

BILLITON AUSTRALIA
 THE METALS DIVISION OF
 THE SHELL COMPANY OF AUSTRALIA LIMITED

RECONNAISSANCE GOLD EXPLORATION
 NORTH EAST TASMANIA

1989/90
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MINES

631/8

REFER CORRES

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1. INTRODUCTION

This report details the extent of work completed and results obtained by Billiton during 1989-90 in regard to an investigation into the gold potential of the North East Province of Tasmania (Figure 1). At the time, the company had no ground holding in the region and hence the purpose of the study was to identify and characterise the regional controls of gold mineralization and to recommend areas for field reconnaissance and ultimately acquisition.

Office studies and field reconnaissance were carried out by two Billiton geologists and in all, a total of approximately 40 man days were devoted to this work. Subsequently, a regional scale stream sediment survey was completed by 2-3 company staff over a period of seven months from May 1989 - December 1989. In 1990, a geological consultant was engaged for one week to examine the regional nature of the thermal aureoles surrounding the Scottsdale and Blue Tier Batholiths.

Although this report has been compiled almost 18 months after completion of the study, it is written according to the state of knowledge at the time of 1989-90.

102006

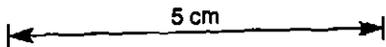
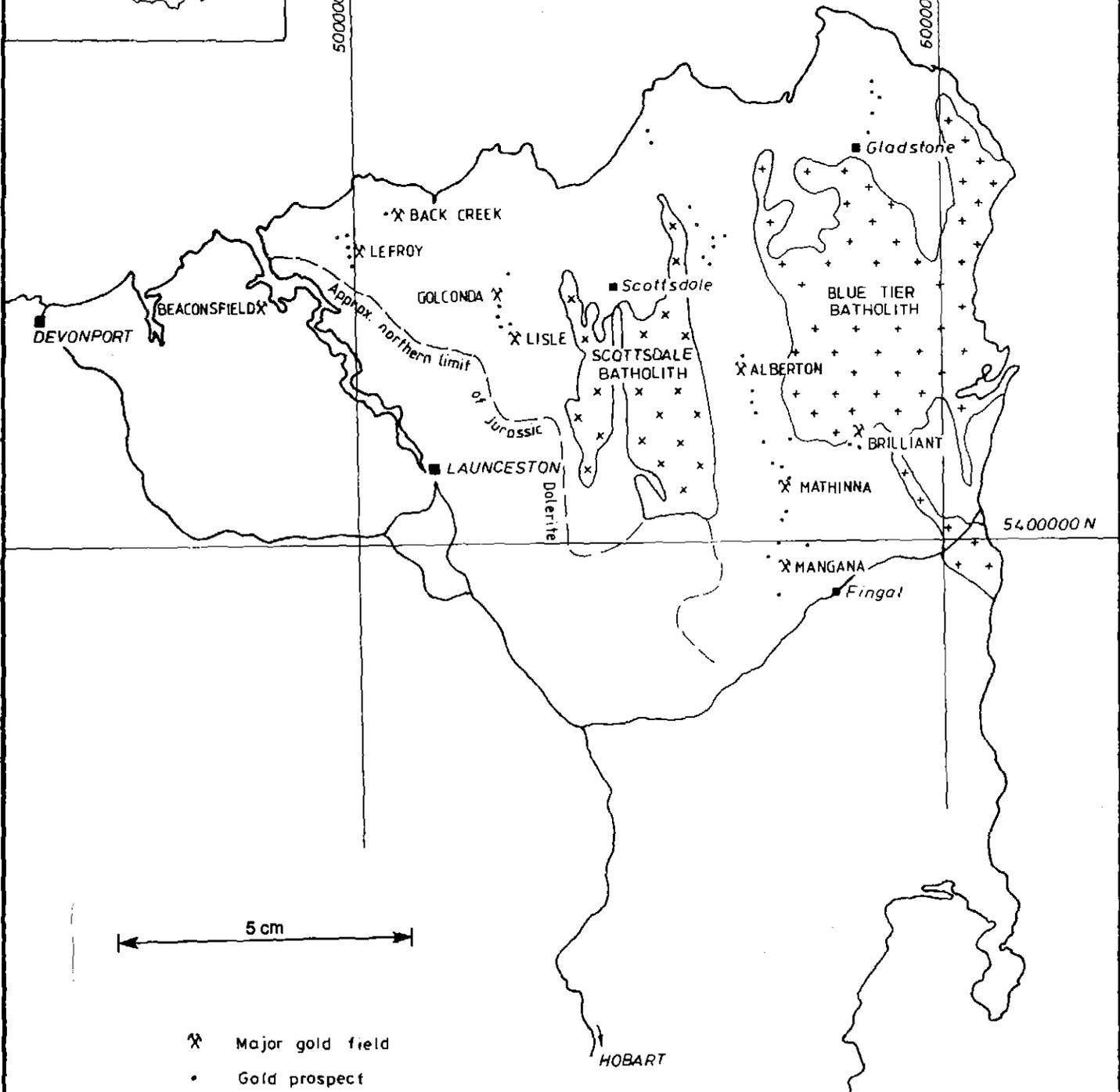


NORTH EAST PROVINCE

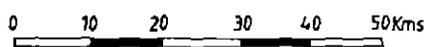
550000 N

500000 E

600000 E



- X Major gold field
- Gold prospect



 Billiton Australia <small>The Metals Division of the Shell Companies of Australia Limited</small>			
Project		N. E. TASMANIA	
Title			
LOCATION OF STUDY AREA			
Author	JPR	Date	12/91
Scale	1:1000000		
Drawn	OH	Office	TAS
Revised	Date		
Drawing No.	Fig. No. 1		

2. REGIONAL COMPILATION

Desk studies comprised the intergration of four data sets to produce a regional synthesis (Figure 2).

The standard 1:250,000 geological sheet (Launceston SK55-4) was used as a basis from which the main lithotypes were delineated (viz Jurassic dolerite, Permian-Triassic sediments, Devonian-Ordovician Mathinna Beds, Devonian adamellite, Devonian granodiorite, Devonian alkali granite). Superimposed on the geology was the distribution of all known gold occurrences. These tended to cluster into ovoid to linear groupings suggesting a structural control on mineralization.

Using a Landsat Mosaic of Tasmania (Technical and Field Surveys, Nov. 1982) it was possible to complete a fracture analysis of the north-east block (Figure 3) in order to identify dominant trends. These were then transferred to the regional synthesis map as linear structural corridors.

The Bouguer gravity map of Tasmania was also used to broadly determine zones of obvious crustal differences by virtue of contrasting gravity signatures. This resulted in the identification of several breaks or discontinuities.

After consideration of this data in regard to the controlling factors of gold mineralization, several observations were made viz

- known gold mineralization is spatially distinct from known Sn, W and Cu, Pb, Zn mineralization.
- known gold mineralization is related to NNW trending structural linears within Mathinna Beds turbiditic sediments.
- the relationship of gold mineralization to granodioritic intrusives has long been suggested and many workings occur within the contact metamorphosed aureole surrounding the intrusives.
- there is an obvious WNW trending gold corridor of dimensions 90 x 25Km extending from Beaconsfield - Lefroy in the north-west to Mangana - Golden Ridge in the southeast.
- many NNW structures are recognised from Landsat but only some have known gold mineralization.

Target areas were selected on the basis of:

- a) location within the gold corridor.
- b) proximity to a major NNW linear.
- c) proximity to a granodiorite pluton.

- d) mapped hornfelsed Mathinna Beds.
- e) known proximal gold mineralization.
- f) proximity to interpreted regional gravity breaks.

As a result of this selection process a total of 40 areas were chosen for further study. These areas are compiled in Table 1 and represented geographically on Figure 4. All areas identified have characteristics which at least superficially suggest that one or more mineralizing traits are present. Inherent in this selection process then is a need to identify the mineralization models which can be applicable to this region.

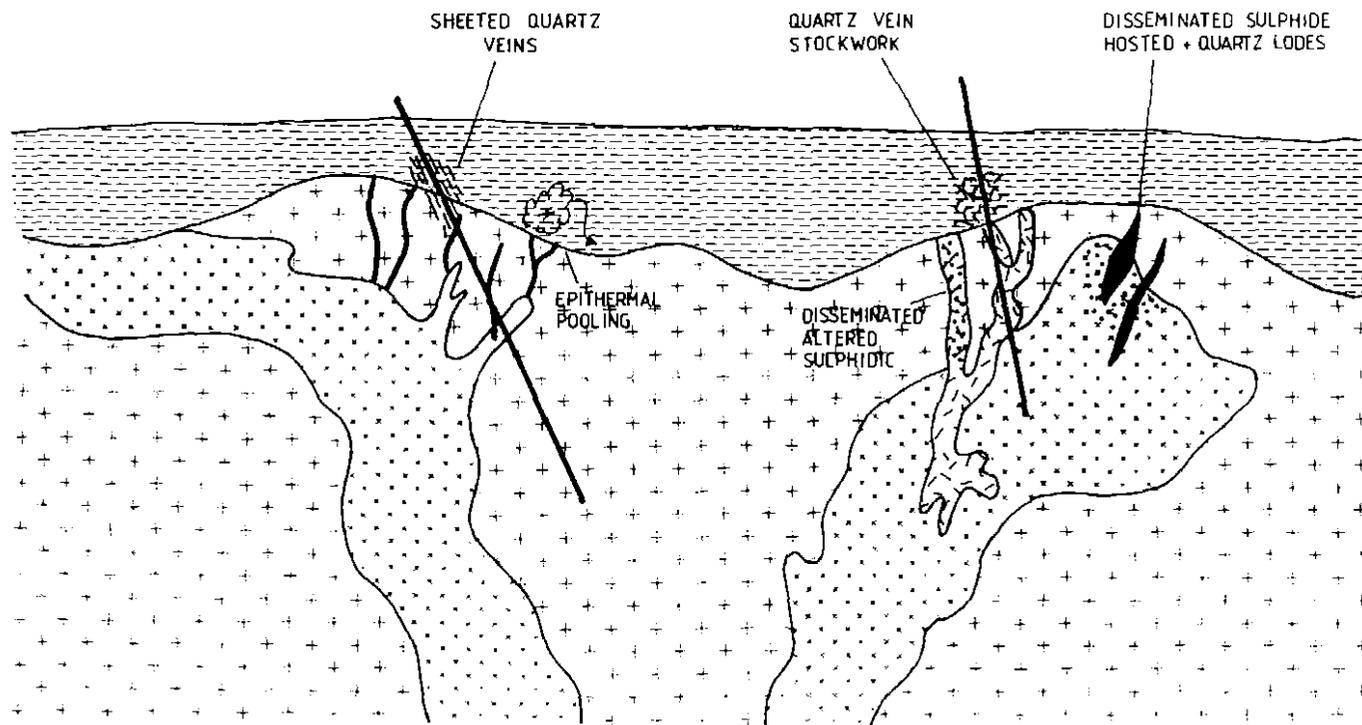
At the outset it was realized that a potential gold target area would attract exploration funding only if it satisfied broad corporate economic criteria. This information is not detailed here but suffice to say that as a "ball Park" estimate, the system would need to contain open pittable mineralization with a total geological resource in excess of 15 tonnes of gold. As an example of this criteria, at a resource grade of 3g.t Au and assuming a pit extent to 100 metres below surface, a potential system might have surface dimensions of 400-500 metres strike x 40-50 metres width.

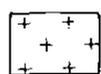
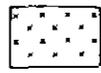
Three target types were considered based upon some regional knowledge of the North East Province: (Figure 5)

AREA	LOCATION	GEOLOGICAL SHEET 1:50000	TOPO SHEET 1:100000	TENEMENTS	REGIONAL CHARACTER
1	LEFROY	PIPERS RIVER	PIPERS	VACANT	MAJOR LINEAR KNOWN MINERALIZATION
2	PIPERS RIVER	PIPERS RIVER	PIPERS	DERWENT MINERALS	MAJOR LINEAR
3	BACK CREEK	PIPERS RIVER	PIPERS	DERWENT MINERALS	KNOWN MINERALIZATION
4	TURNERS MARSH	PIPERS RIVER	PIPERS	VACANT	GRAVITY BREAK MAJOR LINEAR POST-DEVONIAN COVER
5	LEBRINA	PIPERS RIVER	PIPERS	ARGYLE MINING	MAJOR LINEAR SMALL WORKING NOT HORNFELSED
6	GOLCONDA LISLE	PIPERS RIVER LAUNCESTON	PIPERS	ARGYLE MINING & ETA	MAJOR LINEAR KNOWN MINERALISATION EXTENSIVE HORNFELS GRANODIORITE APOPHYSES
7	PATERSONIA	LAUNCESTON	PIPERS	VACANT	INTERSECTING LINEARS POST-DEVONIAN COVER
8	BARROW CREEK	LAUNCESTON	PIPERS	ETA	MAJOR LINEAR GRANODIORITE MARGIN HORNFELSED
9	SPRINGFIELD	PIPERS RIVER	PIPERS	VACANT	MAJOR LINEAR
10	BURNS CREEK	LAUNCESTON	PIPERS	PLACECO	GRANODIORITE MARGIN WEAK MINERALISATION STRUCTURAL PROXIMITY
11	SOUTH SPRINGFIELD	RINGAROOMA ALBERTON	FORESTER	VACANT	HORNFELSED SEDIMENTS
12	HANG DOG HILL	RINGAROOMA	FORESTER	D. PARISH TONGANAH KAOLIN MINE	MAJOR LINEAR GRAVITY BREAK
13	LEGERWOOD	RINGAROOMA	FORESTER	VACANT	GRAVITY BREAK GRANODIORITE MARGIN
14	FORESTER	RINGAROOMA BOOBYALLA	FORESTER	PLACECO EXEMPT AREAS	MAJOR LINEAR KNOWN MINERALISATION GRANODIORITE MARGIN
15	GOLDEN RIDGE	ST. HELENS	FORESTER GEORGES BAY	FEDERATION RESOURCES ET AL	GRAVITY BREAK MAJOR LINEAR KNOWN MINERALISATION

AREA	LOCATION	GEOLOGICAL SHEET		TENEMENTS	REGIONAL CHARACTER
		1:50000	1:100000		
16	GREAT FINGAL	BEN LOMOND	ST. PAULS	VACANT	KNOWN MINERALISATION STRUCTURAL EXTENSION
17	FINGAL	BEN LOMOND	ST. PAULS	VACANT	GRAVITY BREAK MAJOR LINEAR
18	MANGANA	BEN LOMOND	ST. PAULS	ALCASTON	GRAVITY BREAK KNOWN MINERALISATION
19	JOY CREEK	BEN LOMOND ALBERTON	FORESTER	VACANT	GRAVITY BREAK MAJOR LINEAR HORNFELED SEDIMENTS
20	UPPER BLESSINGTON	ALBERTON	FORESTER ST. PAULS	VACANT	MAJOR LINEAR GRAVITY BREAK GRANITE MARGIN
21	PORCUPINE CREEK	ALBERTON	FORESTER	VACANT	MAJOR LINEAR GRANITE MARGIN
22	MT. SADDLEBACK	ALBERTON	FORESTER	GOLDSEARCH PLACER	MAJOR LINEAR GRANITE MARGIN GRAVITY BREAK
23	MATHINNA MT VICTORIA	ALBERTON ALBERTON	FORESTER ST. PAULS FORESTER	ALCASTON NARGHUN FEDERATION RESOURCES ET AL	MAJOR LINEAR KNOWN MINERALISATION MAJOR LINEAR KNOWN MINERALISATION
24	ALBERTON	ALBERTON	FORESTER	V. THREADER	GRAVITY BREAK KNOWN MINERALISATION MAJOR LINEAR
25	MT. VICTORIA EAST	ALBERTON	FORESTER	FEDERATION RESOURCES ET AL	GRAVITY BREAK MAJOR LINEAR GRANITE MARGIN
26	RATTLER RANGE	ALBERTON	FORESTER	VACANT	MAJOR LINEAR
27	TEN MILE CREEK	RINGAROOMA	FORESTER	EXEMPT AREA	ALKALI GRANITE CONTACT AUREOLE
28	LOONES RD.	RINGAROOMA	FORESTER	EXEMPT AREA	HORNFELED SEDIMENTS GRANITE CONTACT ALKALI GRANITE CONTACT
29	MT. CAMERON	RINGAROOMA	FORESTER	EXEMPT AREA	APLITIC INTRUSIVES GOLD CORRIDOR EXTENSION
30	ST. PAULS RIVER	SNOW HILL	ST. PAULS	BHP	HORNFELED SEDIMENTS MAJOR SN MINERALIZATION
31	SYMONDS ROAD	ALBERTON	FORESTER	PLACER	INTERSECTING LINEARS KNOWN MINERALIZATION

AREA	LOCATION	GEOLOGICAL SHEET 1:50000	TOPOGRAPHICAL 1:100000	TENEMENTS	REGIONAL CHARACTER
32	ROSES TIER	ALBERTON	FORESTER	VACANT	ALKALI GRANITE CONTACT AUREOLE
33	WAYBACK HILL	ALBERTON	FORESTER	VACANT	ALKALI GRANITE CONTACT AUREOLE
34	YARMOUTH	ST. HELENS	GEORGES BAY	P.F. MINING SHELF	Pb Zn Ag WORKINGS
35	SCAMANDER	ST. HELENS	GEORGES BAY	P.F. MINING SHELF	Cu Pb Zn Ag WORKINGS
36	ORIECO	ST. HELENS	GEORGES BAY	P.F. MINING SHELF	Cu WORKINGS
37	SILVER ECHO	ST. HELENS	GEORGES BAY	?VACANT	Cu Mo WORKINGS
38	STYX CREEK	ST MARYS	BREAK O'DAY	VACANT	ST MARYS PORPHYRITE ?SHALLOW INTRUSIVE ?EXTRUSIVE ?EPITHERMAL
39	LITTLE MARSH CREEK	ST MARYS	BREAK O'DAY	VACANT	ST MARYS PORPHYRITE ?SHALLOW INTRUSIVE ?EXTRUSIVE ?EPITHERMAL
40	TASMAN HIGHWAY	ST MARYS	BREAK O'DAY	VACANT	ST MARYS PORPHYRITE ?SHALLOW INTRUSIVE ?EXTRUSIVE



-  ADAMELLITE
-  GRANODIORITE
-  LATE STAGE DIFFERENTIATES
-  MATHINNA BEDS

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Project			
N. E. TASMANIA			
Title			
SCHEMATIC REPRESENTATION OF Au MODEL TYPES			
Author	JPR	Date	12/91
Scale			
Drawn	OH	Office	TAS
Revised			
Date			
Drawing No.			
			Fig. No. 5

- the main target was a sheeted/stockwork quartz vein system proximal to granitoid margins and within the hornfelsed contact aureole. A strong structural control is likely and the expected low grade (1-4g.t. Au) may have precluded active prospecting earlier this century.

- a further model for epithermal mineralization was developed. Specifically, the St. Marys Porphyrite (a Devonian acid complex of high level intrusive/extrusive nature) was considered to be a potential host of auriferous-argentiferous mineralization. Scattered base metal mineralization surrounding the complex provide evidence of metal zonation whilst geochemical correlation with the St. Helens pluton indicated a genetic correlation with other intrusives.

- the third model recognised that alkaline plutons are part of the Blue Tier and Scottsdale Batholiths and are late differentiates potentially hosting structurally controlled marginal auriferous mineralization.

3. FIELD STUDIES COMPLETED

Field work was phased over the 1989-90 calendar years according to priorities but for reporting it is convenient to consider the three main methods employed.

3.1 Geological Reconnaissance

Of the 40 target areas, identified, a total of 29 localities were inspected in the field, from which 65 rock chip samples were collected (Samples 16301-65). Samples were despatched to Classic Comlabs Laboratories in Adelaide for assay (Samples 16336-65) and to The Department of Mines Chemical and Metallurgical Laboratory in Launceston for assay (Samples 16301-35). All samples were assayed for Au (fire assay); Cu, Zn, Ag (AAS); Pb, As, Ba, Sn, W, Bi, Sb (XRF).

3.2 Stream Sediment Survey

Of a total of 368 sample sites selected for sampling only 282 were actually sampled. (Samples 16401-73, 16481-500, 16801-900, 17001-89). The remaining sites were not sampled either because of very difficult access or because of the illdefined or contaminated nature of the water course. At each sample point, three samples were collected

- viz
- 1) 5kg BCL -1/4 sediment fraction (Au)
 - 2) 50g -80# sediment fraction (Au Ag Cu Pb Zn As Ba)
 - 3) Pan concentrate (Au Ag Cu Pb Zn As Ba)

Sample type 1) were collected from active portions of the drainage over a 20 metre radius and excluding sediment trap sites or stream banks. Care was taken to ensure collection of all size fractions after coarse screening. Samples were collected in large plastic bags then excess water decanted after settling. After despatch to Classic Comlabs laboratory in Adelaide these samples were analysed for cyanide soluble gold by the B.C.L. (bulk cyanide leach) method. [Otherwise known as the B.L.E.G. (bulk leach extractive gold) technique].

Sample type 2) were collected from sediment traps and quickly screened on site to remove much of the coarser material. Upon returning to the field office these samples were dried then sieved to -80#. The finer fraction was then despatched to Classic Comlabs for assay for Au (fire assay); Cu, Zn, Ag (AAS); Pb, As, Ba (XRF).

Sample type 3) was coarsely panned on site then panning completed upon return to the field office. Samples were despatched and assayed, similarly to the -80# samples.

Results were then compiled and some rudimentary statistics applied to the Au, As results in order to determine threshold levels of anomalism.

3.3 Geological Consultant Study

Petrogenesis Pty. Ltd. was engaged to complete a brief study on the regional prospectivity of the North East Tasmanian thermal aureoles. The extent of this work was limited to four days in the field.

4. FIELD RESULTS

4.1 Geological Reconnaissance

The original forty target areas were prioritised according to their regional characteristics and by more detailed examination of available literature. As a consequence of this ranking process, only 29 localities were examined in the field. Inspections were limited to several traverses per target area, recording geological observations and rock chip sampling areas of ferruginization or quartz veining. Summary findings and anomalous geochemistry of each of the 29 localities is presented in Table 2 whilst the geochemical analyses are recorded in Appendix 1.

Figures 6-12 show the geographical distribution of the sample points on the 1:100,000 scale topographic maps.

