GEOPEKO

A DIVISION OF PEKO WALLSEND OPERATIONS LIMITED
A.C.N. 000 081 434

EL 40/89 KEITH RIVER

ANNUAL REPORT

DECEMBER 1991 - DECEMBER 1992

David Gardner
December, 1992

T277

Distribution: Geopeko, Parkes
Geopeko, Devonport
Department of Mines, Hobart

TABLE OF CONTENTS

1.0 Introduction

1.1 Location and Access

EL 40/89, Keith River (Fig. 1,2), is located in NW Tasmania approximately 10 km south west of the township of West Takone.

Access within the EL is poor and is restricted to unsealed logging roads in the north and east of the EL, and the Savage River Mines Pipeline Road on the western boundary.

The southern portion of the EL is largely inaccessible and access may require the use of cut walking tracks and helicopter support.

1.2 Tenure and Land Usage

EL 40/89 of 250 km2 was granted to Peko Exploration Ltd in January 1990. Partial relinquishment occurred in June 1992.

The EL consists predominantly of Deferred Forest in the west and Multiple Use Forest in the east. The southern edge of the EL includes part of the Savage River, Australian Heritage Commission Act, Registered Entry.

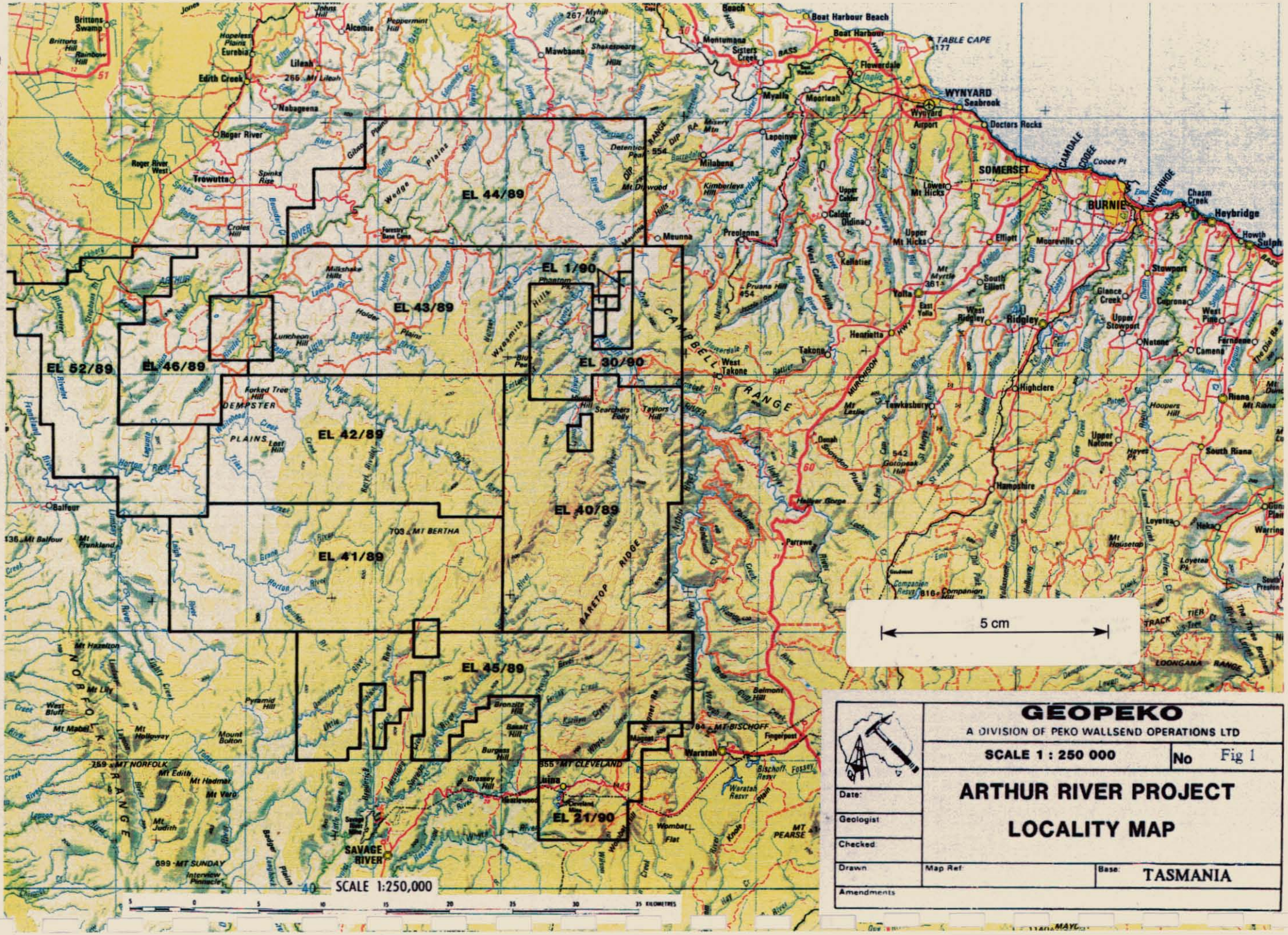
Vegetation is generally comprised of wet eucalypt forest with a thick undergrowth. Buttongrass-tea tree plains occur along north-east trending ridge tops in the parts of the EL.

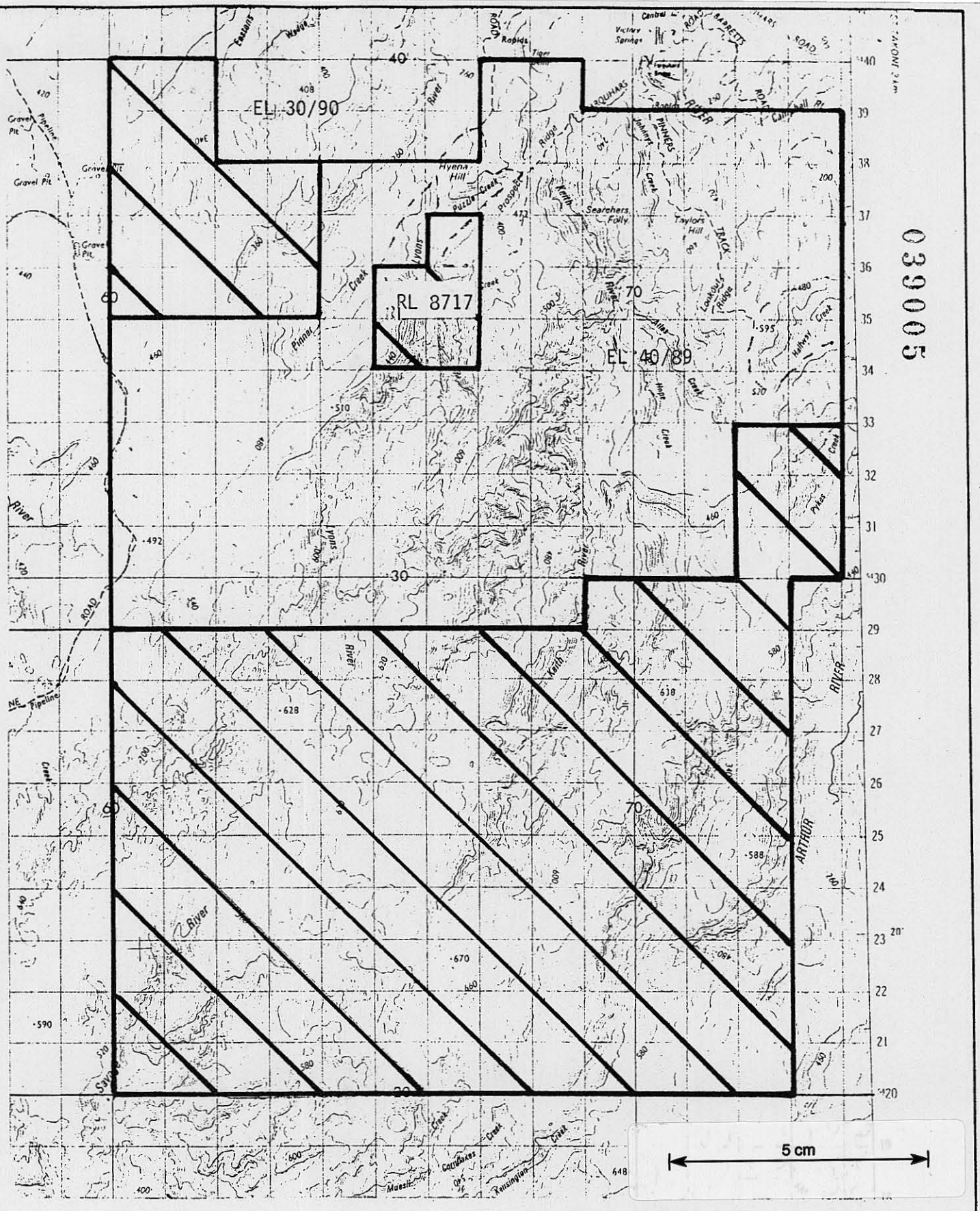
1.3 Regional Geology

EL 40/89 lies within the Rocky Cape Region of NW Tasmania, (Fig 3). The most interesting 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. The Rocky Cape Group contains Precambrian dolerite/gabbro dykes which have been emplaced into north-north west trending faults. Rocks assigned to the Precambrian Burnie Formation outcrop east of the Arthur Lineament. Within EL 40/89, interbedded siltstone and quartz wacke predominate with at least one dolomitic siltstone unit mapped. Close to the Arthur Lineament, these rocks have been metamorphosed to schistose metasandstones and phyllitic metasiltstone.

