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COMMONWEALTH OF AUSTRALIA.

DEPARTMENT OF NATIONAL DEVELOPMENT.

BUREAU OF MINERAL RESOURCES
GEOLOGY AND GEOPHYSICS.

RECORDS.

1953/24.

RUM JUNGLE INVESTIGATIONS 1951 AND 1952
PROGRESS REPORT.

by

R. S. Matheson.

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SUMMARY.

Mining and exploration activities and geological investigations carried out in the Rum Jungle area during 1951 and 1952 have provided important results and basic information concerning the known uranium deposits, and indicated the presence of numerous interesting prospects requiring further investigation.

An important copper-uranium orebody has now been proved at White's Prospect, the reserves of which are conservatively estimated at 153.400 long tons of primary copper ore containing 11,700 long tons of metallic copper, between the 40-ft. and 300-ft. levels. Several thousand tons of secondary ore with a uranium content greater than 0.1 percent. U_3O_8 should also be available at this deposit.

Several thousand tons of secondary ore with a grade in excess of 0.1 per cent. U_3O_8 should also be available at Dyson's and White's Extended deposits, but a reliable assessment cannot be made at this juncture. The present indications are that Dyson's is likely to prove an important deposit.

The nature of the mineralisation in the Rum Jungle embayment area is now better understood, and deposition has occurred close to the axis of a dragfold developed on the north side of Giant's Reef Fault, the favourable host rocks being carbonaceous slates and graphitic schists. Deposition at White's Deposit has been chiefly by selective replacement, and the mineralisation occurred in the interval between Giant's Reef faulting and axial plane shearing of the dragfold, and may be connected with the Giant's Reef period of quartz injection

Low grade radio-active conglomerate beds, discovered in the Crater Grit Formation in 1951, are now known to extend over a length of at least 6 miles and an investigation of them is still in progress. The source of the radio-activity in these beds has not yet been identified, but it is thought that they may possibly represent the leached outcrops of beds which are richer in uranium minerals at depth. Thorough testing of these deposits by drilling is yet to be undertaken.

Preliminary work with encouraging indications has been completed at the first of numerous radio-active anomalies located during an airborne scintillometer survey in 1952. This anomaly, which is being referred to as the Brodribb Deposit, and which occurs at the north end of the Rum Jungle structure, will be tested by drilling in 1953.

The regional geological mapping is progressing, and has already provided some valuable information regarding the broad localisation of mineralisation.

Available information regarding ore reserves and future prospects leads to the belief that the area is likely to prove an important uranium field.

Details of the results and the nature of the investigations are given in the following pages.

INTRODUCTION.

Following encouraging results from preliminary geological, geophysical and prospecting work by the Bureau of Mineral Resources in the Rum Jungle area in 1950, investigations were intensified in the area during 1951 and 1952, to prove known deposits test known prospects, and search for new prospects. The investigations involved geological surveying, geophysical surveying, diamond drilling and surface and underground mining.

By the end of 1952, the Bureau of Mineral Resources had completed their testing of White's Deposit, and proved the presence of an important uranium and copper orebody, but the programme of exploration and development at other known deposits had only been partly completed. At this stage in the investigations the Commonwealth Government made arrangements with the Consolidated Zinc Corporation Ltd. of Broken Hill to undertake mining operations at White's Deposit and future exploration activities within the Hundred of Goyder, the control of this area by the Company to take effect from 1st January, 1953. As a result of these arrangements, the Bureau of Mineral Resources will in future concentrate on investigations outside the Hundred of Goyder.

During the period August to October, 1952, an airborne scintillometer survey of an area of 1300 square miles, embracing the Rum Jungle structure, was undertaken by the Geophysical Section and trial traverses were made over the Edith River and other areas. Ground geological and geophysical investigations followed this work in order to make preliminary inspections of the anomalies located, and assess the prospects for more detailed investigations. This work is not yet completed and will have to be continued during 1953.

This report is a progress report on activities during 1951 and 1952, and should be regarded as supplementary to the progress report produced in 1950 (Matheson, 1950).

Detailed reports by my colleagues, H. J. Ward, N. J. Mackay, E. K. Carter, P. H. Dodd and F. J. Frankovich, on the various deposits in the area examined by them, are being prepared as separate records reports.

A final report on the work of the Bureau of Mineral Resources in the Rum Jungle area cannot be written until full results of petrological, mineralogical and assay work are available.

FIELD WORK.

During 1951 the geological party consisted of R. S. Matheson (Geologist-in-Charge), H. J. Ward, E. K. Carter, and N. J. Mackay, but N. J. Mackay was replaced by G. Sleis at the end of October.

The geologists connected with the Rum Jungle investigations during 1952 were R. S. Matheson (Geologist-in-Charge), H. J. Ward, G. Sleis, E. K. Carter and D. N. Smith of the Bureau of Mineral Resources, and P. H. Dodd and F. J. Frankovich on loan from the American Atomic Energy Commission.

The geophysicists connected with the work during 1951 and 1952 have been D. F. Dyson (Geophysicist-in-Charge), J. Pearce K. Tate, R. de Groote, W. Compston, G. Mumme and R. Green. Geophysicist E. McCarthy was in charge of the airborne scintillometer team operating in the area during 1952.

The Northern Territory Mines Branch supervised mining operations and procurement of mine supplies in the area until August 1952, and also took over responsibility for managing the camp mess from the geological section in November, 1951. In September 1952, W. Rae of the Mining Engineering Section of the Bureau of Mineral Resources, was appointed Manager of the project at Rum Jungle, when the Bureau resumed responsibility for the camp management, and mining operations from the Northern Territory Mines Branch.

During the period 1951 to 1952 mining development and exploration work has been carried out under contract by Northern Drillers.

The activities of the various geologists connected with the investigations are as follows:-

R. S. Matheson was responsible for the planning and supervision of the field geological work, diamond drilling and prospecting activities, and for co-ordinating it with the geophysical and mining work. He was also responsible for the assessment and results of the investigations. When time was available from other commitments he was personally engaged in the preparation of a regional geological map of the Rum Jungle area, made inspections of several new finds and alleged radioactive mineral occurrences reported by prospectors, and numerous anomalies located by the airborne scintillometer.

H. J. Ward has been closely associated with the mining geological work since its inception, and this work involved detailed surface and underground geological mapping, and close attention to the diamond drilling and sampling. He has also beeen connected with the regional geological mapping and prospecting activities.

E. K. Carter revised and extended the 1 inch = 400 ft. detailed geological map of the Rum Jungle area in 1951, and also carried out a geological survey of the country surrounding the uranium prospect in the Ferguson River area. He has also been connected with the mining geological work and prospecting activities.

N. J. Mackay, G. Sleis and D. N. Smith, have been connected with the mining geological work and prospecting activities.

P. H. Dodd, who arrived at Rum Jungle in August 1952, was engaged throughout the remainder of the year in an investigation of the geology and radio-activity of the Crater Grit Formation.

F. J. Frankovich, who arrived at Rum Jungle in August 1952, made a detailed investigation of the Brodribb Deposit, located during the airborne scintillometer survey, and carried out some regional geological mapping on the eastern limb of the Rum Jungle Structure.

MAPS, PLANS AND SECTIONS.

Prior to 1951, maps and plans on various scales have been produced at Rum Jungle, and in order to fall in line with Bureau of Mineral Resources practice, the following scales for mapping were adopted:-

1 inch = 20 feet:	For surface and underground mine geological and assay plans.
1 inch = 40 feet:	For detailed geological mapping around the uranium deposits.
1 inch = 400 feet:	For more extensive geological mapping in the Rum Jungle embayment area, at Mt. Fitch and at Ferguson River.
1 : 15,000 or 1 : 30,000 :	Corresponding to available aerial photographs for regional geological mapping at Rum Jungle and Ferguson River.

Complete aerial photographic coverage of the Rum Jungle area on a scale of 1:15,000 became available during 1952, and a compilation on a scale of 2 inches to 1 mile has been produced therefrom by National Mapping. This compilation is being used as a base on which to plot geological observations recorded on the aerial photographs.

The only deviation from the above adopted scales has been in the mapping of the Crater Prospect on a scale of 1 inch to 200 feet in 1951, and in the mapping of the Brodribb Deposit on a scale of 1 inch = 100 feet in 1952, but the short time available for the work in both instances made this a necessity. Mapping will be done on a larger scale in both areas in the future if warranted.

All available geological and geophysical information concerning the Rum Jungle embayment area has been compiled on gridded sheets drawn on a scale of 1 inch = 100 feet, but this has been done at the request of Zinc Corporation.

The 1 inch = 20 feet, 40 feet and 400 feet surface geological mapping was carried out with a plane table and telescopic alidade using a staff for the tacheometric measurement of distances, while the underground mapping is based on compass and tape and theodolite surveys. The underground plans and sections are compiled on co-ordinated grids.

Numerous plans and sections accompany the various reports that have been prepared on the Rum Jungle area and others are available at the Bureau of Mineral Resources, Canberra.

Plans and sections, which will eventually appear in their own reports, have also been prepared by the Geophysical Section, and this information was readily made available for use in the field.

The maps and plans prepared during 1951 and 1952 are listed below:-

Area.	Description	Scale.
Regional	Geological Map Rum Jungle Structure	1 inch = 1 mile.
Rum Jungle	Geology in the vicinity of the Rum Jungle Radioactive Deposits	1 inch = 400 feet
White's	Geological Plan	1 inch = 40 feet.
White's	Assay and Geological Plans and Sections	1 inch = 20 feet.
Dyson's	Assay and Geological Plan and Section	1 inch = 20 feet.
Brown's	Geological Plan	1 inch = 40 feet.
Brown's	Geological Plan	1 inch = 20 feet.
White's Extd.	Geological Plan	1 inch = 40 feet.
White's Extd.	Geological Plan	1 inch = 20 feet
Intermediate	Geological Plan	1 inch = 20 feet
Crater	Geological Plan	1 inch = 200 feet.
Mt. Fitch	Geological Plan	1 inch = 400 feet.
Mt. Fitch	Geological Plan	1 inch = 40 feet.
Ferguson River	Geological Plan	1:30,000
Ferguson River	Geological Plan	1 inch = 400 feet.
Brodribb	Geological Plan	1 inch = 100 feet
Crater Line	Geological Plan	1:15,000

GEOPHYSICAL WORK.

The Geophysical Section will be producing their own reports, but an outline of their activities is given herewith while the chief results are included in the various geological reports.

The Geophysical work can be conveniently described under the following headings:-

Prospecting
Mining Activities
Assaying.

PROSPECTING:

Both regional and detailed work was carried out.

The regional prospecting involved making Geiger Muller traverses in geologically favourable areas for mineralisation around the Rum Jungle structure and in the Ferguson River area, and in checking dumps at old mining centres for radioactivity. This work met with some success in the discovery of the Crater Prospect by R. S. Matheson and D. F. Dyson in 1951. In the latter part of 1952 an airborne scintillometer survey of the Rum Jungle area was made, and numerous radiometric anomalies were located. Further airborne surveys will be undertaken in 1953.

The detailed prospecting involved making more closely spaced Geiger-Muller traverses within the Rum Jungle embayment area, and self-potential and magnetometer surveys were also undertaken in the search for ore deposits. Detailed Geiger Muller traversing with car mounted equipment was carried out in connection with the ground location of radiometric anomalies indicated from the airborne scintillometer survey.

The detailed prospecting in the Rum Jungle embayment area led to the discovery of White's South Deposit, and has indicated other prospects.

MINING ACTIVITIES.

Radiometric contour plans are prepared around known deposits and interesting prospects, and radiometric profiles and sections are prepared for all costeans. The mining work also involves checking the radioactivity of working faces as the mining increases, for the guidance as to ore occurrence and sampling. Detailed observations are also taken throughout the workings with a view to the later preparation of underground contour plans and sections.

Geiger probing of diamond drill holes was introduced during 1952, and it is intended to eventually also log the numerous old Army bores scattered through Rum Jungle area.

ASSAYING.

The Geophysical Section has been responsible for all the instrument assaying of uranium samples, and equipment is available for this to be done in the field. Further information is given in the Assaying Section of this report.

DIAMOND DRILLING.

The diamond drills, namely a Mindrill E.100 and a Goldfields No.7, were in operation in the area in 1951, and five diamond drills were available during 1952. Those in use during 1952 were as follows:-

Mindrill E100 (screw feed) - throughout the year.

Goldfields No.7 (screw feed) - throughout the year.

Sullivan H.D.22 (hydraulic feed) - from June.

Mindrill A.3000 (screw feed) - from July.

A Sullivan D.6 drill was used for the underground drilling at White's Deposit, and was used effectively up to lengths of about 200 feet.

To the end of 1951, surface diamond drilling done in the area amounted to 3,149 feet 6 inches, and an additional 6.293 feet 6 inches of surface diamond drilling and 2.964 feet 6 inches of underground diamond drilling was done during 1952. It will be seen that the drilling has been concentrated mainly in the vicinity of White's Deposit.

