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PEKO WALLSEND OPERATIONS LIMITED

GEOLOGICAL REPORT ON EXPLORATION LICENCES NOS. 1637 and 1882

By

R. BALDE'

DARWIN

NOVEMBER, 1979.

PREFACE AND EXPENDITURE

Exploration licences No. 1637 and No. 1882 cover one and the same geological mineral field and are treated together in one report for that reason.

The first geological report on E.L. 1637 was included in the "Geological report on the Brocks Creek Region", by R. Balde' and I.C. Faris, March, 1978.

This report is the second geological report on E.L. 1637, covering the period from 20.9.78 to 19.9.79, and the first geological report for E.L. 1882, covering the period from 16.11.78 to 15.11.79. The report contains mainly the "Geological report on the John Bull - Brocks Creek - Faded Lily gold fields. Added to this are three geophysical maps with the results of the airborne geophysics on both E.L.s.

Resume of the expenditure for both exploration licences:

<u>E.L. no. 1637:</u>	<u>Expenditure</u>
-----------------------	--------------------

Period 20.9.77 to 19.9.78	\$4 565.00
Period 20.9.78 to 19.9.79	\$ 611.00

<u>E.L. No. 1882</u>	<u>Expenditure</u>
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Period 16.11.78 to 15.11.79	\$4 909.00
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GEOLOGICAL REPORT ON THE JOHN BULL -  
BROCKS CREEK - FADED LILY GOLD FIELDS

By  
R. BALDE'

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## 1. INTRODUCTION

The John Bull, Brocks Creek and Faded Lily gold fields were actively mined from 1877 to 1915 (Walpole et al., 1968, p. 184-186) and belong to the Zapopan - John Bull group of mines. The total recorded production of this group of mines, excluding the Zapopan production with 26,650oz of gold, was 6,370oz of gold.

## 2. SUMMARY

The geology and geochemistry indicates that the gold occurs mainly in steeply dipping quartz veins.

Those quartz veins are generally parallel with the axial zone of a major NW-SE trending anticline.

A provisional grid was stepped out over the old mined areas with lines perpendicular to the strike length and approximately 50m apart.

Each gold field covers a local ridge. The highest number of quartz veins are present near the top of the ridge which is, as a result, more resistant to weathering and erosion than the lower lands which are almost devoid of quartz veins. One quartz vein occurs every 15m-20m approximately near the top of the ridge, while the frequency of quartz veins along the slope lines is approximately one quartz vein every 100m.

The quartz veins are lensoid in shape. They appear as a thin vein at one spot, widen up to a thickness between 1cm-90cm and disappear again. The average length of these quartz "lenses" is between 50m-75m, as is also indicated by the size of the old workings.

A total of 162 rock samples of outcropping quartz veins were collected along the grid lines and assayed for gold at the assay laboratory in Mount Morgan.

In order to investigate a possible relationship between gold, copper, lead, zinc, and arsenic, the 20 samples with the highest gold values and 10 samples with traces of gold were selected and sent off to be assayed for these additional elements.

### 3. CONCLUSIONS

Bulk-mining of primary gold mineralisation in quartz veins is uneconomic for the following reasons:

1. The number of quartz veins with a grade of over 2 grams/tonne of gold (arbitrary minimum grade) is too small.
2. The low frequency of quartz veins within the sedimentary host rocks, one quartz vein every 20m, is too low for bulk mining. Even if it would be possible to separate the quartz veins from the sediments by a mechanical device, a photo-electric cell for example, the concentrate of vein-type quartz would not reach an economic mineable grade of gold as a result of 1.

Selective mining of individual quartz veins is uneconomic because the average length of a quartz vein is approximately 75m., what is considered to be too short.

No relationship exists between the gold, copper, lead, zinc or arsenic.

#### 4. RECOMMENDATIONS

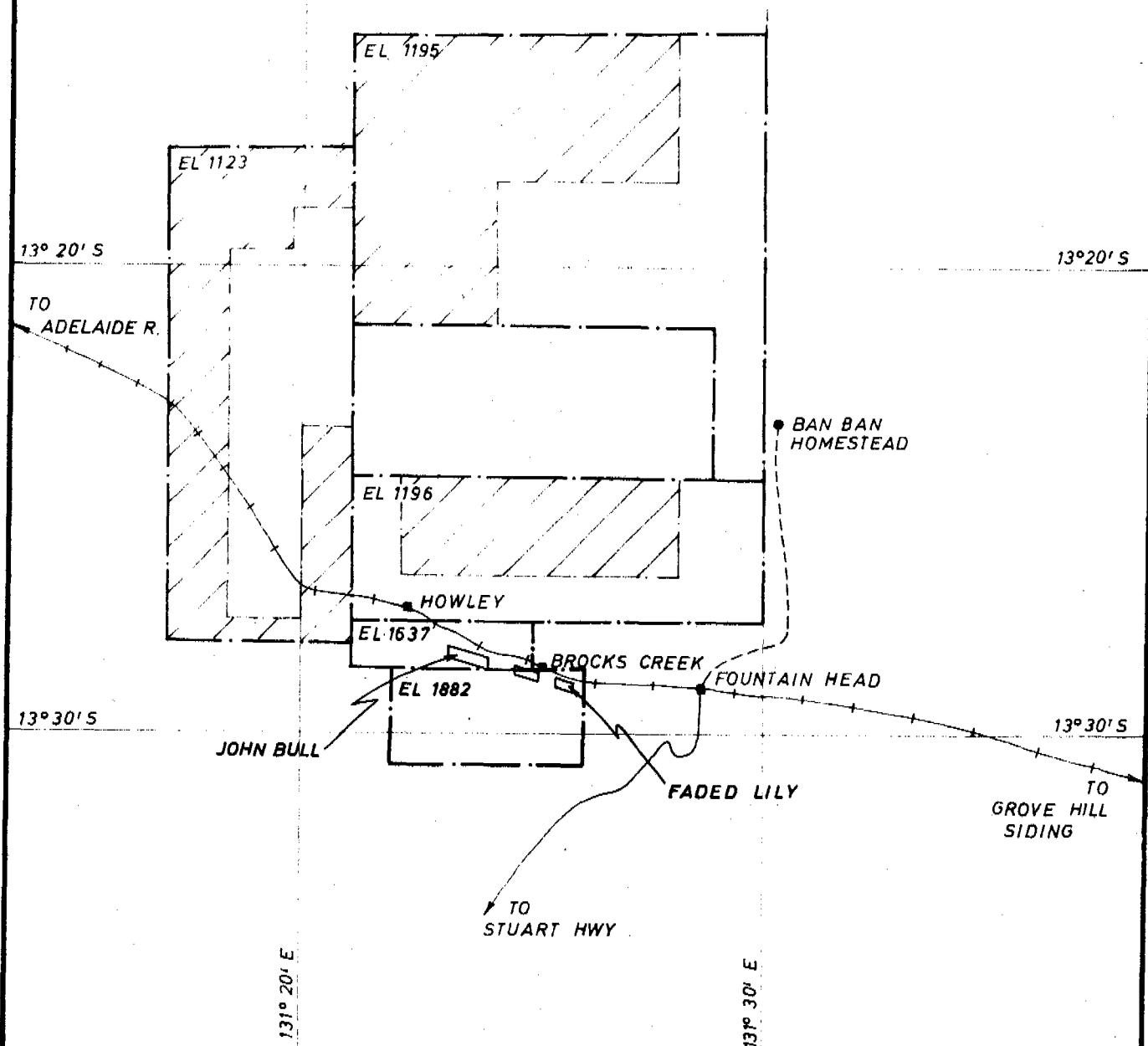
1. No further exploration to be conducted for primary gold mineralisation in the quartz veins.
2. An orientation survey should be carried out over the alluvial flats, south of the primary mineralisation, in order to investigate a possible alluvial/eluvial concentration of gold at the base of the alluvial sediments.

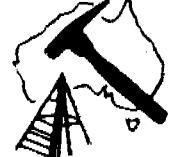
Auger drilling, with drill holes 25m apart along 1km surveyed line going south from each gold field should be adequate to establish the presence or absence of a gold-bearing horizon.

