Aquitaine Australia Minerals Pty. Ltd.

# OPEN FILE

E.L. 893 - 'LEGUNE'

ANNUAL REPORT

~~FOR THE PERIOD ENDING~~

30TH APRIL 1974



Distribution:

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Mines Department/Darwin

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MG: 470

July 1974

# C O N T E N T S



# F I G U R E S



1 - Appendix

## 1. SUMMARY

E.L. 893 was granted to A.A.M. on 2nd May 1973.

Geological reconnaissance confirmed the presence of Burt Range Formation in the NW corner of the E.L. Three small hills locally known as Buffalo Hill, 10 km N of Legune Homestead are the only Paleozoic outcrops in the area. Burt Range Formation (C1b) occurs there in a faulted contact with Cockatoo Formation (Duc) at the northern-most hills of the Buffalo Hill group.

Two lines of dipole-dipole IP were surveyed across the contact Duc/C1b. No IP anomaly was discovered. Results are inconclusive as the highly conductive black soil overburden appears to have prevented the electric current from penetrating into the bedrock.

Results of rotary-percussion drilling were similarly inconclusive. Nine holes were drilled but only three of them reached bedrock. The other holes had to be abandoned before they reached target depth because black mud made it impossible to keep the holes open.

It is recommended not to resume field work on E.L. 893 before results of IP work and drilling with the Foraco VPRH on the adjacent E.L. 675 become available. There we expect conditions similar to those on E.L. 893 but as we intend to proceed from SW to NE, i.e. from areas with little or no overburden to areas with gradually increasing overburden thickness, we might be able to obtain meaningful data.

An airborne magnetometer survey was carried out in March 1974 but results are not yet available. They will be included in next year's annual report.

## 2. INTRODUCTION

E.L. 893 was granted on 2nd May, 1973 (Fig. 1). The 1973 dry season saw intensive exploration activity at the margin of the Bonaparte Gulf Basin and when E.L. 893 was granted our programme was modified to include work on this E.L.

Base camp was set up near the abandoned Ochre Mine on E.L. 675. Most of our exploration activities were carried out from there.

The Annual Report on E.L. 675 (MG 341) contains some general comments regarding our exploration activities on several E.L.'s, including E.L. 893, along the margin of the Bonaparte Gulf Basin. The following report on E.L. 893 therefore refers only to work carried out on E.L. 893.

During field work on the E.L. an attempt was made to reconnoitre an area N of the E.L. There we hoped to find outcrops of Paleozoic rock, but were unable to cross the tidal flats which cover most of this area. A helicopter was not available at the time and thus we had to abandon this attempt.

## 3. EXPLORATION 1973

### 3.1 Geological Mapping

This season a major part of our work has been concerned with the mapping of the eastern margin of the Bonaparte Gulf Basin and especially the Burt Range Formation where mineralization is known to occur.

Unfortunately very little rock outcrops on E.L. 893, most of the surface being covered by Cainozoic black soil and sand (Fig. 2).

Approximately 10 km N of the Legune Homestead three small low hills locally known as Buffalo Hill were investigated.

These were the only Paleozoic outcrops found on the E.L. and the rocks are identified as Kelly's Knob Member of the Cockatoo Formation.

On the western edge of the two northern-most outcrops a calcareous quartz sandstone was tentatively identified as Burt Range Formation (Fig. 3). No fossil evidence was found to support this conclusion but later geochemical work showed that the lead and zinc content of these rocks is compatable with results found in positively identified Burt Range Formation elsewhere along the Basin margin.

The Burt Range Formation and Cockatoo Formation are separated by a brecciated highly iron and manganese stained zone which lies on a strong airphoto lineation and is interpreted as a basin margin-parallel fault. Mapping elsewhere along the basin margin has revealed several similar large faults.

## 3.2 Induced Polarization

IP has proved rather successful elsewhere in the region and thus because of the limited outcrops we decided to carry out dipole-dipole IP work at Buffalo Hill. A grid of three lines each 2 km long, separated by 1 km was surveyed to the NE of the northern-most outcrop at Buffalo Hill. Grid N was taken at 30° E of TN to parallel the lineament. The lines were positioned to cover the inferred contact Cockatoo Formation/Burt Range Formation.

