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Blast hole and auger hole test project -
Rum Jungle Creek South

by

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BLAST HOLE AND AUGER HOLE TEST PROJECT -

RUM JUNGLE CREEK SOUTH

Ten blast holes and ten auger holes were drilled by Territory Enterprises Pty. Ltd. (T.E.P.) between 20/9/66 and 5/10/66, in order to test which type of drill is the most suitable prospecting tool for detecting uranium mineralisation. The project in all took four days to complete.

The area chosen was on the northern perimeter of the Rum Jungle Creek South open-cut, where uranium mineralisation is known to occur. Geologists of T.E.P. have suggested that uranium mineralisation may only be detected by probing to the zone where pitchblende is present; and that secondary uranium minerals in the oxidised zone may not be present unless phosphorous is available to fix the uranium as uranium phosphate minerals (chiefly torbernite, autunite and saleeite). Thus the shallower depths (40 feet or so) to which the auger drill is capable of penetrating may not be sufficient to detect uranium at depth. The writer was present during the drilling and probed, sampled and logged all the holes. A T.E.P. geologist also carried out these operations independently.

The accompanying illustration shows the location of the holes, the radiometric profiles, and the geology from cuttings.

Blast Holes

The blast holes were drilled by Davis Contractors Pty. Ltd., under contract to T.E.P. The machine used was a Joy air-blast percussion drill powered by an Atlas Copco compressor. A separate compressor was used to blow the cuttings into a collecting bin. A sample was taken for geochemical analysis every 5 feet.

The target depth for the blast holes was 100feet, but in practice it was found that, if the holes were deepened below the water table they rapidly became blocked by mud and could not be probed to anything like the full depth. Some of the holes were redrilled to enable probing to the full depth, but it was still not possible to probe holes 1 and 9 below 33 feet and 36 feet respectively.

Auger Holes

An auger hole was drilled within a few feet of each of the blast holes, using a Gemco drill owned by T.E.P. Ltd. All the holes were drilled to 41 feet, with the exception of hole 6, which struck hard ground at 35 ft. It was possible to probe all the holes to within 3 feet of the bottom and most of them to within 1 foot.

Radiometric Results

The blast holes and auger holes were probed with a Harwell 1368 A ratemeter and probe unit. The type of probe containing 3 Geiger tubes, which is normally used in B.M.R. surveys, was too large to go down the blast holes, so that the less satisfactory single tube probe had to be used.

Values were recorded at intervals of 1 foot. Blast holes numbers 2, 3, 4, 7 and 8 showed significant increases in radioactivity towards the bottom of the hole. No. 10 had a sharp peak at 10 feet, but this decreased with depth. In general, readings were higher in chloritic schist than in black slate.

Holes 1 and 9 could not be probed to sufficient depth to evaluate the results.

Most of the holes had moderate radiometric peaks in the A and B horizons.

In the auger holes, radioactivity was in nearly all cases lower than in the blast holes, and this difference was most marked where the blast holes showed strong anomalies towards the bottom. Only one of the auger holes (A7) had a high order anomaly at depth, though many of the holes had peaks of moderate intensity, especially in the A and B horizons.

The following table summarises the radiometric peaks in the blast holes and auger holes.

Blast Hole	Depth Probed	RA max.	Auger hole	Depth Probed	RA max.
BD 1	33 ft	.055mR/hr. at 5ft	A 1	37 ft	.040 mR/hr. at 5ft.
BD 2	99 ft	.110mR/hr. at 96ft	A 2	39 ft	-
BD 3	59 ft	(1).080mR/hr 38-39 ft (2).135mR/hr at 50 ft	A 3	40 ft	.040 mR/hr 37-38ft.
BD 4	68 ft	Numerous maxima greater than 0.10 mR/hr below 35 ft	A 4	40 ft	(1) .050mR/hr 5 ft. (2) .036mR/hr 40 ft.
BD 5	92 ft	-	A 5	39 ft	-
BD 6	91 ft	-	A 6	32 ft	-
BD 7	78 ft	.105mR/hr at 65 ft	A 7	40 ft	.115mR/hr at 37 ft.
BD 8	54 ft	(1).070mR/hr 37ft (2).060mR/hr 43ft (3).065mR/hr 48ft	A 8	38 ft	-
BD 9	36 ft	-	A 9	39 ft	-
BD10	22 ft	over .10mR/hr 7 ft - 18 ft	A10	40 ft	over .03mR/hr. 6 ft - 18 ft, and 28 ft to 33 ft.

