GS1989/194

B I L L I T O N A U S T R A L I A

THE METALS DIVISION OF
THE SHELL COMPANY OF AUSTRALIA LIMITED

EIGHTH ~~& FINAL~~ EXPLORATION PROGRESS REPORT

COLUMBINE - EL2372

FOR THE PERIOD 15/8/88 TO 14/2/89

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D000630470

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D000630480

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SUMMARY

Exploration Licence EL2372, Columbine, was held for a period of four years by The Shell Company of Australia, from 15th February, 1985 to 14th February, 1989.

The licence was pegged to cover the Cargo Dacite Complex which was considered highly prospective for porphyry style gold-copper mineralization. Subsidiary targets included gold mineralization within peripheral silicified zones, and replacement gold mineralization within limestones to the west of Cargo.

Regional exploration programmes included an airborne geophysical survey and stream sediment sampling. A number of geochemically anomalous drainages were detected and led to follow-up exploration programmes.

Detailed exploration programmes including grid based mapping, soil/auger sampling, ground magnetics, rock chip sampling and, where warranted, drilling was conducted on a number of prospects including Cargo (Graveyard Creek and Cargo Sheet Alluvials), Mobbs-Commonwealth and Gum Flat.

Initial exploration at Gum Flat indicated a major gold resource. Exploration and evaluation of the prospect culminated in the drilling of 15,457m of RAB, 299m of RC and 803m of diamond drilling. Preliminary economic studies, metallurgical testwork, and mining studies were also conducted. The programme resulted in a resource of 1.833 million tonnes @ 0.43g/t Au, with a nominal cut-off grade of 0.3g/t Au, being identified. Unfortunately the resource failed to reach Shell's target objectives.

Three flow-on Prospecting Licences (PLAs 965, 966 & 967) have been pegged over the Gum Flat resource. The remainder of the exploration licence was allowed to lapse on 14th February, 1989.

The Gum Flat Resource is currently for sale.

Total expenditure on the exploration licence was $993,434.

1.0 INTRODUCTION

This report is the eighth and final exploration progress report for EL2372, Columbine. The report details exploration conducted in the eighth reporting period, 15th August, 1988 to 14th February, 1989, and summarises all exploration conducted by Shell on the licence.

2.0 TENEMENTS

Exploration Licence Application No. 567 (Orange), was applied for on 15th August, 1984. The ELA was granted as Exploration Licence No. 2372, with an area of approximately 119 square kilometres, to the Shell Company of Australia Limited, on 15th February, 1985 for an initial two year term. The licence is centred on the township of Cargo, 32 kilometres south-west of Orange (Figure 1). The expenditure commitment during the initial term was $82,000.

The Exploration Licence was renewed on 27th March, 1987 for an additional period of two years, over a reduced area of approximately 59 square kilometres. The expenditure commitment for the second term was $102,000.

Three flow-on Prospecting Licence Applications (PLAs 965, 966 & 967) were pegged to cover the Gum Flat gold resource on 8th February, 1989. The remainder of Exploration Licence 2372 was allowed to lapse on 14th February, 1989.

3.0 SUMMARY OF EXPLORATION CONDUCTED ON EL2372

This section summarises all exploration conducted within EL2372 during its four year period of tenure. Details of the work programmes conducted may be found in the six monthly exploration progress reports (Clarke 1985; Rangott 1986a, 1986b, 1987; Kenny 1987, 1988; Kenny & Gibbs 1988)

3.1 First Reporting Period - 15/2/85 to 14/8/85

During the first reporting period only brief work was carried out over the Gum Flat workings west of Cargo. In this area, a north trending belt of limestone occurs to the south of Cargo. Alluvial cover obscures the geology west of Cargo, however it is probable that limestone occurs in close proximity to the gold-copper mineralized dacite complex, possibly with a faulted contact. A review of old mine records confirmed that limestone occurs beneath the Gum Flat alluvial workings.

Features of the Gum Flat workings were the substantial depths (to 70 metres) and reports of a steeply dipping to sub-vertical 'vein of wash' (? infilled karst topography). A field inspection was made to check for the possibility of eluvial material having been worked by the old miners. The Gum Flat area is close to the Cargo Dacite Complex, and the interaction of porphyry related phyllic fluids and limestone could have produced an alteration zone which may have weathered to clay/ jasperoid material. Field inspection of dump indicated alluvial material, however, with no evidence of jasperoid.