Results are inconclusive. The highly conductive overburden apparently prevented the electrical current from penetrating into the bedrock. Thus the IP pseudo sections do not give any information about the bedrock under the black soil and sand.

The pseudo section of line 8000N (Fig. 4) which passes across the northern extremity of the northern-most outcrop at Buffalo Hill clearly reflects the faulted contact Duc/Clb, but line 9000N which runs parallel to line 8000N, 1000 m away failed to give any similar IP results (Fig. 5). The bedrock is therefore presumably too deep below the black soil.

The third line, line 10,000N was not covered by IP after the inconclusive results on lines 8000N and 9000N.

Contractor for the IP work was Geoterrex.

3.3 Rotary-percussion drilling

In conjunction with the IP work a programme of rotary-percussion drilling was carried out by contractor Austral United Geophysics. A total of nine holes were drilled but only three holes managed to pass through the black mud and these were located very close to, or on outcrops.

The problem with the black mud is that it makes it impossible to keep a drill hole open. As soon as the drill bit is lifted off the bottom of the hole, the walls collapse. If the drillers succeed and eventually reach a depth of 20 m or so, as in hole 9000N/5000E, the hole nevertheless has to be abandoned because of the viscous black mud which can not be blown out of the hole.

Drilling might only be successful with a diamond drill rig or a Foraco VPRH.

## 4. CONCLUSIONS AND RECOMMENDATIONS

The Burt Range Formation which is our main target within the Paleozoic sediments, appears to occur only in the NW corner of the E.L. The Bonaparte Gulf Basin margin i.e. the disconformity between the Proterozoic and the Paleozoic is obviously further NW than shown by Veevers & Roberts (1968). Thus only a limited area within the E.L. appears to have potential for sedimentary Pb/Zn mineralization.

Results of exploration in this area are inconclusive. Neither IP nor rotary-percussion drilling penetrated down to bedrock. Geochemical results of the few outcrops and sub-outcrops are not very encouraging.

Exploration in the area is severly hampered by the very thick overburden and lack of outcrops. It is therefore recommended to await results of exploration in the NE of E.L. 675 before engaging in further ground exploration on E.L. 893. It is planned to survey dipole-dipole IP lines with systematic spacing on E.L. 675. These lines, surveyed from SW to NE should encounter increasing thicknesses of overburden and finally conditions like on E.L. 893. It is hoped that the IP contractor can develop a technique which enables him to penetrate to the bedrock and to obtain meaningful data.

As far as drilling is concerned it is apparent that a normal rotary-percussion drill cannot succeed in the black soil and mud. Diamond drilling is too costly to be used for reconnaissance work. The only alternative at the moment appears to be the Foraco VPRH. This machine recovers the drill cuttings through the drill rods. Thus no collapsing of drill holes can occur because the drill rods function

as casing. It is however to be feared that the drill rods will be settling so solidly in the black mud due to the vibrating of the drill rig that they cannot be retrieved.

An airborne magnetometer survey was carried out in March 1974. The resulting contour maps are not available as yet but should eventually give valuable information regarding the shape of the basin margin.

## 5. REFERENCES


RAMDOHR, R. (November 1973) — Exploration Licence 675 Annual Report for the year ending 1st November, 1973 (MG 341).

VEEVERS, J.J. & ROBERTS, J. (1968) — Upper Paleozoic Rocks, Bonaparte Gulf Basin of North-Western Australia Bureau of Mineral Resources, Geology and Geophysics, Bulletin 97.


R. RAMDOHR

P. D'AUVERGNE

## 6. APPENDIX

Logs of the following rotary-percussion drill holes are attached:

8000N/4700E
8000N/4950E
8000N/5000E
9000N/5000E
10000N/4800E
10000N/5000E
BH 1
BH 2
BH 3

AQUITAINE AUSTRALIA MINERALS PTY. LTD.

