

**BMR  
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1970/23  
c.3**

Record No. 1970 / 23

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

*by*

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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.

## 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).

## 2. GEOLOGY

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  $-60^{\circ}$ 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.

anomaly, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 187, 188, 189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201, 202, 203, 204, 205, 206, 207, 208, 209, 210, 211, 212, 213, 214, 215, 216, 217, 218, 219, 220, 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1681, 1682, 1683, 1684, 1685, 1686, 1687, 1688, 1689, 1690, 1691, 1692, 1693, 1694, 1695, 1696, 1697, 1698, 1699, 1700, 1701, 1702, 1703, 1704, 1705, 1706, 1707, 1708, 1709, 1710, 1711, 1712, 1713, 1714, 1715, 1716, 1717, 1718, 1719, 1720, 1721, 1722, 1723, 1724, 1725, 1726, 1727, 1728, 1729, 1730, 1731, 1732, 1733, 1734, 1735, 1736, 1737, 1738, 1739, 1740, 1741, 1742, 1743, 1744, 1745, 1746, 1747, 1748, 1749, 1750, 1751, 1752, 1753, 1754, 1755, 1756, 1757, 1758, 1759, 1760, 1761, 1762, 1763, 1764, 1765, 1766, 1767, 1768, 1769, 1770, 1771, 1772, 1773, 1774, 1775, 1776, 1777, 1778, 1779, 1780, 1781, 1782, 1783, 1784, 1785, 1786, 1787, 1788, 1789, 1790, 1791, 1792, 1793, 1794, 1795, 1796, 1797, 1798, 1799, 1800, 1801, 1802, 1803, 1804, 1805, 1806, 1807, 1808, 1809, 1810, 1811, 1812, 1813, 1814, 1815, 1816, 1817, 1818, 1819, 1820, 1821, 1822, 1823, 1824, 1825, 1826, 1827, 1828, 1829, 1830, 1831, 1832, 1833, 1834, 1835, 1836, 1837, 1838, 1839, 1840, 1841, 1842, 1843, 1844, 1845, 1846, 1847, 1848, 1849, 1850, 1851, 1852, 1853, 1854, 1855, 1856, 1857, 1858, 1859, 1860, 1861, 1862, 1863, 1864, 1865, 1866, 1867, 1868, 1869, 1870, 1871, 1872, 1873, 1874, 1875, 1876, 1877, 1878, 1879, 1880, 1881, 1882, 1883, 1884, 1885, 1886, 1887, 1888, 1889, 1890, 1891, 1892, 1893, 1894, 1895, 1896, 1897, 1898, 1899, 1900, 1901, 1902, 1903, 1904, 1905, 1906, 1907, 1908, 1909, 1910, 1911, 1912, 1913, 1914, 1915, 1916, 1917, 1918, 1919, 1920, 1921, 1922, 1923, 1924, 1925, 1926, 1927, 1928, 1929, 1930, 1931, 1932, 1933, 1934, 1935, 1936, 1937, 1938, 1939, 1940, 1941, 1942, 1943, 1944, 1945, 1946, 1947, 1948, 1949, 1950, 1951, 1952, 1953, 1954, 1955, 1956, 1957, 1958, 1959, 1960, 1961, 1962, 1963, 1964, 1965, 1966, 1967, 1968, 1969, 1970, 1971, 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1979, 1980, 1981, 1982, 1983, 1984, 1985, 1986, 1987, 1988, 1989, 1990, 1991, 1992, 1993, 1994, 1995, 1996, 1997, 1998, 1999, 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 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2179, 2180, 2181, 2182, 2183, 2184, 2185, 2186, 2187, 2188, 2189, 2190, 2191, 2192, 2193, 2194, 2195, 2196, 2197, 2198, 2199, 2200, 2201, 2202, 2203, 2204, 2205, 2206, 2207, 2208,

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## GEOLOGICAL LOG OF DRILL HOLE

PROJECT GOULD AREA

HOLE No. 68-7

CO-ORDINATES

201 S 444.5 E

REMARKS

RUM JUNGLE DISTRICT, N.T.

Gould Grid

R.L. GROUND

Length 509' 3"

LOCATION Mt. MINZA

ANGLE FROM HORIZONTAL

-60°

DIRECTION Grid E.

DESCRIPTION OF CORE

R.L.

DEPTH

LOG

H.L.

COVERY

REMARKS

ASSAYS

No core recovery.

28' as below  
30' 9"

Thinly interbedded

SILTSTONE, cream to grey, hard,  
siliceous, some soft, porous; and  
SHALES, dark grey to black, some  
carbonaceous;Cleavage not well developed -  
apparently along bedding.

Beds 1/8" - 2'.