Nine of these localities showed evidence of wide zones (10-30m), of quartz vein stockworking and sheeted quartz vein systems repeated, in some cases over several hundred

NORTHEAST TASMANIA REGIONAL GOLD SAMPLING 1989

TABLE 2

AREA	LOCATION	GEOLOGICAL SHEET 1:50000	TOPO SHEET 1:100000	TENEMENTS	REGIONAL CHARACTER	SAMPLE NO. ROCK CHIP	SAMPLE COORDS.	COMMENTS	ANOMALOUS RESULTS ppm						
									Au	Ag	Cu	Pb	Zn	As	Sn
5	LEBRINA	PIPERS RIVER	PIPERS	ARGYLE MINING	MAJOR LINEAR SMALL WORKING NOT HORNFELSE	16301	5443200N 522850E	COULDN'T FIND WORKING ALL PINE PLANTATION	1.02		930	110	770		
6	GOLCONDA LISLE	PIPERS RIVER LAUNCESTON	PIPERS	ARGYLE MINING & ETA	MAJOR LINEAR KNOWN MINERALISATION EXTENSIVE HORNFELS GRANODIORITE APOPHYSES	16302	5441200N 526100E	INSPECTED "ENTERPRISE", NARROW QUARTZ VEINS IN HORNFELS SEDIMENTS LISLE, POOR EXPOSURE							
8	BARROW CREEK	LAUNCESTON	PIPERS	ETA	MAJOR LINEAR GRANODIORITE MARGIN HORNFELSE	16303 16304	5425000N 535100E 5421600N 535500E	MICACEOUS HORNFELSE QUARTZITES, SOME QUARTZ VEINING							
10	BURNS CREEK	LAUNCESTON	PIPERS	PLACECO	GRANODIORITE MARGIN WEAK MINERALISATION STRUCTURAL PROXIMITY	16313 16314	5409850N 540950E 5409850N 540950E	LINE OF WORKINGS 40M STRIKE, NARROW QUARTZ REEFS 1-5CM	1.77				640		
11	SOUTH SPRINGFIELD	RINGAROOMA ALBERTON	FORESTER	VACANT	HORNFELSE SEDIMENTS	16305 16306	5436200N 543900E 5433000N 543100E	HORNFELSE MICACEOUS QUARTZITES ADJACENT TO CONTACT. SOME QUARTZ VEINING							
12	HANG DOG HILL	RINGAROOMA	FORESTER	D. PARISH TONGANAH KAOLIN MINE	MAJOR LINEAR GRAVITY BREAK	16307	5439400N 549950E	KAOLINISED QUARTZ VEINS IN GRANITE							
14	FORESTER	RINGAROOMA BOOBYALLA	FORESTER	PLACECO EXEMPT AREAS	MAJOR LINEAR KNOWN MINERALISATION GRANODIORITE MARGIN	16311	5452900N 555600E	MINOR QUARTZ VEINLETS IN SANDSTONES							

102018

AREA	LOCATION	GEOLOGICAL SHEET 1:50000	TOPO SHEET 1:100000	TENEMENTS	REGIONAL CHARACTER	SAMPLE NO. ROCK CHIP	SAMPLE COORDS.	COMMENTS	ANOMALOUS RESULTS ppm											
									Au	Ag	Cu	Pb	Zn	As	Sn					
15	GOLDEN RIDGE	ST. HELENS	FORESTER GEORGES BAY	FEDERATION RESOURCES ET AL	GRAVITY BREAK MAJOR LINEAR KNOWN MINERALISATION	16331	5416300N 588300E	BROAD SPREAD OF MINOR DIGGINGS. CARBONATE AND FERRUGINOUS ALTERATION.												
						16332	5416300N 588300E													
						16333	5416300N 588300E													
						16334	5416300N 588000E		42.30	30	4100	145	4100							
						16335	5416300N 588000E		10.90		470	110	700							
						16347	5415550N 585850E		1.92											
						16348	5415550N 585850E		1.50											
						16349	5415650N 586700E		2.30		930		890							
						16	GREAT FINGAL		BEN LOMOND	ST. PAULS	VACANT	KNOWN MINERALISATION STRUCTURAL EXTENSION	16354	5496650N 579600E	IRREGULARLY ORIENTED QUARTZ VEINS 1-20CM WIDE IN ZONES UP TO 30M WIDE WITHIN METASEDIMENTS					
													16355	5496750N 578600E						
16356	5496750N 578450E																			
16357	5496750N 578350E																			
16358	5499300N 578500E																			
16359	5498900N 578900E																			
16360	5498200N 579700E																			
16361	5497900N 580050E																			

102019

AREA	LOCATION	GEOLOGICAL SHEET 1:50000	TOPO SHEET 1:100000	TENEMENTS	REGIONAL CHARACTER	SAMPLE NO.	SAMPLE ROCK CHIP COORDS.	COMMENTS	ANOMALOUS RESULTS ppm					
									Au	Ag	Cu	Pb	Zn	As
18	MANGANA	BEN LOMOND	ST. PAULS	ALCASTON	GRAVITY BREAK KNOWN MINERALISATION	16351	5495200N 572550E	MASSIVE MILKY/GLASSY QUARTZ VEINS, UP TO 20CM WIDE IN ZONES UP TO 15M WIDE WITHIN METASEDIMENTS						
						16352	5495350N 572350E							
						16353	5493400N 572500E							
19	JOY CREEK	BEN LOMOND ALBERTON	FORESTER	VACANT	GRAVITY BREAK MAJOR LINEAR HORNFELSED SEDIMENTS	16350	5407500N 560850E	NARROW QUARTZ VEINS WITHIN SILICIFIED MATH- INNA BEDS. ZONES UP TO 10M WIDE. RELICT BLADE TEXTURES WITHIN QUARTZ VEINS.						
						16362	5407400N 559700E							
20	UPPER BLESSINGTON	ALBERTON	FORESTER ST. PAULS	VACANT	MAJOR LINEAR <0.05 GRAVITY BREAK <0.05 GRANITE MARGIN	16315	5406300N 546500E	ZONES UP TO 25M WIDE OF IRREGULAR QUARTZ VEINLETS OVER 500M						
						16316	5406300N 546600E							
						16317	5406300N 546650E							
						16318	5406550N 547450E							
						16319	5406550N 547450E							
21	PORCUPINE CREEK	ALBERTON	FORESTER	VACANT	MAJOR LINEAR <0.05 GRANITE MARGIN	16320	5411800N 549600E	THIN QUARTZ AND GRANITIC VEINS IN SILTSTONES, PARTLY FERRUGINOUS.						
22	MT. SADDLEBACK	ALBERTON	FORESTER	GOLDSEARCH PLACER	MAJOR LINEAR GRANITE MARGIN GRAVITY BREAK			NO QUARTZ VEINING ACROSS GRANITE MARGIN						

102020

AREA	LOCATION	GEOLOGICAL SHEET 1:50000	TOPO SHEET 1:100000	TENEMENTS	REGIONAL CHARACTER	SAMPLE NO. ROCK CHIP	SAMPLE COORDS.	COMMENTS	ANOMALOUS RESULTS ppm												
									Au	Ag	Cu	Pb	Zn	As	Sn						
23	MATHINNA	ALBERTON	FORESTER ST. PAULS	ALCASTON NARGHUN	MAJOR LINEAR KNOWN MINERALISATION	0.05	16321	5410100N 571900E	NUMEROUS ZONES OF 10-25M WIDE QUARTZ VEIN STOCK- WORK SYSTEMS WITHIN MATHINNA METASEDIMENTS												
						0.05	16322	5410100N 571900E													
						0.05	16323	5410100N 571400E													
						0.05	16324	5410000N 571200E													
						0.05	16325	5410000N 571200E													
						0.05	16326	5413250N 569200E													
						0.05	16327	5413700N 569850E													
						0.05	16328	5415800N 568450E													
						MT VICTORIA	ALBERTON	FORESTER		FEDERATION RESOURCES ET AL	MAJOR LINEAR KNOWN MINERALISATION	0.02	16341	5427500N 568300E	SHEETED QUARTZ VEINS WITHIN SHEAR ZONES UP TO 25M WIDE WITHIN MATHINNA METASEDIMENTS						
												0.02	16342	5426700N 568400E							
												0.12	16343	5426400N 568350E		0.12					
												0.01	16344	5426100N 568900E							
												0.02	16345	5426000N 569000E							
												5.4	16364	5419850N 567900E		5.40				2950	
<0.01	16365	5419850N 567900E																			
<0.01	16363	5407400N 579400E																			

102021

AREA	LOCATION	GEOLOGICAL SHEET 1:50000	TOPO SHEET 1:100000	TENEMENTS	REGIONAL CHARACTER	SAMPLE NO. ROCK CHIP	SAMPLE COORDS.	COMMENTS	ANOMALOUS RESULTS ppm						
									Au	Ag	Cu	Pb	Zn	As	Sn
36	ORIECO	ST. HELENS	GEORGES BAY	P.F. MINING SHELF	Cu WORKINGS	16329	5413900N 501150E	EXTENSIVE SHEAR CONTROLLED MINERALISATION	0.11	150	4550	990	340	3160	
						16330	5413900N 501150E	SAMPLED DUMPS AND MAIN SHEAR IN OPEN CUT FACE.		420	420	3900	180		
37	SILVER ECHO	ST. HELENS	GEORGES BAY	?VACANT	Cu Mo WORKINGS	16346	5422800N 599500E	QUARTZ VEIN/BLOW 25M WIDE CONTAINING VEINS UP TO 25CM WIDE OF MASSIVE aspy, cpy, py.							
38	STYX CREEK	ST MARYS	BREAK O'DAY	VACANT	ST MARYS PORPHYRITE ?SHALLOW INTRUSIVE ?EXTRUSIVE ?EPITHERMAL			OBSERVED BASE OF UNIT. MINOR LITHIC INCLUSIONS. POSSIBLE SHALLOW LEVEL INTRUSIVE.							
39	LITTLE MARSH CREEK	ST MARYS	BREAK O'DAY	VACANT	ST MARYS PORPHYRITE ?SHALLOW INTRUSIVE ?EXTRUSIVE ?EPITHERMAL			ABUNDANT LITHIC FRAGMENT HORIZON OBSERVED AT HUGHES PT. PORPHYRITE POSSIBLY PARTIALLY EXTRUSIVE OR SHALLOW LEVEL INTRUSIVE.							
40	TASMAN HIGHWAY	ST MARYS	BREAK O'DAY	VACANT	ST MARYS PORPHYRITE ?SHALLOW INTRUSIVE ?EXTRUSIVE			AT THIS LOCATION APPEARS TO BE INTRUSIVE.							

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metres in sediments within granite contact aureoles. Veining density was quite variable up to 12 veins per metre with vein thicknesses typically 1-3cm. Results of the rock chip sampling programme were generally disappointing given the extensive quartz vein sheeting and alteration observed. However, two significant localities have been recognised. The most significant results were obtained from samples 16334, 16335, 16347, 16348 and 16349 being 42.3gt, 10.9gt, 1.92gt, 1.5gt and 2.3gt Au respectively. These samples are from a known gold producing region, Golden Ridge, 15km west of Scamander.

The Golden Ridge region (see Figure 11), of approximately 6sq km, is located geologically within the contact margin of the Upper Devonian Poimena Pluton. The pluton consists of biotite bearing granite/adamellite with a narrow eastern margin/contact zone composed of biotite granodiorite intruded into the Lower Devonian Mathinna Beds. The Mathinna Beds consist of a sequence of interbedded grey to yellow and brown micaceous sandstones and minor dark grey carbonaceous shales. Five small abandoned workings occur in the area, two of which occur within the biotite granodiorite margin, the remainder within the sediments. All the known deposits consist of narrow (less than 0.5m) auriferous quartz veins which usually contain arsenopyrite and lesser instances of pyrite, chalcopyrite and galena. The mineralization appears to follow approximately N-S shear zones. Abundant ferruginous staining accompanies the shear zones in

places. Historical grades are quite high, up to 132gt Au, however these high grade zones would appear to occur as small shoots within the vein systems. Only one small channel sampling programme has been carried out in the past (1939) at the Golden Ridge Mine, with a maximum value over 3m of 13.1gt Au. The area is currently held under EL 58/88, the tenement holders being Federation Resources N.L.

A result of 5.4gt Au for sample 16364 originated from abandoned workings (Simpson Adit), situated on Strickland Ridge, approximately 13km NNW of Mathinna. The mineralization at Simpsons Adit consists of a narrow veined quartz stockwork system within partially silicified Mathinna meta-sediments. The visible workings consist of a system of trenches and adits over 75m of strike oriented at 240°. A further sample, taken from within one of the adits, contained no detectable gold (16365).

Two less significant anomalous samples were obtained, with values of 1.02gt (16301) and 1.77gt (16314).

4.2 Stream Sediment Survey

After the initial reconnaissance programme it was decided to screen particular areas of interest by carrying out a stream sediment survey. As a first pass, a total of 73 sample sets were collected (BCL, -80#, PC) and assayed.

Subsequently, two further phases of sampling were completed and in all 282 sites were sampled. Location of these sites is presented in Table 3 and Figures 6-12 whilst geochemical analyses are presented in Appendix 2.

Results of this survey were scanned visually and subsequently a basic statistical treatment applied to determine anomalous values. The statistical results for the gold analyses from all three sample types are shown on Table 4. The assays indicate a total of 13 anomalous sites clustered about four regions (see Table 5).

viz Back Creek - Lefroy	16847, 16846
Alberton - Mangana	17013, 17019, 16807, 16465, 17008, 16429, 17077
Golconda - Lisle	16404, 16410, 16884
Gladstone	16829

Further reconnaissance was carried out in these four areas and as a result of this the Golconda - Lisle area was applied for under tender and a detailed compilation of the Alberton - Mangana trend completed. The other two areas at Back Creek - Lefroy and Gladstone were not considered to show favourable characteristics for the type of mineralization sought.

STREAM SEDIMENT SAMPLE LOCATIONS

TABLE 3

SAMPLE NUMBER	AMG NORTHING	AMG EASTING	1:100000 TOPO SHEET	SAMPLE NUMBER	AMG NORTHING	AMG EASTING	1:100000 TOPO SHEET		
3001	16401	5444950	525050	PIPERS	16451	5458700	553700	FORESTER	3051 ✓
3002	16402	5443900	523300	PIPERS	16452	5453800	553500	FORESTER	3052 ✓
3003	16403	5442900	525000	PIPERS	16453	5429050	528450	PIPERS	3053 ✓
3004	16404	5441400	526400	PIPERS	16454	5433650	527500	PIPERS	3054 ✓
3005	16405	5441300	526300	PIPERS	16455	5426050	531900	PIPERS	3055 ✓
3006	16406	5438000	522000	PIPERS	16456	5426400	533500	PIPERS	3056 ✓
3007	16407	5439500	527500	PIPERS	16457	5426400	533500	PIPERS	3057 ✓
3008	16408	5439400	528300	PIPERS	16458	5425300	534550	PIPERS	3058 ✓
3009	16409	5435750	530750	PIPERS	16459	5425350	534750	PIPERS	3059 ✓
3010	16410	5436300	526350	PIPERS	16460	5395800	574800	ST PAULS	3060 ✓
3011	16411	5436300	526350	PIPERS	16461	5403700	579000	ST PAULS	3061 ✓
3012	16412	5435850	526600	PIPERS	16462	5399400	580750	ST PAULS	3062 ✓
3013	16413	5395750	606300	BREAK O' DAY	16463	5409600	563250	FORESTER	3063 ✓
3014	16414	5394850	608200	BREAK O' DAY	16464	5429200	569000	FORESTER	3064 ✓
3015	16415	5390800	609050	BREAK O' DAY	16465	5430500	567750	FORESTER	3065 ✓
3016	16416	5398150	606850	BREAK O' DAY	16466	5413450	546500	FORESTER	3066 ✓
3017	16417	5399600	606600	BREAK O' DAY	16467	5411350	544300	FORESTER	3067 ✓
3018	16418	5402200	604150	BREAK O' DAY	16468	5411600	549850	FORESTER	3068 ✓
3019	16419	5402500	603500	BREAK O' DAY	16469	5421300	538050	PIPERS	3069 ✓
3020	16420	5404500	603950	BREAK O' DAY	16470	5408250	548550	FORESTER	3070 ✓
3021	16421	5396250	599800	BREAK O' DAY	16471	5411700	539600	PIPERS	3071 ✓
3022	16422	5396750	599800	BREAK O' DAY	16472	5411450	540100	PIPERS	3072 ✓
3023	16423	5416700	560700	FORESTER	16473	5407700	545300	FORESTER	3073 ✓
3024	16424	5416700	560700	FORESTER	16481	5424110	529360	PIPERS	3081 ✓
3025	16425	5411550	567500	FORESTER	16482	5424980	530210	PIPERS	3082 ✓
3026	16426	5410300	568250	FORESTER	16483	5427150	537760	PIPERS	3083 ✓
3027	16427	5418700	568850	FORESTER	16484	5428620	534000	PIPERS	3084 ✓
3028	16428	5417250	568950	FORESTER	16485	5428110	534800	PIPERS	3085 ✓
3029	16429	5415400	571000	FORESTER	16486	5432100	538490	PIPERS	3086 ✓
3030	16430	5413750	571500	FORESTER	16487	5435810	537950	PIPERS	3087 ✓
3031	16431	5414200	570000	FORESTER	16488	5436040	563110	FORESTER	3088 ✓
3032	16432	5418150	587750	GEORGES BAY	16489	5432960	566060	FORESTER	3089 ✓
3033	16433	5416900	587750	GEORGES BAY	16490	5433090	566000	FORESTER	3090 ✓
3034	16434	5416900	587750	GEORGES BAY	16491	5432690	568310	FORESTER	3091 ✓
3035	16435	5419300	590350	GEORGES BAY	16492	5429000	570220	FORESTER	3092 ✓
3036	16436	5416700	591300	GEORGES BAY	16493	5429480	569700	FORESTER	3093 ✓
3037	16437	5416400	591150	GEORGES BAY	16494	5430950	567000	FORESTER	3094 ✓
3038	16438	5416200	591250	GEORGES BAY	16495	5419760	569590	FORESTER	3095 ✓
3039	16439	5415000	592550	GEORGES BAY	16496	5417250	570340	FORESTER	3096 ✓
3040	16440	5425800	585800	GEORGES BAY	16497	5418610	569750	FORESTER	3097 ✓
3041	16441	5422350	587300	GEORGES BAY	16498	5416020	571420	FORESTER	3098 ✓
3042	16442	5419800	587900	GEORGES BAY	16499	5416920	568560	FORESTER	3099 ✓
3043	16443	5443400	561000	FORESTER	16500	5415890	575500	FORESTER	3100 ✓
3044	16444	5441400	560200	FORESTER	16801	5412910	567240	FORESTER	3101 ✓
3045	16445	5445600	555800	FORESTER	16802	5413180	566700	FORESTER	3102 ✓
3046	16446	5445600	555800	FORESTER	16803	5439550	566000	FORESTER	3103 ✓
3047	16447	5447750	555750	FORESTER	16804	5434890	570660	FORESTER	3104 ✓
3048	16448	5450800	556850	FORESTER	16805	5436220	566950	FORESTER	3105 ✓
3049	16449	5451900	556550	FORESTER	16806	5424710	567200	FORESTER	3106 ✓
3050	16450	5459100	557600	FORESTER	16807	5426700	566590	FORESTER	3107 ✓

different position on Fig.

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SAMPLE NUMBER	AMG NORTHING	AMG EASTING	1:100000 TOPO SHEET	SAMPLE NUMBER	AMG NORTHING	AMG EASTING	1:100000 TOPO SHEET
3108	16808	5425400	567000 FORESTER	16858	5442890	508400 PIPERS	3185 ✓
3109	16809	5427240	566100 FORESTER	16859	5445550	506900 PIPERS	3189 ✓
3110	16810	5441180	533040 PIPERS	16860	5447110	507320 PIPERS	3160 ✓
3111	16811	5436690	536920 PIPERS	16861	5447240	510250 PIPERS	3161 ✓
3112	16812	5439300	536610 PIPERS	16862	5444540	503890 PIPERS	3162 ✓
3113	16813	5429690	536640 PIPERS	16863	5443640	502550 PIPERS	3163 ✓
3114	16814	5407820	595050 GEORGES BAY	16864	5442240	505510 PIPERS	3164 ✓
3115	16815	5409000	595820 GEORGES BAY	16865	5434810	516500 PIPERS	3165 ✓
3116	16816	5409380	595400 GEORGES BAY	16866	5433180	518800 PIPERS	3166 ✓
3117	16817	5412360	595380 GEORGES BAY	16867	5433150	520500 PIPERS	3167 ✓
3118	16818	5412590	595350 GEORGES BAY	16868	5433120	521850 PIPERS	3168 ✓
3119	16819	5413900	594620 GEORGES BAY	16869	5440940	521850 PIPERS	3169 ✓
3120	16820	5414520	592800 GEORGES BAY	16870	5437150	522550 PIPERS	3170 ✓
3121	16821	5415150	594950 GEORGES BAY	16871	5439210	519340 PIPERS	3171 ✓
3122	16822	5415020	596110 GEORGES BAY	16872	5443360	517750 PIPERS	3172 ✓
3123	16823	5417190	598320 GEORGES BAY	16873	5447850	517120 PIPERS	3173 ✓
3124	16824	5466140	585890 SWAN ISLAND	16874	5451450	514610 PIPERS	3174 ✓
3125	16825	5471200	590060 SWAN ISLAND	16875	5453450	520050 PIPERS	3175 ✓
3126	16826	5474020	590720 SWAN ISLAND	16876	5442540	523080 PIPERS	3176 ✓
3127	16827	5475260	591690 SWAN ISLAND	16877	5444100	528150 PIPERS	3177 ✓
3128	16828	5478290	593290 SWAN ISLAND	16878	5447660	532220 PIPERS	3178 ✓
3129	16829	5469910	593660 SWAN ISLAND	16879	5445500	531660 PIPERS	3179 ✓
3130	16830	5475880	598950 SWAN ISLAND	16880	5444790	530040 PIPERS	3180 ✓
3131	16831	5472950	597450 SWAN ISLAND	16881	5440360	530210 PIPERS	3181 ✓
3132	16832	5421840	590290 GEORGES BAY	16882	5439250	531650 PIPERS	3182 ✓
3133	16833	5424300	587720 GEORGES BAY	16883	5438140	533020 PIPERS	3183 ✓
3134	16834	5426300	590800 GEORGES BAY	16884	5434980	527200 PIPERS	3184 ✓
3135	16835	5429480	590480 GEORGES BAY	16885	5438210	524300 PIPERS	3185 ✓
3136	16836	5428600	584690 GEORGES BAY	16886	5446520	538760 PIPERS	3186 ✓
3137	16837	5424020	577460 FORESTER	16887	5444380	539800 PIPERS	3187 ✓
3138	16838	5423520	577110 FORESTER	16888	5442890	538180 PIPERS	3188 ✓
3139	16839	5426300	578090 FORESTER	16889	5446460	534700 PIPERS	3189 ✓
3140	16840	5426000	578880 FORESTER	16890	5444710	534580 PIPERS	3190 ✓
3141	16841	5427050	581540 FORESTER	16891	5440420	537880 PIPERS	3191 ✓
3142	16842	5454300	497580 TAMAR	16892	5440400	539810 PIPERS	3192 ✓
3143	16843	5455850	491960 TAMAR	16893	5440350	540300 PIPERS	3193 ✓
3144	16844	5456320	493090 TAMAR	16894	5437000	541000 PIPERS	3194 ✓
3145	16845	5452180	492820 TAMAR	16895	5435410	540710 PIPERS	3195 ✓
3146	16846	5452390	492800 TAMAR	16896	5431160	541550 PIPERS	3196 ✓
3147	16847	5453600	506110 PIPERS	16897	5434430	530420 PIPERS	3197 ✓
3148	16848	5454180	510850 PIPERS	16898	5429490	528180 PIPERS	3198 ✓
3149	16849	5449900	513600 PIPERS	16899	5435400	542810 FORESTER	3199 ✓
3150	16850	5448200	512660 PIPERS	16900	5436500	544920 FORESTER	3200 ✓
3151	16851	5447210	515460 PIPERS	17001	5435000	546440 FORESTER	3201 ✓
3152	16852	5451840	511000 PIPERS	17002	5432820	546000 FORESTER	3202 ✓
3153	16853	5448080	501670 PIPERS	17003	5433300	546050 FORESTER	3203 ✓
3154	16854	5443510	513620 PIPERS	17004	5436660	547340 FORESTER	3204 ✓
3155	16855	5440950	515050 PIPERS	17005	5435240	551000 FORESTER	3205 ✓
3156	16856	5443420	512600 PIPERS	17006	5392090	572190 ST PAULS	3206 ✓
3157	16857	5441000	511260 PIPERS	17007	5392400	572730 ST PAULS	3207 ✓

Plotted on map?