Much of the drilling originally proposed to test other prospects in the area remained undone at the end of 1952, but it included in the Zinc Corporation's future drilling programme.

Low and disappointing core recovery has been obtained during the diamond drilling so far completed in the area, and the recognition of lode intersections is largely dependent on assay results from sludge samples and on Geiger probing of the holes, Better core recoveries have been obtained generally from the deeper holes which apparently entered less oxidised and more settled country at depth, while the larger coring for the deeper holes was probably also an important factor improving recovery. It has been suggested that better core recovery could be obtained in the future from shallow holes by using greater diameter bits and hydraulic feed machines.

Development work in 1952 failed to locate the values indicated from sludge sampling and Geiger probing between 25 feet and 30 feet in U.D.D.H.2, and b eyond 70 feet in U.D.D.H.4 and contamination is suggested. U.D.D.H.2 is drilled from near the lode, and U.D.D.H.4 is an uncased hole previously intersecting the main lode. In U.D.D.H.2 contamination apparently occurred at the point of sludge collection, while contamination in U.D.D.H.4 results from failure to case off the main lode section before proceeding with the drilling of the footwall country.

It is suspected that there may be a certain amount of contamination at the lower end of the lode intersections obtained in the surface drill holes, as they are also uncased.

Details of the diamond drilling done during the period 1950 to 1952 and also information regarding core recovery are given in the following tables.

SURFACE DIAMOND DRILLING - RUM JUNGLE
TO 31st DECEMBER, 1952.

Deposit	Drill	Co-ords of Site.	Reduced Level of Site.	Bearing	Depression	Bore Depth Ft. Ins.	Instrument Assay	Remarks	Date	Drill
	WDA	176N 142.E	313'	155°	70°	94 6	Varies 0.19% to 0.23% between 34'6" and 44'6". Varies 0.8% to 1.8% between 44'6" and 94'6"		1950	Mindrill E100
	WDB	166.5N 89.E	312'	155°	60°	92	Varies 0.1% to 1.0% between 14'6" and 43'		1950	Mindrill E.100
	WDC	173.5N 113E	313'	155°	60°	89 6	No important results		1950	Mindrill E.100
White's	WDD			Not used.						
	WDE	211N 160.5E	314'	162°	60°	109 6	0.13% between 24.'6" and 31'. Varies 0.31% and 0.87% between 74'6" and 109'6"		1950	Mindrill E100
	WDF	211.5N 302.5E	321'	171°	60°	99 6	Varies 0.12% to 0.46% between 21'6" and 69'6". Varies 0.19% to 0.64% between 84'6" and 89'6"		1950	Mindrill E100
	WDG	141N 45E	311'	155°	60°	100	Varies 0.022% to 0.033% between 15 ft. and 30 ft.		1951	Mindrill E/100
	WDH	122.5N 9-E	311'	155°	60°	100	Varies 0.01% to 0.015% between surface and 15 ft.		1951	Goldfields No.7

Deposit	Drill	Co-ords of Site	Reduced Level of Site.	Bearing	Depression	Bore Depth Ft.Ins.	Instrument Assay	Remarks	Date	Drill.
	WDI	153N 67.5E	312'	155°	60°	70'	No important results	Hole abandoned at 70 ft.	1951	Mindrill E100
	WDJ	186.5N 228E	316'	145°	60°	100'	Varies 0.11% to 1.20% between 10 and 100 ft.		1951	Mindrill E100
	WDK	151.5N 196E	316'	129°	60°	132'	No important results		1951	Mindrill E100
	WDL	231.5N 387E	323'	157°	45°	103'	Results generally low Highest 0.05%		1951	Mindrill E100
	WDM	243N 414.5E	325'	157°	45°	100'	Results generally low. Highest 0.015%		1951	Mindrill E100
	WDN	243N 193E	316'	162°	60°	190'	Varies from 0.13% to 1.35% between 34 and 190 ft.		1951	Goldfields No.7
	WDO	9.5N 225.5S	311.6'	298°30'	45°	156'	0.32% between 80 and 85 ft. Varies 0.07% to 0.15% between 125 ft. and 150 ft.	No water return between 150 and 156 feet.	1952	Goldfields No.7
	WDP	2.58 409E	313.14'	298°30'	45°	412'	Averages 0.38% between 280 and 335 ft. Maximum value 1.64%		1952	Sullivan 22
	WDQ	2.58 413E	313.14'	336°30'	50°	544'	No important results		1952	Sullivan 22
	WDR	100N	311.61'	337°	60°	103	Averages 1.11% between 65 & 103 ft.	Hole finished in low grade ore.	1952	Mindrill E100

Deposit	Drill	Co-ords of Site	Reduced Level of Site	Bearing	Depression	Bore Depth Ft.Ins.	Instrument Assay	Remarks	Date	Drill
	WDS	47.5S	313.11'	298°30'	46°30'	108	No important results	No sludge between 95-105 ft.	1952	Mindrill A3000
	WDT	444N 125E	329.71'	155°30'	60°	176'	No important results		1952	Mindrill E100
	WDU	372N 510E	335.81'	157°	60°	137 6	No important results		1952	Mindrill E100
	W1	25N 360.5E	312.61'	298°30'	70°	365	Averages 0.39% between 310 and 360 ft.	Hole abandoned.	1952	Mindrill A3000
White's Contd.	W2	259N 546E	327.12'	157°	60°	100	No important results		1952	Mindrill E100
	W3	36.2N 441.2E	314.1'	298°30'	45°	518'	Averages 0.37% between 285 and 385 ft.		1952	Mindrill A3000
	W4	5N 502.5E	314.5'	335°30	50°	551'	Values 0.16% from 70 to 75 ft. Values 0.12% from 135 to 140 ft. Values 0.11% fro, 145 to 150 ft. Averages 0.09% from 175 to 190 ft. Averages 0.1% from 210 to 220 ft.	Redrilled over cement and collected core between 307 and 323 ft. Hole deflected.	1952	Sullivan 22
	W5	50.58 388E	313.3'	298°30'	45°	85'	No important results	Hole abandoned	1952	Sullivan 22
	W6	32S 300E	312.8'	298°30'	60°	236 6	No important results yet	No water return at 236'6"	1952	Sullivan 22
	W7	82S 550E	313.8'	298°30'	60 °	397'	No important results yet	In progress	1952	Sullivan 22

Deposit	Drill	Co-ords of Site	Reduced Level of Site	Bearing	Depression	Bore Depth Ft.Ins.	Instrument Assay	Remarks	Date	Drill
White's South	WS1	256S 82W	313.89'	347°55'	45°	189	Averages 0.21% between 65 and 75 ft.		1952	Goldfields No.7
	WS2	277S 179W	314.36'	348°	45°	197	No important results		1952	Goldfields No.7
	WS3	318S 120W	316.14'	348°	45°	234	Values 0.11% between 85 and 90 ft. Values 0.11% between 135 and 140 ft.	No water return at 234'.	1952	Goldfields No.7
	WS4	467S 242W	318.13'	348°	45°	223	No important results		1952	Goldfields No.7
	WS5	322S 119.5W	316.14'	348°	60°	225'	Values 0.12% between 125 and 130 ft. Values 0.09% between 130 and 135 ft.		1952	Goldfields No.7
	WS6	236S 18E	312.9'	348°	45°	150'	No important results		1952	Goldfields No.7
	WS7	359.5S 211.5W	317.4'	346°	45°	246 6	Average 0.21% between 170 and 180 ft.		1952	Goldfields No.7
	WS8	350S 305.5W	314.6'	347°30'	45°	140'	Values 0.11% between 80 and 85 ft.		1952	Goldfields No.7
	WS9	180S 280S	313'	347°30'	45°	130'	No important results		1952	Goldfields No.7

Deposits	Drill	Co-ords of Site	Reduced Level of Site.	Bearing	Depression	Bore Depth Ft.Ins.	Instrument Assay	Remarks	Date	Drill.
White's Extd.	WEDA	24N 139.5W	352'	308°	60°	134 6	Averages about 0.07% with maximum 0.09% between 90 and 125 ft.		1951	Mindrill E100
	WEDB	20S 130W	352'	322°	45°	140	No important results.	No recovery after 134 ft.	1951	Mindrill E100
	WEDC	10.5N 155W	352'	320°30'	60°	60'	No important results.	Hole abandoned.	1951	Mindrill E100
	WEDD			Not used.						
	WEDE	29N 161W	352'	320°30'	60°	123'	No important results		1951	Mindrill E100
	WEDF	8N 91W	353'	320°30'	60°	100'	Varies from 0.04% to 0.01% between 25 and 50 ft. Otherwise less than 0.04%		1951	Mindrill E100
	WEDG	25N 143E	352'	Due North	60°	113'	Varies from 0.05% to 0.06% between 40 and 50 ft. Otherwise less than 0.04%.		1951	Mindrill E.100
	WE1	61.58 168W	350'	360°	50°	170	No results yet available. In progress.		1952	Mindrill A1000

Deposit	Drill	Co-ords of Site	Reduced Level of Site.	Bearing	Depression	Bore Depth Ft.Ins.	Instrument Assay.	Remarks	Date	Drill.
Crater	C1	205' on bearing 107° from datum.		32°30'	45°	110'	No important results.		1952	Mindrill E100.
	C2	350' on bearing 319° from datum.		35°	45°	154'	No important results.	To 60 ft. with Mindrill carried beyond with Goldfields No.7.	1952	Mindrill E100 and Goldfields No.7
Dyson's	DDA	166N 240.0E	395'	275°	45°	100'	0.12% between 10 and 15 ft. Varies 0.09% and 0.39% between 65 and 80 ft.		1951	Mindrill E100.
	DDB	166N 242.5E	395	275°	80°	100'	0.20% between 5 ft. and 10 ft. Varies 0.06% between 60 and 100 ft.		1951	Mindrill e100.
	DDC	151N 238.5E	394.5	248°	45°	110'	Varies from 0.12% to 0.71% between 80 and 110 ft.		1951	Mindrill E100.
	DDD			Not used.						
	DDE	191N 229E	397'	298°	80°	90'	Varies from 0.31% to 0.54% between 45 and 60 ft. Values 0.1% between 60 and 85 ft.		1951	Mindrill E100
	D1	170N 385E	375.5'	-	90°	335	No important results.		1952	Mindrill A3000

Deposit	Drill	Co-ords of Site	Reduced Level of Site.	Bearing	Depression	Bore Depth Ft.Ins.	Instrument Assay	Remarks	Date	Drill.
Brown's	BDA	262.5S 14.50E	323'	347°	45°	180'	Results all less than 0.01%		1951	Goldfields No.7
	BDB	164S 1550.5E	320'	315°	60°	117'	0.04% between 45 and 50 ft. All other assays 0.02% or less		1951	Goldfields No.7
	BDC	125S 103E		310°	45°	110'	Results all less than 0.01%		1951	Goldfields No.7
Inter-mediate	IDA	Bearing 275 Distance 121' from base peg A	312'	141°	60°	53'	Shows 0.016% between 40 and 45 ft. Otherwise 0.01 or less.	Only four sludge samples - hole aban-doned at 53 ft.	1951	Mindrill E100.
Mt. Fitch	FDA	486N 95W	298'	35°	70°	61'	No important results		1950	Mindrill E100
	FDB	465.5N 109W	297'		Vertical	133'6"	No important results		1950	Mindrill E100
	FDC	826N 400SW	303'		Vertical	44'6"	No important results		1950	Mindrill E100

UNDERGROUND DIAMOND DRILLING : RUM JUNGLE.

To 31st December, 1952.

Deposit	Drill Site	Co-ords Site.	Reduced Level Site.	Bearing Magnetic	Elevation	Bore Length.	Instrument Assay % Equiv. U_3O_8	Remarks	Drill.
White's	UDDH1	81.5N 189E	218'	142°	+1°	150'	No important Results		Sullivan D6.
	UDDH2	160.5N 341E	218'	147°	+1°	235'	Values between 25 ft and 30 ft. - 0.11%	Crosscutting failed to reveal values between 25 and 30 ft.	Sullivan D6.
	UDDH3	182.5N 329.5E	218'	322°	+1°	150'	Values 0.11 between to ft. and 75 ft. Values 0.13% between 120 and 125 ft.		Sullivan D6.
	UDDH4	149.5N 220.5E	218'	322°	+1°	215'	Average 0.39% between 20 and 60 ft. Averages 0.23% between 70 and 110 ft. Value 0.14% between 140 and 145 ft. Averages 0.43% between 170 and 195 ft.	Cross cutting failed to reveal values between 70 and 110 ft. and beyond. Contamination is suggested.	Sullivan D6.
	UDDH5	160N 278.5E	218'	322°	+1°	185'	Values 0.11% between 40 and 45 ft.		Sullivan D6.
	UDDH6	137N 265E	218'	142°	+1°	155'	Values 0.09% between 25' and 30'.		Sullivan D6.
	UDDH7	192N 411.5E	218'	142°	+1°	192'	Averages 0.10% between 165 and 180 ft.	First 57 ft. of hole redrilled.	Sullivan D6.

