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B.M.R. Rotary-Percussion Drilling Rum Jungle District, N.T. 1967-1968

(Woodcutters, Area 44 Extended, Waterhouse No. 2 Prospect, and Rum Jungle Creek South)

by

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B.M.R. ROTARY - PERCUSSION DRILLING

RUM JUNGLE DISTRICT, N.T.

1967-1968

(WOODCUTTERS, AREA 44 EXTENDED, WATERHOUSE NO. 2 PROSPECT, AND RUM JUNGLE CREEK SOUTH)

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SUMMARY

A total of 8,202 feet of rotary and percussion drilling was carried out in 1967 and 1968 in the Rum Jungle East, Rum Jungle Creek South, and Gould areas as part of a uranium - base metals prospecting programme. Radiometric anomalies delineated by previous regional and detailed auger drilling programmes were tested to varying depths. This report comprises the results of several rotary - percussion drilling programmes, giving particular attention to radiometric results.

Most of the drilling was done in the Woodcutters area, which is within the Rum Jungle East grid. The highest radioactivity in this area was from the R1 and R3 anomalies (Shatwell, 1966): values up to 0.070 mR/hr (milliroentgens per hour) were recorded from rotary - percussion holes on these prospects. Minor syngenetic and epigenetic sources of radioactivity yielding values up to 0.100 mR/hr were located by the author in diamond drill holes which had been put down on these prospects earlier. No further drilling is recommended in this area.

Only four holes of the drilling programme recommended by Semple (Semple, 1968) were completed in Area 44 Extended, which is also within the Rum Jungle East Grid. One anomaly of 0.080 mR/hr was revealed. Further drilling is required to test the remaining anomalies in this area.

The Waterhouse No. 2 Prospect in the Gould area was tested with 7 drill holes; one anomaly of 0.042 mR/hr was revealed. Further testing of this prospect is required.

Five holes were drilled for Territory Enterprises Pty Limited in the Rum Jungle Creek South area to fill in time while other B.M.R. areas were inaccessible to the drill. Further drilling will be carried out by the company in the area.

Of three rotary and percussion drills used in the exploration programmes, the Mayhew rig used in 1968 seems to be the most efficient machine for the purpose.

INTRODUCTION

Location

Rum Jungle East comprises an area about 12 miles long and 4 miles wide, located mainly between the Rum Jungle Granite Complex and the Stuart Highway.

The Woodcutters area is within Rum Jungle East and is situated immediately west of the Stuart Highway, approximately between the 48 and 52-mile posts. Area 44 Extended, also within Rum Jungle East, adjoins and overlaps the western portion of the Woodcutters area and extends westward almost to the Rum Jungle Granite Complex.

The Waterhouse No. 2 prospect is 6 miles south of Batchelor, and the Rum Jungle Creek South mine is 1½ miles west of Batchelor.

History of Exploration

Semple (1967 a and b), outlined the history of exploration of the Rum Jungle East and Gould areas to 1966. Following his and Shatwell's (1966) recommendations, rotary - percussion drilling was introduced to test some of the radiometric and geochemical anomalies in the areas.

The Drilling Programmes

In June 1967 an Atlas Copco Air Trac wagon drill was made available by the Mines Branch, Northern Territory Administration, for field trials. 2225 feet of drilling was done in the Woodcutters area, mainly on the R3 radiometric anomaly.

In July-August and later in November-December of that year a B.M.R. Carey rotary-percussion rig was made available; 2,162 feet of drilling was done in the Woodcutters and Gould (Waterhouse No. 2) areas.

A Mayhew rotary-percussion rig was made available by the B.M.R. Petroleum Technology Section in May-July 1968; 3815 feet of drilling was done in the Woodcutters, Area 44 Extended, and Rum Jungle Creek South areas.

Geochemical samples were collected at varying intervals from all the drill holes and analysed by atomic absorption spectrophotometry for copper, lead, zinc, and in some cases silver, nickel, cobalt and phosphorous.

Most of the holes were probed for radioactivity. The Carey and wagon drill holes were probed mainly with a single geiger tube probe coupled to a Harwell Type 1368A ratemeter; the Mayhew holes were probed using a Widco 1000 logging unit with a scintillometer probe. Four of the Carey holes were probed using a geiger tube probe coupled to an EMI type 59A ratemeter with a recording unit which was not calibrated; an approximate calibration was later made for this unit using the Widco logger. The radiometric profiles from these four holes are depicted with dotted lines (see plates 5, 10, and 13). The 1968 Mayhew holes were electrically probed with the Widco logging unit.

D.G. Semple was in charge of the wagon drilling programme and the first part of the Carey drilling programme; J.L. Willis supervised the second part of the Carey drilling programme. A. Taube was in charge of the Mayhew programme.

WOODCUTTERS AREA

General

Drilling in the Woodcutters area comprised 2,225 feet of wagon drilling, 1,312 feet of Carey drilling; and 2,493 feet of Mayhew drilling. No further rotary-percussion drilling is recommended in this area.

Geology

The geology of the Woodcutters area has been described by Dodson and Shatwell (1965), Shatwell (1966), and Semple (1967b). The area covered by the drilling programme is underlain by sediments of the Lower Proterozoic Golden Dyke Formation, which here consists of black calcareous carbonaceous silty slaty shale with interbedded calcilutite and dololutite. The sequence has been tightly folded. The map of the area made by Shatwell in 1966 is used as the basis for the discussion of the results. The more recent detailed work of Semple (1967b) did not significantly alter the results of the earlier survey.

The sediments in the area have been intensely weathered to an average depth of about 100 feet and partially weathered to about 200 feet. A typical weathering profile in shale is as follows:

0 - 5'	Ferruginous pebbles, sand, and clay;	Intensely weathered
5 - 15'	Mottled brown and white clay;	
15 - 100'	Brown, purple, and grey siltstone and shale, very soft and porous.	
100 - 200'	Black silty shale, non-calcareous, carbonaceous, soft and porous	Partially weathered
200'+	Erratic gradation to black calcareous carbonaceous silty slaty shale, usually pyritic.	Fresh

Pyrite usually appears within the "partially weathered" zone, but it may be oxidised to hematite or limonite well below the top of the "fresh" calcareous zone.

Limestone and dolomite usually weather to soft silty or sandy argillaceous rock; but in some cases silicification has apparently occurred. The outcrops of grey pyritic siliceous lutite at the L1 prospect which Semple (1967b) called "quartzite" are apparently derived from calci-dololutite at depths. These outcrops could also represent originally siliceous interbeds or lenses within the sediments.

Radiometric Results

Table I summarises the radiometric results from the rotary-percussion drill holes in the Woodcutters area. Radiometric profiles are plotted on plates 5 to 16.

The highest radioactivity in any of the rotary-percussion drill holes was from the R3 anomaly (Shatwell, 1966; Semple 1967b); values of up to 0.070 mR/hr were recorded in a wagon drill hole at 154S 34E (plate 15). Drilling in a pattern around this hole failed to intersect any other significant radioactivity. A diamond drill hole put down on the prospect in 1966 was found by the writer to contain a syngenetic source of radioactivity. DDH 66-13 (plate 14), passed through a bed of calci-dololutite from 260 to 282 feet which yielded radiometric values up to 0.100 mR/hr. The radioactivity was traced to several thin beds of black material within the calci-dololutite.

Radioactivity reaching values of 0.060 mR/hr was recorded from a Mayhew drill hole at 116S 36E on the R1/L1 anomaly. A value of 0.080 mR/hr from a Carey hole at 118S 38E was inferred from a comparison of the logs of an uncalibrated recorder with the Widco logger (plate 10); this value could be as low as 0.040 mR/hr if the base setting of the uncalibrated recorder had been changed. Other rotary-percussion drill holes on the R1/L1 prospect yielded only values lower than 0.030 mR/hr. Diamond drill holes on the prospect

yielded anomalies up to 0.100 mR/hr associated with epigenetic material. DDH's 67-2, 67-5 and 67-6 (plates 9 and 10), intersected several crystalline carbonate veins exhibiting distinct zoning and colloform textures; black colloform material in these veins is apparently the source of the radioactivity.

Rotary-percussion drill holes on the R1/L2 anomaly and the R1 anomaly south of L2 yielded only low values, the maximum being a surface anomaly of 0.042 mR/hr (plate 8). A diamond drill hole (DDH 68-4), on the L2 anomaly, however, yielded a sharp peak of 0.050 mR/hr above a background of 0.020 mR/hr; the radioactivity was traced to minor fine black interbeds associated with a 1" band of calci-dololutite (A. Taube, in prep.).

The R2 anomaly (Shatwell, 1966) yielded values of up to 0.040 mR/hr in a Mayhew drill hole at 138S 27E and inferred values (from comparison of an uncalibrated recorder with the Widco logger) of up to 0.070 mR/hr in Carey drill holes at 138S 26E and 28E (plate 13). A Mayhew drill hole put down next to a Carey drill hole at 138S 26E failed to reproduce a bottom-hole radiometric anomaly. Other holes in this area failed to reveal any significant radioactivity.

The R4 anomaly, at the south end of the Woodcutters area yielded a value of 0.060 mR/hr from a drill hole at 256S 6E (plate 16). The anomaly was confined to the surface; values from other holes in the area were low.

Radiometric profiles from the diamond drill holes in the Woodcutters area show a correlation of background radioactivity with lithology: black shales yield a background of about 0.010 mR/hr above the background for carbonate rock. This is broadly exemplified by the profile of DDH 67-9 (plate 6); in this hole zones of homogeneous black shale yield higher background radioactivity than do zones of shale interbedded with calci-dololutite. On a detailed scale, beds of calci-dololutite as small as a few feet thick correlate distinctly with "lows" on the radiometric profile (A. Taube, in prep.).

Radiometric profiles of the rotary-percussion drill holes in the Woodcutters area show a distinct correlation with the weathering profiles. In the "intensely weathered" zone the typical radiometric profile has a sharp peak within a few feet of the surface and falls off rapidly to a fairly constant level at about 0.010 mR/hr. The "partial weathering" zone usually yields values of about 0.025 mR/hr. Fresh rock generally drops back to below 0.010 mR/hr or less, depending largely on lithology.

Geochemical Results

From the Woodcutters area, representative geochemical samples were bulked over 10 to 15 foot intervals from the Carey and Wagon drill holes and over 20 foot intervals from the Mayhew drill holes. All samples were assayed by atomic absorption spectrophotometry for copper, lead, and zinc and in some cases cobalt, nickel and silver.

Results in general confirmed the findings of previous auger-drilling programmes, in that high surface values were usually associated with high down-hole values. In profile, however, the values were often erratic. Anomalous lead and zinc values are usually associated with each other; anomalous copper values occur sporadically.

In the diamond drill holes, geochemical values tended to be higher in weathered and partially weathered rock than in fresh rock.

The highest geochemical values from rotary-percussion holes on the L2 anomaly were 450 ppm copper, 2500 ppm lead, and 4000 ppm zinc; these values came from various holes near the peaks of the anomaly. Maximum values for nickel and cobalt (one hole only was tested for these) were 400 and 140 ppm respectively. A possible stratigraphic correlation of geochemical lead values has been suggested from drill holes on Section 90S (plate 6), but some doubt is thrown on this correlation by the apparently erratic behaviour of geochemical values from other holes in the area.

The highest geochemical values from the area south of L2 were 210 ppm copper, 480 ppm lead, and 2000 ppm zinc. The values showed no definite pattern of occurrence.

The L1 anomaly yielded values of 430 ppm copper, 10,000 ppm lead, and 2300 ppm zinc from a Carey drill hole at 118S 36E. Lead and zinc values from other drill holes on the prospect were also anomalous. Diamond drilling beneath the anomaly revealed the source of the values to be a number of minor quartz-carbonate veins containing galena and sphalerite.

The Z3 anomaly yielded maximum values of 190 ppm copper, 85 ppm lead, 1300 ppm zinc, and 1.5 ppm silver. The values were regularly distributed in section and followed the surface anomalies in plan.

The R2 anomaly yielded maximum values of 310 ppm copper, 160 ppm lead, and 800 ppm zinc, which apart from a few erratic values, were regularly distributed.

The R3 anomaly yielded maximum values of 220 ppm copper, 580 ppm lead, and 1600 ppm zinc; moderately anomalous lead and zinc values occurred in some of the easternmost drill holes.

The R4 anomaly did not yield any significant geochemical values.

AREA 44 EXTENDED

General

The drilling programme outlined for Area 44 Extended could not be completed in 1968 owing to other commitments for the Mayhew drill. Only four holes were put down in this area, totalling 321 feet of drilling. Further drilling is required in this area to complete the programme.

Geology

Semple (1968) described the geology of Area 44 Extended. The area covered by the present investigation is underlain by sediments of the Lower Proterozoic Golden Dyke Formation, which here consists of black calcareous silty slaty shale, with interbedded calcilutite and dololutite. In this area the sequence of sediments apparently dips steeply east.

These sediments are intensely weathered at the surface, but the typical weathering profile found in the Woodcutters area is not evident in the drill holes. Fresh rock was generally found at less than 100 feet depth, and the "partially weathered" zone appeared to be absent.

Outcrops of grey siliceous lutite (described as black cherty slate by Semple, 1968) could represent either beds of calci-dololutite which have been silicified at the surface, or originally siliceous beds or lenses within the sediments.

Most of the drill cuttings returned consisted of intensely weathered, poorly consolidated clayey and silty material, which could have been derived either from shale or from calci-dololutite.

Radiometric Results

Table II summarises the radiometric results from the rotary-percussion drilling in Area 44 Extended; profiles are plotted on plates 17 and 18.

The highest radioactivity in this area was from a drill hole at 220S 50W (plate 17); a peak of 0.080 mR/hr was recorded at 10' depth. The peak fell off gradually to 0.030 mR/hr at 20 feet and dropped to 0.010 mR/hr in fresh rock at 106 feet (total depth). An earlier auger drill hole at the same position yielded a radiometric peak of 0.028 mR/hr at 10' depth.

Values up to 0.50 mR/hr were recorded from a drill hole at 220S 46W. This hole was abandoned owing to caving prior to reaching fresh rock.

The two other holes in the area encountered difficult drilling conditions and had to be abandoned; maximum readioactivity recorded in these holes was 0.040 mR/hr.

Geochemical Results

Representative samples were taken in 20 foot intervals from the drill holes and assayed by atomic absorption spectrophotometry for copper, lead, and zinc.

Maximum geochemical values from the area were 250 ppm copper, 320 ppm lead, and 290 ppm zinc; these values fall within the moderately anomalous zones defined by the auger drilling programme.

GOULD AREA - WATERHOUSE NO. 2 PROSPECT

General

Eight Carey drill holes totalling 850 feet of drilling were put down on the Waterhouse No. 2 prospect in 1967. The Carey drill was unfortunately unable to cope with drilling conditions on the prospect, and the target depth (150-200 feet) was reached only three times. Further drilling is required to complete the testing of this prospect.

