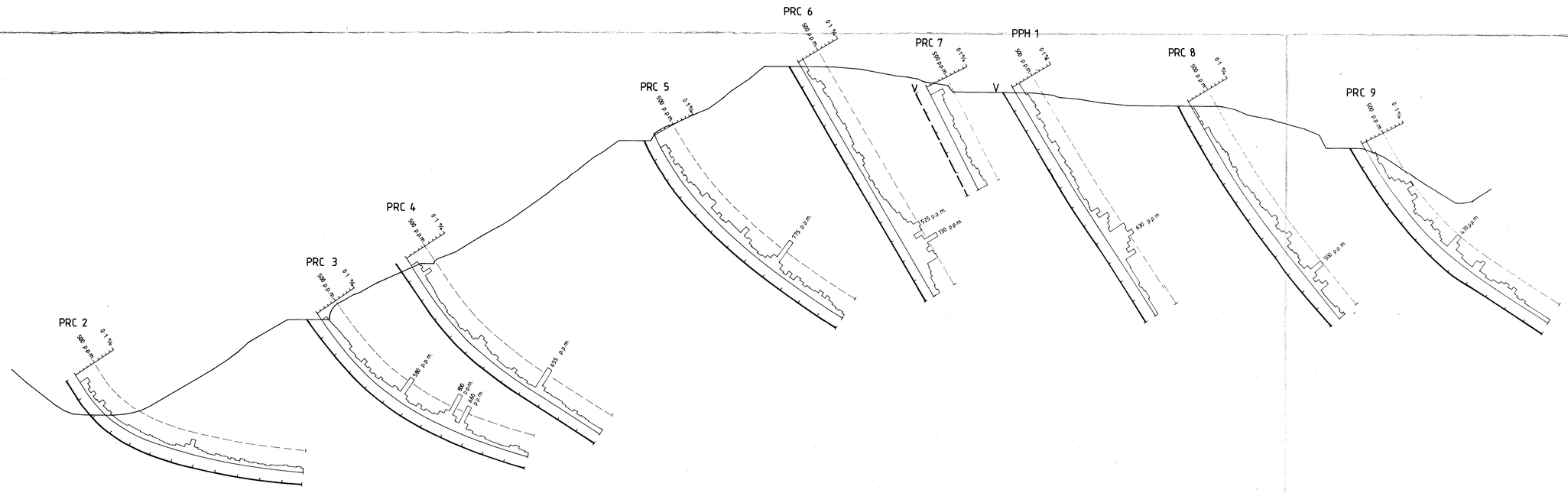
5 cm



LINE 200 S ; Zn - in - soil anomaly

N.W.

S.E.



DRILL HOLE ; Zn GEOCHEMISTRY

342285

LINE 200 S (by 120° to 300°)

The Shell Company of Australia Limited METALS DIVISION	
E.L. 10/80 GREAT PYRAMID PINNACLES GRID PRC DRILL HOLE TRAVERSE Zn GEOCHEMISTRY 014	
84-2218	
SCALE 1:10000	DATE 17-4-84
AUTHOR PAR	DRAWN J.L.L.
OFFICE DEVONPORT	REP.No.
ENCL No.	DRG No D/LH01/610

5 cm

1650 W 1600 W 1550 W 1500 W 1450 W

200
190
METRES R.L.
180
170
160

PRC 10

CREEK

LITHOLOGY

50 m
100 m
120 m E. of H.

1100
1000
900
800
700
P.P.M. Sn
600
500
400
300
200
100

Sn in Soil

500 p.p.m.
0.1 %

PRC 10

N.S.

CREEK

170
160
METRES R.L.
150
140

Sn GEOCHEMISTRY

5 cm

LINE 100 S

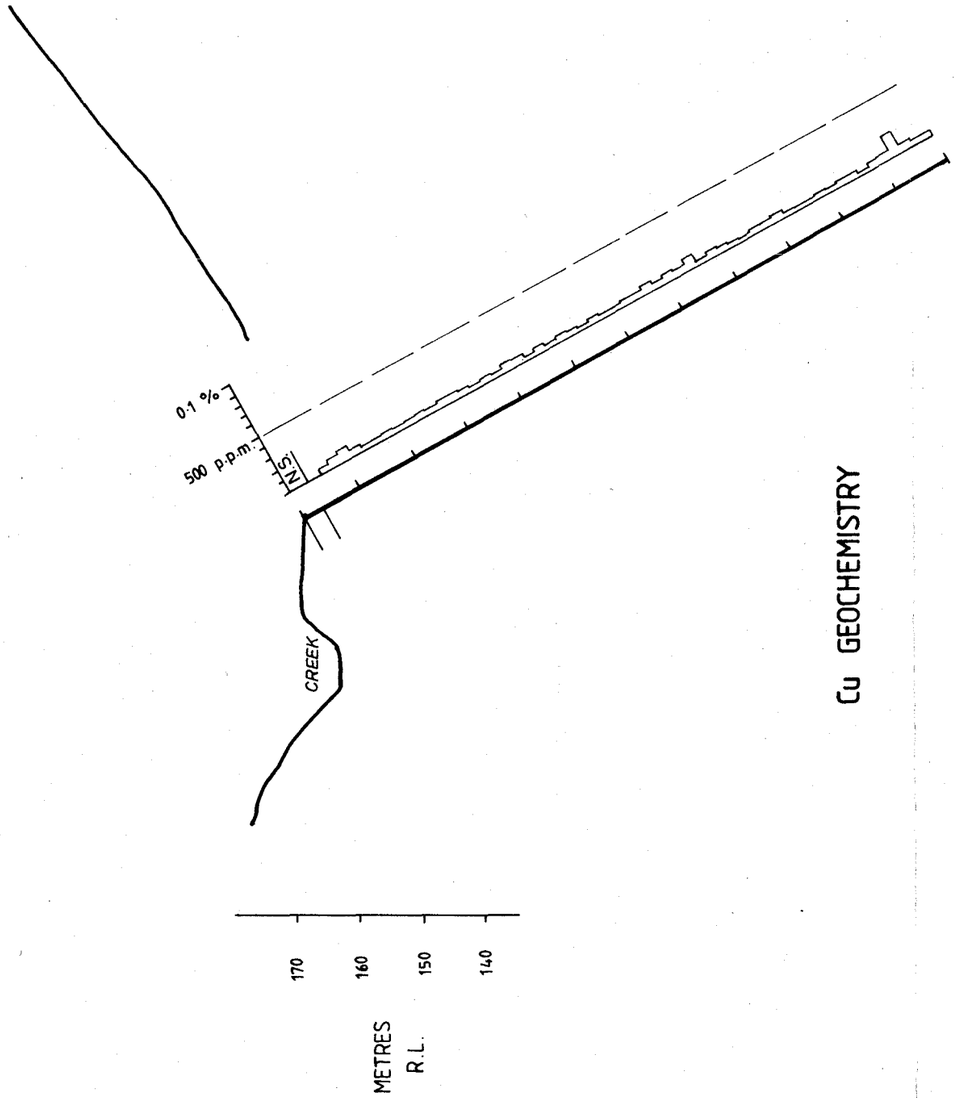
(HOLE NOT SURVEYED)

342286

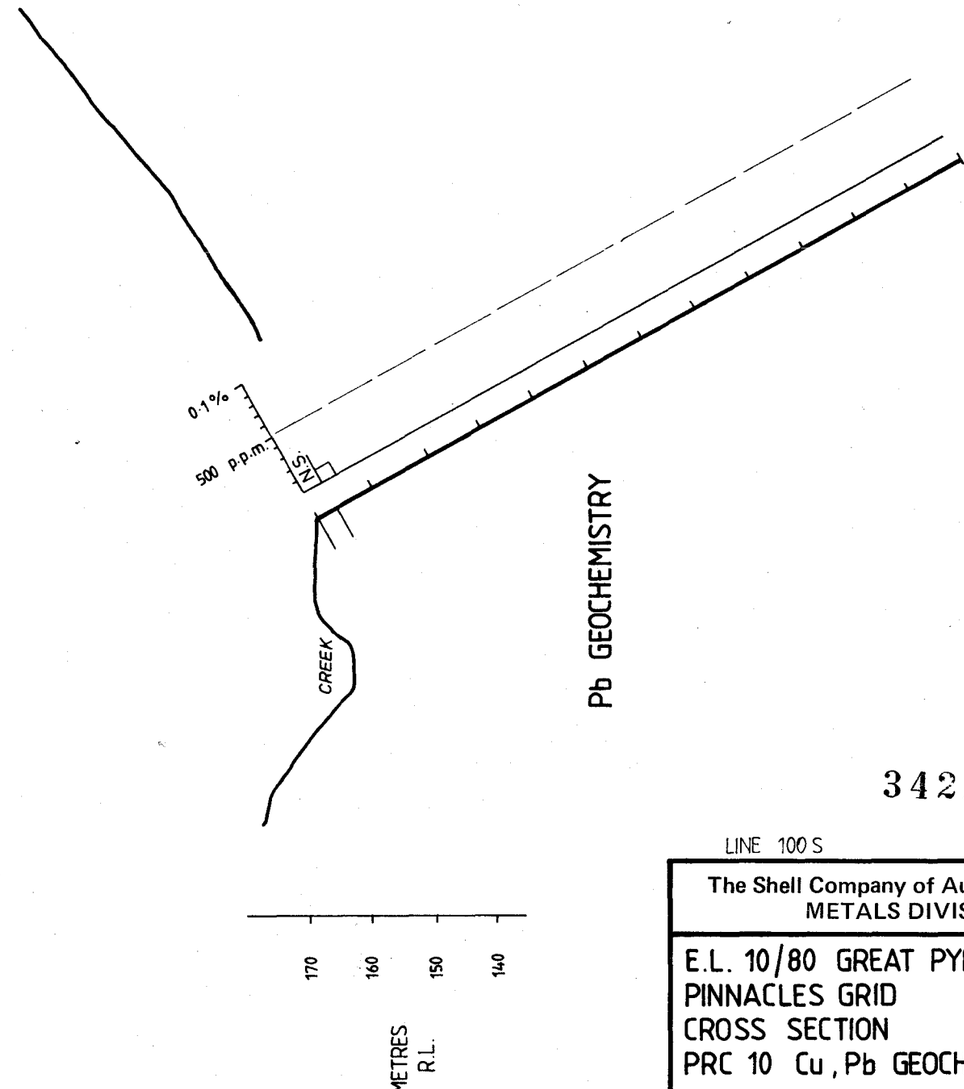
The Shell Company of Australia Limited
METALS DIVISION

E.L. 10/80 GREAT PYRAMID
PINNACLES GRID
CROSS SECTION 015
PRC 10 Sn VALUES
LITHOLOGY 84-2218

SCALE	1:10 000	DATE	9-2-84
AUTHOR	P.A.R.	DRAWN	J.L.L.
OFFICE	D'PORT	REP.No.	
DRG.No.	D/LH01/606	FIG.No.	



