DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

Rept. Bk. No. 79/121

URANNO MICROGRANITE DEPOSIT for ROAD SEALING AGGREGATE AND RAIL BALLAST

section 16 hundred of Stokes
(S.A. Highways Department)

MINERAL RESOURCES SECTION

By

A.M. PAIN

SENIOR GEOLOGIST
EXTRACTIVE MINERALS

J.T. VALENTINE
GEOLOGIST

October, 1979

D.M. No. 212/79

FRONTISPIECE - Uranno microgranite deposit, section 16 hundred of Stokes. Looking SW at proposed quarry site. Negative No. 30922.

CONTENTS

FIGURES	TITLE	PLAN No.
7	Log of Diamond drillhole No. DS1	79-702
8	Log of Diamond drillhole No. DS2	79-703
9	Log of Diamond drillhole No. DS3	79-704
10	Photographs of Diamond Drill Core	

FRONTISPIECE. Uranno microgranite deposit, section 16 hundred of Stokes. Looking SW at proposed quarry site. Negative No. 30922

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

URANNO MICROGRANITE DEPOSIT for ROAD SEALING AGGREGATE AND RAIL BALLAST

Rept. Bk.No. 79/121
D. M. No. 212/79

ABSTRACT

A quarry to yield 100 000 m^3 of in situ material has been outlined in a microgranite deposit, 15 km east of Cummins, and 10 km southeast of the Uranno railway siding, on Eyre Peninsula.

Diamond drilling and laboratory testing has shown the material to be suitable for sealing aggregate and rail ballast, with L.A. losses of 18-21%. Narrow zones of poor quality weathered material adjacent to some joints are a minor constitutent which should be easily scalped out.

Large reserves of additional material exist to the south and west of the area outlined.

INTRODUCTION

Following a request from the Highways Department, geological assistance was provided to locate a suitable source of sealing aggregate for southern Eyre Peninsula, initially for 50 000 m^3 of in situ material to be available by November 1979.

During a reconnaissance of the area between 17th and 20th April, 1979, a potential chipping source was located 15 km east of Cummins.

Three holes were drilled by a Department of Mines and Energy diamond rig between 21st and 29th June 1979 to provide samples for testing and to prove the required reserves.

In early July 1979, the Australian National Railways became interested in the deposit as a potential source of rail ballast. A large crushing contract to supply both materials simultaneously would have obvious cost advantages.

LOCATION AND ACCESS

The microganite deposit is located on section 16 hundred of Stokes county Flinders within the District Council of Tumby

Bay, part of the Eyre Planning Area.

Access from the sealed Cummins-Tumby Bay road, is northwards via 6 km of unsealed road from Yallunda Flat, 18 km eastnortheast of Cummins (Fig. 2).

The nearest railway siding is at Uranno, 10 km to the northwest along an unsealed road.

The proposed quarry site is situated on the rocky northern slope of a hill (Frontispiece) which rises about 30 m above a north westerly draining tributary to Kapinka Creek.

Access from the Yallunda Flat - Uranno road is currently along a farm track through a gate 700 m south of the Kapinka intersection .

MINERAL TENURE

The deposit is on Crown land held under perpetual lease by Mr R.L. Proctor and within Exploration Licence No. 453 held by Pancontinental Mining Limited and Power Reactor and Nuclear Fuel Development Corporation which expires on the 29th March 1980.

On freehold land, extractive minerals may only be pegged by the landowner, but on land held under perpetual lease, extractive minerals may be pegged by the holder of a Miner's Right after serving 21 days written notice of entry (section 58 of the Mining Act, 1971-1978).

Under Section 80 of the Act, permission of the Exploration Licence holder must be obtained before a Mineral Claim may be pegged. Although access to construction materials can be achieved under the Highways Act 1926-1975, it is recommended that the Highways Department obtains continuing exclusive access to this deposit. Appropriate action should be discussed with the Mining Registrar.

ENVIRONMENTAL ASSESSMENT

The deposit lies within rural land under Interim Development

Control with control of extractive mineral development vested in the State Planning Authority.

The extensive microgranite outcrop has been fenced as an east-west paddock 200 m wide for grazing. The adjoining paddocks to the north and south are cultivated for cereal crops.

Soil cover over the deposit is thin and supports only grasses. There are no trees or shrubs to be disturbed by a quarrying operation.

The nearest house, 1 km northwest of the proposed quarry is occupied by Mr. R.L. Proctor, and the nearest dam is in a tributary of Kapinka creek, 200 m northeast of the site.

The proposed quarry will not be visible from any main roads, but will be visible for about 1 km along the lightly trafficked unsealed road between Uranno and Stokes.

GEOLOGICAL SETTING

The accompanying regional geology plan (Fig. 1) is adapted from Department of Mines and Energy sources including LINCOLN (Johns, Thatcher, and O'Driscoll, 1958).

The oldest rocks exposed in the Lincoln Uplands comprise Proterozoic metasediments of the Flinders and Hutchinson Groups, including schist, gneiss, calcsilicate and quartzite. These are intruded by granitic rocks including a faintly foliated micro-granite near Uranno.

SITE GEOLOGY

The proposed quarry site is on the northern flank of a hill underlain by fine to medium grained grey microgranite.

Outcrop is bold, extending over 60% of the proposed quarry site, and is largely controlled by jointing in the microgranite. The most prominent joint set trends east-west with near-vertical dips. The trends of subsidiary joint sets are shown on Figure 6.

Brown sandy soil overlying the granite is expected to reach depths of 2.5 m between the outcrops.

DRILLING

Three diamond holes totalling 67.3 m were sited to prove 50 000 m^3 of situ material, and were inclined at 45 degrees to the northwest to intersect the faint foliation at right angles.

Photographs and logs of the core are presented in Figures 7-10.

QUALITY OF THE STONE

Petrographic Examination

Thin sections were examined by W.G. Harvey, (Scientific Officer, Highways Department) who reported the absence of deleterious secondary minerals in fresh rock. Some cloudy alteration of feldspar grains was observed but should not affect the properties of the stone in service.

Mineralogical composition is reported as

Potash feldspar	35-60%
Plagioclase feldspar	10-25%
Quartz	10-15%
Biotite	15-40%

Acessories including amphibole, sphene, calcite and opaques range from 1-10%.

Aggregate Testing

Samples of drill core from between 7 m and 10 m in each of the three holes were tested in the Highways Department Laboratory at Northfield. Detailed results are presented in Table 1 and summarised on the drill logs in Figures 7-9.

