COMMONWEALTH OF AUSTRALIA

DEPARTMENT OF NATIONAL DEVELOPMENT

BUREAU OF MINERAL RESOURCES GEOLOGY AND GEOPHYSICS

RECORDS

1963/145

SUMMARY OF GEOLOGICAL AND GEOCHEMICAL INVESTIGATIONS, 1963 - HUNDRED OF GOYDER, NORTHERN TERRITORY.

by

J.F.Ivanac and B.P.Walpole

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RECORD 1963/145

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Note: Information shown on Plates 3,4,8,13 and 14 has been obtained from Preliminary Plans produced by the Geophysical Branch and Territory Enterprise Proprietary.

SUMMARY OF GEOLOGICAL AND GEOCHEMICAL INVESTIGATIONS, 1963 - HUNDRED OF GOYDER, NORTHERN TERRITORY

Introduction

The Bureau programme in the Hundred of Goyder during 1963 continued the geological, geochemical and geophysical survey commenced in 1961 and extended in 1962. Progress to 19th October is shown on Plate 1.

Early delays to the auger drilling/geochemical programme were encountered when the drilling contractor, Geotechnical and Engineering Services Ltd could not attain a satisfactory drilling rate. The Bureau's own rig was brought in and partly compensated for the delays, and eventually new contractors were engaged on 24th August. Progress since then has been satisfactory.

Of the different grids to be auger drilled, Mt. Fitch and Dolerite Ridge - Area 55 - Browns West have been completed and Area 44 commenced. Follow up drilling at closer hole spacing was also completed on the 1962 Area 55 grid to better outline the copper indications at Anomaly A. The Mt. Fitch grid was extended north and south as shown on Plate 1 and will link up with Dolerite Ridge this year. This extension was possible because extra footage was available within the contract due to shallower ground than was anticipated; and also because of the footage drilled by the Bureau rig. It was undertaken in order to close off the geochemical anomaly at Mt. Fitch.

Detailed geological mapping has proceeded with the drilling.

Diamond drilling is completed at Area 55 and in progress at Mt. Fitch.

Details of results achieved to the middle of October are summarized below.

Area 55 - Browns West - Dolerite Ridge (Plates 3, 4, 5 & 6)

At Area 55 the additional auger drilling (23,313 feet completed to 19th October) diminished the size of the copper indication at Anomaly A.

Although sufficient footage for up to three diamond drill holes was allowed to test these anomalies, in the event only one was warranted. This hole was completed at 304 feet and intersected minor copper and lead mineralization.

Auger drilling at Browns West/Dolerite Ridge did not disclose any new anomalies.

Browns Copper Deposit

By arrangement with Australian Mining and Smelting Pty Ltd, the Bureau rig was used to drill a series of deep auger holes across Browns copper anomaly for an orientation survey.

This provided useful data for the study of the Mt. Fitch area, particularly in regard to copper/nickel/cobalt ratios.

Mt. Fitch (Plates 7 - 14 inclusive)

Auger drilling (15897 feet completed to 19th October) has confirmed the copper geochemical anomaly obtained by surface sampling in 1958 and outlined it in more detail. A close correlation has been established between anomalous copper nickel and cobalt ratios with those obtained from the orientation study at Browns. A broad radiometric anomaly coinciding with the geochemical anomaly at Mt. Fitch has also been outlined.

Copper analyses in weathered rock range up to 10,000 parts per million, nickel up to 2000 ppm. and cobalt up to 1500 ppm. Copper mineralization is visible on the surface as malachite in a calcareous shale lens, jasper boulders, and dolomite; and as chalcopyrite/pyrite in dolomite.

The anomaly is located in Coomalie Dolomite close to its contact with underlying Crater Beds and has the characteristic pattern of a "leakage anomaly", suggesting that the source may be at depth.

Lenticular outcrops of ferruginous material previously thought to be laterite are most probably gossans. They are closely associated with the anomalies and appear to represent a pyritic horizon in the dolomites. Rare boxworks, possibly ex chalcopyrite/pyrite, occur in places.

Diamond drilling is in progress to test the anomaly. Plate 7 shows the sites of three drill holes. DG 22 is now completed and intersected some sulphides (pyrite, chalcopyrite in dolomite) from 68 feet to 72 feet 2 ins. and 109 feet 3 ins. to 112 feet 10 ins. Two diamond drills are operating in the area and a third is being set up in an attempt to complete the Bureau programme in this area before the wet season commences.

This occurrence of chalcopyrite in the Coomalie Dolomite focusses attention on a formation as yet largely unprospected in the Hundred of Goyder.

It is intended to continue auger drilling to close-off the anomaly to the north.

Depending on results achieved by the remainder of the auger sampling and diamond drilling, further work may be necessary at Mt. Fitch in 1964.

Area 44 (Plate 1)

Auger drilling is in progress.

Geological Mapping

Compilation of geological and geochemical maps at uniform scale of 400 feet to 1 inch continued.

The geology is being mapped in detail in areas being auger drilled and the so called Rum Jungle Granite complex mapped at photo-scale in an attempt to outline the Archaean inlier and study the different granites and their relationships to Archaean and Proterozoic rocks (see Plate 17).

Nine rock types have been distinguished and mapped. In order of decreasing age these are -

Schists and gneisses; granite gneiss; diorite; coarse granite; feldspathic granite; leucocratic granite; pegmatite; quartz-tourmaline veins and dolerite dykes.

Only the quartz-tourmaline veins and dolerite dykes are clearly younger than the sediments of the Pine Creek Geosyncline.

The Run Jungle Complex is partly an inlier of metamorphic and granite rocks which form the basement, upon which the surrounding rocks of the Pine Creek Geosyncline have been deposited. The oldest rocks within the complex are the schists and gneisses which are sparsely outcropping and occur as inclusions within the later rock types.

Phosphate (Plates 15 and 16)

The 1963 phosphate programme included air blast/rotary percussion drilling (8588 feet to 19th October) and diamond drilling (914 feet to 19th October).

The rate of progress of drilling has been slow due largely to the hardness of the ground and the slow rate of penetration of the down-the-hole hammer drill. Rotary bits were ineffective in the abrasive ground.

