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Tenements EL 41/89 Plans 3

Comments 1 Comments 2 <sup>v1</sup> Text Appendices Plans

Geochemistry Water Cu Pb Zn AS Au C  
Rocks Cu Pb Zn Au Fe Ni

<sup>v2</sup> Water Sampling Data

MAP SHEET 1:250 000 SERIES

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**GEOPEKO**

A DIVISION OF PEKO EXPLORATION

**EL 41/89 MT BERTHA**

REPORT ON

EXPLORATION ACTIVITY

JANUARY 1990 TO NOVEMBER 1990

91-3212

VOL 1/2

EL41/89

LETTER  
8-1-'91  
REFERS

**OPEN FILE**

Katrina Virgoe  
Ian Mathison  
December, 1990

T248

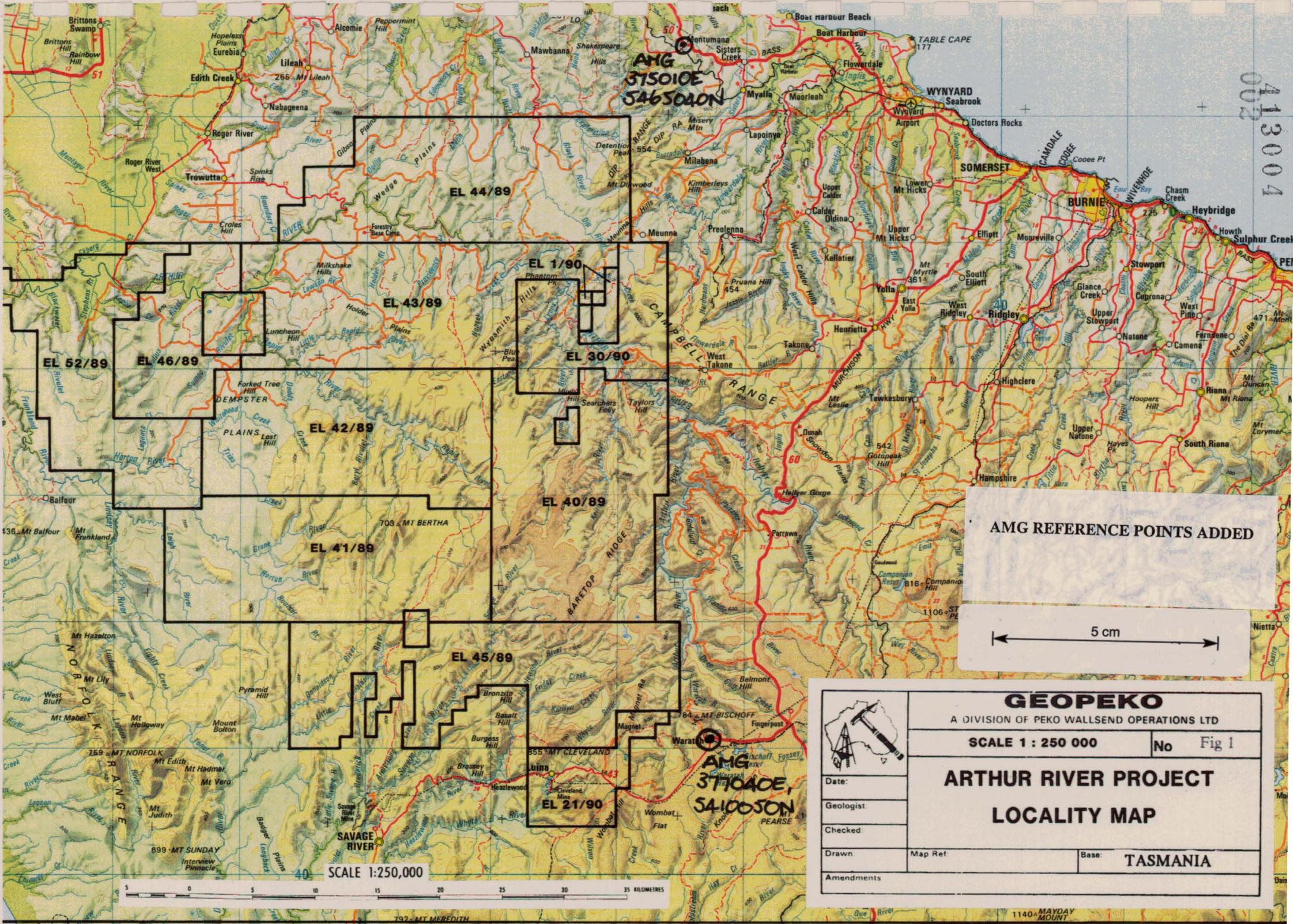
Distribution: Geopeko, Parkes  
Geopeko, Rosebery  
DMMR, Hobart

**MEMORANDUM**

AMG REFERENCE POINTS ADDED

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SCALE 1:250,000

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792 - MT MEREDITH

1140 - MAYDAY MOUNT

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SAVAGE RIVER

Brittons Swamp

Edith Creek

265 - Mt Lileah

Nabageena

Roger River

Trowutta

Crotes Hill

EL 44/89

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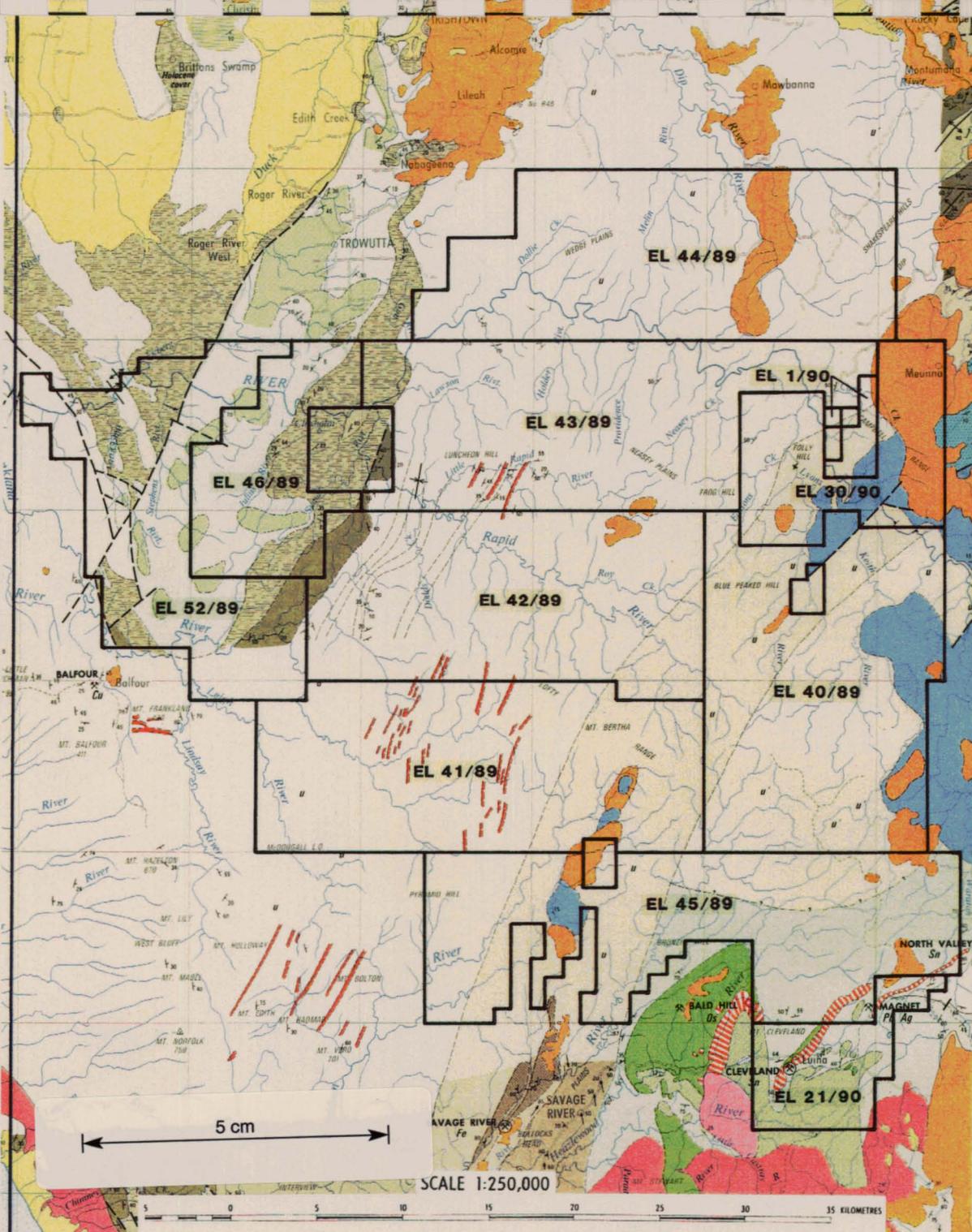
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<b>HOLOCENE</b>		Alluvium, sand, gravel and talus.
<b>PLEISTOCENE</b>		Till, fluvio-glacial, periglacial and associated deposits. Erosional surface.
<b>TERTIARY</b>		Non-marine sequences (light); marine limestone (dark); basalt and related igneous rock types (orange).
<b>TRIASSIC</b>		Low angle unconformity.
<b>PERMIAN</b>		Fluvio-lacustrine sequences of sandstone siltstone mudstone (light) with carbonaceous sequences indicated (dark). Fresh water sequence with some coal measures.
<b>UPPER CARBONIFEROUS</b>		Upper glacio-marine sequence of pebbly mudstone pebbly sandstone and limestone. Fresh water sequence with some coal measures. Lower glacio-marine sequence of pebbly mudstone, pebbly sandstone, minor limestone, Tasmanite oil shale and basal tillite.
<b>CAMBRIAN</b>		Middle-Upper Cambrian fossiliferous usually greywacke turbidite sequences (horizontally lined overprint); acid with intermediate volcanic and associated rocks dominant (dark); and horizon with fossiliferous Upper Cambrian shallow water deposits (vertically lined overprint); basic-intermediate volcanic and associated rocks dominant (diagonally lined overprint); probably Cambrian unfossiliferous usually greywacke turbidite sequences (light); probably Cambrian unfossiliferous orthoquartzite sequence (dotted).
<b>PRECAMBRIAN</b>		Usually unconformity attributed to Penguin Orogeny but apparent conformity at Smithton and Pieman River.
<b>PRECAMBRIAN</b>		Comparatively unmetamorphosed sequences. Mudstone-sandstone sequences (u) - dominantly mudstone (light), dominantly orthoquartzite (dark), quartzwacke turbidite successions (small dot over-print), conglomerate (large dot over-print); dolomite (horizontally lined over-print); basalt lava (vertically lined over-print).
<b>PRECAMBRIAN</b>		Metamorphic rocks. Pelitic sequences (dark); metaquartzite sequences (light) with some platy quartzite units indicated (vertically lined over-print); amphibolite (diagonally lined over-print). Garnet bearing rocks are indicated (g).
<b>IGNEOUS ROCKS</b>		
<b>CAMBRIAN</b>		Dominantly adamellite-granite.
<b>LOWER CARBONIFEROUS - UPPER DEVONIAN</b>		Coarser grained basic rocks.
<b>PRECAMBRIAN</b>		Serpentine, peridotite and associated rocks.
<b>PRECAMBRIAN</b>		Dolerite.