Cu GEOCHEMISTRY



Pb GEOCHEMISTRY

342287

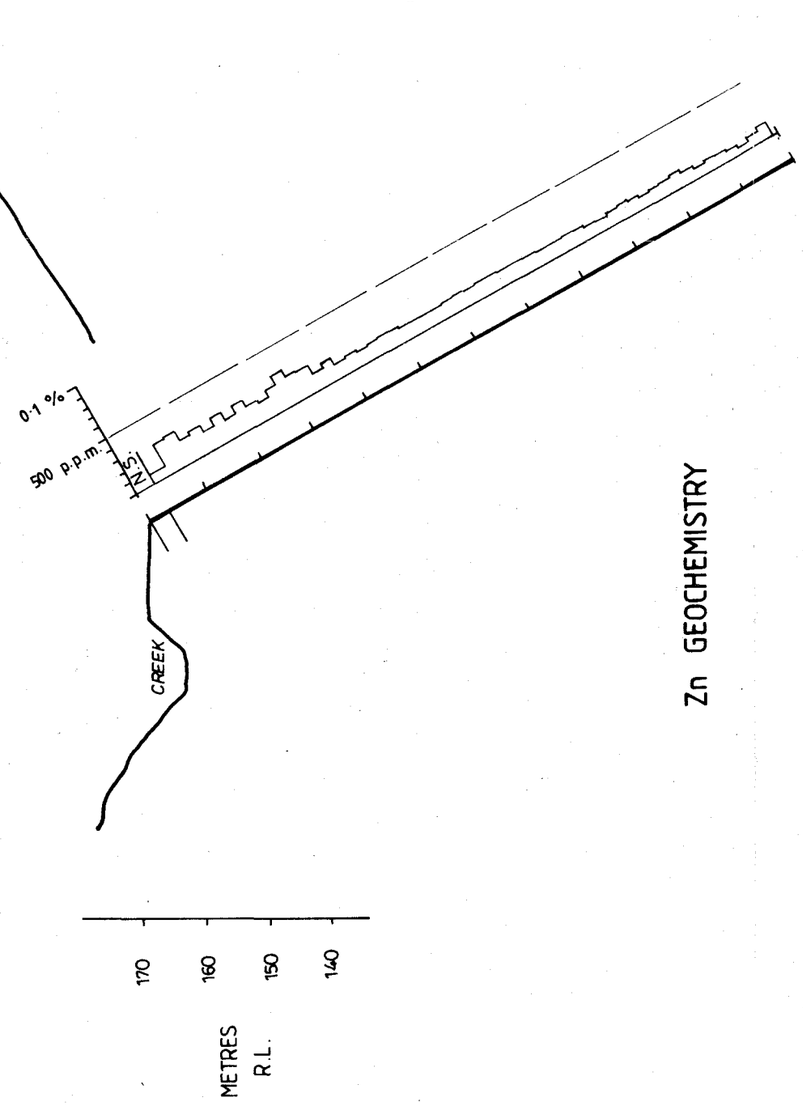
LINE 100 S

The Shell Company of Australia Limited
METALS DIVISION

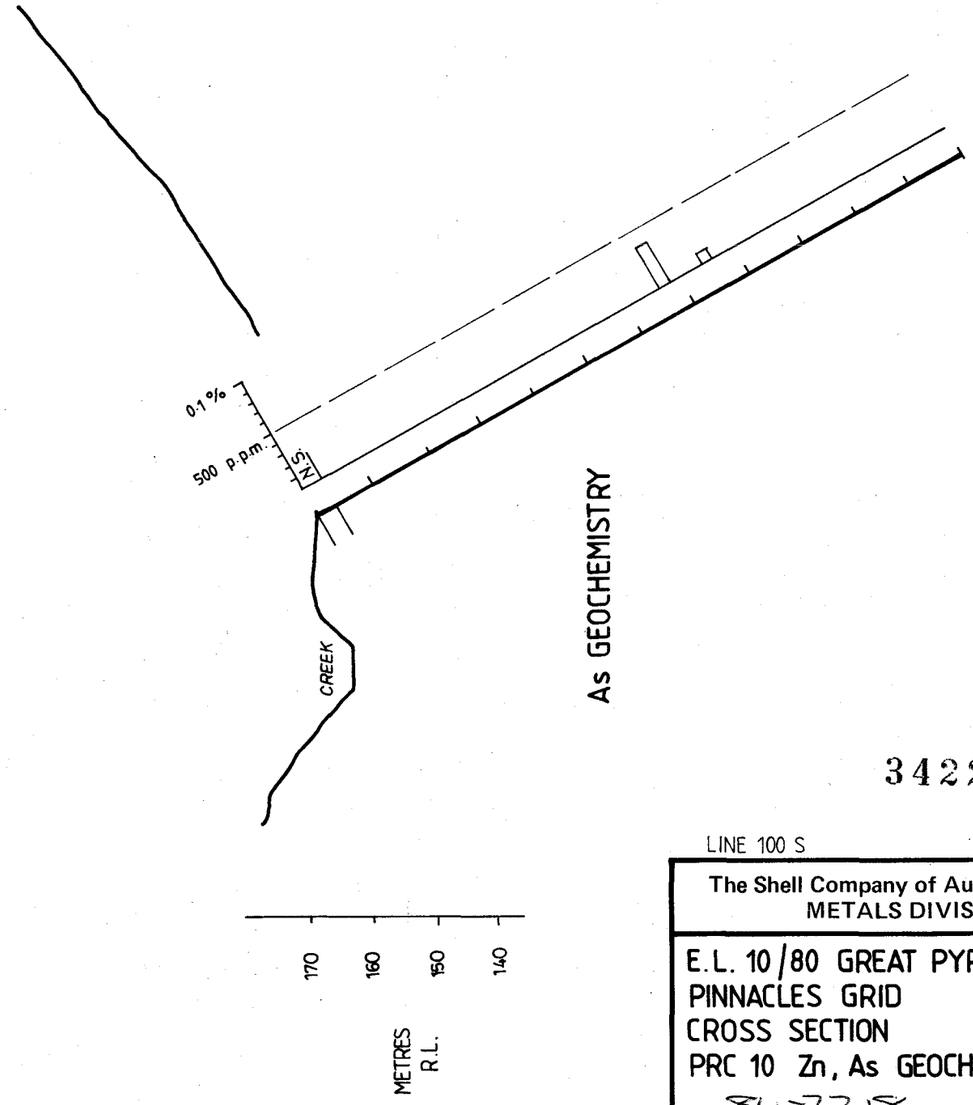
E.L. 10/80 GREAT PYRAMID
PINNACLES GRID
CROSS SECTION 016
PRC 10 Cu, Pb GEOCHEMISTRY

84-2218

SCALE	1:10000	DATE	2-7-84
AUTHOR	P.A.R.	DRAWN	J.L.L.
OFFICE	DEVONPORT	REP.No.	
DRG.No.	D/LH01/615	FIG.No.	



Zn GEOCHEMISTRY



As GEOCHEMISTRY

342288

LINE 100 S

5 cm

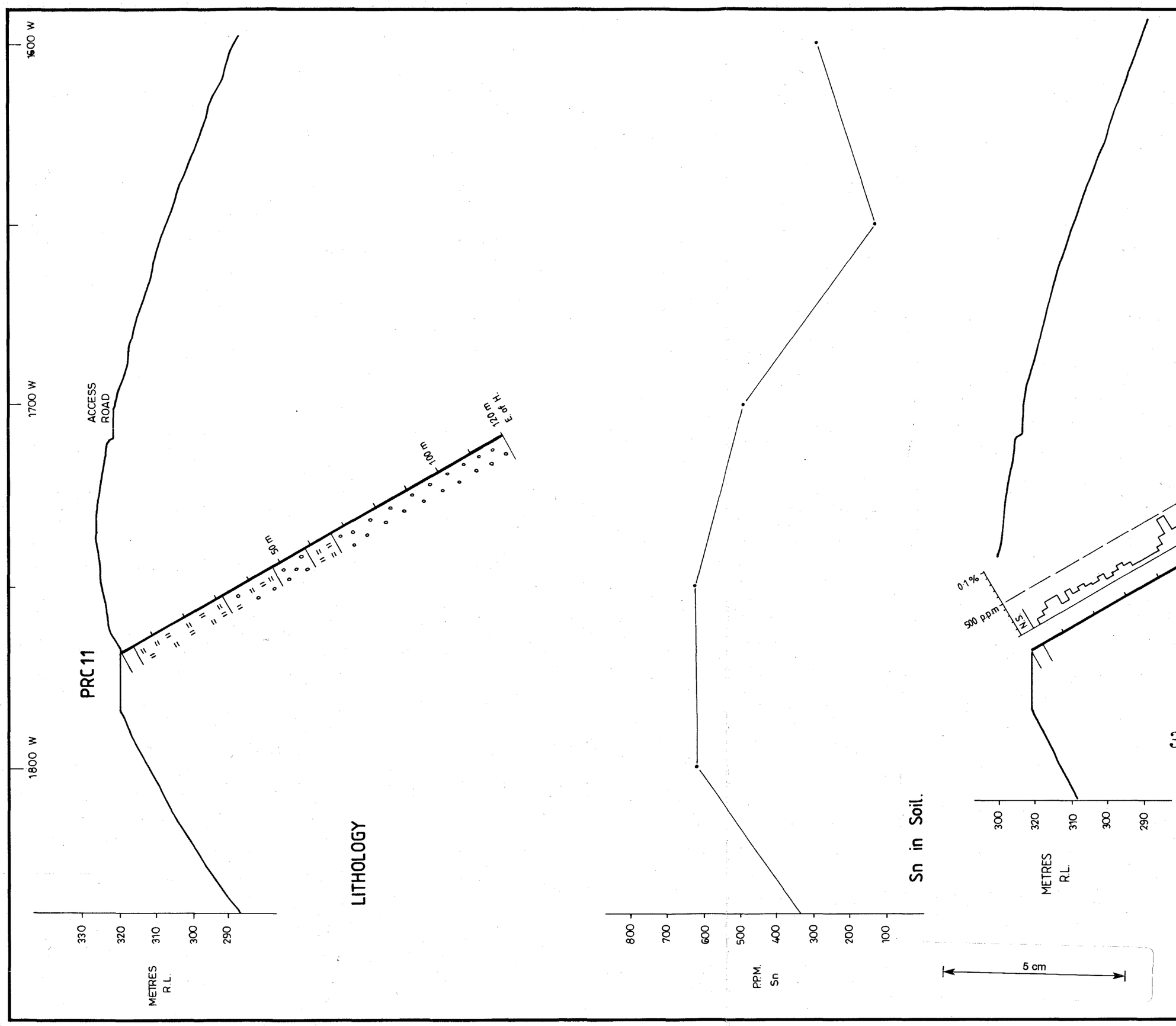
The Shell Company of Australia Limited
METALS DIVISION

E.L. 10/80 GREAT PYRAMID
PINNACLES GRID
CROSS SECTION
PRC 10 Zn, As GEOCHEMISTRY

017

84-2218

SCALE	1:10000	DATE	2-7-84
AUTHOR	P.A.R.	DRAWN	J.L.L.
OFFICE	DEVONPORT	REP.No.	
DRG.No.	D/LH01/616	FIG.No.	