The south eastern corner of the Arthur River Project Area is underlain by rocks of the Cleveland-Waratah Association that lie within the Dundas Trough. These rocks have been correlated with the Crimson Creek Formation and consist of basaltic, andesitic and tholeiitic lavas and volcaniclastic sediments of Eo-cambrian to Cambrian age.

039004


EL 44/89
EL 1/90
EL 43/89
EL 52/89
EL 46/89
EL 30/90
EL 42/89
EL 40/89
EL 41/89
EL 45/89
EL 21/90
5 cm
SCALE 1:250,000
GEOPEKO
A DIVISION OF PEKO WALLSEND OPERATIONS LTD
SCALE 1 : 250 000
No Fig 1
ARTHUR RIVER PROJECT
LOCALITY MAP
Date:
Geologist
Checked
Drawn
Map Ref:
Base: TASMANIA
Amendments

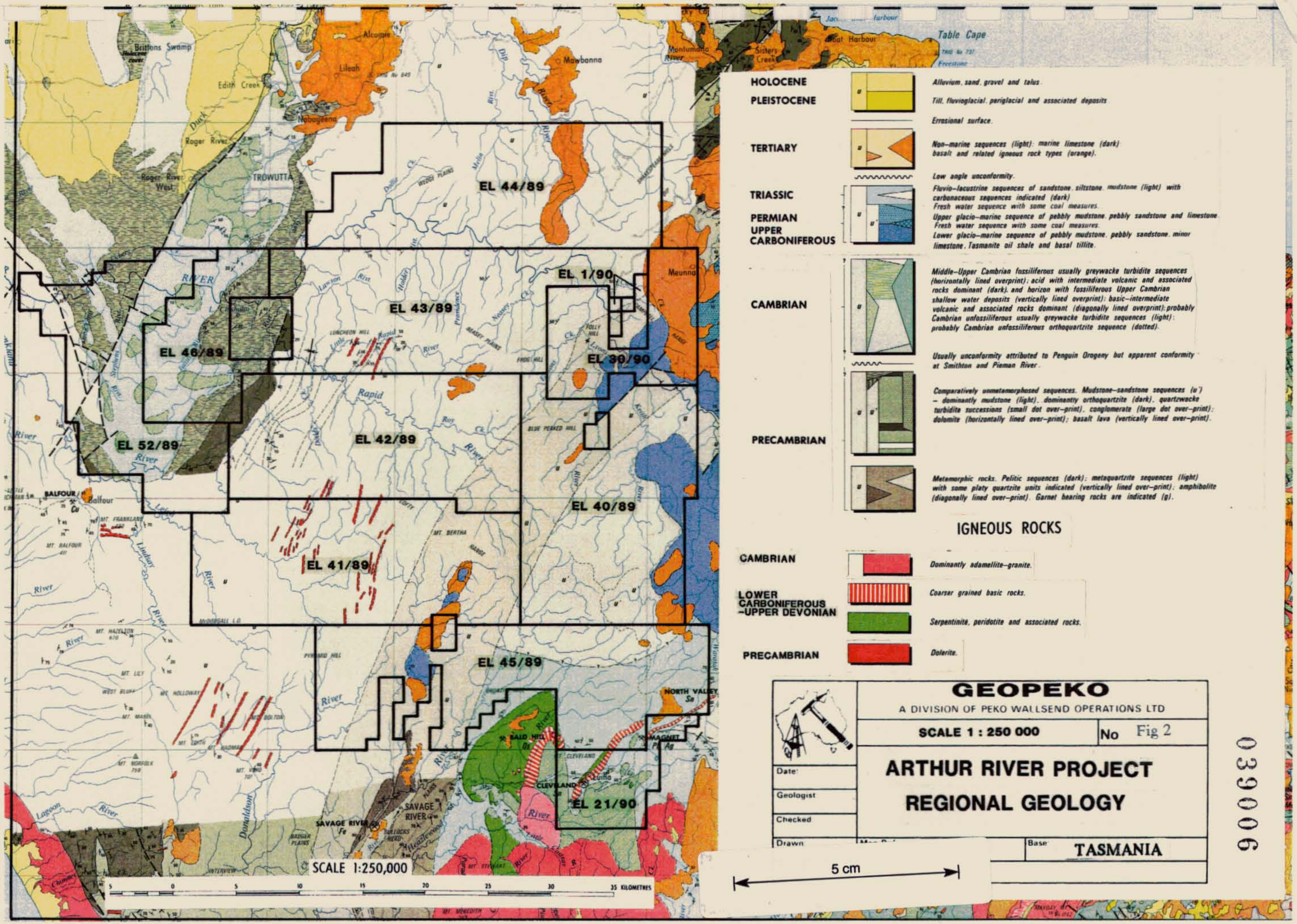


Scale 1: 100 000

AREA RELINQUISHED

	GEOPEKO A DIVISION OF PEKO WALLSEND OPERATIONS LTD A.C.N. 000 081 434	
	EL 40/89 - KEITH RIVER	
Geo.	AREA RELINQUISHED JUNE 1992	
Date.		
App.		
Drawn.	Base DEVONPORT TAS.	No Fig. 2

039005



EL 44/89
EL 43/89
EL 46/89
EL 1/90
EL 39/90
EL 52/89
EL 42/89
EL 41/89
EL 40/89
EL 45/89
EL 21/90
SCALE 1:250,000
35 KILOMETRES
HOLOCENE
PLEISTOCENE
Alluvium, sand, gravel and talus.
Till, fluvioglacial, periglacial and associated deposits.
Errosional surface.
TERTIARY
Non-marine sequences (light); marine limestone (dark) basalt and related igneous rock types (orange).
Low angle unconformity.
TRIASSIC
PERMIAN
UPPER CARBONIFEROUS
Fluvio-lacustrine sequences of sandstone, siltstone, mudstone (light) with carbonaceous sequences indicated (dark)
Fresh water sequence with some coal measures.
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.
CAMBRIAN
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).
Usually unconformity attributed to Penguin Orogeny but apparent conformity at Smithton and Pieman River.
PRECAMBRIAN
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).
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).
IGNEOUS ROCKS
CAMBRIAN
Dominantly adamellite-granite.
LOWER CARBONIFEROUS -UPPER DEVONIAN
Coarser grained basic rocks.
Serpentinite, peridotite and associated rocks.
PRECAMBRIAN
Dolerite.
GEOPEKO
A DIVISION OF PEKO WALLSEND OPERATIONS LTD
SCALE 1 : 250 000
No Fig 2
ARTHUR RIVER PROJECT
REGIONAL GEOLOGY
Date:
Geologist
Checked
Drawn
Base
TASMANIA
5 cm
039006

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).

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

Geopeko report T250 (Virgoe and Mathison, 1990), summarizes previous exploration and details the results of Geopeko's 1990 exploration. Report T260 (Mathison, 1991) reports 1991 exploration. Report T267 (Mathison, 1992) details exploration in the relinquished part of EL40/89, and T276 (Gardner, 1992) describes the overall water sampling program.

1.6 Scope of this report

The aim of Geopeko's exploration of EL 40/89, is to use water sampling, rock chip sampling, geological mapping and the results of previous exploration to delineate prospective and geochemically anomalous areas within the EL. Areas worthy of further investigation are to be followed up with more detailed exploration.

