

BILLITON AUSTRALIA
THE METALS DIVISION OF THE
SHELL COMPANY OF AUSTRALIA LIMITED

EL 4816 BOOMLERA SIDING
ANNUAL REPORT FOR THE PERIOD ENDING

AUTHOR: C.R. MACKAY REPORT NO.: 08.4167
DATE : 13TH SEPTEMBER, 1989 COPY NO. 1 : 1.

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SUMMARY

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SUMMARY

Exploration Licence (EL) 4816, Boomlera Siding is located some 22km north-west of Pine Creek.

The tenement is underlain by interbedded siltstone, shale and greywacke of the Early Proterozoic Burrell Creek Formation of the Finnis River Group. This sequence is wedged between intrusions of the Early Proterozoic Cullen Batholith which occur to the north-east and south-west.

The mineralisation occurs in a major zone of shearing, the Pine Creek Shear Zone, which can be traced for a considerable distance to the north-west and south-east and which hosts major gold mineralisation at Pine Creek (Enterprise), Union Reefs, Spring Hill, Woolwonga and Goodall.

Work to date has consisted of stream sediment sampling, soil sampling, ground and aeromagnetics, mapping/rock chipping and one programme of drilling.

No economically mineralised targets have been intercepted to date, however, recent stream sediment samples have indicated the presence of gold source in the licence area.

1.0

INTRODUCTION

Exploration Licence 4816, Boomlera Siding was granted to Coronation Hill Gold Mines NL on the 13th August 1987 for a period of three (3) years. The Shell Company of Australia Limited, entered into a Joint Venture agreement with Coronation Hill Gold Mines (McKinlay Joint Venture) which included EL 4816, on the 1st July 1988.

This report details the work completed and results gained by Billiton Australia, The Metals Division of The Shell Company of Australia Limited, on behalf of the McKinlay Joint Venture, during the year ended 13th September 1989.

This report excludes any results on work completed on a number of MCN's and MLN's controlled by the Joint Venture within EL 4816. These tenements will be subject to a separate Annual Report that is due at the Mines Department on the 31st December 1989. As a result these tenement areas have been blocked out on plans included in this report.

EL 4816 was reduced by one sub-block on the 13th July 1989 due to negative exploration results and to meet Mines Department relinquishment requirements (See Figure 1).

2.0

LOCATION & ACCESS

The licence area presently consists of two sub-blocks and is situated about 22km north-west of Pine Creek.

Access is best achieved via the Spring Hill Road through a number of tracks which connect with the McKinlay (Ag - Pb) workings to the north and the Elizabeth (Au) and Flora Belle (Ag - Pb) workings to the south.

3.0

GEOLOGY

The tenement is underlain by interbedded siltstones, shales and greywackes of the Early Proterozoic Burrell Creek Formation of the Finnis River Group. The Burrell Creek Formation is extensively deformed, with evidence of at least three major episodes of deformation. There is also some evidence of shearing, probably related to the major north-north westerly trending Pine Creek Shear Zone.

The geology of the tenement has been described in considerable detail in the Annual Report for Exploration Licence 4816 by Coronation Hill Gold Mines NL, September 1988, and this information will not be repeated here. Readers are referred to this report for details on stratigraphy, depositional environment, thermal history and structural history.

13° 37'

MT. WELLS
(abandoned) railway


EL 4816

PINE CREEK.

SUB BLOCK
RELINQUISHED
12/7/89.

13° 40'

13° 44'

| | | | |
|---|--------|---------|--------------------|
|  Billiton Australia <small>The Metals Division of the Steel Company of Australia Limited</small> | | | |
| Project MCKINLAY J.V. | | | |
| Title BOOMLERA SIDING (EL. 4816) LOCATION PLAN. | | | |
| Author GM. | Date | Scale | |
| Drawn | Office | Revised | Date |
| Drawing No. | | | Fig. No. 1. |

4.0

MINERALISATION

EL 4816 encompasses several known mineralised zones - the Elizabeth, a small gold reef mine, two small silver-lead mines, the Flora Belle and the McKinlay, alluvial deposits along the McKinlay Rivers and small scattered alluvial gold deposits.

These mines are described in the above mentioned report and will not be described in detail here.

5.0

WORK COMPLETED

5.1 Background

Early work in the Boomlera Siding area consisted of several geological traverses and brief visits to the major old workings. From this it was decided that the more brittle greywacke units were more likely to host significant tonnages of mineralisation than the shale/siltstone units.

It appeared that what is now known as the Su Ah Ray prospect was the most extensive zone of veined greywacke and so some uncontrolled composite rock chip traverses were collected over approximately 20 - 30m intervals on approximately 100m spaced lines along the top of the major ridge. Values of 0.08, 0.91, 0.08, 0.02, 0.63, 0.13, 0.03 and 0.03 g/t Au were returned and uncontrolled BCL stream sediment sampling around the ridge returned values ranging from 0.75 to 11.5 ppb Au.

After this work was completed a report on work conducted by Zapopan was received (Allen, 1988) and this indicated that the same ridge (Su Ah Ray prospect) had been selectively rock chip sampled and values up to 5.4 g/t Au had been returned over at least 200m of strike.

It thus appeared that the Su Ah Ray prospect was the highest priority target area and hence it was decided to focus attention onto this area.

5.2 Su Ah Ray Prospect

5.2.1 Geological Mapping & Rock Chip Sampling

The Su Ah Ray Prospect was subsequently gridded on a 200m line spacing and geologically mapped at 1:5000 scale (See Figures 2 and 3). As can be seen, the geology consists of a complex sequence of interbedded siltstone, shales and greywacke which have all been effected by a north-westerly trending zone of shearing. Several zones of sheeted to stockwork quartz-limonite veining were defined, the major zone occurring along the crest of the main ridge with two major subsidiary zones occurring on the western flank of the main ridge. Occasional small pits and shallow shafts occur on all these zones and significant workings occur along the western most zone within a small mining lease not controlled by the joint venture.

Rock chipping of this veining while mapping returned best gold values of 0.96, 0.37, 0.31 g/t and 0.95 g/t Au. Some encouraging base metal results were obtained from veining in workings along strike of the Old McKinlay Ag - Pb Mine with values up to 1350 g/t Ag and 4.40% Pb.

5.2.2 Soil Sampling

Composite 2kg BCL and 80# soil samples over 50m were taken over the gridded area. Samples were analysed for Au, Ag, Pb, Zn, Cu and As. Results are presented in Figures 4 and 5. It can be seen that all three major zones of quartz-limonite veining are associated with areas recording greater than 8 ppb Au in soils, the main zone anomaly occurring consistently over a strike length of approximately 1.6 km, the subsidiary zones being less continuous. An area of anomalous gold to the west is associated with old dry blowings and may be an alluvial or eluvial concentration. The low tenor of the anomalies may be due to the discontinuity and limited width of the systems.

The -80# sampling reveals coincident Pb and As anomalies with the main gold anomalies (except for the western zone - possibly adding support to an alluvial origin) with some anomalous Ag and Zn. The old Ag - Pb workings are also highlighted by the -80# sampling.

5.2.3 Ground Magnetics

A ground magnetic survey was conducted over the gridded area (Figure 6) revealing that the main zones of quartz-limonite veining are magnetically inactive. Two major north-westerly trending magnetic highs occur, one on either side of the main mineralised zones. The source of these anomalies is not obvious on the surface.

5.2.4 Drilling

An open hole percussion programme was drilled at Su Ah Ray in October 1988. A total of 1120m in twelve holes were drilled in targets defined by the previous soil sampling and grid mapping. The majority of holes drilled showed little promise with only minor quartz veining and rare sulphides being encountered. Gold results were consistently low, commonly less than 0.01 ppm Au (below detection). Any higher results corresponded to only very narrow zones, no greater than 1m in width (See Figures 7 to 12).

Base metal results were more encouraging with zones of anomalous Ag, Pb and Zn being intersected in several holes. One exceptionally good base metal intersection of 11m at 327 g/t Ag and 2.8% Pb was obtained in MP12 corresponding to a zone of galena mineralisation (See Figures 13 to 18).

Below are tables summarising the best basemetal and gold results received in the programme :-

a) GOLD

| HOLE NUMBER | INTERSECTION |
|-------------|---------------------------------|
| MP2 | 1m @ 8.01 g/t |
| MP4 | 1m @ 1.21 g/t |
| MP5 | 2m @ 0.70 g/t and 3m @ 0.50 g/t |
| MP6 | 2m @ 0.40 g/t |
| MP7 | 2m @ 1.20 g/t and 1m @ 0.98 g/t |
| MP8 | 1m @ 0.98 g/t |
| MP10 | 1m @ 0.86 g/t |

b) **BASE METALS**

| HOLE NUMBER | INTERSECTION |
|-------------|---|
| MP2 | 13m @ 1.16% Zn or 2m @ 3.33% Zn |
| MP11 | 3m @ 29 g/t Ag, 2.11% Pb and 1.05% Zn |
| MP12 | 11m @ 327 g/t Ag, 2.8% Pb or 8m @ 406g/t Ag, 3.4% Pb |

Further limited ground follow-up in the Su Ah Ray prospect of some of the more encouraging drill intercepts returned relatively discouraging results. Follow-up of the 11m base metal intercept in MP12 reveal mineralisation at surface with a true width of a maximum of 4m and strike potential of less than 100m. A rock chip from this mineralisation confirmed good base metal grades with 40% Pb being assayed. However, the size potential for this mineralisation seems extremely limited.

Further rock chip samples were taken from the crest of the Su Ah Ray ridge to try and repeat Zapopan's 3 - 5 g/t Au results and investigate whether drilling in the area may of missed a zone of economic mineralisation. Results of this rock chipping were again disappointing with a best gold result of 1.98 g/t Au from a narrow quartz vein and average results of only 0.05 g/t Au.

Due to the negative results obtained, at present no further work is planned for the Su Ah Ray prospect.

5.3 Stream Sediment Sampling

Following the lack of encouragement from the Su Ah Ray grid area work at Boomlera Siding was re-directed to more regional exploration in the rest of the licence area.

Some 30 BCL Au and -80# Ag, Pb, Zn, Cu and As stream sediment samples were taken throughout the EL area. Sampling in the southern portion of Boomlera Siding was hampered due to poor relief.

The results of the -80# sampling were all quite low. BCL gold results, however, delineated several anomalous drainage areas. Elevated results (i.e., 38.3 and 43.7 ppb Au) drain the Su Ah Ray prospect in a tributary of the McKinlay River. A 131 ppb Au result was initially obtained down stream from there samples. A repeat sample was taken along with two further samples 200m and 400m up-stream, as it was suspected the source may be fill used for the North Australia Railway. The repeat sample recorded 221 ppb Au while the up-stream samples gave 194 and 172 ppb Au results respectively. Detailed follow-up of this anomalous area is presently underway (Figures 19 and 20).

