Gould Area
(Waterhouse No. 2 and Mount Minza)
Geophysical Surveys,
Rum Jungle District
Northern Territory 1968

by

J.E.F. Gardener
Record No. 1970/23

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SUMMARY

Induced Polarisation surveys were made over known electromagnetic anomalies in the Mount Minza area, as recommended from results of a previous survey. An S-P survey was made in the Waterhouse No. 2 area no anomaly was found. Results from a diamond-drill hole in the Mount Minza area are described. All the anomalies originate in unmineralised carbonaceous shale.

Record 1970/23
1. **INTRODUCTION**

Reconnaissance and detailed geophysical surveys have been made in the Gould area since 1965. In 1968, further geophysical surveys were made to investigate specific problems arising from previous work, and one hole was diamond-drilled.

Waterhouse No. 2 and Mount Minza areas warranted detailed surveys within the Gould area. In 1968, induced polarisation (IP) surveys were made over the electromagnetic anomalies at 201S/446.5E and 213S/448.6E in the Mount Minza area as recommended by Duckworth (1968b). The object was to correlate self-potential (S-P) and IP anomalies.

An S-P survey was made in the Waterhouse No. 2 area to test for correlation with the E.M. Gun and IP results. Such a correlation exists elsewhere in the Mount Minza area where the geophysical results (including S-P) and geology are considered similar to those of the South Alligator area. The hole diamond-drilled in the Mount Minza area was recommended by Duckworth (1968a).
Shatwell and Duckworth (1966) have described the geology of the Gould area in general (pp. 3-7) and of the Mount Minza and Waterhouse areas (pp. 13-14). They state that an unusual succession of sediments is well exposed in the core of a south-plunging anticline west and north-west of Mount Minza. All the rocks are part of the Golden Dyke Formation. The sequence at Mount Minza is correlatable with that at the Waterhouse No. 2 area, and there is little doubt that the two sequences are equivalent.
3. METHODS

Frequency domain IP measurements were made. Electrode geometry was dipole-dipole; 100-foot dipoles were used. Frequencies were 0.3 and 5Hz.

The S-P survey was made using fixed base stations tied to a common datum.

The geophysical logs of the diamond-drill hole were made with a Widco 1000-foot logger.
4. RESULTS

Waterhouse No. 2 area

An S-P survey was made in the Waterhouse No. 2 area. Results are shown, together with the geology, in Plate 2. Strong S-P and electromagnetic anomalies occur in the nearby Mount Minza area, where the geological setting is very similar, but at Waterhouse No. 2 the electromagnetic anomalies occur without the accompanying S-P anomalies.

The electromagnetic anomalies occur on the black shales shown in Plate 2. A weak trend in the S-P contours follows the trend of the black shale, but no definite anomalies occur. The fault shown in Plate 2 is reflected in the S-P contours.

The presence of S-P anomalies in the Mount Minza area and their absence in the Waterhouse No. 2 area is unexplained.

Mount Minza area

IP surveys were made on Traverses 201S and 213S on the Slingram anomaly axis described by Shatwell and Duckworth (1966, pp. 15 and 16). IP surveys had been made on this axis previously on Traverses 217S (Farrow, 1967) and 235S (Duckworth, 1968b), and an S-P survey was made on it in 1967 (Duckworth, 1968b). High background frequency effects (up to 7 percent) occur throughout the area. On Traverses 235S, a frequency effect anomaly up to 19 percent and a weak S-P anomaly were found on the Slingram anomaly axis. On Traverse 217S, no anomalous frequency effect and no S-P anomaly were found.

A strong S-P anomaly occurs on Traverse 201S, and no S-P anomaly on Traverse 213S. A strong frequency effect anomaly might have been expected on Traverse 201S, analogous to the one on Traverse 235S. The results (Plate 3) show no frequency effect anomaly on 213S, but there is a medium-strength one at depth (n = 3) on 201S. The cause of these frequency effects and of those on 235S has not been established. The shale here does not appear to be any more carbonaceous than on the other traverses, and the sulphide content appears the same. No correlation between S-P and frequency effect anomalies has been established.

Diamond-drilling, Mount Minza area

Duckworth (1968a) recommended a diamond-drill hole collared at 201S/44.5E, depression -60°E, in the Mount Minza area. Its purpose was partly to test the accuracy of a new method of obtaining depth information using the Slingram method; partly to obtain information on the origins of the electromagnetic, S-P, and radiometric anomalies; and partly to explore for uranium mineralisation.
This hole (DDH 68-7) was drilled in 1968. The boundaries of the conducting body (black shale) based on the depth-probe interpretation and a downward projection of the surface geology, together with the drilling results, are shown in Plate 4. The geological log of the drill hole is contained in Appendix 1.