Due to major problems with the DMMR's analytical techniques for stream water geochemistry, little work was carried out in EL 40/89 in 1991. It was felt necessary to suspend exploration until these problems were corrected and consequently a waiver of expenditure commitment was sought and granted. Reconnaissance water sampling recommenced in December 1991 and was completed in February 1992. A temporary extension of the licence was negotiated to allow the results of 1992 sampling to be evaluated. A large part of the Arthur River Project area was selected for relinquishment after this interpretation. This report summarizes Geopeko's exploration activity in the retained portion of EL 40/89 from December 1991 to December 1992. The area retained is shown by figure 2

2.0 Work Completed

2.1 Water Geochemistry - Sample Collection and Analysis

Water sampling and analytical techniques developed by Angela Giblin (C.S.I.R.O. Div. Exploration Geoscience) were used for this seasons fieldwork (Gardner 1992)

Water samples were collected from streams with a drainage area between 1 and 5 km2. Occasional check samples were collected from streams with drainage areas up to 10 km2 including two or more other samples. At each sample site pH of the water, water colour, float geology, outcrop geology, and vegetation type were recorded. Possible contamination from roads, forestry operations, mines, or farms was noted. Sample sites were marked with numbered tags and flagging tape. Three water samples were collected from each site:

1. A 100 ml sample of raw stream water was collected in a new 125 ml polyethylene sample bottle. Cu, Pb, Cd and Zn were determined by ICP-MS and As by graphite furnace AAS.

2. Au was extracted from one litre of water in the field onto a sachet of activated charcoal. Au was determined by neutron activation at Becquerel Laboratories.

3. Cu, Pb and Cd were pre-concentrated on site by coprecipitation from one litre of water. Metal values were determined by CSIRO using voltammetry.(PDV)

All sample bottles were washed many times in the stream water before treating or collecting samples.

Sixteen water samples were collected in the retained part of EL 40/89 from streams draining known mineralisation (as tests of the techniques) and from creeks with no known mineralisation. These were analysed as part of a set of 195 samples collected From the Arthur Project ELs.

2.2 Data Compilation

P. Jones completed a review of exploration in the area covered by EL 40/89. This is included as appendix 2.

3.0 Results

Water sample details and assay results are shown in appendix 1.

3.1 Statistical Analysis of Results

Cumulative frequency plots were made for PDV.Cu, PDV.Pb, ICPMS.Zn and GFAAS.As using the results of 195 samples from the whole project area. The following anomalous levels were selected using inflexion points.

Element (DL)	1. Possibly Anomalous	% <1	2. Probably Anomalous	% <2
Cu (0.1)	1.5 ppb	85	3.0 ppb	95
Pb (0.05)	0.75 ppb	90	1.4 ppb	97
As (0.01)	0.16 ppb	80	0.30 ppb	97.5
Zn (0.1)	1.7 ppb	85	3.0 ppb	95
Au (0.1)	0.1 ppt	?		

Locations of samples have been plotted onto 1:25,000 scale base maps (plan 2309). Print outs of sample details and results are appended as Appendix 1. Results for the 16 samples are summarized below:

Element	Possibly anomalous	Probably anomalous
Cu	3	2
Pb	1	1
Zn	2	2
As	7	0
Au	0	0

3.2 Discussion of Results

Samples 22078,79, and 22404 drain the Keith River Gossan mineralisation and this shows in elevated Cu and Zn values particularly in 22404. Similarly samples 22402 and 22403 drain the Lyons River Copper show. Slightly elevated (possibly anomalous) As is seen here. The other mineralisation tested is the Atlas Mine in the south west of the EL. Samples 22407 and 22408 show elevated Zn,Pb, and As from this show. Samples 22083 and 22406 drain the extensions of the Atlas Mine but show little anomalism.

The samples testing known mineralisation don't individually pin-point the shows with strongly anomalous metal values. Looking at each group of samples however at least one is 'probably' anomalous with others being 'possibly'. Each show

would be considered interesting based on the water sampling results, and probably considered worthy of follow-up.

Of the few samples not taken around known shows 22077 and 22405 are certainly worthy of follow-up being 'probably' anomalous in Zn and Cu respectively, 22080 is also quite interesting.

4.0 Recommended Program

1). In the 1992-1993 summer field season the water sample coverage will be extended to as much of the EL as possible. (Some helicopter access may be necessary).

2). Areas of potential indicated by last years water sampling, P. Jones' report (Appendix 2) and Leaman (1990) will be mapped and sampled.

3). If results are available in time then detailed follow up to define drill targets will be undertaken.

4). At the completion of this seasons water sampling a review of the techniques and results will be undertaken in conjunction with the CSIRO to assess the effectiveness of the techniques and the future potential of the licence.

5.0 Environmental Disturbance and Rehabilitation

Exploration conducted by Geopeko ~~between~~ has caused minimal environmental disturbance. Semi permanent samples markers left at sample sites are considered to be valuable reference points for future exploration. Walking tracks were cut to DMMR guidelines and should regenerate naturally. No rehabilitation has been necessary.

References

GARDNER, D., VANZINO, L., MATHISON, I., (1992) - Arthur River Project Technical Report on Fieldwork, December 1991 - February 1992. Unpublished Geopeko Report T276

GREEN, G.R., BOTTRILL, R.S., BACON, C.A., TURNER, N.J. (1988) - Mineral Deposits and Metallogenic Map of Tasmania 1:50 000, Tas. DMMR

LEAMAN, D.E., (1990) - Geophysical - Structural Review Rocky Cape Block NW Tasmania. Unpublished report for Geopeko

MATHISON, I.J., VIRGOE, K. (1990) Keith River - Report on Exploration Activity - January 1990 to November 1990. Unpublished Geopeko report T250.

MATHISON, I. (1991) EL 40/89 - Keith River - Report on Exploration Activity December 1990 to November 1991. Unpublished Geopeko report T260.

MATHISON, I., (1992) - EL 40/89 Keith River - Partial Relinquishment Report. Unpublished Geopeko Report T267.

Appendix 1

Water Sample Data

Abbreviations used

Tertiary Basalt	Tb
Carboniferous - Permian Wynyard Tillite	C-Pwt

Precambrian - Cambrian

sediments

Ssst	**sandstone**
Sgwk	**greywacke**
Sslt	**siltstone**
Sdol	**dolomite**
Ssha	**shale**

metamorphics

Msch	**schist**
Mphy	**phyllite**
Mgnst	**greenstone**
Mgnsch	**greenschist**
Msla	**slate**

volcanics

Volc	**volcanic**
tuff	**tuff**

others

U/m	**ultramafic**
int	**intrusive**

Mineralogy

qtz	**quartz**
fs	**feldspar**
Fe	**iron**
py	**pyrite**
ser	**sericite**
chl	**chlorite**
si	**siliceous**

Textures

vn	**vein**
lam	**laminated**
stn	**stain**
wth	**weathered**
clvd	**cleaved**
foln	**foliation**
mas	**massive**
bx	**brecciated**
strg	**strongly**
m	**medium**

Colour

bk	**black**
wh	**white**
gn	**green**
gy	**grey**
yl	**yellow**
bn	**brown**
dk	**dark**
pl	**pale**