## 5. TENURE

The John Bull gold field is covered by Exploration Licence 1637, granted on 20.9.1977.

The Brocks Creek and Faded Lily gold fields are covered by Exploration Licence 1882, granted on 16.11.1978.



<u>LEGEND</u>			GEOPEKO LIMITED	
++	Railway line		GONDWANA PROJECT - DARWIN	
—	Road			SCALE N.T.S.
- - -	Track			
- - -	E.L. bdy.			
[diagonal lines]	Relinquished			
		DATE 27-2-79.		
		GEOLOGIST R.B.		
		DRAWN M.S.		
		CHEKKEI <i>MS</i>		

**REGIONAL POSITION OF THE  
JOHN BULL-BROCKS CREEK-FADED LILY  
GOLDFIELDS**

REP D79/7 FIG. 1

## 6. GEOLOGY

### 1. Topography

The three gold fields are present on a chain of ridges which have a WNW-SSE direction. Most of the old workings were carried out on the crest of the ridges, which are apparently more resistant to weathering and erosion than the lowlands.

### 2. Lithology

The most abundant rock type at Faded Lily is black shale. A single thin amphibolite body is present, parallel with the bedding.

The rocks at Brocks Creek and John Bull show an alternation of shaly chert beds with brown coloured shale and a single black shale bed.

White quartz veins cut transgressively through the sediments at all three gold fields. In places these quartz veins follow the bedding planes, however.

### 3. Structure

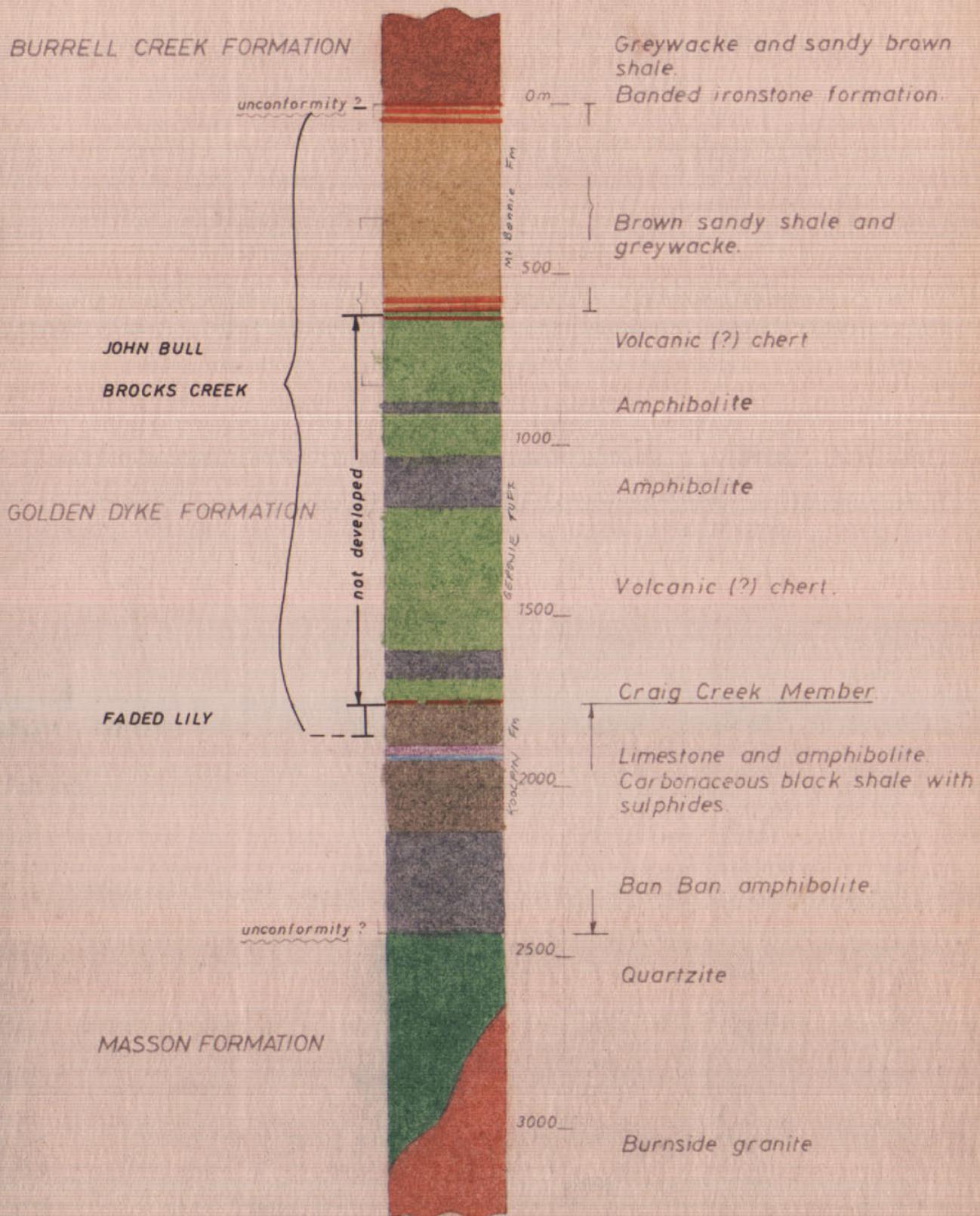
A major NW-SE striking open anticline dominates the region with local secondary folds on both limbs.

The angles of the beds are generally  $40^{\circ}$  in the north-western part and steepen up towards the nose of the anticline where the beds are almost vertical.

Local faulting and/or fracturing seem to be almost parallel with the axial-plane of the anticline. The gold containing quartz veins were probably injected into these zones of weakness.

### 4. Stratigraphy

The black shales, with a thin amphibolite unit in the Faded Lily area, indicate that these rocks probably belong to the central part of the Golden Dyke Formation.

UNITLITHOLOGY

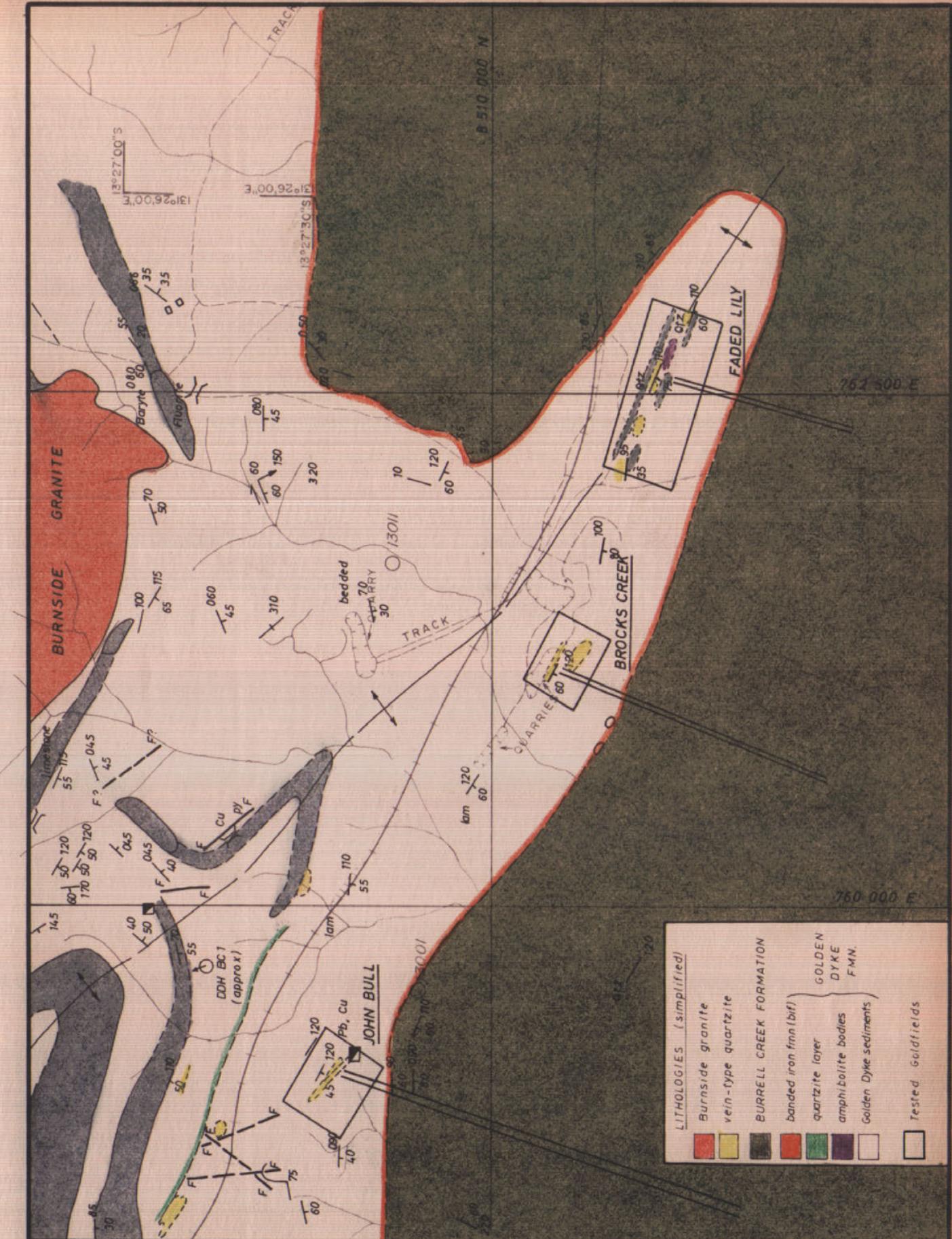
DATE: 27-2-79
GEOLOGIST: R.B.
DRAWN: M.B.
CHECKED: <i>[Signature]</i>