	<b>GEOPEKO</b>	
	A DIVISION OF PEKO WALLSEND OPERATIONS LTD	
	SCALE 1 : 250 000	No Fig 2
<b>ARTHUR RIVER PROJECT</b>		
<b>REGIONAL GEOLOGY</b>		
Date:	Map Ref	Base
Geologist		<b>TASMANIA</b>
Checked		
Drawn		
Amendments:		

## 1.0 INTRODUCTION

### 1.1 Location and Access (Fig. 1)

EL 41/89 Mt Bertha is located in NW Tasmania approximately 20 km north of the township of Savage River.

Access within the EL is very poor and is restricted to the Savage River Pipe Line Road and unsealed logging roads which run near the eastern and western EL boundaries respectively. The central portion of the EL is relatively inaccessible and access requires the cutting of walking tracks and helicopter support.

### 1.2 Tenure and Land Usage

EL 41/89 of 249 km<sup>2</sup> was granted to Peko Exploration Ltd in January 1990. The EL schedule is outlined in Appendix 1.

The EL consists predominantly of State Forest and Crown Land. The area encloses 6 km<sup>2</sup> of The Arthur-Pieman Protected Area and includes part of the "Savage River" and "Norfolk Range" Australian Heritage Commission Act, Registered Entries.

In the western quarter of the EL large tracts of wet eucalypt forest have been intensively logged over the last 10 years. These areas now either lie devoid of vegetation or support thick regrowth. Vegetation over the rest of the EL is generally comprised of buttongrass-tea tree plains and wet eucalypt forest with a thick undergrowth.

### 1.3 Regional Geology

Geopeko's block of Arthur River ELs lie within the Rocky Cape Region of NW Tasmania. The oldest rocks in the area are those of the Precambrian Arthur Lineament. The Arthur Lineament is a north-east trending metamorphic belt consisting of highly deformed sediments, basic volcanics and dolomite. To the west of this belt lies the Rocky Cape Group, a thick shallow marine shelf sequence and to the east lies the Oonah Formation, a deeper water turbidite sandstone sequence. The Rocky Cape Group contains Precambrian dolerite/gabbro dykes which have been emplaced into north-north west trending faults and fractures.

The north western area is underlain by the Eo-Cambrian to Cambrian Smithton Trough which lies with a faulted or unconformable contact on the Rocky Cape Group. The Smithton Trough sequence consists of the basal Forest Conglomerate and Black River Dolomite (Success Creek Group Correlate), volcanoclastic sediments and basalt (Crimson Creek Formation Correlate), the Smithton Dolomite and fossiliferous sediments (Dundas Group Correlate). The south eastern corner of the area is underlain by rocks of the Cleveland-Waratah Association that lie within the Dundas Trough. These rocks have been correlated

STRATIGRAPHIC CORRELATION ADOPTED FOR THIS REPORT

	ROCKY CAPE BLOCK	LYONS RIVER (Arthur Lineament)	CLEVELAND - WARATAH	CORINNA	ZEEHAN (Ord - Dev beds omitted)
<b>TERTIARY</b>	Tb - Tertiary Basalt Tc - Tertiary gravel	Tb - Tertiary Basalt Tc - Tertiary gravel	Tb - Tertiary Basalt Tc - Tertiary gravel	Tb - Tertiary Basalt Tc - Tertiary gravels	Tb - Tertiary Basalt Tc - Tertiary gravels
<b>PERMO-CARB</b>		P - Permian Supergroup Fluvialite sandstone, coal measures, glaci-marine & glacial deposits			
<b>DEVONIAN</b>			Intrusion of Cleveland Granite	Intrusion of Pinnac Granite	Intrusion of Hanson Hill & Haemahik Granite
<b>CAMBRIAN</b>	Cs - Unnamed Quartzwacke, siltstone, mudstone, conglomerate				Dundas Group
			Intrusion/emplacement of Ultramafic Bodies		Intrusion/emplacement of Ultramafic bodies
<b>EO-CAMBRIAN</b>	Ed - Smithton Dolomite  Em - Smithton Basalt Mafic volcanoclastics and tholeiitic basalts  Eb - Black River Dolomite Dolomite, silicified dolomite, chert  Ef - Forest Conglomerate and Quartzite		Ew - Unnamed mafic volcs. volcanoclastics and turbidites with some carbonates	?? Ecd - Corinna Dolomite  Edv - Bernafal Volcanics  Esd - Savage Dolomite	Crimson Creek Formation  Success Creek Group
<b>PRE-CAMBRIAN</b>			Pf - Burnie Formation Interbedded quartzose quartzwacke & siltstone with minor mafic volcs	Pd - Donaldson Formation Quartzose turbidites	Oonah Formation Interbedded quartzwacke and siltstone with some carbonates & mafic volcs
	Prj - Jacobs Quartzite Quartzarenite  Pri - Irby Siltstone Black mudstone, minor siltstone, sandstone, & dolomite  Prd - Detention Quartzite Quartzarenite & siltstone  Prc - Cowrie Siltstone Laminated siltstone, pyritic mudstone	?? Prn - Reedy Formation Quartzite+siltstone, minor dolomite and basic volcs		Pi - Interview Slate and Quartzite	
		Pa - Keith Metamorphics Pelitic & quartzose schist -some calcic & mafic schist (magnetite & amphibolite)		Timms Group Pelitic & quartzose schist -some calcic & mafic schist (magnetite & amphibolite) - magnetite	

with the Crimson Creek Formation and consist of basaltic, andesitic and tholeiitic lavas and volcanoclastic sediments.

The Precambrian-Cambrian rocks along the eastern edge of the area are in places overlain by Permian fluvio-glacial sediments and/or Tertiary basalt.

#### 1.4 Known Mineral Deposits/Occurrences

There are a number of metallic mineral occurrences adjacent to the western, eastern and southern EL boundaries of Geopeko's Arthur River Project. (Green et Al 1988).

These are listed in Table (2) and Figure (3) shows their locations.

The deposits range from small, relatively insignificant workings, e.g. Victory Mine, Atlas Leases to large world class ore bodies e.g. Mt Bischoff, Savage River. In most cases, extensions of the prospective host formations can be continued into Geopeko's Arthur River EL's.

#### 1.5 Previous Exploration

The northwest of Tasmania has seen regional company exploration activity since the mid 1960's. Techniques applied include stream sampling, gridding, soil and rock chip sampling, geological mapping, photogeology, diamond drilling and geophysical surveys. Generally this work has been concentrated in areas within a few kilometres walking distance of vehicular access. As much of the central northwest is remote and inaccessible, this has resulted in many areas having not yet seen intensive modern exploration. (See Appendix 2 for review of previous exploration)

#### 1.6 Exploration Philosophy

Geopeko consider this portion of Tasmania to have been inadequately explored for base metals and gold mineralization. Since the early prospecting stage, systematic exploration by several companies has relied on airborne geophysics (Aeromagnetics and INPUT) and conventional stream sediment geochemistry with limited ground follow up. These techniques will give readily detectable responses from, "ideal" orebodies under "ideal" conditions. However, the combination of rugged topography and intense leaching of soil profiles; the superimposed effects of Tertiary weathering and surficial deposits; the complications of pyritic black shales and manganiferous deposits; and the contamination of several river systems by tailings and slimes from old mining operations would have masked many good responses and obscured any subtle responses.