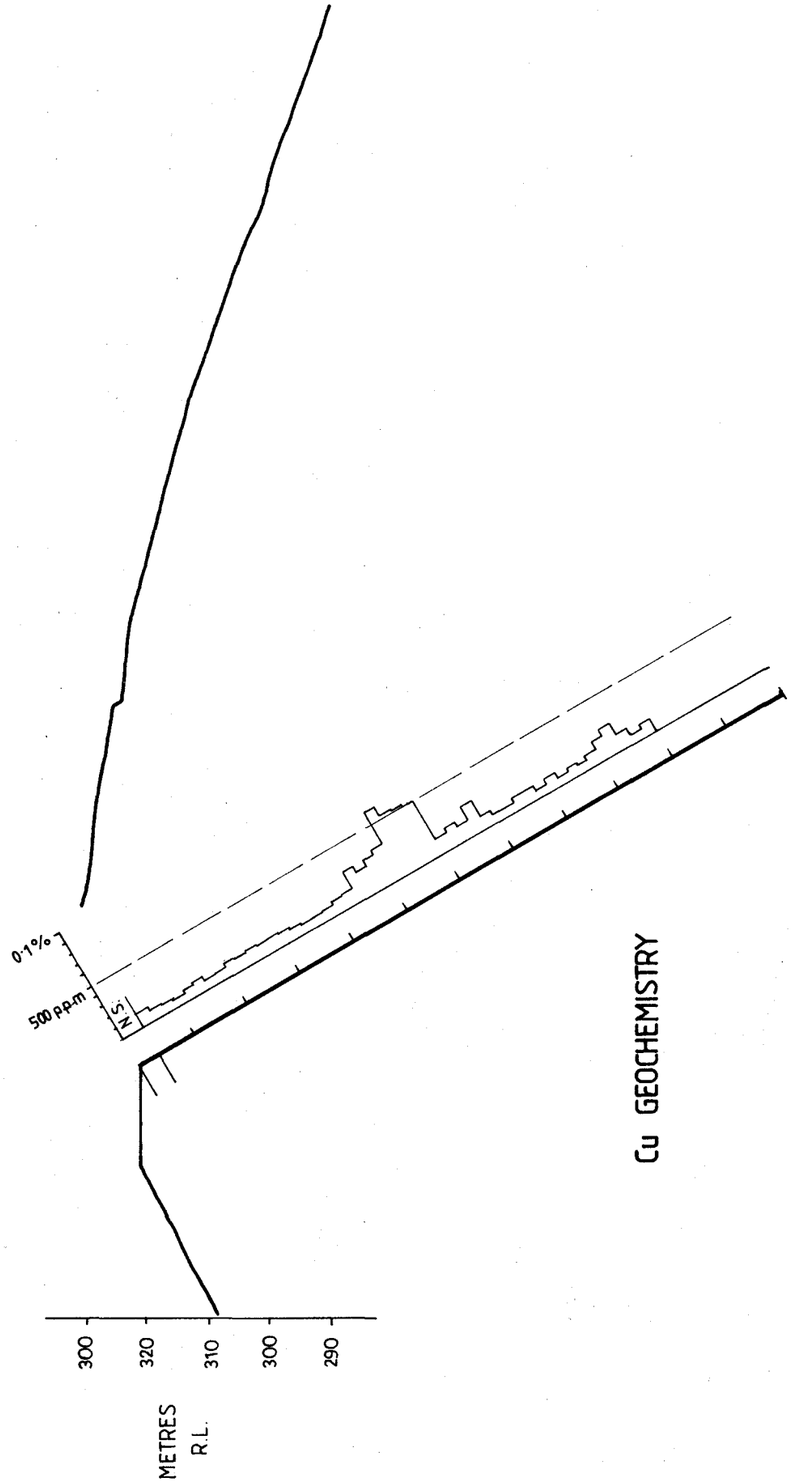


The Shell Company of Australia Limited
METALS DIVISION

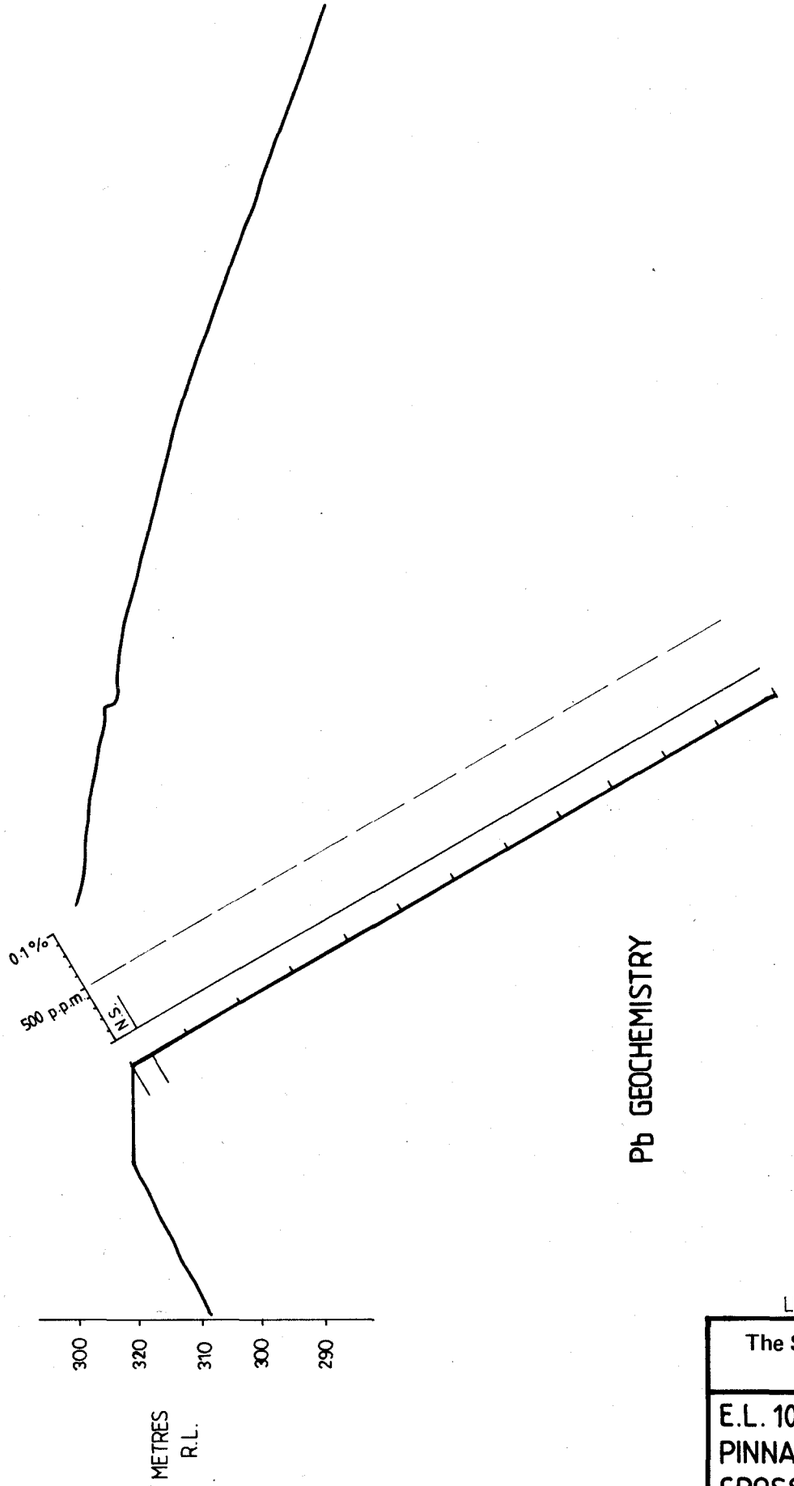
E.L. 10/80 GREAT PYRAMID
PINNACLES GRID
CROSS SECTION
PRC 11 Sn VALUES
LITHOLOGY 84-2218

018

SCALE	1:10000	DATE	9/2/84
AUTHOR	P.A.R.	DRAWN	J.L.L.
OFFICE	D'PORT	REP.No.	
DRG.No.	D/LH01/605	FIG.No.	



Cu GEOCHEMISTRY



Pb GEOCHEMISTRY

5 cm

342290

LINE 80 S

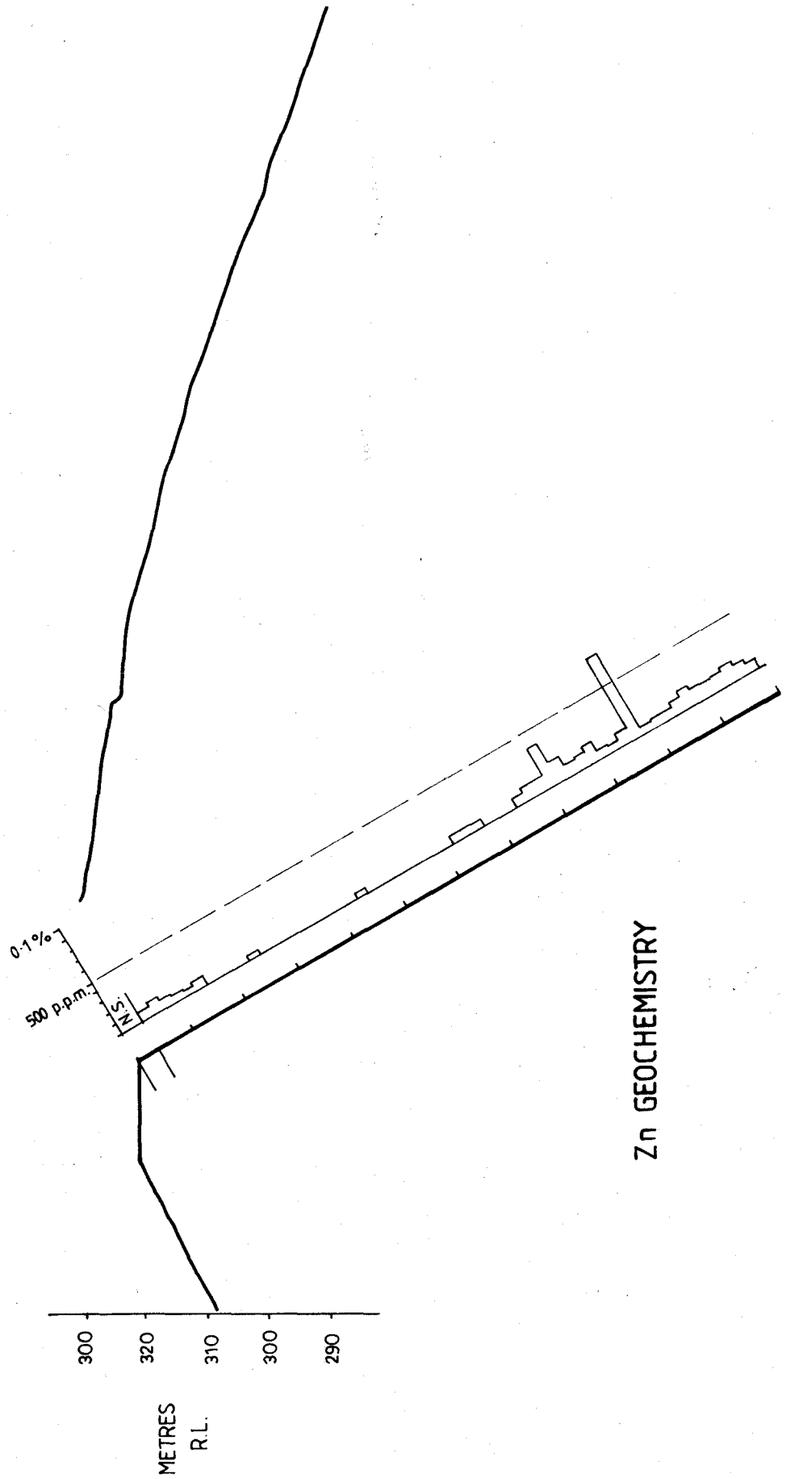
The Shell Company of Australia Limited
METALS DIVISION