It will be seen that the prediction for the top surface of the black shale is accurate. The prediction for the base of the shale bed is reasonably accurate, especially as the strike is at about 80 degrees to the traverse direction and this must introduce some uncertainty into the downward projection of the shale bed.

Geophysical logs are in Plate 5. The resistance log shows the position of the conductor causing the anomalies. The radiometric log shows that the conducting shale is more radioactive than surrounding rocks, but no economic uranium mineralisation was found. The S-P log shows a positive increase with depth down to about 125 feet and then a decrease.

The radiometric log stops at 449 feet owing to an obstruction in the hole. The hole penetrated only the top 33 feet of the second conducting shale, the one which caused the Slingram anomaly at 453E.
5. CONCLUSIONS

The origin of geophysical anomalies in the Waterhouse No. 2 and Mount Minza areas is carbonaceous shale. However, variations in anomaly magnitude and the absence in some places of S-P anomalies remain unexplained.

Diamond-drilling showed that the Slingram depth probe is capable of providing accurate depths to surfaces of conducting bodies.
6. REFERENCES


FARROW, B.B. 1967 - Gould area (Mount Minza and Waterhouse No. 2) geophysical survey, Northern Territory 1966. Ibid. 1967/97 (unpubl.).

SHATWELL, D.O. and DUCKWORTH, K., 1966 - Gould area geochemical and geophysical surveys, Rum Jungle area, Northern Territory 1965. Ibid. 1966/154 (unpubl.).
### GEOLOGICAL LOG OF DRILL HOLE

**PROJECT:** GOUĐL AREA  
**HOLE No.:** 68·7  
**LOCATION:** Mt. MINZA  
**REMARKS:** RUM JUNGLE DISTRICT, N.T.

#### DESCRIPTION OF CORE

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>MINZA</th>
</tr>
</thead>
</table>

No core recovery.

28' to 30'9" as below

- Thinly interbedded
  - SILTSTONE, cream to grey, hard, siliceous, some soft, porous; and
  - SHALE, dark grey to black, some carbonaceous;
- Cleavage not well developed—apparently along bedding.
- Beds 1/4" to 2'.
- Red hematite staining along fractures and beds.
- Rare minor cherty quartz interbeds.

100'

- SILTSTONE, cream to grey-green, well-bedded, beds 1/8" to 1" thick.
- Hard, siliceous, argillaceous.

126'3"

- Cavity

126'3"

- SHALE, black, carbonaceous, siliceous, hard, graphitic, pyritic.
- Gen. massive, rare thin interbeds of grey siliceous lutite <1/4" thick.
- Pyrite often in beds assoc. with quartz, also disseminated.
- Graphite dissem. and along fractures, slickensides.
- Cleavage not well developed.
- Radioactivity averages 0·09mR/Hr. over interval, reaches peaks of 0·12 mR/Hr.

<table>
<thead>
<tr>
<th>R.L.</th>
<th>DEPTH</th>
<th>LOG</th>
<th>REMARKS</th>
<th>ASSAYS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>126.3</td>
<td></td>
<td></td>
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</tbody>
</table>

**EXPLANATION**

1° = 20'

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**REFERENCES**

10° Bedding (30°) Cleavage measured as angle to core normal.

**ASSAYS**

<table>
<thead>
<tr>
<th>98</th>
<th>0°</th>
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<tbody>
<tr>
<td>97</td>
<td>30°</td>
</tr>
<tr>
<td>96</td>
<td>(0°)</td>
</tr>
<tr>
<td>36</td>
<td>(45°)</td>
</tr>
</tbody>
</table>

---

**DRILL No.**

- **Type:** Middrill  
- **Casing in Hole during Drilling:** Yes  
- **EXPLANATION:**  
- **1° = 20°**