Geopeko consider that the geochemical prospecting method developed by Dr. Baker of the Tasmanian Mines Department

TABLE (2) METALLIC MINERAL OCCURRENCES/DEPOSITS

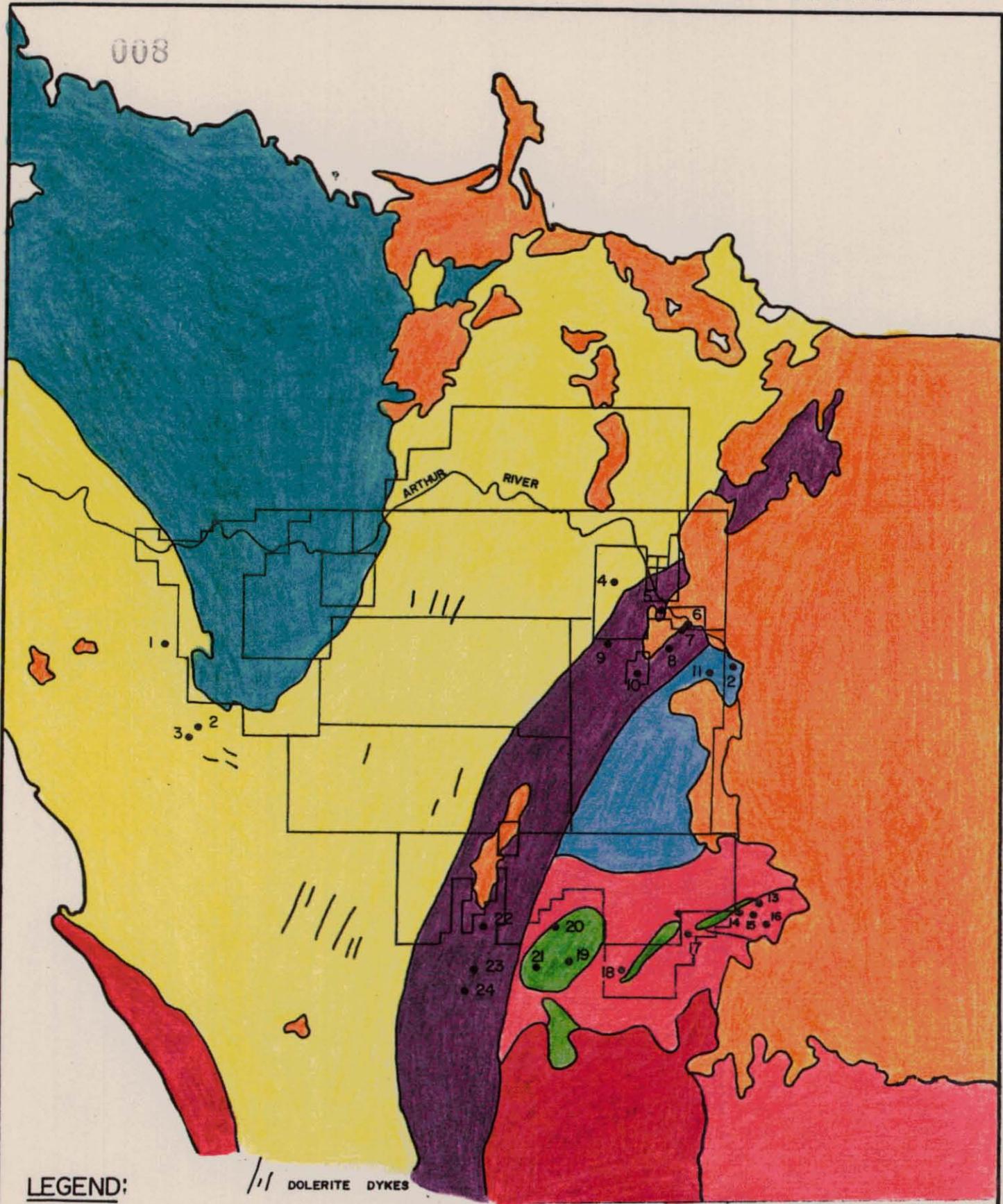
Map No.	Name	Commodity	Geology & Mineral Style	
1	The Clump	Cu	Rocky Cape Group	V
2	Murrays Reward	Cu	Rocky Cape Group	V
3	Specimen Hill	Sn Cu	Rocky Cape Group	V
4	Folly Hill	Au	Rocky Cape Group	A
5	Campbell Hydraulic	Au	Arthur Lineament	A
6	Victory	Cu	Arthur Lineament	V
7	Arthur River	Magnesite	Arthur Lineament	S
8	Keith River Gossan	Magnesite Py (Cu)	Arthur Lineament	MS
9	Pike's	Au	Arthur Lineament	A
10	Lyons River	Magnesite	Arthur Lineament	S
11	Atlas Leases	Ag Pb	Arthur Lineament	V?
12	Kay's	Au	Arthur Lineament	A
13	North Valley	Sn	Oonah Formation	A
14	Silver Cliffs	Pb Ag	Oonah Formation	V
15	Mt Bischoff	Sn	Oonah Formation	SCR
16	Fooks Load	Sn Pb Zn Ag Sb	Oonah Formation	V
17	Magnet	Pb Ag Zn	Crimson Ck Equiv.	V
18	Cleveland	Sn (Cu W Bi Mo)	Crimson Ck Equiv.	SCR
19	Lord Brassey	Ni	Cambrian Ultramafic	M
20	Bald Hill	Os Ir Au	Cambrian Ultramafic	A
21	Caudry's	Os Ir	Cambrian Ultramafic	?
22	Specimen Reef	Au	Arthur Lineament	V
23	Savage River Nth	Magnetite (Py)	Arthur Lineament	MS
24	Savage River Cent.	Magnetite (Py)	Arthur Lineament	MS

Mineralization Styles

A - Alluvial Deposit  
V - Vein Deposit  
M - Magmatic Deposit

S - Stratiform  
MS - Massive Stratiform  
SCR - Stratiform Carbonate Replacement

008



**LEGEND:**

- HOLOCENE - CARBONIFEROUS COVER
- DEVONIAN GRANITE
- SMITHTON BASIN
- DUNDAS TROUGH SEDIMENTS
- BASIC INTRUSIVES
- OONAH FORMATION
- ROCKY CAPE GROUP
- ARTHUR LINEAMENT

/// DOLERITE DYKES



Date: SEPT. 1990.  
Geologist: K.J.V.  
Checked:

Drawn:  
Amendments:

<b>GEOPEKO</b>	
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<b>MINERAL OCCURRENCES.</b>	
(See Table 2 also)	
Map Ref: TAS. DEPT. MINES.	Base: PARKES NSW

whereby the humate content of stream water is analysed for its content of leached metals provides a rapid and inexpensive method of screening large areas of ground.

Selected areas with a combination of suitable geological environment and geochemical characteristics could subsequently be further explored using expensive and slow techniques such as detailed geological mapping, grid based geochemistry and modern geophysical techniques.

As the proposed technique is both rapid and relatively cheap, it should be possible to define prospective areas at an early stage. Consequently Geopeko anticipate that it will be possible to relinquish a large proportion of the area following the first year of tenure.

### 1.7 Target Models

Geopeko consider the Precambrian rocks of NW Tasmania to be prospective for stratiform Pb, Zn, Ag deposits of the Mt Isa-McArthur River type and for stratiform Cu-Zn (Au) deposits of the Besshi Type. The mineralization at the Atlas Leases can be assigned to the first group while the Keith River Gossan can be compared to the Besshi Type.

Several occurrences of alluvial gold along the Arthur River highlight the potential of the area for gold only mineralization. Applicable models for gold mineralization include shear related gold deposits and volcanogenic gold deposits associated with basic volcanics.

The Cambrian and Eo-Cambrian rocks of the Smithton Trough have a potential for carbonate hosted zinc-lead-silver deposits, for carbonate hosted disseminated gold deposits and for shear related gold deposits. While no mineral occurrences are known from the Smithton Trough, anomalous base metal and gold geochemistry has been reported by previous explorers.

## 2.0 EXPLORATION ACTIVITY

### 2.1 Aims

Exploration in EL 40/89 is aimed at delineating through grass root techniques prospective and geochemically anomalous areas within the EL. Areas worthy of further investigation would be followed up with more detailed exploration in the 1991 field season.

As a result of lack of access within the EL and company commitments to other licences in the area, little field work has been carried out in this EL during most of 1990.

Work included a geophysical review and preparation for the 1990-91 summer field season.

## 2.2 Geochemistry

### Work Completed

Five (5) 2 litre huminex water samples were collected from EL 41/89 at a sample density of 1 sample per 2-3 km<sup>2</sup>. At this stage only a few creeks in the eastern part of the EL have been sampled. This is the result of poor access within the central portion of the EL as well as company commitments to other licences in the area.

### Gold in Water

Statistical analysis of 325 water samples taken regionally by Geopeko in the 1989-90 field season indicates that Au values >30 ng/l and Au:C >4 are possibly anomalous and that Au values >50 ng/l and Au:C >8 are probably anomalous. Any higher values are definitely anomalous. (Mathison, 1990)

Of the five samples so far taken in EL 41/89, none have reported anomalous gold assays. Samples 20671 and 20672 drain dolomite from an outlier of the Smithton Trough Sequence. Samples 20161-63 are from creeks draining the Cowrie Siltstone.

The samples reported gold values in the range of 1.0-16.4 ng/l Au and had Au:C ratios of 0.05-1.37.

### Base Metals in Water

Statistical analysis of the 325 water samples taken regionally by Geopeko in the 1989-90 field season indicates that samples with values of Cu >3.8 µg/l, Pb >7 µg/l and Zn >27 µg/l are possibly anomalous and samples with Pb >13 µg/l, Cu >7 µg/l and Zn >47 µg/l are probably anomalous. (Mathison, 1990)

The base metal assay results for the 5 samples taken in this EL were very low with no anomalous results received. The highest results received were 1.10 µg/l Cu (sample 20163), 2.0 µg/l Pb (sample 20161) and 7.0 µg/l Zn (samples 20161 and 20162).

## 2.3 Geophysical Review

A geophysical review of the Rocky Cape Block using regional gravity and magnetic data was undertaken by D.E. Leaman. This work is detailed in a separate report. (Leaman, 1990). Discussions specific to this EL are appended as Appendix 3 and summarized in figures 4 and 5.

Both data sets from within the Arthur Lineament indicate large north-north-east shear and fault zones (features 21, 23, 24). The intersection of such zones with smaller north-east trending structures may be crucial locations for alteration and mineralization. Zone 15 in the south-west corner of the EL represents a relatively shallow depth (1-2 km) to the underlying Pieman Granite. The magnetic data indicates local

underlying Pieman Granite. The magnetic data indicates local responses in this area which may indicate alteration or abnormal chemistry.

Feature 2 which is thought to be a deep crustal feature trends north-north-east through the centre of the EL.

Any trace geochemistry located in these areas is worthy of follow up with more detailed work.

### 3.0 CONCLUSIONS

- \* The north-west corner of EL 41/89 has been covered by the regional 1989-90 water sampling programme.
- \* No gold or base metal anomalies have as yet been located.
- \* No mineralization was encountered or anomalous rocks sampled.
- \* Magnetic and gravity data indicate three anomalous structures within the EL. These areas have not as yet been investigated.