3.2 Second Reporting Period 15/8/85 to 14/2/86

During the second reporting period work was suspended on the exploration licence pending the outcome of an application for renewal of the prospecting licences which cover the major part of the prospective Cargo Dacite Complex.

3.3 Third Reporting Period 15/2/86 to 14/8/86

Work programmes conducted in the third reporting period include:-

- Evaluation of all open file exploration data covering the area of EL2372.
- Collection of 56 stream sediment samples at an approximate density of one sample per 2 square kilometres. Samples were analysed for BCL gold, copper, lead, zinc and arsenic. Areas which were considered geochemically anomalous are indicated in Figure 2.
- Flying and preliminary interpretation of a detailed airborne magnetic and radiometric survey over the exploration licence.
- Follow-up mapping and rock chip sampling of geochemically anomalous areas.
- Partial sponsorship of a La Trobe University Honours Student, Keith Weston, to conduct a study of the Bowan Park area (north of Cargo) and the Cargo Dacite Complex.
- Follow-up of geochemical anomalies (Figure 2) by mapping and rock chip sampling.

3.4 Fourth Reporting Period - 15/8/86 to 14/2/87

Exploration conducted during the fourth reporting period included:-

- Preliminary interpretation of the aeromagnetic and radiometric data.
- Follow-up of the Girraween BCL anomaly. The anomaly was found to be sourced by an old cyanite treatment plant. Auger sampling of magnetic anomalies within the geochemically anomalous area gave negative results.
- Auger sampling at the Cargo Creek aeromagnetic anomaly. Results were not anomalous.
- RAB drilling of the Graveyard Gully and Cargo Sheet Alluvials (Figure 3). This programme detected underlying hard rock mineralization. The mineralized zones were termed the Graveyard and Schoolhouse zones respectively (Figure 4). Technically, the Schoolhouse zone warranted follow-up work, but due to its proximity to Cargo, no further work has been conducted.
- Inspection and rock chip sampling of the Mobbs-Commonwealth workings (within the Vineyard BCL anomaly). Rock chip samples up to 4.5ppm Au were obtained. A gridding and soil sampling programme was planned.

- Inspection and rock chip sampling along the western boundary of PLs 925 and 796.

- Field inspection and rock chip sampling along the southern boundary of PL 795 to check for extrusions of the Dalcouth lode. Only poor outcrop was located and a RAB drilling programme was commenced along the PL boundary.

- Geological examination, rock chip sampling and a review of historical literature on the Gum Flat area concluded there was potential for a significant gold-bearing hydrothermal carbonate-replacement mineralization adjacent to the Cargo Dacite Complex, beneath shallow alluvial deposits.

3.5 Fifth Reporting Period - 15/2/87 to 14/8/87

Exploration activities conducted in the fifth reporting period included:-

- Detailed mapping, ground magnetometry, soil sampling and rock chip sampling over the Mobbs-Commonwealth workings. The programme indicated a 300m long gold geochemically anomalous zone corresponding to altered and veined andesites and a coincident magnetic low. It was planned to test the zone with three percussion drill holes.

- Drilling of 85 RAB holes along the southern boundary of PL 795 failed to locate a postulated southern strike extension of the Dalcouth lode.

- Drilling of 35 RAB holes along the western boundary of PLs 796, 795 and 925. The programme failed to intersect any radiating lode sets.

- Gridding, mapping, ground magnetometry and four lines of gravity surveying were completed over the Gum Flat area. The drilling of 30 deep RAB holes, to test the postulated carbonate replacement gold target, intersected significant thicknesses of gold-bearing alluvium. It was proposed to carry out reverse circulation air core drilling to confirm the grades and thicknesses of gold bearing material, and to obtain sufficient material for metallurgical testwork. Outline RAB drilling was planned to ascertain the strike extent of the mineralized alluvium. A deep diamond drill hole was also proposed to examine the as yet untested carbonate-replacement model.

3.6 Sixth Reporting Period - 15/8/87 to 14/2/88

In the sixth reporting period, the following exploration programmes were conducted:-

- Soil gold and magnetic anomalies in the vicinity of the Mobbs-Commonwealth workings were tested with three percussion holes. The best intersection was 4m @ 3.14g/t Au. The intersections obtained were erratically developed and of limited true width.

- Gridding, ground magnetics and mapping over approximately 7km strike length were completed over the extensions of the Gum Flat alluvials.

- A SIROTEM survey designed to aid drill siting was unsuccessful in determining depths to bedrock.