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SCALE: NOT TO SCALE

No. G

**JOHN BULL - BROCKS CREEK - FADED LILY GOLDFIELDS**  
**DIAGRAMMATIC**  
**STRATIGRAPHIC COLUMN**



LEGEND	
	anticline
	dip and strike
	proposed line for auger holes
	railway line
	fault
DATE: 28-2-74	
GEOLOGIST: R.B.	
DRAWN: n.b.	
CHECKED:	

**GEOPEKO LIMITED**  
GONDWANA PROJECT - DARWIN

SCALE: 1: 25 000

No. G

GEOLOGICAL POSITION OF THE  
JOHN BULL - BROCKS CREEK - FADED LILY GOLDFIELDS

The b.i.f. does occur in the area as well, with hardly any volcanic chert in between. That means that:

- (a) the volcanic chert is squeezed out during the period of tectonic activity with the formation of the anticline, or
- (b) the volcanic chert was never well developed and the area represents a local paleogeographic high.

The latter explanation is more in favour, because the volcanic chert is absent in a broader field region further to the east.

## 7. GEOCHEMISTRY

An initial test of the quartz veins, mined at John Bull gave the following assay results:

Table 1: John Bull rock sample assay results

<u>Sample No.</u>	<u>Au g/t</u>	<u>Cu (ppm)</u>	<u>Pb (ppm)</u>	<u>Zn (ppm)</u>
GS 1540	91.05	760	10	100
GS 1541	34.8	260	5	20
GS 1542	6.0	200	10	20
GS 1543	10.95	130	10	30

These results were so encouraging that a more extensive orientation survey was carried out.

A provisional grid was stepped out over the three mined areas: John Bull mine, Brocks Creek mine and Faded Lily mine.

The crest of the ridge, where most old mine workings are present, formed more or less the median base line of the grid and lines were established on both sides of the ridges. The distance between the lines was approximately 50m.

All outcropping quartz veins, and at a few places the host rocks as well, were sampled along the lines. Half of each rock sample was sent off to the assay laboratory of Mount Morgan Limited for gold assaying. The other half of the sample was retained in Darwin office.

The assay results are listed in Table 11.

Table II John Bull, Brocks Creek and Faded Lily  
rock sample assay results.

Sample No.	Location	Au g/t	Ge (ppm)	Pb (ppm)	Zn (ppm)	As (ppm)
GS 1560	FL 1, 110N	0.15				
GS 1561	FL 1, 40N	0.30				
GS 1562	FL 1, 20S	0.45				
GS 1563	FL 1, 20S	1.65				
GS 1564	FL 2, 100N	0.15				
GS 1565	FL 2, 00N	0.15				
GS 1566	FL 2, 15S	0.15				
GS 1567	FL 2, 25S	Tr				
GS 1568	FL 2, 56S	Tr				
GS 1569	FL 2, 10S	Tr	60	24	14	400
GS 1570	FL 3, 110N	Tr	54	16	16	200
GS 1571	FL 3, 75N	0.30				
GS 1572	FL 3, 62N	3.45				
GS 1573	FL 3, 60N	0.60				
GS 1574	FL 3, 35N	3.60	62	16	14	400
GS 1575	FL 3, 10S	0.30				
GS 1576	FL 3, 30S	0.15				
GS 1577	FL 3, 80S	0.15				
GS 1578	FL 3, 95S	0.15				
GS 1579	FL 4, 100N	Tr	66	16	16	200
GS 1580	FL 4, 00N	0.60				
GS 1581	FL 4, 100S	0.30				
GS 1582	FL 5, 80N	Tr				
GS 1583	FL 5, 25N	2.85	60	28	16	200
GS 1584	FL 5, 10S	0.15				
GS 1585	FL 5, 30S	0.15				
GS 1586	FL 5, 100S	0.15				
GS 1587	FL 6, 30N	2.25				
GS 1588	FL 6, 30S	0.15				
GS 1589	FL 6, 35S	Tr				
GS 1590	FL 6, 75S	0.15				
GS 1591	FL 6, 140S	0.30				
GS 1592	FL 7, 75N	0.15				
GS 1593	FL 7, 40N	4.20	56	32	30	200
GS 1594	FL 7, 5S	40.05	90	24	36	400
GS 1595	FL 7, 10S	10.35	66	28	16	1500
GS 1597	FL 8, 00N	0.15				
GS 1598	FL 8, 10S	0.15				
GS 1599	FL 8, 95S	7.95	15	28	12	800
GS 1600	FL 9, 10S	0.30				
GS 1601	FL 9, 50S	0.30				
GS 1602	FL 9, 80S	0.15				
GS 1603	FL 10, 100N	Tr				
GS 1604	FL 10, 10S	Tr				
GS 1605	FL 10, 30S	0.30				
GS 1606	FL 10, 65S	0.30				
GS 1607	JB 1, 200N	Tr				
GS 1608	JB 1, 250S	Tr				
GS 1609	JB 2, 190N	Tr				
GS 1610	JB 2, 140N	Tr				
GS 1611	JB 2, 35N	6.30	52	12	6	100
GS 1612	JB 2, 0N	Tr	54	20	20	100
GS 1613	JB 2, 0N	0.90				
GS 1614	JB 2, 0N	7.80	74	12	10	200
GS 1615	JB 2, 30S	0.45				