All material was found to be satisfactory for sealing aggregate with Los Angeles abrasion losses of between 18% and 21% on the -19.0 + 9.5 mm size fraction. However, weathered rock adjacent to the deeply weathered clayey zone between 5.7 m and 6.5 m in hole no. 1 caused high sulphate soundness losses of 16% for the - 9.5 + 4.75mm size fraction and 21% for the -4.75 + 2.36mm size fraction, probably because weaker more friable fragments persist in the -9.5mm fraction after laboratory crushing and screening.

TABLE 1

AGGREGATE TESTING

Hole No.	DS1	DS2	DS3
Depth	7-10 m	7-10 m	7-10 m
Los Angeles Loss %			
-19.0 +9.5 mm	21	18	20
Sulphate Soundness Loss %			
-9.5 + 4.75 mm	16	2	1
-4.75 + 2.36 mm	21	2	2
Soil Constants, L.A. Fines			
Liquid Limit %	24	21	22
Plastic Limit %	21	20	20
Plasticity Index %	3	1	2
Linear Shrinkage %	1.5	0.3	0.6

TABLE 2
BITUMEN STRIPPING TESTS

(1) No additive

Sample	% Stripping	
	Dry	Wet
DS1, 7-10 m	78	89
DS2, 7-10 m	97	100
DS3, 7-10 m	96	98

(2) With additive using composite sample DS2, 7-10m and DS3, 7-10m

Additive	% Stripping	
	Dry	Wet
0.5% Megamine BA in C160	3	10
0.5% Wetfix F " "	6	1
0.5% Redicote ZM " "	6	8
0.5% Polyram L200 " "	2	2
0.5% Adogen HC " "	13	23

These sulphate soundness losses contrast with losses of 1-2% in material from the other two drill holes.

The weathered nature of this core is visible in Figure 10.

Bitumen Stripping Tests

Satisfactory resistance to stripping was achieved by four of the five additives used.

Detailed results are presented in Table 2.

RESERVES AND QUARRY DEVELOPMENT

A quarry to yield 100 000 m^3 of in situ material has been outlined in Figures 4 and 5 to supply material for a combined sealing aggregate/rail ballast crushing contract.

Overburden estimated at 6 000 m^3 consisting of soil and weathered rock is expected to reach a maximum depth of 2.5 m in zones of poor outcrop. The average will be less than this overall since 60% of the proposed quarry area has bold outcrop of fresh rock.

Narrow zones of poor quality weathered material adjacent to major joints will be encountered, but these are only a minor constituent and most should be removed by scalping. The incidence of these zones will decrease with depth.

The most prominent joint sets are steeply dipping, and no major stability problems are expected.

Because of the comparatively broad joint spacing, and the lack of a strongly developed foliation, the need for some secondary blasting should be anticipated.

Large reserves for future contracts can be obtained by extending the quarry to the south or west.

CONCLUSIONS AND RECOMMENDATIONS

A quarry to yield 100 000 m^3 of situ material has been outlined approximately 15 km east of Cummins, in a deposit of fine grained faintly foliated microgranite of Proterozoic age.

The quarry site is 6 km south of the sealed Cummins - Tumby Bay road and 10 km by road from the Uranno railway siding on the Cummins - Buckleboo railway line.

Testing and petrographic examination have shown the material to be suitable for sealing aggregate and rail ballast. Some thin zones of deep weathering adjacent to joints or fractures contain deleterious material, but scalping, and if necessary selective quarrying should ensure that this minor constituent of the deposit does not cause problems.

No major stability problems are anticipated in the quarry faces.

Some secondary blasting will be needed because of the relatively broad joint spacing.

Large additional reserves of similar material could be won by extending the quarry to the south and west.

It is recommended that the Highways Department take action to ensure continuing access to the deposit.