- Eight RC aircore boreholes were drilled to check thicknesses and grade intercepts obtained in earlier RAB drilling. Results confirmed the RAB drilling results.

- One diamond drill hole was drilled to test the limestone-replacement model at the andesite-limestone contact beneath the alluvial cover. Core recovery was poor and the concept was not fully tested.

- Drilling of one hundred and eighty three RAB holes was conducted to close off the anomalous gold values in the alluvials.

- Preliminary metallurgical testwork indicated the gold at Gum Flat was largely fine. De-sliming of the ore by cycloning may remove 70% of the gangue, retaining 80% of the gold in a concentrate in the range of 3-4g/t Au amenable to CIL processing.

- Resource calculations based on the RAB and RC drilling programmes indicated a potential resource of 2.836 million m^3 @ 0.85g/m^3 or 4.821 million tonnes @ 0.50g/t.

- Preliminary economic studies indicated the viability of a 1.5 million tonnes per annum operation with operating costs of $4.50 to $5.00 per tonne and a capital requirement of $4 to $7 million. The viability was dependant on the definition of a higher grade start-up tonnage of say, 2 million tonnes @ >0.6g/t, with additional material requiring >0.3g/t to cover operating costs.

3.7 Seventh Reporting Period - 15/2/88 to 14/8/88

During the seventh reporting period, work included the following:-

- Drilling of a total of 8,033m in 206 RAB boreholes (CR336-CR541) (see Figures 5a & 5b) in outline and evaluation drilling of the Gum Flat Prospect.

- Drilling of 6 triple tube, PQ size, diamond drillholes (CD2-CD7), 274m) (for locations see Figure 5a), to obtain samples of mineralized alluvial material to enable closer examination of geology, grade distribution, geotechnical qualities and bulk density variations.

- Geophysical logging of 5 diamond holes (CD2-CD6) to examine bulk density variations (for locations see Figure 5A).

- Drilling of 3 exploratory diamond drillholes (CD8-CD10, 366m) (for locations see Figure 5a), to examine the limestone-andesite contact underlying the alluvial sequence for possible development of skarn-type gold mineralization.

- Computer capture of all drilling data and calculation of initial geological and mining resource estimates.

- Completion of initial mining studies and preliminary metallurgical testwork.

- Completion of detailed ground magnetics and SP and Mise-á-la-masse surveys in the 6300N Sulphide Zone area.

Results of this work programme may be summarised as follows:-

- The overall geological resource of the area examined is of the order of 10-15 million tonnes at a grade of 0.20 to 0.25g/t Au. Within this area, drilling identified three relatively higher grade open-pittable areas - the southern, northern and sulphide zone areas (Figure 5a), which, at a nominal 0.3g/t Au cut-off grade are estimated to contain 1.833 million tonnes at a grade of 0.43g/t Au.

- Metallurgically, there is confidence in the potential to recover 70% of contained gold in a combined gravity (cyclone)/leach plant.

- Preliminary tailings settling studies indicate that tailings disposal, and particularly water reclamation, may be difficult.

- Preliminary geotechnical and mining studies indicate that relatively low cost open-pit type mining would be feasible.

- The potential for producing a high quality clay by-product to improve project economics was evaluated. The findings were that it was possible to separate limited quantities of a kaolin by-product, however, it had a brownish colouration which could not be fully removed by bleaching agents. The clays may have a value for brick manufacture. This remains unchecked.

4.0 EXPLORATION CONDUCTED IN THE CURRENT REPORTING PERIOD

No active field exploration has been conducted in the current reporting period. All the grids in the exploration licence have been removed, and all drill sites have been cleaned up and rehabilitated.

Three follow-on Prospecting Licences have been pegged over the Gum Flat resource (PLAs 965, 966, 967). The PLAs are currently up for sale.

5.0 REFERENCES

Clarke, N. 1985 Billiton Australia (Metals Division of the Shell Company of Australia Ltd) - First Exploration Progress Report, Columbine EL2372, For the Period 15/2/85 to 14/8/85. Report No. 08.3022, September 1985

Rangott, M. 1986a Billiton Australia (Metals Division of the Shell Company of Australia Ltd) - Second Exploration Progress Report, Columbine EL2372, For the Period 15/8/85 to 14/2/86. Report No. 08.3164, February 1986

Rangott, M. 1986b — Billiton Australia (Metals Division of the Shell Company of Australia Ltd) - Third Exploration Progress Report, Columbine EL2372, For the Period 15/2/86 to 14/8/86. Report No. 08.3308, September 1986