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SAMPLE NUMBER	AMG NORTHING	AMG EASTING	1:100000 TOPO SHEET	SAMPLE NUMBER	AMG NORTHING	AMG EASTING	1:100000 TOPO SHEET		
✓ 3208	17008	5394600	572420	ST PAULS	17059	5453580	565740	FORESTER	3259 ✓
✓ 3209	17009	5390400	579620	ST PAULS	17060	5454380	566480	FORESTER	3260 ✓
✓ 3210	17010	5395680	578140	ST PAULS	17061	5456900	562230	FORESTER	3261 ✓
✓ 3211	17011	5395500	578710	ST PAULS	17062	5455520	559320	FORESTER	3262 ✓
✓ 3212	17012	5397520	579980	ST PAULS	17063	5450210	560900	FORESTER	3263 ✓
✓ 3213	17013	5397430	579390	ST PAULS	17064	5441550	558550	FORESTER	3264 ✓
✓ 3214	17014	5404520	578760	ST PAULS	17065	5440400	555300	FORESTER	3265 ✓
✓ 3215	17015	5400180	576510	ST PAULS	17066	5441540	552290	FORESTER	3266 ✓
✓ 3216	17016	5400260	576090	ST PAULS	17067	5441000	550950	FORESTER	3267 ✓
✓ 3217	17017	5401050	577610	ST PAULS	17068	5443290	549620	FORESTER	3268 ✓
✓ 3218	17018	5403020	575580	ST PAULS	17069	5436840	557130	FORESTER	3269 ✓
✓ 3219	17019	5404700	574960	ST PAULS	17070	5435610	557320	FORESTER	3270 ✓
✓ 3220	17020	5404890	566610	ST PAULS	17071	5435920	558750	FORESTER	3271 ✓
✓ 3221	17021	5410100	565700	FORESTER	17072	5428200	560110	FORESTER	3272 ✓
✓ 3222	17022	5411750	561390	FORESTER	17073	5426360	558310	FORESTER	3273 ✓
✓ 3223	17023	5413820	560380	FORESTER	17074	5426580	557490	FORESTER	3274 ✓
✓ 3224	17024	5412360	563680	FORESTER	17075	5431860	555200	FORESTER	3275 ✓
✓ 3225	17025	5411950	564560	FORESTER	17076	5437700	552200	FORESTER	3276 ✓
✓ 3226	17026	5413620	566910	FORESTER	17077	5420540	568690	FORESTER	3277 ✓
✓ 3227	17027	5408200	569880	FORESTER	17078	5418860	565490	FORESTER	3278 ✓
✓ 3228	17028	5410320	561190	FORESTER	17079	5420200	560910	FORESTER	3279 ✓
✓ 3229	17029	5408120	561790	FORESTER	17080	5420000	561000	FORESTER	3280 ✓
✓ 3230	17030	5406450	561620	FORESTER	17081	5424320	545340	FORESTER	3281 ✓
✓ 3231	17031	5407920	557350	FORESTER	17082	5423810	546600	FORESTER	3282 ✓
✓ 3232	17032	5414090	555280	FORESTER	17083	5426710	554000	FORESTER	3283 ✓
✓ 3233	17033	5418380	555770	FORESTER	17084	5420120	556700	FORESTER	3284 ✓
✓ 3234	17034	5418700	555830	FORESTER	17085	5420090	556070	FORESTER	3285 ✓
✓ 3235	17035	5416820	556910	FORESTER	17086	5408250	552500	FORESTER	3286 ✓
✓ 3236	17036	5416020	558880	FORESTER	17087	5408210	553490	FORESTER	3287 ✓
✓ 3237	17037	5410300	558810	FORESTER	17088	5408550	549220	FORESTER	3288 ✓
✓ 3238	17038	5412090	557320	FORESTER	17089	5407850	543080	FORESTER	3289 ✓
✓ 3239	17039	5414180	580360	FORESTER					
✓ 3240	17040	5417670	575000	FORESTER					
✓ 3241	17041	5417200	578750	FORESTER					
✓ 3242	17042	5418880	578220	FORESTER					
✓ 3243	17043	5418450	581060	FORESTER					
✓ 3244	17044	5418690	582460	FORESTER					
✓ 3245	17045	5416100	582400	FORESTER					
✓ 3246	17046	5416400	581220	FORESTER					
✓ 3247	17047	5413800	542660	FORESTER					
✓ 3248	17048	5417400	542800	FORESTER					
✓ 3249	17049	5416620	543500	FORESTER					
✓ 3250	17050	5418920	549750	FORESTER					
✓ 3251	17051	5417390	549200	FORESTER					
✓ 3252	17052	5418210	547840	FORESTER					
✓ 3253	17053	5416610	546120	FORESTER					
✓ 3254	17054	5421260	550210	FORESTER					
✓ 3255	17055	5422840	545920	FORESTER					
✓ 3256	17056	5423450	543710	FORESTER					
✓ 3257	17057	5443020	554880	FORESTER					
✓ 3258	17058	5448610	565150	FORESTER					

AU ASSAY STATISTICS TABLE 4

											PRIORITY 1	PRIORITY 2	PRIORITY 3			
SAMPLE TYPE	SAMPLE NUMBER	MEAN	STD DEV. (SD)	MEAN + 1 SD	MEAN + 2 SD	RANGE	COUNT	FREQ. (%)	CUMUL. FREQ. (%)	INFLEXION POINTS	SAMPLE NUMBER	AU ASSAY	SAMPLE NUMBER	AU ASSAY	SAMPLE NUMBER	AU ASSAY
BLEG	279	1.9	12.2	14.1	26.3	0-0.1	127	45.5	45.5	2,30	17013	160	17019	110	17008	22
						0.1-0.5	90	32.3	77.8			16807	46	16465	14	
						0.5-1.0	27	9.7	87.5			16404	38			
						1.0-5.0	23	8.2	95.7							
						5.0-10.0	6	2.2	97.9							
						10.0-50.0	4	1.4	99.3							
						50.0-100.0	0	0	99.3							
						>100.0	2	0.7	100							
		(ppb)	(ppb)	(ppb)	(ppb)					(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)	(ppb)
-80#	280	0.05	0.2	0.25	0.45	0-0.05	253	90.4	90.4	0.25,1.5	16404	2.3	16429	1.92	16829	0.37
						0.05-0.1	12	4.3	94.7			17019	1.66	17077	0.27	
						0.1-0.5	10	3.6	98.3			16465	0.76			
						0.5-1.0	2	0.7	99			16847	0.72			
						1.0-2.0	2	0.7	99.7							
						>2.0	1	0.3	100							
								(ppm)	(ppm)	(ppm)	(ppm)					(ppm)
PAN CON	277	0.19	0.98	1.17	2.15	0-0.05	234	84.5	84.5	0.3,2.0	16410	11.8	16429	8.6	16846	1.98
						0.05-0.1	12	4.3	88.8			16404	4	17013	1.96	
						0.1-0.5	20	7.2	96			16807	3.9	16884	1.2	
						0.5-1.0	2	0.7	96.7			16465	2.9			
						1.0-5.0	7	2.5	99.2			17019	2.3			
						5.0-10.0	1	0.4	99.6							
						>10.0	1	0.4	100							
		(ppm)	(ppm)	(ppm)	(ppm)					(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)	(ppm)

102030

ANOMALOUS STREAM SEDIMENT SAMPLE SITES

TABLE 5

SAMPLE	BLEG ASSAY AU (ppb)	PRIORITY	-80# ASSAY AU(ppm)	PRIORITY	PC ASSAY AU(ppm)	PRIORITY	TOPO SHEET	LOCATION	TENEMENT STATUS
17013	160	1			1.96	3	St.Pauls	7km north Fingal	Vacant
17019	110	2	1.66	2	2.3	2	St.Pauls	3km south Mathinna	EL 55/83 Alcaston
16404	38	2	2.3	1	4	2	Pipers	2km south-east Golconda	EL 6/90 Baus
16807	46	2			3.9	2	Forester	2km south-east Alberton	EL 53/89 Cuttack
16465	14	3	0.76	2	2.9	2	Forester	2km north-east Alberton	EL 53/89 Cuttack
17008	22	3					St.Pauls	2km north-west Mangana	EL 55/83 Alcaston
16429			1.92	2	9.6	2	Forester	8km north-west Mathinna	EL 53/89 Cuttack
X 16847			0.72	2			Pipers	2km south Back Creek	Vacant
17077			0.27	3			Forester	9km south-east Alberton	EL 53/89
16829			0.37	3			Swan Island	10km north-east Gladstone	Vacant
16410					11.8	1	Pipers	1km north-west Lisle	EL 6/90 Baus
X 16846					1.98	3	Tamar	7km north-west Lefroy	Vacant
16884					1.2	3	Pipers	Lisle	EL 6/90 Baus

4.3 Geological Consultant Study

The conclusions of this study are contained in a report by Petrogenesis Pty. Ltd. as Appendix 3 but it is useful to extract several comments from that work.

viz "Devonian batholiths in north-eastern Tasmania were emplaced at high levels into relatively cold crust, and consequently only generated narrow thermal aureoles. In addition, a large proportion of the prospective roof zone of these aureoles has already been eroded or obscured by post-Devonian cover. These factors rank north-eastern Tasmania as a low priority thermal aureole terrain".

"Within Tasmania, the most extensive roof zone aureole is in the Mathinna to Mangana area. A comprehensive literature review, and brief reconnaissance mapping and sampling would assist with evaluation of this region".

5. CONCLUSIONS

This study has demonstrated that from regional considerations alone gold mineralization in North East Tasmania has a strong structural control and in many cases is hosted by low grade hornfelsed Mathinna Beds sediments within the thermal aureole of proximal granitoids. NNW trending structures appear to be the dominant directional controls but in toto, these structures are defined by a WNW trending corridor from Lefroy to Mangana.

In the search for open pittable large tonnage gold deposits, a total of 40 areas were selected for more detailed study based upon six criteria. Of these, 29 were selected for field reconnaissance by geological traversing and rock chip sampling. Nine of these localities showed evidence of wide zones of quartz vein stockworking or sheeting, in many cases within thermal aureoles. Assays from rock chip samples did not support the initial enthusiasm although two areas, Golden Ridge and Alberton-Mathinna, stood out as excellent exploration targets.

As a further screening tool, a regional stream sediment survey was carried out predominantly in the vicinity of the originally identified target areas and in all, 282 sites were sampled. Results from these samples indicated a total of thirteen strongly anomalous sites clustered in four regions. Further reconnaissance and compilation was completed in these areas to refine the targets.

In order to rank the North East Tasmania Province with other regions in Australia, a consultant was engaged to provide comments on the prospectivity of the province for thermal aureole hosted gold mineralization. The conclusions were not favourable although the Mathinna - Mangana area was given some chance of success.

6. RECOMMENDATIONS

Based upon the results obtained and conclusions drawn from the regional desk studies, field mapping, rock chip sampling, stream sediment sampling and consultant study, a number of recommendation can be made.

- 1) The Golden Ridge area stands out as one having good potential for large tonnage near surface gold mineralization within the thermal aureole of the Poimena Pluton. It is recommended that the tenement holders be approached to determine the possibility of a farm in opportunity.
- 2) The NNW structural trend from Alberton to Mangana is a highly mineralized zone that hosts numerous workings of variable historical production. It is recommended that a detailed compilation of geological/structural setting, mineralization styles and tenement status be completed prior to further field reconnaissance or negotiation with tenement holders.
- 3) The Golconda - Lisle area is also prominent as a large historical producer and evidence from this study suggests good potential to host a large tonnage body of mineralization within or proximal to the numerous granitic apophyses. It is recommended that this ground be applied for under the tender system when it is available.

4) Whilst initial rock chip sampling of the nine areas of quartz vein stockworking/sheeting indicated only two anomalous zones, it is recommended that further reconnaissance be carried out along strike to more accurately map out the distribution of the zones and to collect more rock chip samples.

102036

APPENDIX 1

Geochemical Results Rock Chip Sampling

DEPARTMENT OF MINES

102037

Launceston Office:

Chemical and Metallurgical
Laboratory,
287 Wellington Street,
LAUNCESTON 7249



TASMANIA

Enquiries: P L James
Phone: 003 442431
Your ref.: 08467
Our file:

26 May 1989

Shell Company of Australia Ltd
Metals Division
PO Box 860
DEVONPORT TAS 7310

Attent. Jeff Randell

Dear Sir

Enclosed please find results of analyses of samples submitted by you.

Determinations were made by methods as follows.

Au: By 50 gram fire assay/AAS finish

Ag, Cu, Zn, Pb, As, Bi: By AAS

Ba, Sn, W, Sb: By XRF

You did require Pb, As and Bi to be determined by XRF. However, there are inherent difficulties in the XRF determination of these elements in the presence of one another, which can cause serious aberrations in results. Some of these became apparent in the work done on your samples and accordingly we are giving you AAS results for these three elements. The method of digestion plus special precautions to retain the elements in solution gives reliable results. All minerals of interest will be in solution unless in the form of refractory silicates.

A further note: The XRF determination of tin indicates total value and does not differentiate between cassiterite and stannite. Your sample No 16329 showed a significant amount of tin present.

Checks on a number of gold assays will follow early next week.

Yours faithfully

(P L James)
CHIEF CHEMIST & METALLURGIST

Enc.

Shell Co of Aust. Reg. No 893282-324

g/t

O/No 08467

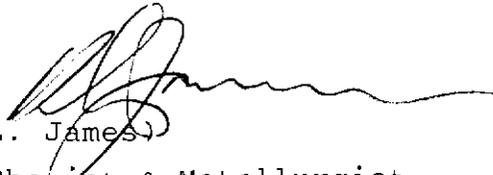
26.5.89

<u>Reg. Nos</u>	<u>Desc.</u>	<u>Ag</u>	<u>Cu</u>	<u>Zn</u>	<u>Pb</u>	<u>As</u>	<u>Ba</u>	<u>Sn</u>	<u>W</u>	<u>Bi</u>	<u>Sb</u>	<u>Au</u>
893282	15946	<5	90	55	30	3500	1800	25	55	40	<10	<0.05
283	947	<5	55	20	<5	<200	630	<10	<50	<10	<10	<0.05
284	948	<5	40	15	50	<200	<20	160	<50	<10	<10	<0.05
285	949	<5	100	25	90	300	35	35	75	<10	<10	0.06
286	950	<5	40	320	110	<200	3660	<10	50	10	<10	<0.05
287	951	<5	80	60	380	<200	30	<10	<50	15	<10	<0.05
288	952	30	960	35700	4500	15700	700	10	550	15	15	0.30
289	954	190	70	14100	19000	<200	220	<10	490	<10	20	<0.05
290	16301	10	90	110	930	770	230	<10	<50	25	10	0.97
291	302	<5	60	70	35	<200	410	<10	60	<10	<10	<0.05
292	303	<5	50	60	55	<200	450	<10	<50	<10	<10	<0.05
293	304	<5	40	80	20	<200	590	<10	60	<10	<10	<0.05
294	305	<5	35	70	25	<200	660	<10	<50	<10	<10	<0.05
295	306	<5	55	50	20	<200	540	<10	<50	<10	<10	<0.05
296	307	<5	10	10	55	<200	40	<10	<50	<10	20	<0.05
297	308	<5	40	15	10	<200	230	<10	55	<10	<10	<0.05
298	309	<5	45	35	20	<200	510	<10	85	<10	<10	<0.05
299	310	<5	40	15	20	<200	70	<10	70	<10	<10	<0.05
300	311	<5	45	35	5	<200	130	<10	<50	<10	<10	<0.05
301	312	<5	60	10	10	<200	<20	<10	<50	30	<10	<0.05
302	313	<5	60	90	30	<200	230	<10	<50	<10	<10	<0.05
303	314	<5	50	55	65	640	130	<10	<50	10	20	1.18
304	315	<5	40	15	10	<200	60	<10	<50	<10	<10	<0.05
305	316	<5	55	25	<5	<200	170	<10	<50	<10	<10	<0.05
306	317	<5	50	20	<5	<200	200	<10	<50	<10	15	<0.05
307	318	<5	75	45	10	<200	280	<10	<50	<10	<10	<0.05
308	319	<5	30	10	<5	<200	360	<10	<50	<10	<10	<0.05

102038

Reg. nos	Desc.	g/t										
		Ag	Cu	Zn	Pb	As	Ba	Sn	W	Bi	Sb	Au
893309	16320	<5	65	45	<5	<200	370	<10	<50	<10	<10	<0.05
310	321	<5	65	25	<5	<200	130	<10	<50	<10	<10	<0.05
311	322	<5	75	30	10	<200	110	<10	<50	<10	<10	<0.05
312	323	<5	45	15	<5	<200	230	<10	<50	<10	<10	<0.05
313	324	<5	55	25	5	<200	510	<10	<50	<10	<10	<0.05
314	325	<5	55	25	10	<200	70	<10	<50	<10	<10	<0.05
315	326	<5	35	20	<5	<200	180	<10	110	<10	<10	<0.05
316	327	<5	50	10	<5	<200	60	<10	<50	<10	<10	<0.05
317	328	<5	60	15	<5	<200	60	<10	<50	<10	<10	<0.05
318	329	150	4550	65	990	340	370	3160	<50	20	<10	<0.05
319	330	30	420	15	420	3900	500	180	<50	20	<10	<0.05
320	331	<5	30	15	5	<200	390	15	<50	<10	<10	<0.05
321	332	<5	40	155	5	<200	550	<10	<50	<10	<10	<0.05
322	333	<5	45	60	10	<200	180	<10	<50	<10	<10	<0.05
323	334	30	85	145	4100	4100	260	<10	<50	140	<10	41.6
324	335	<50	80	110	470	700	570	<10	60	15	10	11.8

Analyses by. 


(P.L. James)

Chief Chemist & Metallurgist

102039

DEPARTMENT OF MINES

102040

Launceston Office.

Chemical and Metallurgical
Laboratory,
287 Wellington Street,
LAUNCESTON 7249



Encloses: Shell Company of Aust Ltd
Phone: Metal Division
Your ref: P.O. Box 860
Our file: Devonport 7310

1.6.89

Attent. Chris. Craig.

Dear Chris,

The check gold assays on a selection of your samples have now been done. The results are as follows:

Reg. No	Description	Au g/t	
		Reported	Check (s)
893282	15946	<0.05	0.12 0.18
893285	15949	0.06	0.08
3288	15952	0.30	0.36
3290	16301	0.97	1.08
3300	16311	<0.05	<0.05
3303	16314	1.18	1.95 2.2
3311	16322	<0.05	0.16 0.06
3318	16329	<0.05	0.08 0.14
3319	16330	<0.05	0.07
3323	16334	41.6	43.1
3324	16335	11.8	10.0

We have checked approximately one in each ten plus those showing significant gold values. Your Ref. No 16330 was checked because a significant amount of arsenic was present.

The deviations in results showing in replicate assays on some samples is almost certainly caused by "shotty" gold.

If you think it necessary we could regrind the assay pulps for a longer period to further "flour" the gold and re-assay.

The only other way to produce a more definitive result would be to do screened fire assays on a comparatively large sample, which is quite costly and time consuming.

I must apologise for the delay in sending you the results which went out to you last week.

Your samples were given high priority but unfortunately the XRF assays for lead, bismuth and arsenic, (the method required by Jeff Randell) gave all sorts of trouble. We had consultation with AMDEL on the subject and they experienced same problems and I understand that XRF is no longer used by them for these elements in the presence of one another.

As stated in the letter covering your results, the XRF method was abandoned and results obtained by AAS.

The problems outlined were the main cause of delay and will not occur in future.

It might be of interest to you to know that we have recently taken part in a NATA gold assaying proficiency test.

Our results on the six samples assayed were \pm one standard deviation in all cases.

Some other lab's were not so precise with a few quite outlandish results being recorded.

Yours faithfully,



(P.L. James)

Chief Chemist & Metallurgist (P.L.)



305 South Road, Mile End South, South Australia, 5031
Telephone: (08) 43 5722 Fax: (08) 234 0321 Telex: LABCOM AA89323

Mr. C. Creogh
Billiton Australia Ltd
30 Mersey Main Road
Spreyton
Devonport
TAS 7310 Australia

Job Number: 9AD0915

Your Reference: 08469/MT24/CJC
Number of Samples: 235
Extra Samples : 0

Date Received: 06-JUN-1989
Date Reported: 28-JUN-1989

This report comprises a cover sheet and pages 1 to 13

This report relates specifically to the samples tested in so far as that the samples as supplied are truly representative of the sample source. Please address any enquiries to Mr. Trevor Francis.

Variations between results on the +80# portions have been noted. The reasons are probably two fold.

1. There is still coarse gold present even after mixermilling.
2. We had very little material to perform the duplicate work (which will throw less emphasis on the duplicate results).

Approved Signature:

for

Dr. John Kikkert
General Manager - Adelaide.
CLASSIC COMLABS LTD

R Chips
16336-365
(2)

- 20#
Pen Com.
B666
Stram
Sediment
16401-16468
(2)

Report Analyte Codes:
 N.A. - Not Analysed.
 L.N.R. - Listed But Not Received.
 I.S. - Insufficient Sample for Analysis.