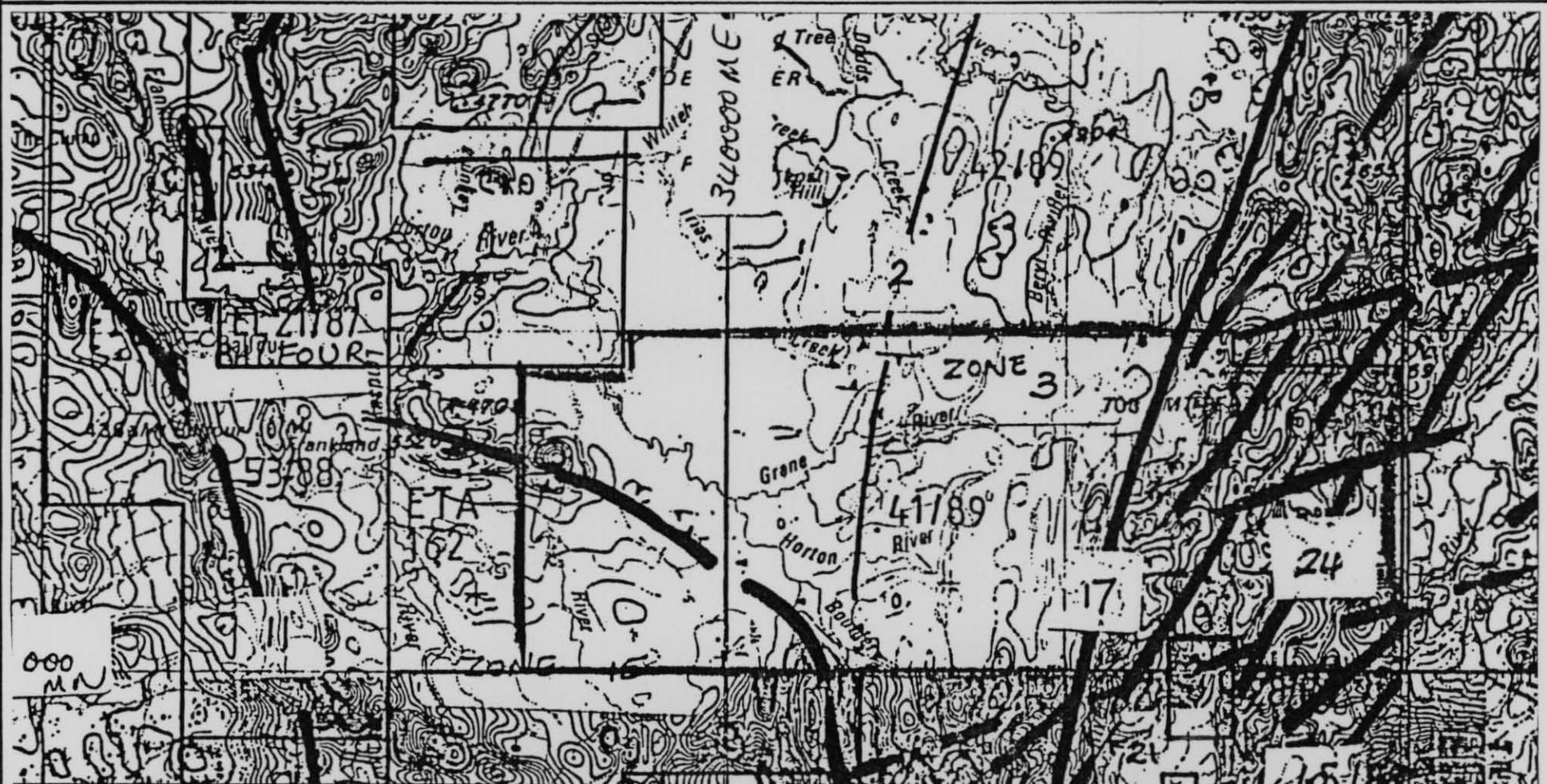
NB: In early December, after the bulk of this report was completed, it became obvious that the DMMR laboratory was having severe problems with the determination of gold in water. Some unknown element or compound was being concentrated by the activated charcoal extraction technique and was reporting on the gold channel. Repeat analyses using alternative techniques indicated that many, but not all, gold results were spurious. Re-analysis of water samples to identify genuinely anomalous samples is currently in progress.

### 4.0 RECOMMENDATIONS

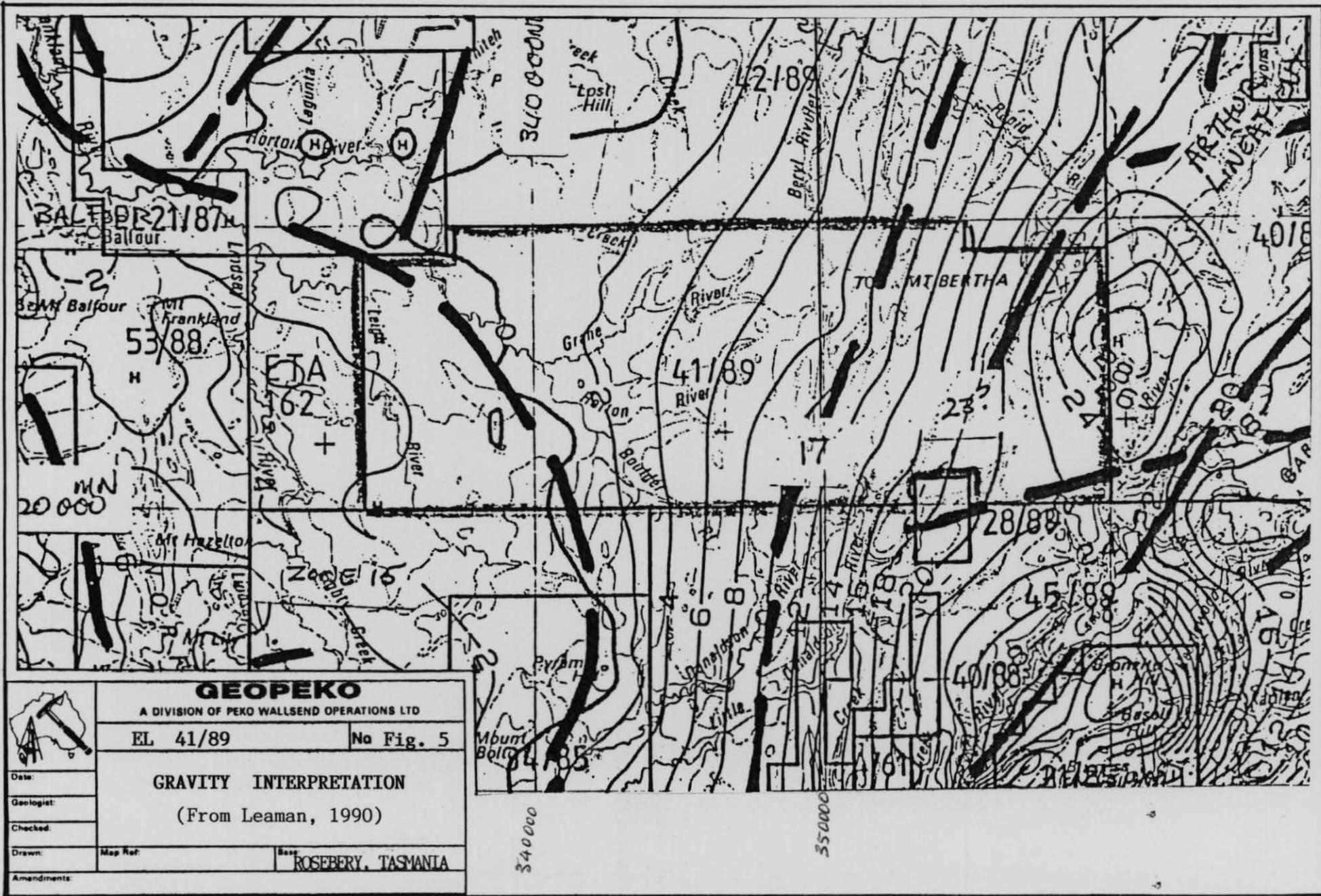
The realization that not all gold in water results provided by the DMMR are valid necessitates either a pause in the program or a change in direction of the project. While alternative ways of selecting zones within this underexplored region are available, they do not offer the new approach, the near total coverage or the relatively low cost of the water technique.

Analysis of the water results shows that many high gold came from streams draining either the Arthur Lineament or the Neasy Formation. Streams draining the Cowrie Siltstone reported uniformly low gold in water and base metal values.

It is recommended that the exploration program in this area should be delayed until resolution of the analytical problem by the DMMR. Anomalous samples with confirmed high gold values should be followed up by detailed geological mapping and rock



	<b>GEOPEKO</b>	
	A DIVISION OF PEKO WALLSEND OPERATIONS LTD	
Date:	EL 41/89	No Fig. 4
Geologist:	<b>AEROMAGNETIC INTERPRETATION</b>	
Checked:	(From Leaman, 1990)	
Drawn:	Map Ref:	Base: ROSEBERY, TASMANIA
Amendments:		



	<b>GEOPEKO</b>	
	A DIVISION OF PEKO WALLSEND OPERATIONS LTD	
Date:	EL 41/89	No Fig. 5
Geologist:	GRAVITY INTERPRETATION	
Checked:	(From Leaman, 1990)	
Drawn:	Map Ref:	Base: ROSEBERY, TASMANIA
Amendments:		

013

5430000

5420000

413015

chip sampling. Areas of the EL underlain by the Cowrie Siltstone should be relinquished.

5.0 ENVIRONMENTAL DISTURBANCE AND REHABILITATION

Exploration conducted by Geopeko during 1990 has caused no environmental disturbance. Semi permanent samples markers left at sample sites are considered to be valuable reference points for future exploration. No rehabilitation has been necessary.