E.L. 10/80 GREAT PYRAMID
PINNACLES GRID
CROSS SECTION
PRC 11 Cu, Pb GEOCHEMISTRY

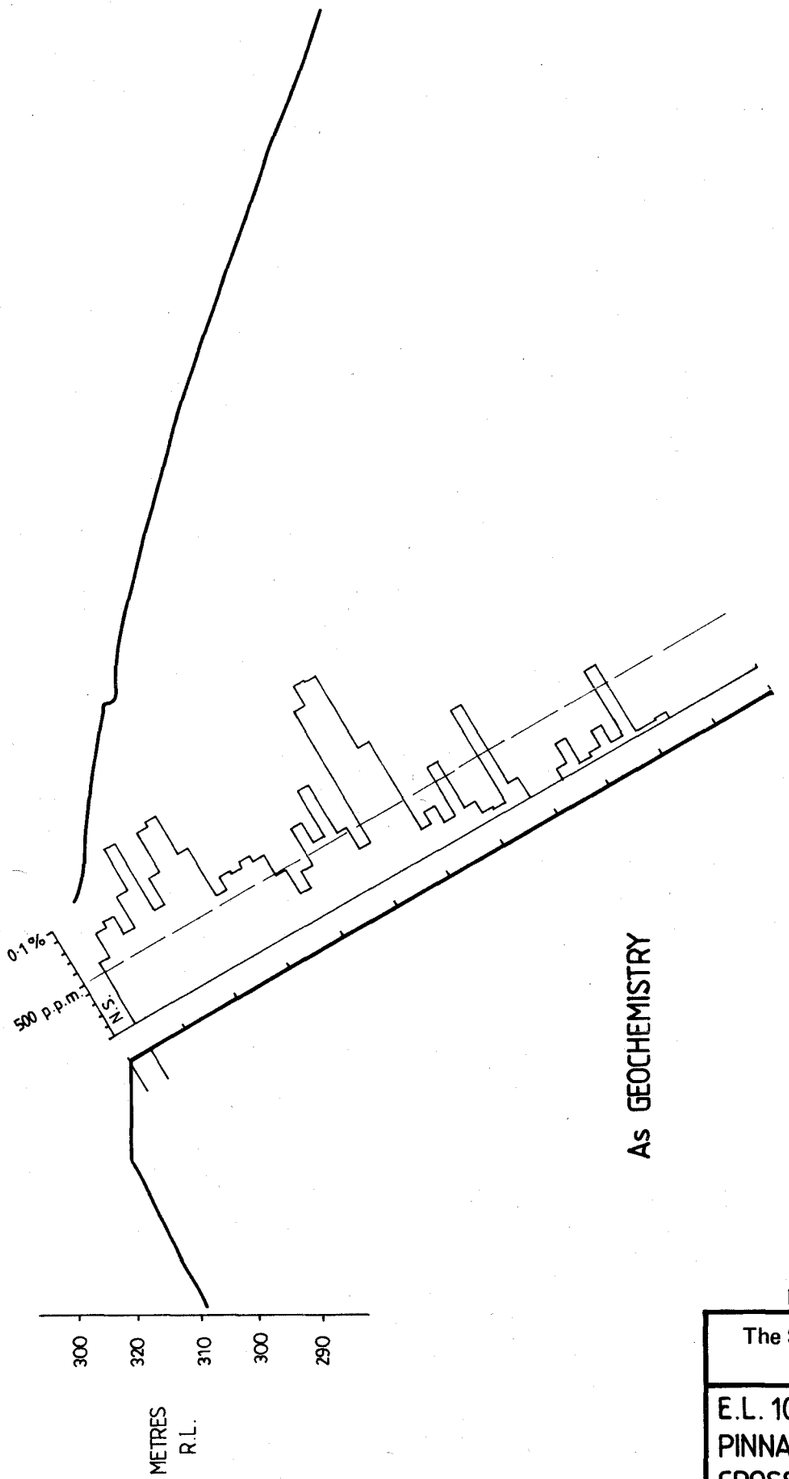
019

84-2218.

SCALE	1:10 000	DATE	2-7-84
AUTHOR	P.A.R.	DRAWN	J.L.L.
OFFICE	DEVONPORT	REP.No.	
DRG.No.	D/LH01/617	FIG.No.	



Zn GEOCHEMISTRY



As GEOCHEMISTRY

5 cm

342291

LINE 80 S

The Shell Company of Australia Limited
METALS DIVISION

E.L. 10/80 GREAT PYRAMID
PINNACLES GRID
CROSS SECTION 020
PRC 11 Zn, As GEOCHEMISTRY

84-2218.

SCALE	1:10000	DATE	2 - 7 - 84
AUTHOR	P.A.R.	DRAWN	J.L.L.
OFFICE	DEVONPORT	REP.No.	
DRG.No.	D/LH01/618	FIG.No.	

1300 W

1400 W

1500 W

CREEK

ACCESS ROAD

PRC 1

50 E

98m E of H

LITHOLOGY

METRES R.L.

210 200 190 180 170

770 p.p.m.

Sn in Soil surface

P.P.M. Sn

800 700 600 500 400 300 200 100 0

(HOLE NOT SURVEYED)

CREEK

0.1 %

500 p.p.m.