Deposit	Drill Site	Co-ords Site.	Reduced Level Site.	Bearing Magnetic	Elevation	Bore Length	Instrument Assay % Equiv. U_3O_8	Remarks	Drill.
White's	UDDH8	205N 402E	218'	325°	+1°	206'	No important results		Sullivan D6
	UDDH9	201N 407E	218'	88°45'	+1°	201'	No important results		Sullivan D6.
	UDDH10	199N 408E	218'	112°30'	+1°	200'	No important results		Sullivan D6
	UDDH11	331N 114E	218'	17°	+1°	158'	No important results		Sullivan D6.
	UDDG12	205N 406.5E	218'	60°30'	+1°	198' 6"	Values 0.10% from 0 to 5 ft. Values 0.11% from 80 to 85 ft.		Sullivan D6.
	UDDH13	330N 107E	218'	321°15'	+1°'	122'	No important results		Sullivan D6
	UDDH14	25N 114.5E	217.3'	233°15'	+1°	215'	No important results		Sullivan D6.
	UDDG15	24N 116.5E	217.2'	168°45'	+1°	195'	No important results.		Sullivan D6
	UDDH16	235N 295.5E	275.3'	357°30'	+1°	187'	Averages 0.22% between 0 and 30 ft.		Sullivan D6

The total amount of drilling done at each deposit, and by each drill to the end of 1952, is as follows:-

Deposit.	No. of Holes.	Footage.
White's (surface)	27	5269' 0"
White's (underground)	16	2964' 6"
White's South	9	1734' 6"
White's Extd.	7	840' 6"
Crater	2	264' 0"
Dyson's	5	755' 0"
Intermediate	1	53' 0"
Brown's	3	407' 0"
Mt. Fitch	3	239' ?"
TOTAL:	75	12506' 6"

Drill	Footage.
Mindrill E100	3139' 0"
Goldfields No.7	2681' 0"
Mindrill A3000	1496' 6"
Sullivan HD22	2225' 6"
Sullivan D6	2964' 6"
TOTAL:	12506' 6"

CORE RECOVERY - RUM JUNGLE.

An analysis of all diamond drilling carried out in the Rum Jungle area by the various drills, from 1950 to 31st December, 1952, is as follows:-

Drill	Footage Drilled	Average Core Recovery.
Mindrill E100	3139.0'	14.3%
Goldfields No.7	2681.5'	11.7%
Mindrill A3000	1496.0'	28.8%
Sullivan HG22	2225.5'	40.8%
Sullivan D6	2964.5'	23.9%

Excluding the Sullivan D6 drill used for underground horizontal drilling, the following figures were obtained for core recovery from all drills from above and below 100 feet bore depth.

Description.	Footage Drilled.	Average Core Recovery.
Above 100 feet level	5436.5'	14.1%
Below 100 feet level	4101.0'	28.2%

An analysis of core recovery from drilling at the various deposits is as follows:-

Deposit.	Footage Drilled.	Average Core Recovery.
White's (surface)	5269'	29.7%
White's (underground)	2964'6"	23.9%
White's South	1734'6"	12.7%
White's Extd.	840'6"	9.6%
Dyson's	735'	11.8%
Mt. Fitch	239'	NIL
Intermediate	53'	10.5%
Crater	264'	15.0%
Brown's	407'	6.0%
TOTAL:	12506'6"	20.8%

MINING.

As encouraging results were obtained from diamond drilling, costeaning and exploratory work in 1950, a programme of development work to open up known deposits and test known prospects was initiated in 1951.

The Geological Section was responsible for the guidance of the mining work, but the actual mining operations, which were carried out by mining contractors, were the responsibility originally of the N.T. Mines Branch, and later of the Mining Engineering Section of the Bureau of Mineral Resources.

Due to numerous factors, the mining work has so far not progressed as quickly as was hoped.

Details of work completed during 1951 and 1952 are as follows:-

WHITE'S DEPOSIT.

Year.	Crosscutting.	Shafting, Winzing and Rising.	Driving	TOTAL.
1951	119 ft.	226 ft.	35 ft.	380 ft.
1952	642' 6"	50 ft.	748 ft.	1442 ft.
TOTALS:	761 ft.	276 ft.	783 ft.	1822 ft.

The cuddies prepared for underground diamond drilling have been included under cross cutting. Most of the work has been done in connection with the development of the 100 ft.level, but 44.5 feet of cross-cutting and 235 feet of driving was done at the 50 ft. level.

DYSON'S DEPOSIT.

Year.	Shaft Sinking.
1951	84 ft.

BROWN'S DEPOSIT.

Year.	Shaft Sinking.
1952	22 ft.

COSTEANING.

Year.	Deposit.	Costean	Footage.
1950	White's	1	42 ft.
"	"	2	60 ft.
"	"	3	56 ft.
"	"	4	34 ft.
"	"	5	58 ft.
"	"	6	64 ft.
"	"	7	64 ft.
"	"	8	61 ft.
"	"	9	59 ft.
"	"	A	109 ft.
"	"	B	186 ft.
1952	"	C	172 ft.
"	"	D	138 ft.
"	"	E	183 ft.
"	"	F	295 ft.
"	"	G	197 ft.
"	"	H	185 ft.
"	"	I	120 ft.
"	White's South	J	400 ft.

Year	Deposit.	Costeaning	Footage.
1951	White's Extd.	A	161 ft.
"	"	B	84 ft.
"	"	C	59 ft.
"	"	D	52 ft.
1952	"	L	510 ft.
"	Intermediate	K	573 ft.
"	Brodribb	(Five costeans) A to E	1026 ft.
		TOTAL:	4748 ft.

White's Deposit: The Bureau of Mineral Resources programme of development and exploration of this deposit was practically completed at the end of 1952, and future work in this regard will be carried out by the Consolidated Zinc Corporation Ltd. during the course of their mining activities. At the end of 1952 the deposit had been developed at the 100 ft. level, and was partly developed at the 50 ft. level, and work was in progress on a 100 ft. winze below the 100 ft. level. The new main shaft sited 140 feet north of No.1 shaft was also being sunk. Diamond drill hole W7 to intersect the ore body at 500 ft. vertical depth from the surface was in progress, and had reached a bore depth of 397 feet at 31st December, 1952.

Dyson's Deposit. In 1951 No.2 shaft, sited to intersect the downward continuation on the dip of the lode channels outlined by shaft sinking and drilling in 1950, was sunk to a depth of 84 feet. It is proposed to sink the shaft to a depth of 110 feet and develop and explore the deposit at the 100 ft. level. Work was not recommenced at this deposit until towards the end of 1952, when a vertical diamond drill hole D1 was drilled to a depth of 335 feet, and shaft sinking was continued. The drill hole was sited to intersect the lode channel at about 200 feet vertical depth, but gave no important results. This has tended to confirm a suspicion that a strike fault, the displacement of which is unkonwn, occurs near No.2 shaft. Development work and exploration must be awaited before further information can be obtained regarding the suspected faulting. It is possible, however, that failure to obtain intersection may be due to an increase in dip of beds.

No primary uranium minerals have yet been obtained from Dyson's Deposit, but it is thought that the mining planned at the 100 ft. level should be near the top of the primary zone of mineralisation.

Brown's Deposits. Both radiometric and self-potential anomalies were located in this area prior to 1951, and it is possible that useful deposits of both uranium and copper may occur in the area.

An extensive programme of drilling is planned for the area, and this was commenced towards the end of 1951 when three holes were drilled, but no further drilling was done in the area during 1952, due to other commitments.

In 1951, two holes (BDA and BDB) were drilled to test the radiometric anomaly, and the eastern self-potential anomaly, and the third hole (BDC) was drilled to test the western self-potential anomaly. No important radiometric results were obtained from this drilling and the copper results were not particularly encouraging, but the work so far done cannot be regarded as conclusive.

A prospecting shaft was commenced on the radiometric anomaly in 1952, but has so far only reached a depth of 22 feett

<u>White's Extd. Deposit</u>. This name has been given to the western of three radiometric anomalies located in 1950 between White's and Dyson's Deposits.

During 1951 all the anomalies were investigated by costeaning, and six holes were drilled to test White's Extd. anomaly. Although the surface occurrences of secondary ore were encouraging, drilling results were rather disappointing.

Further work was planned for the area and this was commenced towards the end of 1952, when drilling of hole WE1 was commenced. This hole is being drilled on a depression of 50 degrees, northwards from the deposit, and at the end of 1952 had reached a depth of <u>170</u> feet. This hole is planned to test the slate formation and pass under a self-potential anomaly. Some costeaning was also done in this area during 1952.

<u>Intermediate Prospect</u>. Drilling was commenced at this prospect towards the end of 1951, but due to a mechanical breakdown of the drill the hole was abandoned without yielding any conclusive results. No further work has yet been undertaken in the area.

<u>Mt. Fitch Prospect</u>. Although further work is planned in this area, nothing has beenndone since 1950.

<u>White's South Deposit:</u> The radiometric anomaly located in this area, which is a short di stance across the East Branch of the Finnies River south of White's Deposit, was drilled during 1952 with encouraging results. In all, 9 holes were drilled and low grade uranium ore intersections were encountered in 5 holes. Underground work will have to be done for a proper understanding of the deposit, which may represent the continuation of White's Deposit after faulting.

The area is extremely soil covered and several costeans have been planned to aid in geological mapping. The first costean, 400 feet long, was comple ted in 1952.

<u>Crater Prospect</u>. The Crater Prospect, discovered in 1951, was tested by two drill holes in 1952, and diamond drilling is planned during 1953.

<u>SAMPLING</u>.

Sampling was the responsibility of the Geological Section, and diamond drill hole sampling (core and sludge), jack hammer hole sampling (sludge), grab sampling and channel sampling were carried out during the course of the investigations. Radiometric work was frequently used as a guidance to sampling.

All samples were bagged and delivered to the Geophysical Section for assay. Details of the samples were transferred from the sample books to the assay register at regular intervals.

Poor core recovery made it difficult to obtain representative samples of core for assay, but split samples of core were collected where the core recovery from lode sections was 30 per cent. or better. The poor core recovery means that the recognition of lode intersections in drill holes is based mainly on sludge samples.

Portions of the samples were returned by the Geophysical Section after instrument uranium assays, and these were used for chemical assay work as warranted.

<u>ASSAYING</u>.

The Geophysical Section is responsible for instrument uranium assaying of samples, and equipment was available for this to be done in the field.

As a check on the field instrument assay results, check instrument assaying is carried out in Melbourne, and selected samples have been submitted from time to time for chemical uranium assays.

The uranium deposits are, in places, closely associated with areas of sulphide mineralisation, and samples have been submitted for determinations of the copper, lead, gold, silver and sulphur content where considered necessary. Most of this work has been carried out by the N.T. Mines Branch, and results are shown on assay plans and sections which have been prepared.

A check on the presence of any germanium associated with the lode material at White's Deposit should also be made.

PROSPECTING.

The Geological and Geophysical Sections co-operated in the prospecting activities, but the Geological Section was responsible for the guidance of the work.

Prospecting activities involved making regional and local geological and geophysical ground inspections of anomalies located by the airborne scintillometer survey; of structurally favourable areas for mineralisation around the Rum Jungle structure; investigating discoveries reported by prospectors; checking on alleged occurrences of rad-active minerals in various localities; and checking dumps at old mining centres for signs of radio-activity. Prospecting activities were carried out in the Ferguson and Edith River areas as well as in the Rum Jungle area.

Radiometric, self-potential and magetometer surveys were also carried out by the Geophysical Section in the embayment area at Rum Jungle, with a view to obtaining either direct or indirect evidence for localising other areas of mineralisation.

During 1952 and 1952 the ground prospecting activities led to the discovery of the Crater Deposit, White's South Deposit and several other prospects warranting more attention. The ground investigation of the anomalies indicated from the airborne scintillometer survey has already shown that several of them warrant more detailed examination.

During the airborne scintillometer survey over 80 first order, 200 second order and 400 third order anomalies were located (Wood and McCarthy, 1952). A preliminary inspection of 85 of these anomalies, 55 of which (comprising 22 first order, 21 second order and 13 third order) occur within the Hundred of Goyder, was made during the latter part of 1952. The remainder will be examined in 1953. The preliminary inspection work to date, much of which was carried out by the Chief Geologist, has shown that many of the anomalies can be dismissed as being due to topography or outcrop conditions. Nearly all those on granite areas can be related to outcrops, knolls or ridges or granite with a high radio-active background, which have given a local mass effect detected by the scintillometer. Several of the anomalies within the Brocks Creek Group need closer investigation however, and the Brodribb anomaly is so far the only one where work has advanced beyond the preliminary inspection stage. Detailed geological mapping, radio-metric surveying and costeaning has already been done here (Frankovich, 1953) and diamond drilling will be undertaken in 1954.