Distribution Codes:
 CC - Carbon Copy
 EM - Electronic Media
 MM - Magnetic Media

102043

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Job: 9AD0915

O/N: 08469/MT24/CJC

ANALYTICAL REPORT

SAMPLE	Pb	As	Ba	Sn	W	Bi	Sb
16336	19	16	230	<4	<10	4	4
16337	28	24	430	6	<10	4	8
16338	16	19	200	4	<10	4	4
16339	19	48	260	4	10	<4	10
16340	22	9	290	6	<10	<4	8
16341	8	8	165	<4	<10	4	6
16342	14	62	380	4	<10	<4	6
16343	10	230	270	4	10	<4	8
16344	11	7	90	<4	<10	<4	6
16345	17	18	170	4	<10	<4	6
16346	<2	46	30	<4	<10	14	6
16347	20	8	260	4	15	<4	6
16348	11	5	75	<4	15	<4	10
16349	930	890	210	4	15	<4	8
16350	16	15	125	4	10	8	4
16351	24	58	80	4	<10	<4	6
16352	90	9	80	6	10	<4	4
16353	3	5	20	4	10	<4	4
16354	14	17	90	6	<10	<4	6
16355	8	11	125	<4	10	<4	8
16356	9	9	50	4	<10	4	8
16357	11	38	80	6	<10	<4	8
16358	12	10	65	4	<10	6	4
16359	4	7	75	<4	<10	<4	4
16360	11	12	65	6	<10	<4	6
UNITS SCHEME	ppm XRF1						

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Job: 9AD0915

O/N: 08469/MT24/CJC

ANALYTICAL REPORT

SAMPLE	Pb	As	Ba	Sn	W	Bi	Sb
16361	11	11	65	<4	<10	<4	10
16362	9	6	80	4	<10	<4	6
16363	54	15	420	6	<10	<4	<4
16364	26	2950	125	<4	10	4	12
16365	32	86	350	4	<10	6	10
UNITS	ppm						
SCHEME	XRF1						



ANALYTICAL REPORT

SAMPLE	Au Avg	Au Dp1	Au Dp2	Au Dp3	Cu	Zn	Ag
16336	0.02	0.03	<0.01	--	15	24	<1
16337	0.02	--	--	--	32	60	<1
16338	0.02	--	--	--	15	28	<1
16339	0.01	--	--	--	15	46	<1
16340	0.01	--	--	--	9	18	<1
16341	0.01	--	--	--	9	32	<1
16342	0.02	--	--	--	19	56	<1
16343	0.12	--	--	--	18	46	<1
16344	0.01	--	--	--	9	24	<1
16345	0.02	--	--	--	9	28	<1
16346	0.02	--	--	--	2750	20	2
16347	1.92	1.72	2.1	--	9	52	<1
16348	1.50	1.00	2.00	--	14	4	<1
16349	2.3	2.7	1.95	--	15	30	2
16350	0.02	--	--	--	17	30	<1
16351	0.03	--	--	--	13	13	<1
16352	0.01	--	--	--	14	44	<1
16353	0.01	--	--	--	8	6	<1
16354	0.01	--	--	--	11	3	<1
16355	<0.01	--	--	--	6	12	<1
16356	<0.01	--	--	--	11	11	<1
16357	<0.01	--	--	--	8	19	<1
16358	0.02	--	--	--	13	11	<1
16359	<0.01	--	--	--	7	4	<1
16360	0.01	--	--	--	20	16	<1

UNITS SCHEME	ppm FA1	ppm FA1	ppm FA1	ppm FA1	ppm AAS1	ppm AAS1	ppm AAS2
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102046



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Job: 9AD0915
O/N: 08469/MT24/CJC

ANALYTICAL REPORT

SAMPLE	Au Avg	Au Dp1	Au Dp2	Au Dp3	Cu	Zn	Ag
16361	<0.01	--	--	--	11	5	<1
16362	<0.01	--	--	--	8	13	<1
16363	<0.01	--	--	--	30	220	<1
16364	5.4	5.2	5.8	--	15	46	<1
16365	<0.01	--	--	--	16	78	<1
UNITS	ppm	ppm	ppm	ppm	ppm	ppm	ppm
SCHEME	FA1	FA1	FA1	FA1	AAS1	AAS1	AAS2

APPENDIX 2

Geochemical Results Stream Sediment Sampling

See also 91-3259 for
~~see~~ a better (1:25,000) map of samples
from Lide area.



Job: 9AD0915

O/N: 08469/MT24/CJC

ANALYTICAL REPORT

SAMPLE Au

16401	<0.05
16402	0.25
16403	0.85
16404	38
16405	2.1
16406	1.90
16407	0.45
16408	1.10
16409	0.10
16410	0.25
16411	4.7
16412	0.30
16413	<0.05
16414	0.05
16415	0.10
16416	0.15
16417	0.20
16418	<0.05
16419	0.05
16420	<0.05
16421	0.25
16422	0.20
16423	0.55
16424	0.25
16425	<0.05
UNITS	ppb
SCHEME	BLEG2



Job: 9AD0915

O/N: 08469/MT24/CJC

ANALYTICAL REPORT

SAMPLE	Au
16426	<0.05
16427	<0.05
16428	<0.05
16429	1.15
16430	0.35
16431	<0.05
16432	0.35
16433	0.50
16434	0.10
16435	<0.05
16436	0.30
16437	0.50
16438	2.5
16439	0.20
16440	0.05
16441	0.10
16442	0.15
16443	<0.05
16444	<0.05
16445	0.05
16446	0.20
16447	0.05
16448	0.05
16449	0.35
16450	0.15
UNITS	ppb
SCHEME	BLEG2

102050



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Job: 9AD0915

O/N: 08469/MT24/CJC

ANALYTICAL REPORT

SAMPLE	Au
16451	0.15
16452	0.15
16453	0.05
16454	3.6
16455	0.10
16456	1.45
16457	0.15
16458	0.85
16459	0.60
16460	0.45
16461	0.30
16462	0.25
16463	0.55
16464	0.15
16465	14
16466	0.10
16467	0.20
16468	0.10
UNITS	ppb
SCHEME	BLEG2

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Job: 9AD0915

O/N: 08469/MT24/CJC

ANALYTICAL REPORT

SAMPLE	Cu	Zn	Ag	Pb	As	Ba	Au
16401	3	12	<1	2	6	65	<0.01
16402	<2	17	<1	5	3	65	0.01
16403	3	13	<1	7	48	95	0.26
16404	17	24	<1	50	165	105	4.0
16405	5	15	<1	17	32	70	0.46
16406	8	115	<1	19	9	370	0.02
16407	3	44	<1	10	9	200	0.02
16408	2	18	<1	9	8	155	0.19
16409	10	100	<1	15	10	400	0.01
16410	3	24	<1	5	15	130	11.8
16412	<2	11	<1	3	3	90	0.04
16413	<2	24	<1	13	8	440	0.01
16414	<2	18	1	22	2	520	0.01
16415	<2	20	1	13	5	430	0.01
16416	<2	26	2	105	<2	570	0.01
16417	<2	15	2	12	7	460	<0.01
16418	2	16	1	18	5	480	0.01
16419	4	26	1	17	5	460	<0.01
16420	5	26	<1	11	4	410	<0.01
16421	7	14	<1	40	2	210	<0.01
16422	3	12	<1	11	7	260	0.02
16423	3	28	<1	24	10	230	0.08
16425	3	30	<1	24	6	220	0.02
16426	3	18	<1	5	8	190	0.03
16427	4	36	<1	6	5	130	0.02
UNITS	ppm						
SCHEME	AAS1	AAS1	AAS2	XRF1	XRF1	XRF1	FA1



ANALYTICAL REPORT

SAMPLE	Cu	Zn	Ag	Pb	As	Ba	Au
16428	4	50	<1	10	8	300	0.01
16429	7	38	<1	7	6	250	8.6
16430	3	16	<1	20	68	45	0.02
16431	8	52	<1	6	3	90	0.01
16432	2	30	<1	6	9	210	0.05
16433	4	24	<1	14	11	250	0.01
16434	2	28	<1	8	7	260	<0.01
16435	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.	L.N.R.
16436	2	15	<1	26	5	290	0.01
16437	<2	16	<1	22	4	340	0.52
16438	2	24	<1	10	9	250	0.02
16439	5	48	<1	5	7	160	0.04
16440	<2	22	<1	20	15	330	0.02
16441	<2	12	<1	40	<2	270	0.01
16442	<2	14	<1	48	5	360	0.01
16443	<2	19	<1	9	6	290	0.45
16444	3	46	<1	9	<2	50	0.02
16445	<2	17	<1	3	7	75	0.01
16446	<2	17	<1	12	8	170	0.01
16447	<2	22	<1	16	8	180	0.14
16448	<2	10	<1	12	8	175	0.01
16449	3	30	<1	6	4	45	0.03
16450	<2	7	<1	8	7	150	0.42
16451	<2	7	<1	3	5	50	0.05
16452	<2	8	<1	4	5	65	<0.01
UNITS SCHEME	ppm AAS1	ppm AAS1	ppm AAS2	ppm XRF1	ppm XRF1	ppm XRF1	ppm FA1



Job: 9AD0915

O/N: 08469/MT24/CJC

ANALYTICAL REPORT

SAMPLE	Cu	Zn	Ag	Pb	As	Ba	Au
16453	12	58	<1	3	5	140	0.02
16454	2	30	<1	13	7	410	0.03
16455	16	140	<1	4	9	150	0.08
16456	4	30	<1	22	13	490	0.01
16457	L.N.R.						
16458	7	50	<1	11	4	440	0.02
16459	2	26	<1	6	5	380	0.01
16460	4	48	<1	11	4	450	0.15
16461	4	30	<1	9	9	360	0.01
16462	3	32	<1	11	9	220	0.02
16463	2	26	<1	11	7	250	0.01
16464	4	44	<1	8	8	150	0.04
16465	4	30	<1	13	7	260	2.9
16466	2	26	<1	13	44	135	0.01
16467	6	28	<1	13	6	440	<0.01
16468	3	32	<1	10	3	240	0.01
16401 -80#	9	62	1	11	7	370	<0.01
16402 -80#	5	60	<1	14	8	200	<0.01
16403 -80#	8	44	2	13	4	185	0.02
16404 -80#	36	46	2	24	130	280	2.3
16405 -80#	11	34	1	62	260	210	0.03
16406 -80#	18	135	<1	20	18	230	<0.01
16407 -80#	9	58	<1	24	10	330	0.07
16408 -80#	3	34	<1	14	9	260	0.04
16409 -80#	14	105	<1	12	3	230	<0.01

UNITS	ppm	ppm	ppm	ppm	ppm	ppm	ppm
SCHEME	AAS1	AAS1	AAS2	XRF1	XRF1	XRF1	FA1



ANALYTICAL REPORT

SAMPLE	Cu	Zn	Ag	Pb	As	Ba	Au
16410 -80#	2	22	<1	12	11	240	0.04
16412 -80#	5	26	<1	16	3	170	0.23
16413 -80#	4	42	<1	22	7	460	0.01
16414 -80#	3	38	<1	22	5	580	<0.01
16415 -80#	3	36	1	24	4	490	<0.01
16416 -80#	8	32	1	22	7	480	<0.01
16417 -80#	5	22	<1	24	7	520	0.02
16418 -80#	7	28	<1	15	5	490	0.02
16419 -80#	6	40	<1	24	6	480	0.01
16420 -80#	4	30	<1	16	6	400	0.01
16421 -80#	3	22	<1	16	4	250	0.02
16422 -80#	3	30	<1	17	7	370	0.01
16423 -80#	10	56	1	28	14	230	<0.01
16425 -80#	10	76	1	22	7	310	0.02
16426 -80#	5	28	<1	11	7	160	0.01
16427 -80#	12	46	1	18	10	260	0.01
16428 -80#	10	84	1	14	8	260	0.02
16429 -80#	3	17	1	9	9	95	1.92
16430 -80#	4	30	<1	10	5	165	0.05
16431 -80#	11	92	<1	18	7	310	0.01
16432 -80#	5	42	<1	28	50	480	0.02
16433 -80#	9	44	1	20	9	330	0.02
16435 -80#	5	50	1	42	10	380	0.01
16436 -80#	4	34	1	24	10	360	0.01
16437 -80#	4	34	<1	15	16	290	0.14

UNITS	ppm	ppm	ppm	ppm	ppm	ppm	ppm
SCHEME	AAS1	AAS1	AAS2	XRF1	XRF1	XRF1	FA1



Job: 9AD0915

O/N: 08469/MT24/CJC

ANALYTICAL REPORT

SAMPLE	Cu	Zn	Ag	Pb	As	Ba	Au
16438 -80#	5	42	1	19	10	240	0.01
16439 -80#	8	62	1	30	22	330	0.01
16440 -80#	<2	19	<1	54	5	440	0.01
16441 -80#	<2	34	1	54	7	430	0.01
16442 -80#	5	46	2	17	9	370	0.02
16443 -80#	6	52	1	15	7	150	0.01
16444 -80#	11	96	1	15	6	135	<0.01
16445 -80#	2	17	1	12	8	310	<0.01
16446 -80#	3	18	1	14	6	300	<0.01
16447 -80#	2	20	1	15	5	290	<0.01
16448 -80#	4	22	2	4	5	90	<0.01
16449 -80#	9	64	2	10	12	180	<0.01
16450 -80#	<2	17	1	9	9	115	0.08
16451 -80#	2	20	1	13	8	175	<0.01
16452 -80#	<2	28	1	9	6	120	<0.01
16453 -80#	15	64	1	20	6	390	0.01
16454 -80#	6	64	1	11	11	310	<0.01
16455 -80#	38	210	2	28	11	310	<0.01
16456 -80#	9	70	3	11	8	480	<0.01
16457 -80#	L.N.R.						
16458 -80#	20	88	<1	13	9	370	<0.01
16459 -80#	13	90	<1	22	7	550	<0.01
16460 -80#	12	84	<1	26	7	410	<0.01
16461 -80#	12	74	<1	58	12	300	<0.01
16462 -80#	9	66	<1	18	8	280	<0.01
UNITS	ppm						
SCHEME	AAS1	AAS1	AAS2	XRF1	XRF1	XRF1	FA1



ANALYTICAL REPORT

SAMPLE	Cu	Zn	Ag	Pb	As	Ba	Au
16463 -80#	9	62	<1	22	7	280	<0.01
16464 -80#	11	90	1	18	16	270	<0.01
16465 -80#	2	30	1	11	20	135	0.76
16466 -80#	8	34	<1	24	6	470	0.01
16467 -80#	8	44	1	16	6	280	0.01
16468 -80#	9	38	1	19	7	590	0.01
16424 -80#	7	54	1	32	14	220	<0.01
16434 -80#	10	46	<1	15	14	310	<0.01
16424	4	28	1	8	8	175	0.07
UNITS	ppm						
SCHEME	AAS1	AAS1	AAS2	XRF1	XRF1	XRF1	FA1



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Telephone: (08) 43 5722 Fax: (08) 234 0321 Telex: LABCOM AA89323

Mr Jeff Randell
Billiton Australia
P.O. Box 860
DEVONPORT
TAS 7310 Australia

Job Number: 9AD2159

Your Reference: 11703/MT24/JPR
Number of Samples: 99
Extra Samples : 0

Date Received: 27-SEP-1989
Date Reported: 23-OCT-1989

This report comprises a cover sheet and pages 1 to 5

This report relates specifically to the samples tested in so far as that the samples as supplied are truly representative of the sample source. Please address any enquiries to Mr. Trevor Francis.

*N.E.
S.SEDS
(MT24)*

Approved Signature:

for

Dr. John Kikkert
General Manager - Adelaide.

*16481-16500 BLEG
16801-16813 -80#
PC*

MM Mr Jeff Randell TAS

Report Analyte Codes:

N.A. - Not Analysed.
L.N.R. - Listed But Not Received.
I.S. - Insufficient Sample for Analysis.

Distribution Codes:

CC - Carbon Copy
EM - Electronic Media
MM - Magnetic Media

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Job: 9AD2159

O/N: 11703/MT24/JPR

ANALYTICAL REPORT

Sample	Au
16481	0.15
16482	0.10
16483	0.75
16484	0.30
16485	0.70
16486	0.05
16487	0.15
16488	0.10
16489	0.75
16490	4.4
16491	7.5
16492	0.60
16493	0.20
16494	0.35
16495	0.05
16496	0.30
16497	0.75
16498	0.50
16499	0.55
16500	0.90
16801	0.55
16802	0.35
16803	0.20
16804	0.05
16805	0.35
16806	0.15
16807	46
16808	0.80
16809	0.35
16810	0.50
16811	0.80
16812	0.20
16813	0.30
Units	ppb
Detn Limit	0.05
Scheme	BLEG2



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Job: 9AD2159

O/N: 11703/MT24/JPR

ANALYTICAL REPORT

Sample	Au Avg	Au Dp1	Au Dp2	Au Dp3	As	Pb	Ag
16481 -80#	<0.01	--	--	--	42	30	<1
16482 -80#	<0.01	--	--	--	30	22	<1
16483 -80#	<0.01	--	--	--	26	24	<1
16484 -80#	0.01	--	--	--	28	28	<1
16485 -80#	<0.01	--	--	--	20	20	<1
16486 -80#	<0.01	--	--	--	17	20	<1
16487 -80#	0.01	--	--	--	14	16	<1
16488 -80#	<0.01	--	--	--	13	14	<1
16489 -80#	0.02	--	--	--	42	16	<1
16490 -80#	0.13	0.14	0.12	--	13	12	<1
16491 -80#	0.01	--	--	--	40	12	<1
16492 -80#	<0.01	--	--	--	14	15	<1
16493 -80#	<0.01	--	--	--	9	17	<1
16494 -80#	<0.01	--	--	--	16	9	<1
16495 -80#	0.01	--	--	--	17	22	<1
16496 -80#	0.03	--	--	--	13	18	<1
16497 -80#	0.04	--	--	--	13	7	I.S.
16498 -80#	0.01	--	--	--	10	13	<1
16499 -80#	<0.01	--	--	--	9	16	<1
16500 -80#	0.02	--	--	--	20	24	<1
16481 PC	0.03	--	--	--	<2	7	<1
16482 PC	<0.01	--	--	--	5	15	<1
16483 PC	0.03	--	--	--	3	8	<1
16484 PC	0.05	--	--	--	8	12	<1
16485 PC	<0.01	--	--	--	11	15	<1
16486 PC	<0.01	--	--	--	6	9	<1
16487 PC	<0.01	--	--	--	5	8	<1
16488 PC	<0.01	--	--	--	<2	15	<1
16489 PC	<0.01	--	--	--	28	7	<1
16490 PC	0.25	0.25	I.S.	--	4	5	I.S.
16491 PC	<0.01	--	--	--	22	14	<1
16492 PC	<0.01	--	--	--	10	10	<1
16493 PC	<0.01	--	--	--	8	12	<1
16494 PC	0.58	0.43	0.72	--	35	7	1
16495 PC	0.02	--	--	--	2	7	1
16496 PC	<0.01	--	--	--	4	10	1
16497 PC	0.02	--	--	--	6	5	1
16498 PC	<0.01	--	--	--	3	4	<1
16499 PC	<0.01	--	--	--	5	7	1
16500 PC	<0.01	--	--	--	10	7	1
16801 PC	0.03	--	--	--	10	7	1
16802 PC	<0.01	--	--	--	15	15	1
16803 PC	<0.01	--	--	--	<2	54	<1
16804 PC	<0.01	--	--	--	<2	<2	1
16805 PC	0.01	--	--	--	4	6	<1
16806 PC	0.01	--	--	--	17	7	1
16807 PC	3.9	3.1	4.8	--	180	26	1
16808 PC	<0.01	--	--	--	11	4	1
16809 PC	0.19	--	--	--	12	13	1
16810 PC	<0.01	--	--	--	4	4	<1
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Detn Limit	0.01	0.01	0.01	0.01	2	2	1
Scheme	FA1	FA1	FA1	FA1	XRF1	XRF1	AAS2



Job: 9AD2159

O/N: 11703/MT24/JPR

ANALYTICAL REPORT

Sample	Au Avg	Au Dp1	Au Dp2	Au Dp3	As	Pb	Ag
16811 PC	0.39	0.39	I.S.	--	6	2	1
16812 PC	0.07	--	--	--	<2	2	<1
16813 PC	<0.01	--	--	--	7	10	1
16801 -80#	<0.01	--	--	--	15	15	1
16802 -80#	<0.01	--	--	--	20	13	1
16803 -80#	0.01	--	--	--	5	12	1
16804 -80#	0.03	--	--	--	8	5	<1
16805 -80#	<0.01	--	--	--	9	<2	<1
16806 -80#	0.02	--	--	--	28	13	1
16807 -80#	0.13	0.18	0.08	--	88	20	<1
16808 -80#	0.01	--	--	--	24	15	1
16809 -80#	<0.01	--	--	--	20	17	<1
16810 -80#	<0.01	--	--	--	9	8	<1
16811 -80#	0.03	--	--	--	2	3	<1
16812 -80#	<0.01	--	--	--	6	12	<1
16813 -80#	<0.01	--	--	--	3	9	<1
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Detn Limit	0.01	0.01	0.01	0.01	2	2	1
Scheme	FA1	FA1	FA1	FA1	XRF1	XRF1	AAS2



Job: 9AD2159

O/N: 11703/MT24/JPR

ANALYTICAL REPORT

Sample	Zn	Cu
16481 -80#	62	20
16482 -80#	120	24
16483 -80#	42	12
16484 -80#	42	16
16485 -80#	125	24
16486 -80#	45	10
16487 -80#	28	6
16488 -80#	22	20
16489 -80#	48	25
16490 -80#	24	10
16491 -80#	32	20
16492 -80#	24	12
16493 -80#	42	15
16494 -80#	25	5
16495 -80#	50	19
16496 -80#	34	12
16497 -80#	44	26
16498 -80#	94	14
16499 -80#	70	17
16500 -80#	56	20
16481 PC	40	11
16482 PC	76	13
16483 PC	28	10
16484 PC	80	15
16485 PC	270	16
16486 PC	30	4
16487 PC	19	8
16488 PC	18	6
16489 PC	60	14
16490 PC	13	2
16491 PC	48	14
16492 PC	34	4
16493 PC	50	12
16494 PC	30	11
16495 PC	34	10
16496 PC	32	9
16497 PC	35	12
16498 PC	38	8
16499 PC	50	12
16500 PC	40	11
16801 PC	68	11
16802 PC	52	13
16803 PC	15	7
16804 PC	15	7
16805 PC	13	6
16806 PC	26	12
16807 PC	40	13
16808 PC	52	8
16809 PC	42	10
16810 PC	13	7

Units	ppm	ppm
Detn Limit	2	2
Scheme	AAS1	AAS1



Job: 9AD2159

O/N: 11703/MT24/JPR

ANALYTICAL REPORT

Sample	Zn	Cu
16811 PC	25	15
16812 PC	25	6
16813 PC	42	12
16801 -80#	94	22
16802 -80#	78	32
16803 -80#	17	9
16804 -80#	30	19
16805 -80#	16	11
16806 -80#	28	26
16807 -80#	40	14
16808 -80#	45	28
16809 -80#	30	19
16810 -80#	36	20
16811 -80#	17	6
16812 -80#	35	16
16813 -80#	26	12
Units	ppm	ppm
Detn Limit	2	2
Scheme	AAS1	AAS1

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305 South Road, Mile End South, South Australia, 5031
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*File MT24
874*

Mr C. Creogh
Billiton Australia Ltd
P.O. Box 860
DEVONPORT
TAS 7310 Australia

Job Number: 9AD0932

Your Reference: 08470/MT24/LJC
Number of Samples: 15

Date Received: 08-JUN-1989
Date Reported: 20-JUN-1989

This report comprises a cover sheet and pages 1 to 3

This report relates specifically to the samples tested in so far as that the samples as supplied are truly representative of the sample source. Please address any enquiries to Mr. Trevor Francis.

Approved Signature:

for *Handwritten Signature*

Dr. John Kikkert
General Manager - Adelaide.
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*S.S.E.D.S.
16469-73 BLEG
P.C
-80#*

Report Analyte Codes:
N.A. - Not Analysed.
L.N.R. - Listed But Not Received.
I.S. - Insufficient Sample for Analysis.