## REFERENCES

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APPENDIX 1

EL SCHEDULE

## TASMANIA

No. EL 41/89

(Regulation 6A)

The Mining Act 1929**EXPLORATION LICENCE**

Issued to PEKO EXPLORATION LTD of PO BOX 180, ROSEBERY, TASMANIA, 7470 in respect of 249 square kilometres of land in the Land District of RUSSELL vicinity of MT. BERTHA as described in the schedule hereto.

This licence shall remain in force until the TWELFTH day of JANUARY 1991.

This licence is subject to the following conditions:-

1. That the licensee shall immediately on the issue of this licence take steps to commence preliminary works necessary for the investigation of the area.
2. That the licensee shall carry out investigations as may be necessary to determine the mineral potential of the area, and in particular will fulfil the proposals set out in the exploration programme and approved by the Director of Mines.
3. That the licensee shall employ such technical and other staff and equipment as may be necessary effectively to carry out such investigations.
4. This licence shall apply to all minerals.
5. The licensee shall notify the owner and occupier of private land, in writing, at least three days before entering such land.
6. That the security (Private Land Deposit) provided by Section 15E (1) (a) & (b) of the Mining Act, 1929, (see below) shall be lodged with the Director of Mines before entering private land.
7. The licensee shall observe, perform and fulfil the conditions as set forth in Schedule 'A' (Revised) attached hereto.

8. The licensee shall be liable to pay the cost of any work carried out to remedy any damage arising from any breach of the conditions of this licence.
9. The licensee shall deposit an amount of \$5,000 (Performance Deposit) as security that the conditions contained herein shall be observed. Upon expiry or sooner determination of the licence, if the licensee satisfies the Director of Mines that such conditions have been complied with, the Director of Mines shall refund such deposit or such portion thereof, as he may determine.
10. If it is found, that the operations hereby authorised, are causing any undue damage to, or erosion of, the subject land or other land in the vicinity thereof or are unnecessarily disturbing the environment, the Minister may cancel the licence without compensation to the licensee by giving seven days' notice in writing of his intention so to do.
11. The licensee shall obtain the written permission of the Director of Mines before carrying out any work in a Forest Reserve.
12. The licensee shall arrange and keep in good standing public liability insurance to the minimum of \$1,000,000. Evidence of currency shall be produced on demand.

#### SCHEDULE

Commencing at a north west corner of the area whose grid co-ordinates are 337 000 metres E. 5 430 000 metres N. thence grid east to 355 000 metres E. grid south to 5 429 000 metres N. again grid east to 360 000 metres E. again grid south to 5 420 000 metres N. grid west to 355 000 metres E. aforesaid grid north to 5 421 000 metres N. again grid west to 353 000 metres E. again grid south to 5 420 000 metres N. aforesaid again grid west to 334 000 metres E. again grid north to 5 429 000 metres N. aforesaid again grid east to 337 000 metres E. aforesaid thence again grid north to the point of commencement.

The area excludes 1 skm Savage River Pipeline.

#### LAND TENURE

The area comprises:-       State Forest  
                                   Crown Land  
                                   Arthur Pieman Protected Area.

The area includes part of 'Savage River' and 'Norfolk Range' Australian Heritage Commission Act, Registered Entries.

NOTE: The land tenure table is a guide only.

APPENDIX 2

REVIEW OF PREVIOUS EXPLORATION

## APPENDIX 2

REVIEW OF PREVIOUS EXPLORATIONA2.1 EL 12/65 Pieman Project

During the mid 1960s Pickands Mather & Co International held EL 12/65 over a large part of northwest Tasmania. An extensive regional stream geochemical survey was conducted and although a number of geochemical anomalies were detected, and some resampling occurred later, no further work was undertaken. (Anon. 1966 in Cromer, 1988a). Unfortunately records of this sampling program are no longer held by the Tasmanian DMMR.

A2.2 EL 48/70 and EL 49/70

Two exploration licences to the southwest of Geopeko's Arthur River Project were granted as a joint venture to Australian Consolidated Industries Ltd and Consolidated Goldfields Australia Ltd. Field investigations included an aeromagnetic survey, stream sediment sampling, geological mapping and soil and rock chip sampling. This was designed to detect any tin mineralization that may be associated with the three Devonian granites in the two licence areas. Detailed evaluation was carried out in areas of geochemical and geomagnetic anomalies and known mineralization.

Results were not encouraging enough to justify further exploration and the two ELs were dropped in 1972. (Bell, 1972)

A2.3 EL 6/72 North West Tasmania

Australian and New Zealand Exploration Company was granted EL 6/72 in January 1972. This EL covered an area of the Smithton Trough to the north of the Arthur River. It was considered by ANZECO to be prospective for tungsten due to the similarity of the dolomites to those hosting the King Island Scheelite ore body. A panned concentrate and stream sediment sampling programme was completed over the EL with 94 samples taken and analysed for W, Cu, Pb, Zn, Mo, Sn and Cr. ANZECO received a number of anomalous assays for all the elements tested but found it difficult to interpret the results. Though some follow up was recommended, no further exploration was attempted. (Kinnane, 1972).

A2.4 EL 2/73

Following a study of the mineral potential of Australia during 1971, ESSO took out EL 2/73 in the northwest of Tasmania and conducted an airborne geophysical survey (INPUT) over the licence area. Sixty two anomalies were detected, however, dense vegetation restricted examination to thirty six targets and only thirteen had outcrop. Most of the anomalies were attributed to black slates and lithological contacts. ESSO

considered that no further exploration was warranted and the EL was relinquished in 1974. (Neale, 1973)

#### A2.5 EL 43/70 Keith River

Magnesite was first discovered in the Lyons River-Keith River area in 1925 by P.B. Nye. Since Mineral Holdings Australia was granted EL 43/70 over the area, numerous companies have explored the licence under joint venture agreements. A joint venture between Mineral Holdings Australia and CRAE Pty Ltd in 1982 delineated two deposits of moderate-high grade magnesite. These are known as the Lyons River and the Keith-Arthur River Prospects. (Mackenzie, 1984). Retention Licences 8717 and 8718 cover these two magnesite reserves.

#### A2.6 EL 1/77 Rocky Cape

EL 1/77 was initially taken up by CRAE Pty Ltd to investigate the possible tin potential of the area. Following a joint venture with Geopeko in 1979 and recommendations by P. Legge in 1980 that the Rocky Cape rocks showed similarities to the Selwyn Basin, Canada, the target was extended to shale hosted lead zinc deposits.

Statistical evaluation of regional drainage data indicated that the Trowutta Dempster plains district showed elevated values of Cu, Pb, Zn and Co. (Weir, 1982). Follow up of this area included stream sediment sampling, geological mapping and rock chip sampling. A photogeological interpretation (by Carey, 1981) covered the whole EL. The stream sediment sampling revealed lead anomalies from the Julius River, the Meryanna area, Wents Creek and Stephens Rivulet and an arsenic anomaly from Sumac Rivulet.

Follow up in the Julius River and Meryanna area included detailed stream sampling, gridding, soil sampling and ground geophysics. It was concluded that the Julius River anomaly was derived from a disseminated source or shears within the dolomite and that the Meryanna anomaly was the results of erosional basaltic remnants on topographic highs.

Resampling of the other 3 anomalous areas failed to repeat the initial high values.

CRA Exploration relinquished the northern part of EL 1/77 in 1983 concluding that the black shale sequences exposed at the eastern margin of the trough were too thin to have produced economic mineralization from brines (Weir, 1983).

Exploration continued in the western coastal parts of the EL including diamond drilling at the Alpine and Red prospects for tin before total EL relinquishment in 1985.

#### A2.7 EL 1/79 Rapid River

A detailed program of exploration was carried out over the Rapid River EL by Geopeko and/or CRAE Pty Ltd from 1979 to 1987. Commodities searched for included gold, platinum, shale hosted base metals and Mittershill type tungsten as well as extensions to the Lyons River magnesite trend. The work included airborne magnetic and radiometric surveys, ground follow up of all major magnetic anomalies, geological mapping and stream sediment sampling in selected areas. No significant mineralization was located. (Dickson, 1987)

#### A2.8 EL 10/79

EL 10/79 was operated as a joint venture by CRAE and Mineral Holdings Australia Pty Ltd. The target was initially dolomite, but when some anomalous gold and platinum values were obtained, greater emphasis was given to the metals aspect of exploration. Grades of 3.09 g/t [410732] and 4.06 g/t Au with 0.46 g/t Pt [408726] were obtained from dolomite chip sampling and, although resampling returned results of only 0.04 g/t Pt, the partners concluded that there was a significant gold occurrence in the dolomites. However, EL 10/79 was relinquished in 1984 with no follow up work. (Anon 1985 in Cromer, 1988a)

#### A2.9 EL 12/80 Leigh River and EL 61/83

EL 12/80 was granted to CRAE Pty Ltd in order to investigate two tin stream sediment anomalies located during previous reconnaissance by CRAE in 1977. The EL was also considered for shale hosted lead zinc and gold mineralization and this was supported by the presence of a number of INPUT anomalies obtained by ESSO in 1973. Work carried out included a computer study of all previous stream sediment geochemistry, infill stream sediment sampling, regional scale mapping, follow up of nine aeromagnetic anomalies defined by the Mines Dept. West Coast survey and investigations into the gold potential of altered Cambrian basalts. No significant base or precious metals were detected and the EL was relinquished in 1985. (Dickson, 1985).

EL 61/83 was taken up by CRAE to cover a large aeromagnetic anomaly located on the eastern margin of EL 12/80. A grid was established over the anomaly and Genie EM traverses carried out. No base metal or gold anomalism was detected and the EM failed to locate any conductors. The aeromagnetic anomaly was attributed to unmineralized Precambrian basic volcanics and the EL was dropped in 1985. (Dickson, 1986)

#### A2.10 EL 18/80 Arthur River and EL 18/83 Lake Chisholm

EL 18/80 was taken up by BHP Co Ltd and thought to be prospective for a skarn or massive sulphide hosted tin tungsten deposit of the Renison/Cleveland style. Carlin style gold, diamonds, Mississippi Valley lead-zinc and sedimentary copper

deposits were secondary targets. Work completed includes stream sediment and pan concentrate sampling, rock chip sampling, petrology, a photogeological and Landsat Image study, geological mapping, and evaluation and follow up of existing INPUT and aeromagnetic data. In view of the disappointing results and difficult access, the EL was relinquished in 1983. (Anon, 1983).