A.M. PAIN

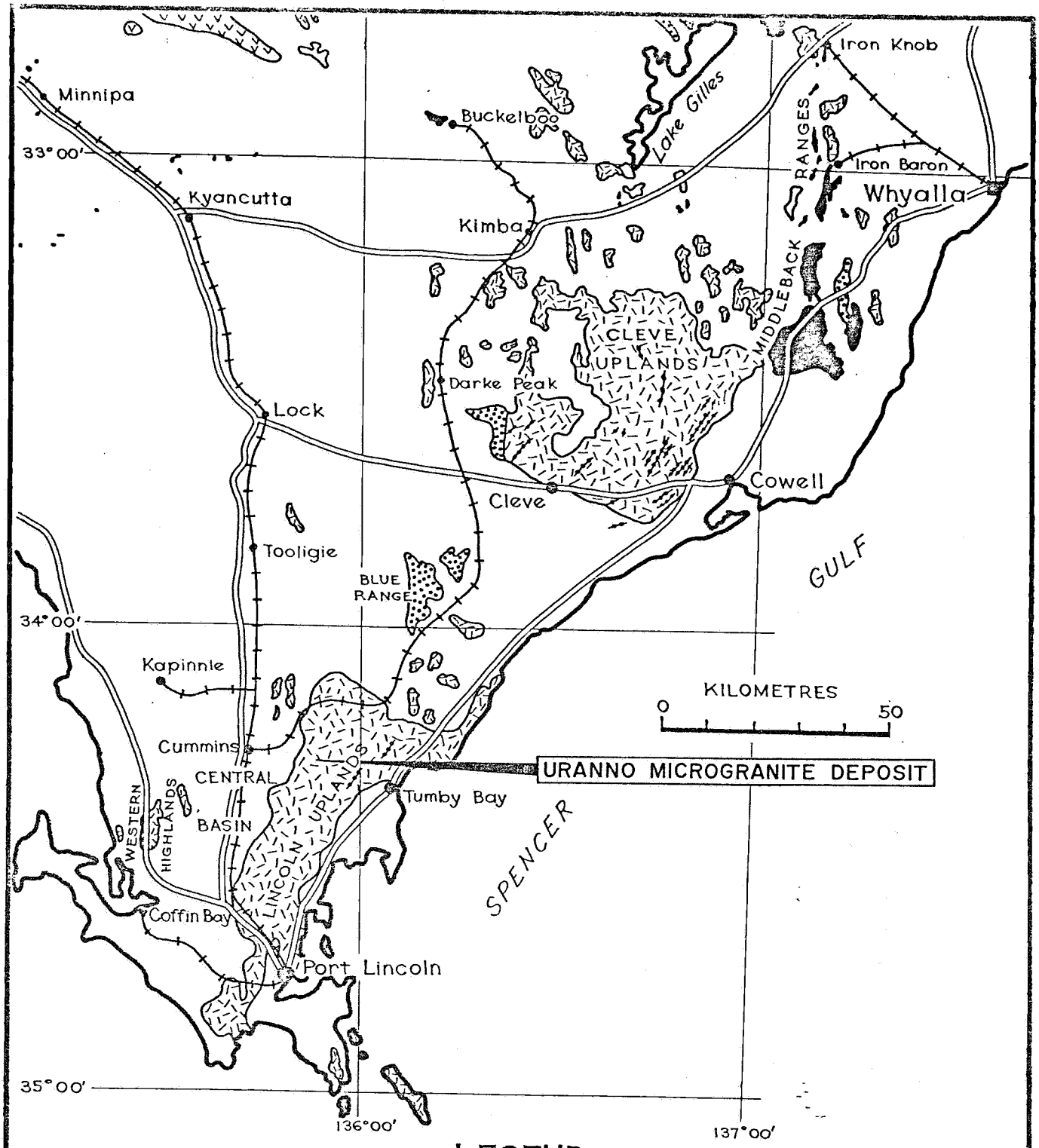
J.T. VALENTINE

AMP/JTV:AF

REFERENCE

HIERN, M.N., 1972. Mineral Resources of the Eyre planning area. Mineral Resour. Rev., S. Aust., 133: 11-28.

JOHNS, R.K., THATCHER, D., and O'DRISCOLL, E.S., 1958. LINCOLN map sheet. Geological Atlas of South Australia. 1:250 000 series. Geol. Surv. S. Aust.



LEGEND

CAINOZOIC — Mainly silica and carbonate sand and aeolianite overlying Tertiary sediments.

PRECAMBRIAN —

- GAWLER RANGE VOLCANICS: Pink quartz feldspar porphyry.
- BLUE RANGE SANDSTONE: Conglomerate, sandstone, siltstone, dolomite.
- BURKITT GRANITE, CHARLESTON GRANITE, MOONABIE PORPHYRY and other massive coarse grained granites.
- CLEVE METAMORPHICS: Schist, gneiss, quartzite, iron formation. Dolomite.

Modified from a plan prepared by Hiern (1972)

FIG. 1

DEPARTMENT OF MINES AND ENERGY — SOUTH AUSTRALIA

INDUSTRIAL MINERALS SECTION	Drn. A.M.P.	URANNO MICROGRANITE DEPOSIT	SCALE: 1:1250 000
	Tcd. A.F.		S 14161
	Ckd. A.F.	REGIONAL GEOLOGY	
	Exd.		DATE: 20-7-79

1516

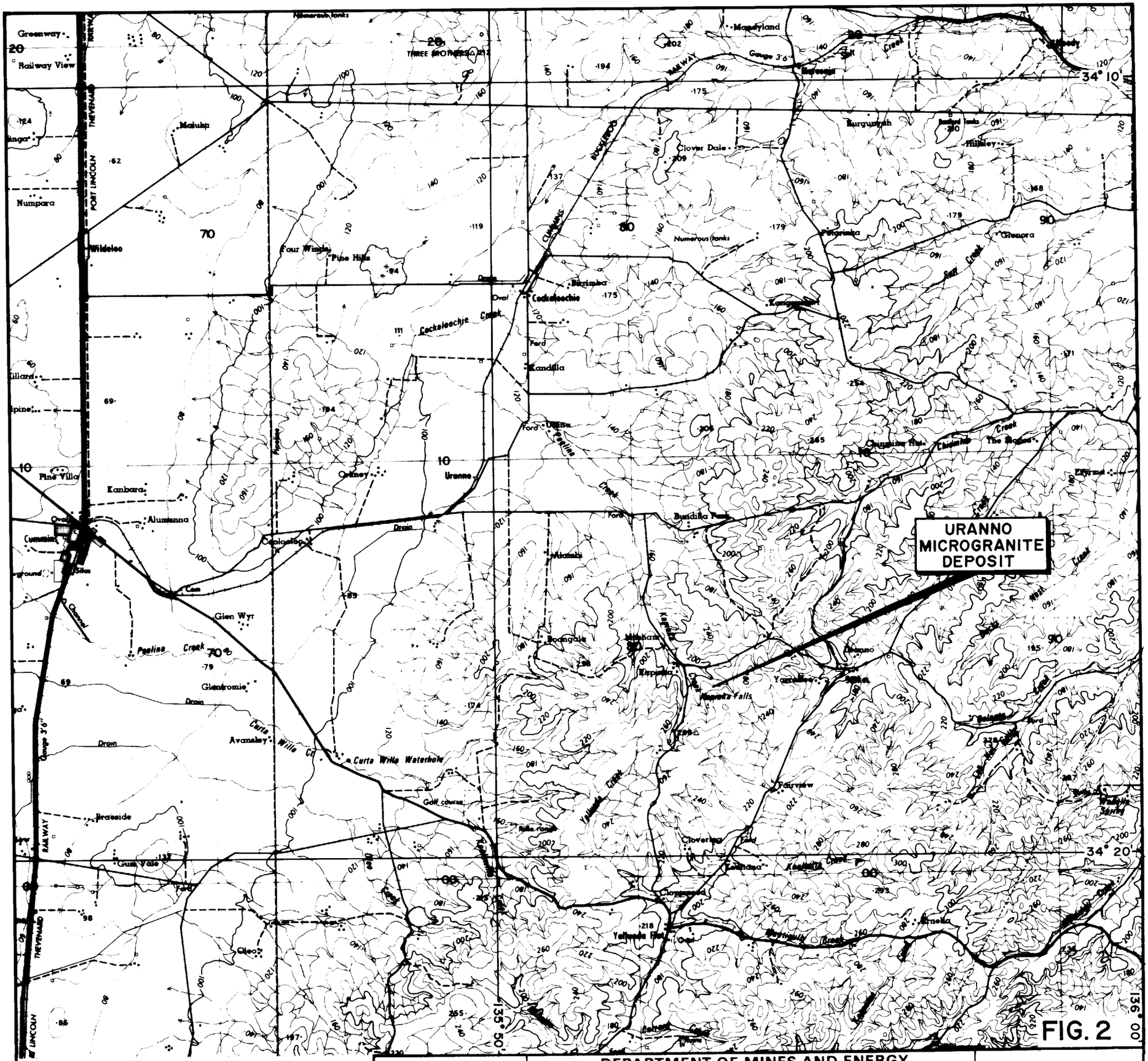


FIG. 2

	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE 1:100 000
COMPILED: J.T.V.	URANNO MICROGRANITE DEPOSIT	DATE: 20·7·79
DRN: A.F. CKD:	LOCALITY MAP	PLAN NUMBER 79-552