Distribution Codes:
CC - Carbon Copy
EM - Electronic Media
MM - Magnetic Media



Job: 9AD0932

O/N: 08470/MT24/LJC

ANALYTICAL REPORT

SAMPLE	Au
16469	0.85
16470	0.15
16471	0.95
16472	0.90
16473	0.85
UNITS	ppb
SCHEME	BLEG2



ANALYTICAL REPORT

SAMPLE	Au Avg	Au Dp1	Au Dp2	Au Dp3	Cu	Zn	Ag
16469	0.13	0.10	0.16	--	5	54	<1
16470	0.01	--	--	--	<2	12	<1
16471	0.03	--	--	--	4	50	<1
16472	<0.01	--	--	--	3	66	<1
16473	0.03	--	--	--	<2	16	<1
16469 -80#	0.18	0.18	0.17	--	8	64	<1
16470 -80#	0.01	--	--	--	5	28	<1
16471 -80#	<0.01	--	--	--	7	34	<1
16472 -80#	0.02	--	--	--	7	38	<1
16473 -80#	0.05	0.07	0.02	--	6	24	<1
UNITS	ppm	ppm	ppm	ppm	ppm	ppm	ppm
SCHEME	FA1	FA1	FA1	FA1	AAS1	AAS1	AAS2



ANALYTICAL REPORT

SAMPLE	Pb	As	Ba
16469	17	11	490
16470	17	6	280
16471	7	5	230
16472	7	5	380
16473	12	10	170
16469 -80#	24	12	620
16470 -80#	19	7	410
16471 -80#	6	8	390
16472 -80#	11	8	530
16473 -80#	17	14	290
UNITS	ppm	ppm	ppm
SCHEME	XRF1	XRF1	XRF1



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*NE AV
S.SEDS.*

Mr. Jeff Randell
Billiton Australia Ltd
PO Box 860
DEVONPORT
TAS 7310

Job Number: 0AD0229

Your Reference: 11717/MT24/JPR Date Received: 24-JAN-1990
Number of Samples: 189 Date Reported: 06-FEB-1990
Extra Samples : 0

This report comprises a cover sheet and pages 1 to 8

This report relates specifically to the samples tested in so far as that the samples as supplied are truly representative of the sample source. Please address any enquiries to Mr. Trevor Francis.

Approved Signature:

for

Dr. John Kikkert
General Manager - Adelaide.

Pan Conc. Steam Seds.

16814-16900 (27)

17001-17089 (27)

176

MM Mr Jeff Randell Devonport

Report Analyte Codes:

N.A. - Not Analysed.
L.N.R. - Listed But Not Received.
I.S. - Insufficient Sample for Analysis.

Distribution Codes:

CC - Carbon Copy
EM - Electronic Media
MM - Magnetic Media



Job: OAD0229

O/N: 11717/MT24/JPR

ANALYTICAL REPORT

Sample	Au Avg	Au Dp1	Au Dp2	Au Dp3	As	Sn	Pb
16801	L.N.R.	--	--	--	L.N.R.	L.N.R.	L.N.R.
16802	L.N.R.	--	--	--	L.N.R.	L.N.R.	L.N.R.
16803	L.N.R.	--	--	--	L.N.R.	L.N.R.	L.N.R.
16804	L.N.R.	--	--	--	L.N.R.	L.N.R.	L.N.R.
16805	L.N.R.	--	--	--	L.N.R.	L.N.R.	L.N.R.
16806	L.N.R.	--	--	--	L.N.R.	L.N.R.	L.N.R.
16807	L.N.R.	--	--	--	L.N.R.	L.N.R.	L.N.R.
16808	L.N.R.	--	--	--	L.N.R.	L.N.R.	L.N.R.
16809	L.N.R.	--	--	--	L.N.R.	L.N.R.	L.N.R.
16810	L.N.R.	--	--	--	L.N.R.	L.N.R.	L.N.R.
16811	L.N.R.	--	--	--	L.N.R.	L.N.R.	L.N.R.
16812	L.N.R.	--	--	--	L.N.R.	L.N.R.	L.N.R.
16813	L.N.R.	--	--	--	L.N.R.	L.N.R.	L.N.R.
16814	<0.01	--	--	--	4	<4	11
16815	<0.01	--	--	--	<2	5	6
16816	0.03	--	--	--	6	<4	22
16817	<0.01	<0.10	--	--	<2	<4	8
16818	0.41	0.50	--	--	<2	34	6
16819	0.01	--	--	--	2	<4	9
16820	0.01	--	--	--	6	<4	25
16821	<0.01	--	--	--	3	5	16
16822	<0.01	--	--	--	25	78	24
16823	0.04	--	--	--	19	20	18
16824	0.02	--	--	--	<2	3600	26
16825	<0.01	--	--	--	13	26	<2
16826	0.02	--	--	--	<2	5	2
16827	0.04	--	--	--	<2	44	15
16828	0.01	--	--	--	<2	45	22
16829	0.02	--	--	--	<2	1220	12
16830	0.02	--	--	--	<2	65	<2
16831	0.02	--	--	--	<2	65	<2
16832	<0.01	--	--	--	3	12	25
16833	0.01	--	--	--	<2	6	45
16834	0.04	--	--	--	<2	6	34
16835	0.01	--	--	--	<2	<4	18
16836	0.05	--	--	--	<2	340	17
16837	<0.01	--	--	--	3	12	20
16838	<0.01	--	--	--	<2	6	20
16839	<0.01	--	--	--	<2	<4	26
16840	0.01	--	--	--	7	8	22
16841	<0.01	<0.30	--	--	3	8	42
16842	0.21	<0.10	--	--	110	530	28
16843	<0.01	--	--	--	5	180	14
16844	<0.01	--	--	--	<2	6	5
16845	<0.01	--	--	--	4	12	<2
16846	1.98	<0.20	--	--	2	370	2
16847	0.01	--	--	--	<2	24	4
16848	0.05	--	--	--	<2	5	<2
16849	0.03	--	--	--	<2	5	<2
16850	<0.01	--	--	--	<2	5	4

PANCON

Units	ppm						
Detn Limit	0.01	0.01	0.01	0.01	2	4	2
Scheme	FA1	FA1	FA1	FA1	XRF1	XRF1	XRF1



Job: 0AD0229

O/N: 11717/MT24/JPR

ANALYTICAL REPORT

Sample	Au Avg	Au Dp1	Au Dp2	Au Dp3	As	Sn	Pb
16851	<0.01	---	---	---	<2	<4	<2
16852	0.03	---	---	---	8	<4	10
16853	0.02	---	---	---	<2	6	<2
16854	<0.01	---	---	---	<2	<4	<2
16855	0.02	---	---	---	<2	<4	3
16856	<0.01	---	---	---	15	<4	6
16857	<0.01	---	---	---	4	<4	<2
16858	L.N.R.	---	---	---	L.N.R.	L.N.R.	L.N.R.
16859	<0.01	---	---	---	8	4	13
16860	<0.01	---	---	---	<2	<4	2
16861	0.01	---	---	---	<2	8	5
16862	0.20	<0.30	---	---	<2	<4	5
16863	0.02	---	---	---	3	<4	20
16864	0.04	---	---	---	<2	6	8
16865	0.01	---	---	---	5	15	11
16866	<0.01	---	---	---	3	6	11
16867	0.02	---	---	---	12	28	11
16868	<0.01	---	---	---	4	6	16
16869	0.07	---	---	---	2	<4	<2
16870	<0.01	---	---	---	4	<4	20
16871	0.05	---	---	---	3	<4	<2
16872	<0.01	---	---	---	9	<4	6
16873	0.08	<0.40	---	---	<2	<4	<2
16874	0.02	---	---	---	<2	<4	5
16875	0.01	---	---	---	<2	<4	<2
16876	<0.01	---	---	---	<2	<4	4
16877	<0.01	---	---	---	<2	6	3
16878	0.17	<0.20	---	---	<2	<4	2
16879	0.18	<0.30	---	---	2	<4	<2
16880	<0.01	---	---	---	<2	<4	3
16881	0.04	---	---	---	3	<4	5
16882	<0.01	---	---	---	4	<4	7
16883	0.02	---	---	---	8	<4	12
16884	1.20	1.02	1.40	---	2	<4	12
16885	<0.01	---	---	---	4	<4	4
16886	0.01	---	---	---	<2	<4	<2
16887	<0.01	---	---	---	<2	5	<2
16888	<0.01	---	---	---	<2	<4	4
16889	<0.01	---	---	---	<2	<4	<2
16890	<0.01	---	---	---	<2	<4	4
16891	<0.01	<0.30	---	---	2	<4	<2
16892	0.29	0.08	0.50	---	<2	<4	15
16893	0.02	---	---	---	<2	<4	7
16894	<0.01	---	---	---	<2	<4	14
16895	0.08	<0.30	---	---	<2	<4	20
16896	0.01	---	---	---	5	<4	17
16897	0.01	---	---	---	7	<4	8
16898	<0.01	---	---	---	42	18	19
16899	0.01	---	---	---	<2	<4	6
16900	<0.01	---	---	---	<2	<4	3

Units	ppm						
Detn Limit	0.01	0.01	0.01	0.01	2	4	2
Scheme	FA1	FA1	FA1	FA1	XRF1	XRF1	XRF1



Job: OAD0229

O/N: 11717/MT24/JPR

ANALYTICAL REPORT

Sample	Au Avg	Au Dp1	Au Dp2	Au Dp3	As	Sn	Pb
17001	0.01	--	--	--	2	<4	22
17002	<0.01	--	--	--	<2	4	32
17003	0.03	--	--	--	<2	4	26
17004	<0.01	--	--	--	<2	4	36
17005	<0.01	--	--	--	<2	26	26
17006	0.01	--	--	--	3	<4	<2
17007	0.01	--	--	--	3	<4	11
17008	<0.01	--	--	--	11	4	15
17009	<0.01	--	--	--	6	<4	12
17010	0.01	--	--	--	8	<4	11
17011	0.01	--	--	--	4	<4	15
17012	<0.01	--	--	--	5	<4	7
17013	1.96	1.62	2.3	--	6	8	11
17014	<0.01	--	--	--	3	<4	11
17015	<0.01	--	--	--	6	<4	9
17016	0.02	--	--	--	9	<4	14
17017	0.01	--	--	--	6	<4	10
17018	0.02	--	--	--	7	<4	12
17019	2.3	3.8	0.72	--	130	<4	17
17020	<0.01	--	--	--	<2	<4	7
17021	0.02	--	--	--	9	<4	8
17022	<0.01	--	--	--	4	<4	11
17023	0.07	<0.20	--	--	2	<4	12
17024	<0.01	--	--	--	14	<4	15
17025	0.01	--	--	--	5	4	10
17026	0.01	--	--	--	16	10	12
17027	<0.01	--	--	--	5	4	15
17028	<0.01	--	--	--	<2	6	15
17029	<0.01	--	--	--	3	8	14
17030	0.02	--	--	--	<2	4	8
17031	<0.01	--	--	--	3	38	10
17032	0.03	--	--	--	<2	12	25
17033	<0.01	--	--	--	<2	160	44
17034	<0.01	--	--	--	<2	340	36
17035	<0.01	--	--	--	<2	<4	34
17036	<0.01	--	--	--	<2	<4	42
17037	0.04	--	--	--	9	4	26
17038	<0.01	--	--	--	<2	<4	28
17039	<0.01	--	--	--	2	<4	12
17040	<0.01	--	--	--	2	<4	7
17041	0.06	<0.20	--	--	6	6	15
17042	<0.01	--	--	--	<2	4	12
17043	0.30	0.09	0.50	--	4	5	12
17044	0.02	--	--	--	2	15	9
17045	0.02	--	--	--	3	<4	17
17046	<0.01	--	--	--	4	4	9
17047	<0.01	--	--	--	<2	5	5
17048	<0.01	--	--	--	4	<4	8
17049	0.14	0.08	0.20	--	5	<4	13
17050	0.02	--	--	--	<2	<4	25

Units	ppm						
Detn Limit	0.01	0.01	0.01	0.01	2	4	2
Scheme	FA1	FA1	FA1	FA1	XRF1	XRF1	XRF1



Job: 0AD0229

O/N: 11717/MT24/JPR

ANALYTICAL REPORT

Sample	Au Avg	Au Dp1	Au Dp2	Au Dp3	As	Sn	Pb
17051	<0.01	--	--	--	6	<4	10
17052	0.02	--	--	--	<2	<4	15
17053	<0.01	--	--	--	<2	<4	5
17054	0.01	--	--	--	<2	<4	30
17055	<0.01	--	--	--	22	12	24
17056	0.02	--	--	--	7	5	<2
17057	0.03	--	--	--	<2	100	9
17058	<0.01	--	--	--	<2	<4	3
17059	0.07	<0.20	--	--	<2	54	<2
17060	0.01	--	--	--	2	52	<2
17061	<0.01	--	--	--	<2	<4	<2
17062	<0.01	--	--	--	<2	270	6
17063	0.04	--	--	--	2	48	2
17064	0.14	<0.10	--	--	<2	16	<2
17065	<0.01	--	--	--	<2	44	<2
17066	0.05	--	--	--	<2	<4	25
17067	0.04	--	--	--	<2	<4	<2
17068	0.01	--	--	--	<2	<4	13
17069	0.05	--	--	--	<2	28	16
17070	0.03	--	--	--	<2	22	19
17071	<0.01	--	--	--	<2	16	20
17072	<0.01	--	--	--	13	22	24
17073	<0.01	--	--	--	3	18	16
17074	<0.01	--	--	--	<2	10	32
17075	0.03	--	--	--	3	15	30
17076	<0.01	--	--	--	<2	5	22
17077	0.92	1.20	0.64	--	22	8	11
17078	0.03	--	--	--	2	<4	6
17079	0.01	--	--	--	2	4	13
17080	<0.01	--	--	--	3	4	11
17081	0.03	--	--	--	3	<4	<2
17082	<0.01	--	--	--	<2	<4	28
17083	0.05	--	--	--	<2	2700	28
17084	0.03	--	--	--	<2	20	36
17085	0.01	--	--	--	<2	5	34
17086	<0.01	--	--	--	9	8	9
17087	<0.01	--	--	--	<2	<4	8
17088	0.07	<0.20	--	--	4	<4	15
17089	0.07	<0.30	--	--	<2	<4	11

Units	ppm						
Detn Limit	0.01	0.01	0.01	0.01	2	4	2
Scheme	FA1	FA1	FA1	FA1	XRF1	XRF1	XRF1



Job: 0AD0229

O/N: 11717/MT24/JPR

ANALYTICAL REPORT

Sample	Cu	Zn	Ag
16801	L.N.R.	L.N.R.	L.N.R.
16802	L.N.R.	L.N.R.	L.N.R.
16803	L.N.R.	L.N.R.	L.N.R.
16804	L.N.R.	L.N.R.	L.N.R.
16805	L.N.R.	L.N.R.	L.N.R.
16806	L.N.R.	L.N.R.	L.N.R.
16807	L.N.R.	L.N.R.	L.N.R.
16808	L.N.R.	L.N.R.	L.N.R.
16809	L.N.R.	L.N.R.	L.N.R.
16810	L.N.R.	L.N.R.	L.N.R.
16811	L.N.R.	L.N.R.	L.N.R.
16812	L.N.R.	L.N.R.	L.N.R.
16813	L.N.R.	L.N.R.	L.N.R.
16814	9	35	<1
16815	4	22	<1
16816	4	26	<1
16817	<2	5	<1
16818	2	7	<1
16819	3	20	<1
16820	5	32	<1
16821	2	10	<1
16822	10	44	<1
16823	13	58	1
16824	2	5	<1
16825	4	22	<1
16826	<2	2	<1
16827	<2	3	<1
16828	3	3	<1
16829	<2	6	<1
16830	2	5	<1
16831	<2	4	<1
16832	2	24	<1
16833	<2	14	<1
16834	2	8	<1
16835	<2	3	<1
16836	4	18	<1
16837	3	15	<1
16838	4	19	<1
16839	3	19	<1
16840	5	24	<1
16841	<2	18	<1
16842	50	68	1
16843	<2	14	<1
16844	<2	<2	<1
16845	3	6	<1
16846	<2	14	<1
16847	<2	3	<1
16848	<2	5	<1
16849	<2	<2	<1
16850	<2	2	<1

Units	ppm	ppm	ppm
Detn Limit	2	2	1
Scheme	AAS1	AAS1	AAS2



Job: OAD0229

O/N: 11717/MT24/JPR

ANALYTICAL REPORT

Sample	Cu	Zn	Ag
16851	<2	<2	<1
16852	4	20	<1
16853	<2	5	<1
16854	<2	4	<1
16855	<2	<2	<1
16856	<2	6	<1
16857	<2	<2	<1
16858	L.N.R.	L.N.R.	L.N.R.
16859	13	26	<1
16860	2	11	<1
16861	<2	6	<1
16862	2	5	<1
16863	8	115	<1
16864	2	12	<1
16865	3	26	1
16866	4	20	1
16867	8	42	1
16868	8	60	1
16869	<2	4	<1
16870	9	120	1
16871	<2	3	<1
16872	9	88	1
16873	<2	5	<1
16874	<2	7	<1
16875	<2	2	<1
16876	<2	26	1
16877	3	9	1
16878	2	5	1
16879	3	11	1
16880	4	30	1
16881	6	46	1
16882	10	58	1
16883	14	84	1
16884	4	20	1
16885	2	22	1
16886	19	50	1
16887	3	32	1
16888	<2	8	1
16889	2	8	1
16890	4	5	1
16891	2	6	1
16892	<2	11	1
16893	3	20	1
16894	<2	4	<1
16895	2	9	<1
16896	2	32	1
16897	11	90	1
16898	18	100	1
16899	<2	11	<1
16900	<2	10	<1

Units	ppm	ppm	ppm
Detn Limit	2	2	1
Scheme	AAS1	AAS1	AAS2



Job: OAD0229

O/N: 11717/MT24/JPR

ANALYTICAL REPORT

Sample	Cu	Zn	Ag
17001	<2	11	<1
17002	2	25	<1
17003	2	18	<1
17004	3	18	<1
17005	5	17	<1
17006	3	20	<1
17007	6	38	<1
17008	7	58	1
17009	4	22	<1
17010	7	48	1
17011	7	46	1
17012	4	24	<1
17013	7	30	<1
17014	6	36	<1
17015	6	60	1
17016	10	72	1
17017	6	34	<1
17018	7	54	1
17019	14	64	1
17020	4	30	1
17021	4	13	<1
17022	<2	16	<1
17023	3	26	<1
17024	7	40	1
17025	6	58	1
17026	8	78	1
17027	10	55	1
17028	2	25	1
17029	7	88	<1
17030	6	40	<1
17031	2	40	<1
17032	<2	11	<1
17033	2	8	<1
17034	3	11	<1
17035	2	9	<1
17036	2	10	<1
17037	5	34	<1
17038	<2	5	<1
17039	2	18	<1
17040	3	13	<1
17041	7	28	<1
17042	4	18	<1
17043	6	26	<1
17044	2	10	<1
17045	2	10	<1
17046	6	25	<1
17047	4	26	1
17048	4	28	<1
17049	11	48	1
17050	4	22	<1
Units	ppm	ppm	ppm
Detn Limit	2	2	1
Scheme	AAS1	AAS1	AAS2

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Job: OAD0229

O/N: 11717/MT24/JPR

ANALYTICAL REPORT

Sample	Cu	Zn	Ag
17051	3	22	<1
17052	5	38	<1
17053	2	16	<1
17054	2	10	<1
17055	4	34	<1
17056	5	46	<1
17057	<2	15	<1
17058	4	10	<1
17059	3	3	<1
17060	5	5	<1
17061	<2	11	<1
17062	3	9	<1
17063	3	14	<1
17064	3	15	<1
17065	<2	12	<1
17066	<2	9	<1
17067	2	9	<1
17068	<2	15	<1
17069	<2	14	<1
17070	<2	12	<1
17071	<2	18	<1
17072	14	84	1
17073	4	28	<1
17074	3	28	<1
17075	2	30	<1
17076	3	24	<1
17077	4	13	<1
17078	4	18	<1
17079	5	30	<1
17080	6	40	<1
17081	3	12	<1
17082	3	20	<1
17083	11	24	<1
17084	2	3	<1
17085	2	12	<1
17086	17	50	<1
17087	6	42	<1
17088	2	17	<1
17089	7	28	<1
Units	ppm	ppm	ppm
Detn Limit	2	2	1
Scheme	AAS1	AAS1	AAS2



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MT24
 Stream SEDS
 N.E. TAS.
 TCEB.

Mr. Jeff Randell
 Billiton Australia Ltd
 PO Box 860
 DEVONPORT
 TAS 7310

Job Number: 9AD3555

Your Reference: 11709/MT24/JPR Date Received: 04-DEC-1989
 Number of Samples: 266 Date Reported: 29-DEC-1989
 Extra Samples : 0

This report comprises a cover sheet and pages 1 to 6

This report relates specifically to the samples tested in so far as that the samples as supplied are truly representative of the sample source. Please address any enquiries to Mr. Trevor Francis.

Approved Signature:

for

Dr. John Kikkert
 General Manager - Adelaide.

BLEB + -80#
 Stream SEDS
 16814 - 16900 (87)
 17001 - 17046 (45)
 132

MM Mr Jeff Randell Devonport

Report Analyte Codes:
 N.A. - Not Analysed.
 L.N.R. - Listed But Not Received.
 I.S. - Insufficient Sample for Analysis.