EL 18/83 lies adjacent to EL 18/80 and was taken by BHP to cover a broadly coincident INPUT/Aeromagnetic anomaly. An extensive grid was cut over the main zone of interest at Lake Chisholm and soil sampling, geophysical surveys and geological mapping were carried out. Pan concentrate sampling was used to follow up anomalous tin geochemistry reported from earlier work. The INPUT/Aeromagnetic anomaly was attributed to a small amphibolite body and magnetically susceptible basalts. No indications of potentially economic mineralization were encountered. (Anon, 1984).

#### A2.11 EL 21/87 Balfour and EL 22/87 Trowutta

Aureole Resources took up ELs 21/87 and 22/87 to explore for platinum group metals, gold and base metals, hosted mainly by receptive rocks along the eastern and southern margins of the Smithton Trough. Work included a regional geophysical evaluation by D.E. Leaman and rock chip sampling for assay and petrological purposes. Despite upgrading the prospectivity of parts of the two ELs, 22/87 was relinquished and 21/87 reduced in 1989 as Aureole shifted their emphasis to other tenements. (Cromer, 1988a + b).

#### A2.12 EL 5/63

EL 5/63 was granted to Comstaff Proprietary Limited in 1963 and covered the area from Rosebery in the south to Wandle Creek in the north. Comstaff divided the EL in 6 areas, ie, Area 1 Arthur River, Area 2 Ramsay, Area 3 Mt Block, Area 4 Chester/Pinnacles, Area 5 Huskisson and Area 6 East Renison. Area 1 covers part of Geopeko's EL 45/89 and is the only area discussed in this summary.

Systematic and detailed exploration of Area 1 commenced in 1970-71 field season and little is reported of any exploration carried out before this time.

Exploration of Area 1 from 1970-75 was based around 2 stream sampling programmes and several widely spaced TURAM EM traverses. The stream sampling surveys produced anomalies in the Tinstone Creek area (Ag,Cu,Zn,Pb,Sn & Ba), Magnet Creek (Sn), Deep Gully (Sn), Rollins Creek (Sn), Dalcos Creek (Sn) and from the Happy Day Creek (Cu, Zn, Ni). Follow up included gridding and soil sampling of the Tinstone Creek area, Happy Day Creek and four other Cu-Zn anomalies. No anomalies indicative of the presence of mineralization were recorded.

The Turam EM survey reported 8 anomalies and 5 of them were gridded and subjected to EM and/or magnetic surveys. No significant results were obtained.

From 1975-78 work was centred on the Magnet-Bischoff grid which was subjected to geological mapping, soil sampling, ground magnetics and EM surveys. Three diamond holes were drilled in the grid area, one to test an EM anomaly and the other two to test the Magnet lode at depth. No mineralization was intersected and no further work on the grid was recommended. (Shaw & Everett, 1985).

In 1980 a programme to investigate the alluvial tin potential of the Arthur River commenced. Initial work was encouraging with a tin volume estimate of 6-8 million m<sup>3</sup> of variable grade outlined. Though follow up work was recommended, no further exploration on this project was reported. (Washausen & Wilding, 1980).

In 1983-85 a DIGHEM survey was carried out over Area 1 using flight lines with a NW-SE direction. Five anomalies were recommended for follow up. Comstaff attributed them to Tertiary basalt cover.

In 1985 Comstaff was required to reduce EL 5/63 and most of Area 1 was relinquished. (Shaw & Everett, 1985).

#### A2.13 EL 1/68 Heazlewood

In 1968 EL 5/63, held by Comstaff Pty Ltd, was subdivided to form EL 1/68. EL 1/68 covered an area north of Luina which is drained principally by the Savage and Heazlewood Rivers.

Initially exploration of this licence focussed on the ultramafics and their potential for nickel mineralization. Gridding, soil sampling, geological mapping, geophysical surveys and some trenching failed to identify any new mineralization.

Regional reconnaissance projects were then implemented in the Savage, Whyte and Heazlewood drainages. The upper Heazlewood drainage basin emerged as the most prospective with anomalous values of zinc and copper. Two grids (HAB, HAC) were cut and geologically mapped and soil sampled. No mineralization was found and geochemical responses were weak.

In 1980, a DIGHEM survey over the total licence area was commissioned and exploration for the next 3 years centred around the follow up of 13 resultant anomalies. All anomalies were gridded, geologically mapped, soil sampled and subjected to ground magnetic and EM surveys. In all cases no mineralization was observed. In late 1983 two EM targets were selected for drill testing. Both holes failed to intersect mineralization and the EM responses were attributed to black graphitic slate and phyllite.

In 1984 Comstaff considered that all avenues for locating mineralization had been exhausted and the EL was relinquished. (Shaw, 1984).

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APPENDIX 3  
GEOPHYSICAL REVIEW

EL 41/89 MT BERTHA

The location of this area is shown in Figure 1.

Figure 25 presents relevant gravity and magnetic data.

This EL covers the southern part of the Rocky Cape Block core zone. It includes part of the overthrust Rocky Cape core, the central portion of the Arthur Lineament zone and part of the roof of the Pieman Granite.

The roof limit of the granite is marked by negative residual anomalies (zone 15) and a rim of abnormally elevated magnetic anomalies. These arc from Balfour toward Savage River. The localised magnetic responses in this siliceous environment does indicate alteration and abnormal chemistry and the northern part of the anomaly near Boundary Rivulet in the far south of the EL should be inspected, as should the feature east of Leigh River (e.g., 335 000 mE, 5427 000 mN).

Gravity coverage is too coarse within zone 15 in this EL to establish the existence of any high relief cupolas on the granite but it is possible that such a feature does exist near the Leigh River. This zone might be mineralised and may be related to the magnetic anomaly defined above.

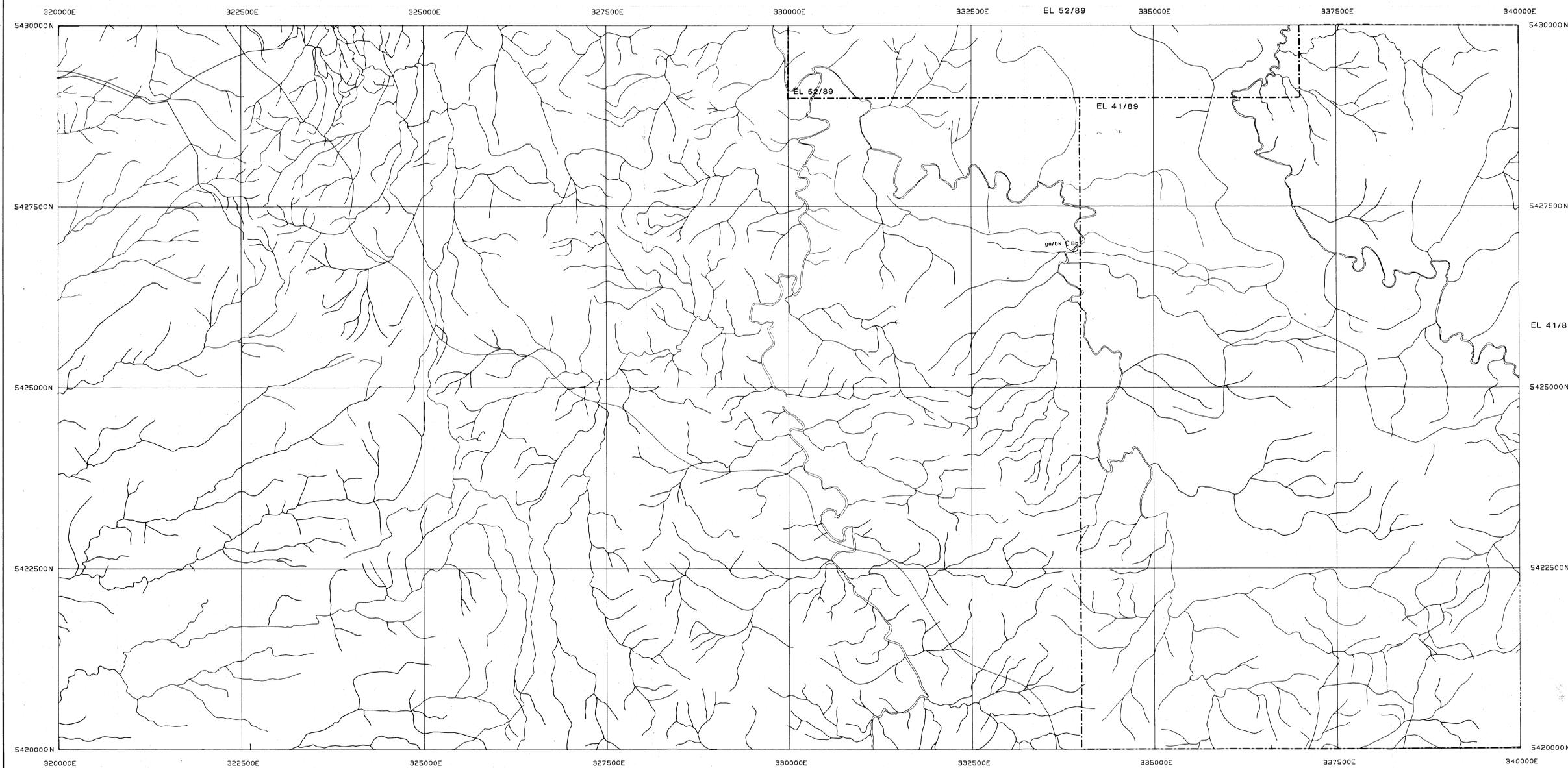
The gravity anomalies in the eastern half of the EL are dominated by the effect of the Lineament rocks and those concealed beneath the Rocky Cape Group. Some large, but ill-defined shears and faults are suggested. The rocks are very dense and probably mafic in origin near the eastern boundary of the licence area.