# DRILLING LOG

| | | |
|---|---|---|
| PERMIT<br>E.L. 893<br>STATE<br>N.T. | P.D.H. BUFFALO HILL (VARIOUS)<br>Location See below<br>Azimuth<br>Depression Vertical | Hole drilled by Austral United<br>Hole started 1.8.73<br>Hole completed 4.8.73<br>Hole logged by P. d'Auvergne |

| DEPTH (metres) | SAMPLE NUMBER | DESCRIPTION | ASSAYS Pb (%) | Zn (%) | |
|---|---|---|---|---|---|
| | | All holes failed to penetrate the black sandy alluvium in which they were collared. The alluvium proved very difficult to drill because of its liquidity.<br><br>In each case only the bottom 2m sample from each hole was analysed.<br><br>Hole numbers, depths attained and analysis results are shown below | | | |
| 0-6 | 2465 | BH 8000N/4700E | .0044 | .0036 | |
| 0-21 | 2472 | BH 9000N/5000E | .0032 | .0028 | |
| 0-8 | 2473 | BH 10000N/5000E | .0016 | .0012 | |
| 0-10 | 2474 | BH 10000N/4800E | .0018 | .0020 | |
| 0-14 | 2479 | BH 2 | .0018 | .0020 | |
| 0-10 | 2480 | BH 3 | .0120 | .0270 | |

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# DRILLING LOG

| | | |
|---|---|---|
| PERMIT<br>E.L. 893<br>STATE<br>N.T. | P.D.H. BH 8000N/4950E<br>Location BUFFALO HILL<br>Azimuth<br>Depression Vertical | Hole drilled by Austral United<br>Hole started 1.8.73<br>Hole completed 1.8.73<br>Hole logged by R. Ramdohr<br>P. d'Auvergne |

| DEPTH (metres) | SAMPLE NUMBER | DESCRIPTION | ASSAYS Pb (%) | Zn (%) |
|---|---|---|---|---|
| 0-2 | NFA | Black sandy soil | | |
| 2-4 | 2466 | Brown coarse grained qtz sdst. | .0024 | .0072 |
| 4-6 | NFA | As above | | |
| 6-8 | 2467 | White & pink slightly calc. qtz sdst. Some Mn nodules | .0016 | .0080 |
| 8-10 | NFA | As above | | |
| 10-12 | 2468 | Red-brown & whitish coarse grained qtz sdst. Some Mn nodules | .0018 | .0100 |
| 12-14 | NFA | As above | | |
| 14-16 | 2469 | Yellow-brown friable coarse grained qtz sdst. Some pink medium grained qtz sdst | .0074 | .0098 |
| 16-18 | NFA | As above | | |
| 18-20 | 2470 | As above | .0012 | .0054 |
| 20-22 | 2471 | As above | .0024 | .0036 |
| | | Hole abandoned because collapse of walls prevented progress | | |

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# DRILLING LOG

| | | |
|---|---|---|
| PERMIT E.L. 893 STATE N.T. | P.D.H. BH 8000N/5000E<br>Location 'BUFFALO HILL'<br>Azimuth<br>Depression Vertical | Hole drilled by Austral United<br>Hole started 1.8.73<br>Hole completed 1.8.73<br>Hole logged by R. Ramdohr |

| DEPTH (metres) | SAMPLE NUMBER | DESCRIPTION | ASSAYS Pb (%) | Zn (%) | |
|---|---|---|---|---|---|
| 0-2 | NFA | Sand and gravel, brown black sandstone, yellow-red; siltstone, argillaceous dolomitic | | | |
| 2-4 | 2457 | | .0054 | .0220 | |
| 4-6 | NFA | | | | |
| 6-8 | 2458 | As above, little clay | .0050 | .0180 | |
| 8-10 | NFA | | | | |
| 10-12 | 2459 | Sandstone, yellow, friable, with Mn spots and nodules | .0022 | .0076 | Watertable (fresh water) |
| 12-14 | NFA | | | | |
| 14-16 | 2460 | As above, limonitic, argillaceous | .0030 | .0120 | |
| 16-18 | NFA | | | | |
| 18-20 | 2461 | Sandstone, multicoloured, quartzose Mn coatings (fault breccia ?) | .0024 | .0078 | |
| 20-22 | NFA | | | | |
| 22-24 | 2462 | Sandstone, quartzose and laminated sandstone, Mn coatings, nodules | .0024 | .0080 | |
| 24-26 | NFA | | | | |
| 26-28 | 2463 | Quartz-sandstone, white, yellow in parts laminated, dolomitic, Mn nodules | .0026 | .0098 | |
| 28-30 | 2464 | | .0038 | .0130 | |