5.4 Regional Mapping/Rock Chipping

Regional mapping and rock chipping has been carried out in Boomlera Siding west of Su Ah Ray. Ridges along strike from the Elizabeth gold workings and anomalous stream sediment catchment areas were followed-up. Results to date have been relatively poor with best gold rock chips at 0.29 and 0.23 g/t Au from stockwork quartz veining never wider than 1m. Rock chip results from areas of follow-up around the 131 ppb Au stream sediment sample are awaited, further follow-up work is expected.

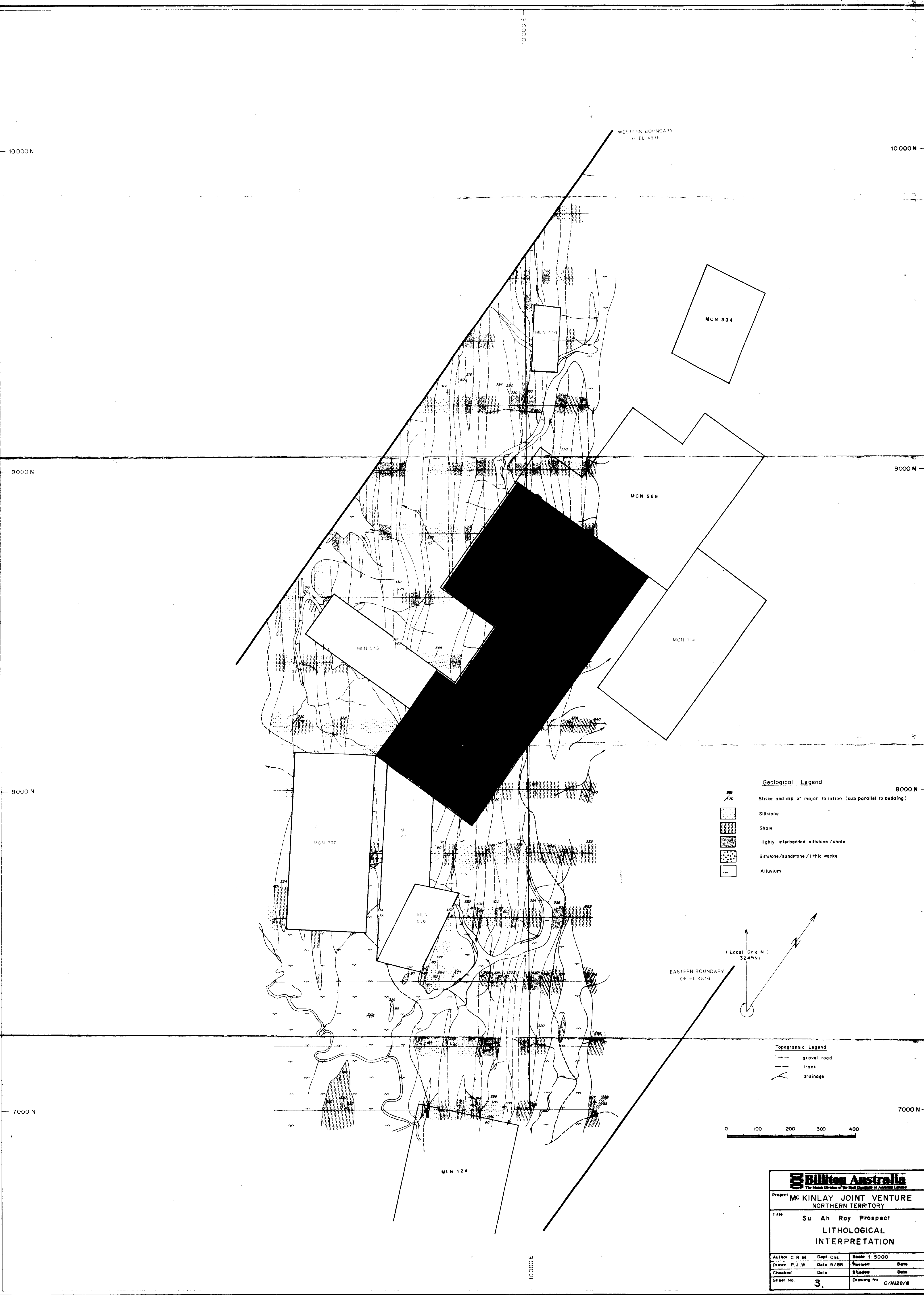
5.5 Aeromagnetics

The results from aeromagnetic data purchased that covers Boomlera Siding were relatively negative. No discrete aeromagnetic targets were delineated. Magnetic signature closely follow changes in lithology in units of the Burrell Creek Formation in Boomlera Siding.

6.0 CONCLUSIONS

It appears from the work conducted to date at Boomlera Siding that the possibility for significant economic gold resource being found at Su Ah Ray Prospect has been considerably down-graded due to the negative drilling results obtained. The possibility of finding a small, high grade base metal resource is yet to be discounted.

The greatest potential in Boomlera Siding lies outside Su Ah Ray and is related to the significant stream sediment sample BCL Au results obtained in a tributary off the McKinlay River. Detailed follow-up in these areas is presently underway.



Geological Legend

- Strike and dip of major foliation (sub parallel to bedding)
- Siltstone
- Shale
- Highly interbedded siltstone/shale
- Siltstone/sandstone/lithic wacke
- Alluvium

Topographic Legend

- gravel road
- track
- drainage

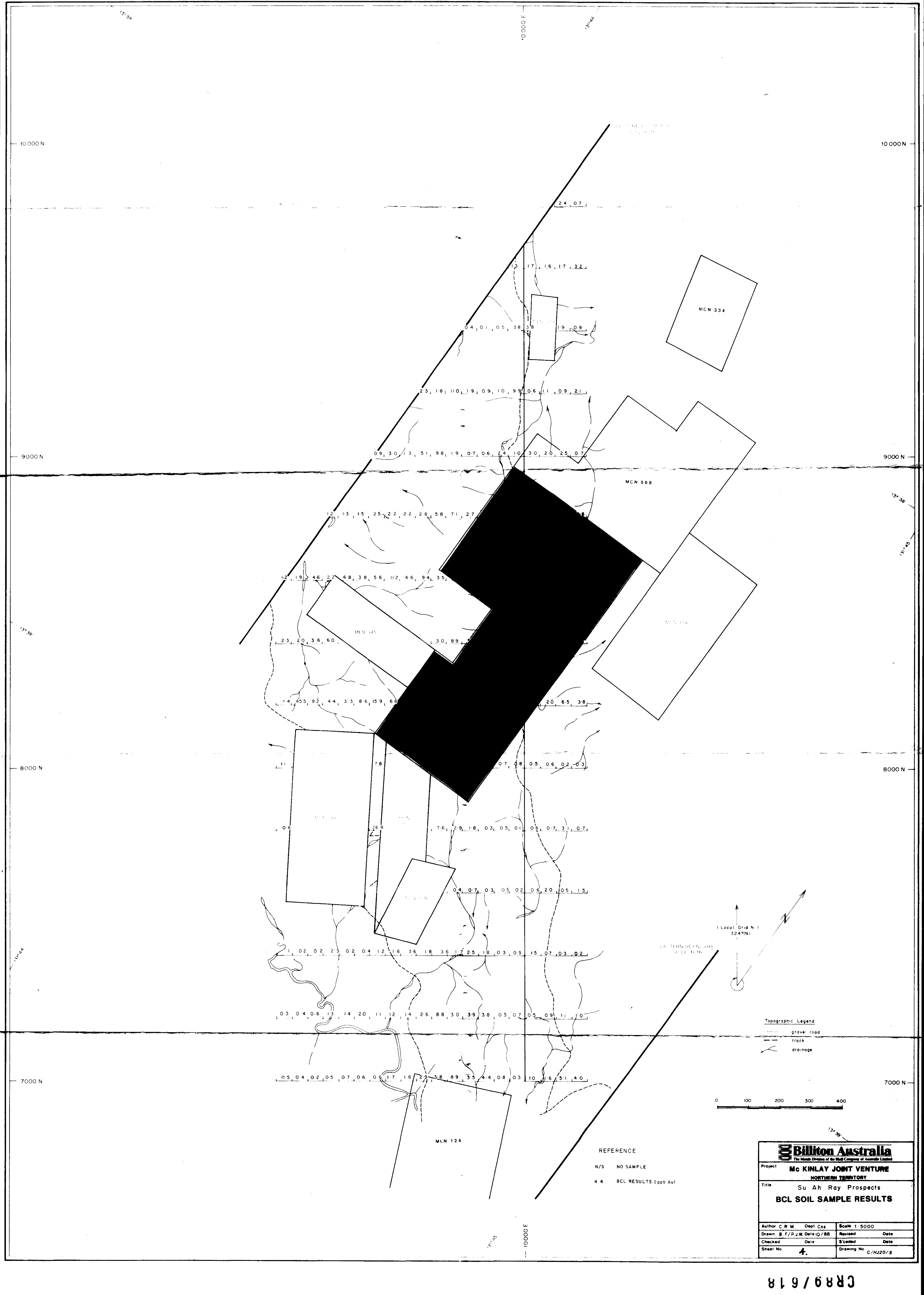
(Local Grid N 1 324°N)

EASTERN BOUNDARY OF EL 4816

0 100 200 300 400

| | | | |
|--|------------|---------------|----------------------|
| Billiton Australia The Metals Division of the BHP Group of Australia Limited | | | |
| Project: McKINLAY JOINT VENTURE NORTHERN TERRITORY | | | |
| Title: Su Ah Roy Prospect LITHOLOGICAL INTERPRETATION | | | |
| Author: C.R.M. | Dept. Cns: | Scale: 1:5000 | |
| Drawn: P.J.W. | Date: 9/88 | Revised: | Date: |
| Checked: | Date: | Staded: | Date: |
| Sheet No: | 3. | | Drawing No: C/HJ20/8 |