Results to date show that Geolsec and Easticks may aggregate about 2,000,000 tons of phosphate rock with minor additions from other deposits in the area.

It appears that the Run Jungle area phosphate deposits are not likely to be large. The programme will be completed this year.

Several hundredweight of ground phosphate rock was shipped to the C.S.I.R.O. Research Station at Katherine.

1964 Programme.

The proposed 1964 programme of the Geological Branch is as follows:-

1. Assessment and analysis of data collected to date and continuation of compilation of geological maps at a scale of 400 feet to 1 inch in co-operation with T.E.P. geologists. Transparent overlays for geological and geochemical maps will be prepared and petrological studies carried out.

2. Continuation of auger drilling and geochemical sampling in Golden Dyke Formation and Coomalie Dolomite on the eastern margin of the Run Jungle Granite.

Traverse Interval	2500 feet
Hole Spacing	200 feet
Estimated total footage	30,000 feet
Estimated cost	£10,500.

3. Tentative. Follow-up of anomalies found during 1963.

4. Other work suggested and requiring discussion as to responsibility

i) Auger sampling — Embayment area.
Mt. Fitch fault line south to Area 55.

ii) Possible further diamond drilling at Mt. Fitch.

Plate I

DARWIN ABT 40M.

DARWIN ABT 39M

131°00'

131°11'

FAULT

FITCH

MOUNT

NORTH

REEF

GIANT'S

FAULT

HIGHWAY

STUART

AUSTRALIAN

RAILWAY

RUM JUNGLE GRANITE

WATERHOUSE GRANITE

Manton No1 Prospect

Manton No2 Prospect

Woodcutters Prospect

Woodcutters South Prospect

Area 44

MT Fitch

Mt. Burton

Dolerite Ridge

Dyson's

White's

White's Extended

Browns

Area 55

Rum Jungle Store

Rum Jungle Creek

Flynns

Geolsec

Rum Jungle Creek South

Meneling H.S.

Castlemaine Hill

Laterites

Crater Hill

BATCHELOR

Airfield

Gould airfield

Area 65

Waterhouse No4 Prospect

Eva Valley H.S.

Waterhouse Prospect

Sargents H.S.

Stapleton Siding

PINE CREEK ABT 90M.

PINE CREEK ABT 88M.

LOCALITY MAP

DETAILED SURVEYS IN RUM JUNGLE AREA, N.T.

SCALE

Miles 1 ½ 0 1 2 Miles

REFERENCE

UP TO 1963

- Geochemical/auger drilling surveys to 19-10-63
- Geophysical surveys to 19-10-63
- Phosphate survey to 19-10-63
- Geochemical/auger drilling surveys to be completed 1963
- Phosphate survey to be completed 1963

1964

- Proposed reconnaissance geochemical/auger drilling survey
- Proposed detailed geochemical/auger drilling survey
- Proposed geophysical survey

Bureau of Mineral Resources Geology and Geophysics

Drawn by R.G. Winchester

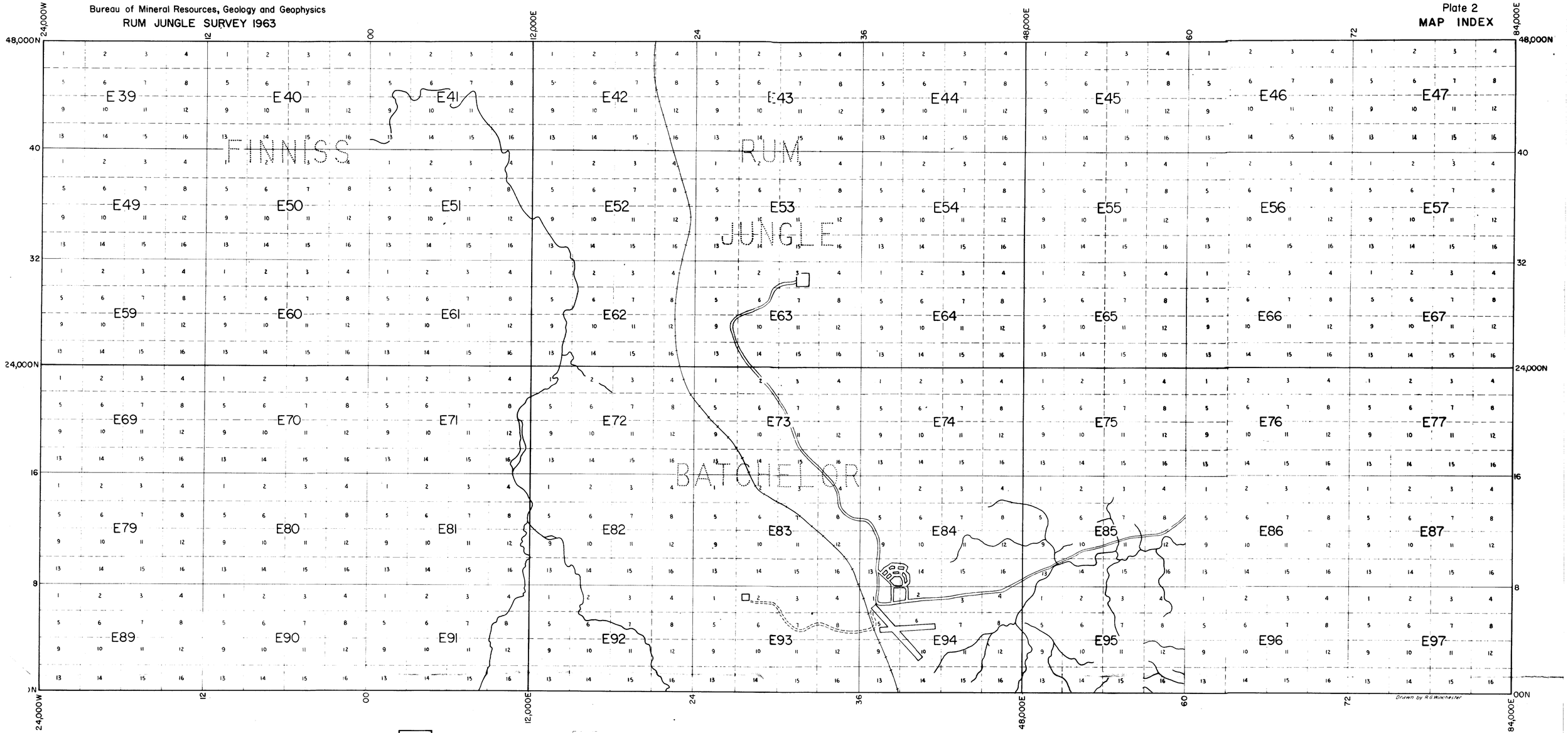
D52/A8/80

Bureau of Mineral Resources, Geology and Geophysics

RUM JUNGLE SURVEY 1963

Plate 2

MAP INDEX



Reference

FINNISS Maps at 1250' : 1" (air photo scale)