Distribution Codes:
 CC - Carbon Copy
 EM - Electronic Media
 MM - Magnetic Media



Job: 9AD3555
O/N: 11709/MT24/JPR

ANALYTICAL REPORT

Sample	Au	Ag
16814	0.05	<0.02
16815	<0.05	<0.02
16816	<0.05	<0.02
16817	<0.05	<0.02
16818	<0.05	<0.02
16819	<0.05	<0.02
16820	0.10	<0.02
16821	0.05	<0.02
16822	0.05	0.04
16823	0.20	0.08
16824	<0.05	<0.02
16825	<0.05	0.02
16826	<0.05	<0.02
16827	<0.05	<0.02
16828	<0.05	<0.02
16829	<0.05	<0.02
16830	<0.05	<0.02
16831	<0.05	<0.02
16832	<0.05	<0.02
16833	<0.05	<0.02
16834	0.05	0.02
16835	<0.05	<0.02
16836	<0.05	<0.02
16837	0.05	<0.02
16838	<0.05	<0.02
16839	<0.05	0.04
16840	<0.05	<0.02
16841	<0.05	<0.02
16842	1.35	<0.02
16843	<0.05	<0.02
16844	<0.05	<0.02
16845	<0.05	<0.02
16846	<0.05	<0.02
16847	0.05	<0.02
16848	<0.05	<0.02
16849	<0.05	<0.02
16850	<0.05	<0.02
16851	<0.05	<0.02
16852	<0.05	<0.02
16853	<0.05	<0.02
16854	<0.05	<0.02
16855	<0.05	<0.02
16856	<0.05	<0.02
16857	0.10	<0.02
16858	0.30	<0.02
16859	0.20	<0.02
16860	0.20	<0.02
16861	<0.05	<0.02
16862	<0.05	<0.02
16863	0.75	<0.02

Units	ppb	ppm
Detn Limit	0.05	0.02
Scheme	BLEG2	BLEG1C



Job: 9AD3555
O/N: 11709/MT24/JPR

ANALYTICAL REPORT

Sample	Au	Ag
16864	0.10	<0.02
16865	0.10	<0.02
16866	0.05	<0.02
16867	<0.05	<0.02
16868	<0.05	<0.02
16869	0.35	<0.02
16870	0.45	<0.02
16871	0.05	<0.02
16872	2.0	<0.02
16873	<0.05	<0.02
16874	<0.05	<0.02
16875	<0.05	<0.02
16876	0.10	<0.02
16877	2.1	<0.02
16878	7.5	<0.02
16879	4.3	<0.02
16880	0.35	<0.02
16881	0.50	<0.02
16882	0.40	<0.02
16883	0.45	0.02
16884	2.2	<0.02
16885	1.50	<0.02
16886	<0.05	<0.02
16887	0.05	<0.02
16888	0.15	<0.02
16889	0.10	<0.02
16890	<0.05	<0.02
16891	0.05	<0.02
16892	<0.05	<0.02
16893	<0.05	<0.02
16894	<0.05	<0.02
16895	0.05	<0.02
16896	1.25	<0.02
16897	0.05	0.02
16898	0.15	<0.02
16899	<0.05	<0.02
16900	<0.05	<0.02
17001	<0.05	<0.02
17002	<0.05	<0.02
17003	<0.05	<0.02
17004	0.10	<0.02
17005	0.10	<0.02
17006	0.25	<0.02
17007	0.15	<0.02
17008	22	<0.02
17009	0.15	<0.02
17010	0.10	<0.02
17011	0.20	<0.02
17012	0.20	<0.02
17013	160	<0.02

Units	ppb	ppm
Detn Limit	0.05	0.02
Scheme	BLEG2	BLEG1C



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Job: 9AD3555

O/N: 11709/MT24/JPR

ANALYTICAL REPORT

Sample	Au	Ag
17014	0.45	<0.02
17015	0.20	<0.02
17016	0.30	<0.02
17017	0.30	0.06
17018	6.5	<0.02
17019	110	<0.02
17020	0.95	<0.02
17021	1.40	<0.02
17022	0.20	<0.02
17023	0.15	<0.02
17024	0.10	<0.02
17025	<0.05	<0.02
17026	0.05	<0.02
17027	0.85	<0.02
17028	0.45	<0.02
17029	0.55	<0.02
17030	0.30	<0.02
17031	0.25	<0.02
17032	0.25	<0.02
17033	0.25	<0.02
17034	0.20	<0.02
17035	0.30	<0.02
17036	0.40	<0.02
17037	0.30	<0.02
17038	0.30	<0.02
17039	0.25	<0.02
17040	0.25	<0.02
17041	0.75	<0.02
17042	0.10	<0.02
17043	0.40	<0.02
17044	0.20	<0.02
17045	1.30	<0.02
17046	0.15	<0.02

Units	ppb	ppm
Detn Limit	0.05	0.02
Scheme	BLEG2	BLEG1C



Job: 9AD3555

O/N: 11709/MT24/JPR

ANALYTICAL REPORT

Sample	As	Sn	Pb	Cu	Zn	Ag	Au
16814 -80	8	6	28	8	50	<1	<0.01
16815 -80	6	6	20	5	40	<1	<0.01
16816 -80	15	8	38	10	42	<1	<0.01
16817 -80	8	6	26	4	16	<1	0.04
16818 -80	5	8	22	6	19	<1	0.03
16819 -80	3	5	25	4	26	<1	0.02
16820 -80	9	<4	26	10	40	<1	0.01
16821 -80	12	6	30	7	42	<1	0.06
16822 -80	38	44	36	16	56	<1	0.01
16823 -80	22	8	30	18	72	1	<0.01
16824 -80	6	220	17	18	22	<1	<0.01
16825 -80	15	26	24	13	58	<1	<0.01
16826 -80	4	5	20	4	18	<1	0.01
16827 -80	11	185	35	2	32	<1	0.01
16828 -80	10	16	38	2	13	<1	0.06
16829 -80	4	100	20	3	19	<1	0.37
16830 -80	8	16	18	4	20	<1	0.02
16831 -80	7	44	13	5	26	<1	<0.01
16832 -80	6	8	44	6	32	<1	<0.01
16833 -80	3	14	46	2	34	<1	<0.01
16834 -80	48	10	55	3	32	<1	<0.01
16835 -80	6	<4	38	5	14	<1	<0.01
16836 -80	2	48	26	10	32	<1	<0.01
16837 -80	5	10	28	7	36	<1	<0.01
16838 -80	4	6	24	9	40	<1	<0.01
16839 -80	9	10	30	11	64	<1	<0.01
16840 -80	5	8	35	11	50	<1	<0.01
16841 -80	4	10	42	<2	44	<1	0.01
16842 -80	8	86	9	7	9	<1	0.02
16843 -80	4	42	10	2	6	<1	0.01
16844 -80	3	24	32	6	4	<1	0.01
16845 -80	3	<4	4	<2	<2	<1	<0.01
16846 -80	3	10	5	2	<2	<1	0.01
16847 -80	7	110	14	6	52	1	0.72
16848 -80	4	8	15	10	88	<1	0.08
16849 -80	3	8	4	2	10	<1	<0.01
16850 -80	4	5	11	<2	22	<1	<0.01
16851 -80	3	4	4	11	5	<1	<0.01
16852 -80	3	<4	6	2	10	<1	<0.01
16853 -80	5	4	6	5	16	<1	<0.01
16854 -80	2	<4	12	3	20	<1	<0.01
16855 -80	6	6	15	4	12	<1	<0.01
16856 -80	4	<4	3	2	10	<1	<0.01
16857 -80	2	<4	7	<2	7	<1	<0.01
16858 -80	6	5	24	25	76	<1	0.01
16859 -80	6	8	15	11	45	<1	0.01
16860 -80	18	6	25	24	135	<1	<0.01
16861 -80	3	10	9	3	19	<1	0.01
16862 -80	5	5	11	9	12	<1	<0.01
16863 -80	4	<4	8	3	14	<1	<0.01
Units	ppm						
Detn Limit	2	4	2	2	2	1	0.01
Scheme	XRF1	XRF1	XRF1	AAS1	AAS1	AAS2	FA1



Job: 9AD3555
O/N: 11709/MT24/JPR

ANALYTICAL REPORT

Sample	As	Sn	Pb	Cu	Zn	Ag	Au
16864 -80	8	4	14	14	56	<1	<0.01
16865 -80	6	6	10	7	40	<1	<0.01
16866 -80	9	<4	11	4	40	<1	0.16
16867 -80	8	6	15	8	68	<1	I.S.
16868 -80	6	<4	8	7	65	<1	0.02
16869 -80	6	<4	18	14	150	<1	0.07
16870 -80	5	6	17	12	140	1	<0.01
16871 -80	2	6	<2	4	11	<1	0.01
16872 -80	3	<4	2	2	30	<1	<0.01
16873 -80	2	5	4	3	6	<1	0.02
16874 -80	2	<4	<2	3	4	<1	<0.01
16875 -80	3	<4	4	3	5	<1	<0.01
16876 -80	5	6	11	8	92	<1	<0.01
16877 -80	5	6	5	5	22	<1	0.01
16878 -80	2	<4	2	2	12	<1	0.08
16879 -80	4	4	4	6	19	<1	<0.01
16880 -80	4	8	9	9	54	1	0.01
16881 -80	5	4	4	10	42	1	<0.01
16882 -80	7	6	7	9	62	1	<0.01
16883 -80	8	4	13	14	90	1	<0.01
16884 -80	5	<4	6	10	26	1	0.22
16885 -80	7	8	8	5	36	1	0.02
16886 -80	4	<4	6	4	26	<1	<0.01
16887 -80	6	6	10	9	58	1	0.01
16888 -80	3	4	8	25	15	<1	0.01
16889 -80	2	5	5	3	15	1	0.01
16890 -80	2	4	7	2	14	<1	<0.01
16891 -80	5	5	8	5	22	<1	<0.01
16892 -80	2	4	20	4	40	<1	0.01
16893 -80	4	<4	24	12	78	1	0.01
16894 -80	3	4	25	2	11	<1	<0.01
16895 -80	3	4	19	3	34	1	0.02
16896 -80	3	6	20	5	55	1	0.01
16897 -80	6	<4	7	9	72	1	0.01
16898 -80	46	4	20	18	115	1	<0.01
16899 -80	2	6	8	<2	15	<1	0.02
16900 -80	3	<4	14	5	13	1	<0.01
17001 -80	2	4	34	3	17	<1	0.09
17002 -80	8	5	30	3	36	1	<0.01
17003 -80	2	4	38	5	30	1	0.01
17004 -80	4	22	35	5	32	1	<0.01
17005 -80	<2	15	38	8	38	1	<0.01
17006 -80	5	6	7	20	38	1	<0.01
17007 -80	7	<4	10	7	48	1	<0.01
17008 -80	17	5	22	14	98	1	0.01
17009 -80	7	6	18	8	28	1	<0.01
17010 -80	8	8	19	10	62	<1	<0.01
17011 -80	12	5	20	12	82	<1	0.01
17012 -80	5	10	18	6	34	<1	0.01
17013 -80	10	5	20	7	36	<1	0.07

Units	ppm						
Detn Limit	2	4	2	2	2	1	0.01
Scheme	XRF1	XRF1	XRF1	AAS1	AAS1	AAS2	FA1



Job: 9AD3555

O/N: 11709/MT24/JPR

ANALYTICAL REPORT

Sample	As	Sn	Pb	Cu	Zn	Ag	Au
17014 -80	11	<4	25	15	76	<1	<0.01
17015 -80	15	5	17	17	120	<1	0.01
17016 -80	13	5	20	16	115	<1	<0.01
17017 -80	6	8	12	9	45	<1	<0.01
17018 -80	11	8	19	8	78	<1	0.02
17019 -80	155	10	28	15	105	<1	1.66
17020 -80	4	4	9	7	42	<1	0.08
17021 -80	17	10	16	7	28	<1	0.12
17022 -80	3	6	10	14	20	<1	0.08
17023 -80	8	5	14	6	46	<1	0.01
17024 -80	16	5	12	6	54	<1	<0.01
17025 -80	11	5	13	6	94	<1	<0.01
17026 -80	16	4	17	12	64	<1	<0.01
17027 -80	7	4	17	11	58	<1	<0.01
17028 -80	5	6	13	11	42	<1	<0.01
17029 -80	4	6	16	9	75	<1	<0.01
17030 -80	4	6	13	7	62	<1	<0.01
17031 -80	7	4	18	5	32	<1	<0.01
17032 -80	<2	8	14	6	26	<1	<0.01
17033 -80	3	46	42	25	16	<1	<0.01
17034 -80	2	56	38	3	13	<1	<0.01
17035 -80	<2	10	42	4	34	<1	0.05
17036 -80	3	8	44	2	20	<1	<0.01
17037 -80	10	4	26	3	44	<1	<0.01
17038 -80	6	<4	30	<2	30	<1	<0.01
17039 -80	7	8	16	10	60	<1	<0.01
17040 -80	5	6	14	6	30	<1	<0.01
17041 -80	7	10	20	7	38	<1	<0.01
17042 -80	4	8	22	17	52	1	<0.01
17043 -80	5	6	12	7	36	1	<0.01
17044 -80	5	6	18	125	40	1	<0.01
17045 -80	10	6	16	6	42	2	<0.01
17046 -80	11	5	12	12	56	1	<0.01
Units	ppm						
Detn Limit	2	4	2	2	2	1	0.01
Scheme	XRF1	XRF1	XRF1	AAS1	AAS1	AAS2	FA1



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Osman Place, Thebarton, South Australia 5031
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102083



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*MT24
N.E. Gold
S. SeDS.*

Mr. Jeff Randell
Billiton Australia Ltd
PO Box 860
DEVONPORT
TAS 7310

Job Number: 0AD0018

Your Reference: 11716/MT24/JPR Date Received: 03-JAN-1990
Number of Samples: 86 Date Reported: 25-JAN-1990
Extra Samples : 0

This report comprises a cover sheet and pages 1 to 3

This report relates specifically to the samples tested in so far as that the samples as supplied are truly representative of the sample source. Please address any enquiries to Mr. Trevor Francis.

Please note that results for samples 17067, 17077 and 17084 were not reported due to the BLEG solution being lost during processing. If more samples are sent we will be happy to analyse them.

Approved Signature:

for

Dr. John Kikkert
General Manager - Adelaide.

*S. SEPS
17047-089 BLEG
-80H*

MM Mr Jeff Randell Devonport

Report Analyte Codes:
N.A. - Not Analysed.
L.N.R. - Listed But Not Received.
I.S. - Insufficient Sample for Analysis.

Distribution Codes:
CC - Carbon Copy
EM - Electronic Media
MM - Magnetic Media



Job: OAD0018
O/N: 11716/MT24/JPR

ANALYTICAL REPORT

Sample	Au	Ag
17047	1.15	0.02
17048	8.5	<0.02
17049	0.75	<0.02
17050	0.10	<0.02
17051	0.10	<0.02
17052	<0.05	<0.02
17053	0.10	<0.02
17054	0.05	<0.02
17055	<0.05	<0.02
17056	0.25	0.04
17057	3.3	<0.02
17058	0.20	<0.02
17059	5.5	0.02
17060	1.50	<0.02
17061	0.05	<0.02
17062	0.95	<0.02
17063	0.45	<0.02
17064	4.7	<0.02
17065	<0.05	<0.02
17066	<0.05	<0.02
17067	N.A.	N.A.
17068	0.05	<0.02
17069	<0.05	<0.02
17070	0.05	<0.02
17071	0.05	<0.02
17072	0.25	0.08
17073	0.20	<0.02
17074	<0.05	0.02
17075	0.05	<0.02
17076	<0.05	<0.02
17077	N.A.	N.A.
17078	0.20	<0.02
17079	1.30	<0.02
17080	0.30	<0.02
17081	0.55	<0.02
17082	0.25	<0.02
17083	7.5	<0.02
17084	N.A.	N.A.
17085	<0.05	<0.02
17086	<0.05	0.02
17087	0.05	<0.02
17088	0.10	<0.02
17089	1.55	<0.02
Units	ppb	ppm
Detn Limit	0.05	0.02
Scheme	BLEG2	BLEG1C



Job: OAD0018

O/N: 11716/MT24/JPR

ANALYTICAL REPORT

Sample	Au Avg	Au Dp1	Au Dp2	Au Dp3	Cu	Zn	Ag
17047-80#	<0.01	<0.01	--	--	20	56	<1
17048-80#	<0.01	<0.01	--	--	24	75	<1
17049-80#	<0.01	<0.01	--	--	14	40	<1
17050-80#	<0.01	<0.01	--	--	12	58	<1
17051-80#	<0.01	<0.01	--	--	13	54	<1
17052-80#	<0.01	<0.01	--	--	13	48	<1
17053-80#	<0.01	<0.01	--	--	13	60	<1
17054-80#	<0.01	<0.01	--	--	8	44	<1
17055-80#	<0.01	<0.01	--	--	8	42	<1
17056-80#	<0.01	<0.01	--	--	11	48	<1
17057-80#	0.02	0.02	--	--	7	32	<1
17058-80#	0.02	0.02	0.02	--	7	34	<1
17059-80#	<0.01	<0.01	--	--	5	28	<1
17060-80#	<0.01	<0.01	--	--	6	32	<1
17061-80#	<0.01	<0.01	--	--	4	24	<1
17062-80#	<0.01	<0.01	--	--	5	40	<1
17063-80#	0.01	0.01	--	--	5	28	<1
17064-80#	<0.01	<0.01	--	--	5	45	<1
17065-80#	<0.01	<0.01	--	--	6	44	<1
17066-80#	<0.01	<0.01	--	--	12	42	<1
17067-80#	<0.01	<0.01	--	--	9	32	<1
17068-80#	<0.01	<0.01	--	--	3	42	<1
17069-80#	<0.01	<0.01	--	--	5	38	<1
17070-80#	0.04	0.05	0.02	--	3	50	<1
17071-80#	<0.01	<0.01	--	--	5	58	<1
17072-80#	<0.01	<0.01	--	--	19	88	<1
17073-80#	0.02	0.02	--	--	6	56	<1
17074-80#	0.02	0.02	--	--	5	76	<1
17075-80#	0.01	0.01	--	--	4	68	<1
17076-80#	<0.01	<0.01	--	--	4	75	<1
17077-80#	0.27	0.17	0.37	--	7	48	<1
17078-80#	0.02	0.02	--	--	9	46	<1
17079-80#	0.02	0.02	--	--	9	44	<1
17080-80#	0.01	0.01	--	--	8	40	<1
17081-80#	0.02	0.02	--	--	5	20	<1
17082-80#	0.01	0.01	--	--	2	40	<1
17083-80#	0.04	0.03	0.04	--	74	94	<1
17084-80#	<0.01	<0.01	--	--	7	38	<1
17085-80#	<0.01	<0.01	--	--	5	22	<1
17086-80#	<0.01	<0.01	--	--	18	74	<1
17087-80#	<0.01	<0.01	--	--	6	58	<1
17088-80#	<0.01	<0.01	--	--	4	40	<1
17089-80#	<0.01	<0.01	--	--	12	46	<1
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Detn Limit	0.01	0.01	0.01	0.01	2	2	1
Scheme	FA1	FA1	FA1	FA1	AAS1	AAS1	AAS2



Job: 0AD0018

O/N: 11716/MT24/JPR

ANALYTICAL REPORT

Sample	As	Sn	Pb
17047-80#	2	<4	28
17048-80#	7	5	30
17049-80#	3	5	18
17050-80#	3	4	30
17051-80#	<2	4	24
17052-80#	2	<4	22
17053-80#	2	<4	18
17054-80#	<2	<4	34
17055-80#	2	4	24
17056-80#	4	<4	13
17057-80#	<2	<4	20
17058-80#	<2	6	8
17059-80#	<2	6	9
17060-80#	<2	4	8
17061-80#	<2	<4	5
17062-80#	6	8	7
17063-80#	3	6	2
17064-80#	3	6	3
17065-80#	2	8	16
17066-80#	<2	10	48
17067-80#	2	10	28
17068-80#	3	18	32
17069-80#	<2	6	50
17070-80#	<2	<4	58
17071-80#	<2	8	44
17072-80#	16	10	24
17073-80#	8	12	32
17074-80#	<2	16	50
17075-80#	<2	8	48
17076-80#	<2	8	44
17077-80#	30	8	6
17078-80#	10	<4	18
17079-80#	4	8	16
17080-80#	8	5	10
17081-80#	<2	<4	5
17082-80#	2	6	35
17083-80#	<2	320	40
17084-80#	<2	42	50
17085-80#	<2	12	48
17086-80#	12	6	11
17087-80#	2	<4	17
17088-80#	4	6	20
17089-80#	<2	4	15

Units	ppm	ppm	ppm
Detn Limit	2	4	2
Scheme	XRF1	XRF1	XRF1

APPENDIX 3

Thermal Aureole Gold Mineralization in N.E. Tasmania

102088

**THERMAL AUREOLE
GOLD MINERALISATION
IN
NORTH-EASTERN TASMANIA**

prepared
by
Jeff Taylor

PETROGENESIS PTY. LTD.
16 Toorac Road, Upwey, 3158.
(03) 754 7272

for
BILLITON AUSTRALIA

1st October, 1990.

Recommendations

A medium to long term commitment to exploration for thermal aureole gold mineralisation in north-eastern Tasmania is not recommended.

Follow-up of the hardrock source of alluvial gold in the Lisle area is warranted.

Evaluation of the structural and lithological controls on gold mineralisation (at specific prospects) is necessary, contingent on continued exploration for thermal aureole gold mineralisation in north-eastern Tasmania.

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Introduction

This report outlines the findings of a four day field excursion in north-eastern Tasmania, designed to examine the nature and extent of Devonian contact metamorphism and related gold mineralisation. The prime aim of this brief study was to establish the regional prospectivity of Tasmanian thermal aureoles as compared to other auriferous hornfels terrains in Australia. Given Billiton's involvement in E.L. 58/88 and E.L. 6/90, preliminary prospect evaluation was an additional objective. Due to lack of time, this is based largely on the general characteristics (published) of historical gold prospects.

Aureole Evaluation

Several factors influence the prospectivity of thermal aureoles for granite-related gold mineralisation. Thermal aureole gold mineralisation, as the name implies, occurs in response to fluid migration in the thermal aureoles of granitoid batholiths/plutons during their emplacement and cooling. As such, this style of mineralisation can only occur within rocks that have been thermally affected by magmatism. Examining the nature and extent of hornfelsing can therefore provide;

- (i) a clear indication of the potential of any given aureole to host widespread precious metal mineralisation,
- (ii) absolute limits to the regional extent of mineralisation, and
- (iii) exploration priorities within an aureole.

In terms of mineralisation, the most productive aureoles are generally the largest. In other words, the larger the volume of rock that has been thermally influenced during granitoid intrusion, the larger the fluid circulation system and the greater the potential for developing structurally favourable depositional sites. (This underscores the importance of chemically favourable host rocks, but is generally applicable to thermal aureoles terrains.)

The size of an aureole is primarily dependent on the temperature of country rocks during intrusion, but to some extent also on the geometry of the intrusive body (Jaeger, 1969). In Australia, and indeed many parts of the world, granitoid batholiths have been emplaced in terrains that were originally regionally metamorphosed to lower greenschist facies conditions, or even lower grades (e.g. the majority of the Lachlan Fold Belt, Pine Creek Geosyncline, much of the New England Fold Belt). This implies that the maximum country rock temperature was $\approx 330^{\circ}\text{C}$ (at a pressure of $\approx 1-2$ kbars) immediately prior to intrusion. A critical factor in the size of the aureole is whether the lower greenschist terrain was maintained at $\approx 330^{\circ}\text{C}$, or whether significant uplift and erosion resulted in cooling of the terrain (e.g. $150-200^{\circ}\text{C}$) before granitoid emplacement.

Regardless of the geometry of granitoid bodies, the focus of fluid flow marginal to granitoids is in the roof zone, as compared to the less prospective pluton side-walls. Both aureole

settings can host gold mineralisation, but roof zones are logically and empirically the most favourable. The relative proportion of roof zone to side-wall aureole depends on the geometry of granitoid bodies, which is largely controlled by stress fields during intrusion. Essentially flat lying, tabular bodies of granite are emplaced during sub-horizontal compression (e.g. Cullen Batholith, most Central Victorian granitoids, and much of the Blue Tier Batholith), and develop extensive roof zones and limited side-walls. Shear related stress regimes can generate narrow, elongate, steeply dipping tabular granitoid bodies (e.g. Wyangala Batholith, most of the Scottsdale Batholith) with extensive side-wall environments and very limited roof zone settings.

It is clear that the potential for locating thermal aureole gold mineralisation marginal to either of these end-member granitoid geometries depends to a large extent on the current level of exposure. For example, the extensive exposure of granitoid material from a flat lying, tabular batholith implies that much of the prospective roof zone has already been eroded. The same degree of unroofing of a narrow, near vertical slab may have removed the limited, albeit prospective roof zone, but will leave extensive side-walls still exposed. On the other hand, the hornfelsed roof zone of an unexposed flat lying, tabular pluton will be significantly larger in aerial extent (and consequently more prospective) than that developed above a thin, vertical granite slab.

A further factor which strongly influences the regional prospectivity of a thermal aureole terrain is the temperature of gold deposition. If gold is being deposited at relatively high temperatures (e.g. 400-500°C), then mineralisation will be confined to inner aureole settings; such deposits (e.g. Golden Mountain - Strathbogie aureole, Victoria; Wonga Mine - Stawell, Victoria) being extremely environment specific will be, a) more readily located, and b) far less common. Relatively low temperature gold mineralisation (300-350°C), however, can occur in outer, middle or inner aureole settings. Clearly the lower the temperature of gold deposition, the greater the volume of potential host aureole available.