Sample No.	Location	Au g/t	Cu (ppm)	Pb (ppm)	Zn (ppm)	As (ppm)
GS 1616	JB 2,	30S	0.15			
GS 1617	JB 2,	60S	0.15			
GS 1618	JB 3,	40N	0.15			
GS 1619	JB 3,	ON	Tr			
GS 1620	JB 3,	ON	Tr			
GS 1621	JB 3,	30S	22.65	36	12	8 200
GS 1622	JB 3,	35S	1.20			
GS 1623	JB 3,	45S	Tr			
GS 1624	JB 3,	100S	Tr			
GS 1625	JB 4,	70N	Tr			
GS 1626	JB 4,	130N	Tr			
GS 1627	JB 4,	ON	Tr			
GS 1628	JB 4,	ON	Tr			
GS 1629	JB 4,	135S	Tr	52	44	20 100
GS 1630	JB 5,	185N	Tr			
GS 1631	JB 5,	155N	Tr			
GS 1632	JB 5,	127N	Tr			
GS 1633	JB 5,	15N	Tr			
GS 1634	JB 5,	ON	0.15			
GS 1635	JB 5,	ON	0.15			
GS 1636	JB 5,	15S	1.05			
GS 1637	JB 5,	20S	0.90			
GS 1638	JB 5,	25S	Tr			
GS 1639	JB 5,	100S	5.25	30	12	6 200
GS 1640	JB 6,	150N	Tr			
GS 1641	JB 6,	ON	0.30			
GS 1642	JB 6,	20S	1.80			
GS 1643	JB 6,	60S	0.45			
GS 1645	JB 6,	140S	0.30			
GS 1646	JB 6,	170S	Tr			
GS 1647	JB 7,	170N	Tr			
GS 1648	JB 7,	70N	Tr			
GS 1649	JB 7,	ON	3.60	40	12	8 200
GS 1650	JB 7,	75N	Tr			
GS 1651	JB 7,	30S	Tr			
GS 1652	JB 7,	35S	Tr			
GS 1653	JB 8,	110N	Tr			
GS 1654	JB 8,	80N	Tr			
GS 1655	JB 8,	10N	Tr	40	4	4 100
GS 1656	JB 8,	ON	0.45			
GS 1657	BC 1,	65N	0.30			
GS 1658	BC 1,	15N	Tr			
GS 1659	BC 1,	10N	Tr			
GS 1660	BC 1,	5N	Tr	1340	12	60 200
GS 1661	BC 1,	50S	Tr			
GS 1662	BC 2,	115N	0.15			
GS 1663	BC 2,	30N	Tr			
GS 1664	BC 2,	15N	Tr			
GS 1665	BC 3,	65S	Tr			
GS 1666	BC 3,	40N	Tr			
GS 1667	BC 3,	35S	0.60			
GS 1668	BC 3,	70S	Tr			
GS 1669	BC 3,	100S	Tr	76	12	12 200
GS 1670	BC 4,	25N	Tr			
GS 1671	BC 4,	10S	Tr			
GS 1672	BC 4,	40S	Tr			
GS 1673	BC 4,	60S	Tr			

Sample No.	Location	Au g/t	Cu (ppm)	Pb (ppm)	Zn (ppm)	As (ppm)
GS 1674	BC 4, 85S	Tr	34	12	8	200
GS 1675	BC 5, 25N	0.30				
GS 1676	BC 5, 75S	Tr				
GS 1677	BC 5, 95S	Tr				
GS 1678	BC 5, 135S	Tr				
GS 1679	BC 5, 190S	Tr				
GS 1680	BC 6, 10N	Tr				
GS 1681	BC 6, 20S	Tr				
GS 1682	BC 6, 170S	Tr	56	16	10	200
GS 1683	FL11, 20N	3.75	90	24	26	400
GS 1684	FL11, 75N	Tr				
GS 1685	FL11, 15N	Tr				
GS 1686	FL11, 15S	3.75	120	60	160	600
GS 1687	FL11, 30S	0.15				
GS 1688	FL11, 90S	1.95				
GS 1689	FL11, 115S	1.05				
GS 1690	FL12, 65N	Tr				
GS 1691	FL12, 40S	0.90				
GS 1692	FL12, 45S	0.45				
GS 1693	FL12, 150S	Tr				
GS 1694	FL13, 90N	1.5				
GS 1695	FL13, 40N	Tr				
GS 1696	FL13, 15S	Tr				
GS 1697	FL13, 30S	Tr				
GS 1698	FL13, 40S	Tr				
GS 1699	FL14, 50N	0.15				
GS 1700	FL14, 0N	Tr				
GS 1701	FL14, 30S	Tr				
GS 1702	FL14, 35S	0.3				
GS 1703	FL14, 60	Tr				
GS 1704	FL14, 105S	Tr				
GS 1705	FL15, 30N	Tr				
GS 1706	FL15, 45S	0.15				
GS 1707	FL15, 45S	24.9	56	26	26	200
GS 1708	FL16, 80N	Tr				
GS 1709	FL16, 90S	2.10				
GS 1710	FL16, 190S	1.95	84	32	28	400
GS 1711	FL16, 200S	0.15				
GS 1712	FL17, 40S	4.50	94	50	84	1800
GS 1713	FL17, 80S	0.30				
GS 1714	FL17, 100S	9.75	40	12	10	800
GS 1715	FL18, 10N	0.30				
GS 1716	FL18, 80S	13.2	60	64	16	1000
GS 1717	FL18, 90S	1.50				
GS 1718	FL18, 95S	Tr				
GS 1719	FL18, 100S	0.60				
GS 1720	FL18, 110S	0.30				
GS 1721	FL18, 125S	5.40	50	16	10	400
GS 1722	FL18, 135S	0.30				

Twenty samples with relatively high gold values plus another ten samples with traces of gold were assayed for copper, lead, zinc and arsenic in order to investigate a possible relationship between gold and the other elements. Plate 4 shows a graph of the five elements assayed for. The samples are ordered along the abscissa according to their highest gold values. This simple graph indicates that no relationship exists between the gold and the copper, lead, zinc or arsenic assay values.

Also the tailing dumps of the John Bull mine were assayed for gold at the laboratory of Mount Morgan Limited.

The assay results are:

Table III. Gold assay results of John Bull's Tailing Dump.

GS 1740	Northern Tailings Dump	0.60	Au g/t
GS 1741	Central Tailings Dump	0.90	Au g/t
GS 1742	Southern Tailings Dumps	0.60	Au g/t

For a routine analysis, samples from the same tailing dumps were sent to Gordon for X.R.F. scanning for significant elements and to A.L.S. in Brisbane for gold analyses. The results are in p.p.m. or indicated otherwise, in table IV (next page):

As an interbedded quartzite north of John Bull shows a similar mineralogy as the gold containing quartz veins, four samples were collected for assaying. Another six samples of outcropping quartz veins in the John Bull region were also assayed for gold. The assay results are (see also Figure 4 for locations):

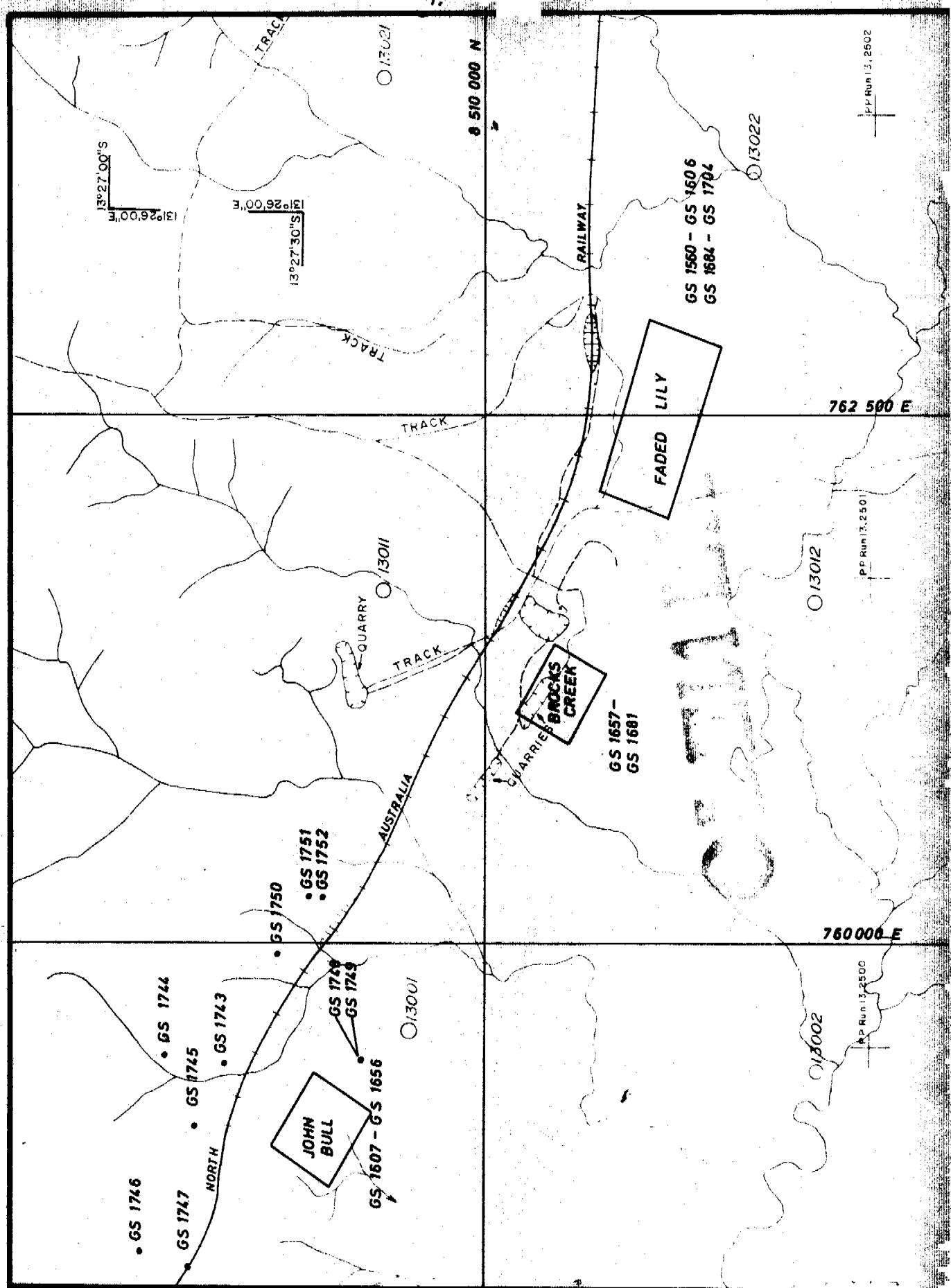
Table V. Gold assay values of rock samples from the John Bull region.