Geology

The geology of the prospect has been described by Wyatt and Alle (1953), Ruxton (1961), Shatwell and Duckworth (1966) and Semple (1967a). The area is underlain by rocks of the Lower Proterozoic Golden Dyke Formation. Shatwell and Duckworth (1966) described a stratigraphic sequence at the prospect as follows:-

Banded shale and siltstone
Silicified shale
Graphitic black shale
Silicified shale
Hematite quartz breccia
Graphitic black shale
Banded ironstone
Tremolitic siltstone

A body of amphibolite occurs at the north end of the prospect.

The sequence strikes north and dips about 30° to 45° eastwards. It is truncated by a northeast-trending fault which brings it into contact with the body of amphibolite.

Semple(in an unpublished note on Carey and wagon drilling, Semple and Willis, 1967), concluded that the silicified black slate bed is the cause of the radiometric anomalies, and that a north-east trending fracture cleavage parallelling the major fault direction will control any mineralisation.

Radiometric Results

Radiometric results are tabulated in Table III. Radiometric profiles are depicted on plate 19.

Maximum radioactivity on the prospect occurred in a drill hole at 253S 393E; 0.042 mR/hr was recorded at 86 feet depth. Values up to 0.028 mR/hr were recorded from other drill holes on line 253S, but only low values (max. 0.018 mR/hr) were revealed in the remaining drill holes. Some of the holes were not probed for their total depth owing to caving and other factors.

Geochemical Results

Geochemical samples were taken in 10 to 11 foot intervals and assayed by atomic absorption spectrophotometry for copper, cobalt, nickel and phosphorous. Copper values tended to substantiate the surface geochemical values and were generally regular in profile. Cobalt and nickel values were generally low and had an irregular distribution. Anomalous phosphate values appeared to coincide with anomalous radioactivity in one hole.

RUM JUNGLE CREEK SOUTH AREA

General

Owing to a prolonged wet season in 1968 the programmed areas for B.M.R. Mayhew drilling were not accessible to the rig for the first week of its term in Darwin. To keep the rig operational for that time, several holes were drilled in the Rum Jungle Creek South area for Territory Enterprises Pty Limited. Four holes totalling 1001 feet of drilling were put down in a pattern around T.E.P. D.D.H. 930 and C.D. 305 to test for radioactivity around these drill holes; and one hole was put down to test a shale bed within the Hematite Quartzite Breccia east of the Rum Jungle Creek South mine. The results of this work have been made available to the Company.

OPERATIONAL ASPECTS

Wagon Drilling

Owing to the exigencies of a concurrent auger drilling programme, full-time supervision of the wagon drilling programme by a geologist was not possible. For this reason little information is available regarding details of drilling rates, setting-up time, and other aspects of the wagon drilling programme.

Apparently, however, the wagon drill could put down four 70 foot drill holes in one day if moves were short and drilling conditions were good. Setting-up time is short - probably less than 15 minutes. Drilling rates probably averaged more than 2 feet per minute in the soft, weathered rock.

The top 20 or 30 feet of the drill holes was usually cased to prevent caving.

Samples for geochemical assay were usually collected by the drillers. The geologist apparently was not always available to do the radiometric probing immediately after the hole was drilled, and consequently some of the holes could not be probed to their full depth.

The deepest hole drilled by the wagon drill was 170 feet deep on Anomaly R2. According to the field log sheet, unweathered rock had not been intersected at that depth; none of the other wagon drill holes apparently reached fresh rock. Most of the holes were terminated at about 70 feet depth.

Carey Drilling

As in the wagon drilling programme, most of the Carey drilling was not fully supervised by the geologist owing to the exigencies of a concurrent auger-drilling programme; and details of drilling rates and setting-up time are not available.

The Carey drilling programme suffered considerably from down time owing to mechanical failures. During periods when continuous drilling was possible, a 200 foot hole could apparently be put down in weathered rock in a day; but if hard calcareous or siliceous rock was encountered the holes would have to be abandoned. The deepest hole drilled by the Carey rig was 216 feet on the L2 Anomaly.

The first 20 or 30 feet of most of the Carey drill holes was cased to prevent caving. Drilling was done with mud since the rig's air compressor was not operative; the down-hole jack-hammer could not be used for the same reason.

Samples for geochemical assay were collected in 10 foot intervals by the drillers; these were representative samples collected in a bucket from below the top of the casing. The geologist apparently was not always available for radiometric probing immediately after the hole was drilled; for this reason some of the holes could not be probed to their full depth.

Mayhew Drilling

The Mayhew drilling programme was fully supervised by a geologist. Drilling times and other operational aspects were recorded in detail.

At first, the drilling programme suffered some down time owing to mechanical failures. During the latter part of the programme, however, the rig averaged one 200 foot hole per day, including drilling in hard calcareous rock and coring. The deepest hole drilled by the rig was 262 feet; average hole depth was about 200 feet. Fresh rock was penetrated in nearly all cases.

Drilling rates were recorded in minutes per 5 foot interval. In weathered and partially weathered rock drilling averaged 2 or 3 feet per minute; fresh rock drilling averaged less than half a foot per minute.

The first 10 or 20 feet of each drill hole was cased to prevent caving. Most of the holes were drilled using air to circulate cuttings; but in the northern part of the Woodcutters area some circulation difficulties were encountered and mud drilling was necessary.

Setting-up time on level ground was usually less than 15 minutes; levelling the rig would require extra time. If mud drilling was necessary, an extra hour would be required for digging a sump. Some drilling time was lost owing to loss of mud circulation in cavities or porous rock.

The down-hole jackhammer was not used except on the R1/L1 anomaly.

During the earlier part of the survey a "Blue Devil" fish-tail bit was used for drilling in weathered rock and a roller-cone bit used for drilling fresh rock. Later it was found expedient to drill as far as possible into fresh rock with the fishtail bit and change directly to a diamond bit for coring, thereby eliminating a trip to change bits.

Representative samples were collected in a bucket placed below the top of the casing. Samples were collected in 5 foot intervals for control, retained for storage in 10 foot intervals, and bulked over 20 foot intervals for assay by atomic absorption spectrophotometry.

Each 5 foot control sample was described and checked for radioactivity with a Harwell Type 1368A Ratemeter in order to select intervals for coring. It was found, however, that this ratemeter was not sensitive enough to detect a moderate down-hole anomaly from the cuttings.

All the Mayhew drill holes were electrically and radiometrically probed using a Widco 1000 logging unit. Some of the first holes drilled could not be probed owing to immediate caving of the hole; later it was made standard practice to do the radiometric probe inside the drill stem before the pipe was pulled from the hole. In this way it was possible to ensure probing to within one or two feet of the total hole depth. Electrical logs cannot be made inside the drillstem; some holes could not therefore be electrically probed owing to caving.

Self-potential probe results tended generally to confirm the results of previous regional surveys; in areas of low to moderate self-potential the downhole log indicated the same. No areas of anomalous SP were investigated and no significant down-hole SP anomalies were recorded.

Single point resistance logs have been found in previous diamond drilling programmes to reflect the lithology of fresh rock penetrated by the drill holes. Black calcareous carbonaceous shale yields low resistance; calcilutite and dololutite yield high resistance. In this survey a correlation was found with the weathering profile: "intensely weathered" shale yields higher resistance than does "partially weathered" or "fresh" shale, both of which yield low resistance. This suggests that the top of a conducting body can be well above the surface of fresh rock - in parts of the survey area this discrepancy was more than 100 feet.

Apart from this correlation, little information was gained from the resistance logs, since most of the drilling was done in weathered rock. However, if deeper drilling is carried out in the future, the resistance logs could be useful for correlating lithologies between drill holes, and it is suggested that electrical logging of the rotary-percussion holes be continued. Electrical logging is particularly recommended for any future drilling programme at Waterhouse No. 2 prospect, where a distinct sequence of rock units of varying resistances is present.

Radiometric Probing

Of the instruments used for radiometric probing, the Widco 1000 logging unit is apparently the most sensitive; several Mayhew drill holes tested with the Widco unit yielded higher radiometric readings than did auger drill holes at the same localities. Differences in calibration of the instruments could account for this discrepancy; but this increase could also be caused by an actual increase in radiation owing to a larger surface area (larger diameter drill hole) being exposed. The first alternative seems the most

likely since the Carey drill holes, tested with the Harwell ratemeter, generally yielded results of the same order of magnitude as the auger drill holes.

CONCLUSIONS AND RECOMMENDATIONS

Minor sources of primary radioactivity have been found beneath three of the radiometric anomalies outlined by surface auger drilling programmes in the Woodcutters area. These occurrences have all been too small or too weak to be considered significant other than as objects of academic interest, and no further drilling is recommended in this area. The highest radiometric results from this area were of the order of 0.1 mR/hr, which is only about 0.1 lb/ton U_3O_8 equivalent.

Further drilling is required in Area 44 Extended and in the Gould area at the Waterhouse No. 2 Prospect, to complete the rotary-percussion drilling programmes recommended by Semple (1967a)

Electrical logging and detailed tabulation of drilling rates are recommended for all future holes, particulary at the Waterhouse No. 2 Prospect, where a distinct sequence of rock units of varying electrical properties and hardness is present.

The Mayhew drill seems to be the best unit for intermediate depth exploration (between the auger drilling and diamond drilling stages). Problems of ground water do not affect the Mayhew rig as much as the wagon drill, and radiometric probing to the total depth of the hole can be ensured by probing within the drill stem.

The technique of testing cuttings with a ratemeter while drilling could be a useful guide for coring, providing a sufficiently sensitive instrument is available.

Further drilling programmes of this nature require full time supervision by a geologist or suitably qualified field hand, in order that radiometric probing can be carried out immediately after the hole is completed.

Drilling rates should be tabulated to aid in geological interpretation, and electrical logging could be a useful tool for interpretation in deeper holes.

REFERENCES

BERKMAN, D., 1968 - The Geology of the Rum Jungle Uranium deposits, in Uranium in Australia, pp. 12-31. Aust. Inst. Min. Met. Symposium, 1968.

DODSON, R.G., and SHATWELL, D.O., 1965 - Geochemical and Radiometric Survey, Rum Jungle, Northern Territory, 1964. Bur. Miner. Resour. Aust. Rec. 1965/254 (unpubl.).

RUXTON, B.P., 1961 - The testing of electromagnetic anomalies by diamond drilling at Waterhouse No. 2 Uranium Prospect, N.T. Bur. Miner. Resour. Aust. Rec. 1961/161 (unpubl.).

SEMPLE, D.G., 1967a - Geochemical and radiometric investigations, Gould Area, Northern Territory, 1966 (Mount Minza and Waterhouse No. 2 Areas). Bur. Miner. Resour. Aust. Rec. 1967/41 (unpubl.).

SEMPLE, D.G., 1967b - Geochemical and radiometric investigations, Prospects L1, L2, L3 and L6, northern part of Woodcutters Area, Rum Jungle East, N.T., 1966. Bur. Miner. Resour. Aust. Rec. 1967/42 (unpubl.).

SEMPLE, D.G., 1968 - Geochemical and radiometric investigations, Rum Jungle East, N.T., 1967. (Area 44 Extended and Coomalie Gap West - northern section). Bur. Miner. Resour. Aust. Rec. 1968/7 (unpubl.).

SEMPLE, D.G., and WILLIS, J.L., 1967 - Report on Carey and Wagon drilling, Rum Jungle area, 1967. Bur. Miner. Resour. Aust. (unpublished file note).

SHATWELL, D.O., 1966 - Geochemical and radiometric investigations, Rum Jungle East Area, 1965 (Coomalie Gap West and Woodcutters areas). Bur. Miner. Resour. Aust. Rec. 1966/34 (unpubl.).

SHATWELL, D.O., and DUCKWORTH, K., 1966 - Gould Area geochemical and geophysical surveys, Rum Jungle Area, Northern Territory, 1965. Bur. Miner. Resour. Aust. Rec. 1966/154 (unpubl.).

TAUBE, A., in prep. - Summary of B.M.R. Diamond Drilling Results, L1, L2, L3 and L6 Anomalies, Woodcutters Area, Northern Territory 1966 to 1968. Bur. Miner. Resour. Aust. Rec. (in prep.).

WYATT, J.D., and ALLE, A.F., 1953 - Preliminary report on Waterhouse Uranium Prospect No. 2. Bur. Miner. Resour. Aust. Rec. 1953/105.

TABLE I

ROTARY - PERCUSSION DRILLING

WOODCUTTERS AREA

RUM JUNGLE EAST GRID

Co-ordinates		Drill	Anomaly	Hole Depth	Probe Depth	Max. Radioactivity mR/hr	Remarks
86S	36E	(C)	R1, L2	112'	91'	0.030@ 50'	inferred radiometric
	37E	(M)	R1, L2	151'	151'	0.033 @ 2'	
	39E	(M)	R1, L2	197'	194'	0.035 @ 2'	
90S	37E	(C)	R1, L2	176'6"	60'	0.010 @ 6'	
	38E	(C)	R1, L2	142'	44'	0.013 @ 42'	
	39E	(C)	R1, L2	116'	-	-	not probed
	40E	(C)	R1, L2	216'	-	-	not probed
	41E	(C)	R1, L2	196'	-	-	not probed
98S	37E	(M)	R1	233'	224'	0.020 @ 80'	
	39E	(M)	R1	208'	206'	0.038 @ 2'	
102S	37E	(M)	R1	160'	160'	0.035 @ 2'	
	39E	(M)	R1	262'	255'	0.042 @ 3'	
116S	36E	(M)	R1, L1	80'	74'	0.065 @ 18'	
	37E	(M)	R1, L1	195'	194'	0.030 @ 15'	
118S	36E	(M)	R1, L1	57'6"	55'	0.020 @ 20'	
	37E	(M)	R1, L1	20'	7'	0.020 @ 5'	caved
	38E	(C)	R1, L1	59'	34'6"	0.080 @ 16'	inferred radiometric
130S	30E	(W)	R2	69'	61'	0.016 @ 3'	
	33E	(W)	Z3	131'	-	-	not probed
	34E	(W)	Z3	170'	-	-	not probed
	34E	(Gemco)	Z3	65'	-	-	not probed
132S	35E	(W)	Z3	20'	-	-	not probed
136S	27E	(W)	R2	60'	56'	0.016 @ 3'	