E39 Maps at 400' : 1"

Maps at 100' : 1"

12,000E T.E.P. mine grid, bearing 359° 58'00"

Scale

1 : 50,000

D52/A8/81

PLATE 3

RUM JUNGLE GEOCHEMICAL SURVEY 1961-63

AREA 55 TO BROWN'S

Geology, Topographic Contours and Electromagnetic Anomaly Axes

800 0 800 1600 2400 FEET

WEST FINNISS

DOLERITE RIDGE

DOLERITE RIDGE EAST

FINNISS RIVER

WEST

Rum

Jungle

North Australian Railway

1956 Geophysical and 1958 Geochemical Baseline

BROWN'S WEST

AREA 55 W/ WEST

LAGOON

AREA 55 WEST

AREA 55 A

AREA 55

AREA 55 B

Creek

N

Reference

- Dolerite
- Greywacke
- Chloritic and carbonaceous shale
- Amphibolite and chlorite schist
- Dolomite and calcareous shale
- Talc
- Quartzite
- Strike of bedding, dip indicated
- Geological boundary, position approximate
- Fault, position approximate
- Fault, position inferred
- 230 — Topographic contours at intervals of 5 feet based on mean sea level, Darwin
- Axes of electromagnetic anomalies

Bureau of Mineral Resources, Geology and Geophysics June 1962

To accompany Record No.

D 52/8/64

PLATE 4

3

RUM JUNGLE GEOCHEMICAL SURVEY 1961-63

AREA 55 TO BROWN'S

Radiometric Contours on Surface and in Weathered Rock

800 0 800 1600 2400 FEET

WEST FINNISS

DOLERITE RIDGE

DOLERITE RIDGE EAST

AREA 55 W/ WEST

AREA 55 WEST

AREA 55

AREA 55 A

AREA 55 B

BROWN'S WEST

WEST FINNISS

Rum

Jungle

Creek

N

Reference

Surface radiometric contours at intervals of ·025 and ·050 mR/hr.

Radiometric contours in weathered rock at intervals of ·024, ·048, ·096 and ·192 mR/hr.

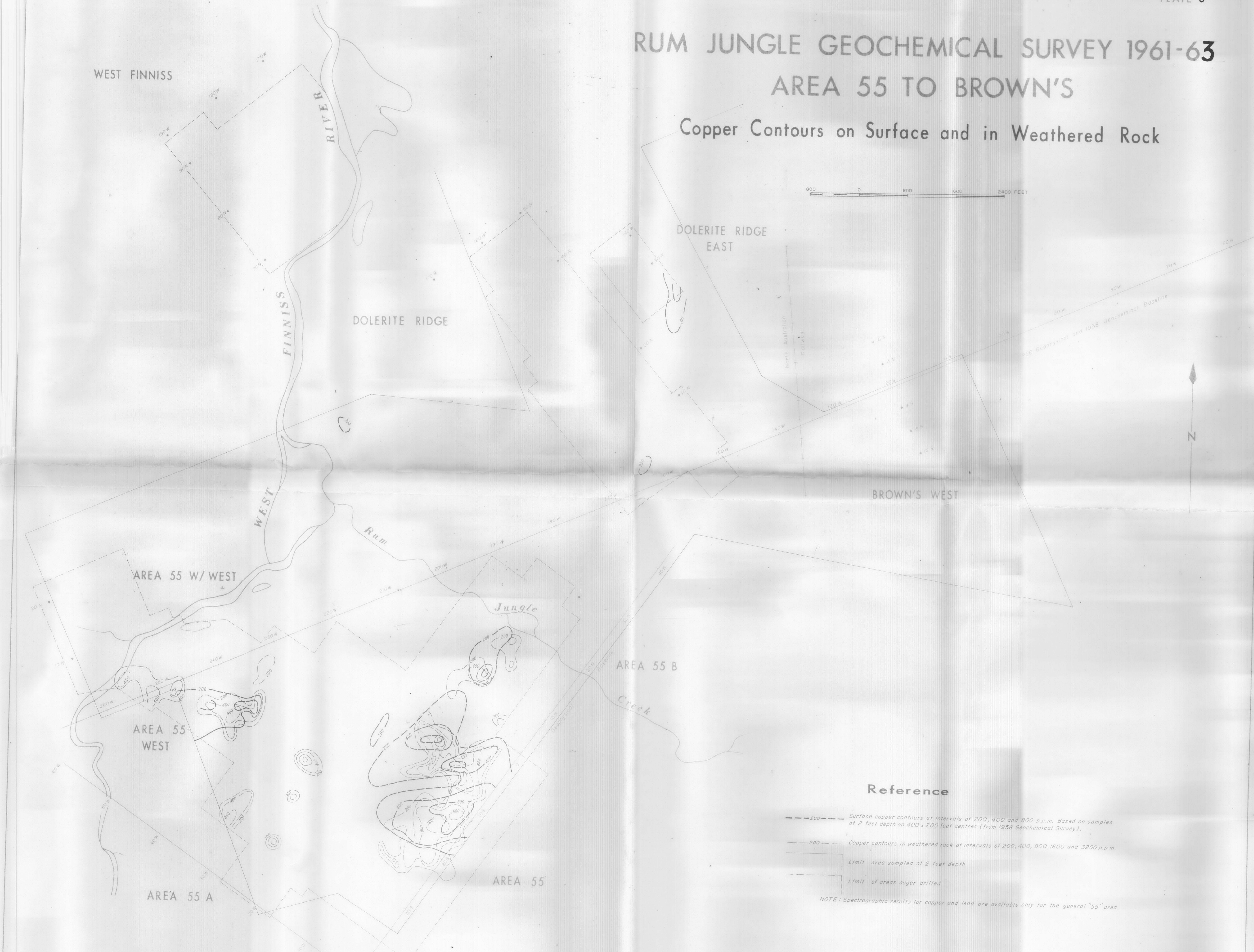
Limit of geophysical surveys

Limit of areas auger drilled

Bureau of Mineral Resources, Geology and Geophysics June 1963 To accompany Record No.