ARTHUR RIVER PROJECT - 1991-92 WATER SAMPLES

EL 40/89 - KEITH SHEET

SAMPLE NUMBER **22077** DATE 17/02/1992 EL40/89 MAP KEITH

AMG COORDS. 368475 mE 5439050 mN

VEGETATION REGROWTH EUC

STREAM FLOW SLOW
LEVEL LOW
WIDTH 1.0m
DIRECTION 0°

CONTAMINATION FROM LOGGING
WATER COLOUR
PH 6.50
DRAINAGE AREA 1.0 km²

GEOLOGY
OUTCROP Smst

FLOAT 90 % Smst
10 % Sslt mica
0 %

SAMPLE NUMBER **22078** DATE 17/02/1992 EL40/89 MAP KEITH

AMG COORDS. 368525 mE 5439000 mN

VEGETATION REGROWTH EUC

STREAM FLOW SLOW
LEVEL LOW
WIDTH 1.0m
DIRECTION 0°

CONTAMINATION FROM LOGGING
WATER COLOUR
PH 7.00
DRAINAGE AREA 1.0 km²

GEOLOGY
OUTCROP Smst

FLOAT 90 % Smst
10 % Sslt
1 % Mqzt

SAMPLE NUMBER **22079** DATE 18/02/1992 EL40/89 MAP KEITH

AMG COORDS. 368750 mE 5437850 mN

VEGETATION RAIN FOREST

STREAM FLOW MODERATE
LEVEL AFT.RAIN
WIDTH 1.0m
DIRECTION 0°

CONTAMINATION FROM ROADS
WATER COLOUR
PH 7.00
DRAINAGE AREA 0.2 km²

GEOLOGY
OUTCROP

FLOAT 100% Msch mica qtz chl
0 %
0 %

ARTHUR RIVER PROJECT - 1991-92 WATER SAMPLES

EL 40/89 - KEITH SHEET

SAMPLE NUMBER **22083** DATE 18/02/1992 EL40/89 MAP KEITH

AMG COORDS. 374575 mE 5435425 mN

VEGETATION RAIN FOREST

STREAM FLOW MODERATE
LEVEL AFT.RAIN
WIDTH 1.5m
DIRECTION 0°

CONTAMINATION FROM LOGGING
WATER COLOUR
PH 7.50
DRAINAGE AREA 2.5 km²

GEOLOGY
OUTCROP

FLOAT 10 % Tb
10 % Qtz cobbles
80 % Mphy-sch-sla

SAMPLE NUMBER **22401** DATE 17/02/1992 EL40/89 MAP KEITH

AMG COORDS. 363300 mE 5435400 mN

VEGETATION RAIN FOREST

STREAM FLOW MODERATE
LEVEL AVERAGE
WIDTH 1.0m
DIRECTION 0°

CONTAMINATION FROM NONE
WATER COLOUR CLEAR
PH 7.20
DRAINAGE AREA 1.5 km²

GEOLOGY
OUTCROP

FLOAT 40 % Msch
50 % Qtz angular
10 % Volcaniclastics

SAMPLE NUMBER **22402** DATE 17/02/1992 EL40/89 MAP KEITH

AMG COORDS. 366300 mE 5435500 mN

VEGETATION WET EUCALYPT

STREAM FLOW MODERATE
LEVEL AVERAGE
WIDTH 1.5m
DIRECTION 0°

CONTAMINATION FROM ROADS
WATER COLOUR CLEAR
PH 7.20
DRAINAGE AREA 0.6 km²

GEOLOGY
OUTCROP

FLOAT 30 % Basalt
30 % Quartz
30 % Pelite

Ironstone 10 percent.

ARTHUR RIVER PROJECT - 1991-92 WATER SAMPLES

EL 40/89 - KEITH SHEET

SAMPLE NUMBER **22080** DATE 18/02/1992 EL40/89 MAP KEITH

AMG COORDS. 373050 mE 5436900 mN

VEGETATION RAIN FOREST

STREAM FLOW MODERATE
LEVEL AFT.RAIN
WIDTH 2.0m
DIRECTION 0°

CONTAMINATION FROM ROADS
WATER COLOUR
PH 7.00
DRAINAGE AREA 2.0 km²

GEOLOGY
OUTCROP

FLOAT 10 % Mqzt
90 % Msch chl mica qtz
0 %

SAMPLE NUMBER **22081** DATE 18/02/1992 EL40/89 MAP KEITH

AMG COORDS. 373075 mE 5436850 mN

VEGETATION RAIN FOREST

STREAM FLOW SLOW
LEVEL AFT.RAIN
WIDTH 1.0m
DIRECTION 0°

CONTAMINATION FROM NONE
WATER COLOUR
PH 7.00
DRAINAGE AREA 0.3 km²

GEOLOGY
OUTCROP

FLOAT 90 % Msch
10 % Mqzt
0 %

SAMPLE NUMBER **22082** DATE 18/02/1992 EL40/89 MAP KEITH

AMG COORDS. 373375 mE 5436600 mN

VEGETATION RAIN FOREST

STREAM FLOW MODERATE
LEVEL AFT.RAIN
WIDTH 1.5m
DIRECTION 0°

CONTAMINATION FROM ROADS
WATER COLOUR
PH 7.00
DRAINAGE AREA 1.2 km²

GEOLOGY
OUTCROP

FLOAT 80 % Mgnsch chl mica
10 % Tb
0 %

ARTHUR RIVER PROJECT - 1991-92 WATER SAMPLES

EL 40/89 - KEITH SHEET

SAMPLE NUMBER **22403** DATE 17/02/1992 EL40/89 MAP KEITH

AMG COORDS. 365850 mE 5436400 mN

VEGETATION RAIN FOREST

STREAM FLOW MODERATE
LEVEL AVERAGE
WIDTH 1.0m
DIRECTION 0°

CONTAMINATION FROM ROADS
WATER COLOUR WEAK BROWN
PH 7.40
DRAINAGE AREA 0.4 km²

GEOLOGY
OUTCROP

FLOAT 30 % Qtz frags
60 % Basalt
10 % Arenite

Chemicals added 12hrs +

SAMPLE NUMBER **22404** DATE 18/02/1992 EL40/89 MAP KEITH

AMG COORDS. 369000 mE 5438500 mN

VEGETATION MIXED FOREST

STREAM FLOW MODERATE
LEVEL AFT.RAIN
WIDTH 1.0m
DIRECTION 0°

CONTAMINATION FROM ROADS
WATER COLOUR WEAK BROWN
PH 6.70
DRAINAGE AREA 0.4 km²

GEOLOGY
OUTCROP

FLOAT 30 % Brown Slate
30 % Ferricrete
0 %

O'nite rain,creek up.