Rangott, M. 1987 — Billiton Australia (Metals Division of the Shell Company of Australia Ltd) - Fourth Exploration Progress Report, Columbine EL2372, For the Period 15/8/86 to 14/2/87. Report No. 08.3631, March 1987

Kenny, K.J. 1987 — Billiton Australia (Metals Division of the Shell Company of Australia Ltd) - Fifth Exploration Progress Report, Columbine EL2372, For the Period 15/2/87 to 14/8/87. Report No. 08.3840, September 1987

Kenny, K.J. 1988 — Billiton Australia (Metals Division of the Shell Company of Australia Ltd) - Sixth Exploration Progress Report, Columbine EL2372, For the Period 15/8/87 to 14/2/88. Report No. 08.3972, April 1988

Kenny, K.J. 1988 & Gibbs, D.R. — Billiton Australia (Metals Division of the Shell Company of Australia Ltd) - Seventh Exploration Progress Report, Columbine EL2372, For the Period 15/2/88 to 14/8/88. Report No. 08.3974, August 1988

6.0 EXPENDITURE

On E.L. 2372 for the six month period to 31/1/89 and cumulative to 31/1/89 is estimated as:-

	THIS PERIOD	CUMULATIVE
Staffing Costs - Labour	4,537	254,560
- Travel	-	1,561
- Other	29	1,772
Vehicle/Equipment Costs	868	43,993
Field and Office Operating Costs	4,828	119,072
Tenement Costs	964	9,447
Geochemical Surveys	-	-
Geophysical Surveys	-	17,278
Analysis - Drilling Samples	-	147,810
- Other Samples	-3,860	19,331
Drilling - Diamond	-	88,896
- Other	-	129,697
Aerial Surveying/Photogeometry	-	-
Gridding/Survey/Access	-	3,568
Geological Studies	-	6,843
Environmental/Other	-	-
AHO geological, geophysical, drawing and computer	1,148	105,717
AHO Management, Admin. and Services	-671	43,889
TOTAL EXPENDITURE	7,843	993,434

Pro rata distribution of this period's expenditure is estimated as:-

1. Geology	5,043
2. Geophysics	-
3. Geochemistry	-
4. Tenement	2,800
5. Drilling	-
6. Other	-
TOTAL	7,843

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SHELL METALS REPORT DATABASE - DATA INPUT SHEET

CHAPTER NAME:
(Office Use Only)

TITLE: EIGHTH & FINAL EXPLORATION PROGRESS REPORT - COLUMBINE EL2372 - FOR THE PERIOD 15/8/88 TO 14/2/89

DATE: /03/89 (Publication date in format dd/mm/yy)

AUTHOR: D. R. GIBBS

SOURCE:
(If Non-SCOA)

DESCRIPTOR:
(Not Indexed)