GS 1743	Tr	Au g/t
GS 1744	0.15	Au g/t
GS 1745	0.15	Au g/t
GS 1746	Tr	Au g/t
GS 1747	Tr	Au g/t
GS 1748	Tr	Au g/t
GS 1749	3.45	Au g/t
GS 1750	0.15	Au g/t
GS 1751	Tr	Au g/t
GS 1752	Tr	Au g/t

Table IV XRF Analyses of John Bull's Tailing Dumps

Sample No.	Location	Au	As	K	Ca	Fe	Mn	Si	Zn	Rb	Y	Sr
GS 1529	Central Tail.	0.105	200		40%	12%	2000				100	1000
GS 1530	Northern Tail.	0.320	1000	1%	1%	5%	0.5%		100			
GS 1531	Southern Tail.	0.48	800	3%	3%	5%	0.5%	10%	50	50		
GS 1532	Southern Tail.	0.41	300	3%		4%	0.1%	5%	200	100		

The high Ca - value in GS 1529 and the relatively low values for Si are a bit of a puzzle. It indicates most likely that the gold was extracted by the cyanide process. Excess of lime is used in this process to neutralise oxidation products of sulphides and later to destroy cyanicides.



**GEOPEKO LIMITED**  
GONDWANA PROJECT - DARWIN

SCALE: 1: 25 000

No. G

JOHN BULL - BROCKS CREEK - FADED LILY GOLDFIELD  
SAMPLE LOCATIONS

DATE: 27.2.79

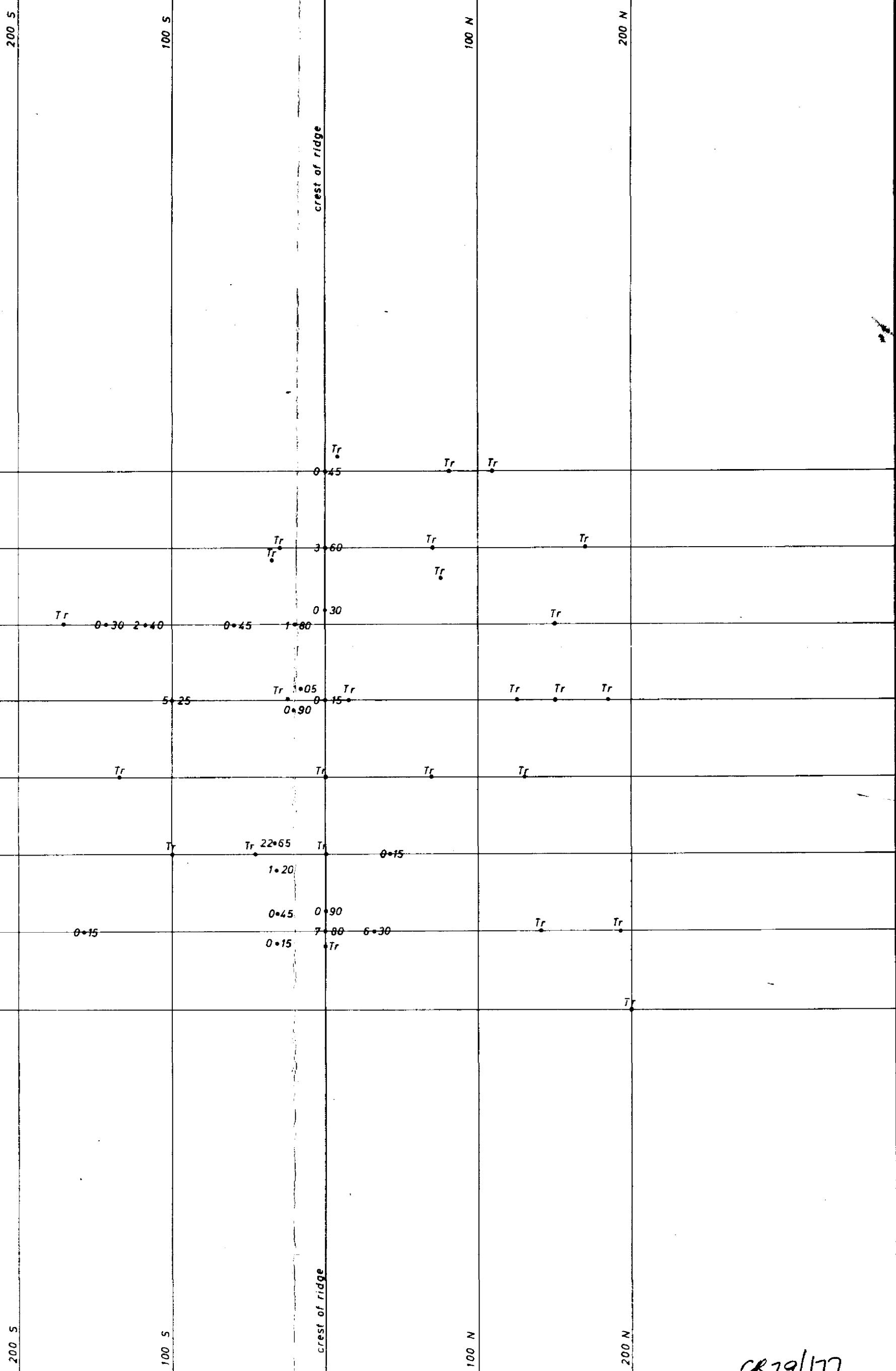
GEOLOGIST: R.B.

DRAWN: M.G.

CHECKED: [initials]

REP D79/7

FIG.