The higher radiometric values obtained in blast holes are most likely caused by contamination of the upper levels of the holes by radioactive material blown up from greater depth. In the auger holes, this material was generally not intersected, so that contamination would not occur.

This theory is supported by the fact that, in holes where no pronounced maxima were recorded the auger and blast hole profiles are in reasonable agreement; whereas the reverse is true in the case of holes such as BD 4 and A 4, in which the blast hole intersected intense anomalies at depth.

Radiometric assays

Part of the sample from blast holes in zones of anomalous radioactivity was radiometrically assayed in Darwin. The highest value obtained was 0.65lb/ton eU_3O_8 in BD 7 between 60 and 65 feet.

Most of the other samples assayed at about 0.2 lb/ton eU_3O_8/.

Geochemical Samples

The blast holes were sampled every 5 feet and a bottom sample was taken from the auger holes, for geochemical analysis. The samples were submitted to AMDEL (Adelaide) for atomic absorption spectrographic analysis for copper, lead, zinc, nickel, cobalt and P_2O_5 .

Conclusions

This project has shown that holes drilled to intersect uranium mineralisation in the primary zone are more reliable for radiometric prospecting than shallower holes which do not intersect primary ore.

However, the auger holes in most cases showed peaks of over .03 mR/hr, and it has been common B.M.R. practice in the past to re-examine any anomalies of this magnitude.

Blast hole drilling is approximately $2\frac{1}{2}$ - 3 times as expensive as auger drilling, and is much slower. Furthermore, the method appears to be useless below the water table. Auger drilling is a relatively cheap and rapid method which is still capable of producing a clean hole in wet ground.

Recommendations

Deep blast hole drilling would probably be the best method of following-up radiometric anomalies obtained by auger drilling. It would perform a valuable function if used as an intermediate step between auger drilling and diamond drilling. However, the blast hole drill would normally be too slow and expensive for reconnaissance prospecting.

D. O. SHATWELL

15th December, 1966.
DOS/SP

Appendix 1

Geochemical Analyses of Drill Hole Samples.

Rum Jungle Creek South.

Analyses by AMDEL. Metals determined by AAS, P_2O_5 not stated.

Results in ppm for metals, in % for P_2O_5.

Hole No	Depth	Cu	Pb	Zn	Co	Ni m	P_2O_5%
BD1	0 - 10'	75	55	170	65	120	0.15
	10 - 20'	25	30	130	190	400	0.1
	20 - 30'	30	40	75	60	70	0.1
	30 - 40'	35	40	170	80	220	0.15
	40 - 50'	35	65	200	65	180	0.2
	50 - 60'	90	150	300	130	130	0.35
	60 - 70'	35	90	200	120	220	0.3
	70 - 80'	40	150	250	140	200	0.15
	80 - 90'	120	120	140	85	65	0.5
BD1	90 - 98'	110	140	250	95	120	0.45
A1	41'	60	80	150	85	210	----
BD2	0 - 10'	20	20	130	40	170	0.25
	10 - 20'	12	30	110	35	75	0.2
	20 - 30'	12	35	90	40	45	0.25
	30 - 40'	15	40	130	85	140	0.15
	40 - 50'	20	35	60	25	20	0.2
	50 - 60'	15	35	80	35	10	0.1
	60 - 70'	20	30	130	35	40	0.2
	70 - 80'	40	100	190	180	160	0.3
BD2	80 - 90'	100	120	180	140	130	0.4
A2	41'	12	40	30	25	55	----
BD3	0 - 10'	12	40	55	40	60	0.3
	10 - 20'	35	40	70	55	85	0.25
	20 - 30'	15	20	170	95	110	0.35
	40 - 40'	100	90	120	110	160	0.65
	40 - 50'	600	80	110	200	140	0.5
	50 - 60	100	110	100	55	130	0.25
BD3	60 - 65'	40	45	45	25	50	0.25
A3	41'	35	35	60	40	90	----