1516

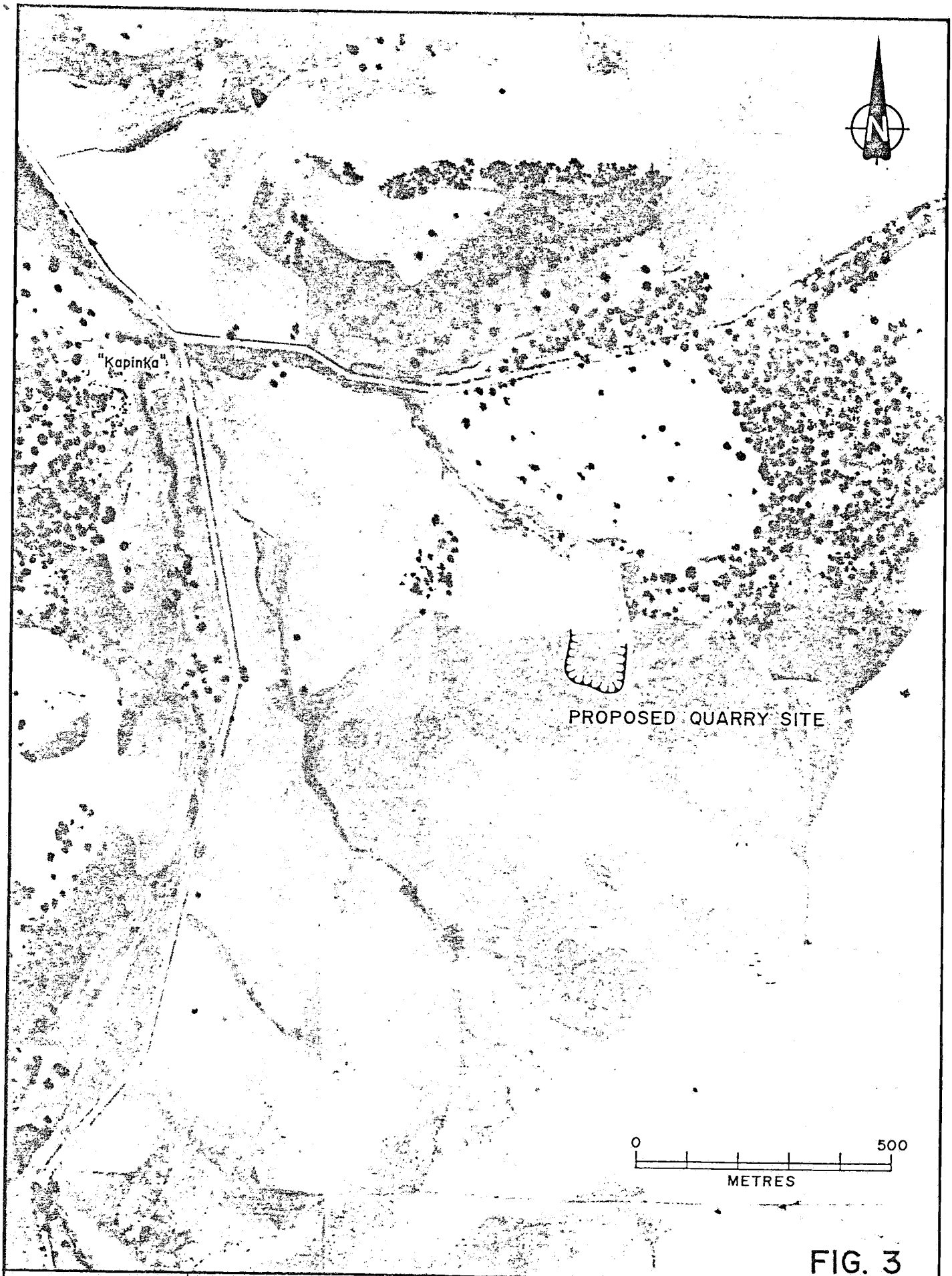
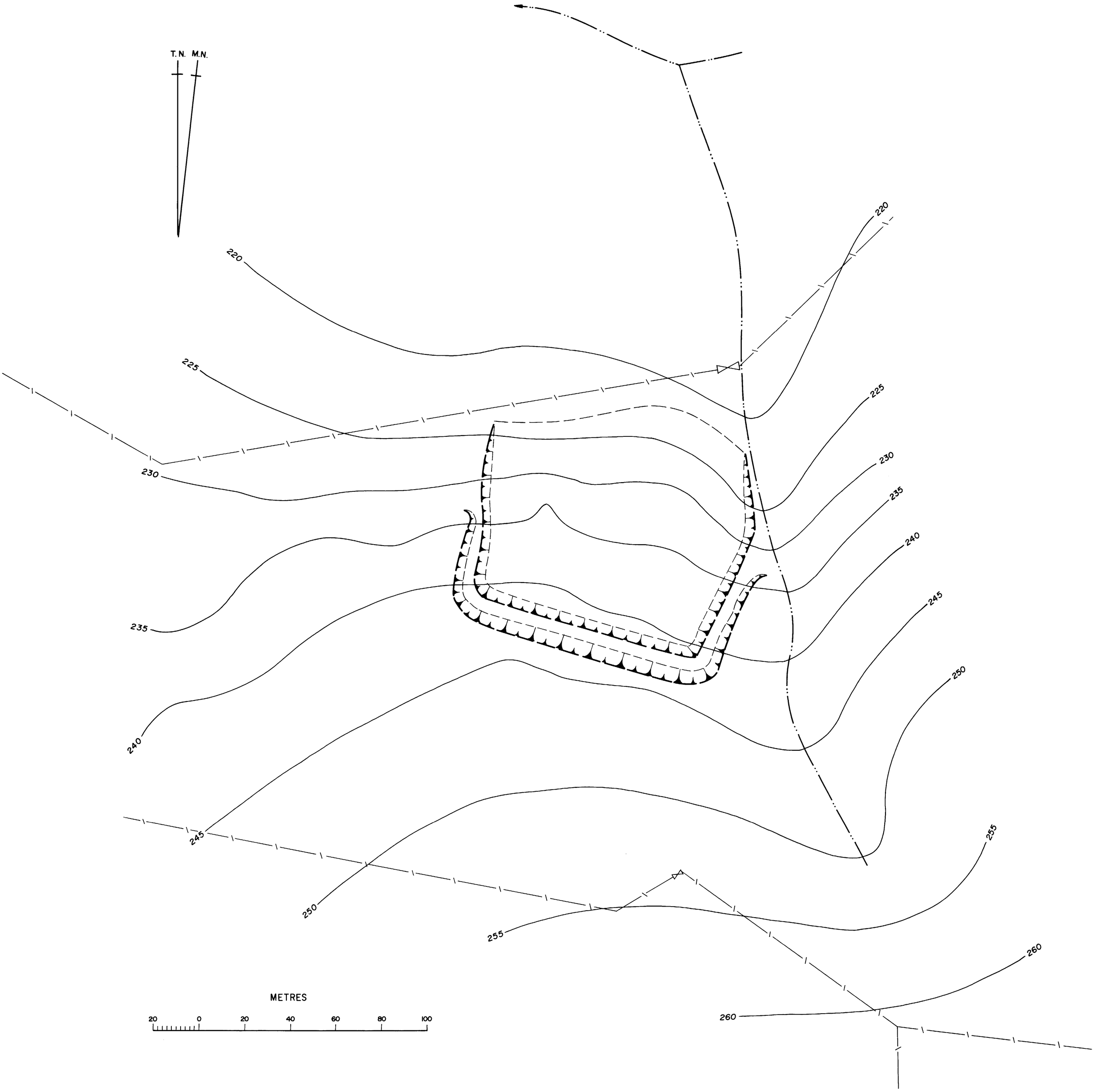