Co-ordinates		Drill	Anomaly	Hole Depth	Probe Depth	Max. Radioactivity mR/hr	Remarks
138S	26E	(C)	R2	153	148	0.050 @ 148'	inferred radiometric
	26E	(M)	R2	193'	192'	0.034 @ 2'	
	27E	(M)	R2	234'6"	224'	0.041 @ 140'	
	28E	(C)	R2	150'	148'	0.070 @ 148'	inferred radiometric
	31E	(W)	R2	70'	59'	0.018 @ 4'	
150S	32E	(W)	R3	48'	48'	0.026 @ 3'	
	34E	(W)	R3	50'	40'?	0.027 @ 2'	
	36E	(W)	R3	57'	57'	0.023 @ 50'	
	37E	(W)	R3	60'	55'	0.031 @ 11'	
	38E	(W)	R3	60'	58'	0.018 @ 2'	
152S	32E	(W)	R3	100'	56'	0.021 @ 2'	
	33E	(W)	R3	80'	75'	0.025 @ 26'	
	34E	(W)	R3	70'	62'	0.025 @ 4'	
	35E	(W)	R3	60'	26'	0.021 @ 3'	
	36E	(W)	R3	65'	61'	0.030 @ 18'	
	37E	(W)	R3	70'	65'	0.035 @ 63'	
	38E	(W)	R3	60'	58'	0.024 @ 17'	
153.5S	34E	(W)	R3	70'	54'	0.017 @ 18'	
154S	32E	(W)	R3	90'	49'	0.013 @ 7'	
	33E	(W)	R3	80'	61'	0.018 @ 28'	
	34E	(W)	R3	70'	48'	0.070 @ 26'	
	34.5E	(W)	R3	60'	40'	0.015 @ 39'	
	35E	(W)	R3	70'	40'	0.028 @ 52'	
	36E	(W)	R3	70'	48'	0.025 @ 45'	
	37E	(W)	R3	70'	61'	0.017 @ 42'	
	38E	(W)	R3	60'	50'	0.015 @ 5'	
154.5S	34E	(W)	R3	90'	80'	0.023 @ 73'	
256S	4E	(M)	R4	157'	157'	0.055 @ 3'	
	6E	(M)	R4	195'	195'	0.060 @ 5'	
	8E	(M)	R4	150'	144'	0.032 @ 2'	

TABLE II

ROTARY - PERCUSSION DRILLING

AREA 44 EXTENDED

RUM JUNGLE EAST GRID

Co-ordinates		Drill	Anomaly	Hole Depth	Probe Depth	Max. Radioactivity mR/hr	Remarks
220S	46W	R2	105	93'	0.052 @ 35'		
	50W	R2	106	102'	0.080 @ 10'		
228S	38W	R3	90'	47'	0.038 @ 35'		
	40W	R3	20'	19'	0.038 @ 16'		

TABLE III

ROTARY - PERCUSSION DRILLING

GOULD AREA - WATERHOUSE No. 2 PROSPECT

Co-ordinates		Drill	Hole Depth	Probe Depth	Max. Radioactivity mR/hr	Remarks
246S	393.5E	C	123'	60'	0.006 @ 9', 23'	
247S	392E	C	159'	137'	0.014 @ 114-120'	
	393E	C	3'	-	-	
	394E	C	54'	14'	0.014 @ 3'	
	395E	C	55'	23'	0.018 @ 23'	
251S	394E	C	78'	75'	0.025 @ 20', 36', 49'	
253S	392E	C	5'	3'	0.028 @ 3'	
	393E	C	158'	146'	0.042 @ 86'	
	394E	C	151'	0 - 14' and 129-150'	0.026 @ 148'	
	395E	C	57'	50'	0.028 @ 50'	

APPENDIX NO. 1

GEOCHEMICAL ANALYSES

WOODCUTTERS AREA

RUM JUNGLE EAST GRID

Geochemical analyses from the Woodcutters Area are listed by co-ordinate position, sample number and depth of sample. Samples were analysed at A.M.D.L. by atomic absorption spectrophotometer for copper, lead, zinc, silver, nickel and cobalt (though not all samples were analysed for all these elements. See text). All results are in p.p.m. unless otherwise stated.

C = Carey Drill
M = Mayhew Drill
W = Wagon Drill
G = Gemco Drill

Sample No.	Drill	Co-ordinates		Depth (feet)	Cu	Pb	Zn	Ni	Co
67126235	C	86S	36E	0 - 6	80	670	100	80	10
36				6 - 16	90	2400	140	70	15
37				16 - 27	230	1100	770	180	50
38				27 - 38	310	1900	1900	400	140
39				38 - 49	150	750	570	180	65
40				49 - 59	110	660	320	120	50
41				59 - 70	150	560	600	170	75
42				70 - 80	450	1450	1500	220	120
43				80 - 91	270	1150	1250	250	95
44				91 - 101	120	560	850	170	65
67126145				101 - 112	120	550	790	130	40
				Total depth of hole - 112'					
68121114	M	86S	37E	0 - 20	85	490	80		
15				- 40	140	300	110		
16				- 60	25	430	530		
17				80	70	200	930		
18				- 100	100	160	4000		
19				- 120	50	75	2700		
20				- 140	50	30	1600		
21				- 148	60	75	630		
22				148 - 151	100	25	1700		
				Total depth of hole - 151'					

Sample No	Drill	Co-ordinates		Depth (Feet)	Cu	Pb	Zn
68121103	M	86S	39E	0 - 20'	85	150	350
04				- 40'	85	100	2100
05				- 60'	140	45	1900
06				- 80'	50	30	2300
07				- 100'	70	35	2000
08				- 120'	70	85	2600
09				- 140'	75	140	2700
10				- 160'	45	310	3400
11				- 180'	45	130	2600
12				- 194'	40	100	730
13				194 - 197'	30	40	670
	TOTAL DEPTH OF HOLE - 197'						
67126000	C	90S	37E	0 - 7	75	60	180
01				7 - 10½	60	40	200
02				10½ - 18	40	40	140
03				18 - 22½	45	70	310
04				22½ - 28	50	60	250
05				28 - 38½	60	25	320
06				38½ - 49	70	30	210
07				49 - 59½	85	50	270
08				59½ - 70	100	90	260
09				70 - 80½	140	360	370
10				80½ - 91	100	550	330
11				91 - 101½	120	2000	390
12				101½ - 112	90	700	400
13				112 - 122½	90	630	800
14				122½ - 133	105	660	600
15				133 - 143½	90	690	480
16				143½ - 154	95	660	560
17				154 - 164½	105	700	560
18				164½ - 175	145	850	1100
19	C	90S	37E	175 - 176½	215	1300	1400
	TOTAL DEPTH OF HOLE - 177'						

Sample No.	Drill	Co-ordinates		Depth (Feet)	Cu	Pb	Zn	
67236020	C	90S	38E	0 - 7½	70	90	120	
21				7½ - 18	110	65	430	
22				18 - 28½	90	55	460	
23				28½ - 39	105	350	870	
24				39 - 49½	130	1400	500	
25				49½ - 60	140	1450	600	
26				60 - 70½	110	650	500	
27				70½ - 81	95	600	500	
28				81 - 91½	120	730	580	
29				91½ - 102	115	740	520	
30				102 - 112½	70	570	560	
31				112½ - 123	80	600	640	
32	(washed sample)			136'	55	660	560	
33				136'	80	550	580	
34	C	90S	38E	142'	5	145	420	
	TOTAL DEPTH OF HOLE - 142'							
35	C	90S	39E	0 - 8	140	560	210	
36				8 - 17	95	200	330	
37				17 - 28½	130	340	490	
38				28½ - 39	165	440	580	
39				39 - 50	100	190	600	
40				50 - 60	90	470	770	
41				60 - 71	140	2500	1200	
42				71 - 81	115	550	690	
43				81 - 91½	100	550	690	
44				70 - 81	190	1400	1000	
45				81 - 90	150	1700	1100	
46	(Bentonite & Lime)				5	30	85	
47	(Bentonite, Lime & Gel Flakes)				5	30	70	
48	C	90S	39E	Core - 116'	15	170	2000	
	TOTAL DEPTH OF HOLE - 116'							
67126049	C	90S	40E	0 - 9	130	100	360	
50				9 - 19½	240	200	1000	
51				19½ - 29	375	530	1200	
52				29 - 40	240	320	1100	
53				40 - 50	140	240	900	
54				50 - 60	125	680	880	
55				60 - 71	120	310	2200	
56				71 - 81	125	340	3300	cont'd

Sample No	Drill	Co-ordinates		Depth (Feet)		Cu	Pb	Zn
67126057	C	90S	40E	82	- 92	85	250	2900
58				92	- 102	115	170	2800
59				102	- 112½	75	120	2800
60				112½	- 122	105	120	2600
61 (A)				122	- 132	80	130	1700
61 (B)				Core	138'	70	20	3300
62				Core	144'	330	245	2100
63				144	- 154'	165	200	2300
64				154	- 165	150	110	1800
65				165	- 175	100	110	1850
66				175	- 186	160	210	2050
67 (A)				186	- 196	140	125	1700
67 (B)				Core	205'	125	55	360
68	C	90S	40E	Core	216'	15	75	1400

TOTAL DEPTH OF HOLE - 216'

69	C	90S	41E	0	- 18'	45	125	90
70				18	- 28	55	60	150
71				28	- 39	40	20	180
72				39	- 49	65	15	250
73				49	- 60	75	20	285
74				60	- 70	65	30	350
75				70	- 81	75	30	530
76				81	- 93	110	30	740
77				93	- 102	210	90	1550
78				102	- 112	250	140	2200
79				112	- 123	175	85	2100
80				123	- 134	70	140	3300
81				134	- 145	60	140	2750
82	Grease sample only							
83				145	- 155	50	60	1150
84				155	- 165	90	75	1550
85				165	- 175	135	110	1200
86				175	- 187	90	85	1000
87	C	90S	41E	Core	196'	25	45	650

Sample Number 67126082 missing - Grease sample only

TOTAL DEPTH OF HOLE - 196'

Sample No	Drill	Co-ordinates		Depth (Feet)	Cu	Pb	Zn	
68121079	M	98S	37E	0 - 20'	65	20	440	
80				- 40'	65	150	540	
81				- 60'	75	55	540	
82				- 80'	30	75	580	
83				- 100'	30	180	670	
84				- 120'	30	130	530	
85				- 140'	30	220	670	
86				- 160'	30	160	1000	
87				- 180'	30	40	530	
88				- 200'	30	55	530	
89				- 220'	40	55	750	
90				- 233'	40	40	610	
	TOTAL DEPTH OF HOLE - 233'							
91	M	98S	39E	0 - 20'	50	50	330	
92				- 40'	25	20	210	
93				- 60'	30	45	130	
94				- 80'	40	35	320	
95				- 100'	50	35	710	
96				- 120'	45	25	560	
97				- 140'	45	35	430	
98				- 160'	30	20	480	
99				- 180'	45	35	750	
100				- 200'	30	160	1900	
01				- 203'	60	170	710	
02		Core		203 - 208'	20	190	180	
	TOTAL DEPTH OF HOLE - 208'							
68121137	M	102S	37E	0 - 20'	60	65	240	
38				- 40'	50	35	670	
39				- 60'	45	55	650	
40				- 80'	30	35	650	
41				- 100'	50	400	730	
42				- 120'	30	220	670	
43				- 140'	50	170	670	
44				- 160'	25	480	590	
	TOTAL DEPTH OF HOLE - 160'							
68121123	M	102S	39E	0 - 20'	50	35	310	
24				- 40'	100	35	480	
25				- 60'	210	45	770	
26				- 80'	655	170	710	
27	M	102S	39E	- 100'	25	25	340	cont'd

Sample No.	Drill	Co-ordinates		Depth (Feet)		Cu	Pb	Zn	Ni	Co
68121128	M	102S	39E		- 120'	120	35	1000		
29					- 140'	140	150	2000		
30					- 160'	50	95	690		
31					- 180'	50	65	650		
32					- 200'	30	45	630		
33					- 220'	40	35	730		
34					- 240'	65	55	820		
35					- 253'	30	30	340		
36			Core	253	- 262'	390	50	120		
	TOTAL DEPTH OF HOLE - 262'									
68121172	M	116S	36E	0	- 20'	150	2900	1000		
73					- 40'	140	2500	1100		
74					- 60'	120	1500	940		
75					- 80'	100	1200	860		
	TOTAL DEPTH OF HOLE - 80'									
68121176	M	116S	37E	0	- 20'	75	1800	500		
77					- 40'	90	2000	620		
78					- 60'	55	1600	540		
79					- 80'	55	1200	690		
80					- 100'	60	1100	830		
81					- 120'	60	1200	690		
82					- 140'	60	980	710		
83					- 160'	45	930	620		
84					- 180'	55	1100	620		
85					- 195'	25	480	320		
	TOTAL DEPTH OF HOLE - 195'									
68121168	M	118S	36E	0	- 20'	55	1900	520		
69					- 40'	40	2100	550		
70					- 53'	100	4600	1000		
	TOTAL DEPTH OF HOLE - 53'									
71	M	118S	37E		20'	140	5600	1500		
	TOTAL DEPTH OF HOLE - 20'									
68126230	C	118S	38E	0	- 6	60	5000	320	20	30
31				6	- 17	250	10000	2000	20	20
32				17	- 27	430	10000	2300	20	25
33				27	- 38	140	10000	1200	20	5
34	C	118S	38E	38	- 49	140	10000	1000	20	8
	TOTAL DEPTH OF HOLE - 57'									

Sample No.	Drill	Co-ordinates		Depth (Feet)	Cu	Pb	Zn	Ag	Co
67125031	W	152S	37E	0 - 10	70	45	30		
32				10 - 20	105	60	50		
33				20 - 30	80	120	40		
34				30 - 40	70	80	45		
35				40 - 50	60	120	60		
36				50 - 60	70	80	160		
37	W	152S	37E	60 - 70	95	90	150		
		TOTAL DEPTH OF HOLE - 70'							
67125025	W	152S	38E	0 - 10	50	90	45		
26				10 - 20	55	220	45		
27				20 - 30	55	240	250		
28				30 - 40	120	240	1600		
29				40 - 50	100	100	600		
30	W	152S	38E	50 - 60	50	50	240		
		TOTAL DEPTH OF HOLE - 60'							
67125109	W	153.5S	34E	0 - 10	65	50	40	0.1	
10				10- 20	220	130	700	0.2	
11				20 - 30	190	45	650	0.2	
12				30 - 40	140	45	240	0.3	
13				40 - 50	140	30	200	0.3	
14				50 - 60	95	20	210	0.4	
15	W	153.5S	34E	60 - 70	115	40	320	1.0	
		TOTAL DEPTH OF HOLE - 70'							