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# DRILLING LOG

| | | |
|---|---|---|
| PERMIT E.L. 893 | P.D.H. BH 1 | Hole drilled by Austral United |
| STATE N.T. | Location BUFFALO HILL | Hole started 3.8.73 |
| | Azimuth | Hole completed 3.8.73 |
| | Depression Vertical | Hole logged by P. d'Auvergne |

| DEPTH (metres) | SAMPLE NUMBER | DESCRIPTION | ASSAYS Pb (%) | ASSAYS Zn (%) |
|---|---|---|---|---|
| 0-2 | NFA | Black soil & white medium grained angular calc. qtz sand | | |
| 2-4 | 2475 | White friable medium grained angular qtz sdst | .0024 | .0094 |
| 4-6 | NFA | Yellow-brown friable medium grained angular highly calc. qtz sdst | | |
| 6-8 | 2476 | As above | .0024 | .0110 |
| 8-10 | NFA | As above. Becoming more indurated | | |
| 10-12 | 2477 | As above | .0016 | .0062 |
| 12-14 | NFA | As above. Locally ferruginous | | |
| 14-16 | 2478 | Brown & White open textured medium grained subrounded to rounded calc qtz sdst. | .0010 | .0070 |
| | | Hole abandoned because of extremely high water inflow causing washout of walls. | | |

10382 MG 357

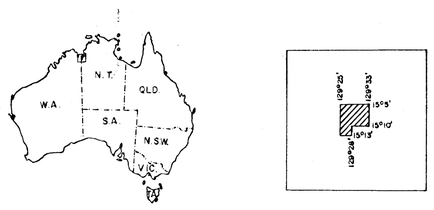
AQUITAINE AUSTRALIA MINERALS PTY. LTD. FIG. 2.

# EL893
## LEGUNE

# GEOLOGICAL MAP

Scale 1/25,000

KILOMETRES 1 .5 0 1 1.5 2 2.5 KILOMETRES







| | | |
|---|---|---|
| DATE 23-10-73 | AUTHOR CKD. P.J. Auvergne | ADMTS. |
| DRN. BY S. WILLIAMS | DEPT. Mineral Geology | |
| DRG. CKD. | BASE MAP | |

CR74/29

## LEGEND

| | | | |
|---|---|---|---|
| CAINOZOIC | Undifferentiated | Czs | sand |
| | | Czb | black soil |
| LOWER CARBONIFEROUS | Burt Range Fm. | Clb | quartz sandstone, calcareous |
| UPPER DEVONIAN | Kellys Knob Sandstone | Duk | quartzitic sandstone |

Queens Channel

EL 675 | EL 893

129°33'

15°5'

See enlargement of this area – Fig. 3

Fault Contact

Clb

Duk

Czb

Czs

Line 10000 N

Line 9000 N

Line 8000 N

"Buffalo Hill"

Clb

Duk

Duk

Duk

Sweetwater Bore

EL 675

Czs

track

EL 675
EL 893

Legune Homestead

Kununurra

15°13'

15°10'

129°33'

129°25'

129°28'

AQUITAINE AUSTRALIA MINERALS PTY. LTD. FIG. 3.