FIG. 3

	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE: 1:10 000 approx.
COMPILED: J.T.V.	URANNO MICROGRANITE DEPOSIT SECTION 16 HUNDRED OF STOKES AERIAL PHOTOGRAPH	DATE: 14 · 9 · 79
DRN: A.F. CKD:		PLAN NUMBER S12459



METRES

20 0 20 40 60 80 100

Fence and gate

Creek

Contour in metres, (datum: A.H.D.) 250

Proposed quarry

Note: A.H.D. approximate.

FIG. 4

DEPARTMENT OF MINES AND ENERGY – SOUTH AUSTRALIA

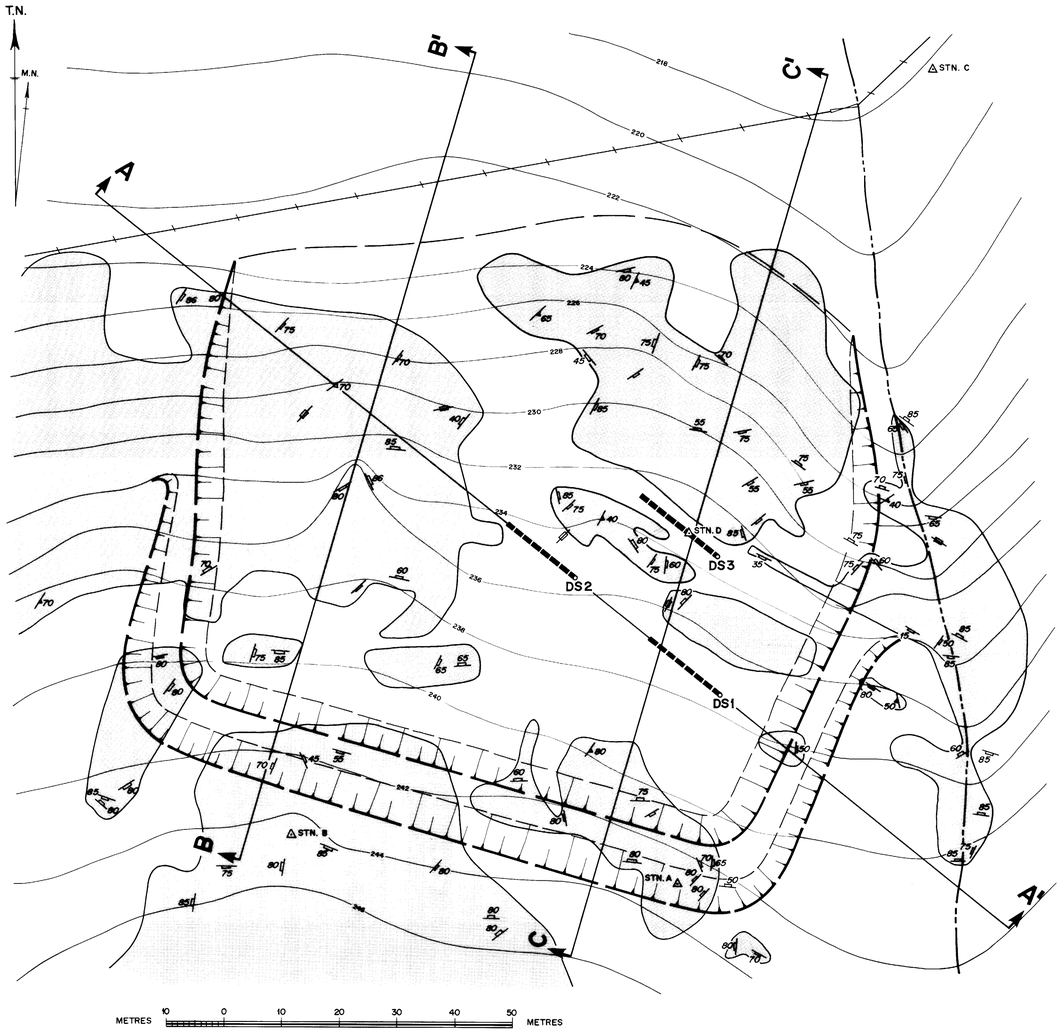
URANNO MICROGRANITE DEPOSIT

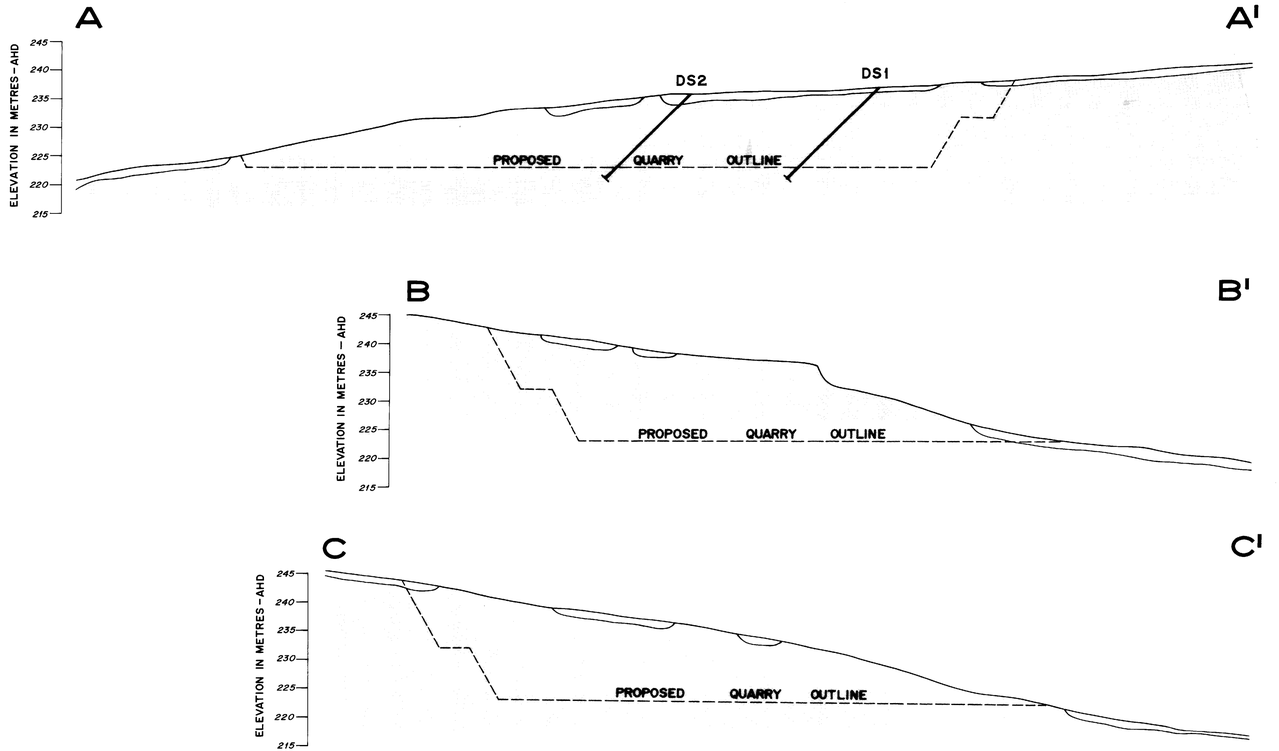
SECTION 16 HUNDRED OF STOKES

TOPOGRAPHY AND PROPOSED QUARRY OUTLINE

	COMPILED: A. Pain	DRN: K.W.	SCALE: 1:1000	PLAN NUMBER
DIRECTOR GENERAL		CKD:	DATE: July 1979	79-553

1516





LEGEND

- SOIL COVER.
- MICROGRANITE. Hard, grey, quartz-feldspar-biotite rock. Fine grained with minor medium and coarse granite. Faintly foliated.