N S

PRC 1

Sn GEOCHEMISTRY

210 200 190 180 170

342292

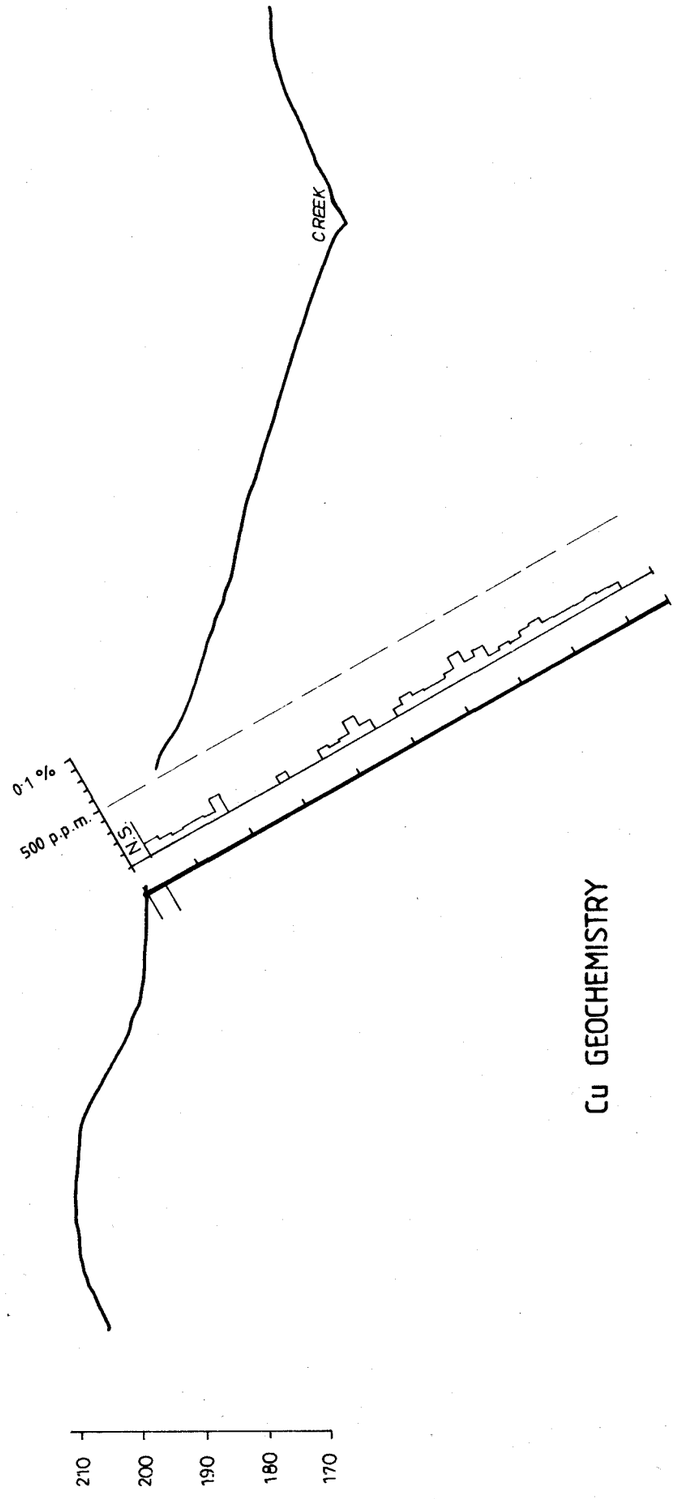
5 cm

LINE 475 S

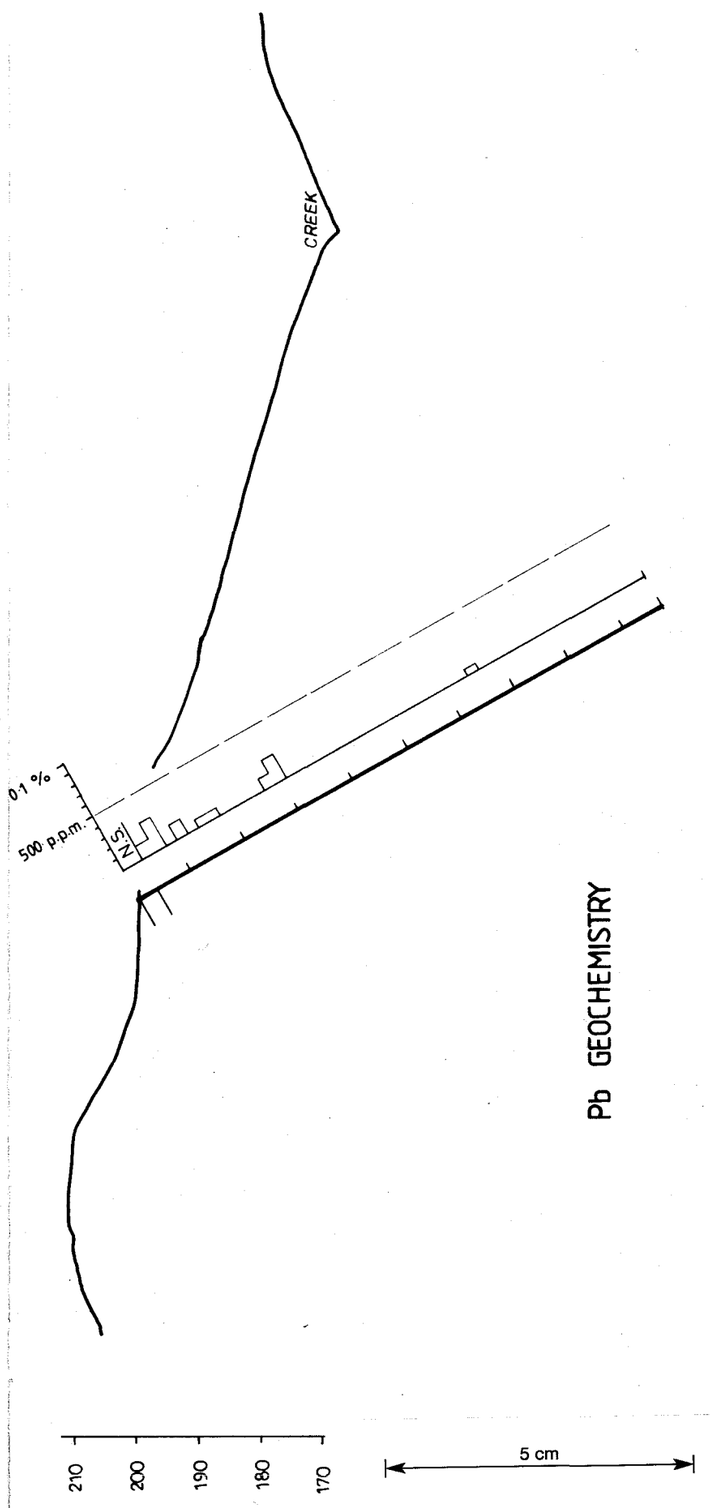
The Shell Company of Australia Limited
METALS DIVISION

E.L. 10/80 GREAT PYRAMID
PINNACLES GRID
CROSS SECTION 021
PRC 1 Sn VALUES
LITHOLOGY 84-2218

SCALE	1:10000	DATE	9/2/84
AUTHOR	P.A.R.	DRAWN	J.L.L.
OFFICE	D'PORT	REP.No.	
DRG.No.	D/LH01/607	FIG.No.	



Cu GEOCHEMISTRY



Pb GEOCHEMISTRY

342293

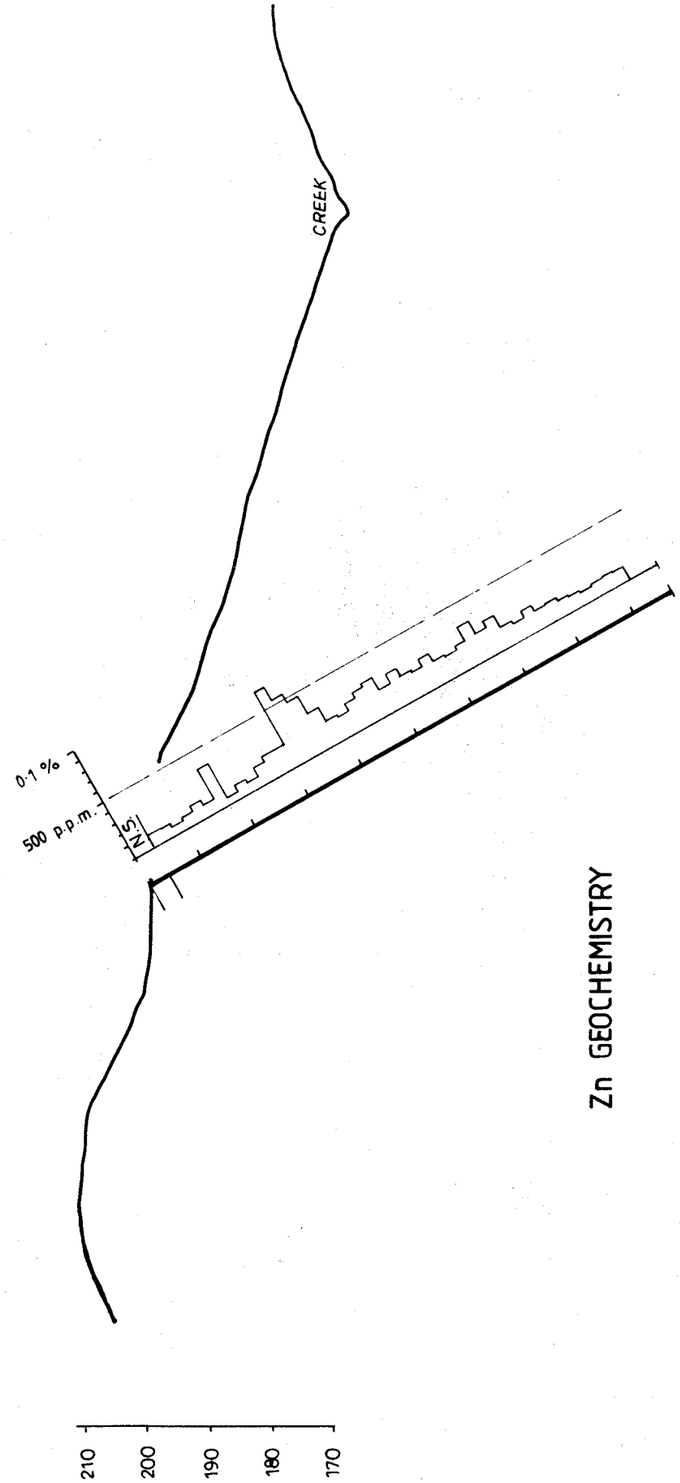
LINE 475 S

The Shell Company of Australia Limited
METALS DIVISION

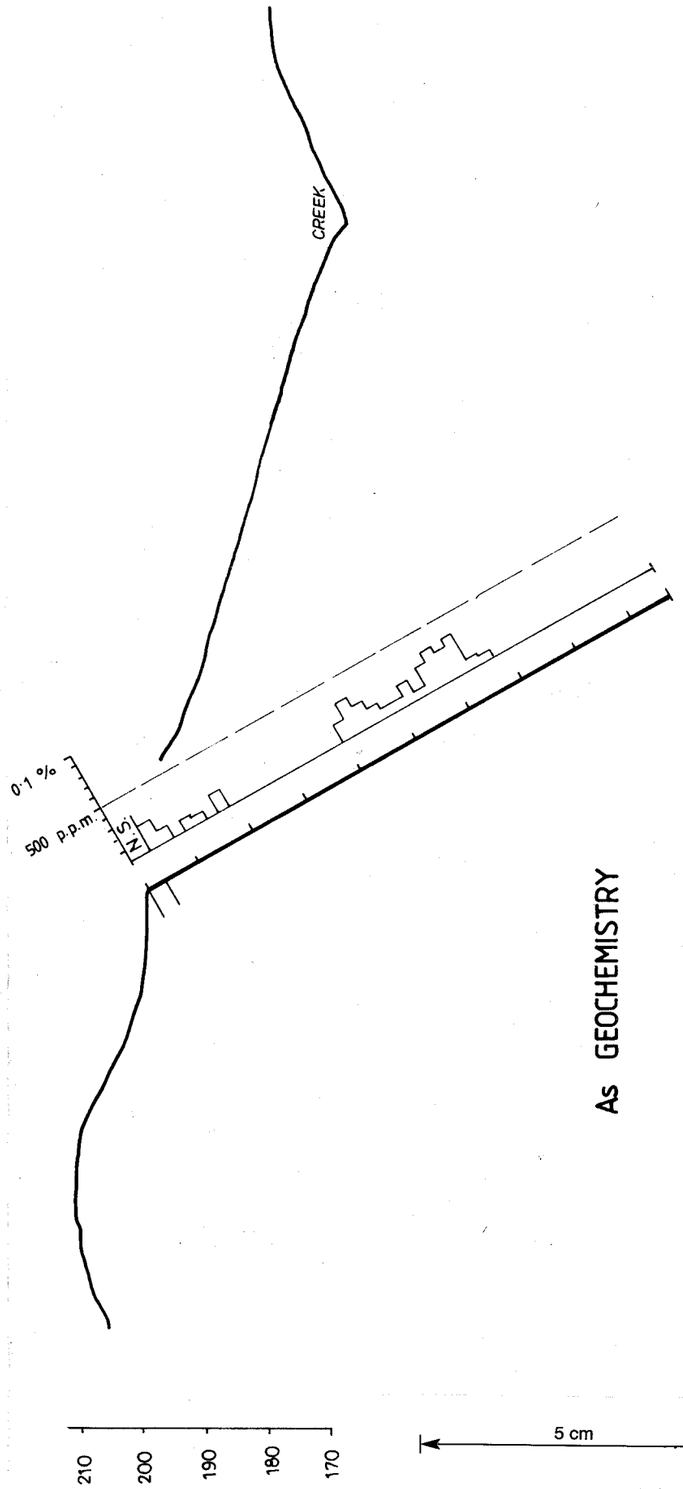
E.L. 10/80 GREAT PYRAMID
PINNACLES GRID
CROSS SECTION 022
PRC 1 Cu, Pb GEOCHEMISTRY

84-2218

SCALE	1:10000	DATE	15 - 6 - 84
AUTHOR	P.A.R.	DRAWN	J.L.L.
OFFICE	DEVONPORT	REP.No.	
DRG.No.	D/LH01/613	FIG.No.	



Zn GEOCHEMISTRY



As GEOCHEMISTRY

342294

LINE 475 S

The Shell Company of Australia Limited
METALS DIVISION

E.L. 10/80 GREAT PYRAMID
PINNACLES GRID
CROSS SECTION 023
PRC 1 Zn, As GEOCHEMISTRY

84-2218

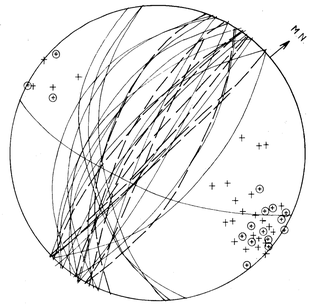
SCALE	1:10000	DATE	2 - 7 - 84
AUTHOR	P.A.R.	DRAWN	J.L.L.
OFFICE	DEVONPORT	REP.No.	
DRG.No.	D/LH01/614	FIG.No.	