Red hematite staining along  
fractures and beds.

Rare minor cherty quartz interbeds.

NQ 2 1/8"

Nil

5°

98

2°

97

BQ 1 7/16"

Nil

98

0-5°  
30°  
(70°)  
same

36

0°  
(45°)

96

30°  
(>0°)  
sameSHALES, 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 0.08 mR/Hr.  
over interval, reaches peaks of  
0.12 mR/Hr.

DRILL NO.

TYPE Mindrill w/L

CASING IN HOLE DURING DRILLING

EXPLANATION

1" = 20'

HEAD OFFICE

LOGGED BY

A.T.

DRILLER M. Losko

10° Bedding  
(30°) Cleavage

REFERENCES

measured as angle to core normal.

DRAWN BY

CHECKED BY

SHEET 1 OF 3

DRAWN NO.

D52/B7-540A

same = Same sense. TO ACCOMPANY RECORD No. 1970/23

## GEOLOGICAL LOG OF DRILL HOLE

PROJECT GOULD AREA  
HOLE No. 68-7  
LOCATION Mt. MINZA  
CO-ORDINATES 201 S 444-5 E  
REMARKS RUM JUNGLE DISTRICT, N.T.  
Gould Grid  
R L GROUND Length 509'3"  
ANGLE FROM HORIZONTAL -60°  
DIRECTION Grid E

200'

SHALE as above, black, hard,  
siliceous, carbonaceous, graphitic,  
pyritic.

229'

233' SILTSTONE, pink, massive, silic.

SHALE as above.

252'

SILTSTONE, pink to yellow-brown,  
grey, hard, siliceous, argillaceous;  
gen. bedded. Some mottled red-brown.

275' 6"

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.

300'

312'

SILTSTONE or FINE SANDSTONE,  
cream to grey, silic. and argillaceous.

322'

SHALE, black, hard, silic., occasional  
minor siliceous grey interbeds.

332'

SILTSTONE, shaly, light to medium  
grey with abundant brick-red stain-  
ing 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.

Pyrite is rare.

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

400'

DRILL NO. ....	EXPLANATION	HEAD OFFICE
TYPE Mindrill W/L	CASING IN HOLE DURING DRILLING	LOGGED BY A.T.
DRILLER M. Laska	REFERENCES	DRAWN BY
COMMENCED	10° Bedding } measured as angle to core normal.	CHECKED BY
COMPLETED	(31°) Cleavage	SHEET 2 OF 3
	TO ACCOMPANY RECORD No. 1970/23 D52/B7-541A	DRAWING NO.

## GEOLOGICAL LOG OF DRILL HOLE

PROJECT. GOULD AREA. REMARKS. RUM JUNGLE DISTRICT, N.T.  
 HOLE No. 68-7. CO-ORDINATES 201 S. 444.5 E. Gould Grid. R L GROUND Length. 509'3"  
 LOCATION Mt. MINZA. ANGLE FROM HORIZONTAL -60° DIRECTION Grid E.

DESCRIPTION OF CORE	R.L.	DEPTH	LOG	CORE RECOVERY %	REMARKS	ASSAYS
	CASING	SIZE OF CORE				
<p>400' <i>SILTSTONE as above, shaly, grey, gen. massive, some ferruginous staining along fractures and bedding.</i></p> <p><i>At about 435 ft., rock becomes predominantly red-brown.</i></p>						
457' <i>Thinly interbedded SHALE, black, carbonaceous, and SILICEOUS LUTITE, light grey, massive (siliceous dololite ?)</i>						
476' <i>SHALE, black, carbonaceous, siliceous, graphitic, pyritic. Massive except for minor pyritic beds.</i>						
499' <i>SHALE as above with minor cherty quartz veins (?) along bedding.</i>						
509'3" TOTAL DEPTH						
<p><i>Electrical and Radiometric logs run.</i></p> <p><i>Core scraped for spectroscan.</i></p> <p><i>Stratigraphy: 0-509'3" Pld.</i></p> <p><i>Surveys: None Acid tube container lost down hole.</i></p>						

DRILL NO. ....  
 TYPE Mindrill W/L

CASING IN HOLE DURING DRILLING

EXPLANATION

1" = 20'

HEAD OFFICE

LOGGED BY

A.T.