The most prospective thermal aureoles are developed around multi-phase batholiths comprising flat lying, tabular plutons which are emplaced into relatively warm, upper crustal rocks. Favourable levels of crustal exposure can maximise the area of roof zone hornfelsing. Relatively cool gold precipitation enables all parts of the aureole to be prospective.

Evaluation of the factors outlined above will establish the propensity of an aureole to host widespread gold mineralisation. Whether such mineralisation represents an economically viable deposit depends on the local structural, lithological and chemical controls. Although these considerations were largely beyond the scope of the present study, a limited literature review permitted a brief evaluation of the most prospective styles of target in north-eastern Tasmania.

Early Palaeozoic Geology of North-eastern Tasmania

General

The Mathinna Beds represent an Ordovician to Early Devonian sequence of proximal to distal turbidites which progressively young to the east (Williams et al., 1989). They have been subjected to one major phase of deformation which resolved large scale (up to 20 km wavelength), asymmetric, upright to slightly SW reclined, NNW trending, close to isoclinal folds with shallow, doubly plunging fold axes. Williams et al., (op cit.) consider that tectonic transport in north-east Tasmania was from the south-west. This deformed sequence has been subjected to widespread intrusion by dominantly post-tectonic, discordant, high-level granitoids of the Scottsdale, Blue Tier and Eddystone Batholiths. These granitoids range in age from 348 to 395 Ma.

No exposures of the Eddystone Batholith or its aureole were observed.

Several general observations can be made about the other batholiths and their aureoles based on, a) the geometry of individual plutons and the overall shape of the batholith, b) fabrics within the granitoids (igneous and solid state deformation fabrics), c) granite-sediment and granite-granite contact relationships, d) the nature and extent of hornfelsing, and e) the distribution of vein related Au mineralisation.

Scottsdale Batholith and Aureole

- (i) Broadly NNW elongate batholith, obliquely discordant to the NW trending Mathinna Beds.
- (ii) Steeply dipping to sub-vertical, syn to post emplacement (primary flow and solid state deformation) fabrics indicating steep sided plutons.
- (iii) Reid (1926) remarked that contact metamorphism in the Lisle area was more extensive in a north-south direction around the limited granitoid exposures, and abruptly terminated to the east and west. Recent observations confirmed the rapid thermal gradients on the eastern and western margins of some plutons, and support Reid's hypothesis of asymmetric hornfelsing. This feature is believed to further support the contention that many phases of the batholith are likely to be steep-sided, near vertical, roughly north trending, strike extensive, narrow plutons, that were intruded into relatively cold country rocks.
- (iv) The spatial association between gold mineralisation and granitoids of this batholith is conspicuous. This is clearly not the case for all gold mineralisation in north-eastern Tasmania. The relationship is believed to more self evident due to the extremely narrow aureoles.
- (v) Widespread exposure of the batholith around Scottsdale indicates significant erosion of the roof zone. Most of the remaining aureole appears to be the side-wall

setting to steep sided plutons. The Lisle area is probably the best remaining example of a preserved roof zone of this batholith.

Blue Tier Batholith and Aureole

- (i) The southern portion of the Blue Tier Batholith contains the St. Mary's Porphyrite, which at least partially represents a pyroclastic flow, indicating subaerial eruption. This ignimbrite is intruded by essentially coeval (and probably co-magmatic) granitoids of the Blue Tier Batholith. This is clear evidence that at least some of the granitoids were emplaced at extremely high levels in the crust. Under near surface conditions (1-1.5 kms), the Mathinna Beds would have been relatively cold during intrusion (perhaps 100-150°C).
- (ii) Plutons of this batholith commonly exhibit rounded outlines and discordant contacts with the Mathinna Beds.
- (iii) Internal contact relations and fabrics suggest that many plutons are flat lying to gently dipping tabular bodies (this applies to north-eastern Tasmania and to the northern extension of the Blue Tier Batholith in southern Victoria at Wilsons Promontory).
- (iv) The flat, tabular shape of the plutons is further supported by the extensive hornfelsing in the vicinity of the Blue Tier Batholith. Regional traverses demonstrated that the published geology maps only indicate the extent of inner aureole (cordierite bearing) contact metamorphism. In fact, hornfelsing is essentially continuous from Scamander, west through to Mathinna, and from here south to Mangana. While much of this area is in a middle to outer aureole setting (biotite stable to sub-biotite zone), local thermal highs (up to cordierite grade) not always associated with exposed granitoid occur sporadically throughout. These highs are on the scale of tens to a few hundred meters in width.
- (v) Widespread exposures of the Blue Tier Batholith, in conjunction with extensive granite hosted tin mineralisation strongly suggests that much of the very uppermost portion of the batholith has been exhumed. This indicates that a large portion of the roof zone aureole has been eroded. Only small pockets of hornfelsed sediment remain in the far north-east of the state, but considerable tracts of hitherto unrecognised middle to outer aureole occur in the Scamander - Mathinna - Mangana area.
- (vi) The spatial association between precious metal mineralisation and magmatism is far less apparent around the Blue Tier Batholith due to the far broader and more subtle middle and outer aureole hornfelsing. Hence, while the Mangana and Mathinna Goldfields may not be close to an exposed granitoid, contact metamorphic assemblages infer proximal sub-surface granitoids.

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Aureole Prospectivity

- (1) The Blue Tier and Scottsdale batholiths are both high level intrusive bodies, displaying narrow contact aureoles which indicate emplacement into relatively cold crust. On these criteria alone, north-eastern Tasmania cannot be rated as a highly prospective thermal aureole terrain.
- (2) Extensive erosion has significantly reduced the proportion of roof zone settings, and exposure of the Mathinna Beds has been further restricted by post-Devonian cover. These factors minimise the volume of aureole able to be explored.
- (3) Hornfelsing marginal to the Blue Tier Batholith is more widely exposed, and thus more prospective, due to its flat, tabular geometry. The geometry of the Scottsdale Batholith limits the potential for roof zone development.
- (4) The largest and most continuous domain of roof zone hornfelsing occurs in the Mathinna - Mangana area (presumably above granitoids of the Blue Tier Batholith). In real terms, this is a relatively small area of only weak to moderately prospective middle to outer aureole roof zone.

Mineralisation

General

Most of the gold prospects examined were found to be hosted by hornfelsed Mathinna Beds. In addition, the majority of those areas indicated on published maps as containing historical mining activity were determined to be hornfelsed. Examples include;

<u>Goldfield</u>	<u>Prospects</u>	<u>Grade of Hornfelsing</u>
Hogan's Track Mines	Golden Ridge	High-grade
	Brilliant	" "
	Trafalgar	" "
	New Carthage	" "
Mathinna Goldfield	Golden Gate	Low-medium grade
North-east of Tower Hill	(numerous)	At least low-grade
Golconda Goldfield	Enterprise	High-grade
Panama Goldfield		High-grade / Granite
Lisle Goldfield	(hardrock prospects)	" " "
Cradle Creek Goldfield	Bessell Reward	Low-medium grade
Lefroy Goldfield		" " "
Beaconsfield Goldfield		Medium-high grade

Consequently, despite the lack of definitive mineralogical evidence (refer below), the majority of the gold mineralisation in north-eastern Tasmania is considered to be granite related. Mineralisation in the different goldfields exhibits some variety in structural setting, vein style,

vein geometry and gangue mineralogy, but in general is remarkably uniform. The following is a brief summary of typical characteristics;

Host Rock Almost invariably meta-sedimentary rocks, generally semi-massive to massive lithologies (sandstones and greywackes), and some deposits display an association with graphitic units. Rarely deposits occur in granitoids.

Style and Geometry Quartz-rich (\pm sulphide bearing) vein related mineralisation. Commonly in the form of laterally and vertically discontinuous discrete lodes (i.e. minimal wallrock dissemination). Individual veins often pinch and swell, and in any given field can vary in thickness from <1 cm to ≈ 8 m (averaging 0.3-1.0 m). Lodes are most commonly discordant to bedding, and moderate to steeply dipping, but exhibit good lateral consistency in their orientation (i.e. roughly planar). Some essentially flat lying veins have been recorded. Shear zone hosted vein swarms have been described (e.g. Lefroy Goldfield), and stratabound zones of micro-veining may be present in the Lisle area (refer below).

Mineralogy Three main auriferous vein types; (i) Quartz-rich veins, (ii) Quartz - pyrite veins, and (iii) Quartz - arsenopyrite - pyrite - chalcopyrite (\pm sphalerite / galena) veins. Type (i) appears to contain electrum, whereas type (iii) is dominated by essentially pure gold and often some silver. Characteristic of thermal aureole mineralisation, all of the gold (and electrum) is very fine grained (ranging from roughly 20 μm to a few millimetres, but averaging <1 mm). Electrum commonly occurs as discrete aggregates, whereas gold exhibits an intimate association with sulphides.

Structural Controls Unknown: further work required.

Physicochemical Constraints Relatively low temperature gold deposition is indicated by several factors; (i) chlorite (\pm sericite) stable alteration haloes, (ii) non-granoblastic quartz vein textures, and (iii) high liquid/vapour ratios in (generally) two-phase (largely secondary) fluid inclusions (sections examined from Golden Ridge, Golden Gate, Enterprise and Lefroy). The intimate association of gold and sulphides suggests that sulphidation may be necessary for gold precipitation (i.e. gold bi-sulphide aqueous species likely). This is further supported by the infrequent relationship between graphitic shales and gold deposits (e.g. Golden Gate, Lefroy). Considering vein geometry, the rich, discontinuous "high-grade shoots" reported from several historical mines give the impression of representing bedding - vein intersections; this also suggests that chemical controls on gold deposition may be locally important.

It is difficult to assess the potential for significant sheeted vein or stockwork development in the vicinity of these deposits without a better understanding of their structural setting. Based on the limited data available, most of the historical lode systems are unlikely to develop economically viable low grade haloes (stockworks, disseminations...etc). A preliminary literature survey suggests that specific prospects in the Mangana Goldfield have some potential to develop broad zones of auriferous veining (e.g. Specimen Hill, Tower Hill). A more thorough literature search and/or reconnaissance mapping and sampling would clarify the value of these areas.

E.L. 58/88 - Golden Ridge

A detailed analysis of the structural setting and vein geometry would be required to fully evaluate the prospects in this licence. In general, the historical mines appear to typify the narrow, laterally discontinuous, discrete lode style of mineralisation described above. This is confirmed by recent rock-chip sampling. The potential for developing broader zones of auriferous limonitic micro-veining (e.g. New Golden Ridge) can only be established with a clearer understanding of the structural, lithological and/or chemical controls on mineralisation. The available exploration data provides little encouragement for further work.

E.L. 6/90 - Lisle

The Lisle alluvial goldfield produced ≈250,000 ozs of gold largely from Cainozoic terrace deposits. These sediments are contained within the Lisle basin, which is surrounded by an elliptical cordon of hills that represent the high grade hornfels zone around the Lisle granodiorite. The granodiorite has been recessively weathered and occupies the topographically low central part of the basin, upon which the auriferous gravels have been deposited. No hardrock source which adequately accounts for this substantial gold production has been located. The nature of the Cainozoic sediments and their alluvial gold is fundamental to determining the source of the gold. Many of the following observations have been adapted from Reid (1926);

- (i) All of the gold in the terrace deposits is angular, indicating minimal abrasion and a proximal source.
- (ii) All of the gold is extremely fine grained (2-3 g nuggets being rare).
- (iii) Very little of the gold is attached to quartz.
- (iv) The gold attached to quartz is generally high silver electrum, and the free gold is essentially pure.
- (v) Most of the gold at Lisle was derived from sediments draining the northern and eastern portions of the basin; this gold is largely pure.
- (vi) Smaller concentrations of gold were derived from the western part of the basin; this is dominantly electrum ± quartz.

- (vii) Alluvial gold accumulations are closely associated with horizons containing at least some detrital vein quartz fragments.
- (viii) Most of the quartz vein detritus appears to be barren.
- (ix) Alluvial deposits draining the northern and eastern portion of the basin are generally quartz-vein detritus poor.
- (x) Gold has been infrequently found in the soil and talus slope material overlying the steep hillsides around Lisle.
- (xi) In nearby hardrock prospects (e.g. Panama, Golconda, Denison and Lebrina), the best grades of gold are found in sulphide-rich fractures and pods crosscutting quartz veins.

We may conclude from these observations that;

- (i) Gold is locally derived from (relatively late-stage) mineralisation within the high grade hornfelses (i.e. within the confines of the basin), and not from pre-Cainozoic alluvial deposits overlying some part of the aureole.
- (ii) The gold appears to occur in association with sulphide-rich mineralisation which probably overprints the quartz-electrum phase, and is released during weathering.
- (iii) The largest proportion of the gold does not show a direct association with abundant quartz vein detritus, and may be hosted elsewhere.
- (iv) Given a suitable orientation survey, geochemical soil sampling within the soil-rich talus should prove effective in locating the gold source (e.g. BCL Au, As, Cu, Pb, Zn, Ag, S).

Brief reference to stratabound mineralisation in the Lisle area (Reid, 1926) strongly recommends that discrete lodes are not the exclusive habit of gold in Tasmania. Reid (op cit.) reports that in the north-eastern portion of the Lisle aureole that numerous "sandstone" beds (which from descriptions may be psammo-pelites or even massive pelites varying in thickness from 0.3 m to \approx 3.0 m), not visibly veined, but "impregnated" with quartz and gold, returned assays of up to \approx 40 ppm Au (averaging \approx 3 ppm for 10 samples). This *new* style of target is interpreted to represent stratabound zones of micro-veining (sulphide-rich), and appears to occur in association with at least some discrete quartz \pm sulphide rich auriferous lodes in the Lisle area. The equivalent of this style may be the narrow swarms of limonitic microveinlets giving rise to the broad zones of low-order mineralisation in the costean samples at New Golden Ridge (E.L. 58/88).

Given the restricted drainage in the Lisle basin, the large quantity and nature of alluvial gold clearly recommends follow-up of the hardrock source.

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Conclusions

Devonian batholiths in north-eastern Tasmania were emplaced at high levels into relatively cold crust, and consequently only generated narrow thermal aureoles. In addition, a large proportion of the prospective roof zone of these aureoles has already been eroded or obscured by post-Devonian cover. These factors rank north-eastern Tasmania as a low priority thermal aureole terrain. Conclusions concerning regional prospectivity do not preclude the occurrence of an economically viable gold target, but strongly suggest that such mineralisation is likely to be very uncommon.

There are several other larger thermal aureole terrains in Australia that are considered to have much greater potential. For example; Pine Creek Geosyncline, Granites - Tanami Block, Halls Creek, parts of eastern Victoria.

Other styles of gold deposit are more prospective than thermal aureole gold mineralisation in north-eastern Tasmania (e.g Starra style).

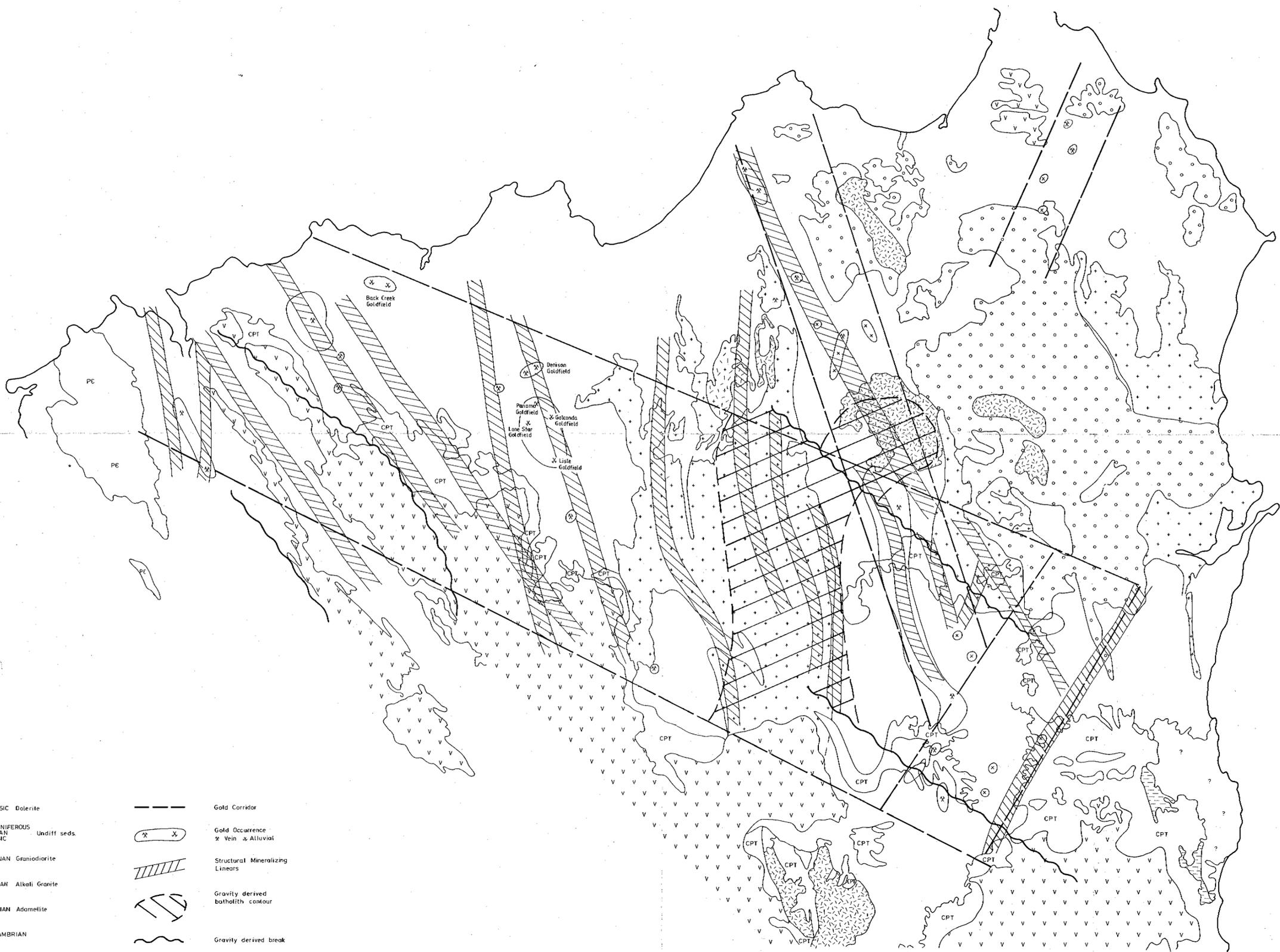
Within Tasmania, the most extensive roof zone aureole is in the Mathinna to Mangana area. A comprehensive literature review, and brief reconnaissance mapping and sampling would assist with evaluation of this region.

A thorough appraisal of the ability of discrete lodes to develop marginal stockworks, sheeted veins or stratabound micro-veining, requires detailed structural, lithological and vein geometry data from specific prospects. Very little of this information is currently available. The best target for an economically viable gold resource appears to be zones of sulphide-rich micro-veining. Controls on the distribution of this fracturing are critical. I.P. may be a useful tool for locating this style of mineralisation.

The hardrock source of the alluvial gold at Lisle is likely to be sulphide-rich, fracture controlled mineralisation which may be stratabound. The northern and eastern portions of the Lisle aureole are considered to be an attractive exploration target. An orientation soil survey over the talus-slope scree in an area of known hardrock mineralisation should provide sampling criteria (e.g. sample depth(s), size, constituents (rock/soil), grainsize ...etc). The arsenopyrite - pyrite - chalcopyrite - gold - silver \pm base metal association suggests that samples should be analysed for Au, As, Cu, Pb, Zn, Ag and possibly S. Suitable pathfinders should be chosen from this suite. The location, mapping and sampling of adits will also assist evaluation.

References

- Jaeger, J. G., 1969. Thermal effects of intrusions. *Rev. Geophys.*, 2, 443-467.
- Reid, A. M., 1926. The Golconda gold mining district. Geological Survey Bulletin No. 37. Tasmania Dept. of Mines.
- Twelvetrees, W. H., 1907. The Mangana goldfield. Geological Survey Bulletin No. 1. Tasmania Dept. of Mines.
- Twelvetrees, W. H., 1909. The Lisle goldfield. Geological Survey Bulletin No. 4. Tasmania Dept. of Mines.
- Williams, E., McClenaghan, M. P. and Collins, P. L. F., 1989. Mid-Palaeozoic deformation, granitoids and ore-deposits. Chapter 7 - Geology and mineral resources of Tasmania; Burrett, C. F. and Martin, E. L. (eds). GSA special Publication No. 15.