D 52/8/65 JK

RUM JUNGLE GEOCHEMICAL SURVEY 1961-63
AREA 55 TO BROWN'S
Copper Contours on Surface and in Weathered Rock



Reference

- - - 200 - - - Surface copper contours at intervals of 200, 400 and 800 p.p.m. Based on samples at 2 feet depth on 400 x 200 feet centres (from 1958 Geochemical Survey).

— — 200 — — Copper contours in weathered rock at intervals of 200, 400, 800, 1600 and 3200 p.p.m.

Limit area sampled at 2 feet depth

Limit of areas auger drilled

NOTE : Spectrographic results for copper and lead are available only for the general "55" area

D 52/8/67

PLATE 6

RUM JUNGLE GEOCHEMICAL SURVEY 1961-63

AREA 55 TO BROWN'S

Lead Contours in Soil and Weathered Rock

800 0 800 1600 2400 FEET

WEST FINNISS

DOLERITE RIDGE

DOLERITE RIDGE EAST

BROWN'S WEST

FINNISS RIVER

WEST Rum Jungle Creek

AREA 55 W/ WEST

AREA 55 WEST

AREA 55 A

AREA 55

AREA 55 B

Eastern Geophysical Baseline

N

Reference

Surface lead contours at intervals of 120, 240, 480, 960, 1920 and 3840 p.p.m. (From geochemical survey 1958)

Limit of surface geochemical survey

Lead contours in weathered rock at intervals of 120, 240, 480, 960, 1920 and 3840 p.p.m.

Limits of areas auger drilled

Note: Spectrographic results for copper and lead are available only for the General "55" Area

Bureau of Mineral Resources, Geology and Geophysics June 1963

15,000 E

To accompany Record No.

20,000 E

D52/8/68

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RUM JUNGLE SURVEY 1963

Plate 7

MT. FITCH SPECIAL
Geology and Topography

Quartz filled shear zone
Dolomite and talc schist
Quartz sericite schist
Sericite schist
Talc and sericite schist
Cu
D623 -55°
D622 -55°
Carbonaceous chlorite sericite schist
Talc schist, ? dolomite and ? tremolite schist
D158 -60°
D156 -60°
D340 -60°
Alluvium
Alluvium over talc and sericite schist
Quartz sericite schist
? Dolomite and ? tremolite schist
Hematite
Granite
Ferruginous zone
D624 -55°
Carbonaceous schist
Sericite schist
Quartzite arkose
breccia
Talc schist
Hematite
Sericite schist
Talcose schist
Quartzite
Sericitic schist
Quartz schist
Brown schist
Black schist
Quartz
Pink quartzite
Talc schist
Talc schist
Amphibolite
Pink quartzite breccia
Quartzite and schist
Calcareous Grey shale
Grey schist
Talcose sericitic shale
Sandstone
Quartzite
Hematite boulder conglomerate
Grey schist
Creek
Brown soil
Hematite boulder conglomerate
FINNISS
Brown soil
Granite
Granite
Granite
Alluvium
Alluvium
Alluvium
EAST
RIVER
Alluvium
Tremolite schist
Quartzite sericitic quartzite
Carbonaceous and chloritic schist
Swamp
Laterite
Dolomite

450N 444N 438N 432N 426N 420N 414N 408N 402N 396N 390N 384N 378N 372N 366N 360N 354N

9,000E 10 11 12 13 14 15 16,000E

144E 410·75N 406·75N 402·75 398·75N 394·75N 390·75N 386·75N 382·75N 378·75N 374·75N 370·75N 366·75N 362·75N 358·75N 354·75N

96E 102E 108E 114E 120E 126E 132E 138E 150E

44 43 42 41 40 39 38 37 36

40,000N 35,000N

Drawn by R.G. Winchester.

REFERENCE

- Geological boundary, dashed where approximate
- Established fault, position accurate
- Shear
- Costean
- Vehicle track
- DG24 -55° B.M.R. diamond drill hole, showing direction and declination
- D156 -60° T.E.P. diamond drill hole showing direction and declination

MAJOR GRID : T.E.P. mine grid, bearing 359°58'00"

MINOR GRID : B.M.R. geophysical grid 1963

SCALE

Feet 400 200 0 400 800 Feet

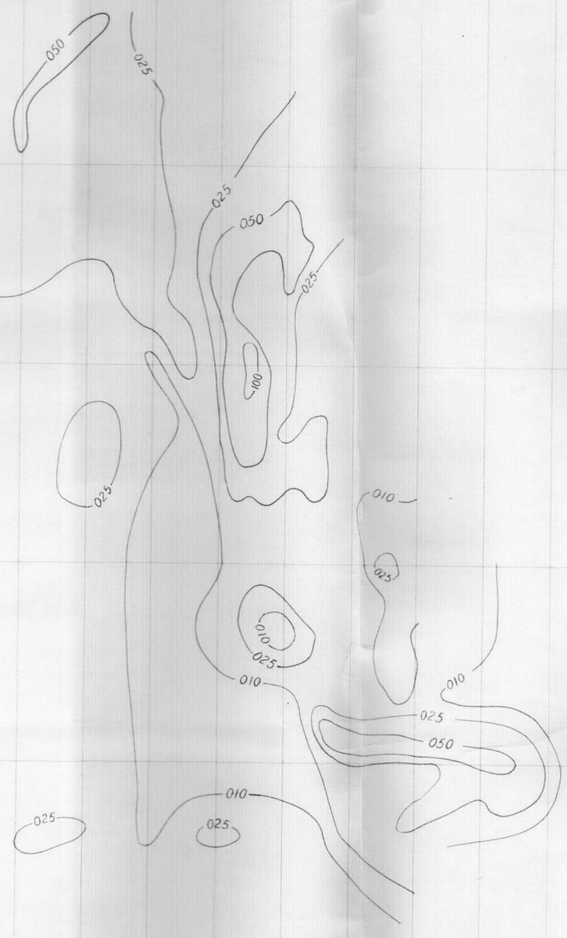
D52/A8/82

Plate 8

Bureau of Mineral Resources, Geology and Geophysics

RUM JUNGLE SURVEY 1963

MT. FITCH SPECIAL
Radiometry



REFERENCE

010 Boundaries enclosing maximum radiometric probe values of ·010, ·025, ·050 and ·100 units in auger drill holes

Probe readings approximate surface readings in mR/hr when multiplied by 2.