DRAWN BY

CHECKED BY

DRILLER M. Laska

COMMENCED

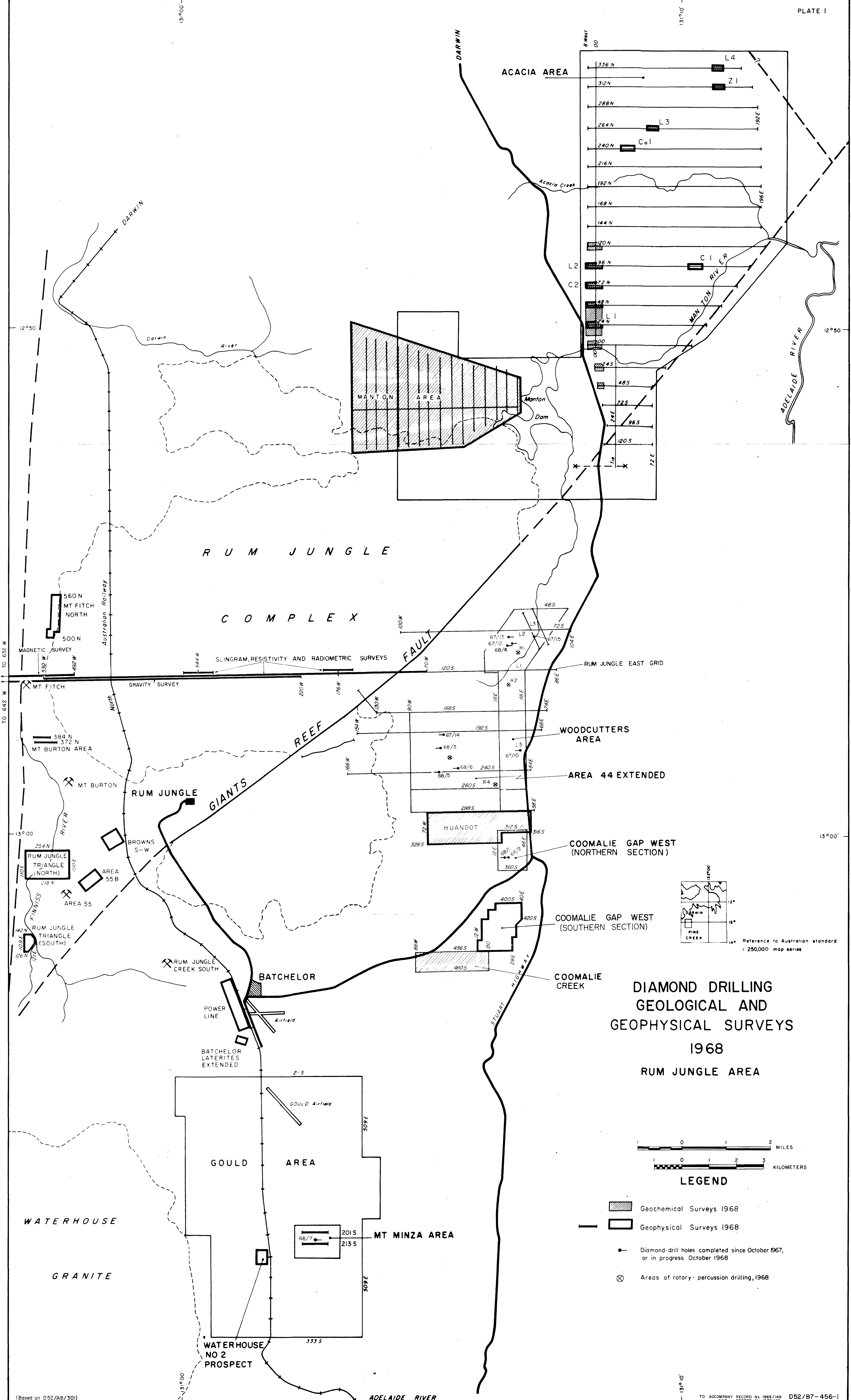
COMPLETED

10° Bedding } measured as angle to core normal.  
 (37°) Cleavage }

TO ACCOMPANY RECORD No. 1970/23 D52/B7-542A

SHEET 3 OF 3

DRAWING NO.