DATE: 23/11/78  
GEOLOGIST: R.B.  
DRAWN: M.B.  
CHECKED: [initials]

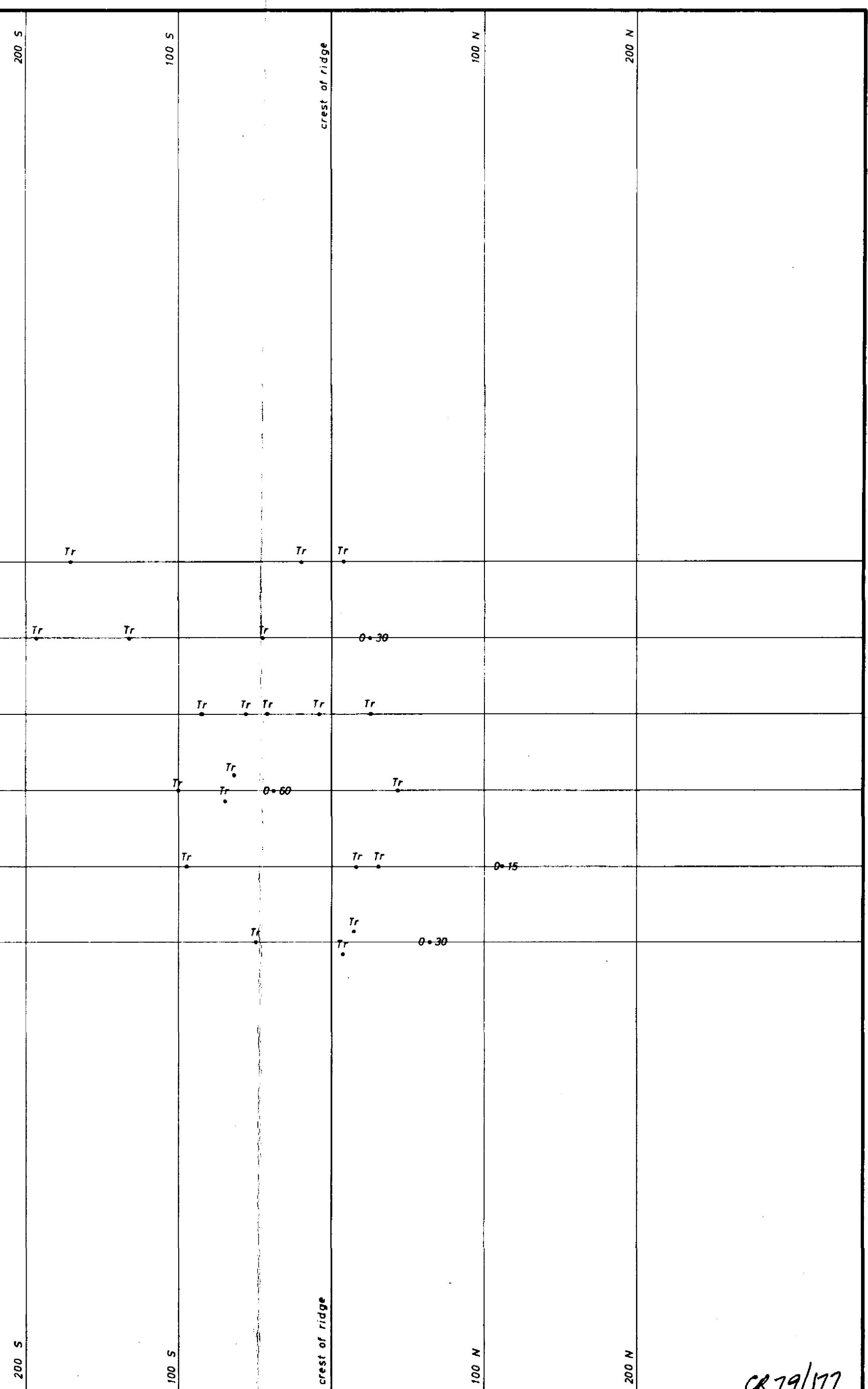
**GEOPEKO LIMITED**  
GONDWANA PROJECT - DARWIN

25 0 100 m  
SCALE: approx 1:2500

CR79/177

**JOHN BULL MINE**  
Au - assay results of outcropping  
quartz veins

REP D 79/7 PLATE 1



CR 79/177



# **GEOPEKO LIMITED**

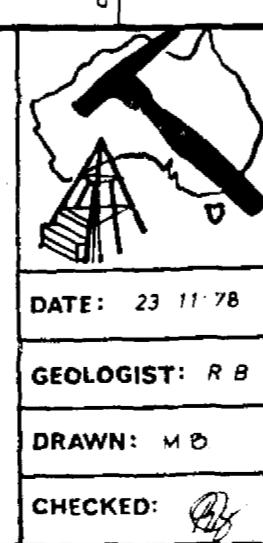
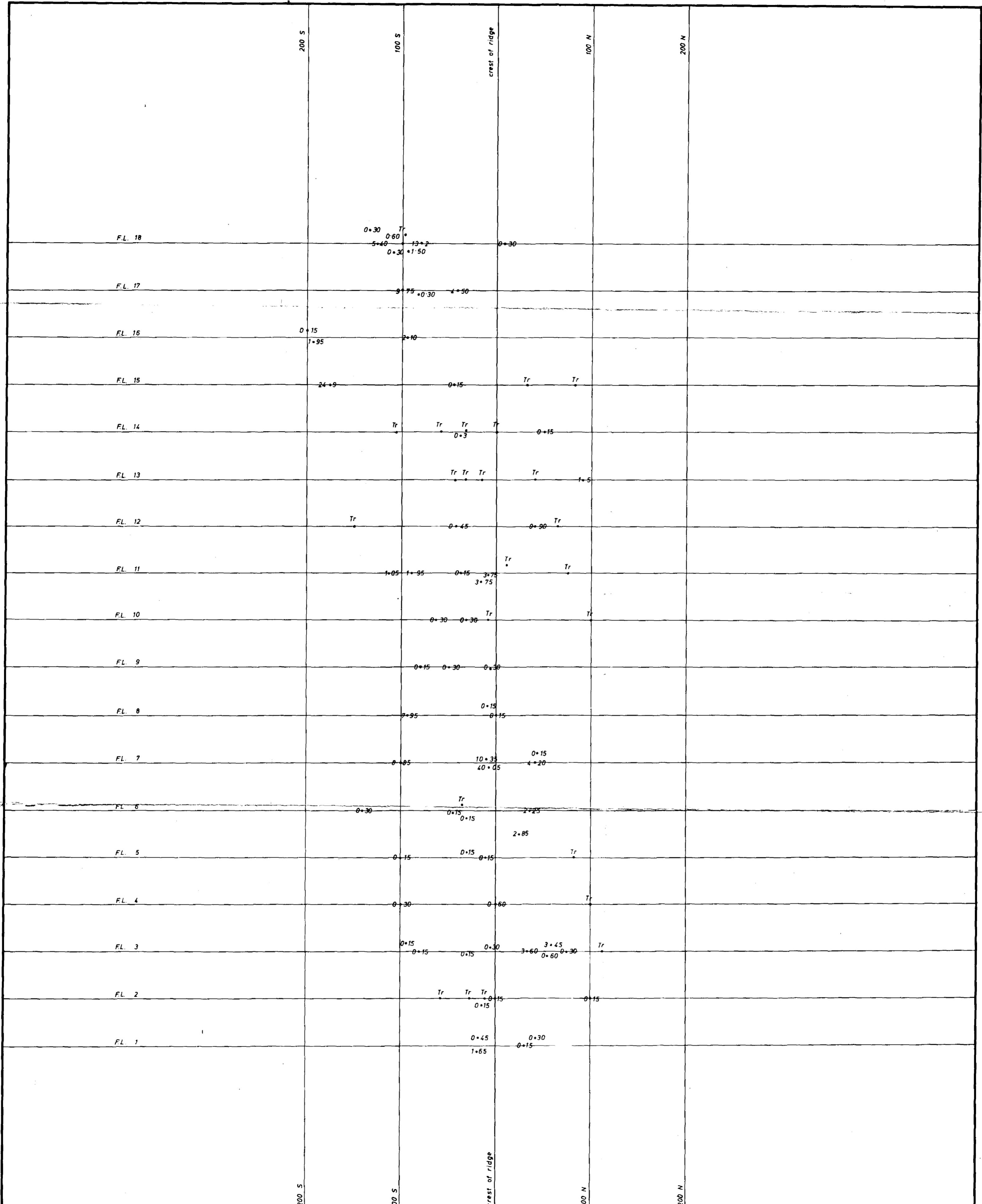
**GONDWANA PROJECT - DARWIN**