Metals in ppm; P_2O_5 in %

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Hole No	Depth	Cu	Pb	Zn	Co	Ni	P_2O_5%
BD 4	0 - 10'	30	35	85	35	70	0.35
	10 - 20'	75	75	140	130	120	0.25
	20 - 30'	220	30	140	50	75	0.6
	30 - 40'	30	15	110	95	75	1.15
	40 - 50'	85	40	120	140	95	0.55
	50 - 60'	18	20	150	150	110	0.8
	60 - 70'	30	40	190	80	140	0.95
BD 4	70 - 80'	60	75	190	90	180	1.05
A4	41'	15	12	110	60	70	---
BD 5	0 - 10'	15	20	190	60	95	0.3
	10 - 15'	20	15	150	50	60	0.25
	15 - 20'	12	25	140	50	55	0.25
	20 - 25'	20	30	140	40	45	0.25
	25 - 30'	12	15	130	85	65	0.45
	30 - 35'	12	15	130	65	50	0.45
	35 - 40'	12	25	120	75	60	0.6
	40 - 45'	12	30	130	75	50	0.4
	45 - 50'	12	30	140	70	55	0.4
	50 - 55'	12	25	140	70	50	0.4
	55 - 60'	12	20	120	70	55	0.6
	60 - 65'	20	25	130	65	55	0.45
	65 - 70'	20	15	130	50	45	0.45
	70 - 75'	30	20	140	60	50	0.4
	75 - 80'	12	12	60	65	45	0.4
	80 - 85'	12	25	150	75	55	0.4
BD 5	85 - 90'	30	30	190	70	55	0.35
A5	41'	12	25	120	65	55	---
BD 6	0 - 5'	20	30	50	30	45	0.3
	5 - 10'	10	18	65	60	60	0.15
	10 - 15'	15	25	100	55	60	0.2
	15 - 20'	12	12	95	45	55	0.15
	20 - 25'	30	40	120	50	55	0.25
	25 - 30'	12	30	110	45	55	0.3

Metals in ppm; P_2O_5 in %

BD 6 (contd) .../3

Hole No	Depth	Cu	Pb	Zn	Co	Ni	P_2O_5%
BD 6 (contd)	30 - 35'	15	60	120	50	65	0.3
	35 - 40'	10	25	160	55	60	0.4
	40 - 45'	10	20	150	50	65	0.4
	45 - 50'	12	15	160	60	60	0.4
	50 - 55'	20	45	130	60	65	0.55
	55 - 60'	10	20	140	55	60	0.45
	60 - 65'	12	20	140	60	65	0.4
	65 - 70'	15	20	140	55	55	0.45
	70 - 75'	15	20	130	60	50	0.5
	75 - 80'	8	10	140	55	45	0.35
	80 - 85'	20	20	130	55	65	0.4
BD 6	85 - 90'	25	20	170	65	60	0.4
A6	35'	8	15	110	60	50	---
BD 7	0 - 5	12	25	130	35	80	0.25
	5 - 10'	18	18	150	55	80	0.15
	10 - 15'	18	18	120	40	85	0.2
	15 - 20'	45	25	140	60	120	0.3
	20 - 25'	30	15	150	65	170	0.5
	25 - 30'	25	20	160	65	120	0.45
	30 - 35'	12	15	170	180	130	0.6
	35 - 40'	40	8	150	50	100	0.4
	40 - 45'	12	8	160	170	150	0.5
	45 - 50'	30	15	180	60	140	0.65
	50 - 55'	--	--	---	--	---	0.7
	55 - 60'	55	20	230	220	180	0.9
	60 - 65'	130	20	220	180	200	2.55
	65 - 70'	100	55	160	60	120	1.55
	70 - 75'	20	12	180	50	100	1.15
	75 - 80'	20	20	180	40	100	1.15
	80 - 85'	25	12	160	40	75	0.6
BD 7	85 - 88'	35	25	190	65	85	0.7
A7	40'	30	15	110	160	45	---