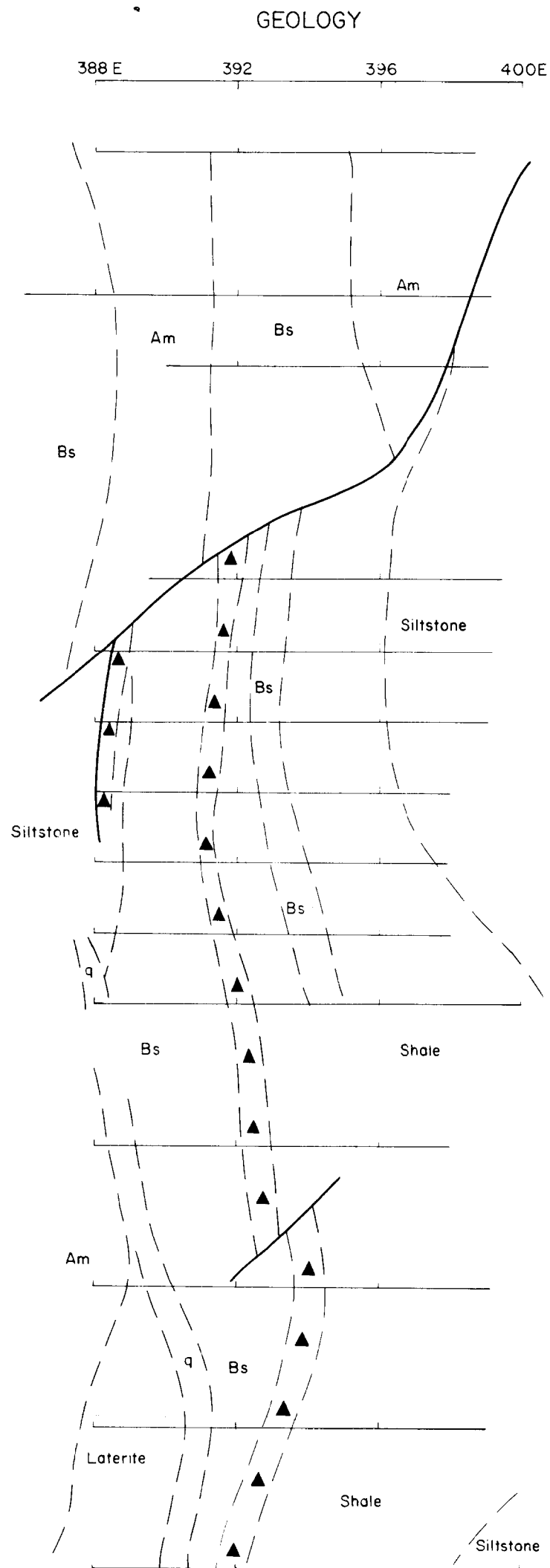


**DIAMOND DRILLING  
GEOLOGICAL AND  
GEOPHYSICAL SURVEYS  
1968  
RUM JUNGLE AREA**



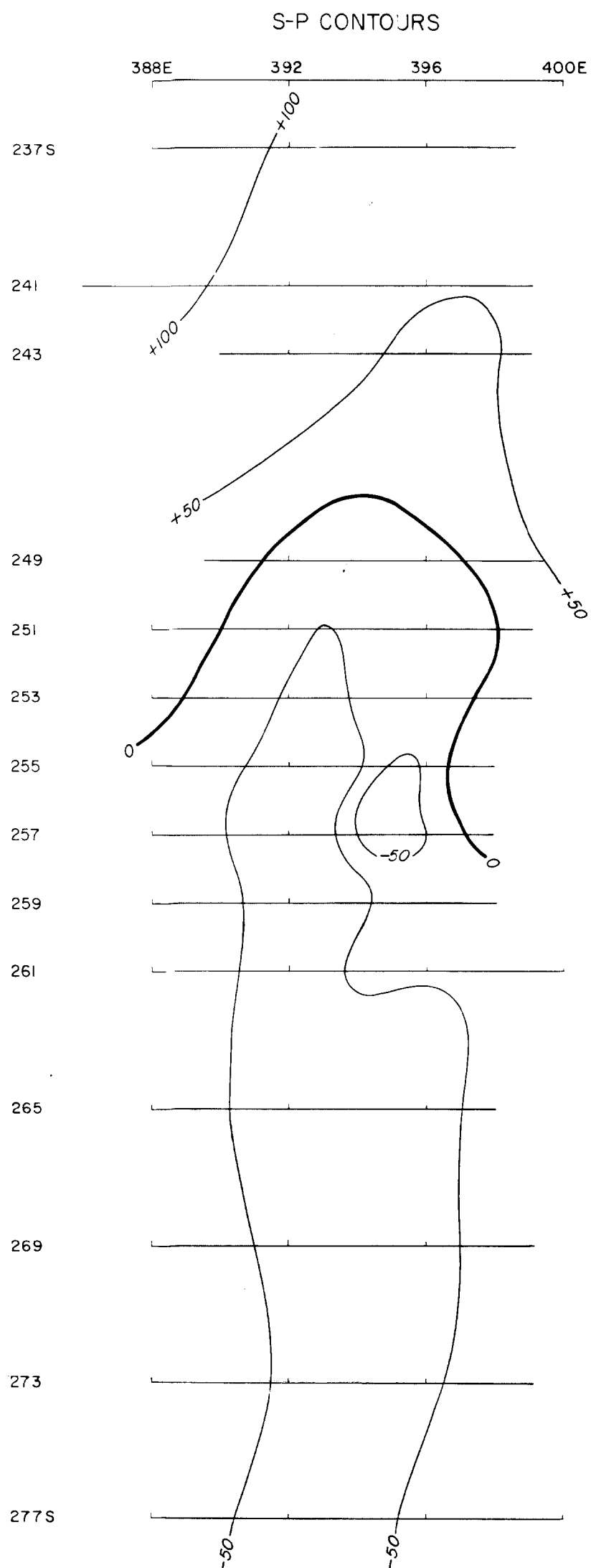
**LEGEND**

- Geochemical Surveys 1968
- Geophysical Surveys 1968
- Diamond-drill holes completed since October 1967, or in progress October 1968
- Areas of rotary-percussion drilling, 1968



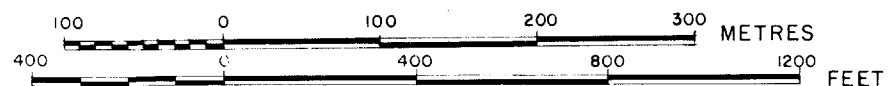
#### LEGEND

- Fault
- Am Amphibolite
- Bs Black shale
- ▲ Haematitic quartz breccia
- q Quartzite
- - - Geological boundary