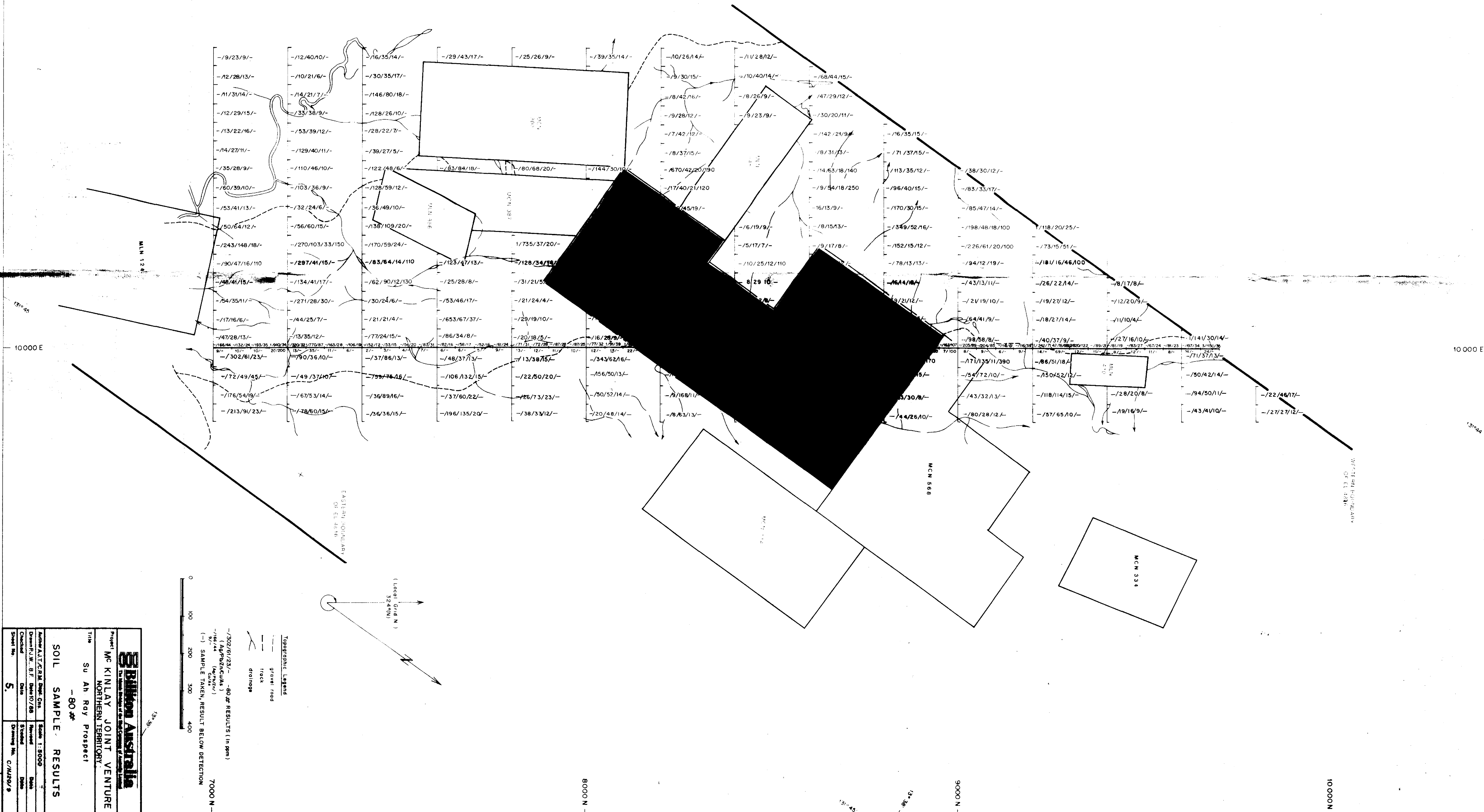
819/6830

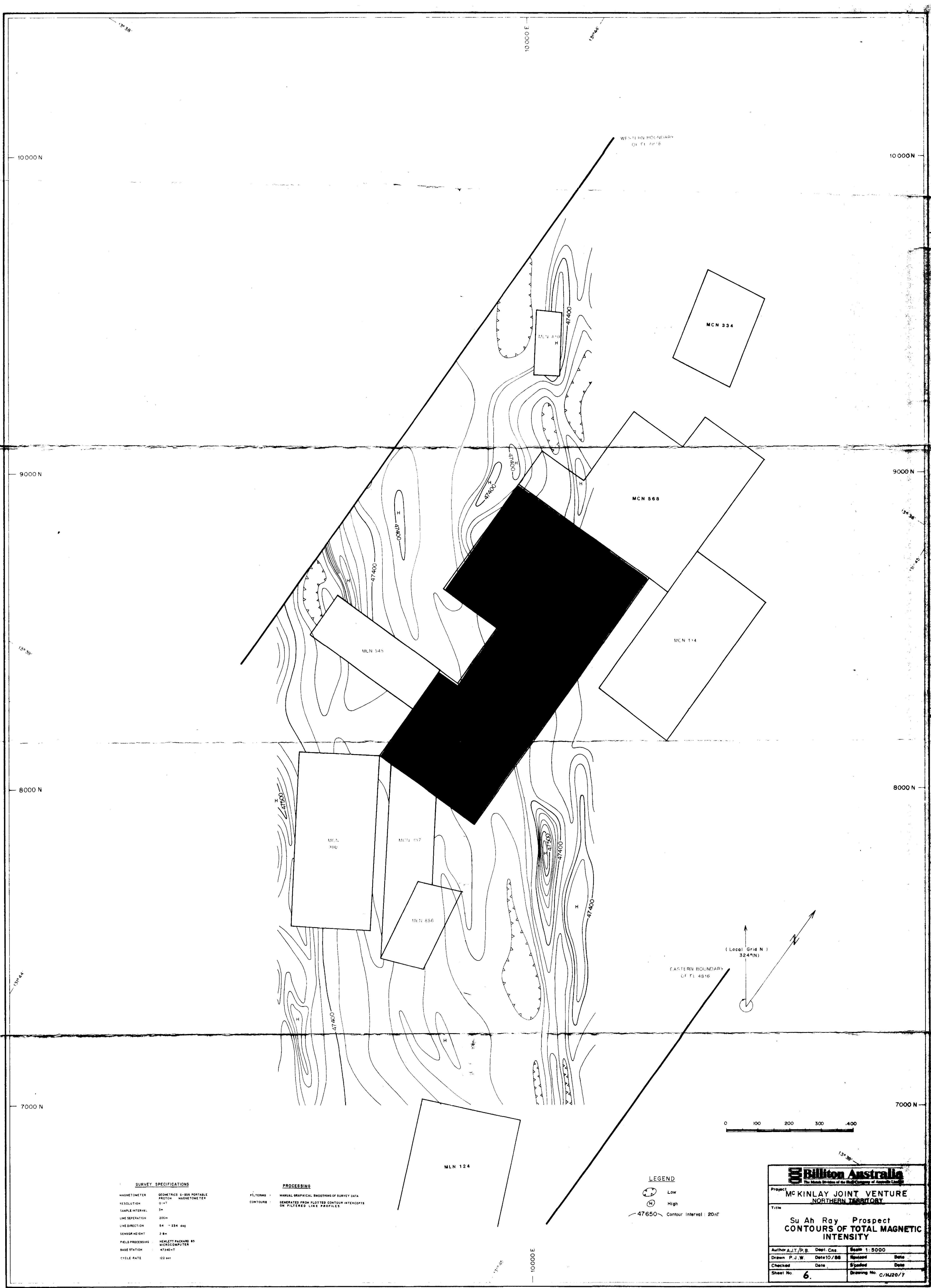


| REFERENCE | |
|-----------|----------------------|
| N/S | NO SAMPLE |
| 4.4 | BCL RESULTS (ppb Au) |

| | | | |
|--|----------------------------|--------------|------|
| Billiton Australia The Metals Division of the BHP Company of Australia Limited | | | |
| Project Mc KINLAY JOINT VENTURE NORTHERN TERRITORY | | | |
| Title Su Ah Ray Prospects BCL SOIL SAMPLE RESULTS | | | |
| Author C.R.M. | Dept. Cns | Scale 1:5000 | |
| Drawn B.F./P.J.W. | Date 10/88 | Revised | Date |
| Checked | Date | S'ced | Date |
| Sheet No 4. | Drawing No C/HJ20/8 | | |

CR89/618





SURVEY SPECIFICATIONS

MAGNETOMETER: GEOMETRICS 6-885 PORTABLE PROTON MAGNETOMETER
RESOLUTION: 0.1 nT
SAMPLE INTERVAL: 5m
LINE SEPARATION: 200m
LINE DIRECTION: 04 - 034 deg
SENSOR HEIGHT: 2.8m
FIELD PROCESSING: HEWLETT PACKARD 85 MICROCOMPUTER
BASE STATION: 47540 nT
CYCLE RATE: 120 Hz