Sample No.	Drill	Co-ordinates	Depth (Feet)	Cu	Pb	Zn	Ag
6712158	W	130S 30E	0 - 10	60	15	45	1.5
59			10 - 20	35	10	40	0.6
60			20 - 30	30	10	65	1.0
61			30 - 40	45	15	70	1.5
62			40 - 50	35	15	75	0.4
63			50 - 60	25	10	70	0.4
64	W	130S 30E	60 - 70	70	20	130	0.7
		TOTAL DEPTH OF HOLE - 69'					
6712165	W	130S 33E	0 - 10	110	20	270	<0.1
66			10 - 20	190	15	760	0.5
67			20 - 30	140	10	880	0.4
68			30 - 40	140	15	900	0.4
699			40 - 50	120	15	1300	0.4
70			50 - 60	75	10	660	0.3
71			60 - 70	60	15	550	0.5
72			70 - 80	55	15	390	0.3
73			80 - 90	45	10	350	0.4
74			90 - 100	55	15	350	0.2
75			100 - 110	60	20	380	0.3
76			110 - 120	55	10	310	0.3
77			120 - 130	45	15	290	0.3
78			130 - 140	45	10	260	0.2
79			140 - 150	55	15	220	0.2
80	W	130S 33E	150 - 160	50	15	210	0.3
		TOTAL DEPTH OF HOLE - 160'					
6712181	W	130S 34E	0 - 10	95	20	210	0.1
82			10 - 20	85	15	370	0.1
83			20 - 30	60	15	600	0.2
84			30 - 40	55	15	680	0.2
85			40 - 50	50	15	600	0.2
86			50 - 60	50	10	660	0.2
87			60 - 70	45	25	470	0.2
88			70 - 80	45	15	440	0.2
89			80 - 90	40	15	410	0.3
90			90 - 100	55	10	570	0.3
91			100 - 110	50	15	550	0.4
92			110 - 120	65	15	520	0.6
93			120 - 130	40	20	450	0.4
94			130 - 140	45	10	440	0.3
95			140 - 150	45	5	360	0.5
96			150 - 160	40	5	310	0.4
97	W	130S 34E	160 - 170	35	5	340	0.4
		TOTAL DEPTH OF HOLE - 160'					

Sample No	Drill	Co-ordinates		Depth (Feet)	Cu	Pb	Zn	Ag
67125200	G	130S	34E	0 - 6	95	15	110	0.1
01				6 - 12	55	10	95	0.3
02				12 - 18	95	8	350	0.1
03				18 - 24	90	10	490	0.2
04				24 - 30	85	10	550	0.1
05				30 - 36	80	10	520	0.1
06				36 - 42	80	5	490	0.1
07				42 - 48	70	10	600	0.1
08				48 - 54	90	20	520	0.3
09				54 - 60	100	8	460	0.1
10	G	130S	34E	60 - 66	90	15	480	0.1
		TOTAL DEPTH OF HOLE - 66'						
Note :	Drilled by Gemco [illegible] drill							
67125198	W	132S	35E	0 - 10	90	15	350	0.2
99	W	132S	35E	10 - 20	110	10	800	0.3
		TOTAL DEPTH OF HOLE - 20'						
67125152	W	136S	27E	0 - 10n	55	85	55	0.4
53				10 - 20	60	45	55	0.2
54				20 - 30	70	35	55	0.3
55				30 - 40	110	30	65	0.8
56				40 - 50	85	25	55	0.6
57	W	136S	27E	50 - 60	95	35	70	0.8
		TOTAL DEPTH OF HOLE - 60'						

Sample No	Drill	Co-ordinates		Depth (Feet)		Cu	Pb	Zn	Co	Ni
67126215	C	138S	26E	0 - 6		130	90	130	100	100
16				6 - 17		90	35	50	25	50
17				17 - 27		220	85	200	80	80
18				27 - 38		50	80	40	14	35
19				38 - 48		65	35	30	25	35
20				48 - 59		70	45	45	20	40
21				59 - 70		60	105	60	20	40
22				70 - 80		60	45	120	20	60
23				80 - 90		85	45	170	25	80
24				90 - 101		110	55	280	40	120
25				101 - 112		90	40	230	40	130
26			Core	112 - 120		30	30	50	10	40
27				120 - 131		70	90	150	35	75
28				131 - 142		100	40	120	35	80
29	C	138S	26E	142 - 153	Core	50	25	50	15	50
		TOTAL DEPTH OF HOLE - 153'								

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Sample No	Drill	Co-ordinates	Depth (Feet)	Cu	Pb	Zn	Co	Ni
68121158	M	138S 26E	0 - 20	80	35	30		
59			- 40	50	35	25		
60			- 60	90	35	65		
61			- 80	85	35	90		
62			- 100	100	25	280		
63			- 120	90	35	520		
64			- 140	150	45	390		
65			- 160	130	35	220		
66			- 180	85	45	180		
67	M	138S 26E	- 193	55	35	150		
		TOTAL DEPTH OF HOLE - 193						
68121145	M	138S 27E	- 20	60	45	30		
46			- 40	75	35	50		
47			- 60	60	35	100		
48			- 80	60	25	110		
49			- 100	100	35	120		
50			- 120	310	50	290		
51			- 140	230	25	260		
52			- 160	140	35	240		
53			- 180	100	25	190		
54			- 200	120	15	350		
55			- 220	120	45	440		
56			- 225	130	35	280		
57	M	Core	225 - 334	110	35	360		
		TOTAL DEPTH OF HOLE - 334						
67126200	C	138S 28E	- 6	65	45	65	30	60
01			6 - 16	50	30	55	10	50
02			16 - 26	65	20	140	25	70
03			26 - 36	120	40	200	60	130
04			36 - 46	95	15	160	55	100
05			46 - 56	90	30	140	55	110
06			56 - 67	120	30	270	40	140
07			67 - 78	70	20	150	20	90
08			78 - 89	60	15	130	20	80
09			89 - 100	80	20	170	30	90
10			100 - 116	60	30	170	30	85
11	(Core)		116 - 120	110	10	350	75	130
12			120 - 130	70	10	210	40	105
13			130 - 142	65	15	100	20	95
14	C	138S 28E	142 - 150	30	20	200	15	75
		TOTAL DEPTH OF HOLE - 150'						

Sample No	Drill	Co-ordinates	Depth (Feet)	Cu	Pb	Zn	AG
67125145	W	138S 31E	0 - 10	75	70	120	0.5
46			10 - 20	15	65	40	1.2
47			20 - 30	50	160	80	0.8
48			30 - 40	20	85	45	0.8
49			40 - 50	30	65	130	0.8
50			50 - 60	40	70	200	1.0
51	W	138S 31E	60 - 70	20	45	70	1.0
		TOTAL DEPTH OF HOLE - 70'					
67125001	W	150S 32E	0 - 10	55	95	120	<0.1
02			10 - 20	35	90	95	<0.1
03	W	150S 32E	20 - 30	55	400	130	<0.1
		TOTAL DEPTH OF HOLE - 30'					
67125004	W	150S 34E	0 - 10	135	360	140	0.1
05			10 - 20	120	580	110	<0.1
06	W	150S 34E	20 - 30	95	540	85	<0.1
		TOTAL DEPTH OF HOLE - 30'					
67125007	W	150S 36E	0 - 10	50	130	60	0.1
08			10 - 20	30	140	50	<0.1
09			20 - 30	30	140	55	<0.1
10			30 - 40	40	130	70	<0.1
11			40 - 50	35	140	65	<0.1
12	W	150S 36E	50 - 60	40	120	110	<0.1
		TOTAL DEPTH OF HOLE - 60'					
67125013	W	150S 37E	0 - 10	40	240	25	0.1
14			10 - 20	70	390	80	0.1
15			20 - 30	70	320	120	0.1
16			30 - 40	60	190	210	0.2
17			40 - 50	75	190	260	0.2
18	W	150S 37E	50 - 60	50	110	170	<0.1
		TOTAL DEPTH OF HOLE - 60'					
67125019	W	150S 38E	0 - 10	45	85	130	0.1
20			10 - 20	40	40	110	0.1
21			20 - 30	50	40	140	0.1
22			30 - 40	40	50	150	0.3
23			40 - 50	40	50	105	<0.1
24	W	150S 38E	50 - 60	35	35	95	0.3
		TOTAL DEPTH OF HOLE - 60'					

Sample No	Drill	Co-ordinates		Depth (Feet)	Cu	Pb	Zn
67125062	W	152S	32E	0 - 10	60	60	50
63				10 - 20	25	30	20
64				20 - 30	20	15	15
65				30 - 40	30	15	25
66				40 - 50	30	15	20
67				50 - 60	30	10	25
68				60 - 70	40	10	20
69				70 - 80	45	10	20
70				80 - 90	65	15	25
71	W	152S	32E	90 - 100	65	15	30
		TOTAL DEPTH OF HOLE - 100'					
67125054	W	152S	33E	0 - 10	100	60	55
55				10 - 20	20	80	25
56				20 - 30	20	200	35
57				30 - 40	85	160	230
58				40 - 50	90	60	210
59				50 - 60	110	40	240
60				60 - 70	95	60	180
61	W	152S	33E	70 - 80	80	120	80
		TOTAL DEPTH OF HOLE - 80'					
67125047 b	W	152S	34E	0 - 10	80	100	90
48				10 - 20	45	85	95
49				20 - 30	40	30	70
50				30 - 40	25	20	50
51				40 - 50	40	25	120
52				50 - 60	55	25	250
53	W	152S	34E	60 - 70	65	50	500
		TOTAL DEPTH OF HOLE - 70'					
67125044	W	152S	35E	0 - 10	35	45	25
45				10 - 20	35	30	20
46				20 - 30	40	60	120
47 a	W	152S	35E	30 - 40	50	120	950
		TOTAL DEPTH OF HOLE - 40'					
67125038	W	152S	36E	0 - 10	65	70	25
39				10 - 20	100	60	65
40				20 - 30	40	80	25
41				30 - 40	40	280	55
42				40 - 50	70	80	40
43	W	152S	36E	50 - 60	40	80	20
		TOTAL DEPTH OF HOLE - 60'					

Sample No	Drill	Co-ordinates		Depth (Feet)	Cu	Pb	Zn	Ag
67125072	W	154S	32E	0 - 10	65	660	40	
73				10 - 20	35	25	25	
74				20 - 30	35	25	18	
75				30 - 40	50	20	30	
76				40 - 50	55	20	40	
77				50 - 60	40	15	30	
78				60 - 70	25	15	20	
79				70 - 80	40	25	20	
80	W	154S	32E	80 - 90	40	15	20	
		TOTAL DEPTH OF HOLE - 90						
67125081	W	154S	33E	0 - 10	50	45	40	
82				10 - 20	35	50	70	
83				20 - 30	30	20	50	
84				30 - 40	30	20	55	
85				40 - 50	45	30	90	
86				50 - 60	110	110	170	
87				60 - 70	140	60	160	
88	W	154S	33E	70 - 80	180	45	190	
		TOTAL DEPTH OF HOLE - 80						
67125089	W	154S	34E	0 - 10	55	60	35	
90				10 - 20	95	60	190	
91				20 - 30	110	20	550	
92				30 - 40	100	15	500	
93				40 - 50	120	50	500	
94				50 - 60	110	40	600	
95	W	154S	34E	60 - 70	140	40	750	
		TOTAL DEPTH OF HOLE - 70						
67125103	W	154S	34.5E	0 - 10	75	45	60	0.2
104				10 - 20	70	120	50	0.2
105				20 - 30	70	60	45	0.2
106				30 - 40	65	60	40	0.2
107				40 - 50	150	30	130	0.3
108	W	154S	34.5E	50 - 60	120	30	200	1.0
		TOTAL DEPTH OF HOLE - 60						
67125096	W	154S	35E	0 - 10	45	35	25	0.6
97				10 - 20	30	30	20	0.5
98				20 - 30	100	30	50	0.3
99				30 - 40	120	35	120	0.6
100				40 - 50	95	35	230	0.7
101				50 - 60	120	45	800	1.2
102	W	154S	35E	60 - 70	65	65	85	0.8
		TOTAL DEPTH OF HOLE - 70						

Sample No	Drill	Co-ordinates		Depth (Feet)	Cu	Pb	Zn	Ag
67125125	W	154S	36E	0 - 10	40	90	25	0.2
26				10 - 20	20	85	20	0.3
27 27				20 - 30	20	35	30	0.3
28				30 - 40	40	45	45	0.6
29				40 - 50	45	190	45	0.6
30				50 - 60	50	280	40	0.0
31	W	154S	36E	50 - 70	40	230	30	1.5
TOTAL DEPTH OF HOLE - 70'								
67125132	W	154S	37E	0 - 10	35	35	55	1.5
33				10 - 20	30	70	30	0.2
34				20 - 30	50	50	30	0.8
35				30 - 40	50	75	40	0.6
36				40 - 50	55	85	50	0.8
37				50 - 60	30	75	40	1.0
38	W	154S	37E	60 - 70	20	75	25	0.8
TOTAL DEPTH OF HOLE - 70'								
67125139	W	154S	38E	0 - 10	80	45	150	1.2
40				10 - 20	110	25	470	0.1
41				20 - 30	110	30	420	0.8
42				30 - 40	130	60	480	0.8
43				40 - 50	190	280	760	1.0
44	W	154S	38E	50 - 60	200	170	940	1.0
TOTAL DEPTH OF HOLE - 60'								
67125116	W	154.5S	34E	0 - 10	60	45	90	0.2
17				10 - 20	25	25	30	0.2
18				20 - 30	40	35	50	0.2
19				30 - 40	110	80	110	1.2
20				40 - 50	95	55	90	0.7
21				50 - 60	120	75	90	1.0
22				60 - 70	130	45	120	1.0
23				70 - 80	145	60	120	1.0
24	W	154.5S	34E	80 - 90	110	75	110	1.2
TOTAL DEPTH OF HOLE - 90'								

Sample No	Drill	Co-ordinates		Depth (Feet)	Cu	Pb	Zn	Co	Ni
68121060	M	256S	4E	0 - 20'	45	90	100	20	60
61				- 40'	45	55	150	20	70
62				- 60'	60	20	140	20	70
63				- 80'	55	35	100	15	70
64				-100'	75	30	80	15	70
65				-120'	75	30	50	25	70
66				-140'	85	60	80	50	100

Sample No	Drill	Co-ordinates	Depth (Feet)	Cu	Pb	Zn	Co	Ni
68121067			- 147'	85	55	70	40	85
68	M	256S 4E	- 157' (core)	65	55	170	25	70
	TOTAL DEPTH OF HOLE - 157'							
68121069	M	256S 6E	- 20	65	65	70		
70			- 40'	75	30	85		
71			- 60'	90	65	190		
72			- 80'	80	45	130		
73			- 100'	60	35	110		
74			- 120'	100	55	140		
75			- 140'	70	45	110		
76			- 160'	60	45	180		
77			- 180'	120	35	140		
78	M	256S 6E	- 195'	75	35	190		
	TOTAL DEPTH OF HOLE - 195'							
68121052	M	256S 8E	- 20'	85	90	120	25	90
53			- 40'	110	100	530	80	180
54			- 60'	65	110	210	35	110
55			- 80'	95	90	220	30	120
56			- 100'	95	130	200	35	110
57			- 120'	120	90	160	50	120
58			- 140'	85	65	180	30	120
59	M	256S 8E	- 150'	18	20	20	<5	10
	TOTAL DEPTH OF HOLE - 150&							

APPENDIX NO. 2

GEOCHEMICAL ANALYSES

AREA 44 EXTENDED

RUM JUNGLE EAST GRID

Geochemical analyses of samples from this area are listed by co-ordinate position of hole, depth of sample, and sample number. Samples were analysed at Australian Mineral Development Laboratories by atomic absorption spectrophotometer; results are in parts per million.