MAJOR GRID : T.E.P. mine grid, bearing 359°58'00"

MINOR GRID : B.M.R. geophysical grid 1963

SCALE

Feet 400 200 0 400 800 Feet

Drawn by R.G. Winchester.

D52/A8/83

Plate 9

MT. FITCH SPECIAL
Geochemistry — Copper

Bureau of Mineral Resources, Geology and Geophysics
RUM JUNGLE SURVEY 1963

REFERENCE

- Isochemical contours extrapolated at 500 and 1000 p.p.m. based on bottom of auger hole samples in weathered rock.
- Geological boundary, position approximate
- Established fault, position accurate
- Shear
- B.M.R. auger drill hole
- DG23 B.M.R. diamond drill hole, showing direction and declination

MAJOR GRID : T.E.P. mine grid, bearing 359° 58' 00"
MINOR GRID : B.M.R. geophysical grid 1963

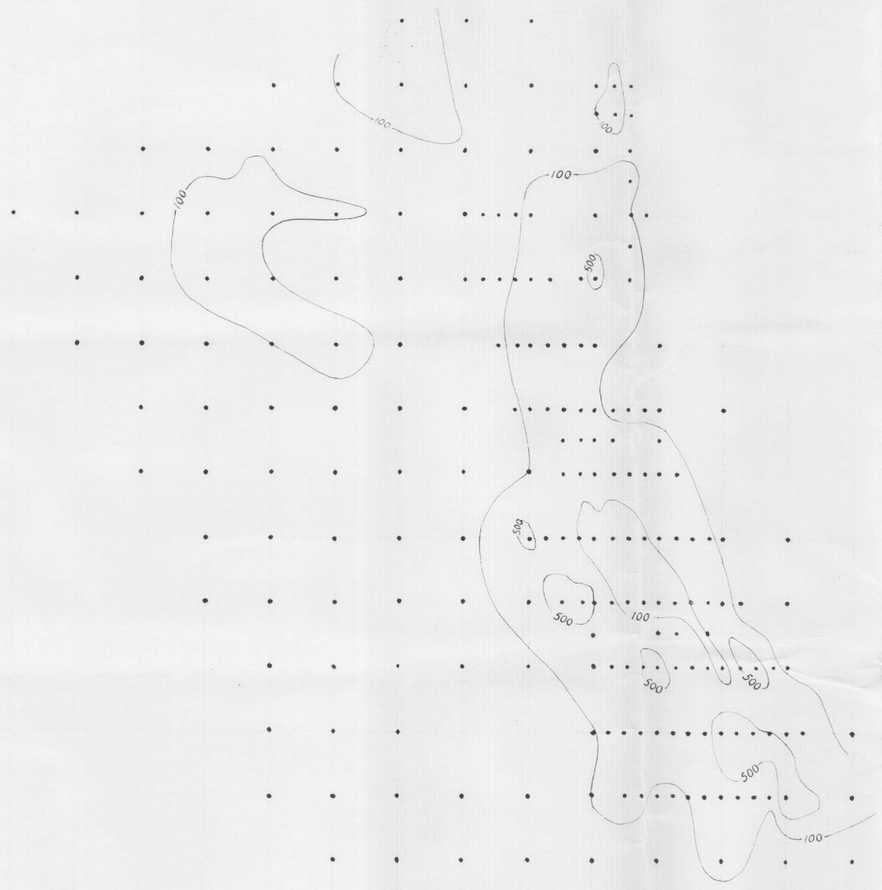
SCALE
Feet 400 200 0 400 800 Feet

Drawn by R.G. Winchester.

D52/A8/84

Plate 10

MT. FITCH SPECIAL
Geochemistry — Nickel



Bureau of Mineral Resources, Geology and Geophysics
RUM JUNGLE SURVEY 1963

Drawn by R.G. Winchester.

REFERENCE

100 Isochemical contours extrapolated at 100 and 500 p.p.m., based on bottom of auger hole samples in weathered rock.

• B.M.R. auger drill hole

MAJOR GRID : T.E.P. mine grid, bearing 359°58'00"
MINOR GRID : B.M.R. geophysical grid 1963