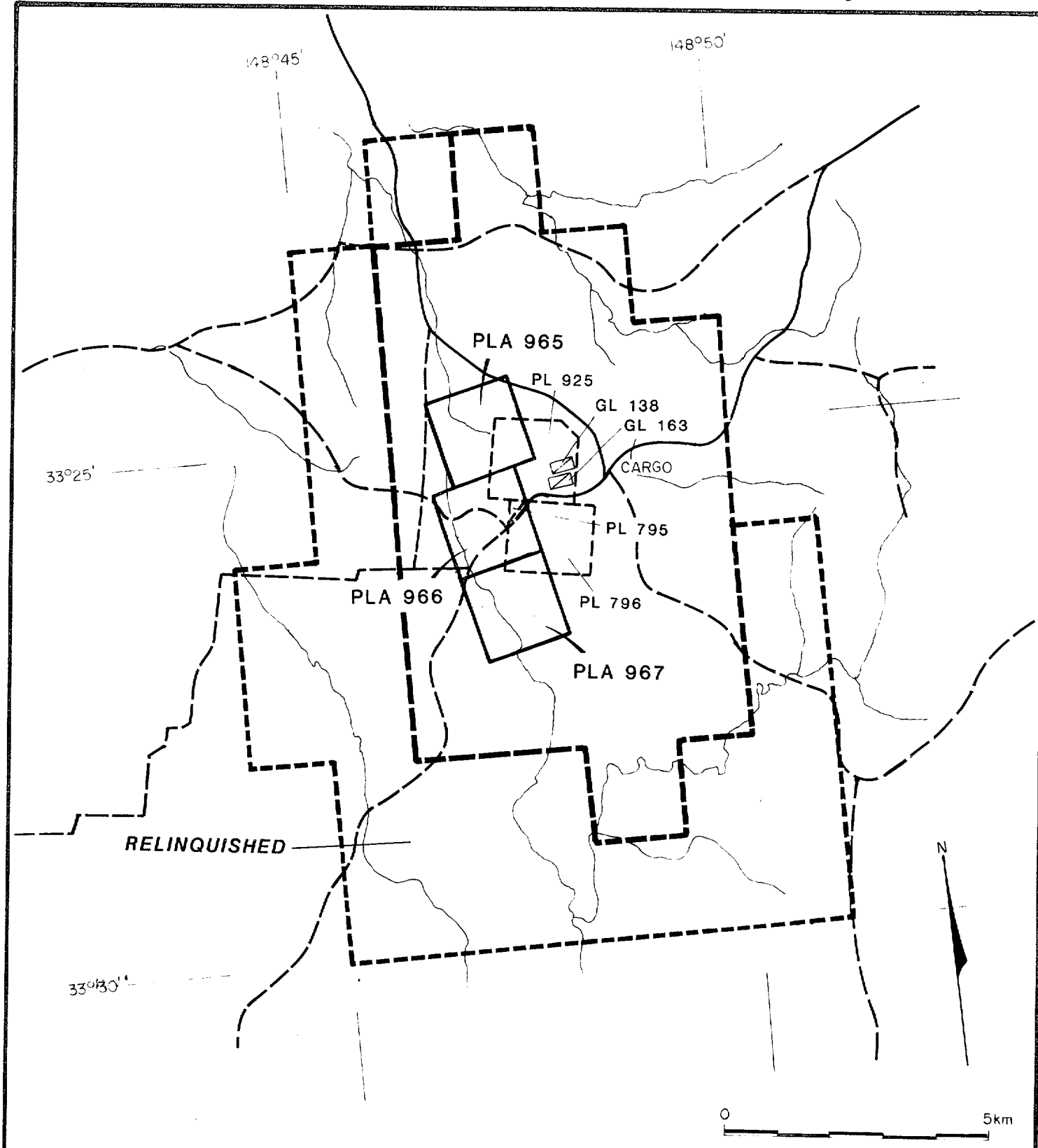
PROSPECT/PROJECT: COLUMBINE, GUM FLAT, MOBBS-COMMONWEALTH, CARGO

KEYWORDS: CARGO DACITE COMPLEX, GOLD MINERALIZATION, AIRBORNE MAGNETICS & RADIOMETRICS, STREAM SEDIMENT GEOCHEMISTRY DETAILED MAPPING, SOIL GEOCHEMISTRY, GROUND MAGNETICS, SIROTEM, SP, IP, RAB DRILLING, RC DRILLING, DIAMOND DRILLING, ECONOMIC STUDIES, RESOURCE ESTIMATES, METALLURGY

LOCATION: 30KM SOUTH-WEST OF ORANGE, NEW SOUTH WALES

SHEET NAME: BATHURST SI/55-8
(1:250,00)

REPORT NO: 08.4307
(Not Indexed)



Road sealed

Road unsealed

Relinquished EL boundary

P.L. boundary (non Shell)