PROCESSING

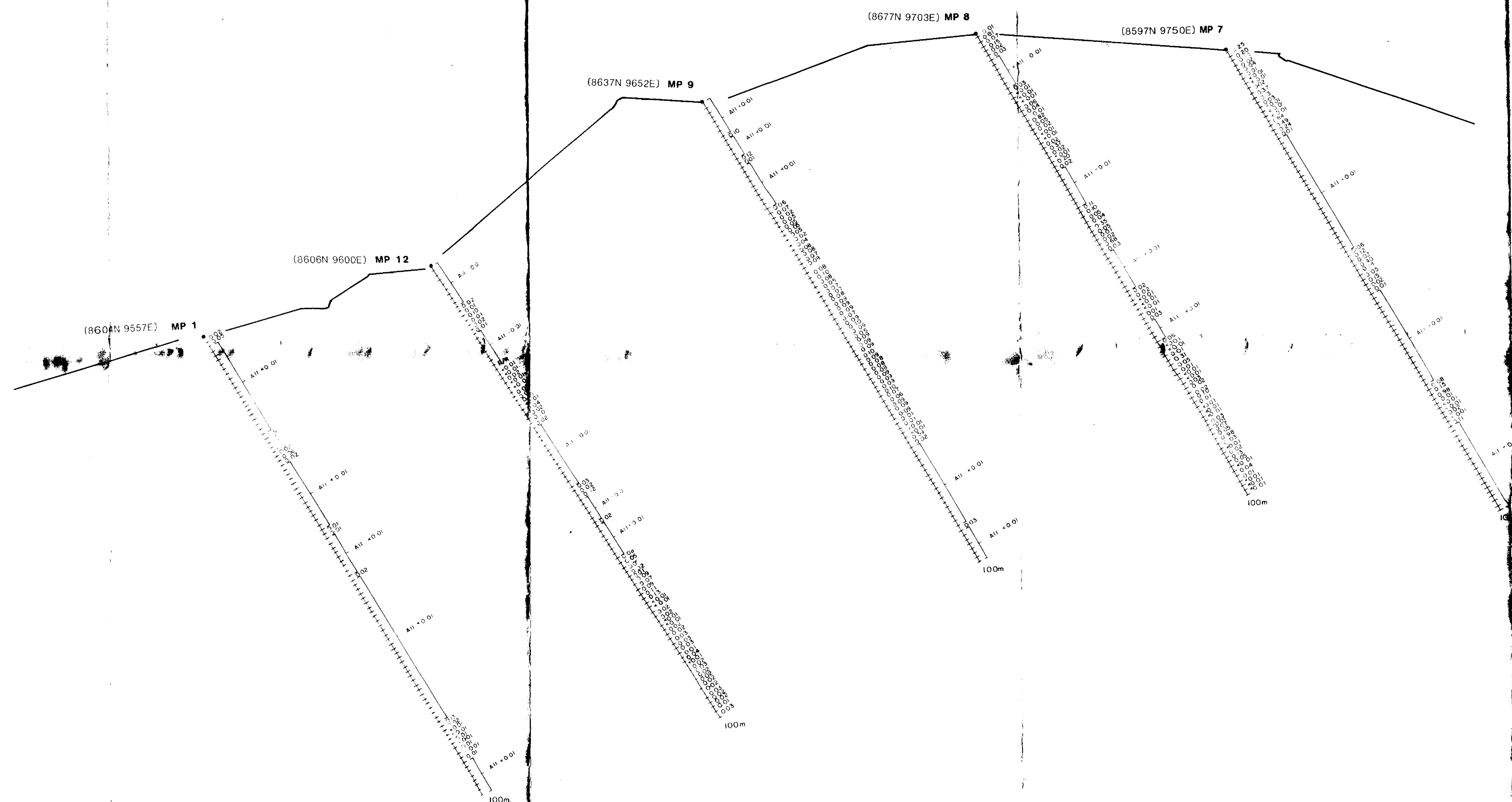
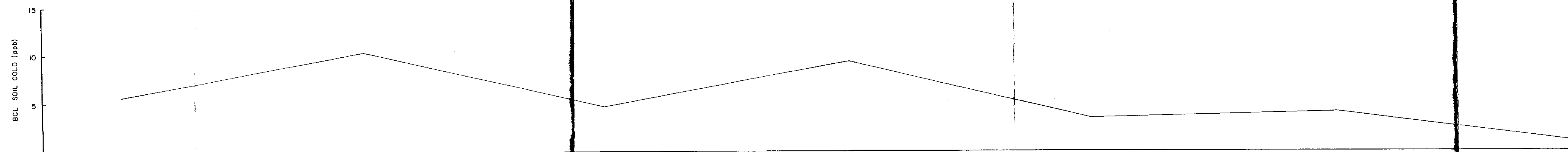
FILTERING: MANUAL GRAPHICAL SMOOTHING OF SURVEY DATA
CONTOURS: GENERATED FROM PLOTTED CONTOUR INTERCEPTS ON FILTERED LINE PROFILES

LEGEND

Low
High
47650 Contour Interval: 20nT

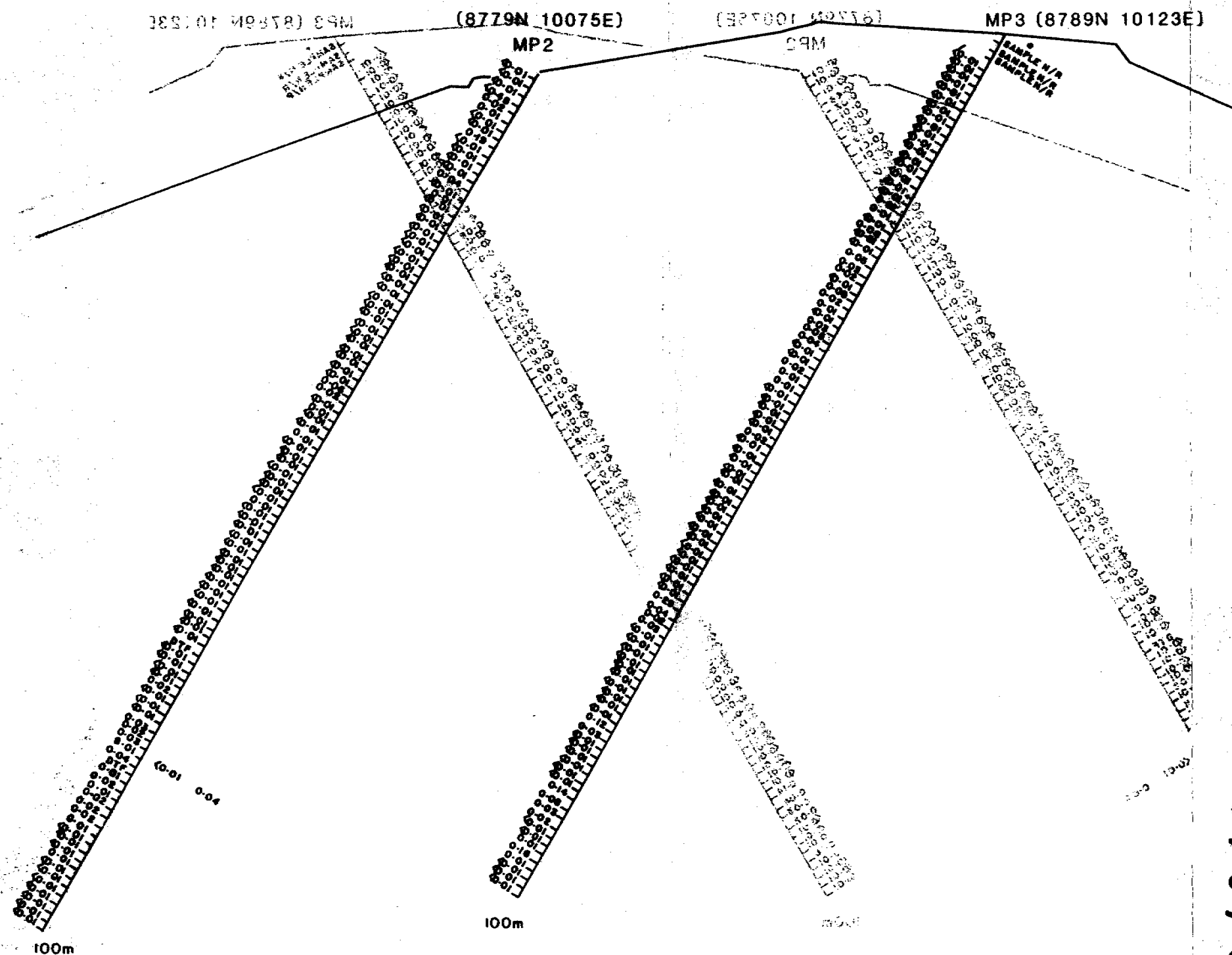
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|--|----------------------|---------------|-------|
| Billiton Australia The World Division of the Billiton Group of Companies | | | |
| Project: McKINLAY JOINT VENTURE NORTHERN TERRITORY | | | |
| Title: Su Ah Ray Prospect CONTOURS OF TOTAL MAGNETIC INTENSITY | | | |
| Author: A.J.T./P.B. | Dept. Cns: | Scale: 1:5000 | |
| Drawn: P.J.W. | Date: 10/88 | Revised: | Date: |
| Checked: | Date: | Scanned: | Date: |
| Sheet No: 6. | Drawing No: C/HJ20/7 | | |

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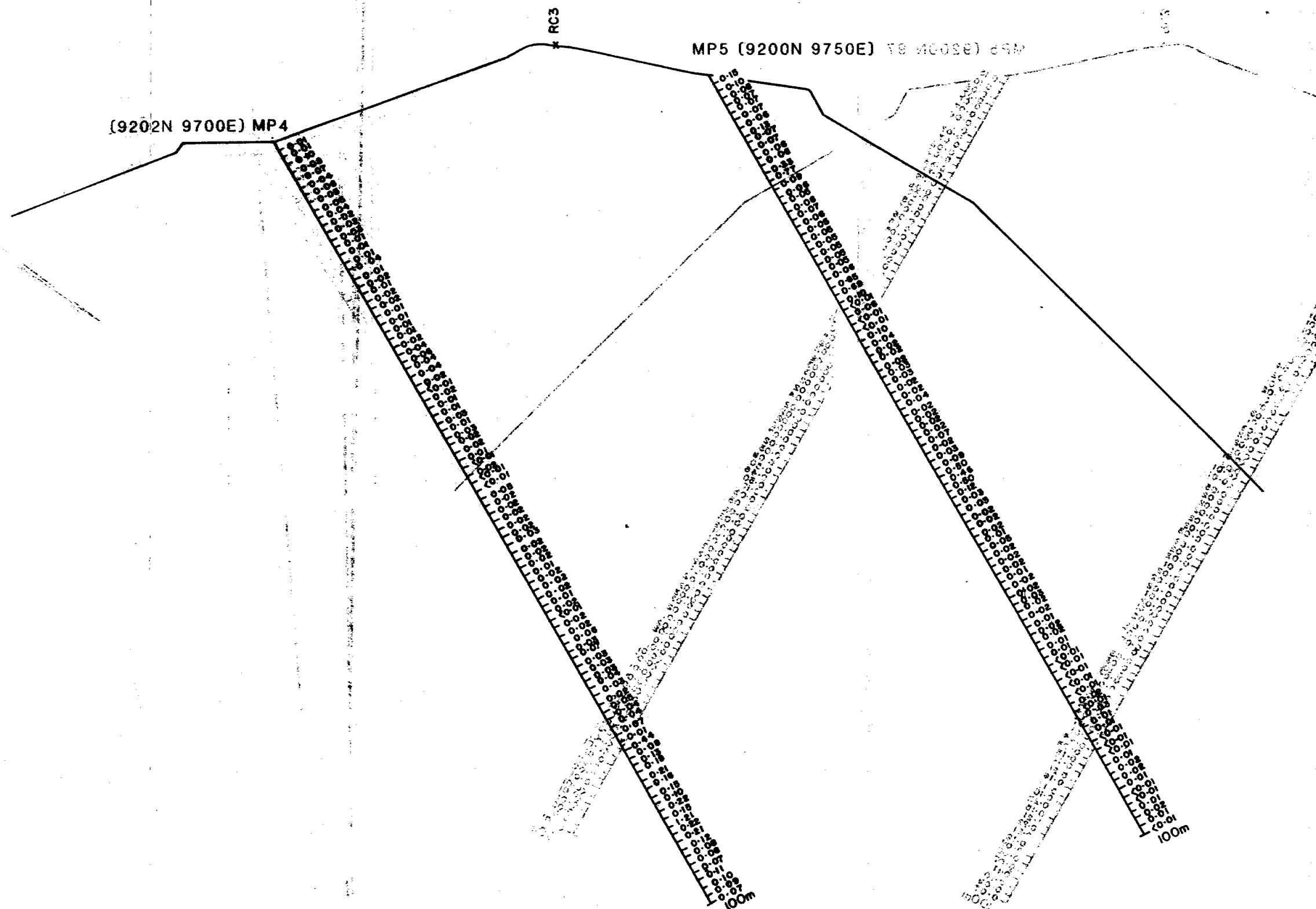
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|---|------------------------------|--------------------|------|
| Billiton Australia <small>The Metals Division of the Steel Company of Australia Limited</small> | | | |
| Project Mc KINLAY J.V. EL 4816 NORTHERN TERRITORY | | | |
| Title SU AH RAY PROSPECT PERCUSSION DRILLING LINE 8600N Au RESULTS (ppm) | | | |
| Author CM | Dept. CMS | Scale 1:500 | |
| Drawn B.F. | Date 2/89 | Revised | Date |
| Checked | Date | Stood | Date |
| Sheet No. 7 | Drawing No. C/4050/21 | | |