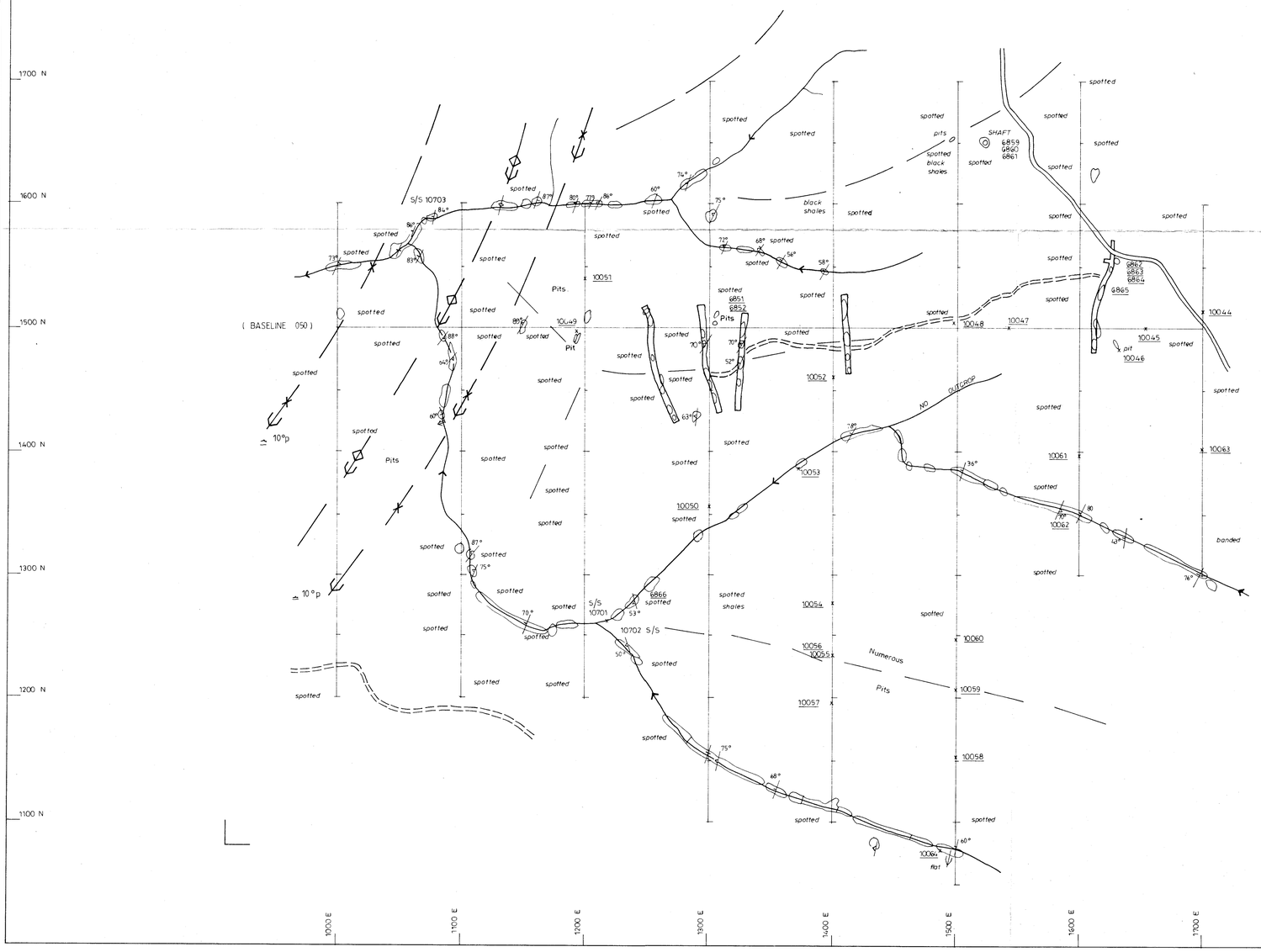
LOILA TIER GRID

POLES AND PLANES TO
BEDDING AND CLEAVAGE

BEDDING ——— + +
n = 26

CLEAVAGE — — — + ⊕
n = 16





LEGEND

- FOLD AXIS AND PLUNGE
- BEDDING
- CLEAVAGE
- YOUNGING DIRECTION
- spotted — SPOTTED SHALES/SILTSTONE AND SOME SANDSTONES
- 10050/6851 — ROCK CHIP SAMPLES.
- S/S 1072 — STREAM SEDIMENT SAMPLES
- ROAD
- GOSTEAN
- DISUSED TRACK
- RIDGE CRESTS
- OUTCROPS
- PITS/SHAFTS

GRID NORTH

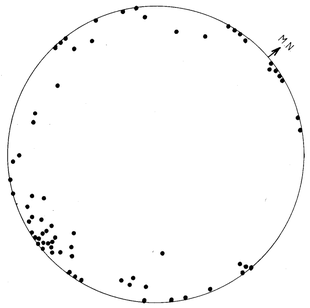
342295

0 50 m 100m

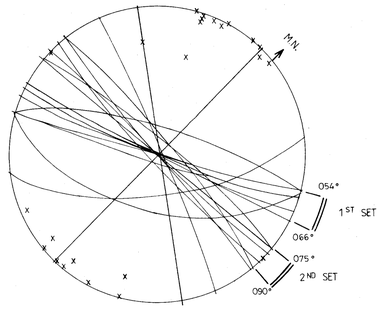
5 cm

The Shell Company of Australia Limited METALS DIVISION	
E.L. 12/78 SCAMANDER LOILA TIER GRID GEOLOGY – BEDDING 024 (INCLUDES STERONET DATA)	
84-2218 Scale 1:2000	
FIG. No.	REPORT No.
ENCL. No.	DRG. No. D/LH02/540
DATE 7-5-84	AUTHOR P.A.R.
DRAWN J.L.L.	OFFICE DEVONPORT

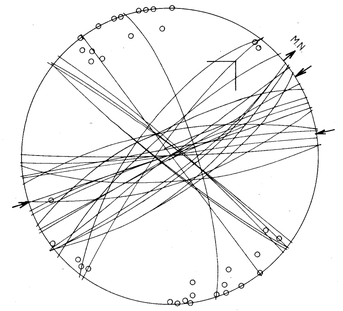
LOILA TIER GRID
Poles to Fractures
n = 54



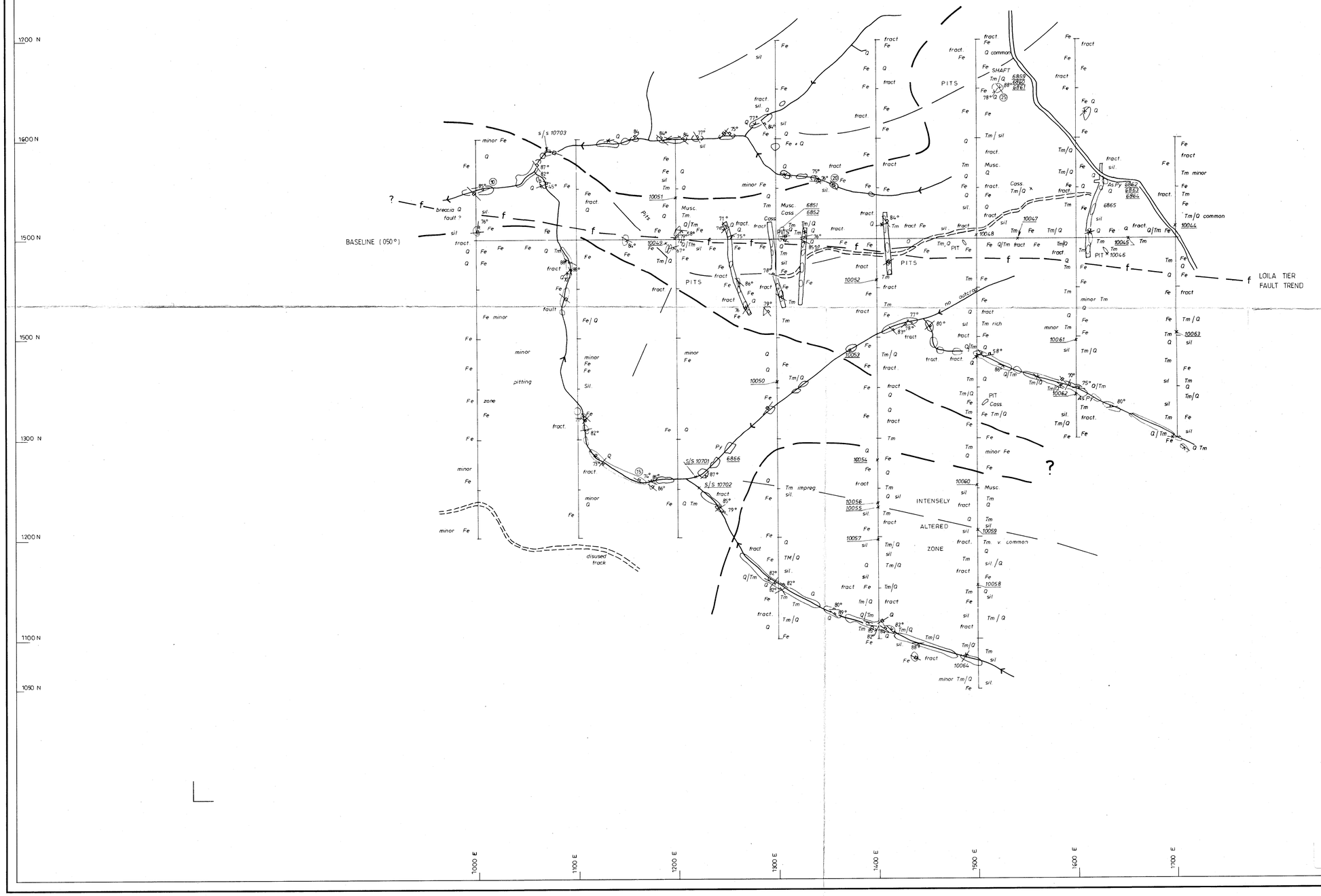
LOILA TIER GRID
Poles and Planes to
Tourmaline and Quartz Veins
n = 18



LOILA TIER GRID
Poles and Planes to
Quartz Veins
n = 29



STEREONET PLOTS (LAMBERT EQUAL AREA PROJECTION)



LEGEND

- 70° — FRACTURES
- Q 80° — VEINS
- Q — QUARTZ
- Tm — TOURMALINE
- sil. — SILICIFICATION
- fract. — FRACTURED
- Musc. — MUSCOVITE SELVAGE
- Cass. — CASSITERITE
- Fe — IRON STAINING
- 10050 / 6851 — ROCK CHIP SAMPLES
- S/S 10701 — STREAM SEDIMENT SAMPLES.
- ROAD
- COSTEAN
- DISUSED TRACK
- RIDGE CRESTS
- OUTCROPS
- PITS.