A list of the anomalies which have been noted for more detailed investigations during 1953 are as follows:-

Page 15 to follow page 13.
No page 14 in record.

A. OUTSIDE THE HUNDRED OF GOYDER.

Co-ords of Site.	Air Photos.	Work recommended.
915229, 911240, 915250 917251, 220245, 925242	5161 & 5162, Run 20 5152-5154, Run 19	Radiometric traverse. along reef formation.
025302, 025298, 021289	5090 & 5191, Run 17	Detailed radiometric traversing of area.
931285, 932277, 932273, 929264, 946264, 946261, 957273, 957253	5151 & 5152, Run 19 5111 & 5112, Run 18	When checking area near points 920245 & 925242, 2 miles to south-west, similar traverse along this reef required.

B. INSIDE THE HUNDRED OF GOYDER.

019363, 018362	5193 & 5194, Run 14	Detailed radiometric traversing of area.
021367	5193 & 5196, Run 14	Detailed radiometric traversing of area.
021367	5193 & 5196, Run 14	Detailed radiometric traversing of area covered by quarries.
968434, 964440	5177 & 5178, Run 11	Geological mapping and radiometric contouring required.
953443, 948447, 943446	5174 & 5175, Run 10	General geological mapping to see what part sequence this area belongs.
958418, 948422, 951412, 953409	5178 & 5179, Run 11 5025 & 5026, Run 12	Detailed geological mapping and radiometric survey.
932693	5127 & 5128, Run 9	None at plotted position. Further investigations should be done in Mt. Fitch area.
043327	5060 & 5061, Run 16	Needs further examination but not very encouraging.
076315	5062 & 5063, Run 16	Further investigation warranted, may be connected with anomalies further north.

In addition several of the anomalies occur along the Crater lines of radio-activity which are discussed in a separate report (Dodd, 1953), and some additional ones occur near the Brodribb Deposit.

Radio-active mineral discoveries were made by prospectors during 1952 in the Edith River area and at Howard Springs. They can be conveniently referred to as the Edith River Find, Tennison's Find and the Howard Springs Prospect, and they are discussed in separate reports. Further investigations will be carried out in these areas in 1953.

Aid was given to prospectors throughout the year in inspecting prospects, in checking the radio-activity of samples submitted, and in making assays of samples from the new discoveries.

GENERAL GEOLOGY

The regional geological mapping, commenced in 1950, was continued during 1951 and 1952 when time was available from other commitments. The extent of our knowledge of the regional geology at the end of 1951 is illustrated in Plate 1, and at the end of 1952 in Plate 2. Additional mapping, and petrological work on the suites of rocks which have been collected, is required, however, for a proper understanding of the geology of these areas.

The principal known uranium deposits are situated on the southern flank of a domal structure in Pre-Cambrian meta-sediments, which have been regionally folded and faulted, and intruded by granite. The sediments, which consist of interbedded grits, quartzites, pebble beds conglomerates, breccias, crystalline limestones and slates (partly carbonaceous and graphitic) are mainly shallow water types, and are assigned to the Brock's Creek Group of Lower Proterozoic age (Noakes, 1949).

Basic dykes, which are younger in age than the granite are also present in the area.

The core of the domal structure is occupied by the granitic complex, consisting of undifferentiated granite and granitised sediments, and these rocks occupy an area of about 10 miles from north to south by 6 miles from east to west. Quartz veins, representing at least two periods of injection, occur in the area.

A similar domal structure with much the same lithography occurs in the Brocks Creek Group, a few miles south west of Batchelor, and the core of the structure is also occupied by the granitic complex.

Superficial deposits of soil, alluvian and laterite, of Recent to Tertiary age, obscure the basement rocks in many parts of the area.

Brock's Creek Group.

During mapping of the Rum Jungle structure in 1951 this group was subdivided for mapping into the following sequence of geological formations, in stratigraphical order from top to bottom.

Mt. Fitch Quartzite.
Slates (partly carbonaceous and graphitic)
Limestone
Quartzite Breccia and Pink Quartzite
Limestone
Quartzite and some slate.
Limestone.
Quartzite, grits, pebble beds and conglomerates.
Hematised Breccia conglomerate.
Quartzite (white).
Limestone.

Due to the shallow water origin of the sediments, lithological changes and lensing out of some formations occur along their strike. Further mapping is required before it can be established how many of the above formations extend to the adjoining domal structure, but it is already known that some are represented, for example the hematised breccia conglomerate.

The last two formations in the above sequence have so far only been mapped in the south eastern corner of the Rum Jungle structure, but granitised equivalents have been recognised below the hematised breccia conglomerate in the south western corner of the structure.

Slates. The slates have a widespread distribution in the area and various types, including argillaceous slates, sandy slates, carbonaceous slates, chloritic schists and marls, are present. The carbonaceous slates have been important host rocks for copper and uranium mineralisation.

The slate formations have acted as incompetent rocks during regional folding, and are contorted internally. Schistosity and cleavage frequently marks the bedding of the slates.

There is an intersting occurrence of a brecciated carbonaceous slate bed, unrelated to the faulting and shearing, to be seen in the workings at the 100 ft. level, White's Deposit. The slate formation itself is known to be contorted, and this particular bed is thought to represent a flow breccia, failure having occurred during folding and prior to mineralisation.

Quartzites, Grits and Conglomerates. These rocks are best represented in the Crater Formation overlying the Hematised Breccia Conglomerate. The grits vary in grain size from fine to coarse, while the conglomerates vary from pebble beds to coarse conglomerates and are shearing in some places (Plate 7). Ripple marks and cross bedding have been noted in the quartzites and grits. Three thin beds of conglomerate, occurring in this formation at the southern end of the Rum Jungle structure, are radio-active (Dodd, 1953).

The other quartzite formations have shaly partings and contain thin, intercalated beds of slate.

Limestones: Four limestone formations, which will be named later according to the best type-locality areas, have so far been mapped in the sequence. Where seen in the fresh state, the limestones are white to grey, crystalline, metamorphosed rocks, ranging from fine to coarse grained, with scattered patches showing rosette structure. Scattered pods and seams of chert are contained in the limestone. The limestone ranges in composition from fairly pure cherty limestone to sandy and argillaceous types, and intercalations of adjoining formations are often present near the boundaries.

Extensive silicification of the limestones has occurred in places and has resulted from either granitization or weathering processes.

Granitized silicified limestone, having a general appearance of white quartzite, but containing relict crystalline structure indicative of the limestones, occurs on the strike of limestone formations near the junction of the Brock's Creek Group with the granitic complex.

The extensively silicified outcrops of limestone occurring well within the Brock's Creek Group, however, are attributed to weathering processes, the source of the silica being impure sandy seams contained in the original rock. Pseudomorphs of quartz after calcite have been noted in some of these silicified limestones.

The limestone is presumably somewhat dolomitic, as bunches and individual crystals of asbestiform talc have been produced as a metamorphic mineral in the limestone formations in proximity to the granitic complex.

Hematised Breccia Conglomerate. This formation, which occurs stratigraphically below the Crater Grit Formation, and is frequently the basal formation in the Brocks Creek Group immediately above the granitic complex, occurs around the Rum Jungle and adjoining domal structure. It is the most important stratigraphical marker formation so far recognised in the geological section.

The formation is a sheared hematised breccia-conglomerate containing rounded and angular pebbles and boulders in a hematised quartzite matrix. The hematisation appears to have been most intense near the junction with the granitic complex, and it falls off as the formation becomes granitised and as its position along the strike becomes further from the granitic junction.

Micaceous hematite occurs in both the pebbles and the matrix of the formation, and the hematisation is believed to be a metamophic process occurring during the period of granitisation. The hematite is believed to have formed during the metamorphism from iron-bearing minerals originally contained in the bed itself, in much the same way as the hematite was formed in the jaspilites in the Pre-Cambrian of Western Australia (Miles, 1946). There may have also been a certain amount of primary enrichment of the bed with hematite during the period of granitisation, which is a process thought by the writer to have occurred at the Koolyannabbing iron ore deposit in Western Australia. Specular hematite veinlets intrude the micaceous hematite-bearing jaspilite at this locality.

A petrological study of a suite of rocks collected from the hematised breccia-conglomerate formation is being undertaken.

The formation is strongly megnetic in places, indicating the presence of magnetite.

Quartzite-Breccia. This formation, which consists always of quartzite breccia occurring in association with pink quartzite is regarded as a sedimentary talus breccia. The breccia portion of the formation consists of unsorted, angular reef quartz fragments varying from fine to very coarse, occuring in a matrix of pink quartzite. Scattered fragments of quartz are also seen at times in the associated pink quartzite, and cross bedding is common.

In places, the quartzite member and also the usual quartzite matrix of the breccia member is quite sandy and suggesting surface silicification elsewhere. The friable nature of the section of this formation in the railway cutting 1¾ miles west of White's Deposit, supports this view.

It has been suggested that the quartzite-breccia formation was essentially a carbonate rock, but, although some intercalations of limestone occur at its junctions and there could possibly be some carbonate in the cement, it is essentially a sandy rock, and the writer can find no evidence to support this view.

Granitic Complex.

The granitic complex consists of undifferentiated granite, granitised sediments, quartz veins and pegmatite dykes. Suites of rocks have been collected from the granitic complex and petrological work is being undertaken.

Granite. The granite is believed to have been intruded either contemporaneously with or immediately following the period of regional folding. The massive granite occurs throughout the area as scattered small outcrops and large "rocks", protruding through granitised sediments or granitic soil. The occurrences of granite are believed to represent localised and scattered bosses, occurring in a much more extensive area of granitised rocks.

Fine to coarse grained and also porphyritic, massive biotite granite occurs, and jointing has been well developed. The granitic gneisses are in general regarded as an advanced stage in the granitisation process.

Granitised Rocks. Granitised sediments, varying from partially to extensively granitised rocks are well developed around the margin of the granitic complex, and have also been noted well within the granitic complex. The partially granitised sediments show inheritied structure or composition from the rocks being granitised.

An investigation of the granitisation effects around the south-west and southern margin of the Rum Jungle granitic complex is at present being undertaken by P. H. Dodd, but the work is as yet incomplete. It has always been difficult to determine a boundary between sediments partially effected by granitisation and what can be definitely regarded as granitised sediments, and work to date has given some basis for a subdivision. Based so far only on field work, a stage is reached in the section of granitised rocks where introduced or recrystallised bluish quartz and felspar crystals begin to appear. It is thought that for mapping purposes, these rocks can be called granitised rocks, and those intervening between the normal sediments, partially granitised rocks. Sericitisation is usually common in the zone of partial granitisation.

Although the granitic complex is displaced by Giant's Reef Fault, it appears that the period of granitic intrusion had not ceased or there was some regeneration of the granitic magma afterwards, as granitisation effects have been noted in the axial plane shear of the dragfold on Giant's Reef Fault, and quartz occurs both along Giant's Reef fault and in some of the later cross faults. It appears that the age of granitisation is closely connected in time with the period of quartz deposition along Giant's Reef fault and probably also with the period of mineralisation

Quartz Veins. Quartz veins representing at least two periods of injection, and possibly three, occur in the area.

The first period of injection is that represented by Giant's Reef, while the second period is represented by the quartz veins occurring in the cross faults which displace the Giant's Reef.

The quartz associated with the mineralising solutions may be associated with the Giant's Reef period of quartz injection, or belong to a third period occurring shortly afterwards prior to cross faulting.

Pegmatite Dykes. Narrow pegmatite dykes, some of which show displacements by later faults, have been noted in several places in the granitic complex.

Basic Instrusives. Bouldery basic dykes, which are post-granite in age, have been noted in two places in the area mapped.

One prominent basic (dolerite) dyke, striking in a north north-westerly direction and intruding the Brock's Creek Group, can be seen about 2¾ miles west of White's Deposit, and a second less prominent one intrudes granitised rocks between Rum Jungle Siding and Fettler's Camp.

Superficial Deposits. Soil, alluvium and laterite obscure the underlying rocks over considerable part of the area examined. Surface silicification has also been active in the area and tends to obscure the nature of the underlying rocks.

Thin laterite cappings and laterite boulders, which are thought to be remnants of a much more extensive capping of Tertiary age, occur on many of the hill tops in the area. The laterite is frequently ferruginous (hematitic), and occasionally somewhat manganiferous, and has a tubular structure. This ferruginous laterite is thought to represent the basal section of the old laterite profile. A good cross section of the capping can be seen at the Brodribb Deposit, where costeaning has shown that the layer is thin and superficial, and terminates irregularly at depth with roots of ferruginous laterite passing into the underlying bleached and porous weathered slates. Leaching of the laterite cappings is probably occurring during the present cycle of erosion. There has been uranium enrichment in some of the hematitic laterite cappings in the area, so that a knowledge of the lateritisation processes has an economic significance. It has already been p ointed out that metamorphic hematite is associated with the hematised breccia conglomerate, and the hematite associated with the laterite represents a second type of hematite (secondary) in the area. It is also po ssible that some primary hematite is connected with the mineralisation at White's Deposit, but it has not yet been definitely identified.