Metal Results in ppm; P_2O_5 in %

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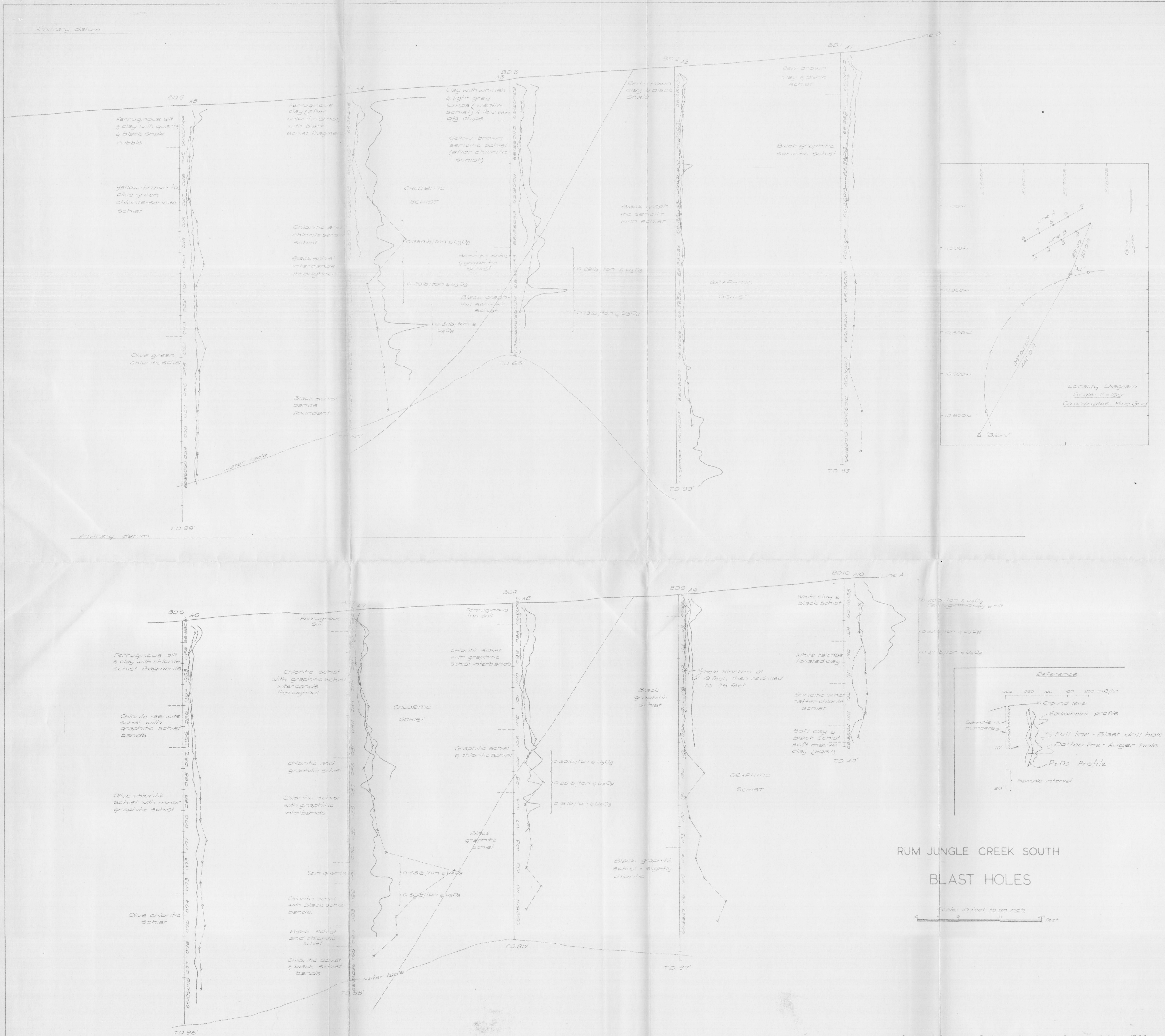
Hole No	Depth	Cu	Pb	Zn	Co	Ni	P_2O_5%
BD 8	0 - 5'	12	15	55	25	70	0.2
	5 - 10'	12	12	60	35	70	0.2
	10 - 15'	12	15	45	30	50	0.2
	15 - 20'	12	12	60	30	60	0.25
	20 - 25'	10	25	60	35	65	0.25
	25 - 30'	12	12	190	130	80	0.3
	30 - 35'	35	35	85	65	90	0.55
	35 - 40'	75	65	85	55	70	0.3
	40 - 45'	30	40	60	25	50	0.7
	45 - 50'	35	65	190	130	400	0.3
	50 - 55'	25	45	110	70	150	0.35
	55 - 60'	75	85	80	40	85	0.4
	60 - 65'	30	45	80	70	75	0.3
	65 - 70'	40	90	110	85	90	0.65
BD 8	70 - 75'	30	80	160	120	100	0.25
A8	41'	12	20	35	25	12	---
BD 9	0 - 5'	290	260	120	45	90	0.1
	5 - 10'	65	60	75	55	110	0.15
	10 - 15'	18	25	75	65	110	0.15
	15 - 20'	30	45	60	85	110	0.15
	20 - 25'	15	35	100	65	110	0.15
	25 - 30	15	40	110	40	100	0.15
	30 - 35'	15	25	60	25	25	0.1
	35 - 40'	20	40	95	30	80	0.15
	40 - 45'	18	50	85	65	90	0.6
	45 - 50'	85	35	130	55	120	0.15
	50 - 55'	18	40	80	75	90	0.25
	55 - 60'	25	40	90	150	180	0.5
	60 - 65'	20	35	80	140	140	0.4
	65 - 70'	30	35	70	130	130	0.6
	70 - 75'	40	40	60	140	120	1.1
BD 9	75 - 80'	90	110	130	130	120	0.9
A9	41'	18	125	50	70	65	---