SCALE

Feet 400 200 0 400 800 Feet

D52/A8/85

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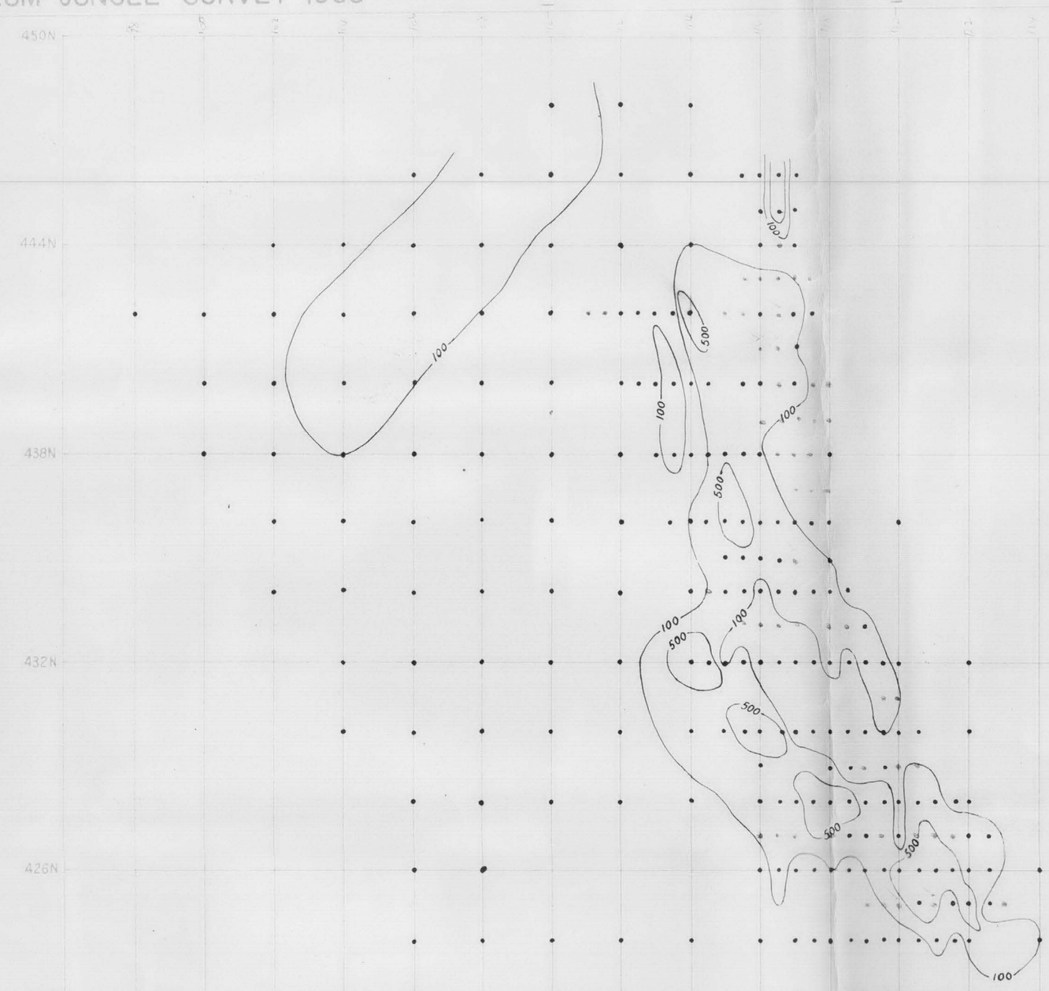
RUM JUNGLE SURVEY 1963

Plate II

MT. FITCH SPECIAL

Geochemistry — Cobalt



REFERENCE

100 — Isochemical contours extrapolated at 100 and 500 p.p.m., based on bottom of auger hole samples in weathered rock.

• B.M.R. auger drill hole

MAJOR GRID T.E.P. mine grid, bearing 359°58'00"
MINOR GRID B.M.R. geophysical grid 1963

SCALE

Feet 400 200 0 400 800 Feet

D52/A8/86

Drawn by R.G. Winchester.

Pb BoH

Plate 12

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RUM JUNGLE SURVEY 1963

MT. FITCH SPECIAL
Geochemistry — Lead

REFERENCE

30 — Isochemical contours extrapolated at 30, 200 and 500 p.p.m., based on bottom of auger hole samples in weathered rock.

• B.M.R. auger drill hole

MAJOR GRID: T.E.P. mine grid, bearing 359° 58' 00"
MINOR GRID: B.M.R. geophysical grid 1963

SCALE

Feet 400 200 0 400 800 Feet

D52/A8/87

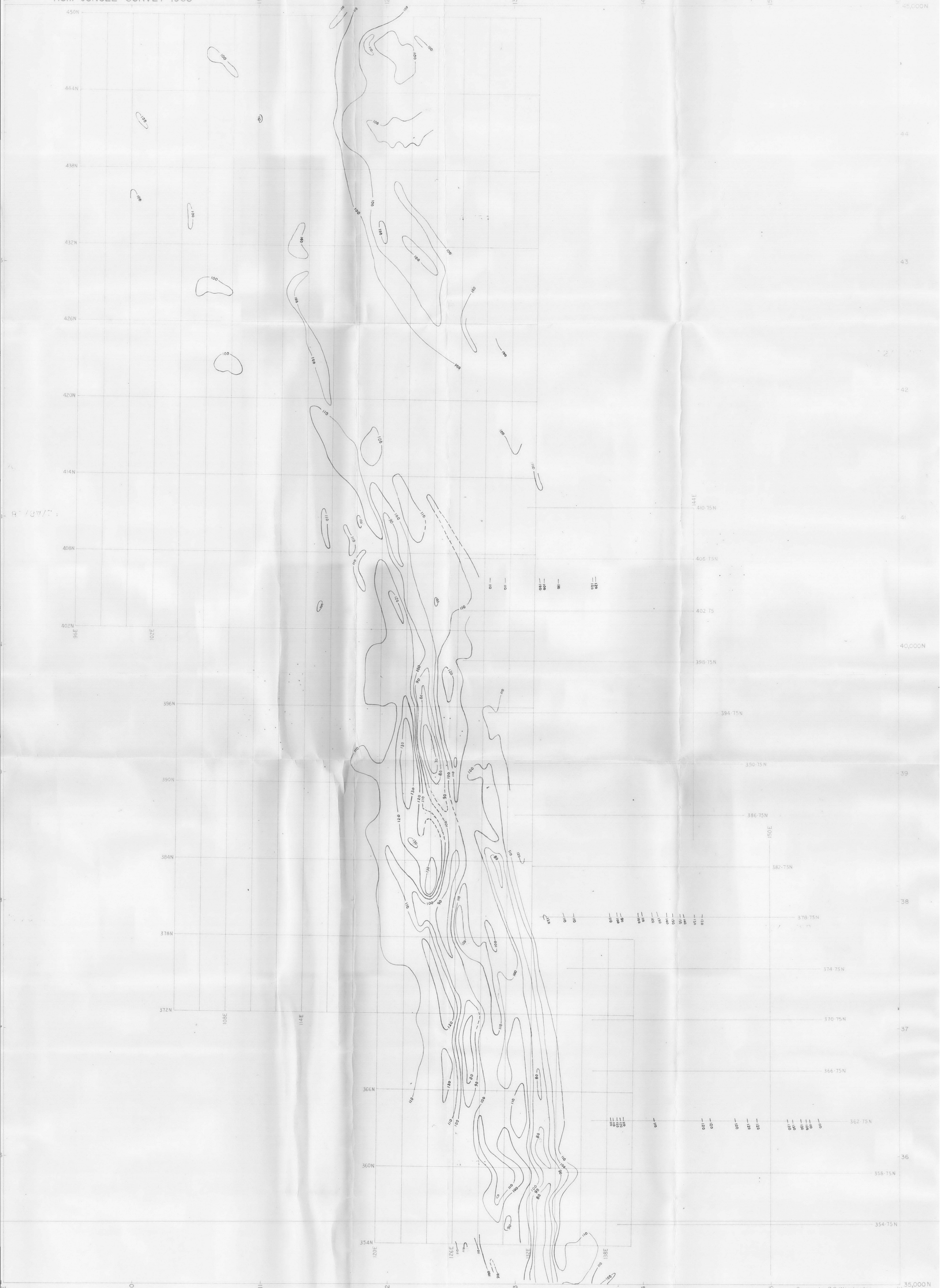
Bureau of Mineral Resources, Geology and Geophysics