It has already been explained that surface silicification of limestone outcrops occurs, but this process also extends to other rock formations. The quartzites and quartzite breccia show a hardening at the surface due to silicification, and the slate talus and outcrops frequently have a whitish appearance due to a superficial film of silica. The surface silicification occurs both above and below the laterite level and is believed to be connected with the present cycle of erosion. Similar surface silicification has previously been noted by the writer in the East Kimberleys, Western Australia (Matheson and Teichert, 1948).

GEOLOGICAL STRUCTURE.

Both regional and local folding and faulting of the Brock's Creek Group have occurred in Pre-Cambrian times.

Folding:

Regional mapping has so far proved the existence of two major domal structures, presumably with an intervening trough or basin, in the Rum Jungle area. Regional folding has occurred on an approximate north-south axis during which period the slate formations of the Brock's Creek Group acted as incompetent beds, and were internally folded and a marked schistosity and cleavage was developed in them. Other evidence of the dynamic effects of the regional folding is the occurrence of sheared pebbles in the conglomerate beds (e.g. at the Crater Prospect, Plate 7).

Additional large scale folding occurred in the Rum Jungle area during the later Giant's Reef faulting, and a large dragfold was formed on the north side of the fault in the embayment area. Observations of lineation and pitch of dragfolds at White's Deposit in the slate formation in the core of this fold give a north-easterly pitch of about 30 degrees. This direction of pitch is also supported by the dips of formations on the south-eastern side of the axis of the dragfold, but, from observations made near Dyson's Find, the formations on the north side of the axis have a southerly dip and a regional south-westerly pitch. The axis of the dragfold strikes in a north-easterly direction parallel with Giant's Reef fault and, as the formations both to the north and south have southerly dips, it appears that the southeasterly limb of the dragfold must be overturned. There also appears to be reversal in regional pitch on opposite sides of the axis of the dragfold; the southern overturned limb pitching north-east and having anticlinal tendencies. Detailed investigations at White's Deposit have so far not supported the contention that a regional south-westerly pitch occurs on the north side of the axis of the gradfold, but observations to date are very local, close to the sheared axial plane of the dragfold and in an area which is disturbed by later cross faulting.

The machanics of the dragfolding and overturning are easily understood when it is realised that the horizontal displacement on Giant's Reef is of the order of 3¼ miles the south side moving to the south-west. Shearing, which is post-mineralisation in age, has also occurred along the axial plane of the dragfold. Some parallel shearing has probably also occurred

Faulting.
At least two periods of faulting have occurred in the Rum Jungle area, and these can be conveniently referred to as the Giant's Fault System, and the Cross Fault System. The Giant's Fault system is the earliest in age and has undergone displacements by the later fault system. Quartz deposition has occurred in both systems of faults.

Several faults of the Giant's Fault system occur in the area, but the main ones recognised are Giant's Reef fault, and a parallel one, which occurs approximately $2\frac{1}{4}$ miles south-east.

Giant's Reef fault, which intersects the southern end of the Rum Jungle structure is one of the most striking features in the area. It trends north-easterly, has a very steep variable dip, and a horizontal displacement of $3\frac{1}{4}$ miles, the south-eastern side being displaced to the south-west. The amount of displacement can be measured fairly accurately from the displacements of the hematised breccia conglomerate formation.

Little is known of the vertical movements associated with this faulting, but the greater extent of granitic rocks on the northern than on the southern side of the fault, suggests that the northern side may have moved upwards. This evidence may be distorted, however, by the fact that granitisation did not cease until after Giant's Reef faulting. Large quartz reefs occur in places along the line of the fault, which, from examination of aerial photographs, is known to continue to the north-west for at least 50 miles.

The parallel fault is also marked by prominent quartz reefs in places, but appears weaker than Giant's Reef fault, only small horizontal displacements being involved.

The axial plane shear of the dragfold in the embayment area mentioned above, appears to belong to the Giant's Reef fault system.

The system of cross faults strikes in a north-north-east to north-west direction, and several examples of them can be seen in the Rum Jungle embayment area. They have caused displacements of Giant's Reef and the axial plane shear of the major dragfold, and must therefore be later in age.

Some post-mineralisation faults may possibly be younger in age than this system of cross faults.

THE URANIUM DEPOSITS.

Six uranium deposits, namely Dyson's, White's Extended, White's, White's South, Intermediate, and Brown's deposits, occur sporadically over a length of 6,000 feet along a line trending in a north-easterly direction in the Rum Jungle embayment area, and three additional prospects, namely Mt. Fitch, Crater and Brodribb prospects, occur outside it. With the exception of the Crater Prospect, which is associated with conglomerate beds in a grit formation, and which may possibly be of detrital origin, all deposits are of hydrothermal origin, and are closely associated with carbonaceous slates and graphitic schists.

The testing of the deposits, commenced in 1950, is still in progressm White's deposit being the only one so far developed to any extent.

Only a summary of information concerning the various deposits is given herewith, and the following detailed reports on them have been prepared, or are in preparation, by my colleagues.

White's Deposit (H. J. Ward)
White's Extended Deposit (H. J. Ward)
White's South Deposit (H. J. Ward).
Brown's Deposit (H. J. Ward)
Mt. Fitch Deposit (H. J. Ward)
Dyson's Deposit (N. J. Mackay)
Intermediate Deposit (H. J. Mackay).
Crater Deposit (N. J. Mackay)
Crater Line Investigation (P. H. Dodds).
Brodribb Deposit (F. J. Frankovich).

Copper mineralisation is closely associated with the uranium mineralisation at White's, White's South, Intermediate, Brown's and Mt. Fitch Deposits, but at Dyson's and White's Extended deposits the occurrence of copper minerals is extremely rare. The deposits can therefore be conveniently separated for description on the relative abundance of copper minerals.

At White's Deposit, which can be regarded as a type locality for the copper-rich uranium deposits, surface exposures were not very impressive. The slate country rocks are fairly widely stained by secondary copper minerals, and small parcels of copper ore have been mined in the early days from shallow workings but the presence of torbernite at the surface was of rare occurrence. Prospecting work later revealed the occurrence of uranium ochres, including phosphuranylite, in addition to torbernite, in the oxidised zone. These secondary uranium minerals occurred in association with azurite, malachite, iron oxides, and pseudo-malachite and dihydrite (Alteration products of torbernite).

The primary minerals cholcopyrite, bournonite, bornite, pyrite and uraninite, first began to appear below ground water level at 28 feet vertical depth from the surface, and the secondary copper sulphides, chalcocite and covellite were in evidence near the water table. It is suspected that some primary chalcocite may be present but it has not yet been identified. The occurrence of the primary minerals is mainly as selective replacements of bedding and of cleavage in the contorted carbonaceous slates and graphitic schists, but chalcopyrite, pyrite and uraninite have also been determined in quartz veinlets intersecting these rocks.

Work carried out at the 100 ft. level indicates that there is a more uniform distribution of uranium and copper mineralisation over a greater width than near the surface. This is probably due partly to structure, but also strongly suggests extensive leaching, and very erratic localised areas of secondary enrichment in the oxidised zone.

At White's South deposit narrow uranium ore intersections have been obtained over a length of 240 ft; at the intermediate and Mt. Fitch deposits radio-metric anomalies occur over lengths of 240 feet and 100 feet respectively; and at Brown's deposit the radiometric anomaly is 400 feet long, surface copper showings extend over a length of 1,800 feet and self-potential anomalies are indicated over a length of 800 feet. Development and exploration activities are not very far advanced at these deposits, and available information is contained in the detailed reports.

The investigations are also only in a very early stage at the Brodribb deposit, but the radiometric anomaly extends over a length of 1,800 feet, It occurs in a similar lithological environment to White's Deposit, and what appear to be uranium micas and pseudo-malachite have already been id entified from the area. It is therefore tentatively grouped with the uranium-copper types of deposit.

The lodes at Dyson's and White's Extended deposits are obscured at the surface, and both were located during radiometric prospecting by the geophysicists. Costeaning at the surface disclosed lodes rich in autunite and uranium ochres.

Diamond drilling has shown that these secondary uranium minerals persist to 100 feet vertical depth from the surface and, although pyrite is present, no primary uranium minerals have yet been detected Copper minerals are limited to about one recognised occurrence at each locality.

At Dyson's Deposit the lode, which has so far been proved over a length of 120 feet and to 160 feet down the dip, occurs in close association with thin beds of carbonaceous slates, interbedded with quartzites and some limestone. Quartz veins, some of which contain pyrite, are present in the area.

Due to poor core recovery and poor outcrop conditions, the geology at White's Extended Deposit is not yet clear, but the lode appears to be associated with a brecciated zone near the junction of slates and limestone. Quartz veins are also present in the area.

The Crater Prospect is a different type of uranium deposit, and was discovered by the writer and S. Dyson in 1951. It is situated approximately 3½ miles south-east of White's Deposit and is a type locality for low grade radioactive conglomerate beds occurring in the Crater Grit Formation of the Brock's Creek Group. The radio-active conglomerate beds are known to extend south-eastward from the vicinity of the Fettler's Camp to the Crater Prospect, and then eastwards through the Batchelor Gold Find, for an over-all distance of at least 6 miles. Three separate radio-active conglomerate beds have so far been recognised in the formation and several anomalies which are regarded at this juncture as significant, have been located (Dodd, 1953).

From mineralogical work carried out in 1951, it was suggested that the radio-activity may be due to the presence of detrital radio-active minerals such as zircon, xenetime and monazite, but the results were not conclusive. From work on further material in 1952 it was stated that, "although this work has essentially been qualitative, the quantities of zircon and monazite obtained in the separations are quite insufficient to account for even the small degree of radio-activity shown by the sample." Radiation absorption tests have suggested that uranium is present, but so far no source for the radio-activity has been identified.

Assay results of samples from the outcrops of the anomalies have indicated that they are low grade, but it is hoped that they may represent the leached outcrops of beds which are richer in uranium minerals at depth. This being the case, then the radio-activity at the surface probably comes at least partly from residual daughter products of the uranium series.

Autoradiograph studies of alpha tracks are at present being undertaken to test this possibility and future drilling will establish definitely whether or not the beds are richer in uranium minerals at depth.

The occurrence of these radio-active conglomerate beds in the same area, and in the same rock group, in which hydrothermal uranium deposits are known, suggests to the writer that they are of hydrothermal rather than detrital origin.

The table hereunder shows the minerals which have so far been identified in lode material from the uranium deposits in the Rum Jungle and Ferguson River areas.

MINERALS IDENTIFIED IN RUM JUNGLE DEPOSITS TO DECEMBER, 1951.

DEPOSIT	Uraninite.	Torbernite Autunite	Phosphuranylite Uranium Ochre	Carnetite	Chalcocite	Chalcopyrite	Pyrite	Bornite	Bournonite	Native Bismuth	Braveite	Pseudo-Malachite	Dihydrite	Malachite	Azurite	Erythrite	Covellite	Sphalerite	Galena	Cubanite	Cobaltite	Lollingite	Enargite Pyromorphite Cerussite	Native Copper	Tennantite	Hematite.
White's.	X	X	X	X	X	X	X	X	X	(X)	(X)	X	X	X	X		X	(X)		(X)				(X)		X
White's Extd.		X	X																							
Dyson's		X	X			(X)	X																			
Brown's		X				X	X							X	X				X				XX			
Intermediate														X	X								X			
Mt. Fitch		?												X												
Ferguson River	X	X				X	X			(X)				X		X	X				X	X	X	X		

(X) = rare occurrence.

THE MINERALISATION AND ITS CONTROL.

It has already been pointed out that the main uranium deposits are distributed sporadically in a north-east direction over a length of 6,000 feet, and that two types of deposits, namely copper rich and copper poor occur.

Dyson's, White's, White's South and Brown's Deposits appear to be situated on the southern limb and close to axis of the dragfold on Giant's Reef Fault. White's Extended deposit on the southern limb of the dragfold near the junction of the slate formation, with the limestone and quartzite breccia formations; and the Intermediate Deposit on the northern limb near the junction of the slate formation with the limestone formation.

The dragfold was developed in the Brocks Creek Group during Giant's Reef faulting, and the axial plane shear of this dragfold presumably slightly later. Mineralisation occurred in the time interval between these two movements, and may be connected with the Giant's Reef period of quartz injection.

It was originally thought that the Axial plane shear provided an entry for the mineralising solutions, but investigations in the underground workings at White's deposit have indicated that the shear is unmineralised at this locality, and presumably post-mineralisation in age. This being the base, then mineralisation must have progressed upwards on the crest of the dragfolds, along formation junctions and within favourable beds in the slate formation, prior to axial plane shearing. Deposition is believed to have occurred largely by replacement processes, but some mineralised quartz, veinlets are present.