Gold lease

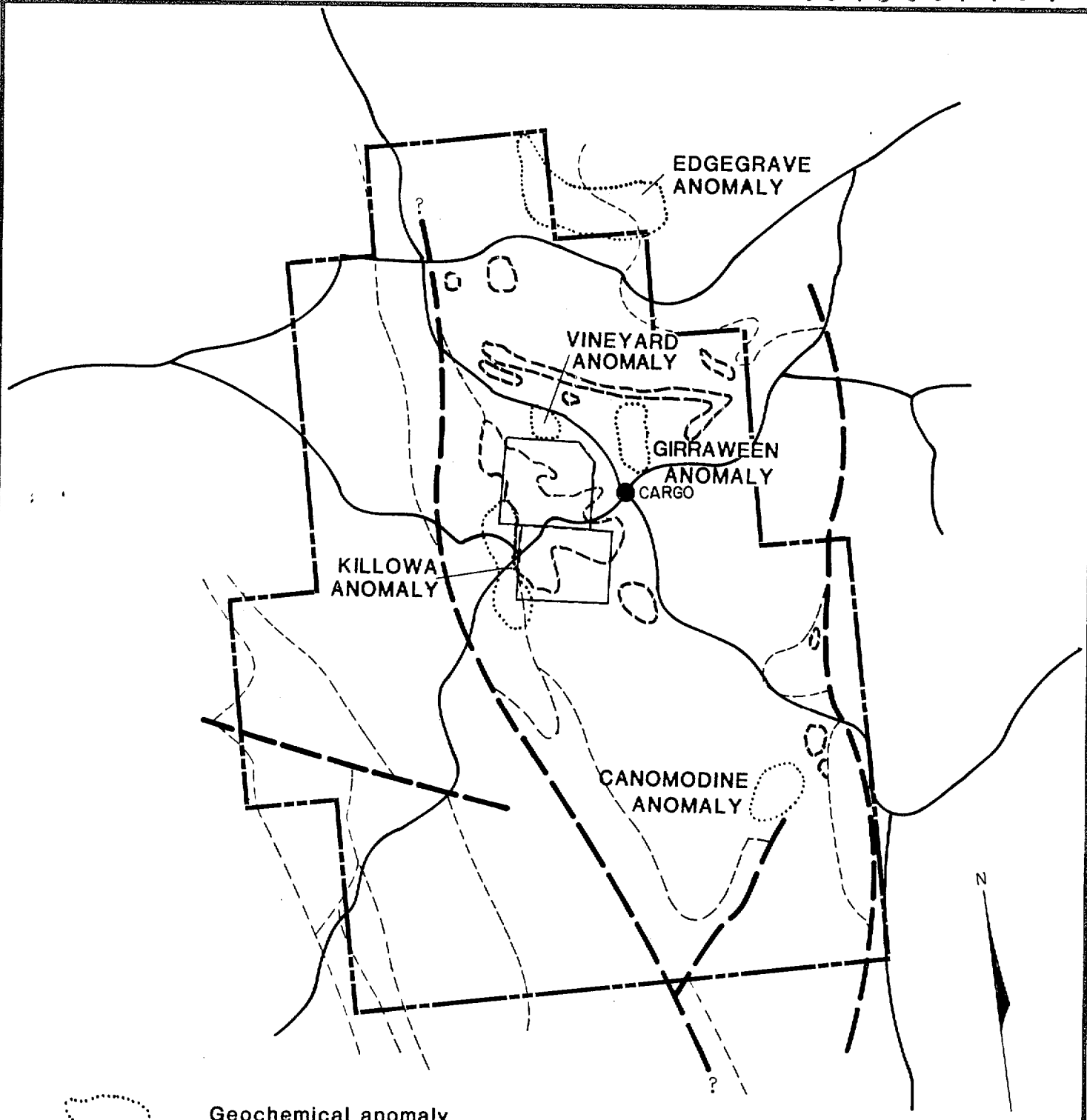
Creek

Shell PLA boundary

0 1 2 3 4 5
cm

D000630500

The Shell Company of Australia Limited METALS DIVISION	
CANOWINDRA DISTRICT NSW	
COLUMBINE EL2372	
LOCATION OF EXISTING TITLES	
SCALE 1:[illegible]	DATE MARCH 86
AUTHOR MER	DRAWN CJW
OFFICE ORANGE	REP.No.
DRG.No.O/CE03/009	FIG.No. 1



Geochemical anomaly

Alluvium

Intrusives

Cargo Creek limestone

Cargo andesite

Fault

Outline of E.L. 2372

Outline of Cargo P.L.s

Roads

0 1 2 3 4 5
cm

The Shell Company of Australia Limited METALS DIVISION	
CANOWINDRA DISTRICT NSW COLUMBINE E.L. 2372 GEOCHEMICAL ANOMALIES	
SCALE 1:100,000	DATE JULY 86
AUTHOR MFR	DRAWN CJW
OFFICE ORANGE	REP.No.
DRG.No.D/CE03/012	FIG.No.