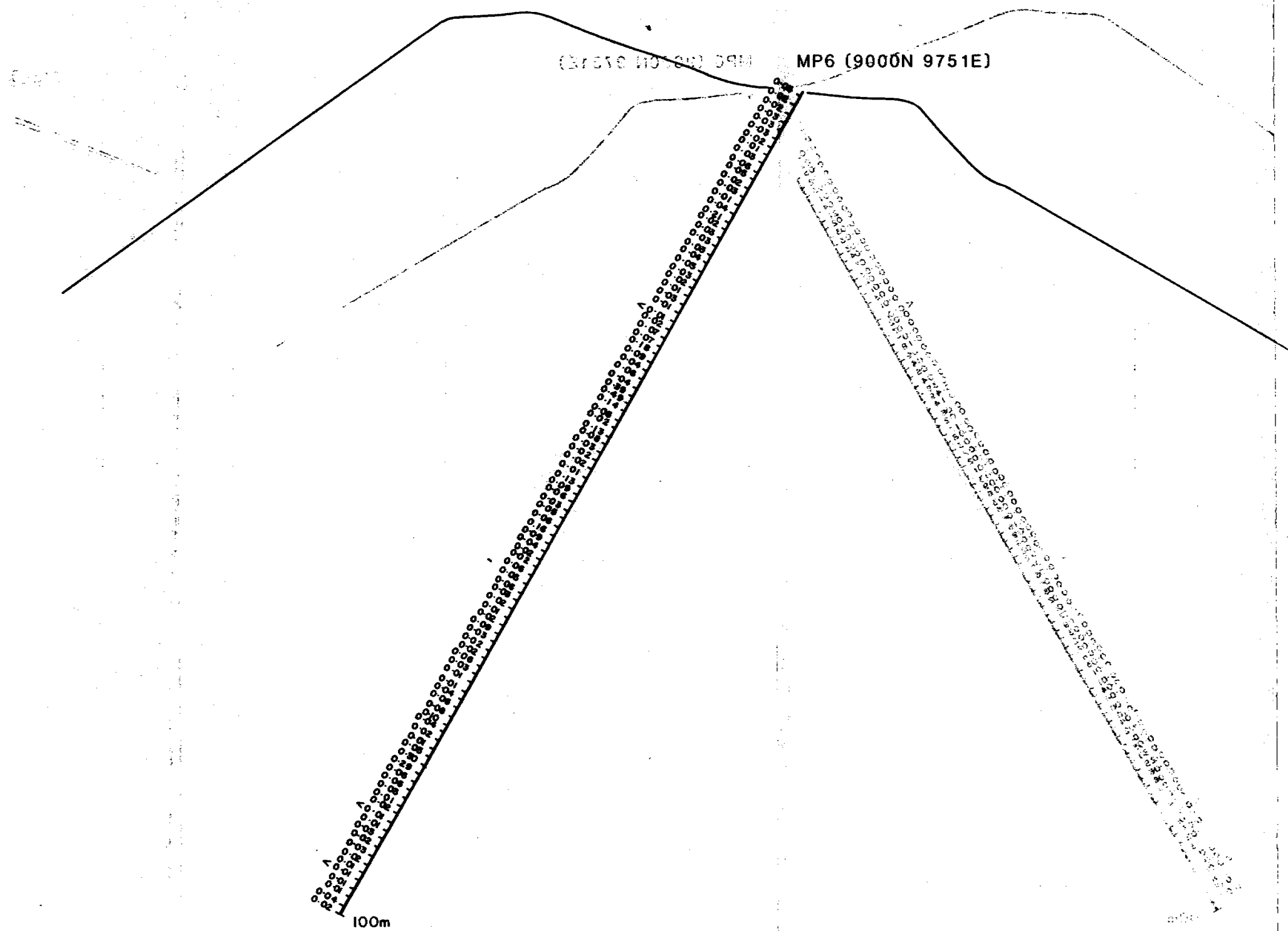
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| | | | |
| Project Mc KINLAY J.V. EL 4816 NORTHERN TERRITORY | | | |
| Title DRILLHOLES MP2 & MP3 Au RESULTS | | | |
| Author CM | Date 2/9 | Scale 1:500 | |
| Drawn Office | Office Mc/b | Revised | Date |
| Drawing No C/MJ50/11 | | | Fig No 8 |




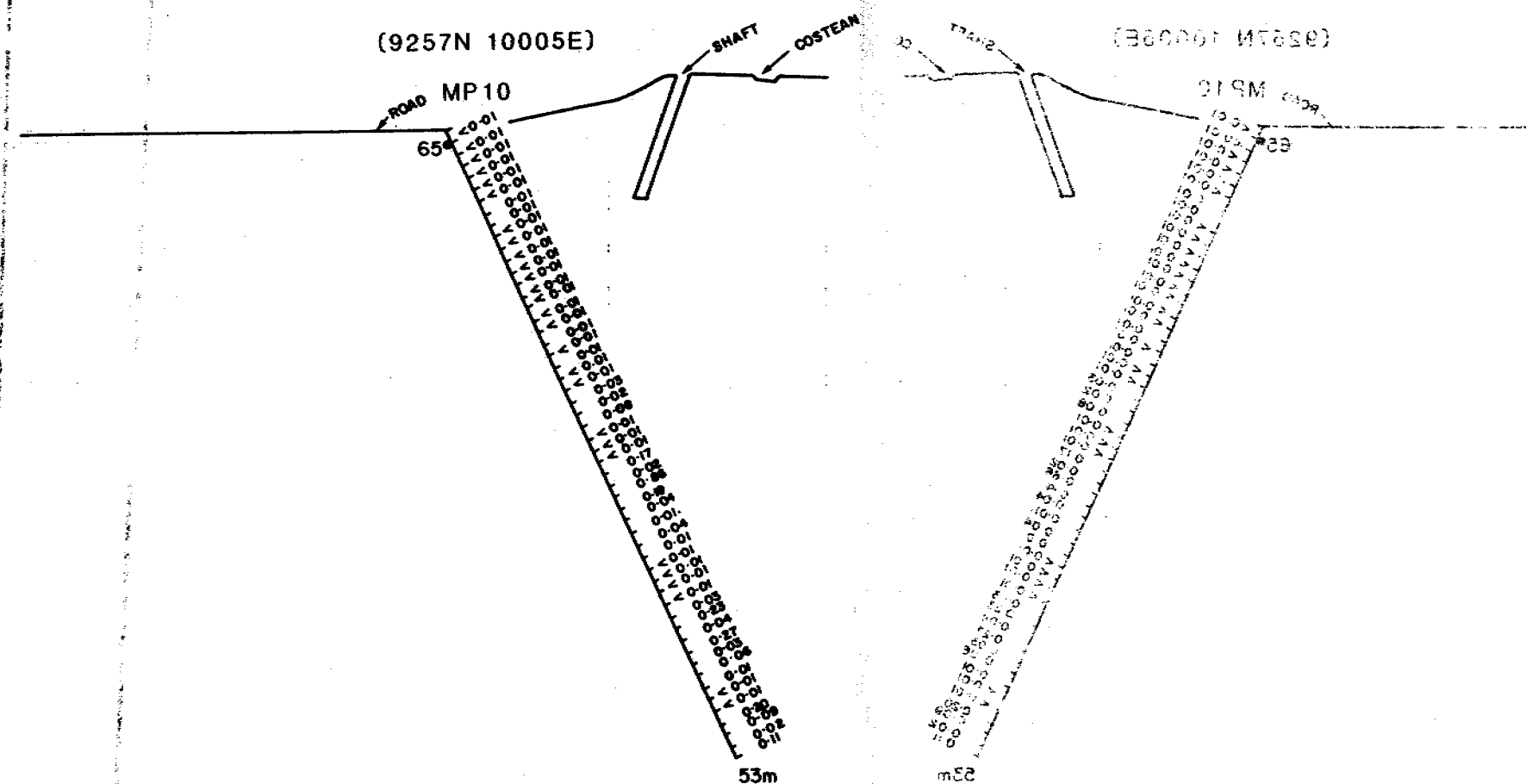
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|  | | | |
| Project Mc KINLAY J.V. EL 4816 NORTHERN TERRITORY | | | |
| Title DRILLHOLES MP4 & MP5 Au RESULTS | | | |
| Author C.M. | Date 2/99 | Scale 1:500 | |
| Drawn McJb | Office McJb | Revised | Date |
| Drawing No. c/11/20/19 | Fig. No. 9 | | |