Sample No	Drill	Co-ordinates	Depth (Feet)	Cu	Pb	Zn
68121186		220S 50W	- 20'	200	90	130
87			- 40'	250	75	180
88			- 60'	60	75	290
89			- 80'	60	160	290
90			- 100'	60	65	150
91	Core	220S 50W	- 106'	70	55	120
		TOTAL DEPTH OF HOLE - 106'				
68121192		220S 46W	- 20'	150	100	180
93			- 40'	200	35	180
94			- 60'	120	35	200
95			- 80'	120	45	220
96			- 100'	100	50	290
		220S 46W	- 105	no sample		
		TOTAL DEPTH OF HOLE - 105'				
68121197		228S 40W	- 20	50	100	50
		TOTAL DEPTH OF HOLE - 20'				
68121198		228S 38W	- 20'	35	130	90
99			- 40'	20	140	100
200			- 60'	20	160	80
01			- 80'	35	320	100
02			- 90'	30	180	70
		TOTAL DEPTH OF HOLE - 90'				

APPENDIX No. 3

GEOCHEMICAL ANALYSES

WATERHOUSE No. 2 PROSPECT

Geochemical Analyses of samples from the Waterhouse No. 2 Prospect are listed by co-ordinate position of hole, depth of sample and sample number. Samples were analysed by atomic absorption spectrophotometer at AMDEL and all results are in P.P.M.

Samples taken are representative samples from the Footage interval indicated.

Sample No.	Co-ordinates	Depth (Ft)	Cu	Co	Ni	P%
67126088	246S 393.5E	0 - 8	340	20	50	0.08
89		8 - 18	270	50	180	0.07
90		18 - 28	180	100	200	0.28
91		28 - 39	180	80	200	0.39
92		39 - 49	100	65	160	0.26
93		49 - 60	390	90	170	0.28
94		60 - 70	190	90	200	0.29
95		70 - 81	160	80	200	0.39
96		81 - 91	200	90	200	0.35
97 (A)		Core 102	100	70	160	0.25
97 (B)		Core 109	110	100	140	0.02
98		102- 112	130	40	180	0.10
99	246S 393.5E	112 - 123	130	60	190	0.24
	TOTAL DEPTH OF HOLE - 123'					
67126100	247S 392E	0 - 9	140	25	100	0.01
01		9 - 19	180	50	100	0.29
02		19 - 29	130	70	230	0.18
03		29 - 39	100	25	160	0.06
04		39 - 49	85	20	130	0.05
05		Not Analysed - Grease				
06		49 - 60	130	70	290	0.23
07		60 - 70	130	40	190	0.07
08		70 - 81	100	25	130	0.04
09		81 - 91	100	30	180	0.05
10		Core 100	150	40	190	0.05
11		Core 100	50	12	80	0.06
12		91 - 111	140	35	160	0.04
13		111 - 123	100	30	140	0.04
14		123 - 133	80	25	100	0.03

Sample No	Co-ordinates	Depth (Ft)	Cu	Co	Ni	P%
67126115		133 - 144	95	30	140	0.04
16		144 - 154	80	35	140	0.05
17		154 - 159	110	30	180	0.07
18	247S 392E	Core 159	60	50	95	0.27
	TOTAL DEPTH OF HOLE - 159'					

Note: Sample No. 67126105 not analysed. Grease unsuitable for Geochemical Analysis.

67126119	247S - 393E	0 - 3	150	25	40	0.44
	TOTAL DEPTH OF HOLE - 3'					
67126120	247S 394E	0 - 8	520	200	120	0.24
21		8 - 18	240	80	100	0.09
22		18 ¾ 29	210	80	140	0.21
23		29 - 39	600	60	140	0.43
24		39 - 49	230	50	95	0.11
25	247S 394E	49 - 57	220	50	80	0.09
	TOTAL DEPTH OF HOLE - 57'					
67126126	247S 395E	0 - 8	100	20	25	0.02
27		Core 10'	100	25	25	0.30
28		8 - 18	200	25	50	0.16
29		18 - 29	100	50	160	0.63
30		29 - 39	90	40	80	0.16
31		39 - 49	60	15	30	0.06
32		49 - 54	110	40	70	0.12
33	247S 395E	Core 54'	40	15	35	0.06
	TOTAL DEPTH OS HOLE - 55'					
67126187	251S 394E	0 - 7	510	40	70	0.11
88		7 - 17	510	70	70	0.12
89		17 - 28	1450	160	110	0.20
90		28 - 38	930	60	70	0.13
91		38 - 49	490	25	30	0.09
92		49 - 60	1200	35	50	0.07
93		60 - 70	2300	50	65	0.12
94	251S 394E	70 - 80	1300	35	60	0.33
	TOTAL DEPTH OF HOLE - 78'					
67126185	253S 392E	2'	10,000	180	400	1.45
67126186	253S 392E	3'	2,850	75	170	0.34
	TOTAL DEPTH OF HOLE - 3'					

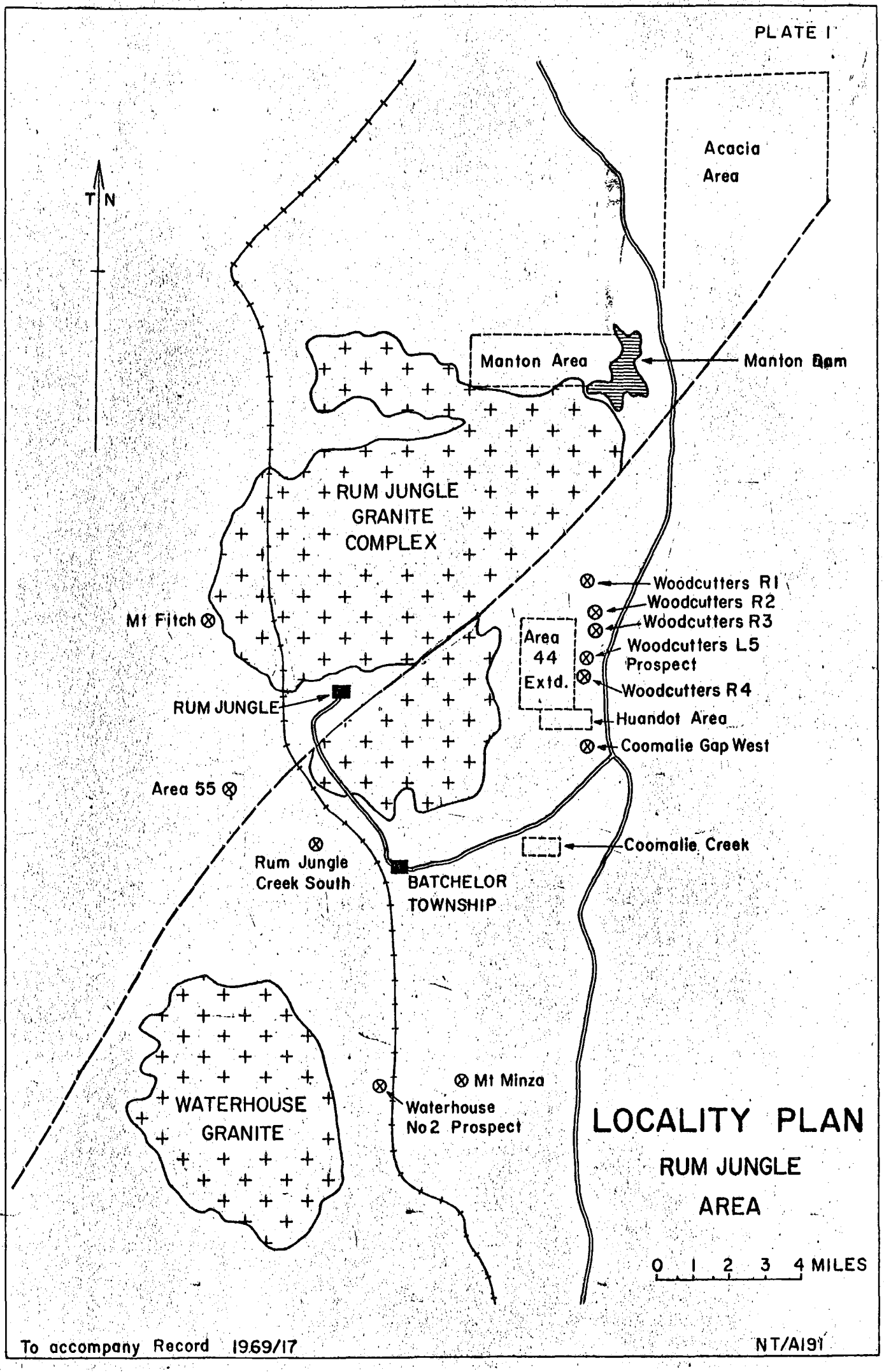
Note: Assay Analysis Sample No. 67126185 Cu 1.30% (Gossan)

Sample No	Co-ordinates	Depth (Ft)	Cu	Co	Ni	P%
67126164	253S 393E	0 - 8	770	15	40	0.05
65		8 - 18	670	10	30	0.04
66		18 - 28	520	8	30	0.07
67		28 - 38	300	5	15	0.06
68		38 - 49	380	10	25	0.09
69		49 - 59	440	8	25	0.09
70		59 - 70	360	8	20	0.14
71		70 - 81	1300	8	35	0.42
72		81 - 91	1250	15	55	0.48
73		91 - 102	440	15	40	3.40
74		102 - 112	220	15	35	0.52
75		112 - 123	180	30	40	0.82
76		123 - 133	155	25	70	0.37
77		133 - 144	130	65	150	0.54
78		144 - 154	185	50	85	0.44
79		Core 102	40	20	40	0.44
80		Core 104	20	35	140	0.08
81		Core 134	20	40	110	0.05
82		Core 136	25	50	200	0.11
83		Core 156	15	15	40	0.04
84	253S 393E	Core 158	12	40	60	0.08
	TOTAL DEPTH OF HOLE - 160'					
67126141	253S 394E	0 - 8	350	25	25	0.06
42		8 - 18	460	10	30	0.04
43		18 - 28	625	10	20	0.06
44		28 - 39	500	5	25	0.05
45		Core 39	320	5	15	0.04
46		Core 42	645	20	60	0.04
47		39 - 49	1500	25	85	0.03
48		49 - 60	11000	55	80	0.02
49		60 - 70	1250	50	70	0.16
50		Core 71	340	15	40	1.16
51		Core 74	1200	35	55	0.98
52		70 - 80	1000	40	70	0.50
53		80 - 91	1300	40	70	0.50
54		91 - 102	1200	100	60	0.37
55		102 - 112	2300	65	100	0.28
56		112 - 122	1650	30	90	0.26
57		122 - 133	870	105	60	0.50
58		Core 113	1100	70	80	0.07
59		Core 117	1250	30	80	0.04
60		133 - 143	530	20	35	0.21
61		143 - 151	1000	30	60	0.21
62		Core 151	15	5	25	0.03
63	253S 394E	Core 151	10	5	15	0.04
	TOTAL DEPTH OF HOLE - 151'					

Sample No	Co-ordinates	Depth (Ft)	Cu	Co	Ni	P%
67126134	253S 395E	0 - 8	270	90	65	0.12
35		8 - 18	320	70	80	0.18
36		18 - 28	520	115	130	0.19
37		28 - 39	370	60	65	0.08
38		39 - 49	350	30	50	0.06
39		49 - 57	950	50	70	0.29
40	253S 395E	Core 57'	515	15	15	0.17

TOTAL DEPTH OF HOLE - 57'

PLATE I



LOCALITY PLAN
RUM JUNGLE AREA

To accompany Record 1969/17

NT/A191

WOODCUTTERS AREA

GEOLOGY, ELECTROMAGNETIC AXES, GEOCHEMICAL ANOMALIES AND RADIOMETRIC CONTOURS

Reference

- Laterite
- LOWER PROTEROZOIC — Golden Dyke Formation — Pld
  - Black shale
  - Amphibolite and chloritic schist
  - Pyritic quartzitic sandstone
  - Siltstone
  - Limestone
- Lithological boundary
- Outcrop boundary
- Fault - broken line position approximate
- q — Quartz vein
- Gossan
- Dip and strike of bedding
- c — Costean
- Vehicle track
- Slingram anomaly axis (1965)
- Turam anomaly axis (1964)
- 800 — Lead contours at 100, 200, 400 p.p.m. } Auger samples
- 150 — Copper contours at 150, 300 p.p.m
- .025 — Radiometric contours at .025, .030 mR/hr (Maximum values in auger holes)
- 66/7 — Diamond drill hole
- Rotary-Percussion drill hole
- L5 Area

SCALE 400 0 400 800 1200 FEET

True North

Part Huandol North Grid 1964

STUART HIGHWAY

Base Line 179° 00' 00"