4301× Rock chip sample site (P.Goldner)

3316× Rock chip sample site (Billiton)

3301⊢ Rock chip traverse (Billiton)

69010× Petrological specimen site

Area of RAB drilling (Billiton 87)

20○ -20# stream sediment sample and AAS gold result in ppb

Approximate outline of old alluvial workings

"VINEYARD"

AREA BEING SOIL SAMPLED

Area of fine network of veining in andesite

3305 3306 3307 3308 3309 3310 3302 3301 3304 3303 3300

4335 4336

PL 925

"GIRRAWEEN"

70 15 110

3314

3313 69010 3312 69011

Tin Dish Gully

5 40

4317 4316

Creek

Gerrybong

Orange

CARGO

CARGO SHEET ALLUVIALS

Cargo Prospect

PL 796

PL 795

4314,15

55 75 80

4310 4311

CARGO CONSOLS

GRAVEYARD GULLY

NEW ZEALANDS ALLUVIALS

4309

4313 4312 40 310

HARRIE WOOD ALLUVIALS

Essex

4308

DALCOUTH LODES

4307 4306

3330 3329 165

Cargo Creek

3332 3331 69012-19 3316 3319 3323 3321 3320 3322 3241 3324 4304 4305 15

DALCOUTH ALLUVIALS

3327 3326 3323,25 3340 3339 3338

GUM FLAT ALLUVIALS

70 680

4303 3333 4302 4301 3334 3337 3336 3335 3315

20 130

Canowindra

0 1 2 3 4 5 cm

A.G.B.W.

T.N. M.N.

Road

Track

Creek

Homestead

0 500m

D000630510

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CANOWINDRA DISTRICT N.S.W.

COLUMBINE E.L.2372

CARGO DACITE COMPLEX

RECONNAISSANCE LOCALITIES
SAMPLING
AND
FOLLOW-UP WORK

SCALE	1:10000	DATE	MAR 87
AUTHOR	MFR	DRAWN	CJW
OFFICE	ORANGE	REP No	
DRG No	O/CE03/038	FIG.No	2

GS1989/194

FROM GS NSW 1976

Breccia pipes

Significant "Reef" deposits (Qtz,py,Ser)

Very approximate extent of dacite complex

ALTERATION (After Weston, 1984)

FROM WESTON 1984

Intense potassic/sodic

Mild potassic/sodic

Phyllic

Propyllitic

Siliceous

Jasper

MOBBS SHAFT

COMMONWEALTH

CARY'S PADDOCK

GAZZARDS

F

PL 925

"GIRRAWEEN"

ALPINE REEFS NORTHWARD

GOLDEN CLAD

HOMES LINK

LONDON REEF

IRONCLAD

SCHOOL HOUSE

PL 796

Pt 795

CARGO CONSOLS

GRAVEYARD

ESSEX

PROPRIETARY

DALCOUTH

GUM FLAT

Tin Dish Gully

Gerrybong Creek

Orange

CARGO

Creek

Essex

0 1 2 3 4 5

cm

T.N. M.N.