Mineragraphic investigations on primary ore from White's deposit (Stillwell, 1950 and 1951) have shown that there is a close association between chalcopyrite and uraninite, and that the chalcopyrite has replaced uraninite and must therefore have crystallised later. A combined uranium-copper mineralisation is accepted for White's, White's South, Intermediate and Brown's deposit.

Uranium mineralisation occurs in stratigraphically lower beds at Dyson's and White's Extended Deposits, but copper minerals are of rare occurrence.

The mineralising solutions have apparently been poor in copper at both these deposits.

Throughout the embayment area the carbonaceous slate beds in the different formations have been the most favourable host rocks for uranium mineralisation, and this also applied to copper mineralisation in the copper-rich area.

Dyson's, White's and Brown's Deposits are all on the overturned limb and on the south side of the axial plane shear, and are associated with carbonaceous slate and graphitic schist beds, occurring as south-easterly dipping limbs of a north-easterly pitching truncated arch. These beds have been selectively replaced by the mineralising solutions, deposition apparently occurring in them near the arch of the fold. Copper mineralisation has a much wider distribution than uranium mineralisation in the copper rich belt, but further exploration may locate blind lenses of uranium ore.

No important uranium or copper deposits have so far been located on the northern limb of the arch truncated by the axial plane shear, but there seems no reason why extensions of the ore body should not exist in the displaced favourable beds. It should be borne in mind, however, that a regional change in pitch is suspected on the north side of the axial plane shear, and this, taken in conjunction with the lack of overturning of the beds, may have been an important factor controlling ore deposition.

Insufficient work has yet been done to describe in detail the mineralisation of the Mt. Fitch and Brodribb deposits, but they occur in a similar lithological environment to White's deposit and have some similar characteristics (e.g. the presence of some copper minerals).

The sources of the radio-activity at the Crater and other similar deposits has not yet been determined, and investigations are in progress.

ORE RESERVES AND GRADE.

Development work and exploration activities were sufficiently advanced at White's Deposit at the end of 1952, for a fairly reliable estimate to be made of the ore reserves for both uranium and copper. Insufficient assay results are yet available for gold, sulphur, lead and silver, to make any assessment with regard to these minerals.

Although work is as yet incomplete at both Dyson's and White's Extended deposits some observations regarding reserves of secondary ore at these two localities are made hereunder.

White's Deposit: This deposit has now been fully developed at the 100 ft. level (R.L. 214 feet), and partly developed at the 50 ft. level (R.L.271 feet) near the top of the primary zone of mineralisation. Lateral underground diamond drilling has been carried on at both these levels, and extensive surface diamond drilling of the deposit undertaken, intersections of the ore body having been obtained below the 100 ft. level at the 200 ft. and 800 ft. levels.

Some idea of the extent of both the uranium and copper mineralisation can be obtained by reference to the accompanying Plates 3 and 4. The extent of the copper ore body has been limited partly by grade, and partly by the area of copper mineralisation which it is considered can be conveniently mined along with the uranium ore body.

The grade and widths of ore of the main lode intersections in the various workings at the 100 ft. level are given in the following table:-

Description.	Uranium		Copper.	
	% Equivalent U_3O_8	Approx. Width.	% Cu.	Approx Width
Section along E. x cut S.W. Hanging Wall Drive	0.58	28 ft.	3.78	40 ft.
Main X cut off No.4 Shaft	0.80	60 ft.	3.59	80 ft.
Section along line of U.D.D.H4	0.42	30 ft.	3.95	70 ft.
Main N.W. Crosscut	0.42	26 ft.	3.98	77 ft.
Section along line of U.D.D.H5	0.11	5 ft.	3.32	70 ft.
Main X cut off No.1 Shaft	0.47	12 ft.	3.37	36 ft.
S.W. and N.E. Footwall Drives	0.51	No walls.	2.41	No walls.
S.W. Hanging Wall Drive	0.23	No walls.	4.75	No walls.
Connecting Drive	1.35	No walls	3.96	No walls.
East Drive	1.5	7 ft.	1.94	No walls.
Average all samples in lode section of workings.	0.65	--	5.37	--

Insufficient work has yet been done, and insufficient assay results are yet available, for a reliable estimate of the ore reserves and grade to be made for the uranium and copper ore bodies at the 50 ft. level.

The following important drill hole intersections of the ore body have been obtained:-

Drill Hole.	Bore Hole Intersection.	R. L. of Intersection.	Uranium % U_3O_8	Copper % Co.
WDA	34'6" to 94'6"	283' to 227'6"	1.01	
WDE	74'6" to 109'6"	249'6" to 219'	0.68	
WDF	21'6" to 99'6"	302'6" to 239'	0.94	
WDJ	10' to 100'	307'6" to 229'	0.31	
WDN	45' to 190'	277' to 151'	0.34	
W1	310' to 360'	20' to-25'	0.39	
	275' to 360'	57' to-25'		1.8
W3	285' to 385'	107' to 39'	0.37	
	275' to 395'	114' to 32'		3.43
WDP	280' to 335'	112' to 75'	0.38	
	260' to 335'	125' to 75'		3.59

From the above results it will be seen that the average grade of the uranium ore-body can be conservatively estimated at 0.4% equivalent U_3O_8, and that of the copper ore body at 3% metallic copper.

With regard to the reserves, the uranium ore-body has an area of 7,275 square feet at the 100 ft. level, and although somewhat different in shape, occupies much the same area at the 200 ft. level. Using a conversion factor of 12.5 cubic feet per long ton, the reserves of ore are indicated as 590 long tons per vertical foot.

The copper ore body on the other hand has an area of 18,750 square feet at the 100 ft. level, and, using the same conversion factor, the reserves of ore are indicated as 1,500 long tons per vertical foot.

Between the base of the oxidised zone, at say 40 ft. vertical depth, and the 200 ft. level, the following reserves are indicated:

Primary Ore.	Reserves.	Contained Cu or U_3O_8
Uranium	94,400 long tons.	382 long tons U_3O_8
Copper	240,000 long tons.	7,200 long tons Cu.

If the ore-body persists with equal dimensions and grade to the 300 ft. level and the intersection obtained in hole W1 suggests that it will, then an additional 59,000 long tons of uranium ore containing 236 long tons of U_3O_8, and an additional 150,000 long tons of copper ore containing 4,500 long tons of metallic copper are available to this level.

Diamond drill hole W7 to intersect the ore body at the 500 ft. level is as yet unfinished.

Insufficient information is yet available to make a reliable estimate of reserves of oxidised ore at White's Deposit, and values are likely to be erratic in the oxidised zone. Several thousand tons of oxidised ore with a grade greater than 0.1% U_3O_8 are likely to be available above the 40 ft. level however.

Dyson's Deposit. Dyson's deposit has so far been opened up over a length of 120 feet, by a few costeans, one prospecting shaft, and by four dia mond drill holes (DDA, DDB, DDC, and DDE), intersecting the lode at 160 feet down the dip. All lode intersections are in the oxidised zone. Based on an average width of 4 feet and using a conversion factor of 12.5 cubic feet per long ton, the inferred reserves have been conservatively estimated at 6,000 long tons of secondary ore averaging greater than 0.1% U_3O_8 (Mackay, 1953)

White's Extended Deposit: This deposit has so far only been tested by two costeans and several drill holes, planned to intersect the lode at 100 feet vertical depth from the surface. Although good indications were obtained at the surface the results at depth have been disappointing. Based on available information some reserves of secondary ore averaging greater than 0.1% U_3O_8 should be available from this deposit, however, and further work is warranted.

PRODUCTION.

The production from White's deposit to date consists of ore mined during development work. Part of the ore has been drummed and exported to U.S.A. for treatment tests, part is drummed and stored at the mine, and a small quantity is probably still in the dumps awaiting drumming. Details are as follows:-

(a) Exported.

397 small drums @ 4 to ton of 0.9% ore.
243 large drums @ 2½ to ton of 1.0% ore.
156 large drums @ 2½ to ton of 0.6% ore.

Giving a total of 259.35 long tons averaging approximately 0.86% U_3O_8.

(b) Stored at Mine.

243 large drums at 2½ to ton of 0.45% ore.
39 large drums at 2½ to ton of 0.40% ore.

Giving a total of 112.8 long tons averaging approximately 0.44% U_3O_8.

CONCLUSIONS AND RECOMMENDATIONS.

The mining development work, the exploration activities and the geological investigations so far completed, have proved that White's deposit is an important uranium-copper ore body, and that numerous other prospects occur, leading to the belief that the Rum Jungle area is likely to prove an important field. Testing and development of the field is continuing.

The deposits in the area are now separated into three types, namely torbernite-bearing copper-rich deposits, autunite-bearing copper poor deposits, and the Crater type of deposits.

Combined uranium-copper mineralisation occurs at White's, White's South, Brown's, Intermediate and Mt. Fitch deposit and possibly also at Brodribb deposit, while uranium mineralisation with practically no copper occurs at Dyson's and White's Extended deposits. Both types of deposits are of hydrothermal origin and are believed to be associated with the same period of mineralisation. Carbonaceous slates and graphitic schists have been the most favourable host rocks for ore deposition and, at White's deposit where primary lode material is exposed in the workings, deposition can be seen to have taken place by selective replacement along bedding and cleavage planes in the slates.

All the deposits, except Mt. Fitch and Brodribb, are localised in a major, north-easterly pitching dragfold with one overturned south-east limb, which was formed on the north side of =Giant's Reef during faulting movements. The north western limb of the dragfold is believed to have general southerly dips, a regional north-east pitch and anticlinal tendencies. The deposits occur sporadically over a length of 6,000 feet in a north-easterly direction close to the axis of the dragfold, and post-mineralisation shearing has occurred on the axial plane of this fold. Later cross faulting has occurred in the area.

Mineralisation is believed to have occurred in the interval of time between the Giant's Reef faulting and the axial plane shearing of the dragfold, and may be closely connected with the Giant's Reef period of quartz injection.

The preliminary testing and development work undertaken at White's deposit is now almost completed, and a fairly reliable assessment of the ore reserves for both uranium and copper to the 300 ft. level can be made.

The reserves of primary ore occurring between the base of the oxidised zone, at 40 feet vertical depth from the surface, and the 300 ft. level have been conservatively estimated as follows:-

Primary Ore.	Reserves	Contained Cu. or U_3O_8.
Uranium	153,400 long tons	618 long tons.
Copper	390,000 long tons	11,700 long tons.

It is also expected that an important ore intersection will be obtained in the unfinished diamond drill hole W7, sited to intersect the ore body at the 500 ft. level.

Reliable estimates of reserves of secondary ore cannot be made at present, but several thousand tons averaging greater than 0.1 per cent. U_3O_8 indicated at both White's and Dyson's deposits and a few thousand tons from White's Extended deposit.

The crater deposit is a type locality for low grade radio-active conglomerate beds, occurring in a grit formation, over a length of at least 6 miles, and was discovered by the writer and geophysicist D. Dyson in 1951. It has been suggested that this deposit, which shows no signs of mineralisation at the surface, is of detrital origin, but these results are not conclusive and the writer favours a hydrothermal origin for the deposit. Investigations are still in hand to determine the source of the radio-activity in this type of deposit, and it is hoped that they may represent the leached outcrops of mineralised beds richer in uranium minerals at depth.

Encouraging indications have been obtained from drilling at White's South deposit, a probable displaced westerly extension of White's deposit, but the testing at present is not very far advanced.

Some drilling with not very encouraging results has already been done at Brown's, White's Extended, and Mt. Fitch deposits, but the prospects are by no means exhausted, and further exploration is warranted.

The Intermediate and Brodribb prospects await testing.

The regional mapping so far undertaken has provided valuable information regarding the structural and lithological localisation of areas of mineralisation, and outlined two regional domal structures with granitic cores potentially favourable for mineralisation, namely the Rum Jungle and adjoining domal structures (Plate 2). The regional mapping is also of considerable value in interpretation of airborne scintillometer results and should be extended in connection with future prospecting activities.

Numerous radio-active anomalies resulting from the airborne scintillometer survey in 1952 await investigation in 1953, and other areas have been recommended for prospecting on geological grounds, in the detailed geological reports. One area deserving special mention for detailed prospecting, however, is along the axis of the dragfold in the Rum Jungle embayment area north-east from Dyson's deposit, particular attention being paid to formation junctions.