SAMPLE NUMBER **22405** DATE 18/02/1992 EL40/89 MAP KEITH

AMG COORDS. 369000 mE 5438500 mN

VEGETATION MIXED FOREST

STREAM FLOW MODERATE
LEVEL AFT.RAIN
WIDTH 1.0m
DIRECTION 0°

CONTAMINATION FROM ROADS
WATER COLOUR VERY WEAK
PH 7.40
DRAINAGE AREA 0.4 km²

GEOLOGY
OUTCROP

FLOAT 30 % Qtz frags
60 % Msch
10 % Pelite

O'nite rain,creeks up

ARTHUR RIVER PROJECT - 1991-92 WATER SAMPLES

EL 40/89 - KEITH SHEET

SAMPLE NUMBER **22406** DATE 18/02/1992 EL40/89 MAP KEITH

AMG COORDS. 373975 mE 5434050 mN

VEGETATION MIXED FOREST

STREAM FLOW MODERATE
LEVEL AFT.RAIN
WIDTH 1.5m
DIRECTION 0°

CONTAMINATION FROM LOGGING
WATER COLOUR CLEAR
PH 7.50
DRAINAGE AREA 1.3 km²

GEOLOGY
OUTCROP

FLOAT 80 % Msch
20 % Qtz angular frags
0 %

O'nite rain,creeks up

SAMPLE NUMBER **22407** DATE 18/02/1992 EL40/89 MAP KEITH

AMG COORDS. 371750 mE 5433500 mN

VEGETATION MIXED FOREST

STREAM FLOW MODERATE
LEVEL AFT.RAIN
WIDTH 2.0m
DIRECTION 0°

CONTAMINATION FROM ROADS
WATER COLOUR WEAK BROWN
PH 7.20
DRAINAGE AREA 1.0 km²

GEOLOGY
OUTCROP

FLOAT 80 % Msch
20 % Tb
0 %

O'nite rain,creeks up

SAMPLE NUMBER **22408** DATE 18/02/1992 EL40/89 MAP KEITH

AMG COORDS. 371850 mE 5433525 mN

VEGETATION MIXED FOREST

STREAM FLOW MODERATE
LEVEL AFT.RAIN
WIDTH 1.5m
DIRECTION 0°

CONTAMINATION FROM ROADS
WATER COLOUR WEAK BROWN
PH 7.50
DRAINAGE AREA 0.3 km²

GEOLOGY
OUTCROP

FLOAT 70 % Msch
30 % Qtz frags
0 %

O'nite rain,creeks up

ARTHUR RIVER PROJECT - 1991-92 WATER SAMPLES

EL 40/89 - KEITH SHEET

SAMPLE NUMBER **22409** DATE 18/02/1992 EL40/89 MAP KEITH

AMG COORDS. 371850 mE 5433550 mN

VEGETATION MIXED FOREST

STREAM FLOW MODERATE
LEVEL AFT.RAIN
WIDTH 1.0m
DIRECTION 0°

CONTAMINATION FROM ROADS
WATER COLOUR CLEAR
PH 7.40
DRAINAGE AREA 0.3 km²

GEOLOGY
OUTCROP

FLOAT 80 % Msch
20 % Qtz frags
0 %

O'nite rain,creeks up

ARTHUR RIVER PROJECT

WATER GEOCHEMISTRY - 1991-92 SAMPLES - CSIRO ANALYSES

EL 40/89 - KEITH SHEET

SAMPLE	ICPMS - RAW WATER				PDV - Preconcentrated				GF AAS	NAA	ICPAES	LOCATION	
NUMBER	Cu ug/l	Pb ug/l	Cd ug/l	Zn ug/l	Cu ug/l	Pb ug/l	Cd ug/l	As ug/l	Au ng/l	Zn ug/l	EL	MAP
22077	0.66	-0.50	-0.50	3.60	0.73	0.22	0.38	0.15	-1.00	-10	40/89	KEITH
22078	0.81	-0.50	-0.50	0.95	1.80	0.59	0.60	0.17	-1.00	-10	40/89	KEITH
22079	1.90	-0.50	-0.50	1.10	1.70	0.10	-0.05	-0.05	-1.00	-10	40/89	KEITH
22080	0.84	-0.50	-0.50	1.70	1.90	0.18	0.35	0.07	-1.00	-10	40/89	KEITH
22081	-0.50	-0.50	-0.50	0.72	0.70	0.17	-0.05	-0.05	-1.00	-10	40/89	KEITH
22082	-0.50	-0.50	-0.50	0.81	0.80	0.09	-0.05	0.15	-1.00	-10	40/89	KEITH
22083	-0.50	-0.50	-0.50	1.20	0.49	0.10	-0.05	0.11	-1.00	-10	40/89	KEITH
22401	-0.50	-0.50	-0.50	1.20	1.40	0.35	-0.05	0.15	-1.00	-10	40/89	KEITH
22402	-0.50	-0.50	-0.50	0.89	1.00	0.11	0.11	0.16	-1.00	-10	40/89	KEITH
22403	0.55	-0.50	-0.50	0.76	1.20	0.65	0.13	0.28	-1.00	-10	40/89	KEITH
22404	1.80	-0.50	-0.50	3.00	5.00	0.42	0.30	0.27	-1.00	-10	40/89	KEITH
22405	1.20	-0.50	-0.50	0.56	6.00	0.13	-0.05	0.16	-1.00	-10	40/89	KEITH
22406	-0.50	-0.50	-0.50	1.00	0.53	0.23	-0.05	0.20	-1.00	-10	40/89	KEITH
22407	-0.50	0.55	-0.50	2.00	0.57	1.80	-0.05	0.11	-1.00	-10	40/89	KEITH
22408	-0.50	0.76	-0.50	1.00	0.41	1.10	-0.05	0.19	-1.00	-10	40/89	KEITH
22409	-0.50	-0.50	-0.50	0.70	0.48	0.20	-0.05	0.13	-1.00	-10	40/89	KEITH

Appendix 2

Assessment of Exploration Potential

P. Jones

REVIEW OF CRAE PROGRAMS (EL's 43/70 - 1/79)

KEITH RIVER IRONSTONE, LYONS RIVER PYRITE

AND ATLAS LEASE AREAS.

P A JONES
Phil Jones and Associates

OCTOBER 1992

CONTENTS

SUMMARY AND CONCLUSIONS

El 40/89 Keith River is situated approximately 5kms west of West Takone a small forestry town in north west Tasmania Fig 1. It has an area of 107 square kilometres and encompasses Retention Lease 8717 and lies immediately adjacent to and to the south of Retention Lease 8718 both held by CRA Pty Ltd for their magnesite potential.

Phil Jones was contracted to review the CRAE work completed on the Keith River Gossans, the Lyons River Pyrite occurrence and the Atlas Leases. To this end some 32 available open file reports discussing work undertaken on CRAE's EL 1/79 and the CRA / Mineral Holding joint venture EL (43/70) were reviewed (See Bibliography).

Data from these reports show that the licence has potential for the discovery of structurally upgraded gold deposits within a carbonate sequence in the vecinity of the Rapid River Structural Discontinuity Zone. Further potential exists for the location of more narrow high grade gold values within a mixed volcanic /ironstone /sediment package at the Keith River Prospect and possibly near the Lyons River Pyrite occurrence. Possible potential exists for the location of the weakly mineralized Atlas Formation south west of Tertiary basalt which covers the known southern extent of the formation. The formation has potential in hosting sedex style basemetal deposits.

The Arthur Lineament would appear to be a significant mineralized province with much of its mineralization being associated with iron formations comprising a mixed ironstone - carbonate - basic volcanic assemblage. CRAE noted that coarse gold occurrences are unlikely to have escaped the attention of old prospectors therefore attention should be concentrated upon the fine gold potential.

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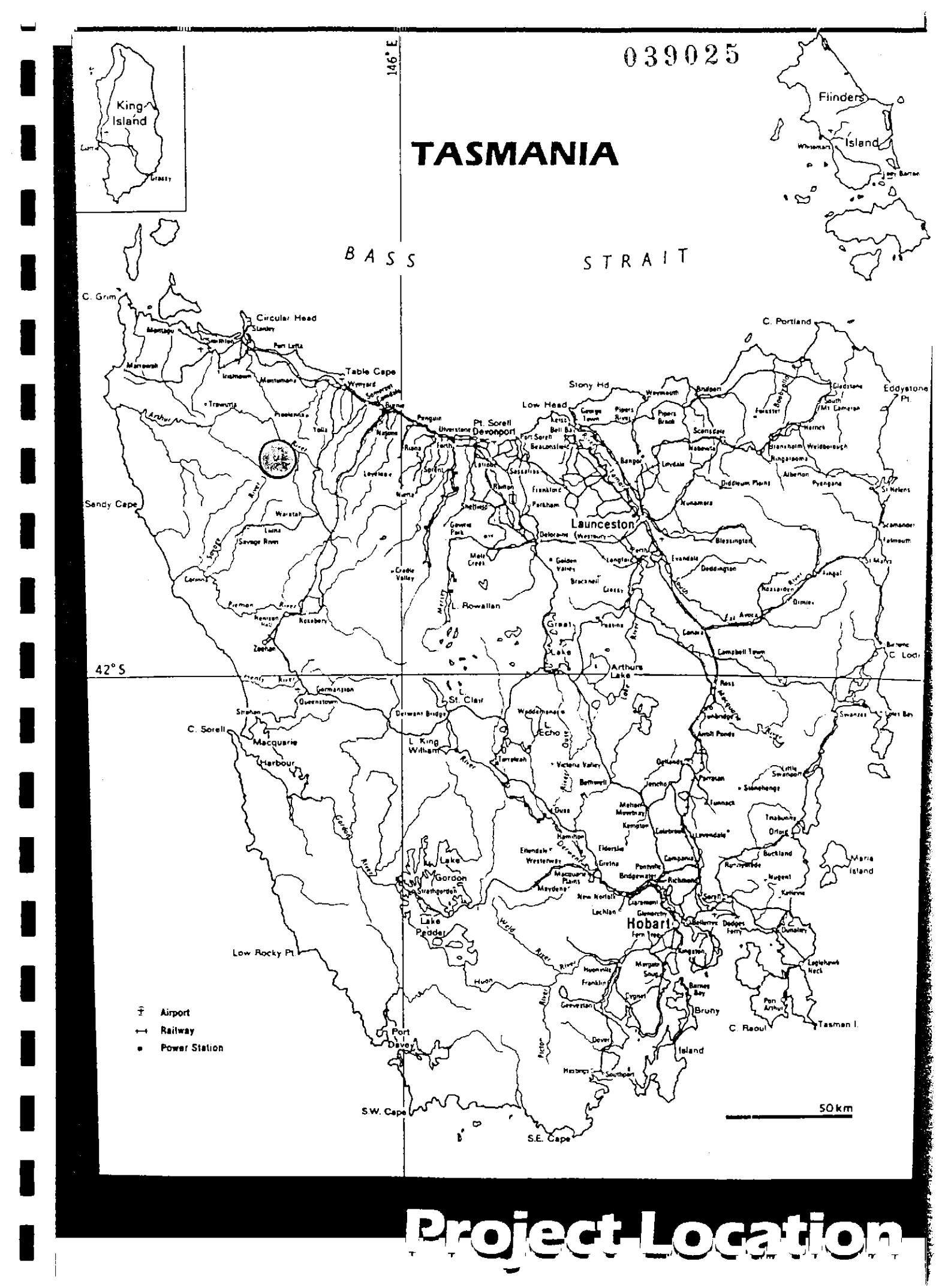

Project Location

To this end some random sampling of minor sections of pyritic core was completed yielding gold values averaging consistently in the range 0.1 to 0.3 g/t and occassionally up to 1.2 g/t over widths of up to 1.5 metres. Sampling of magnetic tailings from magnesite beneficiation trials gave values to 2.8g/t Au and 0.3g/t Pt. Higher grade values appear to coincide with areas of higher temperature (talc schists and calcsilicate rocks) alteration and a reported 4% Zn value over the last metre of core from an OAMAG hole (hole 'C') may also represent a mineralized component to this alteration possibly associated with basic volcanism within the sediment package.

Lower gold values observed in a number of CRAE drillholes show the need for some upgrading process to be located in order to concentrate the gold into economic concentrations. The major structural break occurring in the Rapid River area may give rise to such upgrading features and this area warrants ground assessment. Standard AAS gold assaying on composite 30m (100') samples from KR-1 and 2 (Keith River Ironstone) returned values of less than 1.2 g/t Au. However, more detailed fire assaying at 1 to 2 metre intervals may return higher grade values of economic potential. The anomalous Atlas Formation has been adequately screened over a 1.5Km strike length however, possible extensions SW beneath Tertiary Basalt towards a combined magnetic / input anomaly (ECLAT) should be ground assessed as initial, geological work may have mistaken altered silica dolomite for quartz arenite.