SCALE: approx 1:2500

No. G DN 78/217

*BROCKS CREEK MINE*  
*Au - assay results of outcropping*  
*quartz veins*

REP D 79/7 PLATE 2

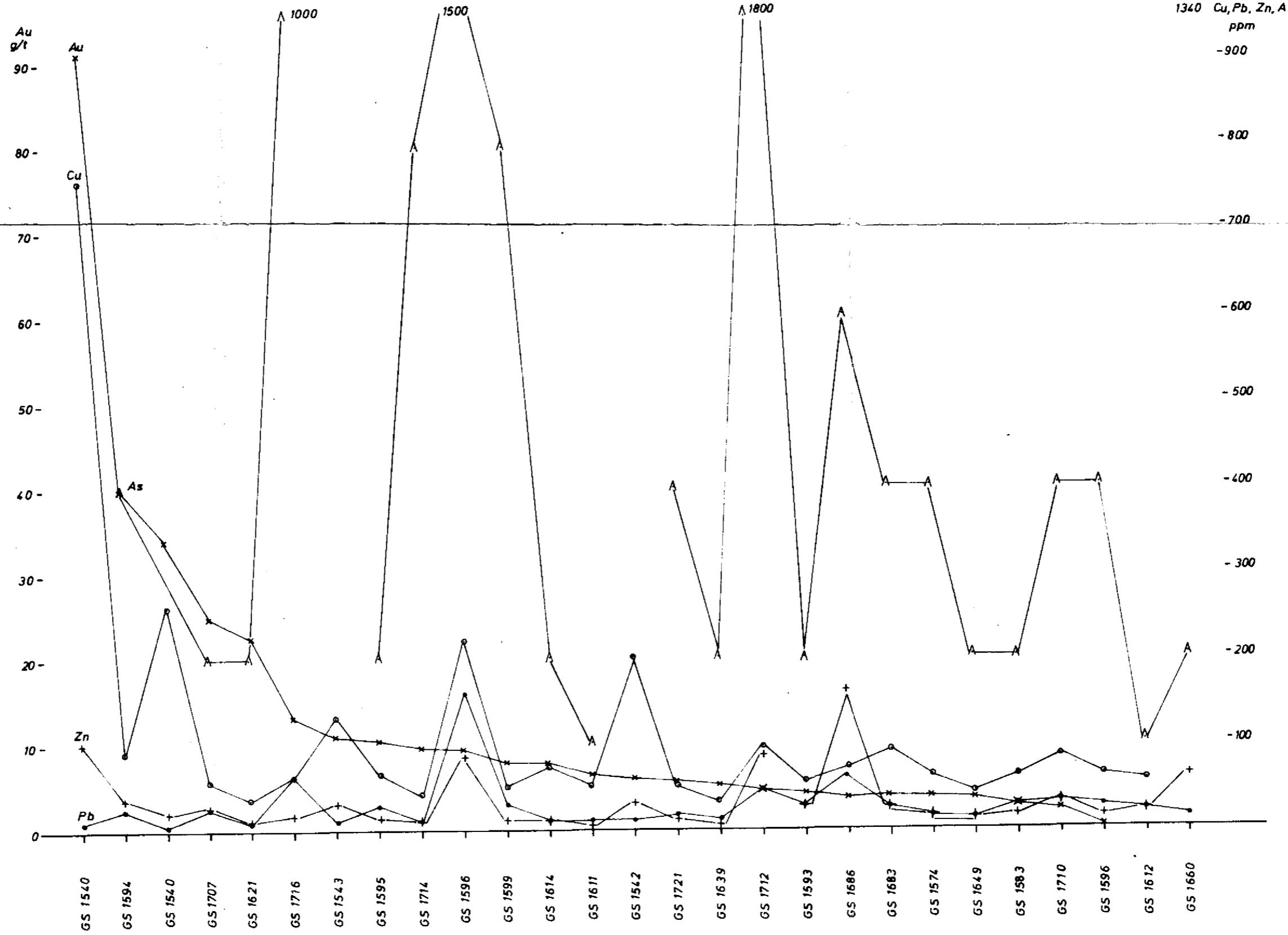


GEOPEKO LIMITED  
GONDWANA PROJECT DARWIN

CA 19/177

No. G DN 78/219

FADED LILY MINE  
Au - assay results of outcropping quartz veins



CR79/177

- x Au
- o Cu
- Pb
- + Zn
- Λ As

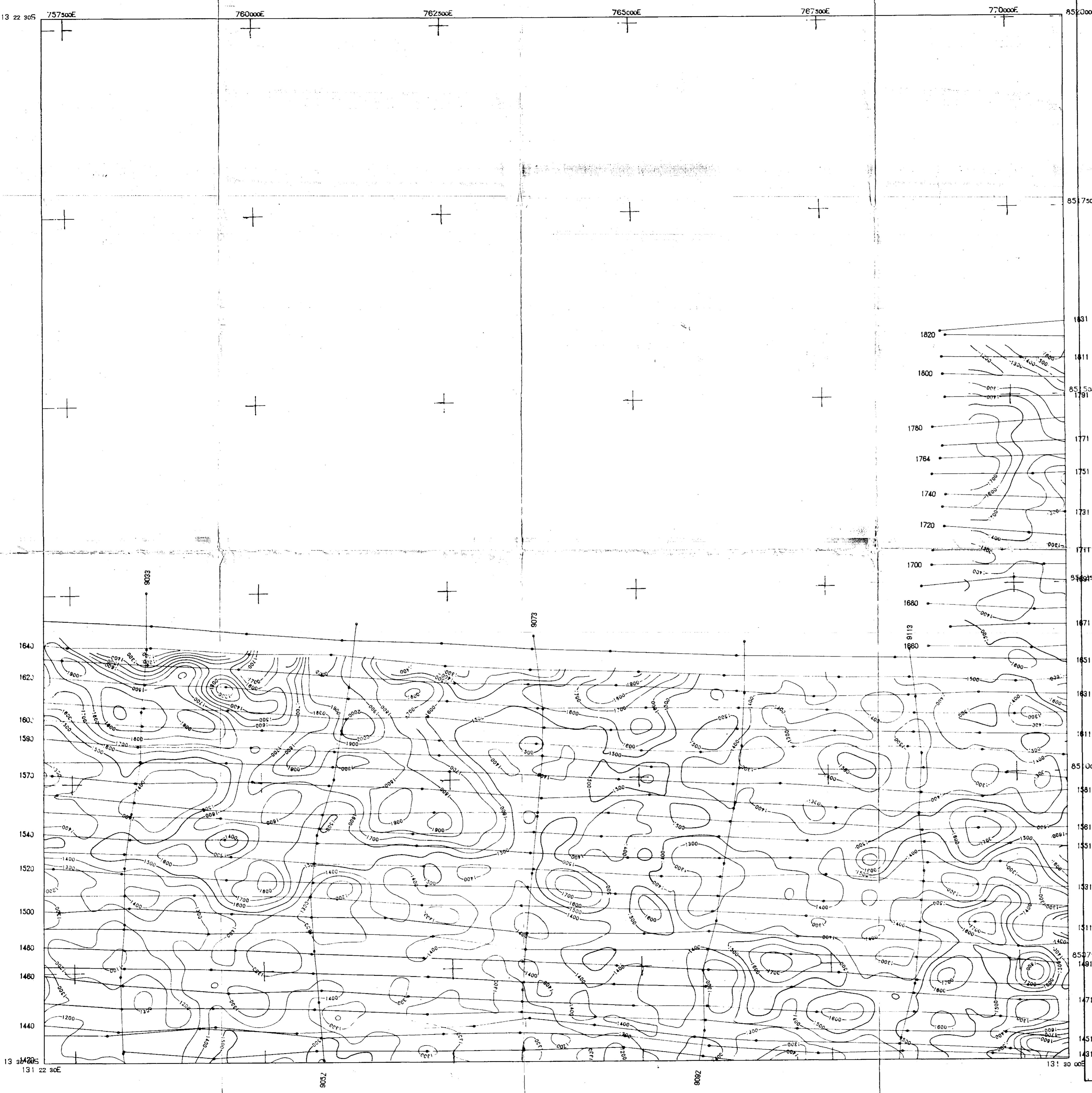
GEOPEKO LIMITED  
GONOWANA PROJECT - DARWIN

DATE: 26.2.79
GEOLOGIST: R.B.
DRAWN: 26
CHECKED: 26

No. G DN 79/12

GRAPH SHOWING RELATIONSHIP BETWEEN  
GOLD, COPPER, LEAD, ZINC AND ARSENIC.