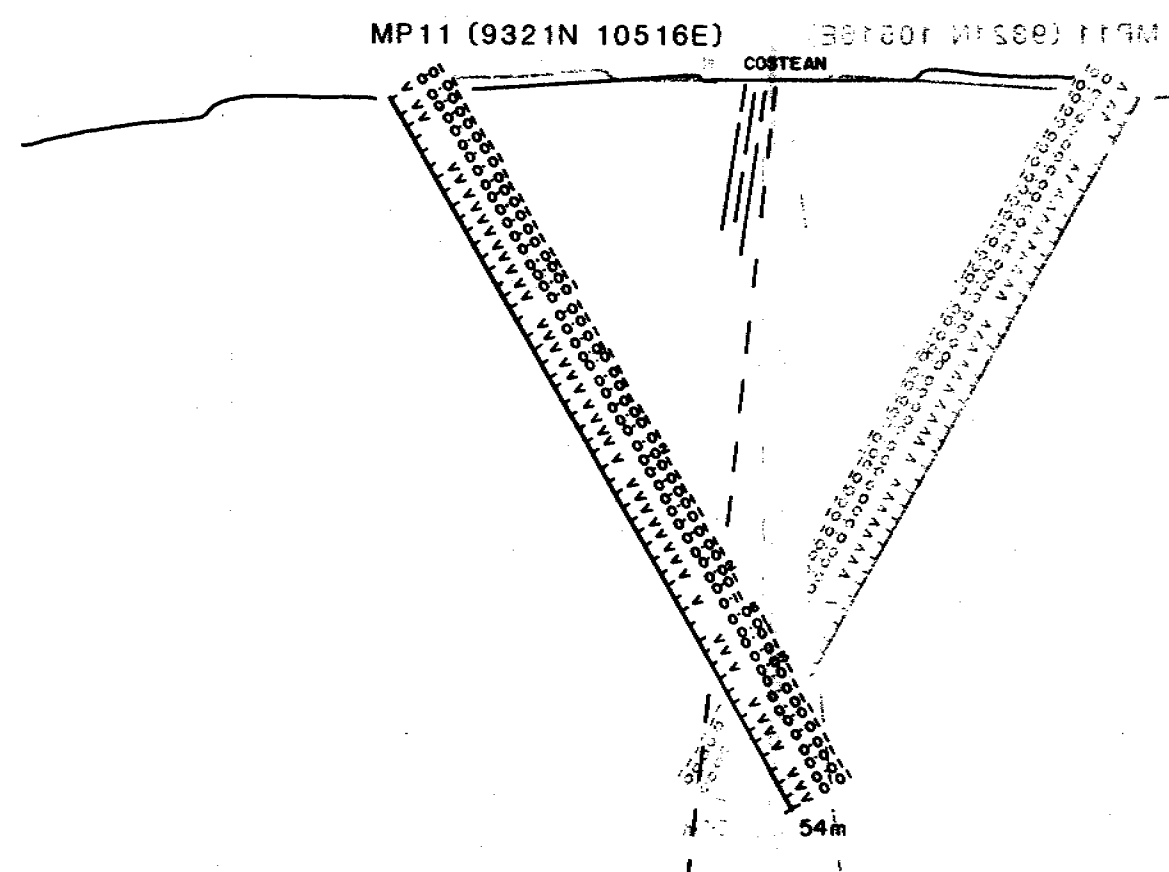
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|  Billion Australia <small>The Mining Division of the Nickel Company of Australia Limited</small> | | | |
| Project | | MC KINLAY J.V. EL 4816 NORTHERN TERRITORY | |
| Title | | DRILLHOLE MP 6 AU RESULTS | |
| Author | C.M. | Date | 2/89 |
| Drawn | Office | Revised | Date |
| Drawing No. | | 01/020/15 Fig. No. 10. | |




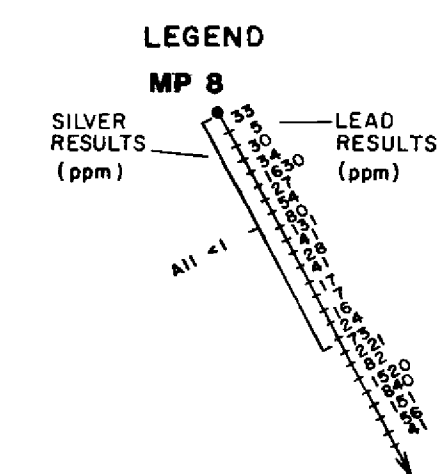
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|  Billiton Australia <small>The Mining Division of the Shell Company of Australia Limited</small> | | | |
| Project Mc KINLAY J.V. EL 4816 NORTHERN TERRITORY | | | |
| Title DRILLHOLE MP10 Au RESULTS | | | |
| Author CM | Date 2/89 | Scale 1:500 | |
| Drawn | Office Melb | Revised | Date |
| Drawing No. C/M/20/15 | | | Fig. No. 11. |



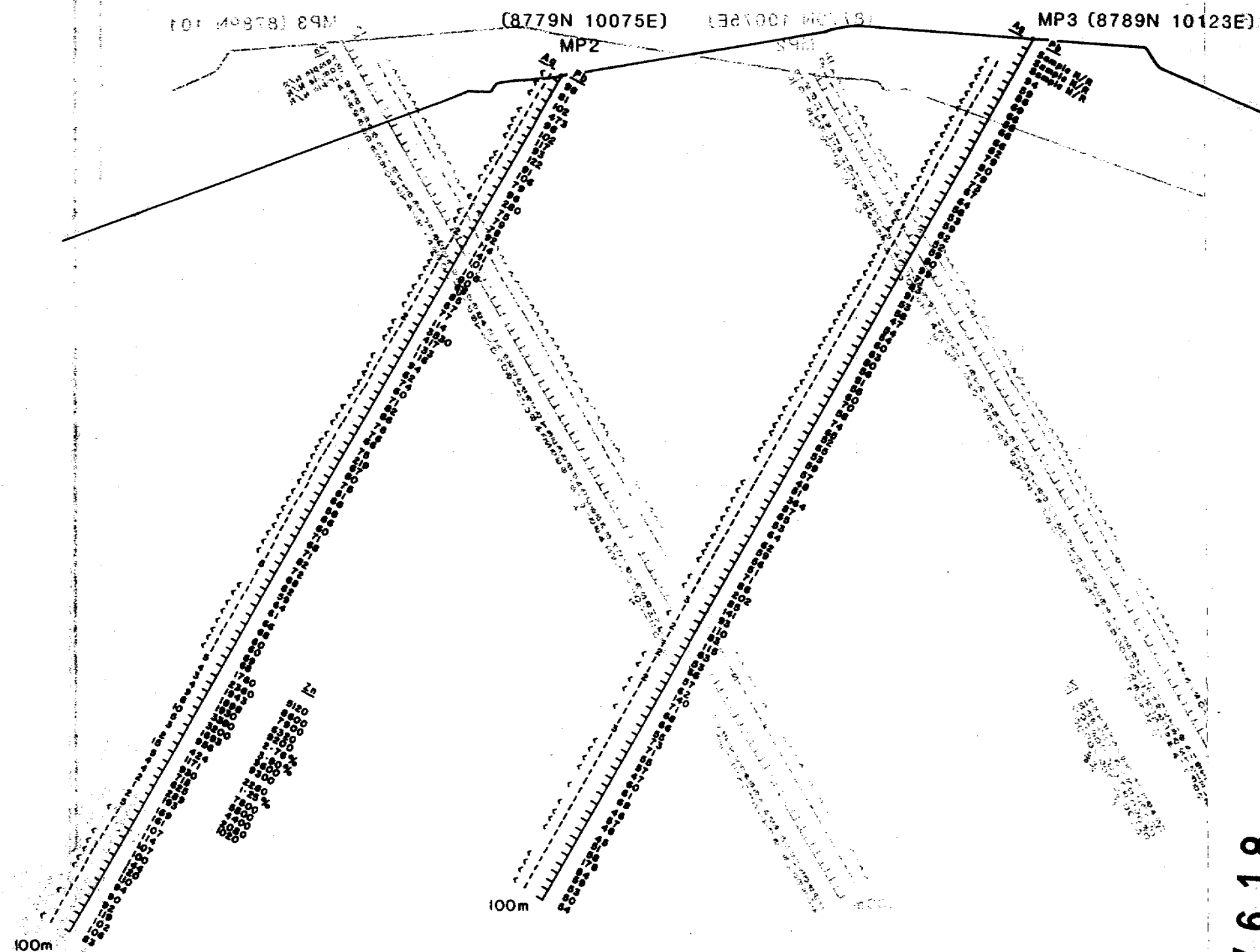
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|  Billiton Australia <small>The Mouth Division of the Shell Company of Australia Limited</small> | | | |
| Project Mc KINLAY J.V. EL 4816 NORTHERN TERRITORY | | | |
| Title DRILLHOLE MP11/ Au RESULTS | | | |
| Author | CM | Date | 2/89 |
| Drawn | Office | Revised | Date |
| Drawing No. | CHJ20/17 | | Fig. No. 12. |



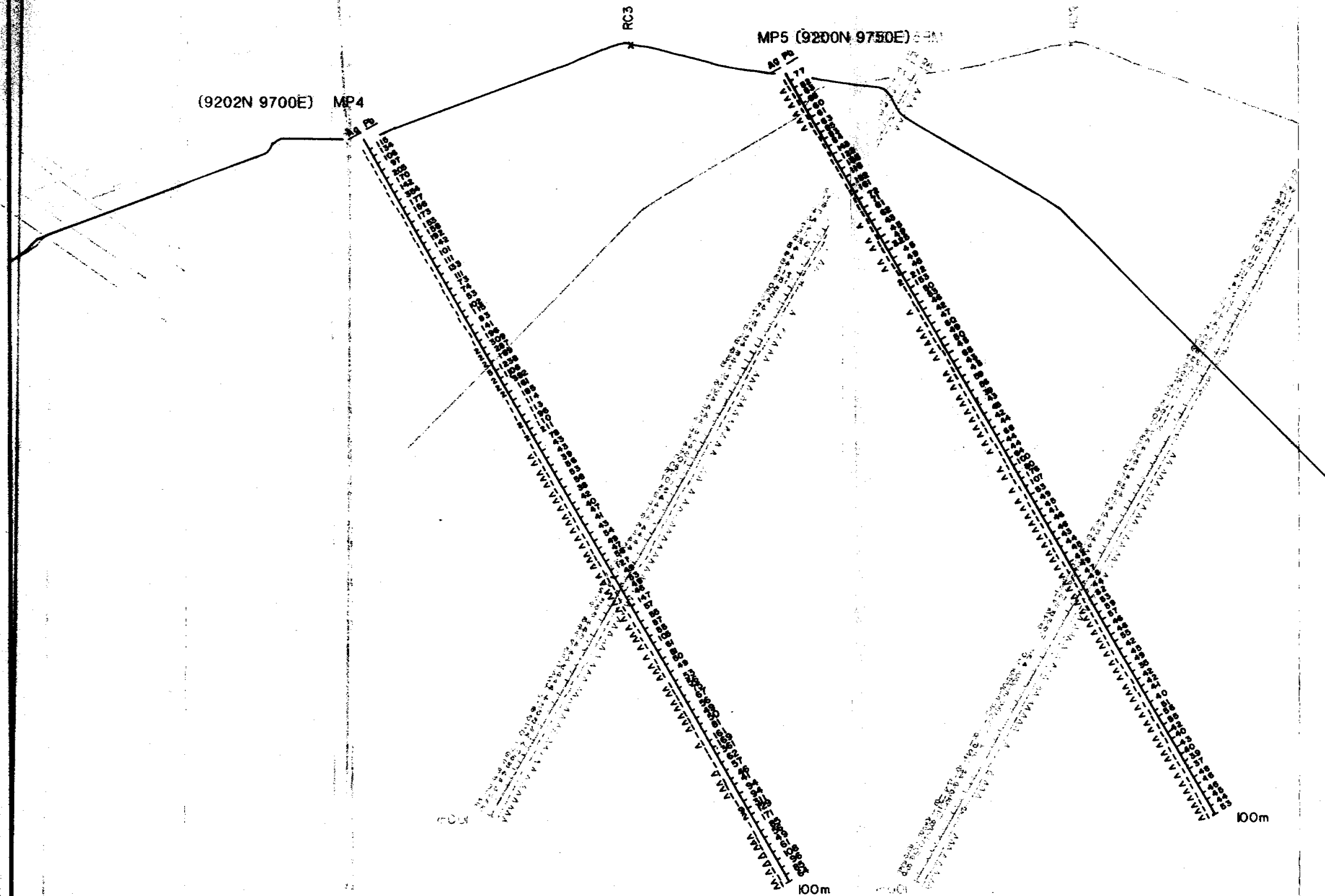
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| Project Mc KINLAY J.V. EL 4816 | | | |
| NORTHERN TERRITORY | | | |
| Title SU AH RAY PROSPECT | | | |
| PERCUSSION DRILLING | | | |
| LINE 8600N Ag & Pb RESULTS (ppm) | | | |
| Author | CM | Dept. | CNS |
| Scale | 1:500 | | |
| Drawn | B.F. | Date | 2/89 |
| Revised | Date | | |
| Checked | Date | Stamped | Date |
| Sheet No. | Drawing No. | | |