GRID NORTH

342296

0 50 m 100 m

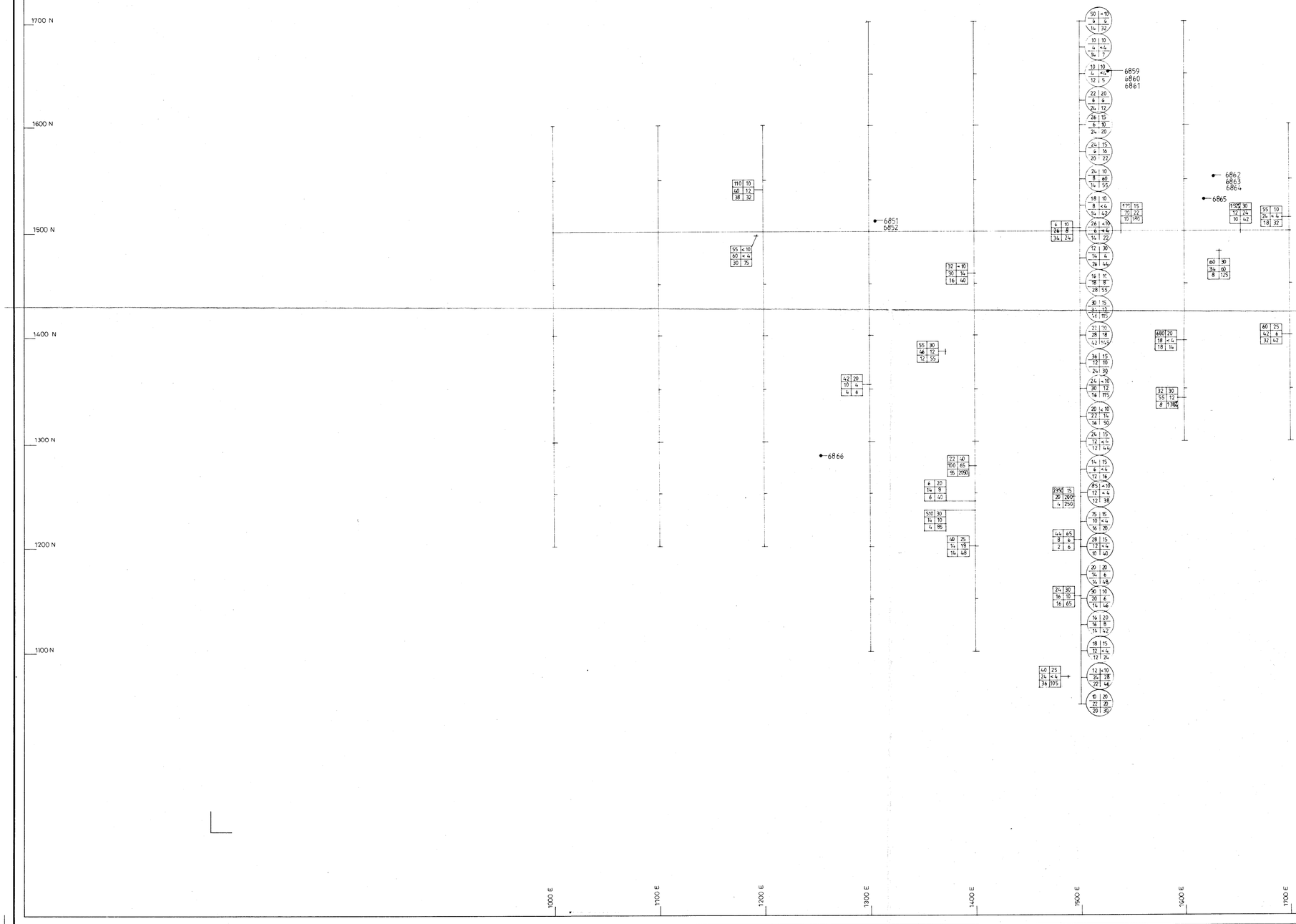
5 cm

The Shell Company of Australia Limited
METALS DIVISION

E.L. 12/78 SCAMANDER
LOILA TIER GRID
GEOLOGY - ALTERATIONS FRACTURES VEINS AND STEREONET PROJECTIONS 025
Scale 1:2000

84-2218

FIG. No.	REPORT No.
ENCL. No.	DRG. No. D/LH02/539
DATE 16-5-84	AUTHOR P.A.R.
DRAWN J.L.L.	OFFICE DEVONPORT



SAMPLE No	ROCK CHIP ANALYSIS					
	Sn	WO_3	Cu	Pb	Zn	As
6851	3.95%	70	14	12	4	290
6852	1.25%	45	16	12	4	240
6859	65	< 10	6	60	6	105
6860	1500	< 10	6	55	10	65
6861	75	30	6	150	8	28
6862	10	< 10	230	610	200	2.65%
6863	28	< 10	155	9000	22	7250
6864	60	50	1050	8.05%	220	3.9%
6865	70	10	12	1100	6	600
6866	4	< 10	16	100	55	120
6867	100	15	14	26	28	190
6868	6	15	14	34	18	2550
6869	8	40	12	24	38	60

ROCK CHIP ANALYSIS

Sn	WO_3
Cu	Pb
Zn	As

SOIL SAMPLE ANALYSIS

Sn	WO_3
Cu	Pb
Zn	As

GRID NORTH

342297

0 100 m

The Shell Company of Australia Limited
METALS DIVISION

E.L. 12 78 SCAMANDER
LOILA TIER GRID
SOIL AND ROCK CHIP SAMPLE RESULTS
Sn , WO_3 Cu , Pb, Zn, As. 026

84-2218

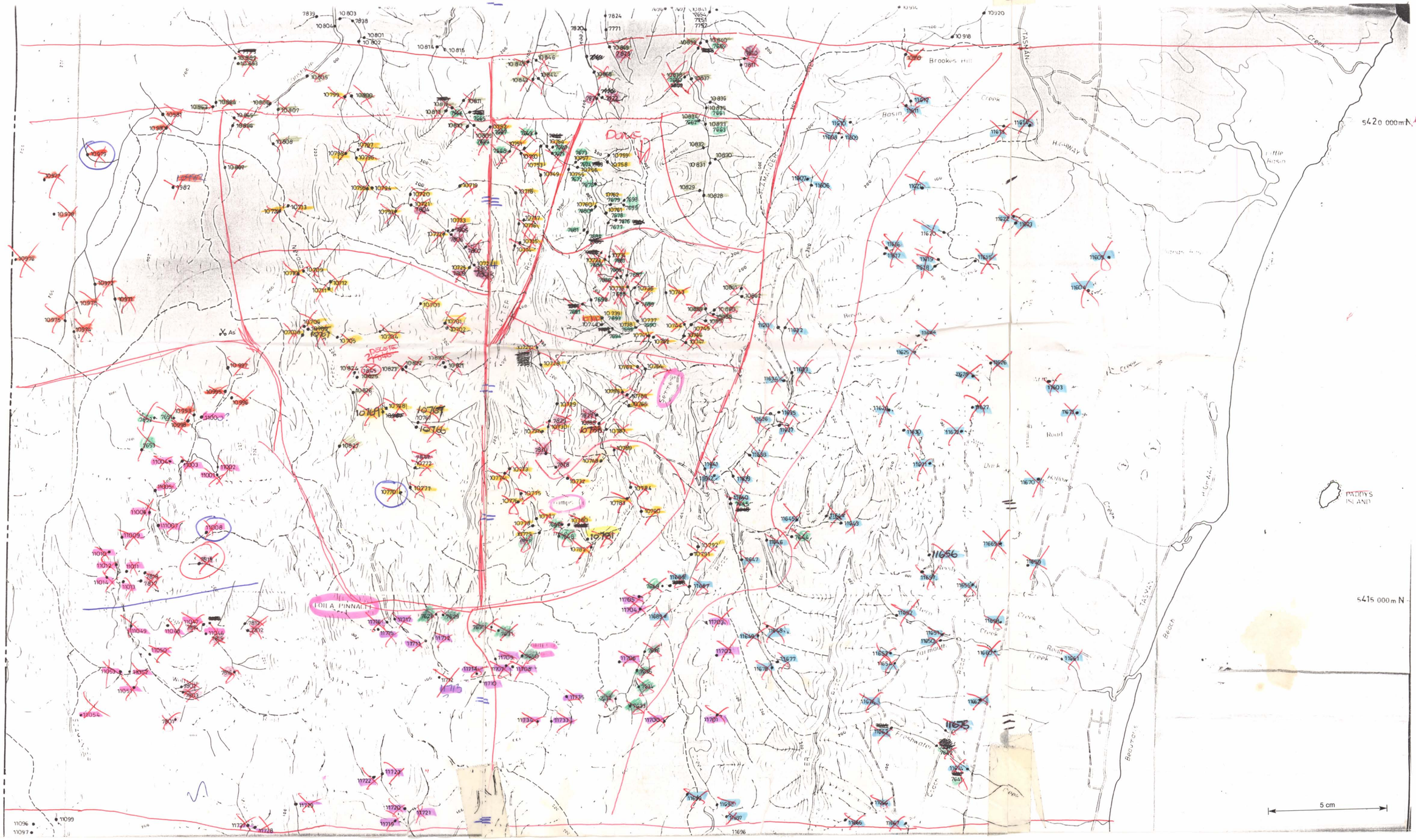
SCALE 1:2000	DATE 29-5-84
AUTHOR P.A.R	DRAWN J.L.L
OFFICE DEVONPORT	REP.No.
ENCL No.	DRG No. D/LH02/544

342298

DOME

PYENGANA
ST HELENS
BRILLIANT
SCAMANDER (BEAUMARIS)

SAMPLE NOS	DATA BASE NOS	
7601 – 7699	0601 – 0699	DOME
7601 – 7647	0501 – 0547	DOME
10701 – 10999	~~11000 – 11200~~ 0701–0999	orange, dirty green, red
11000 – 11200	11000 – 11200	pink, light green
11501 – 11765	11501 – 11765	orange, blue, purple



11750

SCAMANDER (BEAUMARIS)
(FALMOUTH)