# EL893

## BUFFALO HILL AREA

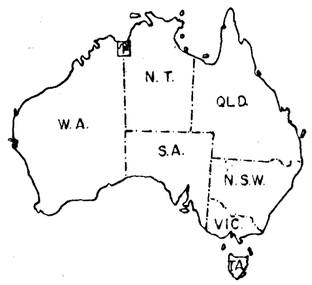
# GEOLOGICAL MAP

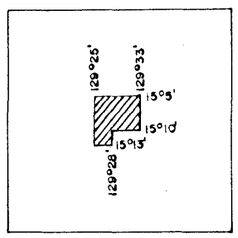
## INSET TO FIGURE 2



Scale 1/10,000

KILOMETRES 0·1 0·2 0 0·2 0·4 0·6 0·8 KILOMETRES




| | | |
|---|---|---|
| DATE 1-11-73 | AUTHOR CKD. P d'Auvergne d'a | ADMTS. |
| DRN. BY S. WILLIAMS | DEPT. Mineral Geology | |
| DRG. CKD. | BASE MAP | |

## LEGEND

| | | | |
|---|---|---|---|
| LOWER CARBONIFEROUS | Burt Range Fm. | Clb | quartz sandstone, partly calcareous |
| UPPER DEVONIAN | Kellys Knob Sandstone | Duk | quartz sandstone, contains pebble horizons |