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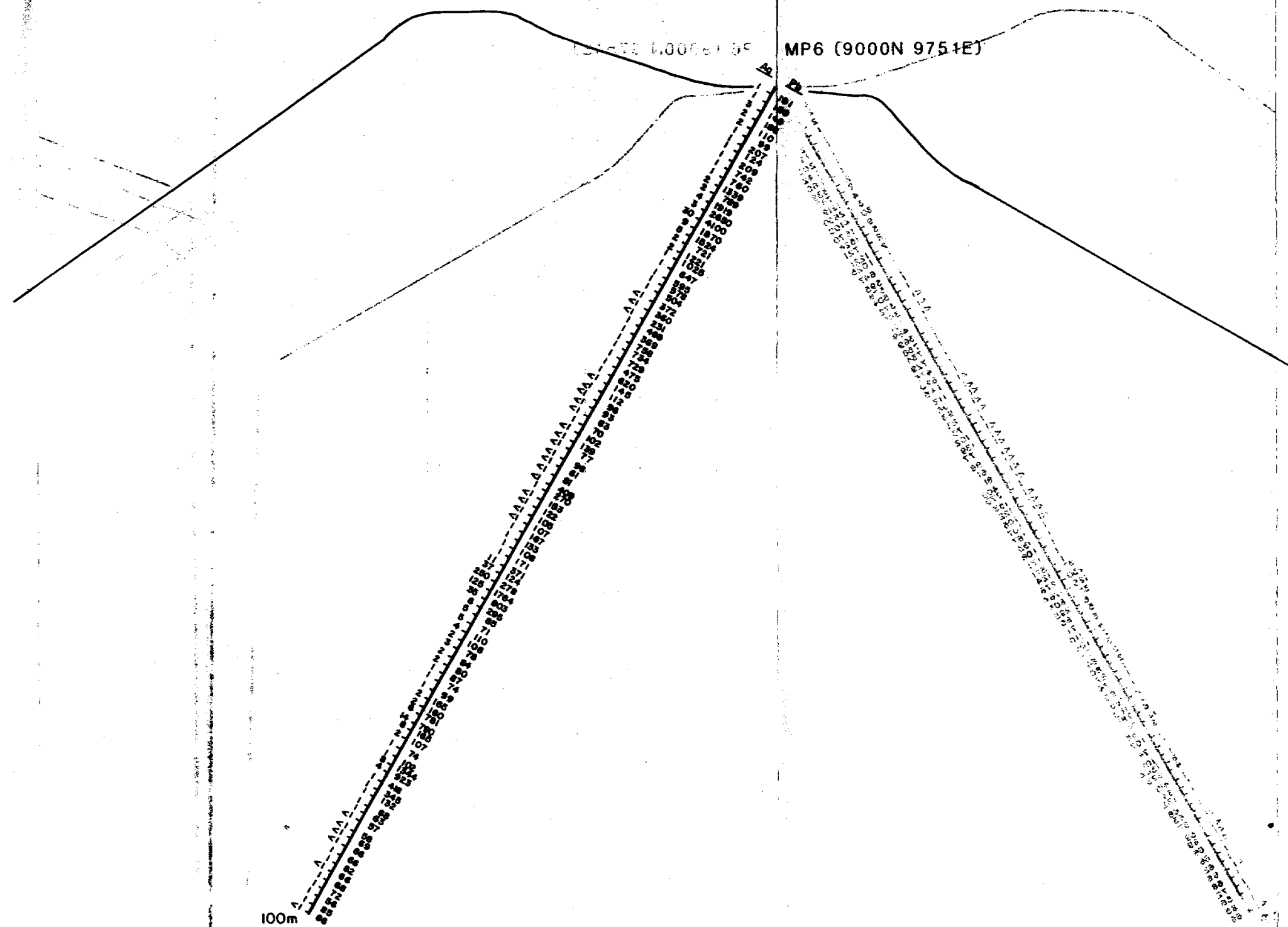
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| | | | |
| Project Mc KINLAY J.V. EL 4816 NORTHERN TERRITORY | | | |
| Title DRILLHOLES MP2 & MP3 Ag & Pb RESULTS | | | |
| Author CM | Date 2/9 | Scale 1:500 | |
| Drawn Office | Office Meth | Revised | Date |
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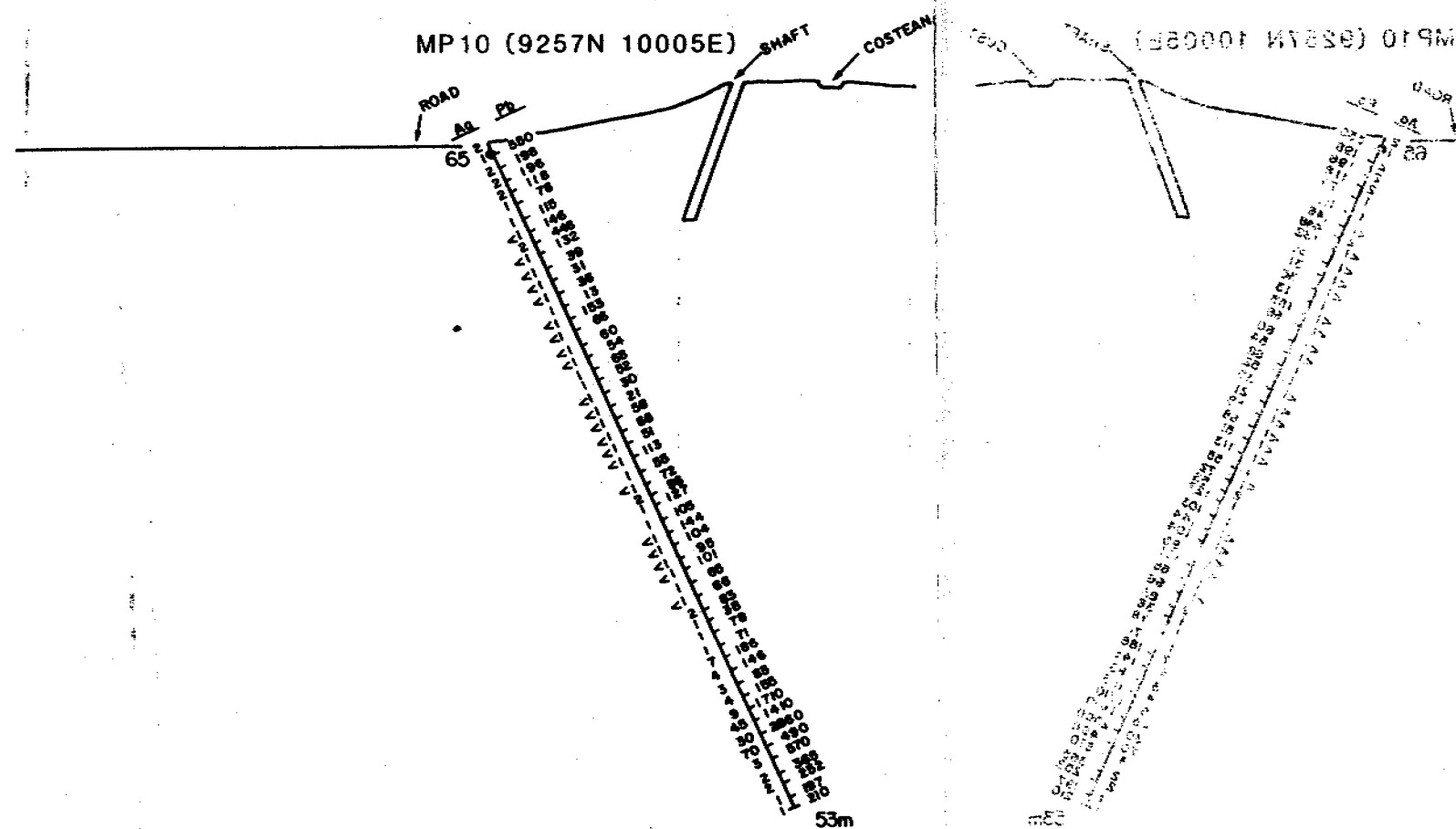
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| | | | |
| Project Mc KINLAY J.V. EL 4816 NORTHERN TERRITORY | | | |
| Title DRILLHOLES MP4 & MP5 Ag & Pb RESULTS | | | |
| Author C.M. | Date 2/99 | Scale 500 | |
| Drawn | Office McK | Revised | Date |
| Drawing No. C/HJ20/22 | | | Fig. No. 15. |



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| Project | | Mc KINLAY J.V. EL 4816 NORTHERN TERRITORY | |
| Title | | DRILLHOLE MP6 Ag & Pb RESULTS | |
| Author | C.M. | Date | 2/99 |
| Scale | 1:89 | Revised | |
| Office | Meib | Date | |
| Drawing No | 44020/16 | Fig No | 16. |