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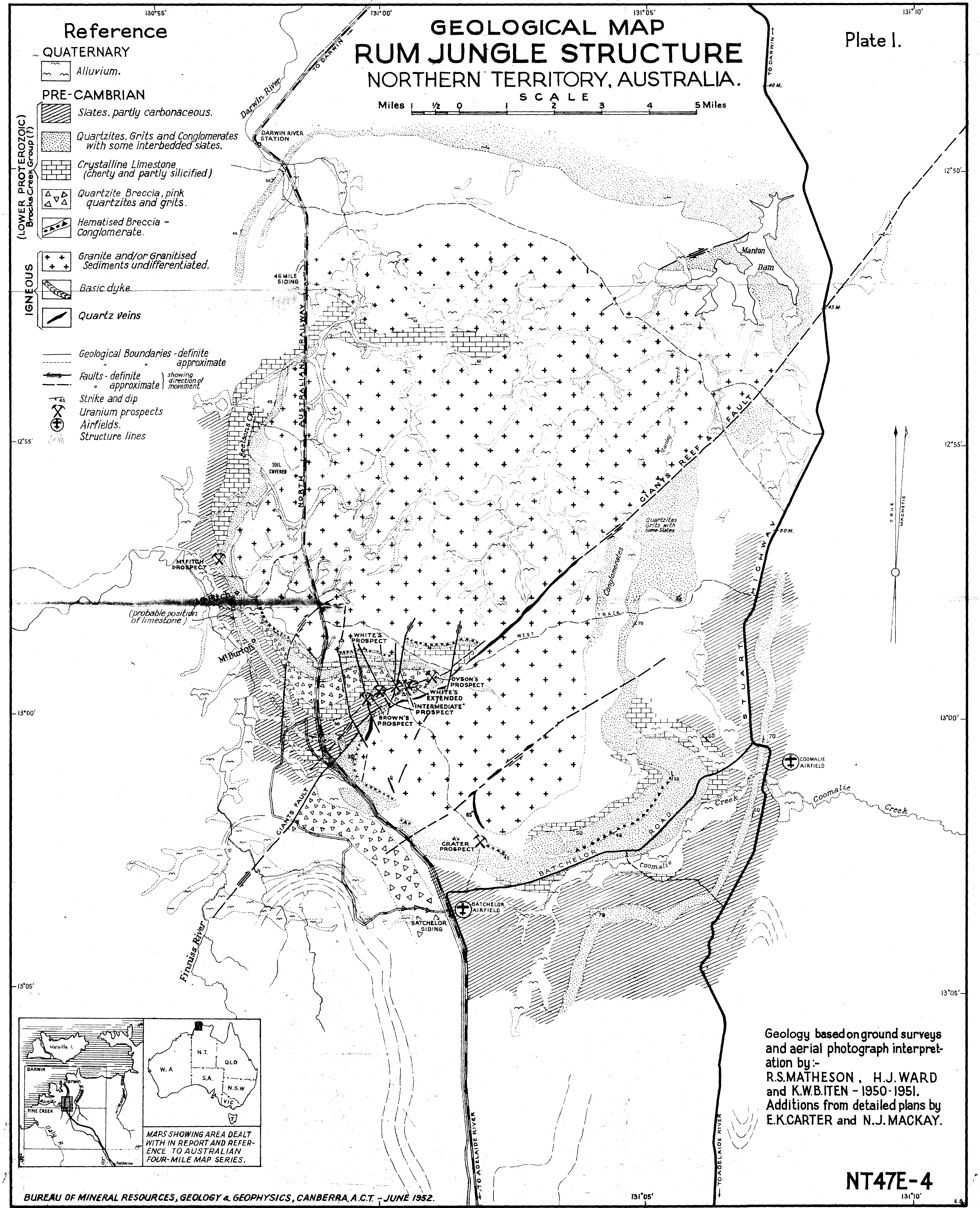

GEOLOGICAL MAP
RUM JUNGLE STRUCTURE
NORTHERN TERRITORY, AUSTRALIA.
Plate I.
SCALE
Miles 1 ½ 0 1 2 3 4 5 Miles
Reference
QUATERNARY
Alluvium.
PRE-CAMBRIAN
(LOWER PROTEROZOIC) Brocks Creek Group (?)
Slates, partly carbonaceous.
Quartzites, Grits and Conglomerates with some interbedded slates.
Crystalline Limestone (cherty and partly silicified)
Quartzite Breccia, pink quartzites and grits.
Hematised Breccia - Conglomerate.
IGNEOUS
Granite and/or Granitised Sediments undifferentiated.
Basic dyke
Quartz veins
Geological Boundaries - definite
" " approximate
Faults - definite
" approximate
showing direction of movement
Strike and dip
Uranium prospects
Airfields.
Structure lines
130°55′
131°00′
131°05′
131°10′
12°50′
12°55′
13°00′
13°05′
TO DARWIN
Darwin River
DARWIN RIVER STATION
46 MILE SIDING
NORTH AUSTRALIAN RAILWAY
Manton Dam
40 M.
45 M.
50 M.
Giants Reef Fault
GIANTS FAULT
Stanley Creek
Quartzites Grits with some Slates
Conglomerates
SOIL COVERED
Mt. FITCH PROSPECT
(probable position of limestone)
Mt. Burton
WHITE'S PROSPECT
DYSON'S PROSPECT
WHITE'S EXTENDED
"INTERMEDIATE" PROSPECT
BROWN'S PROSPECT
CRATER PROSPECT
WEST TRACK
STUART HIGHWAY
COOMALIE AIRFIELD
Coomalie Creek
Coomalie
BATCHELOR ROAD
BATCHELOR AIRFIELD
BATCHELOR SIDING
Finniss River
TO ADELAIDE RIVER
TRUE
MAGNETIC
Melville I.
DARWIN
PINE CREEK
N.T.
QLD
W.A
S.A.
N.S.W
VIC
MAPS SHOWING AREA DEALT WITH IN REPORT AND REFERENCE TO AUSTRALIAN FOUR-MILE MAP SERIES.
Geology based on ground surveys and aerial photograph interpretation by:-
R.S.MATHESON, H.J.WARD and K.W.B.ITEN - 1950-1951.
Additions from detailed plans by E.K.CARTER and N.J.MACKAY.
NT47E-4
BUREAU OF MINERAL RESOURCES, GEOLOGY & GEOPHYSICS, CANBERRA, A.C.T. - JUNE 1952.

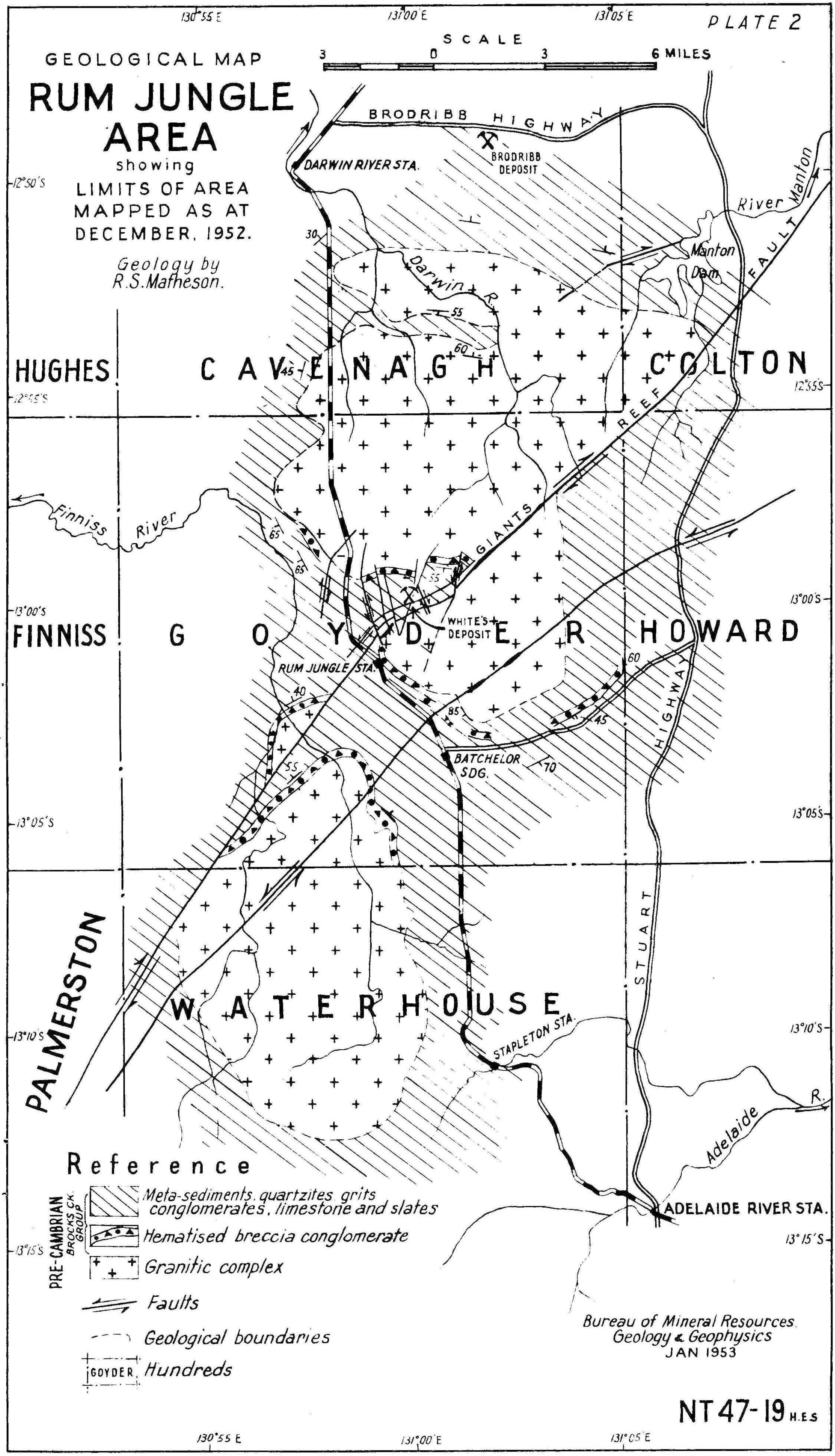
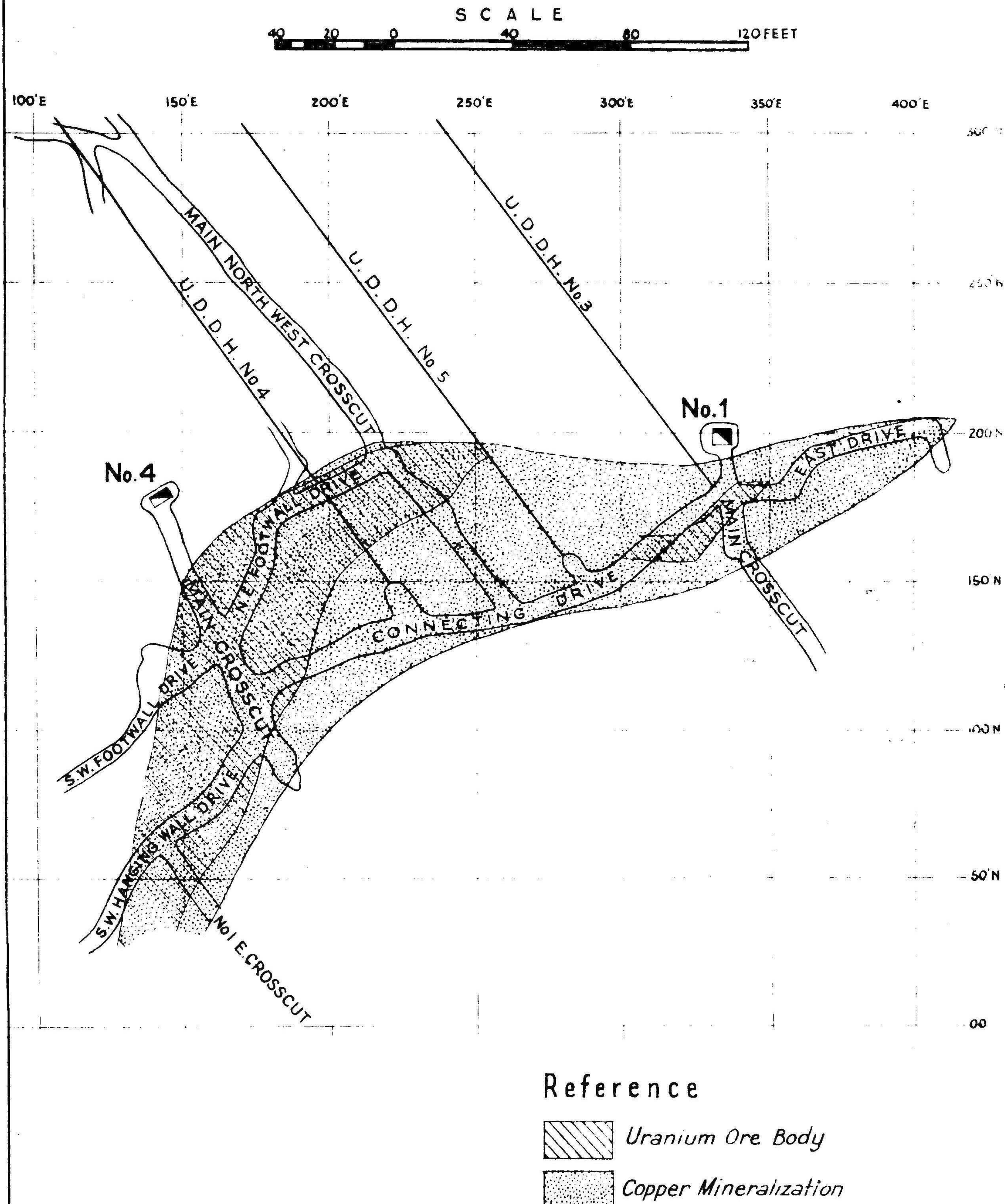