To Accompany Record 1969/17

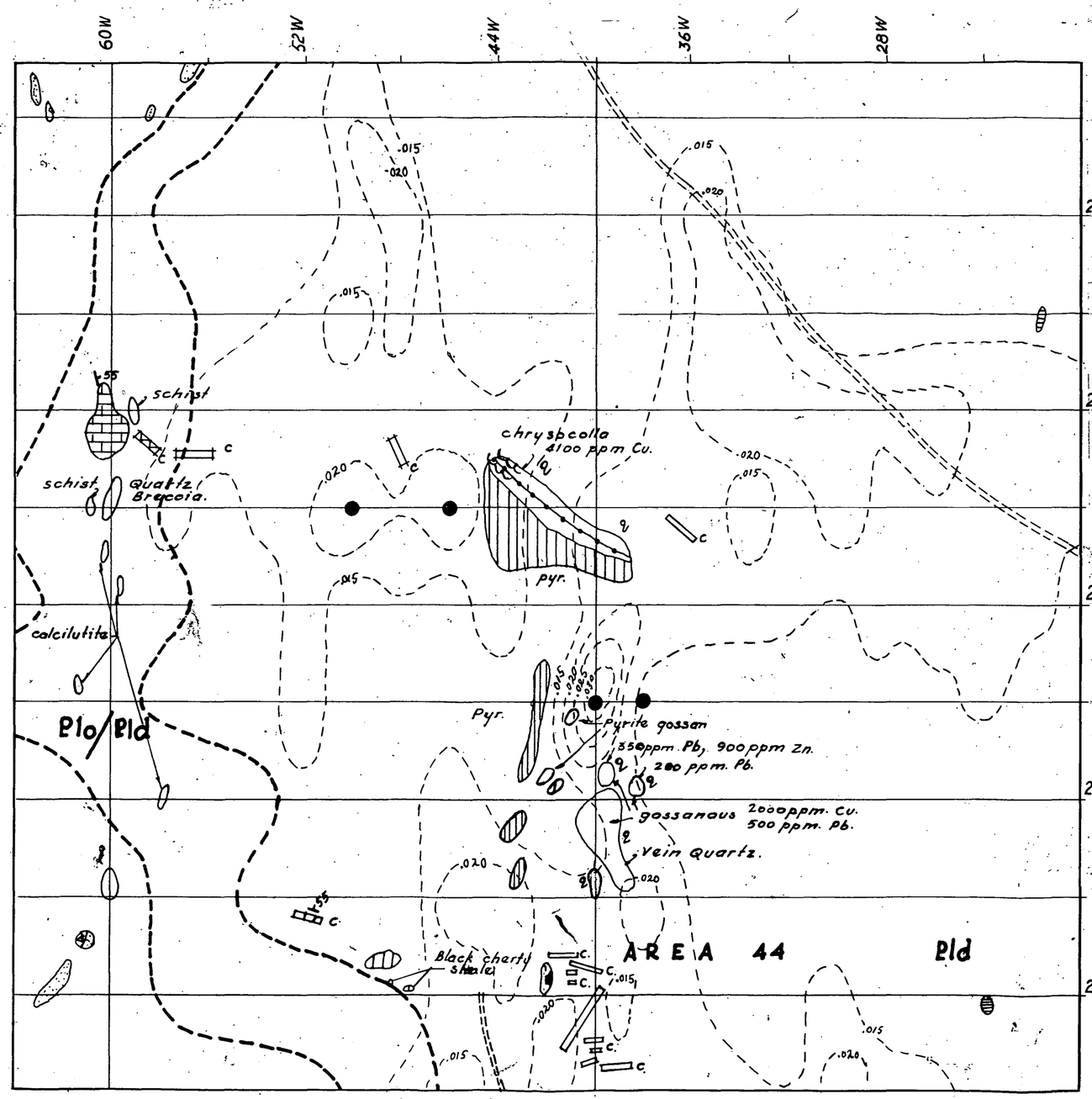
D52/A/98

PLATE 3

GEOLOGY AND RADIOMETRIC CONTOURS
AREA 44 EXTENDED
RUM JUNGLE EAST · N.T.

Contours in milliRoentgens per hour.

Scale 1" = 400 Feet



GEOLOGICAL BOUNDARIES

- Formation boundary - outcropping
- Formation boundary - non outcropping
- Outcrop boundary
- Non-outcropping boundary.

strike and dip of strata

- Inclined, 20
- Inclined, (showing prevailing dip)
- Inclined joints

FOLDS

- Established Synclinal trough position accurate

General:

- Quartz vein. Q
- Costean. C
- Py. Pyrite
- Cu. Copper
- Pb Lead
- Zn. Zinc.
- HS. Homestead
- Vehicle track
- Fence.

Rotary - Percussion Drilling:

- Holes completed 1968

REFERENCE

LOWER PROTEROZOIC

Golden Dyke Formation Pld.

- Undifferentiated shale & schist (non-outcropping.)
- Amphibolite (non-outcropping).
- Brown cherty shale
- Black cherty shale (often pyritic).

Acacia Gap Tongue Pla.

- Quartz Sandstone

Coomalie Dolomite Plo.

Transition Beds Plo/Pld.

- Undifferentiated (non-outcropping)
- Calcilutite
- Dolomite
- Undifferentiated - Quartz sand (non-outcropping).
- Quartz Lateritic - ironstone Breccia.
- Quartzite

Crater Formation Plr.

- Undifferentiated (non-outcropping)
- Quartz - pebble conglomerate
- Quartz greywacke

To Accompany Record 1969/17

D52/AB/315

GEOLOGY WATERHOUSE No2 PROSPECT

Plate 4.

Scale

200 100 0 200 Feet

388E 390E 392E 394E 396E 398E 400E

237S 239S 241S 243S 245S 247S 249S 251S 253S 255S 257S 259S 261S

DD 1960/4 -55°

DD 1960/2 -55°

N T

Reference

Lower Proterozoic

Golden Dyke Formation

- *Amphibolite*
- *Graphitic siltstone*
- *Banded siltstone and shale*
- *Black shale (silicified)*
- *Quartz-hematite breccia*
- *Graphitic black shale*
- *Banded iron formation*
- *Quartzite*
- *Tremolitic siltstone*

Geological boundaries:

- *accurate*
- *approximate*
- *Fault*
- *Strike and dip of bedding* (e.g. 40)
- *Costean*
- *Shaft*

Fracture cleavage:

- *vertical*
- *inclined*
- *lineation*
- *Diamond drill hole* (DD 1960/2, -55°)
- Tb *Torbernite*
- Mal *Malachite*
- *Rotary-percussion drill holes.*
- *Geochemical contours, copper. 100, 200, 400 800, 1600 ppm.*
- *Radiometric contours 0.020, 0.30, 0.40, 0.050 mR/Hr.*

To accompany Record 1969/17

D 52/A8/316 EJ

PLATE 5

36E

38E

40E

W

E

1967 Carey Drill Hole

Cu	Pb	Zn	Ni	Co
80	670	700	80	10
70	2400	740	70	15
230	1100	770	180	30
310	1900	1900	400	140
150	350	570	180	65
110	660	820	120	30
150	560	600	170	75
450	1450	1500	220	120
270	1150	1250	250	95
120	560	850	170	65
120	550	790	130	80

Slate, brown, weathered

0.10 0.05 0 mR/hr

GBM14

Cu	Pb	Zn
85	490	80
140	300	110
25	430	530
70	200	930
100	160	4000
50	75	2700
50	30	1600
60	75	630
100	25	1700

Slate, brown, weathered.

Slate, black, soft, partially weathered

Slate, black, calcareous hard.

0.10 0.05 0 mR/hr

GBM13

Cu	Pb	Zn
85	150	360
85	100	2100
140	45	1900
50	30	2300
70	35	2000
70	85	2600
75	140	2700
45	310	3400
45	130	2600
40	100	1730
30	40	670

Slate, brown, weathered

Slate, black, soft, partially weathered

Slate, black, calcareous, hard

0.10 0.05 0 mR/hr.