GOULD (WATERHOUSE NO. 2) AREA, NT

### GEOLOGY AND S-P CONTOURS

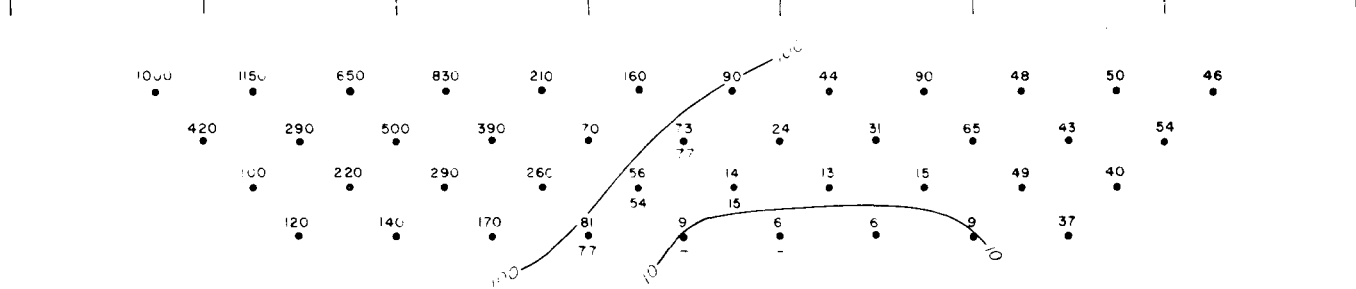


Contour interval 50 millivolts  
Geology after D.G. Semple 1967

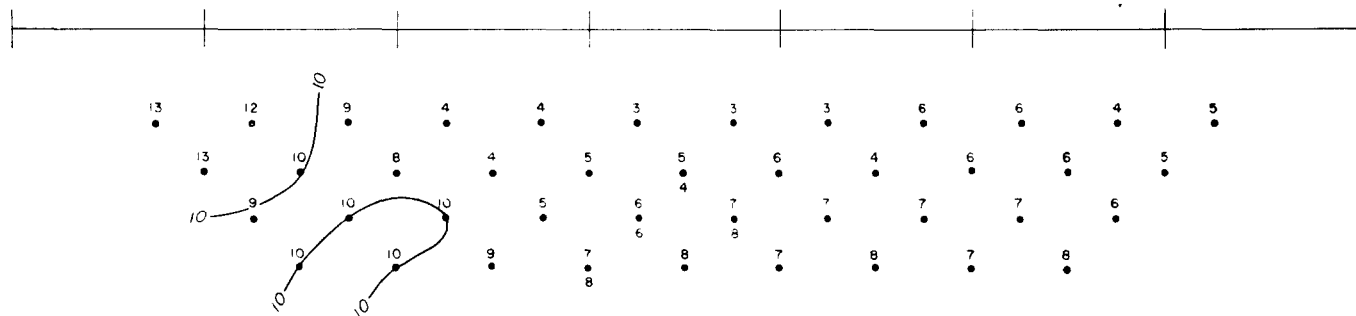
TRAVERSE 213S

440E 442 444 446 448 450 452 454E

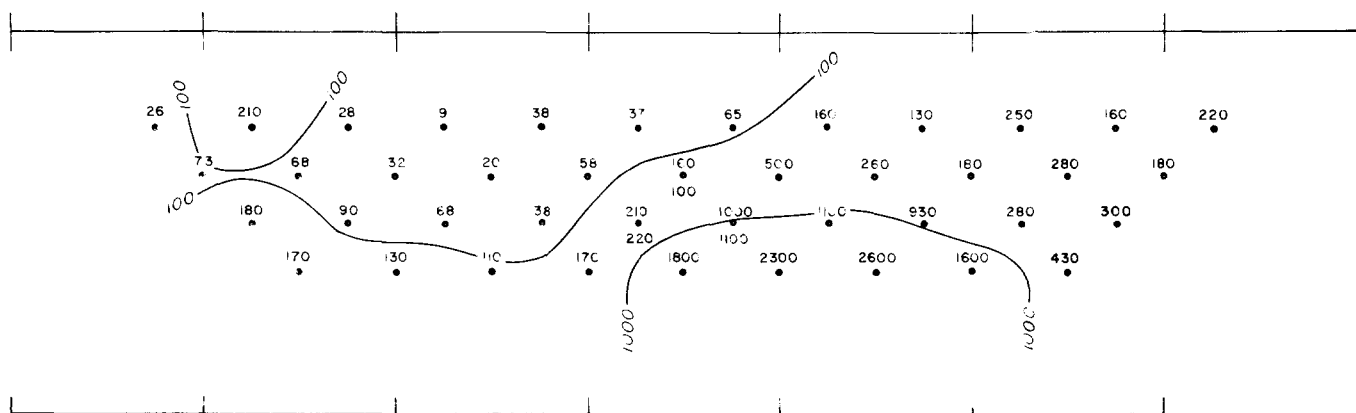
SLINGRAM ANOMALY



APPARENT  
RESISTIVITY  
(ohm-metres)



FREQUENCY  
EFFECT (%)