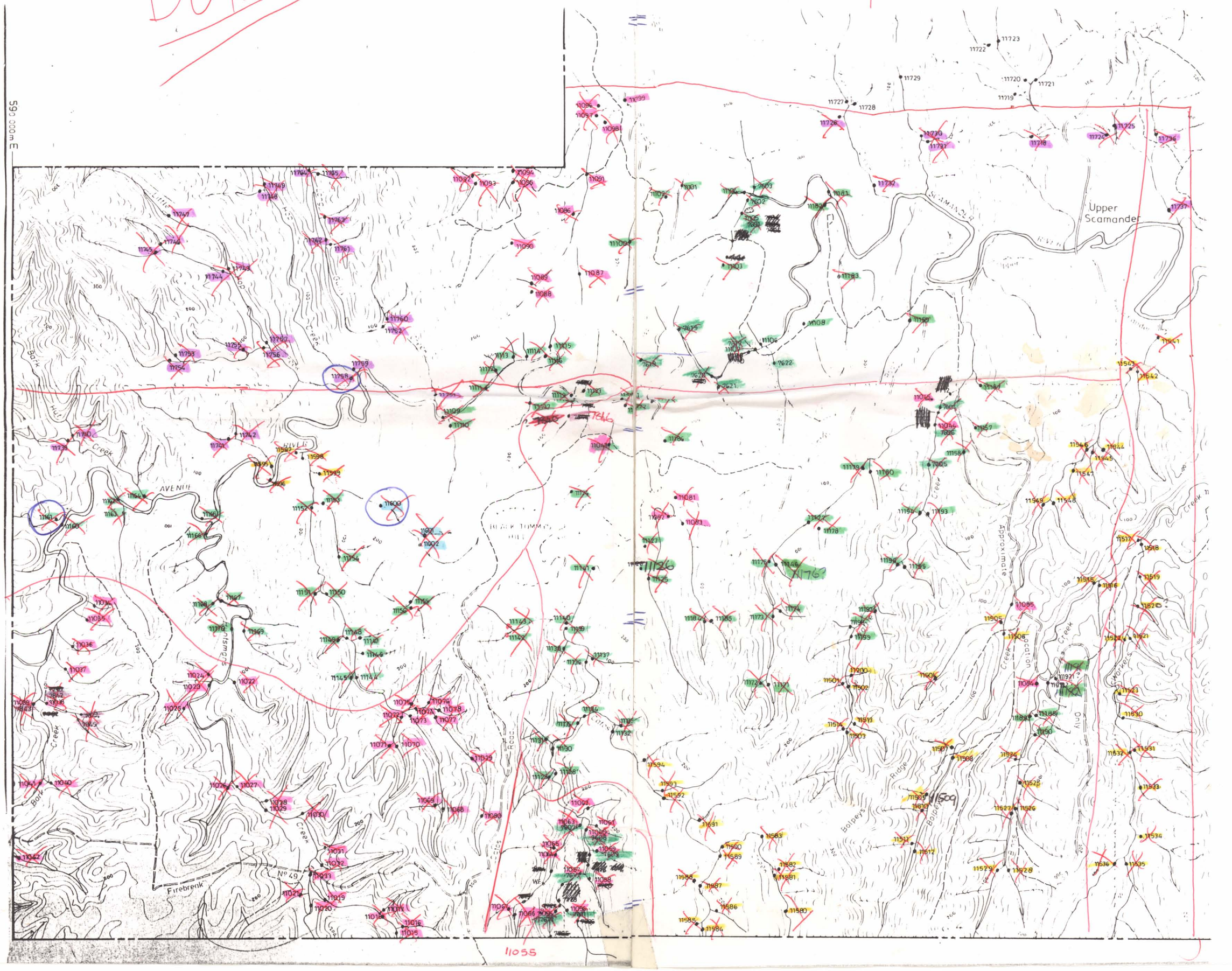
BRILLIANT
DUBLINTOWN

DONE

SAMPLE NOS	DATA BASE NOS
7601-7699	0601-0699
7501-7647	0501-0547
10701-10999	0701-0999
11000-11200	11000-11200
11501-11765	11501-11765

342299

5 cm

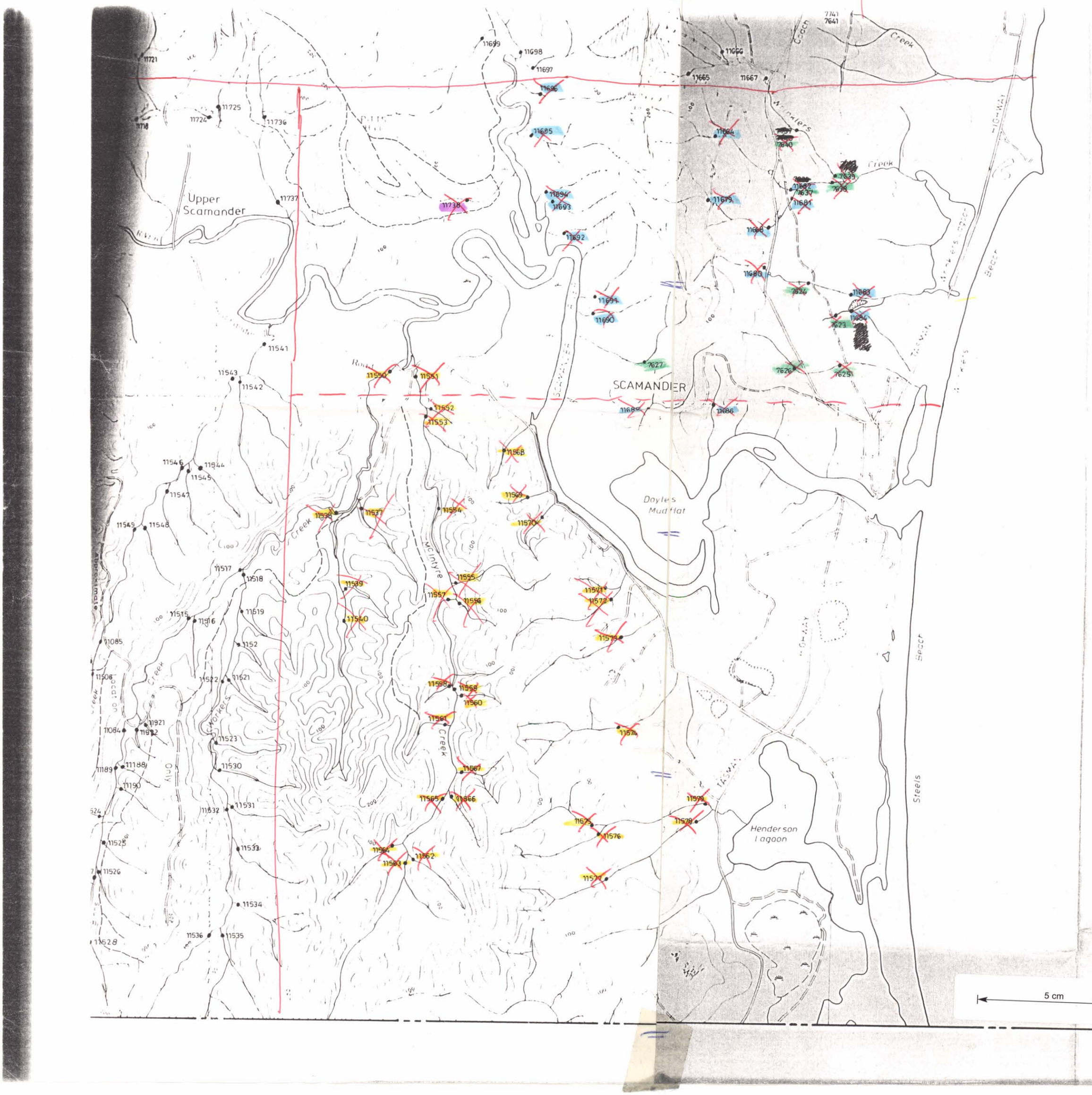


342300

SCAMANDER (BEAUMARIS) (FALMOUTH)

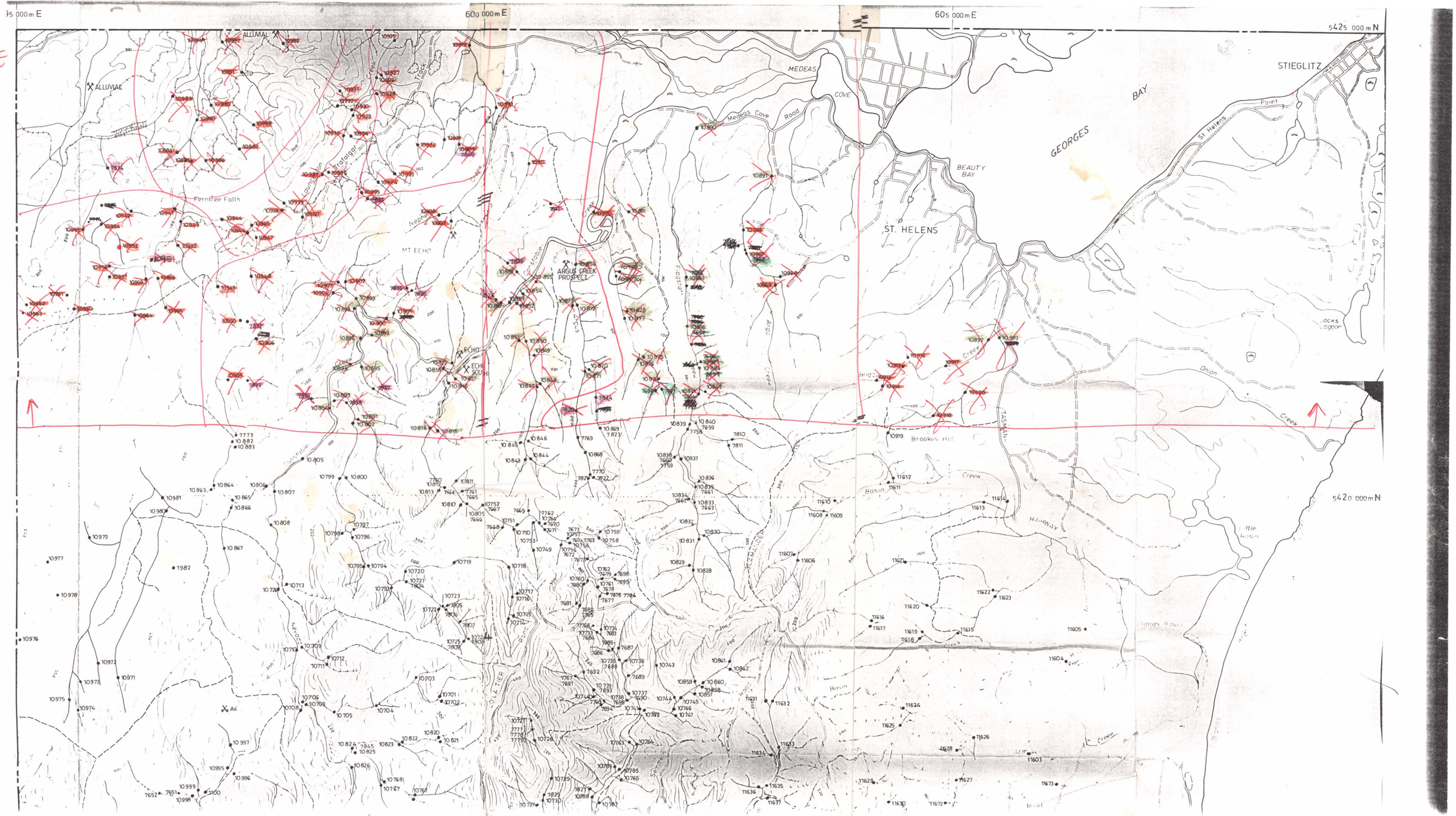
DONE

SAMPLE NOS	DATA BASE NOS
7601-7694	0601-0694
7901-7947	0501-0547
10701-10944	0701-0944
11000-11200	11000-11200
11501-11765	11501-11765



DONE

342301



	SAMPLE NOS	DATA BASE NOS
ST HELENS	7601–7699	0601 – 0699
	7801–7847	0501 – 0547
PYENGANA	10701–10999	0701 – 0999
	11000–11200	11000 – 11200
	11501 – 11763	11501 – 11763

5 cm