Metals in ppm; P_2O_5 in %

.../5

Hole No	Depth	Cu	Pb	Zn	Co	Ni	P_2O_5%
BD 10	0 - 10'	45	70	35	25	70	0.4
	10 - 15'	30	80	35	60	100	0.4
	15 - 20'	25	60	45	25	65	0.5
	20 - 25'	35	90	25	25	50	0.5
	25 - 30'	30	100	40	55	55	0.55
	30 - 35'	35	120	45	35	70	0.5
BD 10	35 - 40	100	340	250	95	110	0.35
A10	41'	18	50	55	105	100	——

Metals in ppm; P_2O_5 in %


Arbitrary datum
BD5 A5
Ferruginous silt & clay with quartz & black shale rubble
Yellow-brown to olive green chlorite-sericite schist
Olive green chloritic schist
T.D. 99'
Water table
Ferruginous clay (after chloritic schist) with black schist fragments
Chloritic and chlorite-sericite schist
Black schist interbands throughout
Black schist bands abundant
CHLORITIC SCHIST
0.26 lb/ton U_3O_8
0.20 lb/ton U_3O_8
0.31 lb/ton U_3O_8
BD3 A3
Clay with whitish & light grey lumps (weathered schist) & a few vein qtz chips
Yellow-brown sericitic schist (after chloritic schist)
Sericitic schist & graphitic schist
Black graphitic sericitic schist
0.29 lb/ton U_3O_8
0.13 lb/ton U_3O_8
T.D. 65'
BD2 A2
Red-brown clay & black shale
Black graphitic sericite with schist
GRAPHITIC SCHIST
T.D. 99'
BD1 A1
Red-brown clay & black schist
Black graphitic sericitic schist
T.D. 98'
Line B
Locality Diagram
Scale 1" = 100'
Co-ordinates Mine Grid
Grid North
Line A
Line B
Arbitrary datum
BD6 A6
Ferruginous silt & clay with chlorite schist fragments
Chlorite-sericite schist with graphitic schist bands
Olive chloritic schist with minor graphitic schist
Olive chloritic schist
T.D. 96'
BD7 A7
Ferruginous silt
Chloritic schist with graphitic schist interbands throughout
chloritic and graphitic schist
Chloritic schist with graphitic interbands
Vein quartz
Chloritic schist with black schist bands
Black schist and chloritic schist
Chloritic schist & black schist bands
Water table
T.D. 89'
0.65 lb/ton U_3O_8
0.50 lb/ton U_3O_8
CHLORITIC SCHIST
BD8 A8
Ferruginous top soil
Chloritic schist with graphitic schist interbands
Graphitic schist & chloritic schist
Black graphitic schist
0.20 lb/ton U_3O_8
0.25 lb/ton U_3O_8
0.13 lb/ton U_3O_8
T.D. 80'
BD9 A9
Hole blocked at 18 feet, then redrilled to 36 feet
Black graphitic schist
Black graphitic schist - slightly chloritic
GRAPHITIC SCHIST
T.D. 87'
BD10 A10
White clay & black schist
White talcose foliated clay
Sericitic schist (after chlorite) schist
Soft clay & black schist soft mauve clay (H2O?)
T.D. 40'
0.40 lb/ton U_3O_8 Ferruginous clay & silt
0.44 lb/ton U_3O_8
0.37 lb/ton U_3O_8
Reference
000 050 100 150 200 mR/hr
Ground level
Radiometric profile
Sample numbers
Full line - Blast drill hole
Dotted line - Auger hole
P_2O_5 Profile
10'
Sample interval
20'
RUM JUNGLE CREEK SOUTH
BLAST HOLES
Scale: 10 feet to an inch
10 5 0 10 20 feet
Bureau of Mineral Resources, Geology & Geophysics, Darwin, October 1966