RECOMMENDATIONS

Reconnaissance water sampling and gold analysis should be completed in the zones adjacent to and within the Rapid River Structural Discontinuity Zone. Standard -80 mesh sampling in the Arthur River area has shown that it does not always pick up a geochemical signature from known primary gold sources. The water sampling may in fact isolate areas where gold is shed in a soluble form. Creeks should be mapped in as much detail as possible in an attempt to locate the carbonate / clastic host (as described at Lyons River) .

The core from the two Keith River holes should be examined and resampled prior to fire assaying for gold at 1 to 2 metre intervals. Should values prove encouraging then detailed rock chip sampling of the ferruginous outcrop should also proceed.

A cursory examination of the possible silica dolomite near the ECLAT Magnetic / Input anomaly should be undertaken to assess its association with the anomalous Atlas Formation.

EXPLORATION TARGETS

The Licence area would appear to have good potential for hosting fine grained occurrences within carbonates or ironstones where they intersect structurally complex areas adjacent to or within the'Rapid River Structural Discontinuity Zone'. This remote and inaccessible area to date has not been explored yet gold values to 0.27g/t within pyritic carbonates and shales have been returned in the same formation some 6kms to the NNE.

Additional potential exists where large thicknesses of basic volcanics (amphibolites) are intermixed with the gold anomalous sediment package in a more hydrothermal type of regime. Significant basemetals may also be associated with this type of mineralizing event and hole 'C' from the OAMAG program may in fact have only just intersected the upper section of such a system with Zinc values to 4% being observed within the last metre of core. The other OAMAG holes also contained the better gold values, for all of the random assaying carried out, with grades up to 1.2 g/t over 1.5 metres. Rock types including calc selicates and talc schists within this zone are indicative of a higher temperature mode of alteration.

A further possability to be canvassed, is for narrow high grade gold deposits associated with the stratiform ironstone beds at the Keith River prospect. Assaying to date has shown that composite 30 metre (100') samples returned less than 1.24 g/t Au (0.04 oz/ton - CRAE 1971) and the possibility of discovering narrow high grade zones within the mixed volcanic sediment sequence is high.

Possible sedex basemetal potential exists along strike to the SW of the Atlas Leases in the vicinity of the CRAE Magnetic / Input anomaly where rocks described as quartz arenites sound broadly similar to silica dolomites observed at Brookside near Corinna. Silica alteration of the Atlas Formation in this area may mask a basemetal prospective portion of the unit.

DESCRIPTION OF THE PROPERTY AND OWNERSHIP

El 40/8 , Keith River is situated approximatley 5kms west of West Takone, north west Tasmania. It was granted on the 12 January 1989 to Geopeko and reduced in area to 107 square kilometres from 250 square kilometres in 1992. The licence is current to 12 January 1993, and encompasses a pre existing Retention Lease (8718) for Magnesite owned by CRA Pty Ltd.

LOCATION AND ACCESS

The licence is located approximately 45 km SW of Burnie and is serviced by both the sealed Murchison Highway, the part sealed Takone Road and also the all weather Farqhuars Road. This gives access to numerous exploration and forestry tracks in the northern section of the licence however the central and southern sections have no vehicular access other than that confined to the Savage River Pipeline track.

The licence supports a thick, wet eucalypt mixed forest with generally thick understory including horizontal scrub particularly in the deep gullies and on the steep slopes

The licence has a high average rainfall approximately 100" per annum which falls predominantly during the May to October period, making exploration over winter difficult and very expensive.

REGIONAL GEOLOGY

Previous workers have defined 3 distinct provinces in the general area of the EL, the most prominent one being the Authur Lineament. This zone is manifest by steeply dipping middle greenschist facies metamorphics comprising qtz. mica schists, phyllites, some quartzites, amphibolites, ironstones and dolomite / magnesite and are known locally as the Keith Beds (possibly early Cambrian?). To the west of the Keith Beds lies a sequence of relatively unmetamorphosed siltstones,shales and quartzites of the Precambrian Rocky Cape Group - Neasey Formation. The contact between the two seems to be gradational and the grade of metamorphism may be rock type dependent. East of the Lineament quartz mica schists and phyllites are referred to as the Whyte Schists, however recent mapping (1984) by CRAE extended the Keith Beds eastwards replacing the Whyte Schists in the Atlas Lease area where a weakly basemetal mineralized mixed dolomite/ dolomitic sediment sequence outcrops. Further east of this area are rocks of the Precambrian Burnie Formation (Oonah equivalent) which consists of mudstones,quartz wackes & black shales which are believed to be younger than the Rocky Cape Group.

Shallow dipping permian shales and mudstones are found unconformably overlying the Keith Beds in the northern portion of the EL.

Tertiary basalts outcrop extensively throughout the EL, however, the majority of the prospective magnesite / dolomite sequence appears fortuitously not to have been covered.

Recent quartz and quartzite gravels are found mainly in the Arthur and Lyons River Valleys and may relate to recent erosion of tertiary accumulations.

The origin of the Arthur Lineament is enigmatic, however, more recent workwould seem to show that the lineament was a major depositional zone with large areas of basic volcanism (now amphibolites) adding to the mixed clastic and cabonate sequence. Carbonate platforms may drape off these volcanic centres as would appear to be the case at the Keith River Ironstone Prospect. The volcanism may have been controlled by deep seated crustal features which also allowed subsequent movement and deformation of rock types.

An additional structural complexity, the Rapid River Deformation Zone is located in the far south west portion of the tenement and is manifest by a NW - SE cross cutting linea feature. The gross character of the Arthur Lineament changes from uranium rich and magnetically intense to the south and thorium rich and magnetically subdued to the north thus indicating it to be a fundamental structure of some importance. Such a feature may have been able to upgrade the weakly to moderately anomalous gold concentrations within the host sediments.

MINERALIZATION

Mineralization discovered to date includes the very large magnesite deposit at Lyons River (30mt of > 40% MgO) and Arthur River (30 mt of > 40% MgO), the Keith River sulphide / oxide horizon, basemetal occurrences at the Victory Mine (copper - gold) and Lyons River Prospect (copper) and gold and platinoid occurrences within the pyritic and magnetic sections of the magnesite portion of the Keith Beds.

The Arthur Lineament would appear to be a significant mineralized province with much of its mineralization being associated with iron formations comprising an ironstone - carbonate - basic volcanic assemblage. C RAE noted that coarse gold occurrences are unlikely to have escaped the attention of old prospectors therefore attention should be concentrated upon the fine gold potential especially within the carbonates . Random fire assaying of old core returned values up to 1.2 g/t over 1.5 metres highlighting this potential further. Further assaying of the magnetite tail from benificiation studies further increased the potential with values to 2.8 g/t Au being returned along with values to 0.3 g/t Pt. CRAE noted however that a geological upgrading mechanism was required to turn these subeconomic values into an economic grade.

WORK CONDUCTED BY CRAE

CRAE Geologists concentrated their efforts over three distinct target zones; these being the Lyons & Arthur River Carbonate horizons, the Keith River Ironstones zone and the Atlas Lease area as well as carrying out more regional magnetic and EM follow up. (Enclosure 1)

1. Lyons and Arthur River Magnesite

Some 18 diamond holes were drilled (11 Lyons River, 7 Arthur River) to delineate the two resources, at least 3 of which were abandoned early. A 30 million tonne deposit grading 40% MgO, 1.1% Fe2 O3, 2.55 % CaO and 5.53% SiO2 was outlined near the Lyons River with dimensions 1.2km x 200-400m x 270m depth (section A-B). A second 30mt deposit grading 40% MgO, 1.57% Fe2 O3, 2.17% CaO and 6.35% SiO2 was delineated at the Arthur River prospect with dimensions of 3.8 km x 150-400m x 100m depth. This second carbonate zone had more cavities than the former, a higher incidence of talc and was close to the Arthur River limiting its depth extent. Further work was recommended south west of and along strike from the Lyons River zone which appears not to have been carried out.

Mineral Holdings requested CRAE to carry out some gold assaying on pyritic core early on in the programme which highlighted a low grade but highly anomalous gold signature of from 0.1 to0.3 g/t Au associated with pyritic sections of the carbonate rich core. Reassaying of some of the older core from previous joint ventures ie OAMAG core, also showed good values to 1.2g/t Au over 1.5m. Further sampling by CRAE on magnesite magnetic tailings indicated gold to 1.8g/t with platinum to 0.15 g/t.