- Fence, gate.
- STN. A — Survey station.
- Creek.
- 85 — Joint strike and dip.
- 35 — Foliation strike and dip.
- Top of hole — Diamond drillhole (angle 45°).
- 236 — Contour (interval 2 metres, datum approx. AHD from 31680 contour plan).

FIG. 5

DEPARTMENT OF MINES AND ENERGY – SOUTH AUSTRALIA

URANNO MICROGRANITE DEPOSIT

SECTION 16 · HUNDRED OF STOKES

PLAN & SECTIONS OF GEOLOGY & DRILLHOLE LOCATIONS

	COMPILED J.T.V.	DRN N.S.	SCALE 1:500	PLAN NUMBER 79-550
DIRECTOR GENERAL		CKD	DATE 23-7-79	

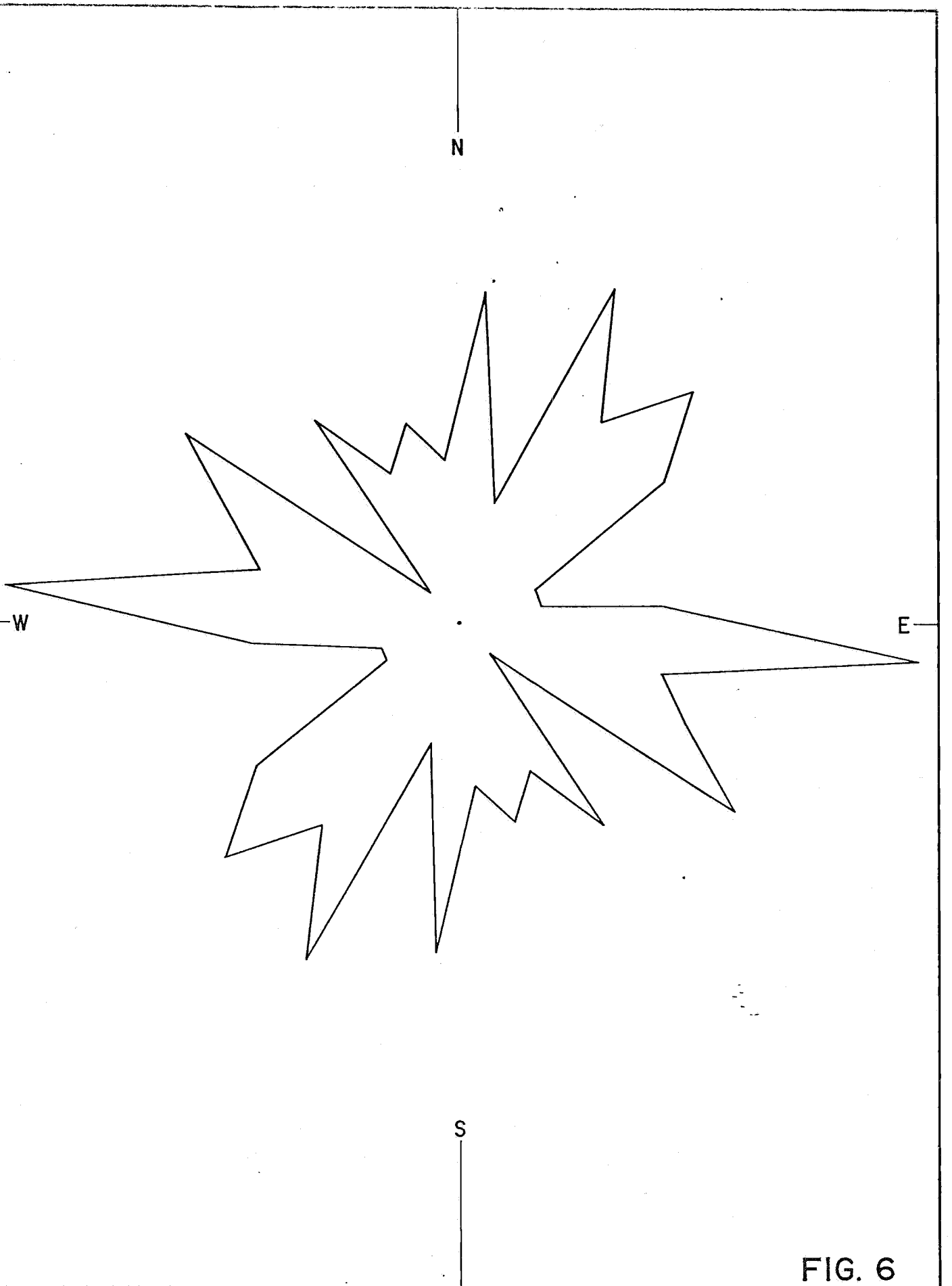


FIG. 6

	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE —
COMPILED A.M.P.	URANNO MICROGRANITE DEPOSIT SECTION 16 HUNDRED OF STOKES JOINT ROSE	DATE 14 · 9 · 79
DRN A.F. CKD 67R		PLAN NUMBER S12460