---

**HEAD OFFICE**

- **M. Laska**
- **Commenced:**
- **Completed:**

---

**A.T.**

- **Drawn by:**
- **Checked by:**

---

**SHEET:** 1 of 3

---

**RECORD No:** D52/B7-540A

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**BUREAU OF MINERAL RESOURCES, GEOLOGY AND GEOPHYSICS**

**APPENDIX I**
### Geological Log of Drill Hole

**Project:** Gould Area
**Location:** Mt. Minza

#### Description of Core

<table>
<thead>
<tr>
<th>R.L. Depth</th>
<th>Core Assay</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>200'</td>
<td></td>
<td>SHALE as above, black, hard, siliceous, carbonaceous, graphitic, pyritic.</td>
</tr>
<tr>
<td>229'</td>
<td>60</td>
<td>SILTSTONE, pink, massive, silic.</td>
</tr>
<tr>
<td>233</td>
<td>100</td>
<td>SHALE as above.</td>
</tr>
<tr>
<td>252'</td>
<td>99</td>
<td>SILTSTONE, pink to yellow-brown, grey, hard, siliceous, argillaceous; gen. bedded. Some mottled red-brown.</td>
</tr>
<tr>
<td>275' 6''</td>
<td>99</td>
<td>HEMATITE QUARTZITE BRECCIA: Coarse angular fragments of white to light grey cherty or sugary quartz in a fine red-brown hematitic silty matrix. Minor chlorite occurs in irregular blobs, veinlets, and stringers.</td>
</tr>
<tr>
<td>312'</td>
<td>40-45°</td>
<td>SILTSTONE or FINE SANDSTONE, cream to grey, silic. and argillaceous.</td>
</tr>
<tr>
<td>322'</td>
<td>99</td>
<td>SILTSTONE, shaly-light to medium grey with abundant brick-red staining along fractures and sub-parallel to bedding. Bedding not distinct, cleavage not well developed. Rock is siliceous and argillaceous but yields no effervescence with HCl.</td>
</tr>
<tr>
<td>332'</td>
<td>100</td>
<td>PYRITE is rare.</td>
</tr>
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</table>

From 370-415 ft. rock is massive and homogeneous, with little ferruginous staining.

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**Drill Details**

- **Drill No.:** Mindrill
- **Type:** W/L

**Explanations**

- **10° Bedding:** Measured as angle to core normal.
- **310° Cleavage:**

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**References**

- **To accompany Record No. 1970/23 D52/B7-541A**

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**Head Office**

- **Logged By:**
- **Drawn By:**
- **Checked By:**

---

**Driller:** M. Losko

**Commenced:**

**Completed:**
**Geological Log of Drill Hole**

**Project:** Gould Area, RUM JUNGLE DISTRICT, N.T.
**Hole No.:** 68-7
**Location:** M. MINZA

<table>
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<th>Hole No.</th>
<th>Coordinates</th>
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<tr>
<td>68-7</td>
<td>201'S 444.5E</td>
<td>Gould Grid</td>
<td>509'3&quot;</td>
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**Description of Core**

<table>
<thead>
<tr>
<th>Depth</th>
<th>R.L.</th>
<th>Casing Size of Core</th>
<th>LOG</th>
<th>Core %</th>
<th>Remarks</th>
<th>Assays</th>
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<tr>
<td>457</td>
<td>20°</td>
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<td></td>
<td></td>
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<tr>
<td>476</td>
<td>20°</td>
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<tr>
<td>499</td>
<td>99</td>
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<td></td>
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<tr>
<td>509'3&quot;</td>
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</tr>
</tbody>
</table>

- **SILTNSTONE** as above, shaly, grey, gen. massive, some ferruginous staining along fractures and bedding.
- At about 435 ft., rock becomes predominantly red-brown.

- Thinly interbedded SHALE, black, carbonaceous, and SILICEOUS LUTITE, light grey, massive (siliceous dololute ?)

- SHALE, black, carbonaceous, siliceous, graphitic, pyritic. Massive except for minor pyritic beds.

- SHALE as above with minor cherty quartz veins (?) along bedding.

**Total Depth**

- Electrical and Radiometric logs run.
- Core scraped for spectroscan.
- Stratigraphy: 0 - 509'3" Pld.
- Surveys: None Acid tube container lost down hole.
Gould (Mount Minza) Area, NT
Traverses 201S and 213S
Induced Polarisation Results
Gould (Mount Minza) Area, NT

Section 2015

DDH 68-7

Surface predicted by probe

HQB Haematitic quartz breccia
B.I.F. Banded ironstone formation

Gould Grid
Surface geology after Shotwell & Duckworth, 1966
Drill hole lithology by A. Taube
Note: 101-5 ft on this log is 100 ft true depth due to a fault in the logger.