There has been no reported full scale assaying of core for gold or the platinoid elements, however, this information may lie in 'closed file' reports for RLs 8817 and 8818. A CSIRO report on hole 'C' from the OAMAG drilling reported sphalerite of low iron quality within the last metre of core. An estimate of 4% Zn was arrived at and the sphalerite was associated with minor chalcopyrite, tetrahedrite and possibly some minor zinc rich carbonate. The author states he was not sure of the nature of the 'beast' as to whether it was a vein or not.

2. Keith River Ironstone

Two diamond holes totalling 406.8 metres were drilled into the 'folded' ironstone sequence to test the moderately anomalous Cu - Zn soil/ rock geochemical zone. Hole KR-1 was angled SE to test the thickest portion of the ironstones near supposed synclinal hinge. Hole KR-2 was sited to test the highest tenor copper levels delin eated by soil sampling on the northeast portion of the 'synclinal' hinge (section C-D) Both holes intersected mineralized zones comprised of banded pyrite/ magnetite minor hematite with trace chalcopyrite observed throughout. Pyritic Core was split in 10' sections and assayed for basemetals and composites over lengths of around 100' were prepared and assayed for gold (AAS aqua-regia). The highest values were received for zinc and copper with two successive 10' intervals returning 1400 and 1560 ppm Zn. Copper yeilded less than 1000ppm throughout.All composite gold assays returned lass than 0.04 oz/ton. (1.24 g/t)

There is no direct evidence for the intense synclinal /anticlinal folding of the ironstone horizon and a possibly more realistic scenario would be for stacked ironstone units within a basic volcanic sediment pile. There is correspondingly no evidence for tight folding in the adjacent carbonate sequences.

3. Atlas Lease Area

Initially CRAE considered the dolomite succession (Atlas Formation) had tin potential being only 12kms along strike to the north of Mt Bischoff. Consequently initial work was that of panned concentrate sampling and checking of aeromagnetic anomalies which lay along the dolomite trend.

High basemetal values within the Atlas Formation sediment package led to a change in ideas to that of a 'sedex' type basemetal occurrence. A 1.3 line km grid was established over the horizon and soil sampling, mapping and geophysical surveys completed. A weak sirotem anomaly was delineated from this survey which was later upgraded by a UTEM programme showing a weak conductor of short strike length concident with mapped gossanous dolomite within a soil anomaly assaying up to 0.12%Zn and 0.22%Pb. Two diamond holes totalling 368.3 metres were completed to intersect the best of the conicident zones over a strike length of 75 metres. Both holes cut highly deformed grey argillites with a prominent sandy to black shaley dolomite occurring in the EM position. Only trace basemetals was encountered in AP - 1 however, minor gossanous mineral-ization from 99.8 - 102.3 metres grading 0.4%PB, 280ppm Zn, 2ppm Ag was cut in hole AP - 2. As CRAE had tested the best anomalous zone no further work was warranted although the Atlas Formation is covered by Tertiary basalt immediately to the SW of the best geochemical zone. CRAE checking of the ECLAT aeromagnetic anomaly SW of the Atlas area led to the discovery of a unit described as welded quartz arenite with lamellae and veinlets of a darker quartz, which sounds broadly similar to 'Silica Dolomite' observed near Brookside at Corinna. No obvious source was found for the magnetism and it was put down to pyrrhotite in black shale.

This unit may be the strike extent of the Atlas Formation albeit showing silica alteration? The AMG coordinates for ECLAT are 369500 m E / 54 28599m N and the magnetic anomaly is coincident with a 4 channel fast decay ESSO input EM anomaly. The area unfortunately lies just 500 metres outside the southern portion of the EL.

4. Regional Work

The majority of CRAE's work was completed south of the licence area however some magnetic responses were field checked, along with some ESSO input anomalies.

Magnetic anomalies checked included Arthur, Arthur West & Kismet which all lie co ncident with remnant Tertiary basalt caps. Approximately 7 Input responses were also replotted the three stronger of which were field checked (2450/10360, 2933/10440 and 555/10480). Work carried out involved geological mapping, ground geophysics and stream sediment and bedrock geochemistry the results of which returned no significant mineralization. The remaining weaker input responses were not field checked and all would appear to lie within Tertiary Basalts cover. Scant mention is made of any geophysical data within the magnesite zones, although this data may be in closed file reports and no mention is made of any ground follow up other than minor magnetics looking for amphibolites in the sedimentary sequence.

5. Other

The Victory Copper Mine was one of the first prospects to be explored by Mineral Holdings with copper values to 22% and gold to 16g/t being recorded in old records, however, only minor tonnages were produced and surface exploration failed to increase its potential. CRAE also reviewed the workings which indicated that the copper / gold occurrence was associated with an amphibolite (basic volcanic) carbonate sediment package with no size potential.

EXPLORATION POTENTIAL

Significant potential exists for structurally remobilized gold deposits within the weakly to moderately anomalous clastic and carbonate rich sediment succession lying adjacent to or within the Rapid River Structural Discontinuity Zone. This major cross cutting linear feature may well be the focus for the upgrading of lower grade values observed in carbonates and pyritic dolomites and shales cut in hole LR - 3 some six kilometres to the NNE. Access to this area is very poor.

Further potential exists for the discovery of narrow high grade gold values within the stratiform ironstones at Keith River and possibly at Lyons River. Assaying to date over 30 metre composite intervals at the Keith River zone returned values of less than 1.24 g/t Au using AAS techniques. Fire assaying of one or two metre intervals of the Keith River core (KR -1 and 2) may well outline high economic grade gold intervals. These results, allied with the CRAE drilling which to date has only tested 250 metres of the 1500 metre long strike, shows the Keith River Zone to have potential to host a large deposit. A thorough rock chip sampling survey of the ironstones may well highlight zones requiring drilling yet CRAE failed to complete such a programme.

A possible carbonate hosted sedex style? basemetal occurrance at the Atlas Leases appears to have been adequately tested, however potential south west and along strike of the Tertiary basalt cover in the vicinity of the ECLAT magnetic/ input anomaly should also be ground checked, assayinng for possible silica dolomite alteration. Access to this area is very poor.

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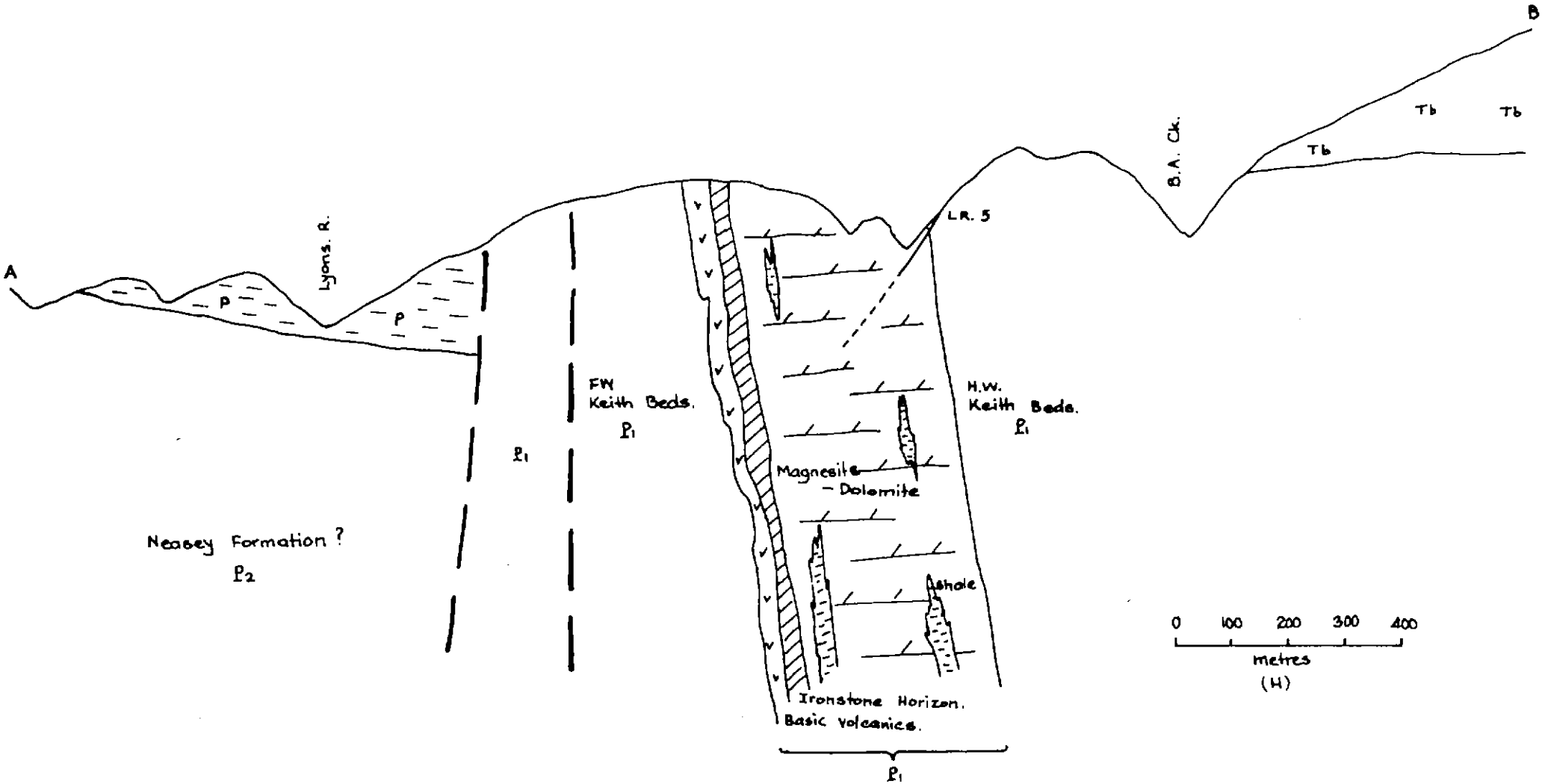
CROSS SECTION A - B