156

DEPARTMENT OF MINES AND ENERGY — SOUTH AUSTRALIA

LOG OF DIAMOND DRILL HOLE

MINERAL RESOURCES DIVISION

HOLE No. DS1

PROJECT MICROGRANITE DEPOSIT (HIGHWAYS DEPARTMENT)
LOCATION 6km. north of Yallunda Flat
HUNDRED Stokes SECTION 16

ELEVATION 237·5m DATUM A.H.D.
INCLINATION 45°
AZIMUTH 302°
DEPTH 22·32m

DRILLER J. JENSEN
COMMENCED 21·6·79
COMPLETED 23·6·79
LOGGED J.T. Valentine
DRILL N° Mindrill E1000, DD16

BORE SERIAL N° 625/79
DOCKET NUMBER 212/79
PLAN REFERENCE 79-550
DRAWING NO 79-702

CORE LOSS (%) 0 50 100	DEPTH (m)	GRAPHIC LOG	LITHOLOGICAL DESCRIPTION	TEST INT	TEST RESULTS: L.A.	SS(i)	SS(ii)	Liq. Lim	Plast. Lim	Plast. Index	Lin Shrink
			0-0·8m. No recovery								
			0·8-1·10m. GRANITE Medium, even grained weathered qtz-feldspar-biotite rock Pink, grey								
			1·10-5·40m MICROGRANITE. Fine, even-grained quartz-feldspar-biotite rock Grey, hard, faintly foliated (80° to core axis). A few thin clay filled joints up to 3mm wide. Coarse granitic zone 1·60 - 1·70 m								
	5		5·40-6·10m MICROGRANITE Fine even grained quartz feldspar-biotite rock Slightly weathered with very weathered greyish green and orange-yellow zone 5·70 - 6·00m Heavily fractured with clay filled joints								
			6·10 - 6·50m. CLAY. Greenish grey with yellow-orange patches (V. weathered zone)								
			6·50 - 9·10m. MICROGRANITE. Fine, even grained quartz-feldspar-biotite rock. Slightly weathered. Core is fractured with weathering along greenish grey and orange-yellow clay filled joints. Very weathered 8·60 - 8·80 m.		21	16	21	24	21	3	1·5
	10		9·10 - 22·30m. MICROGRANITE. Fine, even grained quartz-feldspar-biotite rock. Grey, hard, faintly foliated at 90° to core axis Strongly foliated 16·40 - 17·00 m Greenish grey and yellow-orange clay in weathered fractures 10·50 - 10·70 m, 12·30 - 12·35m, 12·75 - 12·95m Speckled medium grained granite zones 20·00 - 20·25m, 20·35 - 20·80m, 20·83 - 21·80m, 22·10 - 22·32m Coarse grained quartz-feldspar zones 9·50 - 9·75m, 11·50 - 11·70m, 19·30 - 19·60m, 20·80 - 20·83m, 20·25 - 20·35m, 21·80 - 22·10m.								
	15										
	20										
			END OF HOLE 22·32 m.								
	25										

FIG. 7

DEPARTMENT OF MINES AND ENERGY — SOUTH AUSTRALIA

LOG OF DIAMOND DRILL HOLE

MINERAL RESOURCES DIVISION

HOLE No. DS 2

PROJECT MICROGRANITE DEPOSIT (HIGHWAYS DEPARTMENT)
LOCATION 6km north Yallunda Flat
HUNDRED Stokes SECTION 16

ELEVATION 235·5m DATUM A.H.D.
INCLINATION 45°
AZIMUTH 302°
DEPTH 21·00m

DRILLER J. JENSEN
COMMENCED 25·6·79
COMPLETED 26·6·79
LOGGED J. T. Valentine
DRILL No. Mindrill E1000 DD16

BORE SERIAL No. 626/79
DOCKET NUMBER 212/79
PLAN REFERENCE 79-550
DRAWING NO 79-703

CORE LOSS (%) 0 50 100	DEPTH (m)	GRAPHIC LOG	LITHOLOGICAL DESCRIPTION	TEST INT	TEST RESULTS L.A.	S.S.(i)	S.S.(ii)	Liq. Lim.	Plast. Lim.	Plast. Index		
			0·0 - 2·90m. No recovery.									
			GRANITE; Coarse, even grained weathered qtz-feldspar-biotite muscovite rock. Pink and black. Faint foliation at 45° to core axis									
		+ + +	2·90 - 3·20m. Poor recovery									
			3·20 - 3·50m. No recovery									
		+ ++	3·50 - 4·90m. GRANITE. Medium and coarse grained quartz-feldspar-biotite-muscovite rock. Medium grained is grey and black, coarse grained is pink and white. Clay filled fracture, 45° to core axis at 4·90m.									
	5	+ +										
		+ ++	4·90 - 21·00m. MICROGRANITE. Fine, predominantly even grained quartz-feldspar-biotite-muscovite rock, with some speckled medium grained zones. Grey and hard with Pyrite at 7·4m. Foliation 45-75° to core axis.									
		+ + +	Clay filled fractures and angle to core axis, width:									
		+ +	5·80 - 6·00 subparallel to axis									
			7·30 45° 3mm									
			7·50 45° 3mm									
		+ ++	11·70 60° 3mm		18	2	2	21	20	1	0·3	
			11·85 30° 3mm									
			12·60 30° 10mm									
	10	+ +	13·40 45° 3mm.									
			Medium grained granite 12·60 - 13·05m									
		+ ++	Coarse grained quartz-feldspar zones.									
			10·70 - 11·05m; 11·35 - 11·40m, 12·35 - 12·40m; 13·40 - 13·50m;									
		+ +	13·80 - 14·20m, 16·85 (10mm wide)									
			Foliation.									
		+ ++	At 8·50m - 45° variable locally to 75°									
			9·00m - 45°									
			19·70m - 45° (v. faint).									
		+ +										
	15	+ ++										
		+ +										
		+ ++										
		+ +										
		+ ++										
		+ +										
	—20	+ ++										
		+ +										
			END OF HOLE 21·00m									
	—25											