RUM JUNGLE SURVEY 1963

Plate 13

MT. FITCH SPECIAL

Slingram Real Component Contours



REFERENCE

100 — Slingram contours at intervals of 5%, after Ashley 1963

MAJOR GRID : T.E.P. mine grid, bearing 359°58'00"

MINOR GRID : B.M.R. geophysical grid 1963

SCALE

Feet 400 200 0 400 800 Feet

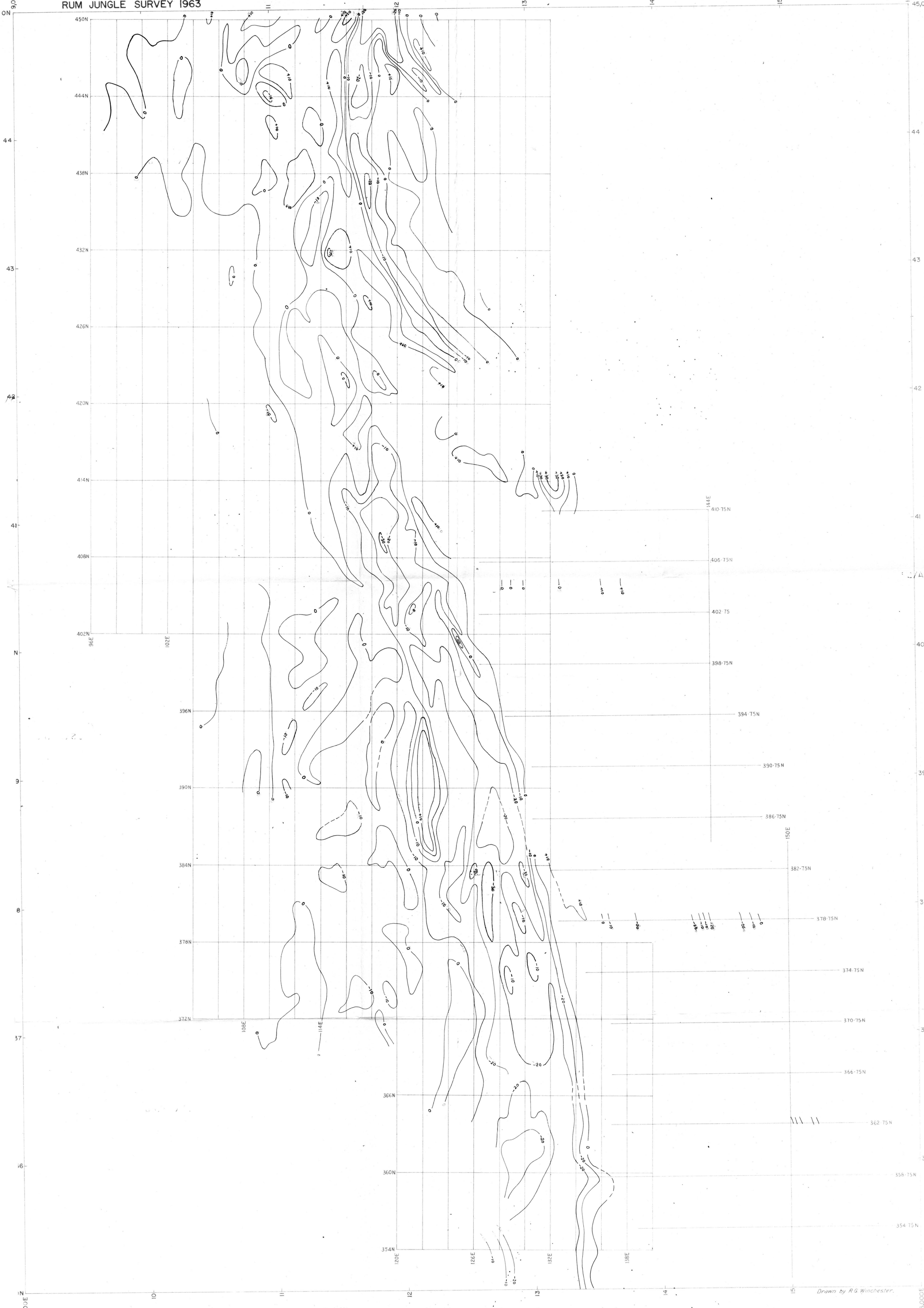
D52/A8/88

Plate 14

Bureau of Mineral Resources, Geology and Geophysics

RUM JUNGLE SURVEY 1963

MT. FITCH SPECIAL
Slingram Imaginary Component Contours



REFERENCE

Slingram contours at intervals of 5%, after Ashley 1963

MAJOR GRID : T.E.P. mine grid, bearing 359°58'00"

MINOR GRID : B.M.R. geophysical grid 1963

SCALE

Feet 400 200 0 400 800 Feet

D52/A8/89

Bureau of Mineral Resources Geology and Geophysics
RUM JUNGLE PHOSPHATE SURVEY 1962-63