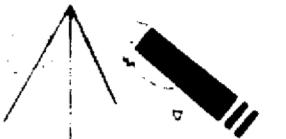
REP D79/7 PLATE 4



# PINE CREEK

BACHELOR 5171- I-SE

**GEOPEKO**



SCALE 1:25 000

	5171-11 NW	5171-11 NE	5271-111 NW
AUSTRALIAN MAP GRID	5171-11 SW	5171-11 SE	5271-111 SW
	5170-I	5170-I	5270-IV

## LOCATION INDEX

## UNIVERSAL TRANSVERSE MERCATOR PROJECTION

# AIRBORNE GEOPHYSICAL SURVEY

# CONTOURS OF BROAD BAND SPECTROMETER CHANNEL

## SPECIFICATIONS

**Nominal flight line separation : 250 m**

**Nominal terrain clearance : 100m**

**Spectrometer: Scintrex GAD 5 with two GSA 64 NaI(Tl)crystal packs**

**Crystal volume : 15 000 cm<sup>3</sup>**

## **Magnetometer : Varian V-85**

## Data acquisition system : Sci

Cycle time: 1s

**Contour interval : 100 cps**

Surveying & data acquisition by Scintrex Pty Ltd

Engineering & map preparation by Engineering Computer Services Pty Ltd

Management by Peko Geoscience

PLAN No 4298 S/A

CR 19/177

PINE CREEK

BATCHELOR 5171-II-SE

GEOPEKO

SCALE 1:25 000

5171-II  
SW NE  
5171-II SE SW  
5170-I 5170-II 5270-IV

LOCATION INDEX

UNIVERSAL TRANSVERSE MERCATOR PROJECTION

AIRBORNE GEOPHYSICAL SURVEY

CONTOURS OF TOTAL MAGNETIC INTENSITY

SPECIFICATIONS

Nominal flight line separation : 250m

Nominal terrain clearance : 100m

Spectrometer: Scintrex GAD 5 with two GSA 64 NaI(Tl) crystal packs

Crystal volume : 15 000 cm<sup>3</sup>

Magnetometer : Varian V-85

Data acquisition system : Scintrex DDA-2

Cycle time: 1s

Contour interval : 10 nT

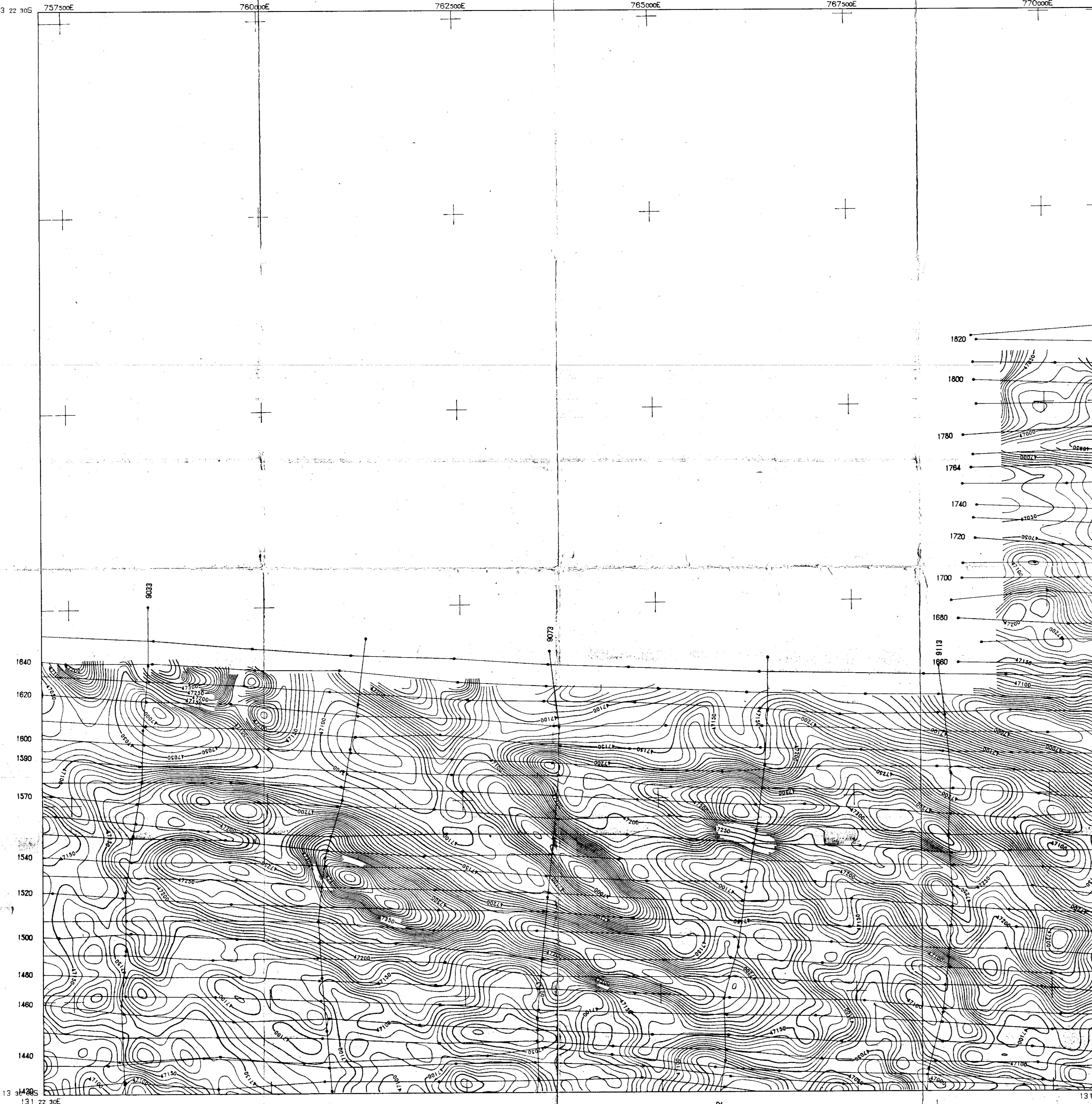
Survey flying & data acquisition by Scintrex Pty Ltd

Data processing & map preparation by Engineering Computer Services Pty Ltd

Project management by Peko Geoscience

PLAN No 4292 S/A

CR 79/177



PINE CREEK

BATCHELOR 5171-II-SE

GEOPEKO

SCALE 1:25000

SIM-III  
SW SE NE NW  
SIT-III SIT-III SIT-III  
SW SE NE NW  
SOT-III SOT-III SOT-III  
SW SE NE NW

LOCATION INDEX

INTERNAL TRANSVERSE MIGRATOR PROFILE

## AIRBORNE GEOPHYSICAL SURVEY

### FLIGHT LINE DIAGRAM

#### SPECIFICATIONS

Nominal flight line separation : 250m

Nominal terrain clearance : 100m

Spectrometer: Scintrex GAD 5 with two GSA 64 NaI(Tl)crystal packs

Crystal volume : 15 000 cm<sup>3</sup>

Magnetometer : Varian V 85

Data acquisition system : Scintrex DDA-2

Cycle time : 1s

Contour interval :

Survey flying & data acquisition by Scintrex Pty Ltd

Data processing & map preparation by Engineering Computer Services Pty Ltd

Project management by Peko Geoscience

PLAN No 4286 S/A

CR79/177