The magnetic data present a clearer view. The lineament zone is shown to be composed of several large blocks which do not, at this northing, appear to extend west of the metamorphic indicators for the lineament. Several ENE structures are also present. None of these features appears to extend west of (17). Structure (24) appears to mark a distinct lithological change and to be associated with mineralisation further north and it should be precisely located in this area. The intersections with other structures may have induced greatest alteration. These sites may be crucial for deposition and exchange systems involving copper and gold.

Magnetic zone 3, between feature (2) and (17), carries a unique magnetic texture suggestive of pervasive tension fracturing. No subtle indicator anomalies have been identified within the central part of the EL.

Reliable location of many of the structural trends within the lineament zone may depend on examination of all observed profiles.





- ROCK TYPES**
- SEDIMENTS:**
- Sst sandstone
  - Sqr quartz arenite
  - Swk greywacke
  - Sst siltstone
  - Sdol dolomite
  - Scon conglomerate
  - Sbx breccia
- IGNEOUS ROCKS:**
- Tert Bb tertiary basalt
  - C Bb cambrian basalt
  - Bd dolerite
- METAMORPHICS:**
- Mpyl phyllite
  - MSqr meta arenite
- SEDIMENT GRAIN SIZE**
- vfg very fine grained
  - fg fine grained
  - mg medium grained
  - cg coarse grained
- TEXTURES**
- vns veins
  - ibd interbedded
  - lam laminated
  - clvd cleaved
  - stn staining
  - gd graded
  - wthd weathered
- COLOURS**
- bk black
  - wh white
  - gn green
  - gy grey
  - pl pale
  - dk dark
  - or orange
  - cm cream
- MINERALOGY**
- py pyrite
  - qt quartz
  - Fe iron
  - Mn manganese
  - cbd carbonate
  - Tq turquoise
- STRUCTURAL SYMBOLS**
- bedding
  - facing
  - overturned bedding
  - cleavage
  - fault
  - rock outcrop
  - float/subcrop
  - definite contact
  - approximate contact
  - interpreted contact

91-3212.

413032

5cm PLATE 1

	3243	3443
	3242	3442

	<b>GEOPEKO</b> A DIVISION OF PEKO EXPLORATION LIMITED
	SCALE - 1:25000 AUSTRALIAN HEIGHT DATUM
	<b>3242 BALFOUR</b>
<b>EL 41/89</b> GEOLOGICAL FACT MAPPING	

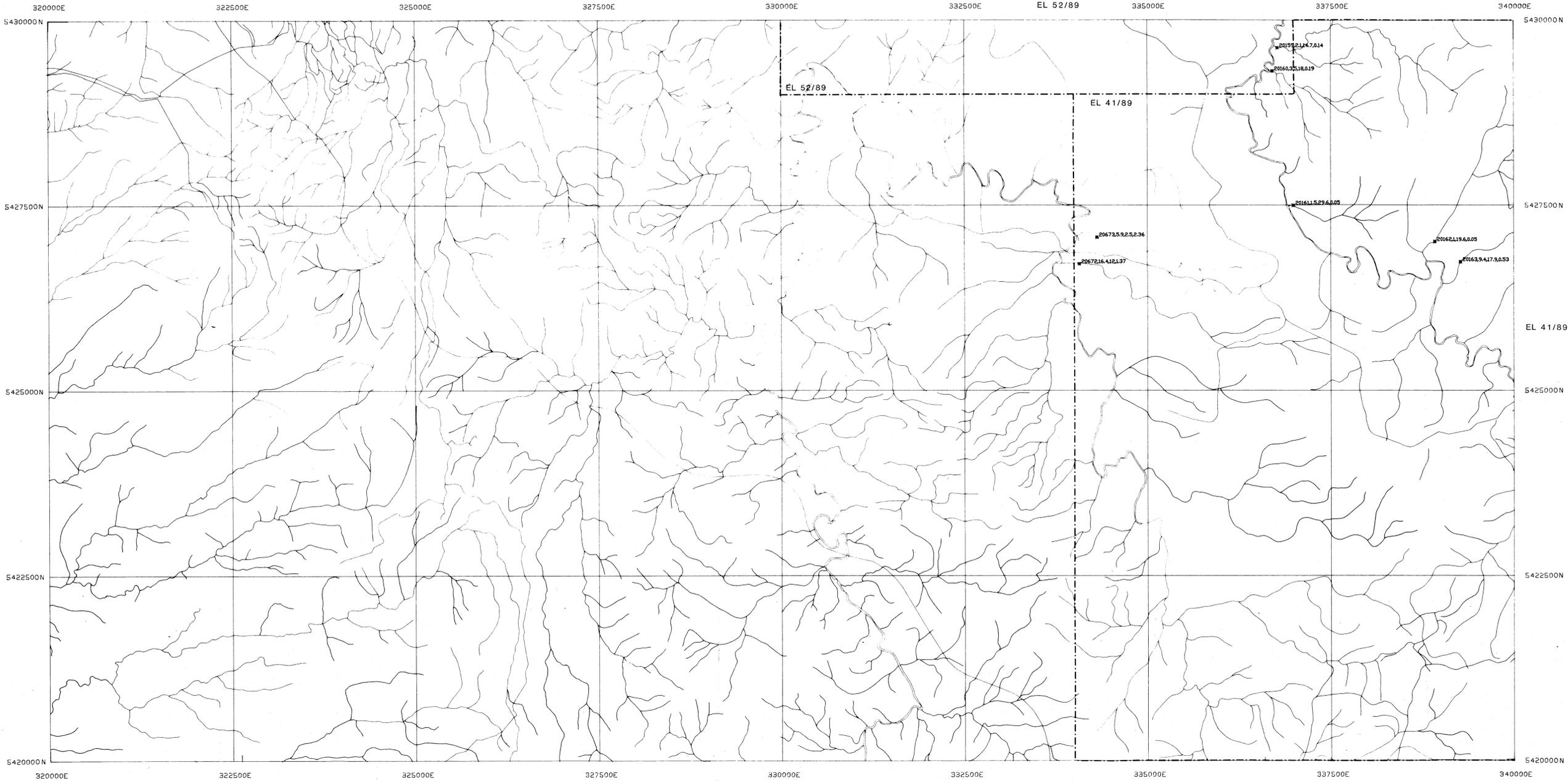


PLATE 2

LEGEND  
 =====  
 Sample Location  
 Sample Number  
 Au (ppt)  
 C (ppm)  
 Au/C Ratio  
 \* 20662, 11.8, 13.9, 0.85  
 BT - Below Detection

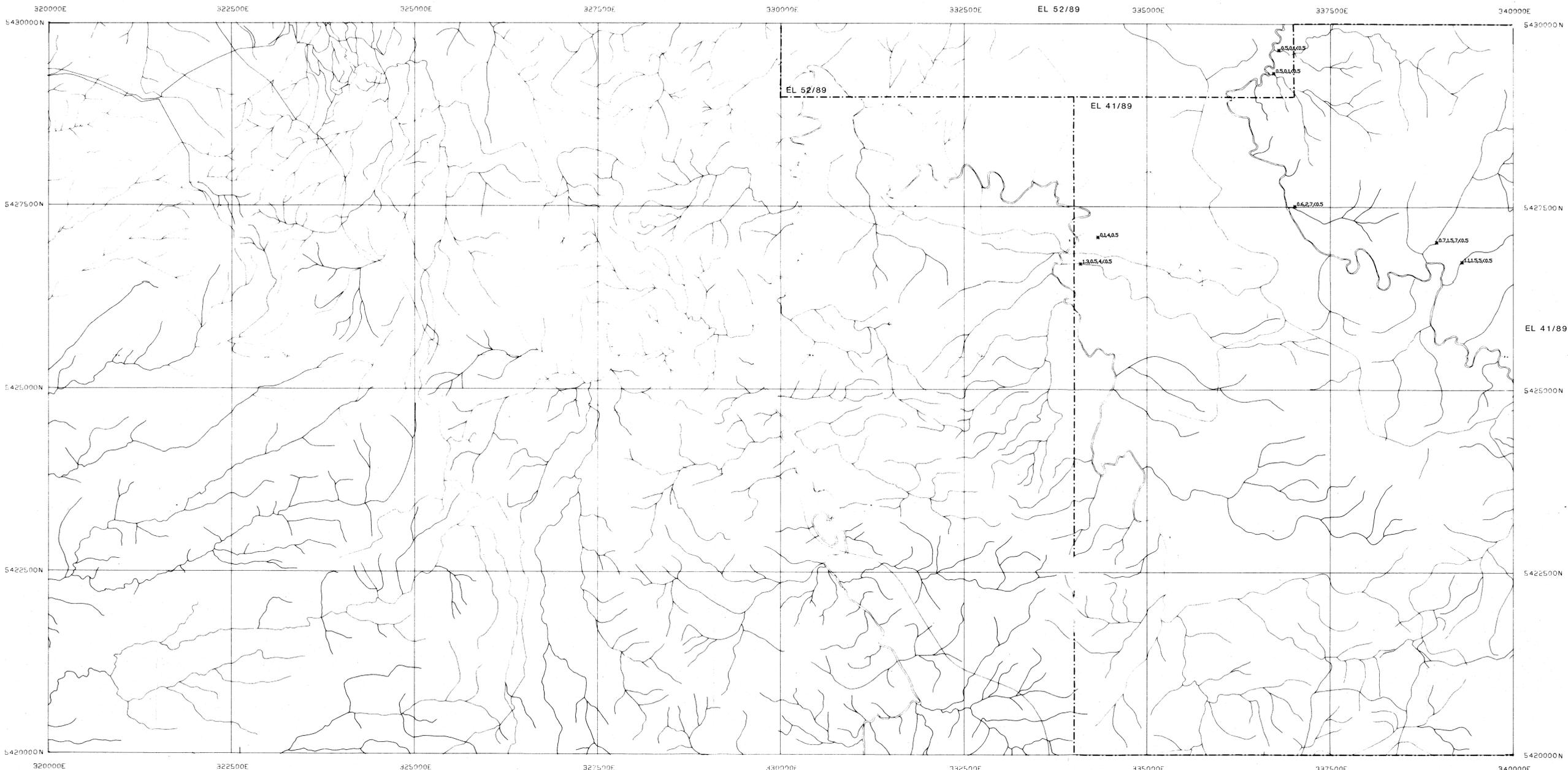
413033



91-3212

	3243	3443
	3242	3442

 TASMANIA	<b>GEOPEKO</b>
	A DIVISION OF PEKO EXPLORATION LIMITED
	SCALE - 1:25000 AUSTRALIAN HEIGHT DATUM
	<b>3242 BALFOUR</b>
	EL 41/89 WATER GEOCHEMISTRY Sample Number, Au, C, Au/C



**LEGEND**  
 =====  
 Sample Location  
 Copper (ppb)  
 Lead (ppb)  
 Zinc (ppb)  
 Arsenic (ppb)  
 \* 3.8,6.5,23,0.5  
 BT - Below Detection

413034

PLATE 3



91-3212.