13° Strike and dip of strata

× × × × Highly ferruginous and manganiferous fault breccia

Fault showing dip of fault plane

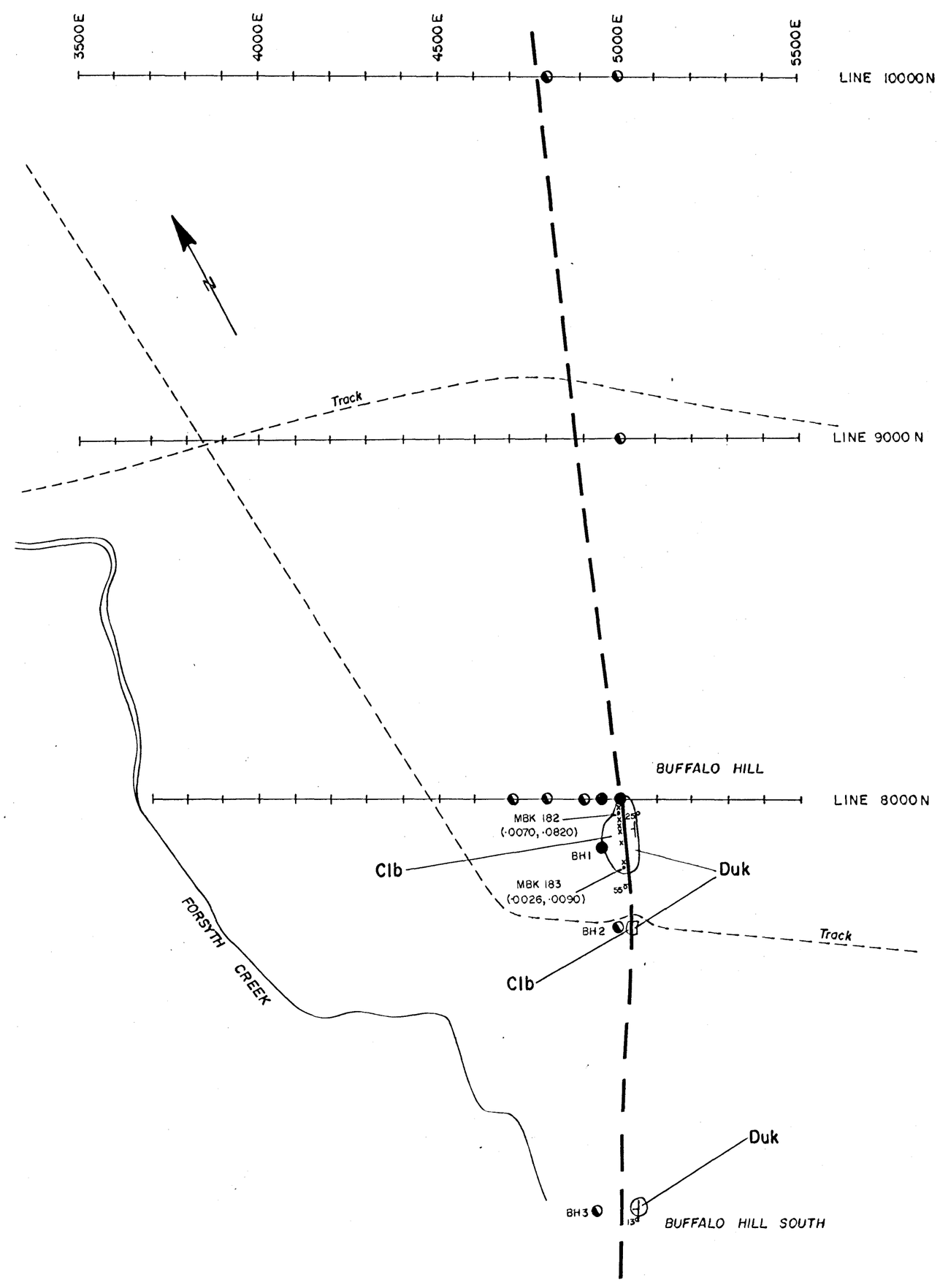
Grid line

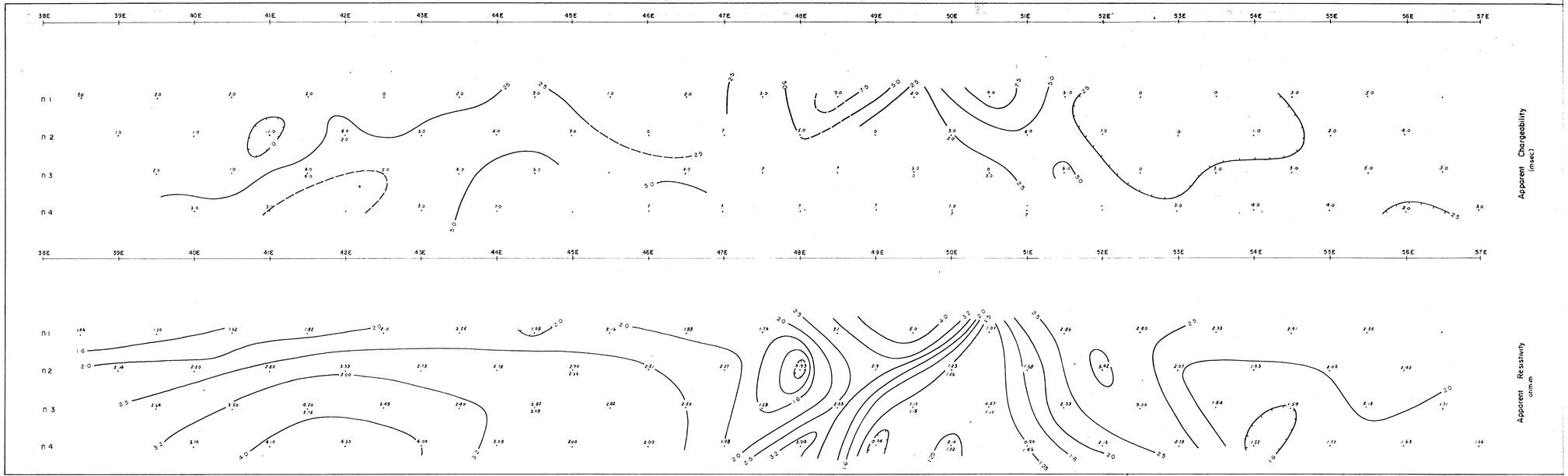
Rotary percussion drill hole which failed to penetrate alluvium

Rotary percussion drill hole which penetrated to bedrock

BH 1 Number of drill hole not drilled on grid line

• MBK 182 (·0070, ·0820) Rock chip, sample number ( % Pb, % Zn)



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AQUITAINE AUSTRALIA MINERALS PTY. LTD. FIG. 4.