PLATE 2
GEOLOGICAL MAP
RUM JUNGLE AREA
showing
LIMITS OF AREA MAPPED AS AT DECEMBER, 1952.
Geology by R.S. Matheson.
SCALE
3 0 3 6 MILES
130°55'E
131°00'E
131°05'E
12°50'S
12°55'S
13°00'S
13°05'S
13°10'S
13°15'S
BRODRIBB HIGHWAY
BRODRIBB DEPOSIT
DARWIN RIVER STA.
River Manton
Manton Dam
Darwin R.
FAULT
GIANTS REEF
HUGHES
CAVENAGH
COLTON
Finniss River
FINNISS
GOYDER
HOWARD
WHITE'S DEPOSIT
RUM JUNGLE STA.
BATCHELOR SDG.
STUART HIGHWAY
PALMERSTON
WATERHOUSE
STAPLETON STA.
Adelaide R.
ADELAIDE RIVER STA.
Reference
PRE-CAMBRIAN
BROCKS CK. GROUP
Meta-sediments, quartzites, grits conglomerates, limestone and slates
Hematised breccia conglomerate
Granitic complex
Faults
Geological boundaries
GOYDER Hundreds
Bureau of Mineral Resources Geology & Geophysics JAN 1953
NT47-19 H.E.S

PLATE

RUM JUNGLE, N.T.
WHITE'S DEPOSIT
PLAN OF 100 FOOT LEVEL
by

R. S. Matheson.



NT47C24

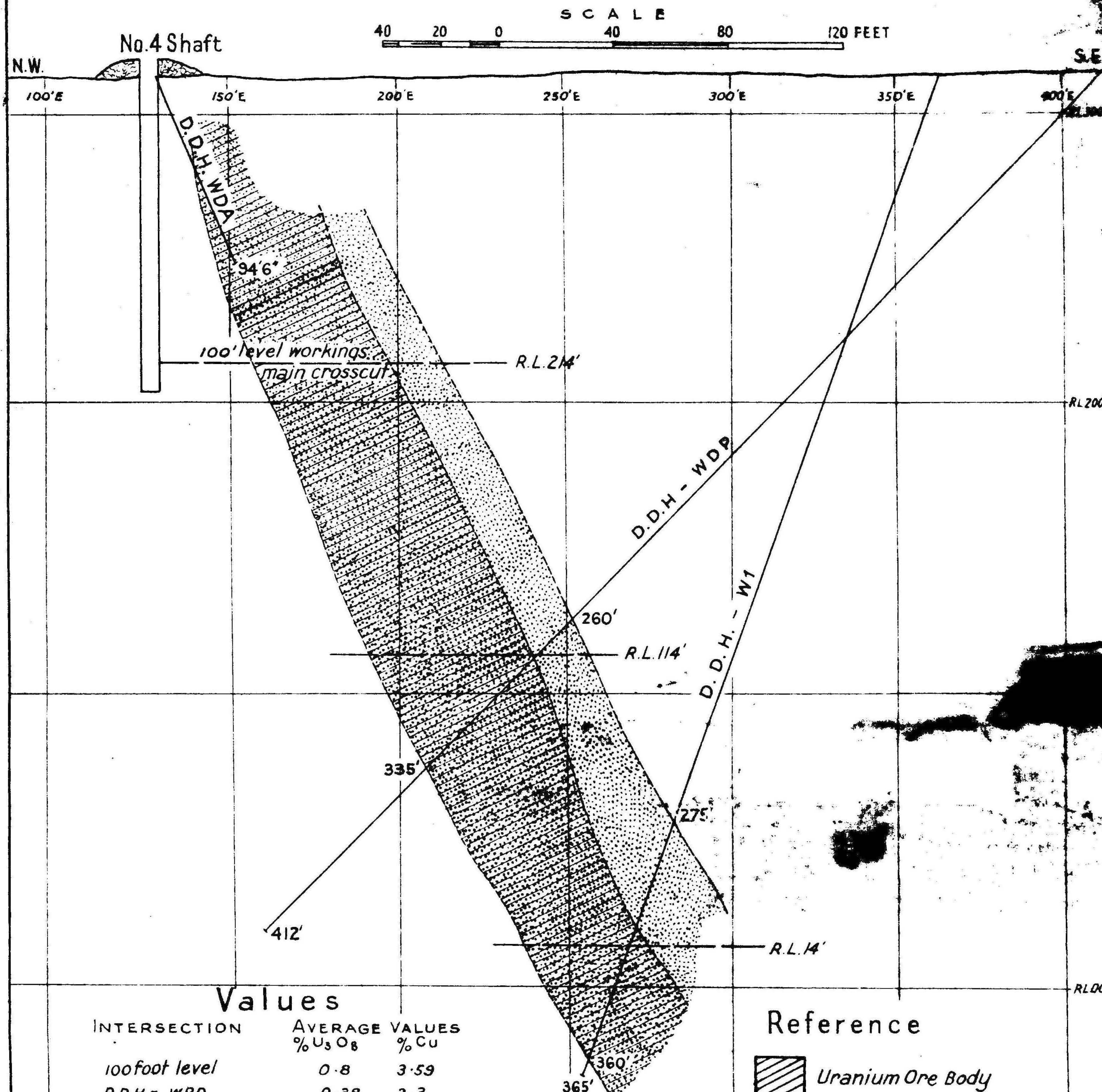
Bureau of Mineral Resources, Geology & Geophysics - JAN 1953.

PLATE 4

RUM JUNGLE, N.T.
WHITE'S DEPOSIT

CROSS SECTION ON BEARING 298° 30′ THROUGH SITE D.D.H-WDP.

by
R.S. Matheson



Values

INTERSECTION	AVERAGE VALUES %U_3O_8	%Cu
100 foot level	0·8	3·59
D.D.H.- WPD	0·38	2·3
D.D.H.- W1	0·39	1·8

Reference

- Uranium Ore Body
- Copper Mineralization

Bureau of Mineral Resources, Geology & Geophysics - JAN 1953

NT47C25 H.E.S.

Fig. 1

Fig 2

PLATE 6

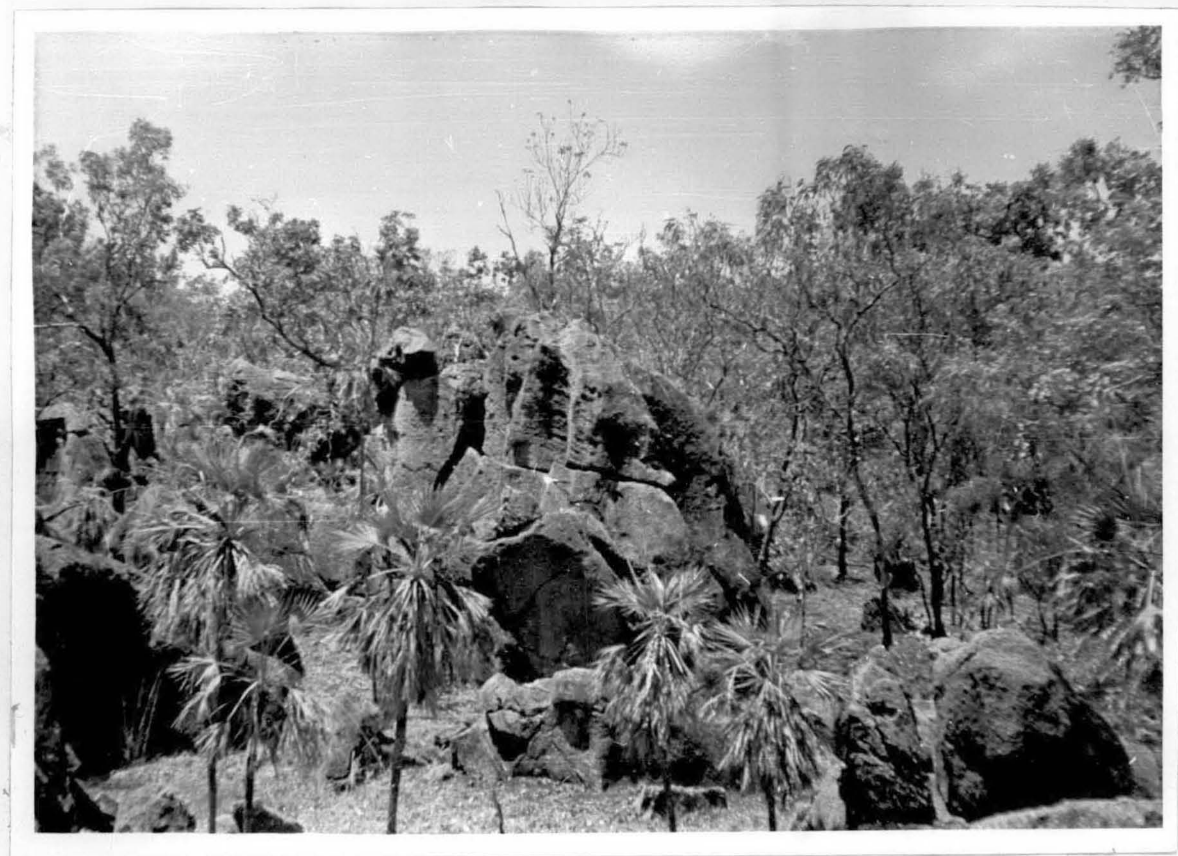


Fig. 1

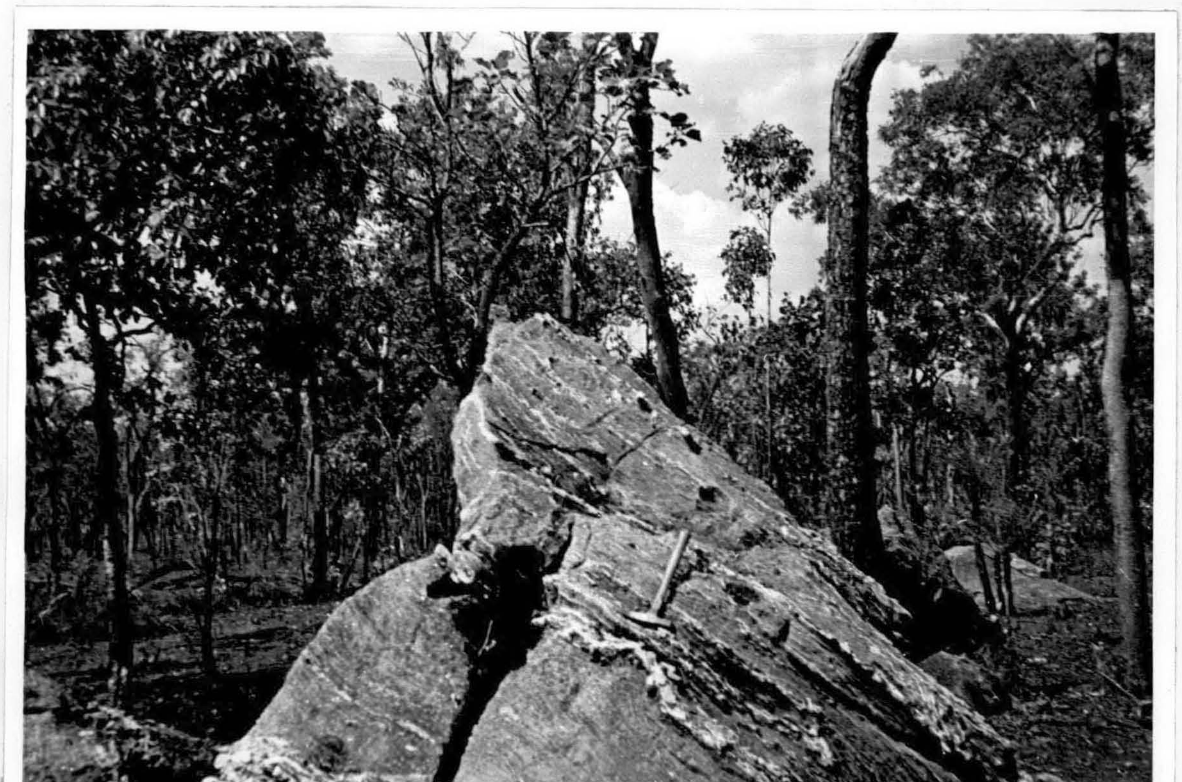


Fig. 2

PLATE 7

18

Fig. 1

19

Fig. 2