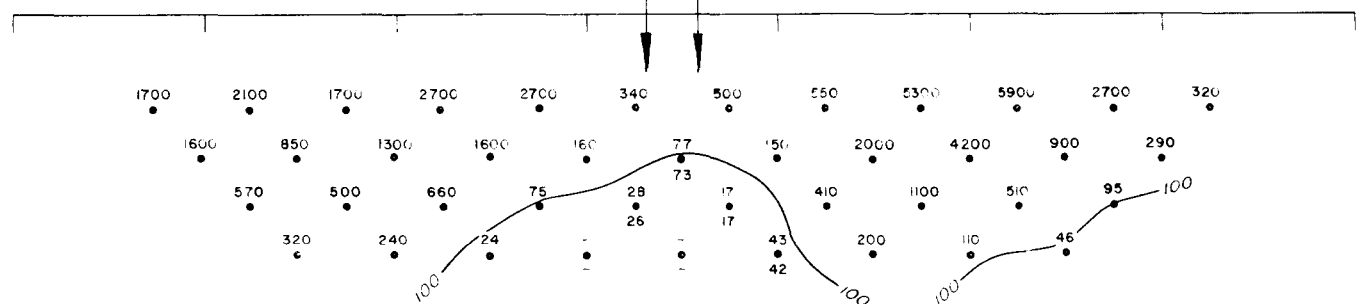
METAL FACTOR

440E 442 444 446 448 450 452 454E

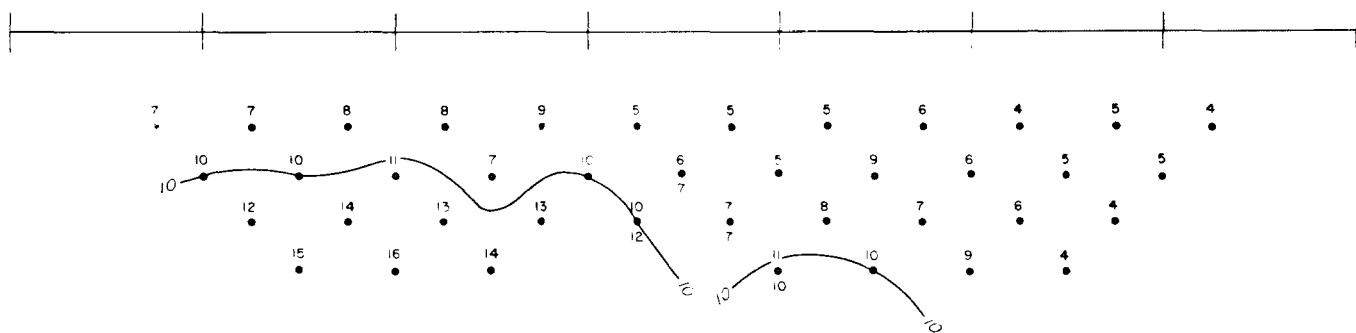
TRAVERSE 201S

SLINGRAM ANOMALY

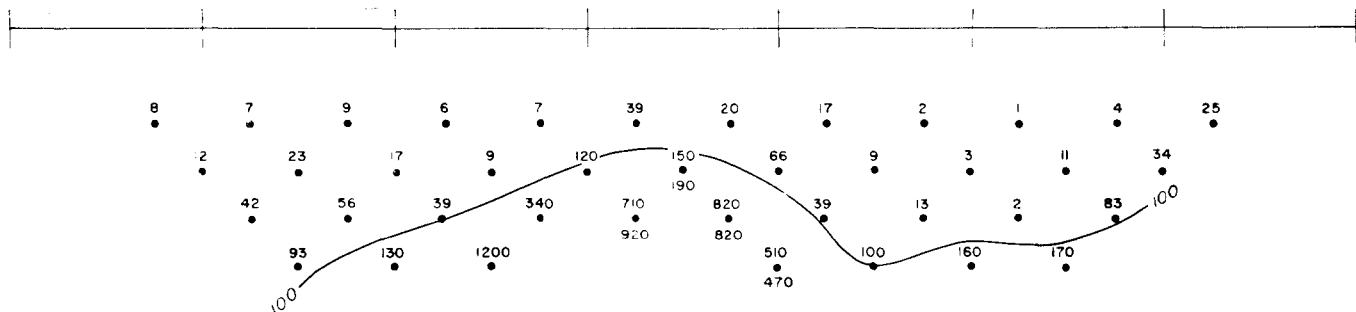
S P ANOMALY



APPARENT  
RESISTIVITY  
(ohm-metres)



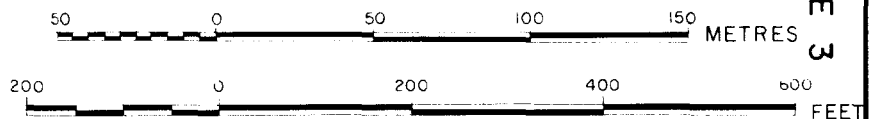
FREQUENCY  
EFFECT (%)