	3243	3443
	3242	3442

	<b>GEOPEKO</b> A DIVISION OF PEKO EXPLORATION LIMITED
	SCALE - 1:25000 AUSTRALIAN HEIGHT DATUM
	<b>3242 BALFOUR</b>
	EL 41/89      WATER GEOCHEMISTRY Cu, Pb, Zn, As

**GEOPEKO**

A DIVISION OF PEKO EXPLORATION

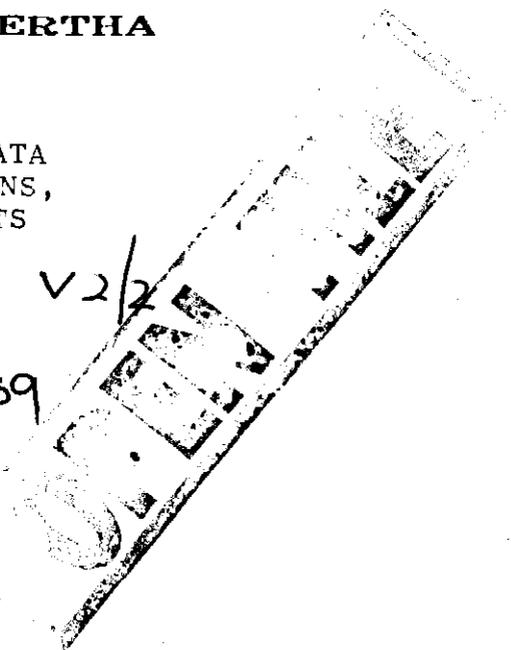
**EL 41/89 MT BERTHA**

1990 SUMMER  
WATER SAMPLING DATA  
SAMPLE DESCRIPTIONS,  
UNITS AND RESULTS

91-3212 V2/2

EL 41/89

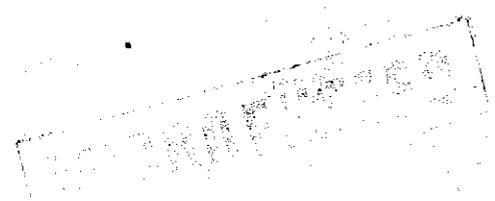
LETTER  
8-1-'91  
REFERS



Katrina Virgoe  
Ian Mathison  
December, 1990

To accompany report  
T248

Distribution: DMMR, Hobart



Page 1

07-01-1991

## ARTHUR RIVER PROJECT WATER SAMPLES - EL 41/89

DATE 02-05-1990    NUMBER 20668    MAP DEMPSTER    TYPE WATER  
 SAMPLER KJV    NORTH 5433900  
 EL    41/89    EAST 335500

WIDTH    2.0    UNIT    Prc  
 DIRECTION    0    FLOAT\_1    none  
 COLOUR    brown    FLOAT\_2  
 FLOW    still    FLOAT\_3

LEVEL low

CONTAM  
 VEGETATION    button grass

DRAINAGE AREA 1.5

DATE 02-05-1990    NUMBER 20669    MAP DEMPSTER    TYPE WATER  
 SAMPLER KJV    NORTH 5434700  
 EL    41/89    EAST 336700

WIDTH    2.0    UNIT    Prc  
 DIRECTION    0    FLOAT\_1    bk Sslt  
 COLOUR    brown    FLOAT\_2    Ssst  
 FLOW    still    FLOAT\_3    qt

LEVEL low

CONTAM  
 VEGETATION    button grass

DRAINAGE AREA 2.0

DATE 02-05-1990    NUMBER 20671    MAP DEMPSTER    TYPE WATER  
 SAMPLER KJV    NORTH 5426720  
 EL    41/89    EAST 334080

WIDTH    2.0    UNIT    Smithton Trough  
 DIRECTION    0    FLOAT\_1    Sdol  
 COLOUR    med brown    FLOAT\_2  
 FLOW    slow    FLOAT\_3

LEVEL low

CONTAM  
 VEGETATION    rain forest

DRAINAGE AREA 2.5

ARTHUR RIVER PROJECT WATER SAMPLES - EL 41/89

DATE 02-05-1990    NUMBER 20672    MAP DEMPSTER    TYPE WATER  
 SAMPLER KJV    NORTH 5426720  
 EL    41/89    EAST 334340

WIDTH    1.0    UNIT    Smithton Trough  
 DIRECTION    0    FLOAT\_1    Sdol  
 COLOUR    weak brown    FLOAT\_2  
 FLOW    moderate    FLOAT\_3  
 CONTAM    logging    LEVEL low  
 VEGETATION    logged    DRAINAGE AREA 2.0

DATE 02-05-1990    NUMBER 20161    MAP BALFOUR    TYPE WATER  
 SAMPLER IJM    NORTH 5427500  
 EL    41/89    EAST 336995

WIDTH    1.0    UNIT    Prc  
 DIRECTION    280    FLOAT\_1    none  
 COLOUR    med brown    FLOAT\_2  
 FLOW    slow    FLOAT\_3  
 CONTAM  
 VEGETATION    button grass    LEVEL low  
 DRAINAGE AREA 2.0

DATE 02-05-1990    NUMBER 20162    MAP BALFOUR    TYPE WATER  
 SAMPLER IJM    NORTH 5427000  
 EL    41/89    EAST 338940

WIDTH    1.0    UNIT    Prc  
 DIRECTION    180    FLOAT\_1    none  
 COLOUR    med brown    FLOAT\_2  
 FLOW    slow    FLOAT\_3  
 CONTAM  
 VEGETATION    button grass    LEVEL low  
 DRAINAGE AREA 3.0

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## ARTHUR RIVER PROJECT WATER SAMPLES - EL 41/89

DATE 02-05-1990      NUMBER 20163      MAP DEMPSTER      TYPE WATER  
SAMPLER IJM              NORTH 5426700  
EL      41/89              EAST 339300

WIDTH      0.5  
DIRECTION      0  
COLOUR      med brown  
FLOW      slow

UNIT      Prc  
FLOAT\_1      none  
FLOAT\_2  
FLOAT\_3

CONTAM  
VEGETATION      rain forest

LEVEL low  
DRAINAGE AREA 2.0

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Database fields

07-01-1

## ARTHUR RIVER PROJECT WATER SAMPLES - EL 41/89

NUMBER	AU	C	AU_C	CU	PB	ZN	AS
20161	1.5	29.6	0.05	0.60	2.00	7	-0.5
20162	1.0	19.6	0.05	0.70	1.50	7	-0.5
20163	9.4	17.9	0.53	1.10	1.50	5	-0.5
20668	15.1	16.2	0.93	0.60	1.00	4	-0.5
20669	18.7	25.4	0.74	0.40	3.50	4	-0.5
20671	14.7	12.3	1.20	0.90	1.00	5	-0.5
20672	16.4	12.0	1.37	1.30	0.50	4	-0.5

ARTHUR RIVER PROJECT 1990 SUMMER - WATER SAMPLES  
DMMR REPEAT ANALYSIS

EL	NUMBER	AU	AURPT
1/90	20071	3468.0	1.8
1/90	20072	82.8	18.0
1/90	20073	118.8	1.3
43/89	20052	47.2	6.5
43/89	20060	47.2	2.6
43/89	20076	596.4	1.6
43/89	20077	47.0	2.6
43/89	20087	67.1	3.6
43/89	20087	67.1	3.6
43/89	20089	35.6	2.6
43/89	20091	30.1	3.6
43/89	20657	30.7	2.3
44/89	20001	66.0	36.6
44/89	20012	36.8	5.1
44/89	20021	33.2	9.1
44/89	20079	36.9	4.4
44/89	20079	36.9	4.4
44/89	20079	36.9	4.4
44/89	20080	56.7	0.4
44/89	20080	56.7	0.4

AU :-by activated carbon extraction  
AURPT :-by new organic extraction technique

**ARTHUR RIVER PROJECT 1990 SUMMER - WATER SAMPLES  
ANALYTICAL METHODS, UNITS AND LABORATORIES**

Element	Units	Laboratory	Method
Au	ng/l (ppt)	DMMR Hobart	Activated carbon extraction from water, Aqua regia digestion - AAS
AuRPT	ng/l (ppt)	DMMR Hobart	Organic solvent extraction from water, AAS determination
C	mg/l (ppm)	DMMR Hobart	Total Organic Carbon - carbon analyser
Au/C	-	DMMR Hobart	Au result in ppt divided by C result in ppm
Cu	ug/l (ppb)	ANALABS Mbne	Carbon rod AAS on raw water
Pb	ug/l (ppb)	ANALABS Mbne	Carbon rod AAS on raw water
Zn	ug/l (ppb)	ANALABS Mbne	Carbon rod AAS on raw water
As	ug/l (ppb)	ANALABS Mbne	Hydride generation AAS on raw water