Road

Track

Creek

0 500m

D000630520

CANOWINDRA DISTRICT NSW

COLUMBINE E.L.2372

CARGO DACITE COMPLEX

SCHEMATIC GEOLOGY ALTERATION AND MINERALISATION

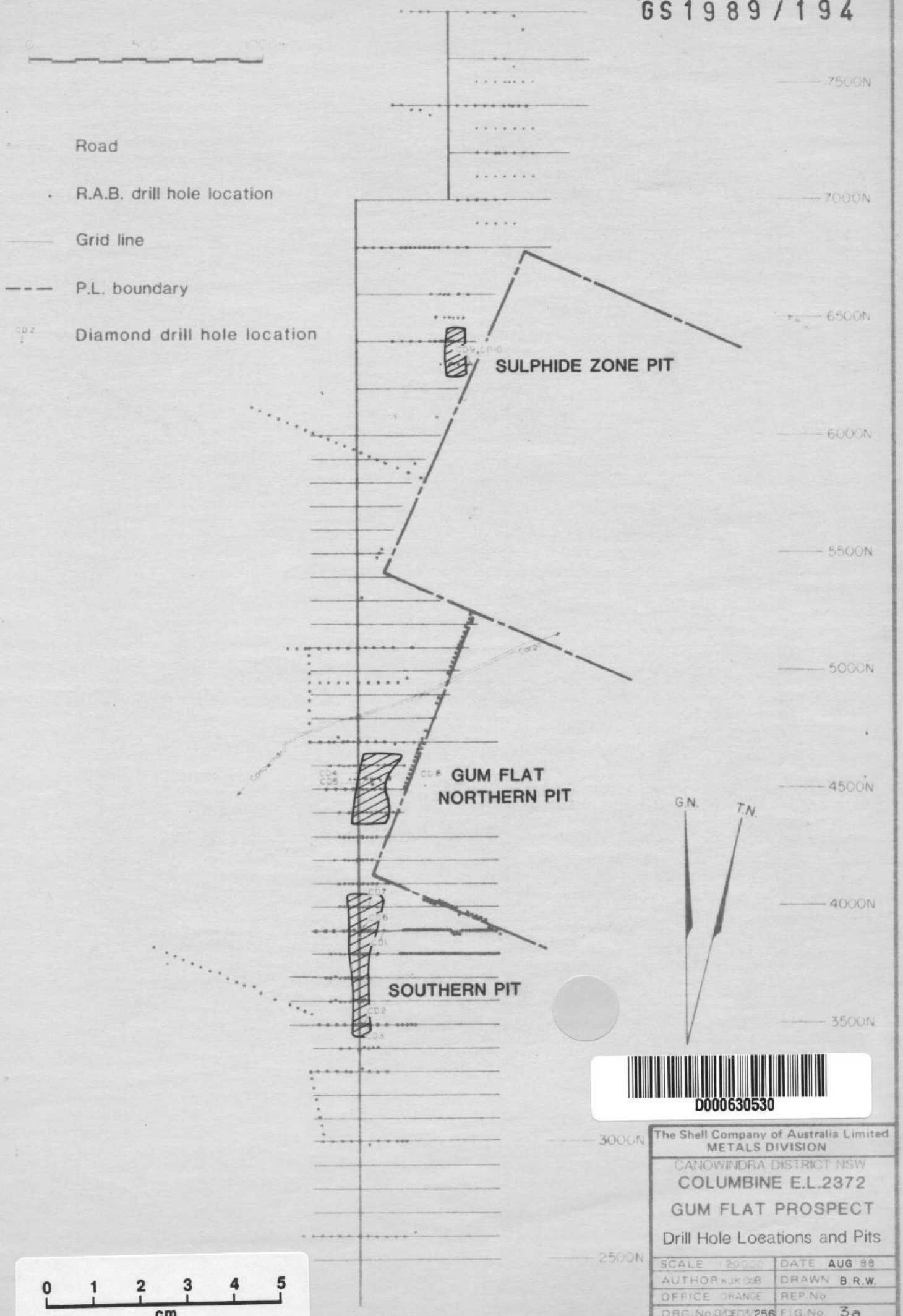
1:10000 MARCH 87

M.F.R. C.J.W.

ORANGE

O/CE03/039

GS1989/194



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METALS DIVISION

CANOWINDRA DISTRICT NSW

COLUMBINE E.L.2372

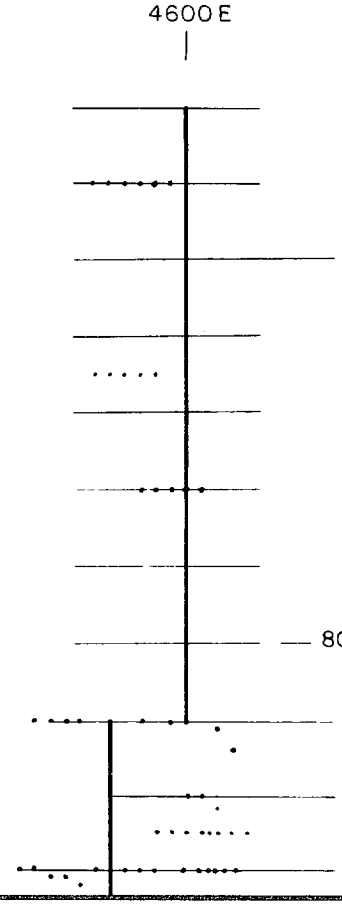
GUM FLAT PROSPECT

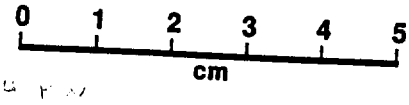
Drill Hole Locations and Pits

SCALE 1:2000	DATE AUG 88
AUTHOR KJK/GB	DRAWN B.R.W.
OFFICE ORANGE	REP.No.
DRG.No.Q/CE03/256	FIG.No 3a

A4 GS

GS1989/194





Road

R.A.B. drill hole location

Grid line

P.L. boundary

The Shell Company of Australia Limited
METALS DIVISION

CANOWINDRA DISTRICT NSW

COLUMBINE E.L.2372
GUM FLAT PROSPECT

DRILL HOLE LOCATIONS

SCALE 1:20,000	DATE MAR 88
AUTHOR KJK/DG	DRAWN B.R.W.
OFFICE ORANGE	REP.No.
DRG.No. /CE03/126	FIG.No.