Plate 15

Pub	*Hematite quartz breccia*
Pld	*Golden Dyke Formation*
Plx	*Amphibolite*
Plo	*Coomalie Dolomite*
	Phosphate rock

- - - - - - - *Geological boundary, position approximate*

—— R —— *Axis of radiometric anomaly*

—— S —— *Axis of slingram anomaly*

—— Cu —— *Axis of geochemical copper anomaly*

SCALE

Feet 1000 500 0 500 1000 2000 Feet

D 52/A8/90

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RUM JUNGLE SURVEY 1963

PLATE 16

RUM JUNGLE

PHOTO SCALE SERIES

12,000E 15 18 21 24,000E 27 30 33 36,000E 39 42 45 48,000E

48,000N 46 44 42 40,000E 38 36 34 32,000N 30 28 26 24,000N

△ MT BURTON

△ MT FITCH

△ GIANTS REEF

△ MT WIMPEY

WEST FINNISS

DOLERITE RIDGE

BUCKSHEE

POWERPLANT

BROWN'S

Geophysical baseline 1956-63

Drawn by R.G. Winchester

SCALE

Feet 1000 500 0 1000 2000 3000 Feet

D52/A8/91

Eub Hematite quartz breccia

Edo Dolerite

Pla Acacia Gap Tongue

Pld Golden Dyke Formation

Plx Amphibolite

Plo Coomalie Dolomite

Ply Sandstone

Plc Crater Formation

Pg Granite

Phosphate rock

Geological boundary, position approximate

Established fault, position accurate

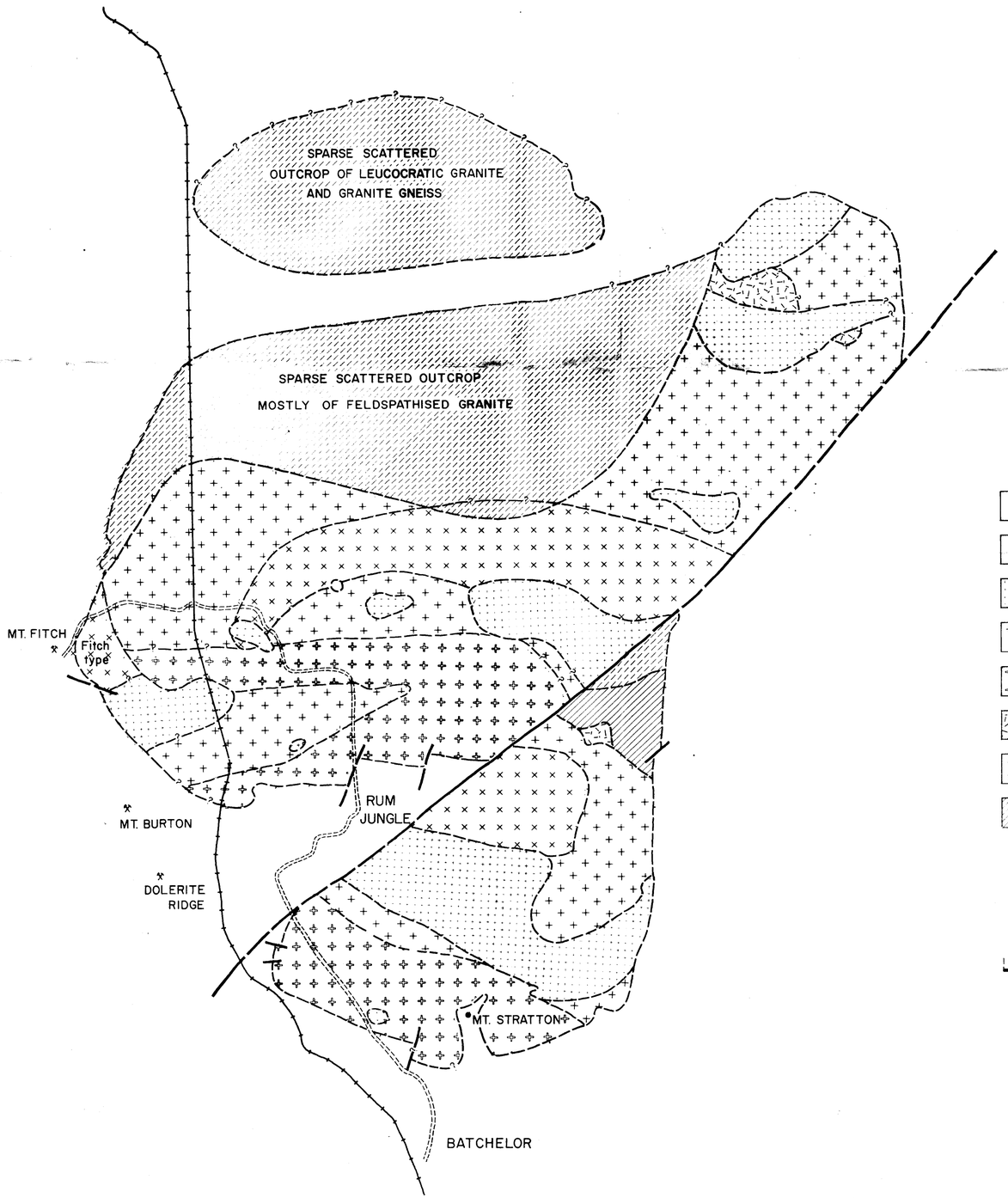
Axis of radiometric anomaly

Axis of slingram anomaly

Axis of geochemical copper anomaly

131°00'

SKETCH MAP OF THE RUM JUNGLE COMPLEX



13°00'

REFERENCE

- PINE CREEK GEOSYNCLINAL SEDIMENTS
- UNDIFFERENTIATED (Poor, scattered outcrop)
- LEUCOCRATIC GRANITE (including Fitch type)
- FELDSPATHISED GRANITE / GNEISS / DIORITE
- COARSE GRANITE
- DIORITE
- GRANITE GNEISS
- SCHISTS, GNEISSES

1 0 1 2 3 4 MILES

13°00'

131°00°

Bureau of Mineral Resources, Geology and Geophysics October 1963