SECTION 865

RUM JUNGLE EAST GRID

Mayhew and Carey drill holes

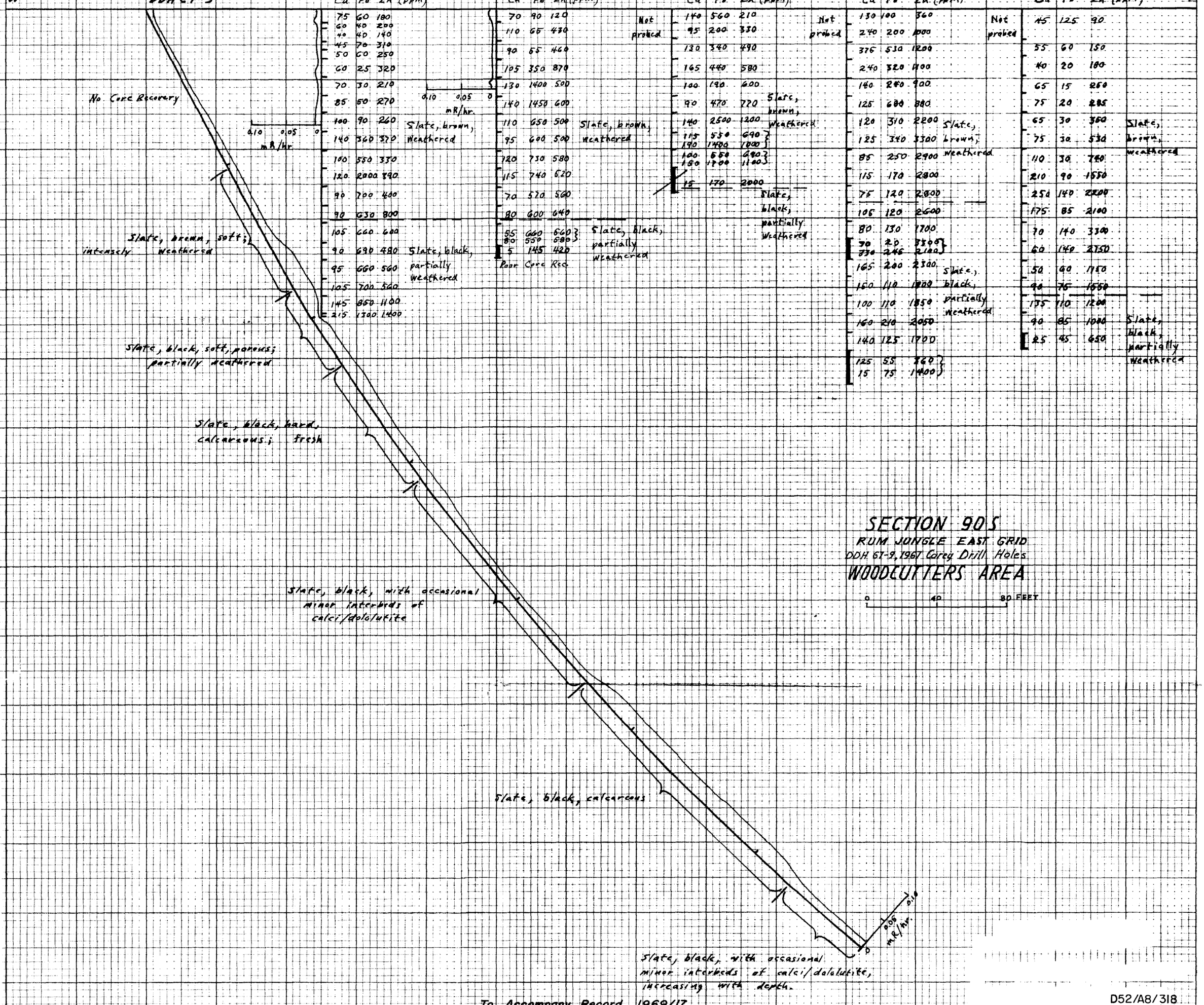
WOODCUTTERS AREA

0 40 80 FEET

To Accompany Record 1969/17

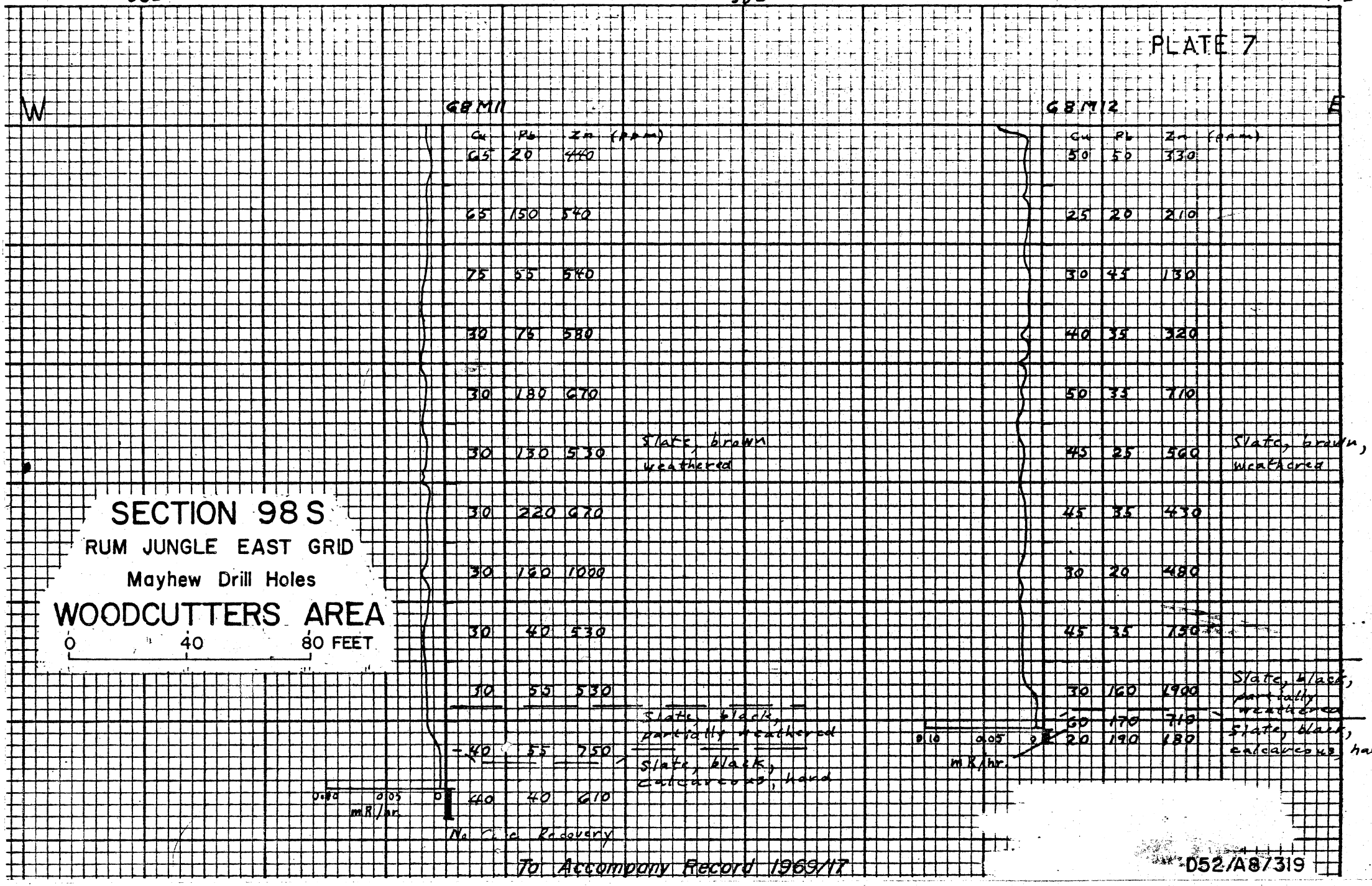
D52/A8735

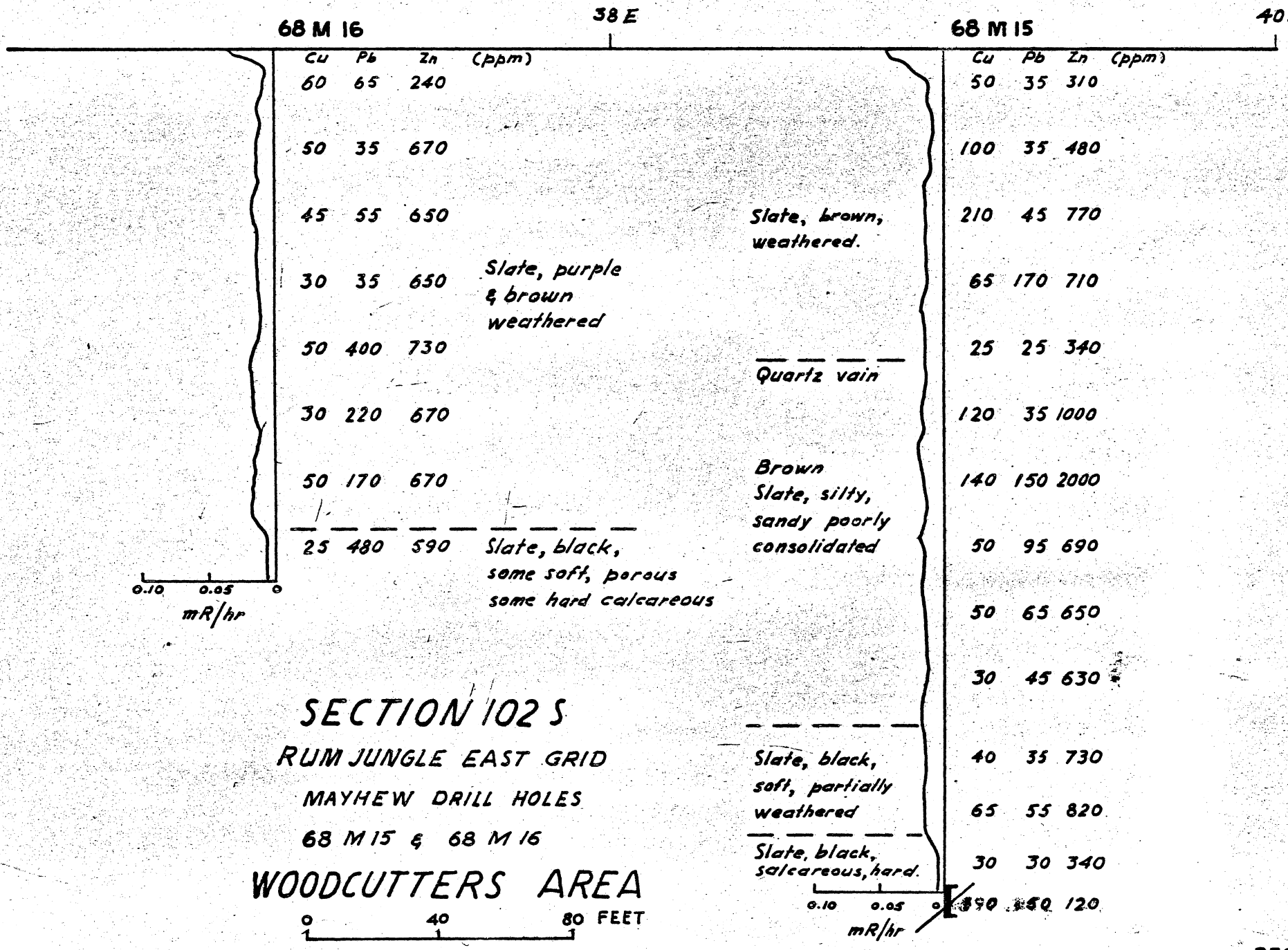
PLATE 6



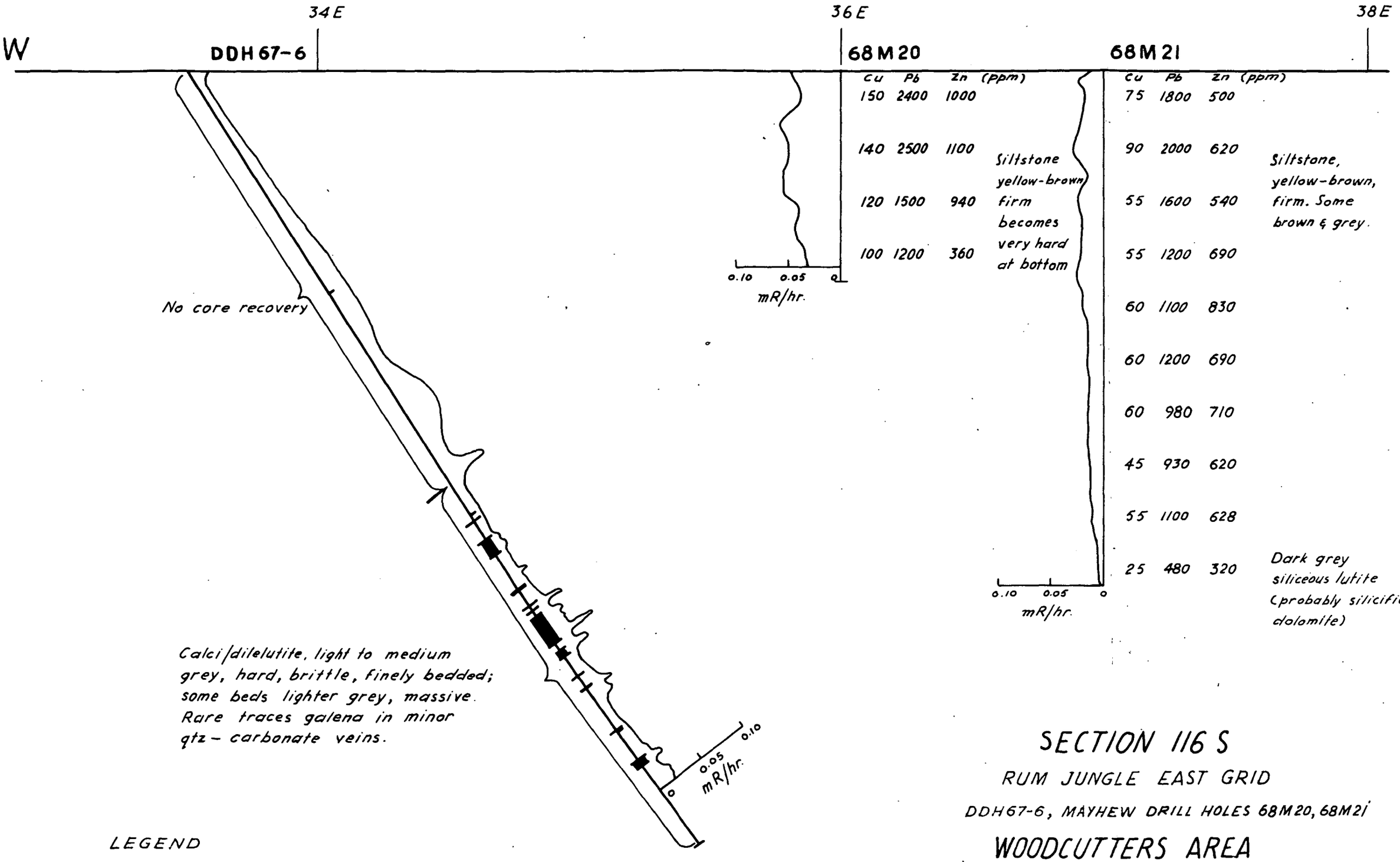
To Accompany Record 1969/17

D52/A8/318


36E
38E
40E
PLATE 7
W
E
GBM11
GBM12
Cu Pb Zn (ppm)
65 20 440
65 150 540
75 55 540
30 75 580
30 180 670
30 130 530
30 220 670
30 160 1000
30 40 530
30 55 530
40 55 750
40 40 610
50 50 330
25 20 210
30 45 130
40 35 320
50 35 710
45 25 560
45 35 430
30 20 480
45 35 750
30 160 1900
60 170 710
20 190 180
Slate, brown, weathered
Slate, black, partially weathered
Slate, black, calcareous, hard
Slate, brown, weathered
Slate, black, partially weathered
Slate, black, calcareous, hard
0.10 0.05 0
mR/hr.
0.10 0.05 0
mR/hr.
No Core Recovery
SECTION 98 S
RUM JUNGLE EAST GRID
Mayhew Drill Holes
WOODCUTTERS AREA
0 40 80 FEET
To Accompany Record 1969/17
052/A8/319



To Accompany Record 1969/17



LEGEND

Crystalline carbonate veins with colloform textures.

SECTION 116 S

RUM JUNGLE EAST GRID

DDH67-6, MAYHEW DRILL HOLES 68M20, 68M21

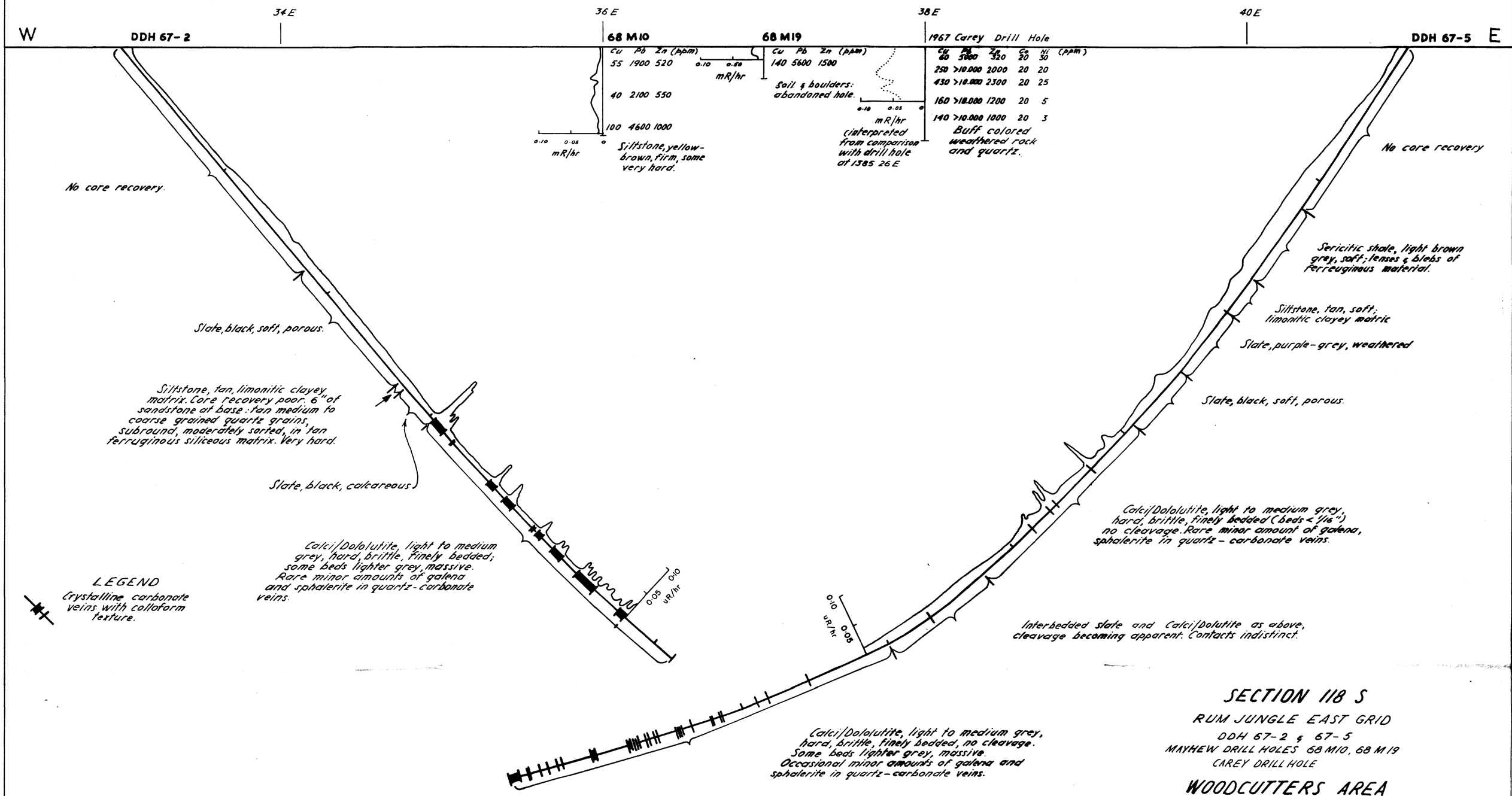
WOODCUTTERS AREA

0 40 80 FEET

To Accompany Record 1969/17

D52/A8/321

PLATE 10



SECTION 118 S

RUM JUNGLE EAST GRID

DDH 67-2 & 67-5

MAYHEW DRILL HOLES 68 M10, 68 M19

CAREY DRILL HOLE

WOODCUTTERS AREA

0 40 80 FEET

To Accompany Record 1969/17

D52/A8/322

PLATE II

30E | 32E | 34E | 36E

D.D.H. G7-7

W

Cu	Pb	Zn	Ag (ppm)	
60	15	45	1.5	
35	10	40	0.6	
30	10	65	1.0	Slate, light grey.
45	15	70	1.5	
35	15	75	0.4	
25	10	70	0.4	Slate, dark grey.
70	20	130	0.7	

0.10 0.05 0 mR/hr

W

Cu	Pb	Zn	Ag (ppm)	
Not probed				Not probed
110	20	270	<0.1	
190	15	760	0.5	
140	10	880	0.4	
140	15	900	0.4	
120	15	1300	0.4	
75	10	660	0.3	
60	15	550	0.6	
55	15	390	0.3	
45	10	350	0.4	Schist, micaceous, purple
55	15	350	0.2	
60	20	380	0.3	
55	10	310	0.3	
45	15	290	0.3	
45	10	260	0.2	
55	15	220	0.2	
50	15	210	0.3	

W

Wagon Drill Samples:

Cu	Pb	Zn	Ag (ppm)	
95	20	210	0.1	
85	15	370	0.1	
60	15	600	0.2	
55	15	680	0.2	
50	15	600	0.2	
50	10	660	0.2	
45	25	470	0.2	
45	15	440	0.2	
40	15	410	0.3	
55	10	570	0.3	
50	15	550	0.4	
65	15	520	0.6	
40	20	450	0.4	
45	10	440	0.3	
45	5	360	0.5	
40	5	310	0.4	
35	5	340	0.4	

G

W

Gemco Samples:

Cu	Pb	Zn	Ag (ppm)	
95	15	110	0.1	
65	10	96	0.3	
95	8	350	0.1	
90	10	490	0.2	
85	10	550	0.1	
80	10	520	0.1	
80	5	490	0.1	
70	10	600	0.1	
90	20	520	0.3	
100	8	460	0.1	
90	15	480	0.1	

No core Recovery

Schist, micaceous, purple

Slate, dark grey, weathered.