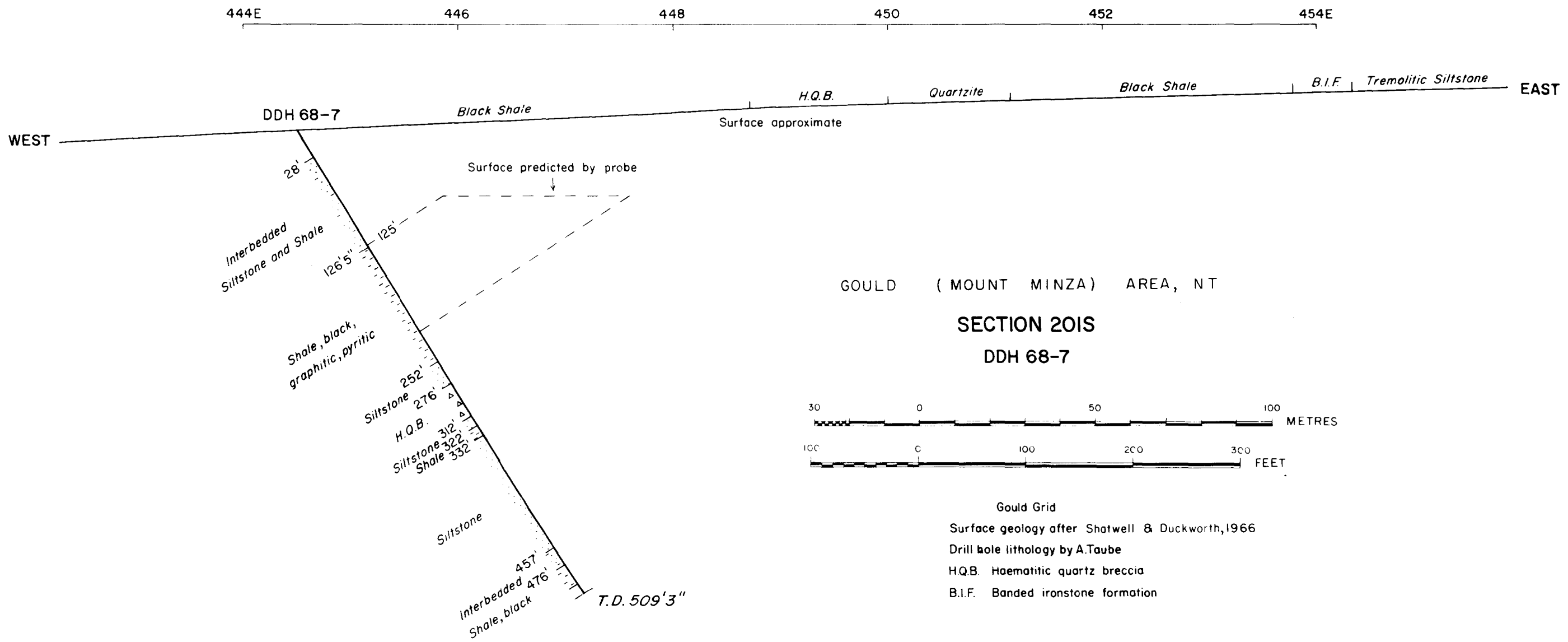
METAL FACTOR

440E 442 444 446 448 450 452 454E

GOULD (MOUNT MINZA) AREA, NT  
TRAVERSES 201S AND 213S  
INDUCED POLARISATION RESULTS







MT MINZA, NT 1968

S-P LOG

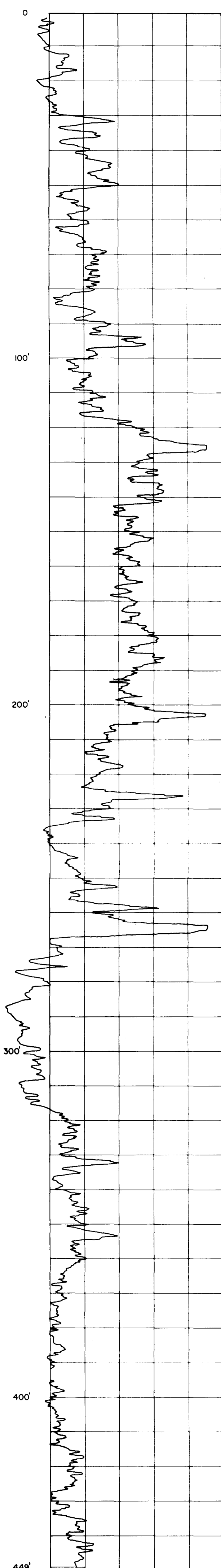
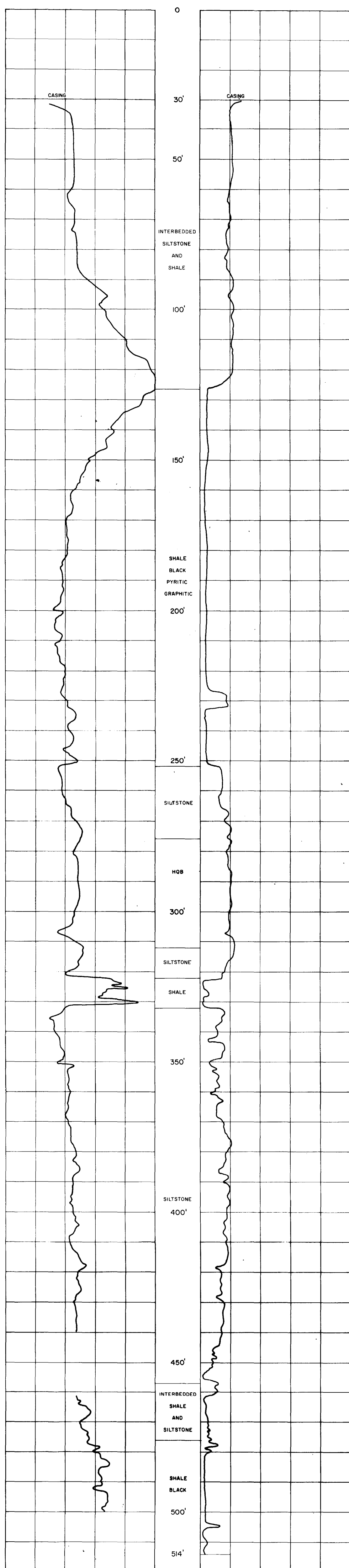
0 100 200  
Millivolts

RESISTANCE LOG

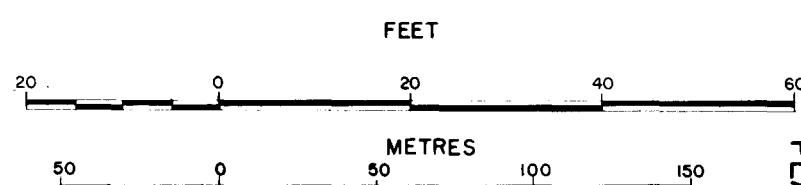
0 800 1600  
ohms

RADIOMETRIC LOG

0.04 0.08 0.12  
mR/hr



GOULD (MOUNT MINZA) AREA, NT  
GEOPHYSICAL LOGS  
DDH 68-7



Note: 101.5ft on this log is 100ft true depth due to a fault in the logger.