EL 893

# BUFFALO HILL

## PSEUDO-SECTION

## PROFILE 8000N

DIPOLE DIPOLE ARRAY DIPOLE LENGTH 100m

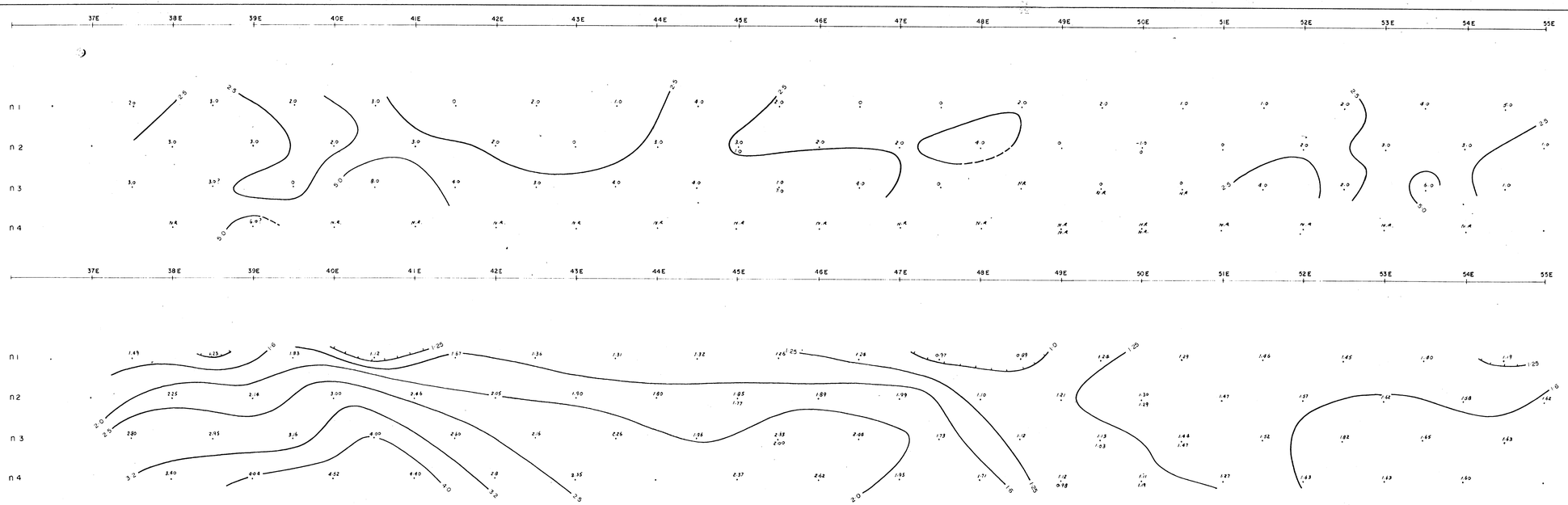
Time on 4 secs Time off 4 secs

SCALE 1 2500

LEGEND

- Plotting point
- 46 Value of Apparent Resistivity in ohm-m
- 99 Value of Apparent Chargeability in msec
- 40 Contour of equal value of Apparent Resistivity
- 10 Contour of equal value of Apparent Chargeability
- Apparent Resistivity contour interval logarithmic
- Apparent Chargeability contour interval 2.5msec

GEOTERREX - SYDNEY




10534 M0357

AQUITAINE AUSTRALIA MINERALS PTY. LTD. FIG. 5.

EL 893

# BUFFALO HILL

## PSEUDO-SECTION

## PROFILE '9000N

DIPOLE DIPOLE ARRAY DIPOLE LENGTH 100m

Time on 4 secs Time off 4 secs

SCALE 1 2500

LEGEND

- Plotting point
- Value of Apparent Resistivity in ohm-m
- Value of Apparent Chargeability in msec
- 40 — Contour of equal value of Apparent Resistivity
- 10 — Contour of equal value of Apparent Chargeability
- Apparent Resistivity contour interval : logarithmic
- Apparent Chargeability contour interval : 2·5msec

GEOTERREX - SYDNEY