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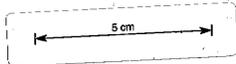
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- JURASSIC Dolerite
- CARBONIFEROUS PERMIAN TRIASSIC Undiff sed.
- DEVONIAN Graniorite
- DEVONIAN Alkali Granite
- DEVONIAN Adometite
- PRECAMBRIAN

- Gold Corridor
- Gold Occurrence
X Vein X Alluvial
- Structural Mineralizing Linears
- Gravity derived batholith contour
- Gravity derived break

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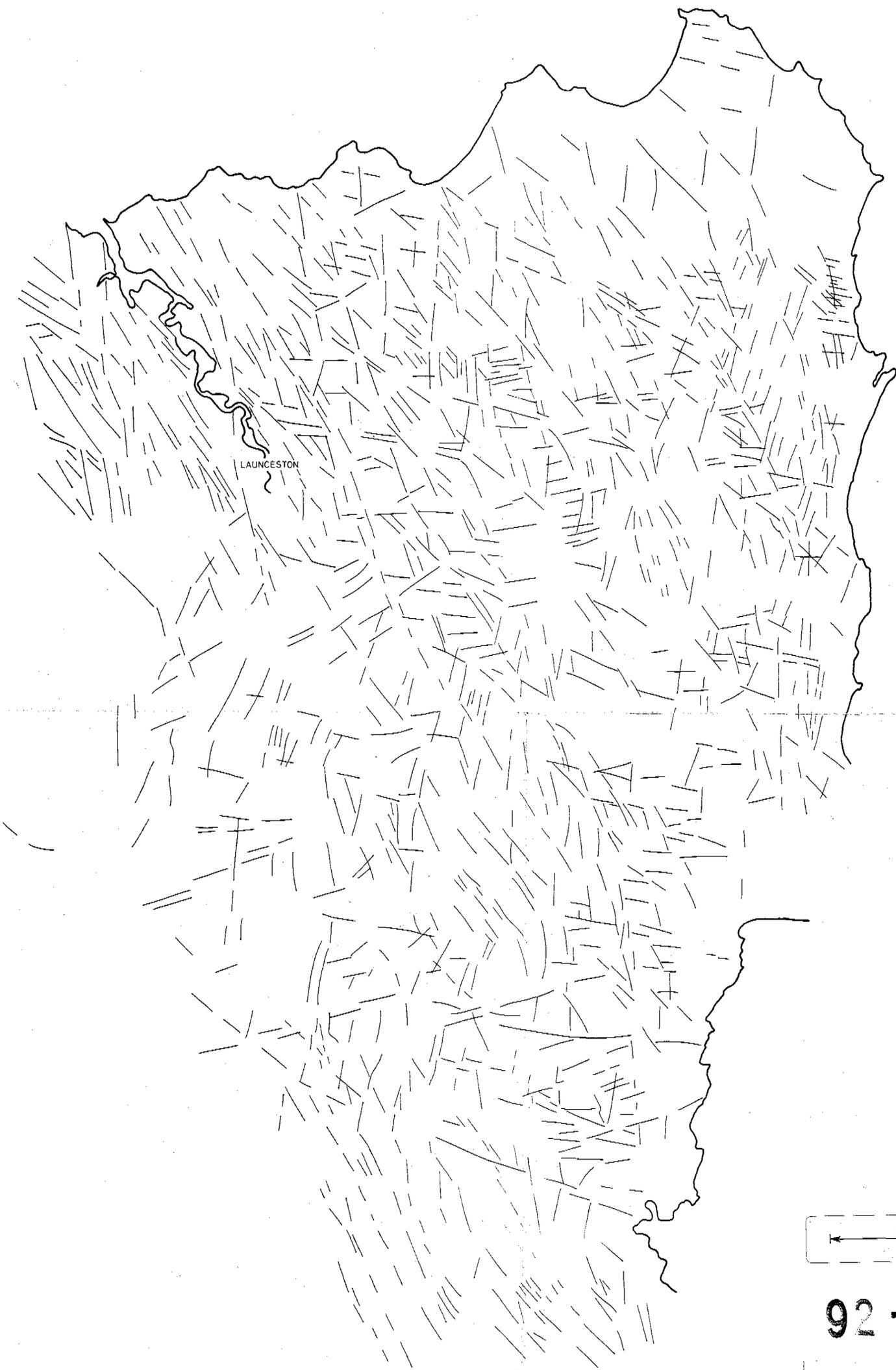


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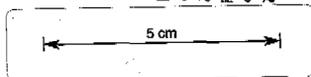


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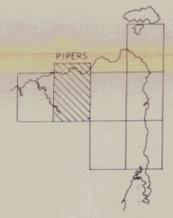
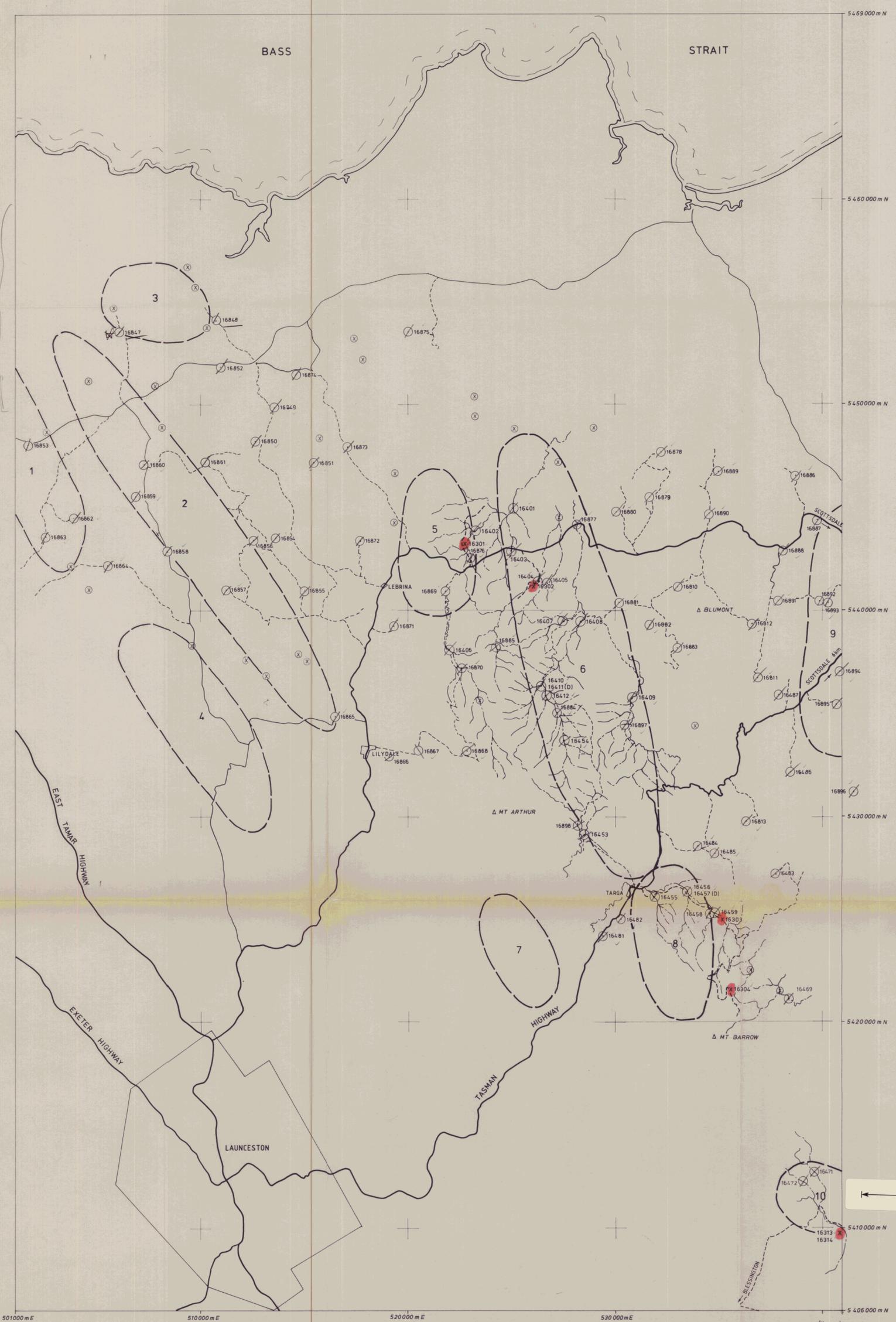
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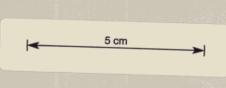
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W. J. O'NEILL
 17
 Samples



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- X Rock chip sample 163 -
- ~ Stream
- - - Track
- Major road

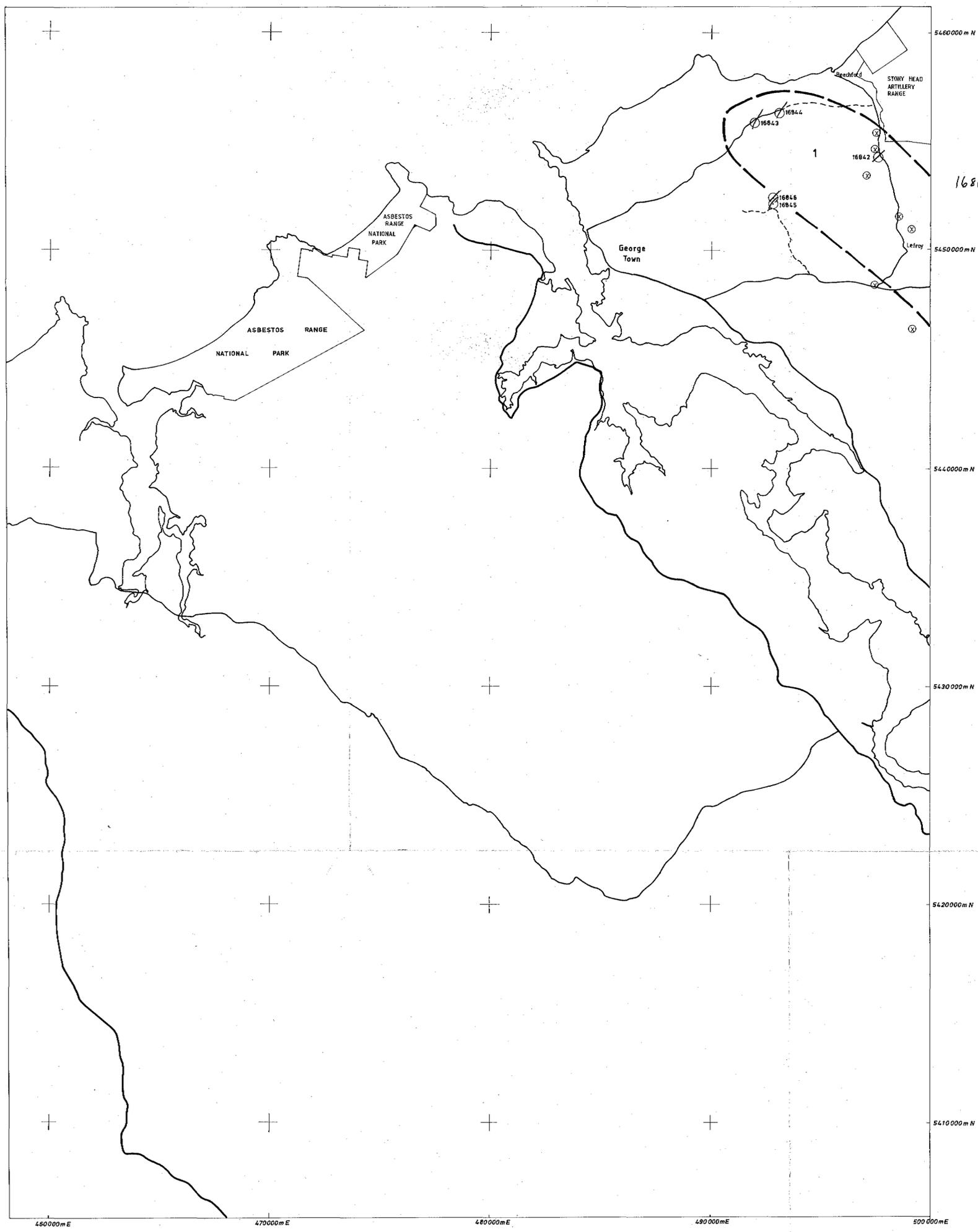


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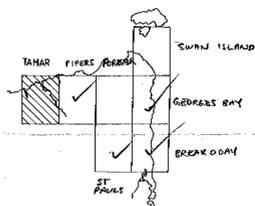
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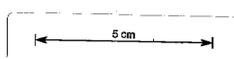
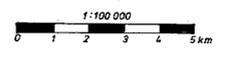
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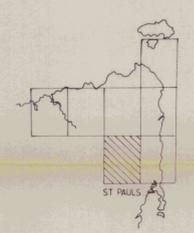
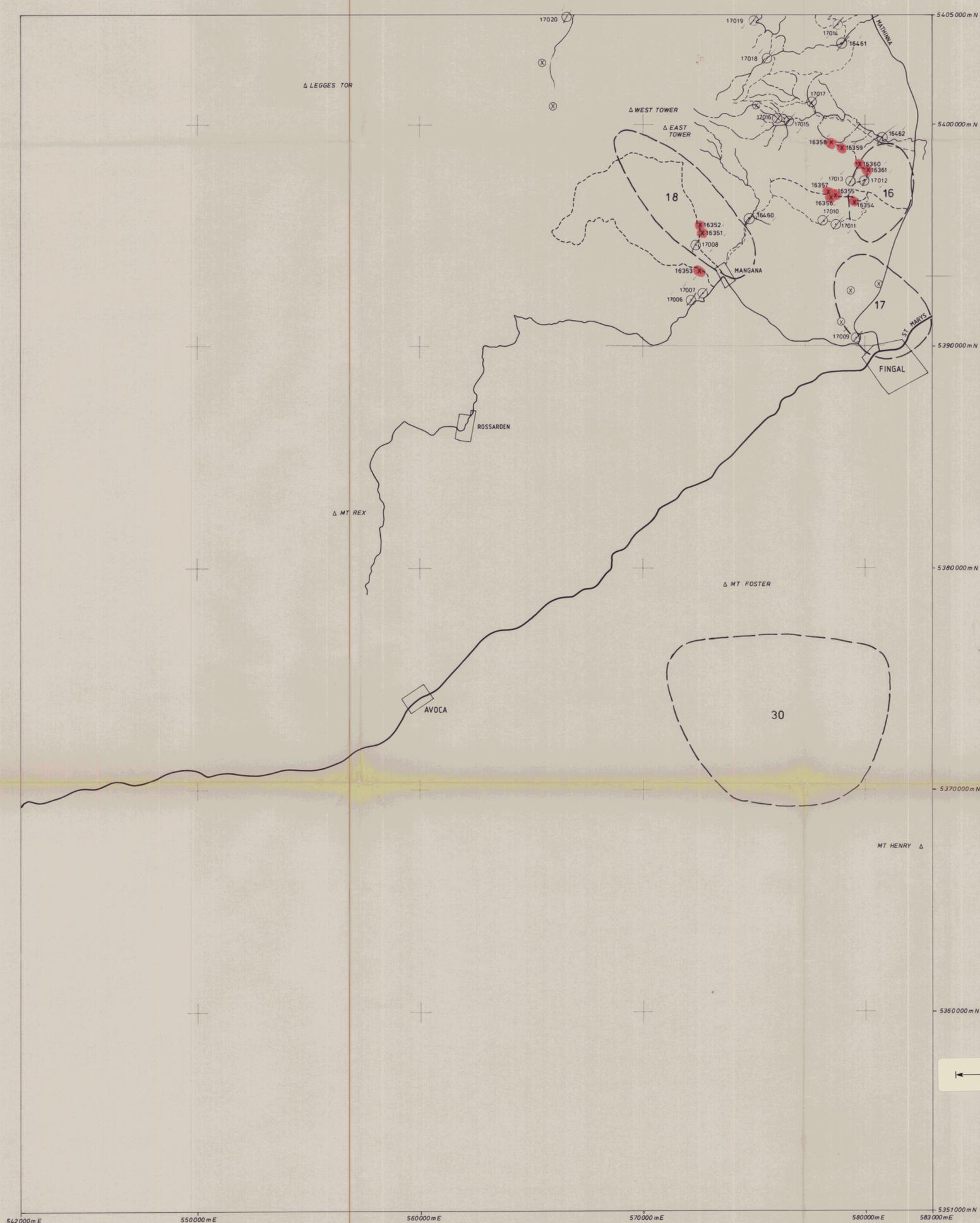


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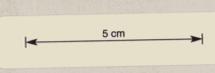


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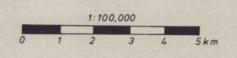
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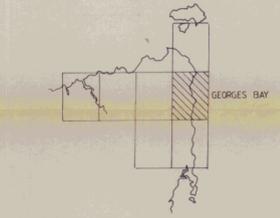
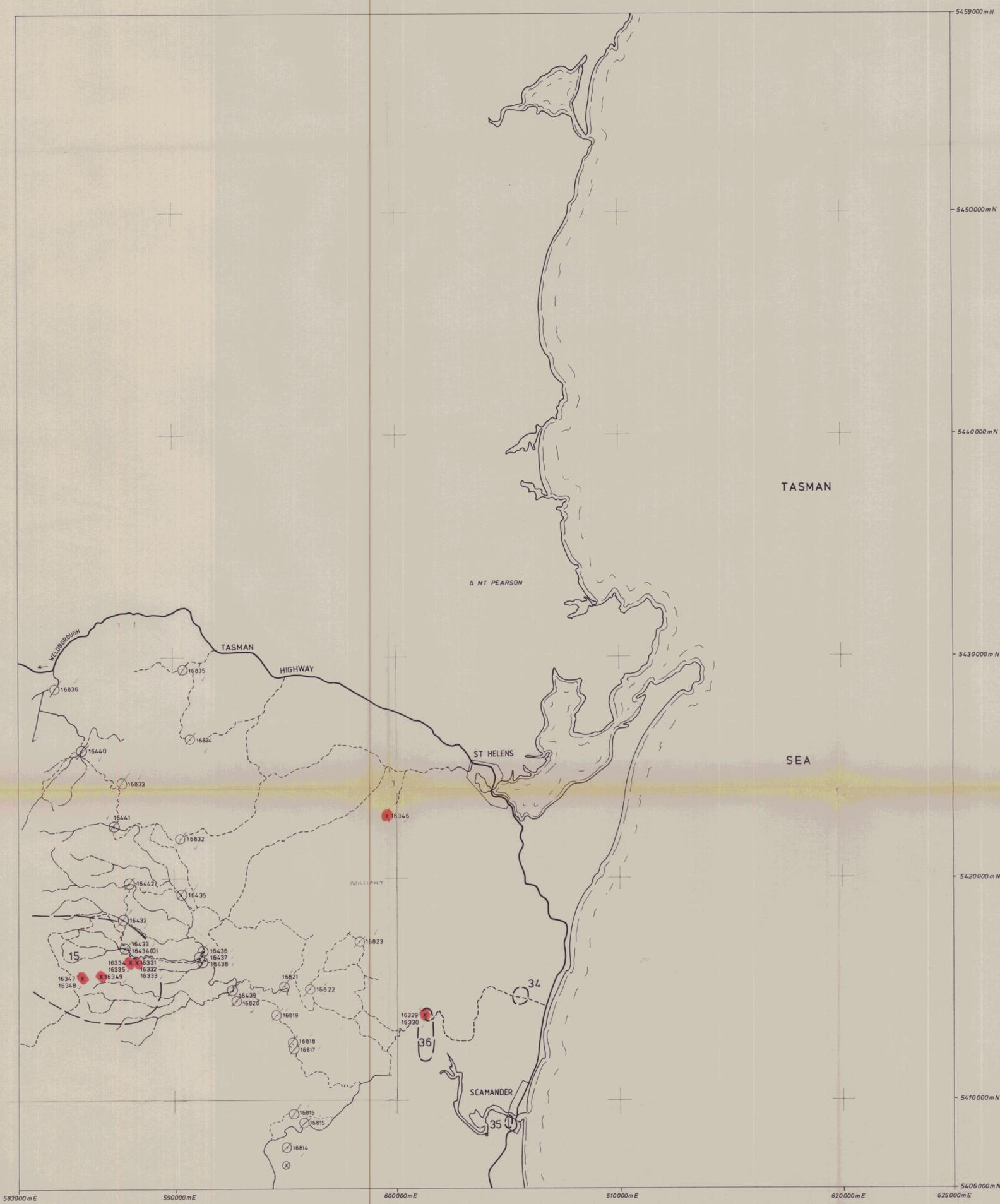


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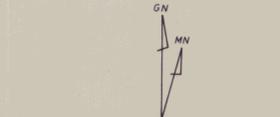


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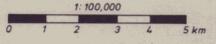
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- Track
- Major road



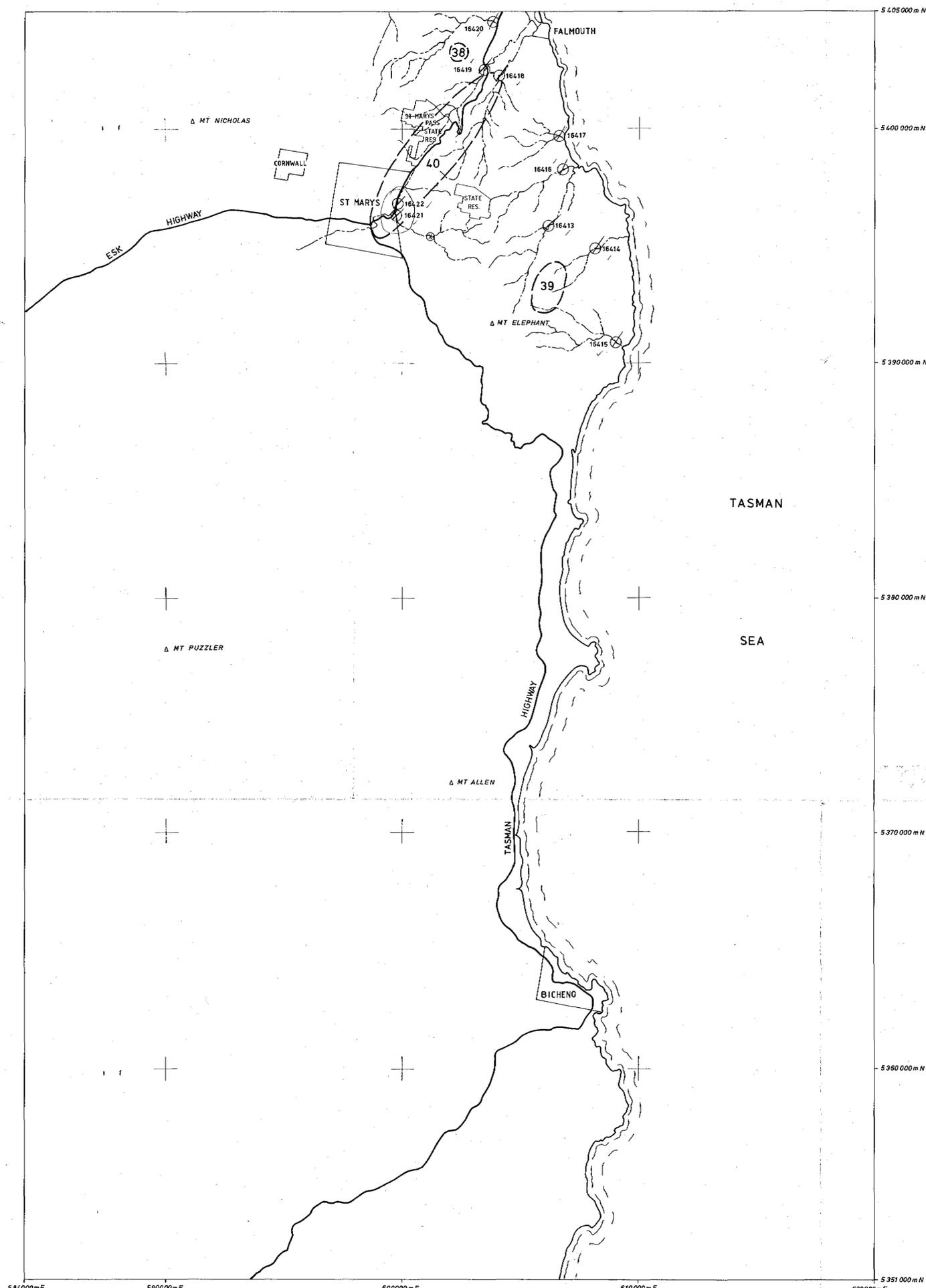
92-3337.



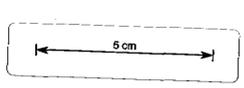
102107



Billiton Australia The Metals Division of the Shell Company of Australia Limited			
Project		TASMANIAN REGIONAL	
Title		NORTH EAST TASMANIA Au SAMPLING	
COMPILED FROM TASMAPS GEORGES BAY SHEET			
Author	CJC	Dept. TAS	Scale 1:100,000
Drawn	DH	Date 6/89	Revised
Checked	Date	S'ced	Date
Sheet No.	Fig. 11	Drawing No.	D/MT 24/007



- Regional Target Area
- Not sampled - No access, No stream
- BCL - 80 Pan conc. 164--
- Rock chip sample 163--
- Stream
- Track
- Major road



92-3337.

1:100,000
0 1 2 3 4 5 km

102108

Billiton Australia <small>The Metals Division of the Shell Company of Australia Limited</small>			
Project		TASMANIAN REGIONAL	
Title		NORTH EAST TASMANIA Au SAMPLING	
COMPILED FROM TASMAPS BREAK O DAY SHEET			
Author	CJC	Dept.	TAS
Scale	1:100,000		
Drawn	OH	Date	6/89
Revised	Date		
Checked	Date		S'ced
Date	Date		
Sheet No.	Fig. 12		Drawing No.
		DJ/MT 24/004	