FIG. 8

1516

DEPARTMENT OF MINES AND ENERGY — SOUTH AUSTRALIA

LOG OF DIAMOND DRILL HOLE

MINERAL RESOURCES DIVISION

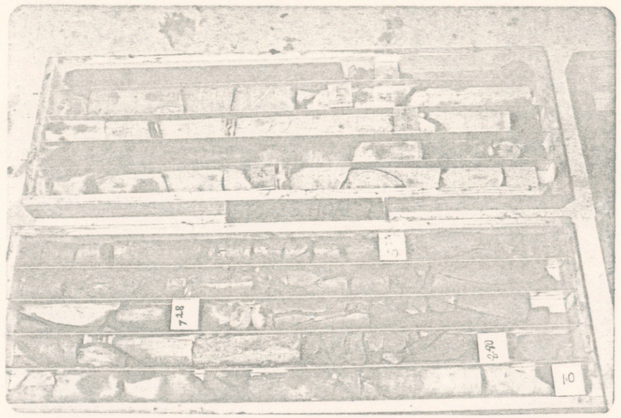
HOLE No. DS 3

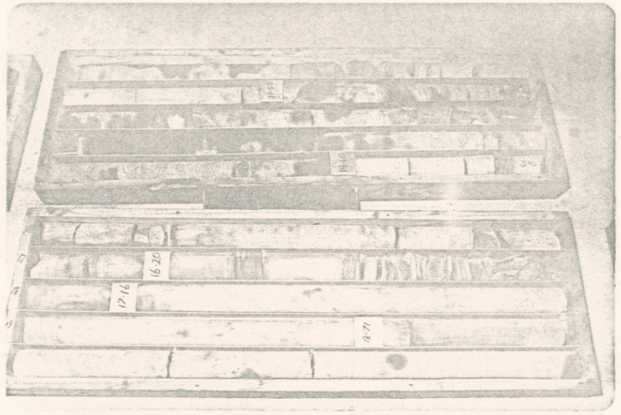
PROJECT MICROGRANITE DEPOSIT (HIGHWAYS DEPARTMENT)
LOCATION 6Km north of Yallunda Flat
HUNDRED Stokes SECTION 16
ELEVATION 233·0m DATUM A.H.D.
INCLINATION 45°
AZIMUTH 302°
DEPTH 24·00m
DRILLER J. JENSEN
COMMENCED 27·6·79
COMPLETED 29·6·79
LOGGED J.T. Valentine
DRILL No. Mindrill E1000 D.D.16
BORE SERIAL No. 627/79
DOCKET NUMBER 212/79
PLAN REFERENCE 79-550
DRAWING NO 79-704

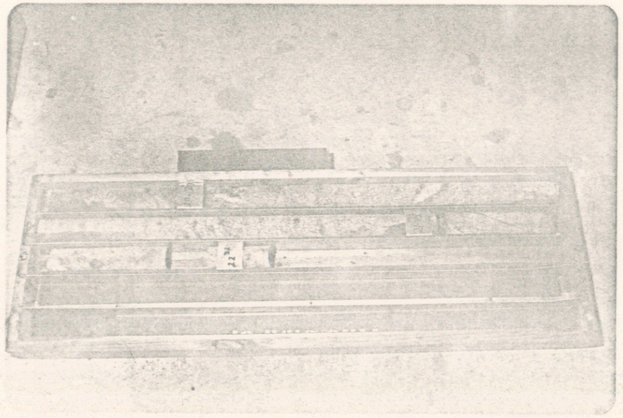
GR

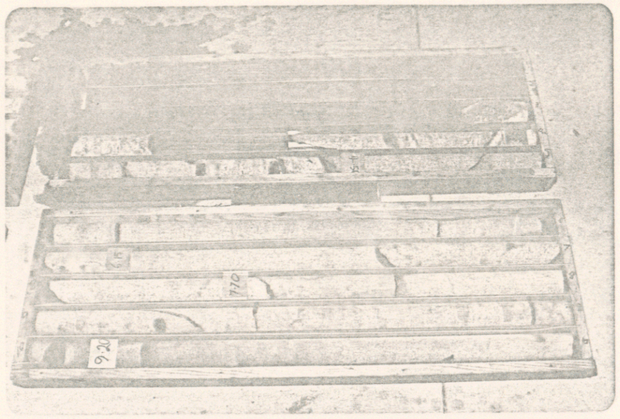
CORE LOSS (%) 0 50 100	DEPTH (m)	GRAPHIC LOG	LITHOLOGICAL DESCRIPTION	TEST INT	TEST RESULTS: L.A.	S.S.0	S.S.(11)	Liq. Lim.	Plast. Lim	plast. Index	Lin. Shrink
			0·0 - 1·7m No recovery.								
		+	1·70 - 24·00 MICROGRANITE. Fine evengrained quartz - feldspar - biotite rock with a few speckled medium grained zones. Grey and hard with foliation at 45° to core axis at 7·60m								
		+	clay filled fractures and angle to core axis · all 3mm wide								
		+	2·60m 80°								
	5	+	3·20 - 3·80m 15°								
		+	6·30, 6·40m 50°								
		+	8·40m 45°								
		+	10·60m 70°								
		+	18·20m 45°								
		+	18·90, 19·30m 45°								
		+	21·50m 45°								
		+	22·50 - 22·80m Heavily fractured. Many weathered surfaces derived from clay-filled fractures. Rock still hard		20	1	2	22	20	2	0·6
		+	22·90m parallel to axis.								
		+	**23·40m** 45°								
	10	+	Coarse grained quartz feldspar zones:								
		+	2·20 - 2·35m, 7·70 - 7·75m, 9·70 - 9·80m, 10·00 - 10·30m, 13·90 - 14·10m, 15·00 - 15·40m, 18·10m, 21·70m, 22·1 - 22·3m.								
		+									
		+									
		+									
	15	+									
		+									
		+									
		+									
		+									
		+									
	20	+									
		+									
		+									
		+									
		+									
	25		E.O.H. 24·00m								

FIG. 9









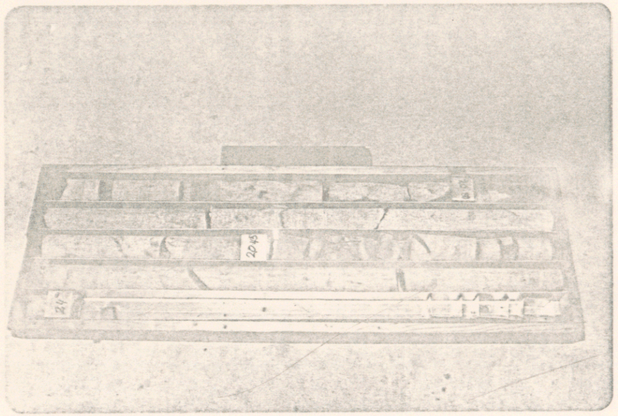


FIG. 10

URANNO MICROGRANITE DEPOS Γ

SECTION 16 HUNDRED OF STOKES

PHOTOGRAPHS OF DIAMOND DRILL CORE