Slate, black, porous weathered

Slate, black, calcareous pyritic

Slate, black, calcareous.

Slump Zone.

0.10 0.05 0 mR/Hr

W = Wagon drill hole

G = Gemco drill hole

SECTION 130S

RUM JUNGLE EAST GRID

DDH 67-7, Wagon & Gemco Drill Holes

WOODCUTTERS AREA

0 40 80 FEET

To Accompany Record 1969/17

D52/A8/323

34E 35E 36E 26E 27E 28E

PLATE 12

W 132S E

	Cu	Pb	Zn	As (ppm)
Mb +	90	15	350	0.2
shattered	110	60	800	0.3

Slate, grey, weathered.

W 136S E

Cu	Pb	Zn	As (ppm)
55	85	55	0.4
60	45	55	0.2
70	35	55	0.3
110	30	65	0.8
85	25	55	0.6
75	35	70	0.8

Slate, grey

0.10 0.05 mR/hr.

SECTION 132S & 136S

RUM JUNGLE EAST GRID

Wagan Drill Holes

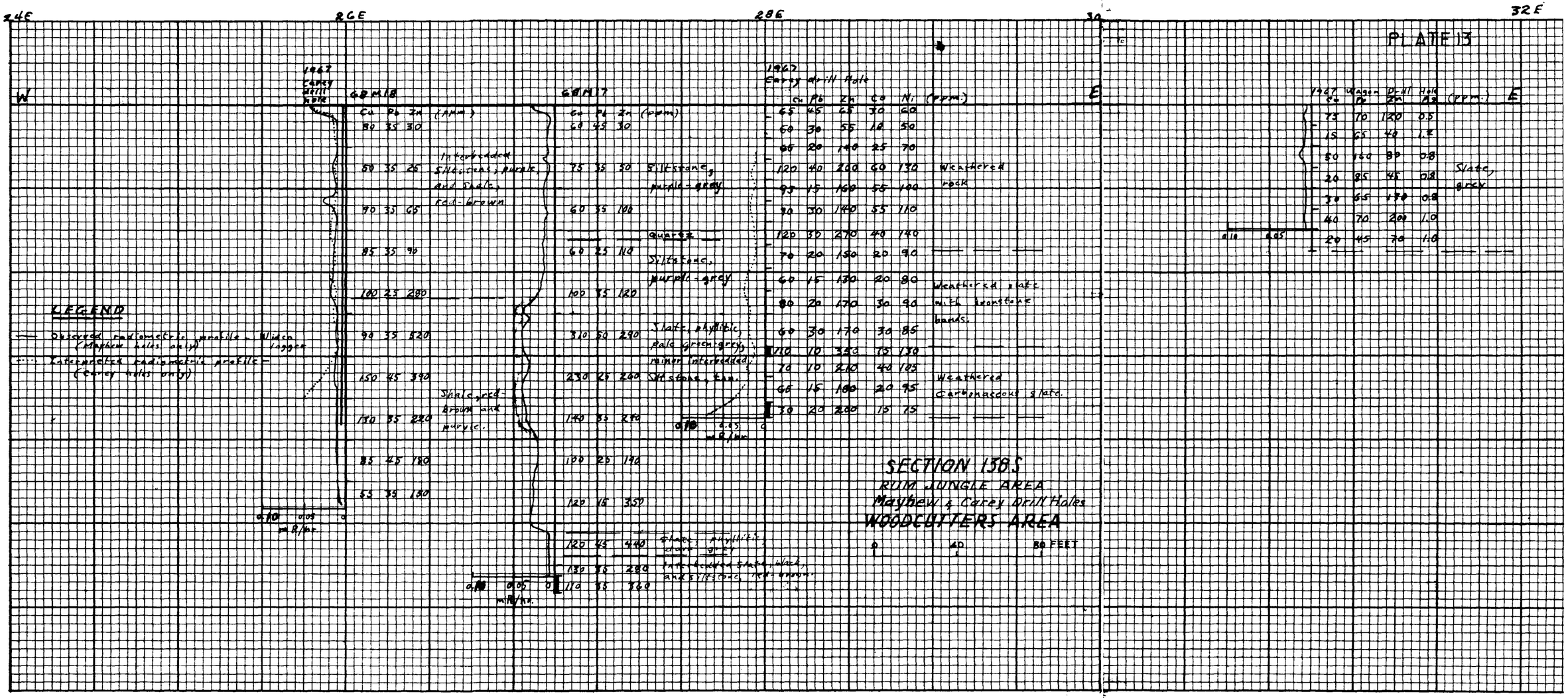
WOODCUTTERS AREA

0 40 80 FEET

To Accompany Record 1969/17

D52/A8/324

PLATE 13



To Accompany Record 1969/17

D52/A8/325

PLATE 14

30E 32E 34E 36E 38E

150S

DDH GG-13

Cu	Pb	Zn	Ag (ppm)
55	95	120	<0.1
75	90	95	<0.1
65	400	130	<0.1

0.10 0.05 0 mR/hr

Cu	Pb	Zn	Ag (ppm)
135	340	140	0.1
120	580	110	<0.1
95	540	86	<0.1

0.10 0.05 0 mR/hr

Cu	Pb	Zn	Ag (ppm)
50	130	60	0.1
30	140	50	<0.1
30	190	55	<0.1
40	130	70	<0.1
35	140	65	<0.1
40	120	110	<0.1

0.10 0.05 0 mR/hr

Cu	Pb	Zn	Ag (ppm)
40	240	25	0.1
70	390	80	0.1
70	320	120	0.1
60	190	210	0.2
75	190	280	0.2
50	110	120	<0.1

0.10 0.05 0 mR/hr

Cu	Pb	Zn	Ag (ppm)
45	85	130	0.1
40	40	110	0.1
50	40	140	0.1
40	50	150	0.3
40	50	165	<0.1
35	35	75	0.3

No Core Recovery

Slate, weathered, pale grey

Slate, weathered, black.

Slate, weathered, very pyritic. Recovery poor

Calc/dolomitic, siliceous, s/c calcareous, hard, pale grey. Radioactivity occurs in black inter beds to ½" thick — beds av. 1" apart.

Slate, black, calcareous, carbonaceous.

0.10 0.05 0 mR/hr

Wagon drill holes all bottomed in purple slates weathered.

SECTION 150S
RUM JUNGLE EAST GRID
DDH66-13, Wagon Drill Holes.
WOODCUTTERS AREA
0 40 80 FEET

To Accompany Record 1969/17

D52/A8/326

PLATE 15

32E

152S	Cu	Pb	Zn
	60	60	50
	25	30	20
	20	15	15
	30	15	25
	30	15	20
	30	10	25
	40	10	20
	45	10	20
	65	15	25
	65	15	30

0.10 0.05 0 mR/hr.

154S	Cu	Pb	Zn
	65	60	40
	35	25	25
	35	25	18
	50	20	30
	55	20	40
	40	15	30
	25	15	20
	40	25	20
	40	15	20

0.10 0.05 0 mR/hr.

34E

152S	Cu	Pb	Zn
	100	60	55
	20	80	25
	20	200	35
	85	160	230
	90	60	210
	110	40	240
	45	60	180
	80	120	80

0.10 0.05 0 mR/hr

154S	Cu	Pb	Zn
	50	45	40
	35	50	70
	30	20	50
	30	40	55
	45	30	90
	110	110	170
	140	60	160
	180	45	190

0.10 0.05 0 mR/hr.

152S	Cu	Pb	Zn
	80	100	90
	45	85	95
	40	30	70
	25	20	50
	40	25	120
	55	25	250
	65	50	500

0.10 0.05 0 mR/hr

154S	Cu	Pb	Zn
	55	60	35
	95	60	190
	110	20	550
	100	15	500
	120	50	800
	110	40	600
	140	40	750

0.10 0.05 0 mR/hr.

36E

152S	Cu	Pb	Zn
	35	45	20
	35	30	20
	40	60	120
	50	120	950

0.10 0.05 0 mR/hr

154S	Cu	Pb	Zn	Ag	(ppm)
	75	45	60	0.2	
	70	120	60	0.2	
	70	60	45	0.2	
	65	60	40	0.2	
	150	30	130	0.3	
	120	30	200	1.0	

0.05 0 mR/hr.

152S	Cu	Pb	Zn
	65	70	25
	100	60	65
	40	80	25
	40	280	55
	70	80	40
	40	80	20

0.10 0.05 0 mR/hr

154S	Cu	Pb	Zn	Ag	(ppm)
	40	35	25	0.6	
	30	30	20	0.5	
	100	30	50	0.3	
	120	35	120	0.6	
	95	35	230	0.7	
	120	45	800	1.2	
	65	65	85	0.8	

0.10 0.05 0 mR/hr.

38E

152S	Cu	Pb	Zn
	70	45	30
	105	60	50
	80	120	40
	70	80	45
	60	120	60
	60	80	160
	95	90	150

0.10 0.05 0 mR/hr

154S	Cu	Pb	Zn
	40	90	25
	20	85	20
	20	35	30
	40	45	40
	45	190	45
	50	280	40
	40	230	30

0.10 0.05 0 mR/hr

152S	Cu	Pb	Zn	Ag	(ppm)
	50	90	45		
	55	220	45		
	55	240	250		
	120	240	1600		
	100	100	600		
	50	50	240		

0.10 0.05 0 mR/hr

154S	Cu	Pb	Zn	Ag	(ppm)
	35	35	55	1.8	
	30	70	30	0.2	
	50	50	30	0.9	
	80	75	40	0.6	
	55	85	50	0.8	
	30	75	40	1.0	
	20	75	25	0.8	

0.10 0.05 0 mR/hr

154S	Cu	Pb	Zn	Ag	(ppm)
	80	45	150	1.2	
	110	25	470	0.1	
	110	30	420	0.8	
	130	60	480	0.8	
	190	280	760	1.0	
	200	120	940	1.0	

0.10 0.05 0 mR/hr

NORTH-SOUTH SECTION ALONG 34E (LOOKING W):

S

154SS	Cu	Pb	Zn	Ag	(ppm)
	60	45	90	0.2	
	25	25	30	0.2	
	40	35	50	0.2	
	110	80	110	1.2	
	95	55	90	0.7	
	120	75	90	1.0	
	130	45	120	1.0	
	145	60	120	1.0	
	110	75	110	1.2	

0.10 0.05 0 mR/hr.

154S

Cu	Pb	Zn	Ag	(ppm)
65	50	40	0.1	
220	130	200	0.2	
190	45	650	0.2	
140	45	240	0.2	
140	30	200	0.3	
45	20	210	0.4	
115	40	320	1.0	

0.05 0 mR/hr

153.5S N

Note: Wagon drill holes bottomed mainly in weathered purple slate.

SECTIONS: 152S, 154S & 34E

RUM JUNGLE EAST GRID

Wagon Drill Holes

WOODCUTTERS AREA

0 40 80 FEET

To Accompany Record 1969/17

D52/A8/327

PLATE 16

4E

6E

8E

W

E

GBM8

Cu	Pb	Zn	Co	Ni (ppm)
45	90	100	20	60
45	85	150	20	70
60	20	140	20	70
55	35	100	15	70
75	30	80	15	70
75	30	50	25	70
85	60	80	50	100
85	55	70	40	85
65	56	170	25	70

Slate, brown, weathered

Slate, black, soft, partially weathered

Slate, black, hard, calcareous; some bands soft, non-calcareous.

0.10 0.05 0 mR/hr

GBM9

Cu	Pb	Zn (ppm)
65	65	70
75	30	85
90	65	190
80	45	130
60	35	110
100	55	140
70	45	110
60	45	180
120	35	140
75	35	190

Slate, brown, weathered.

Slate, black, partially weathered

0.10 0.05 0 mR/hr

GBM7

Cu	Pb	Zn	Co	Ni (ppm)
85	90	120	125	90
110	100	530	80	180
65	110	210	35	110
95	90	220	30	120
95	130	200	35	110
120	90	160	50	120
85	65	180	30	120
10	20	20	<5	10

Slate, brown, weathered

Slate, black, partially weathered

Dark grey Siliceous lutite

0.10 0.05 0 mR/hr

SECTION 256S

RUM JUNGLE EAST GRID

Mayhew Drill Holes

WOODCUTTERS AREA

0 40 80 FEET

50W 48W 46W

PLATE 17

W

68M22

Cu	Pb	Zn	(p.p.m.)	
200	90	180		Clay, khaki, silty
250	75	180		
60	75	290		Shale, grey-brown, silty, soft
60	160	290		
60	65	150		Shale, grey, silty, calcareous
20	55	120		

surface approximate.

0.10 0.05 0
mR/hr.

68M23 E

Cu	Pb	Zn	(ppm)	
150	100	180		Shale, yellow-brown silty
200	35	180		
120	35	200		
120	45	220		No returns.
100	50	290		
				No sample.

0.10 0.05 0
mR/hr

SECTION 220S
RUM JUNGLE EAST GRID
Mayhew Drill Holes
AREA 44 EXTENDED

0 40 80 FEET

To Accompany Record 1969/17

D52/A8/329

40W

38 W

PLATE 18

W

E

68M24

Cu Pb Zn (ppm)

50 100 50

0.10 0.05 0

Clay, sandy, brown.

Shale, grey, silic., hard, calcareous,

68M25

Cu Pb Zn (ppm)

35 130 90

Shale, silty, yellow + brown

20 140 100

Shale, dark grey-green, soft

0.10 0.05 0

20 160 80

35 320 100

Shale, dark grey-green, calcareous, hard.

30 180 70

SECTION 228 S

RUM JUNGLE EAST GRID

Mayhew Drill Holes

AREA 44 EXTENDED

0 40 80 FEET

To Accompany Record 1969/17

D52/A8/330

PLATE 19

392E

393E

394E

395E

W

E

2475

Slate, brown

Slate, black, hard, siliceous

Slate, black, schistose

Slate, black, graphitic

0·05

HEMATITE QUARTZ BRECCIA

0·05

quartz, quartzite

Slate, grey, siliceous

Slate, black

0·05

Quartz, ironstone

Slate, black

2465

Ironstone

Slate, black, siliceous

Quartz and slate

Slate, black

0·05

2513

Slate, weathered

Slate, black

Slate, black, graphitic

0·05

W

E

2553

HEMATITE QUARTZ BRECCIA

Slate, light grey

Slate, black, graphitic

Breccia Zone.

Slate, black

0·05

Slate, brown

Slate, black

Slate, black, pyritic, graphitic

0·05

Slate, grey-brown, siliceous

Slate, black, platy.

0·05

SECTIONS
WATERHOUSE NO.2 PROSPECT
Gould Grid

CAREY DRILL HOLES
Radiometric Profiles in uR/hr

0 40 80 FEET

To Accompany Record 1969/17

D52/A8/331