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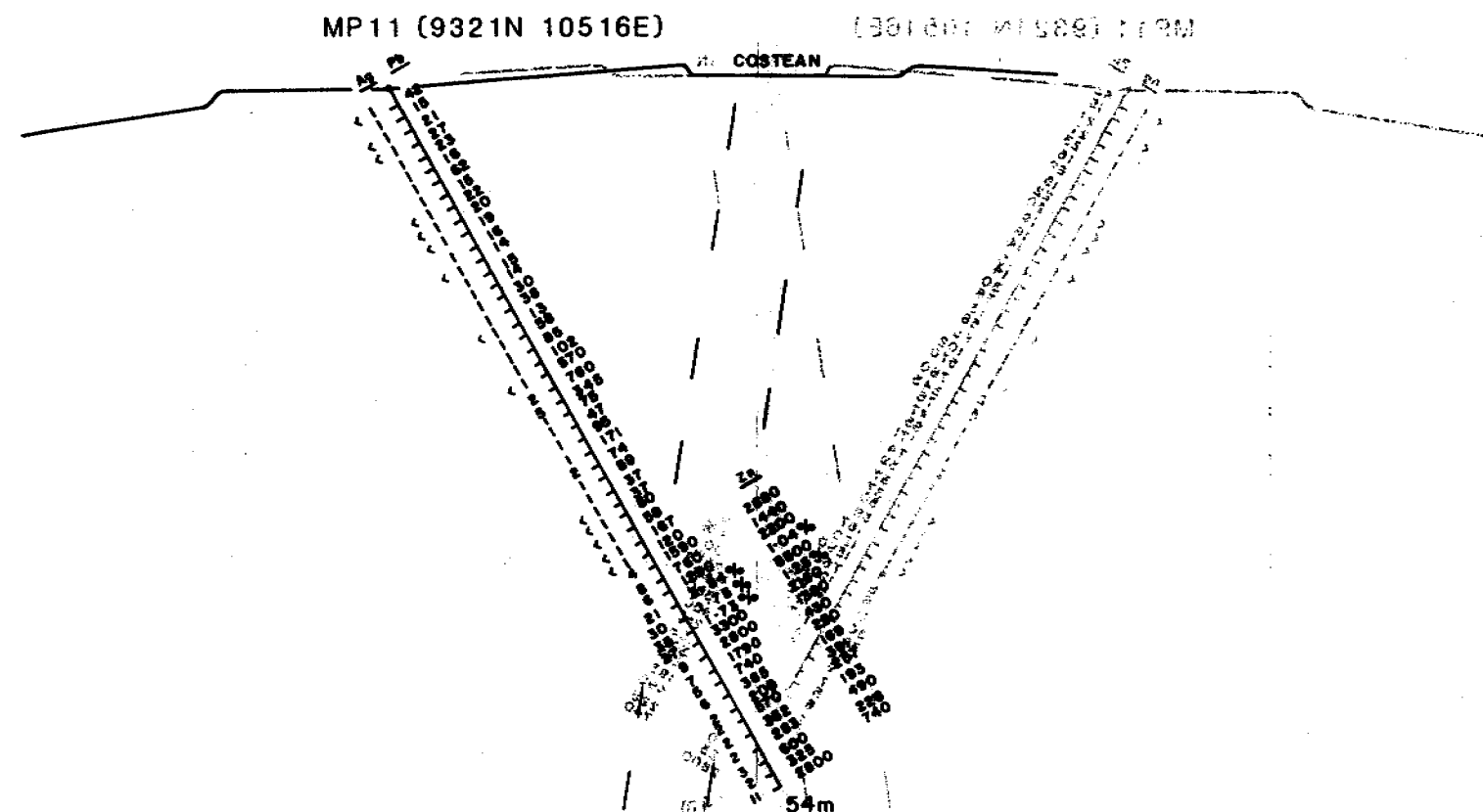
Project **Mc KINLAY J.V. EL 4816**
NORTHERN TERRITORY

Title
DRILLHOLE MP10
Ag & Pb RESULTS

Author **CM** Date **2/89** Scale **1:500**

Drawn **Office** Office **Rev** Revised **Date**

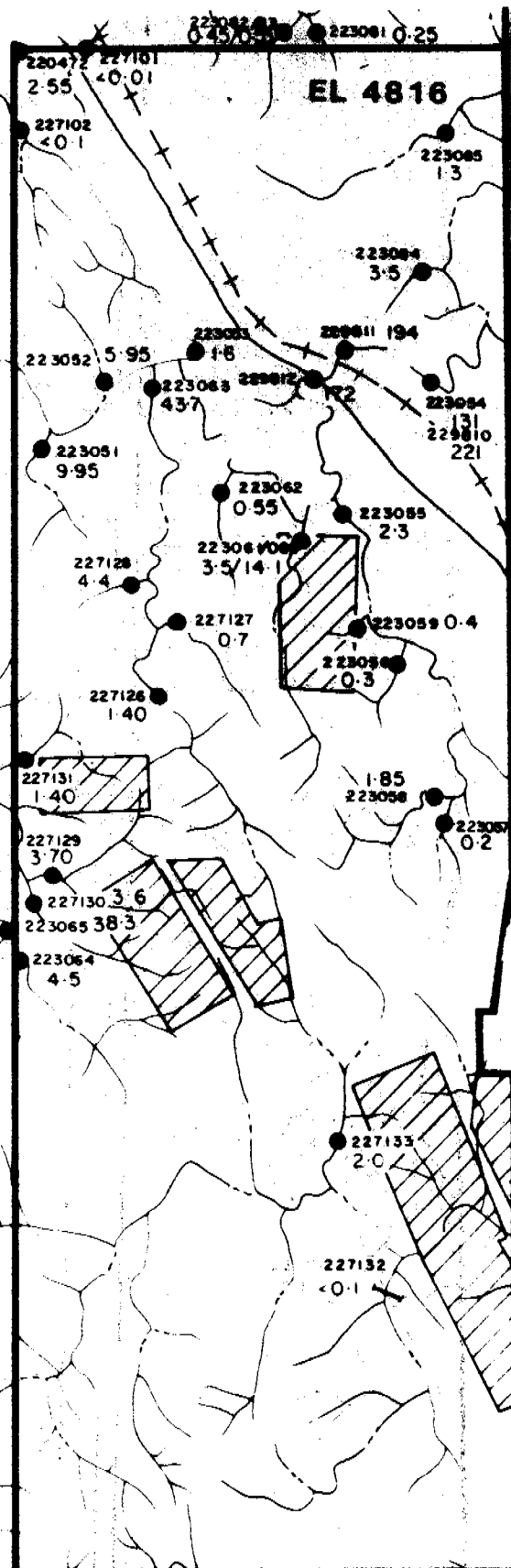
Drawing No **4/4020/14** Fig. No **17**



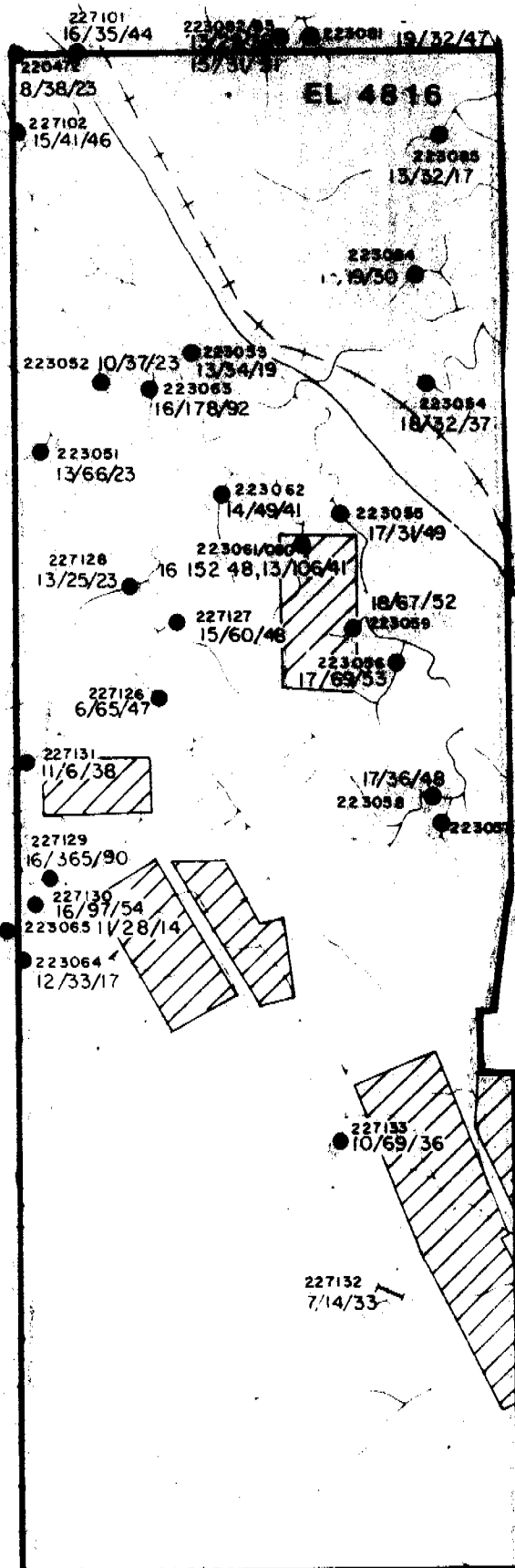
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| Project Mc KINLAY J.V. EL 4816 NORTHERN TERRITORY | | | |
| Title DRILLHOLE MP11 Ag,Pb & Zn RESULTS | | | |
| Author C.M. | Date 2/89 | Scale 1:500 | |
| Drawn | Office Melb | Revised | Date |
| Drawing No. C/HJ20/18 | | | Fig. No. 18. |

13° 57'



13°37'



• 223082 Stream Sed. Loc. Number
5/16/- Cu/Pb/Zn results.
- Below detection.
//// Areas not controlled
by McKinlay J.V.

13°40'

CR89/618

| | | | |
|---|--------|---------|--------------------|
| Billiton Australia <small>The Metals Division of the Shell Company of Australia Limited</small> | | | |
| Project McKINLAY J.V. | | | |
| Title STREAM SEDIMENT Cu/Pb/Zn Results (ppm.) | | | |
| Author CM | Date | Scale | |
| Drawn | Office | Revised | Date |
| Drawing No. | | | Fig. No. 20 |