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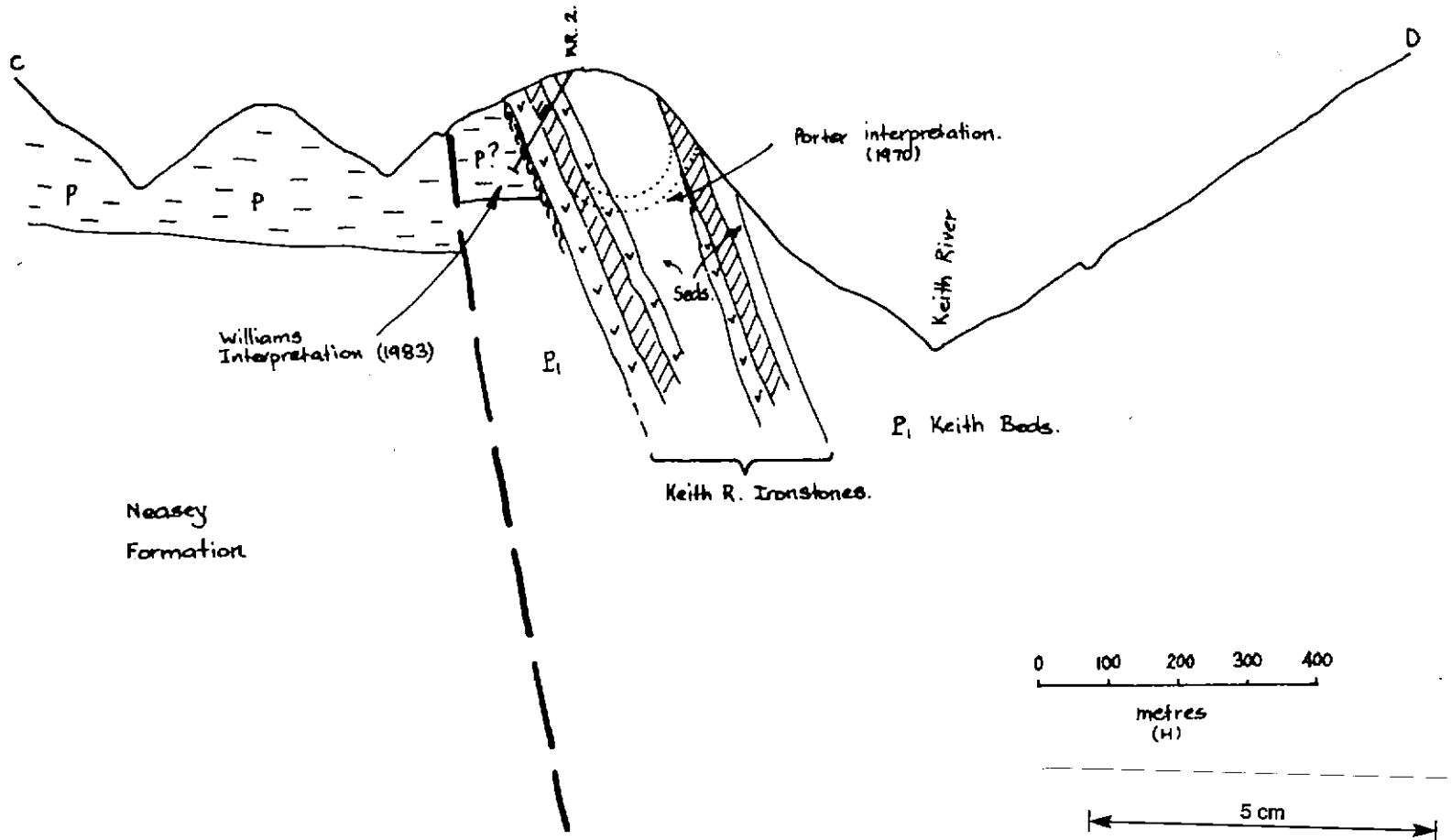

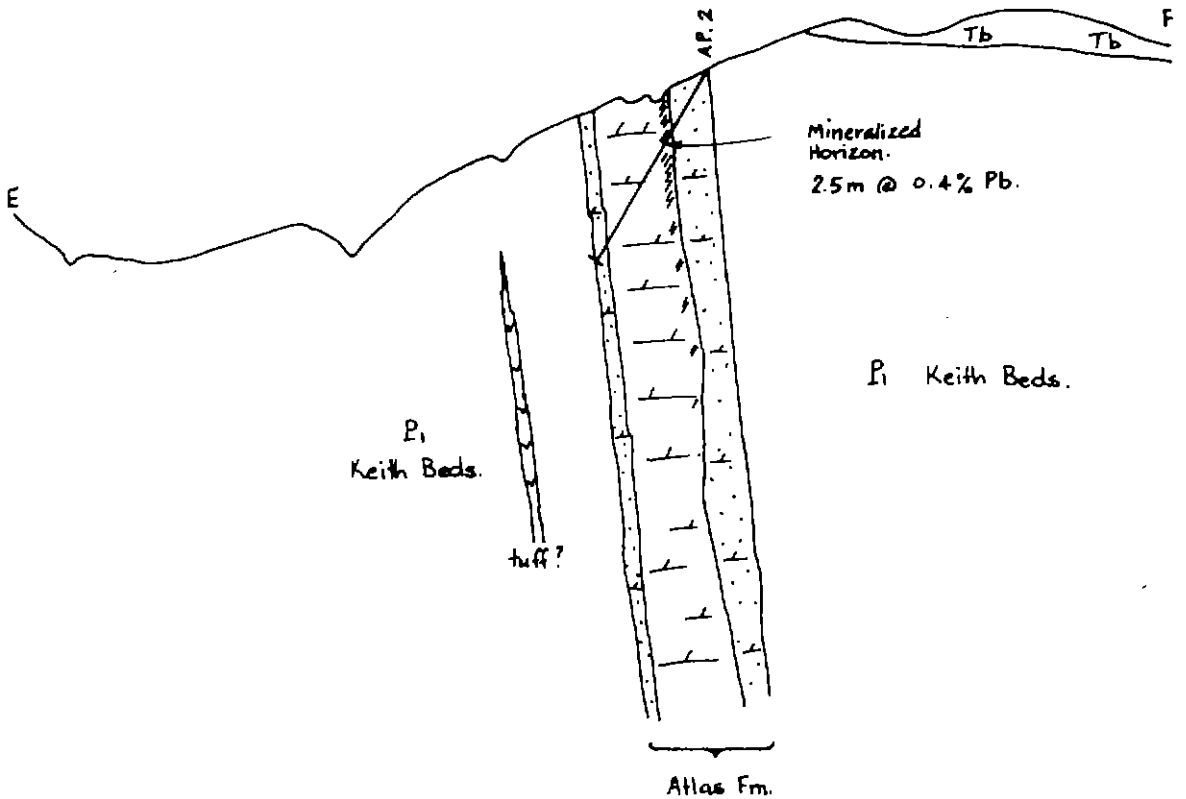

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CROSS SECTION E-F

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EL 30/90

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EL 40/89

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5cm

LOCATION SYMBOLS

+ Location of Rock Chip sample

Location of Water sample

1:25000 SHEET LAYOUT

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3443	3643	3843
3442	3642	3842

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GEOPEKO

A DIVISION OF PEKO WALLSEND OPERATIONS LTD A.C.N. 000 081 434

PARKES

Scale 1:25000

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Project / Tenure

KEITH 3442

93-3408.

SAMPLE LOCATIONS & NUMBER

Geo. Client.	D.G.
Carto.	R.M.N.
Checked	
Date	12/3/92
Appended	
Job No.	82_92

100k. Sheet 7915

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