DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

Rept. Bk. No. 80/118

DREW HILL ALBITE-QUARTZ GNEISS
Near Cathedral Rock, Olary Province.

By

C.H.H. CONOR
GEOLOGIST,

AND

R.J. HARRIS
TECHNICAL OFFICER
MINERAL RESOURCES

SEPTEMBER, 1980

D.M. No. 645/74

CONTENTS

TABLES

PLANS

PLATE

APPENDICES

A Visual estimates of mineralogy extracted from AMDEL Progress Report No. 8, Project 1/1/169 by Dr. B. Stevenson.

B Partial chemical analyses-extracted from AMDEL Progress Report No. 8, project 1/1/169 by Dr. B. Stevenson.

C Preliminary Ceramic Tests - extracted from AMDEL Progress Report No. 9. project 1/1/169 by Dr. W.G. Spencer.

DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

Rept. Bk. No. 80/118
D.M. No. 645/74

DREW HILL ALBITE-QUARTZ GNEISS
Near Cathedral Rock, Olary Province

ABSTRACT

Near Drew Hill, fine grained albite-quartz gneiss within the Willyama Complex consists essentially of equal amounts of albite and quartz.

Reserves of 400 000 tonnes are inferred to a depth of 10 m in the area studied with further substantial tonnages along the strike length of 2 km.

The material fuses above 1200°C and is grey when fired.

Systematic sampling of albite-quartz gneiss in the Olary region is recommended to locate sites richer in albite than Drew Hill.

INTRODUCTION

Following mapping of four pegmatites that had been mined for feldspar (Olliver, 1973) and a review of chemical analysis of feldspar in Departmental records, a reconnaissance sampling programme was undertaken in the Olary Province (Olliver and Stevenson 1980).

Early work was restricted to pegmatites but later granitoid and gneiss were sampled. During this investigation, an albite-quartz gneiss was recognised near Drew Hill pegmatite (Conor and Harris, 1980).

The authors stadia surveyed, geologically mapped and sampled part of this gneiss in September, 1977 to determine potential as a source of soda feldspar.

LOCATION

The deposit is 1.3 km south of Cathedral Rock and 1.3 km north west of Drew Hill on Bimbowrie Station, Olary Province north out of Counties within the Far North Planning Area.

The deposit is 600 m east of Raven Hill South Feldspar Mine, which in 1980 is the only operating feldspar deposit in the State.

ACCESS

From Olary, the Bimbowrie road is travelled northward (Fig. 1). The road bifurcates at a creek crossing 18.5 km from Olary and the easterly fork is followed past Old Boolcoomata Station. The deposit is in the hills, 1.3 km south of Cathedral Rock and is 200 m south of Drew Hill pegmatite (Conor and Harris, 1980). Direct access is by foot and samples were carried out to Raven Hill South Feldspar Mine which is 600 m west.

TENURE

The deposit is on Bimbowrie Station which is pastoral lease-hold property leased by Olcar Pty. Ltd. Currently the area is held by Esso Exploration and Production Australia Inc.

GEOLOGICAL SETTING

The area consists of regional blocks of high grade Willyama Complex metamorphics including schist, gneiss and granitoid. The blocks are separated by corridors of weakly metamorphosed Adelaidean sediments. Figure 2 is based on the preliminary geological plan of Bulloo 1:50 000 sheet prepared by G.M. Pitt (Geologist, Regional Geology Section). The deposit is in the Boolcoomata block on the west-east limb of a regional fold. A calcsilicate bed is overlain by quartzo-feldspathic schist and an albitite unit. Mount Mulga Barite Mine is located within a barite rich zone in this albitite unit. Strike varies from north-south at Mount Mulga Barite Mine to eastnortheast at the site mapped. A west-east fault designated the Drew Hill Fault dislocates

the sequence. The portion of the albitite bed which is the subject of this report is east of the Drew Hill Fault.

GEOLOGY OF THE DEPOSIT

The albitite bed, 100 m wide, consists of fine grained, albite-quartz gneiss. Mapping was restricted to a strike length of 200 m (Fig. 3). Barite is absent but an increase in magnetite content and pods of ferruginous quartzite near the top of the unit may be the lateral equivalent of the barite horizon.

Albite quartz gneiss is underlain by a migmatitic quartz-feldspar-mica schist and overlain by dark, biotite schist with a thin discontinuous quartzite.

The albite-quartz gneiss is fine grained with sacchoroidal texture and it is faintly banded where mafic content is higher. The rock splits into elongate blocks along a moderate well defined foliation (see Plate 1). Foliation and banding dip southerly at about 80^{o}. Tensional lenticular gashes are filled by perthitic pegmatitie.

SAMPLING

Three sample lines 40 m apart were pegged across the albite-quartz gneiss. Rock chip samples were taken from 5 m radii about each sample point at 10 m intervals. One composite chip sample was taken from the whole area and together with nine samples from Line A (Fig. 3) were submitted to the Australian Mineral Development Laboratories (AMDEL). Samples from Lines B and C are stored at the Glenside Core Library.

RESULTS OF SAMPLING

The gneiss consists essentially of albite and quartz. There are traces of biotite, chlorite and opaques but no K-feldspar nor microcline perthite were detected by optical examination (see Appendix A). The chemical composition

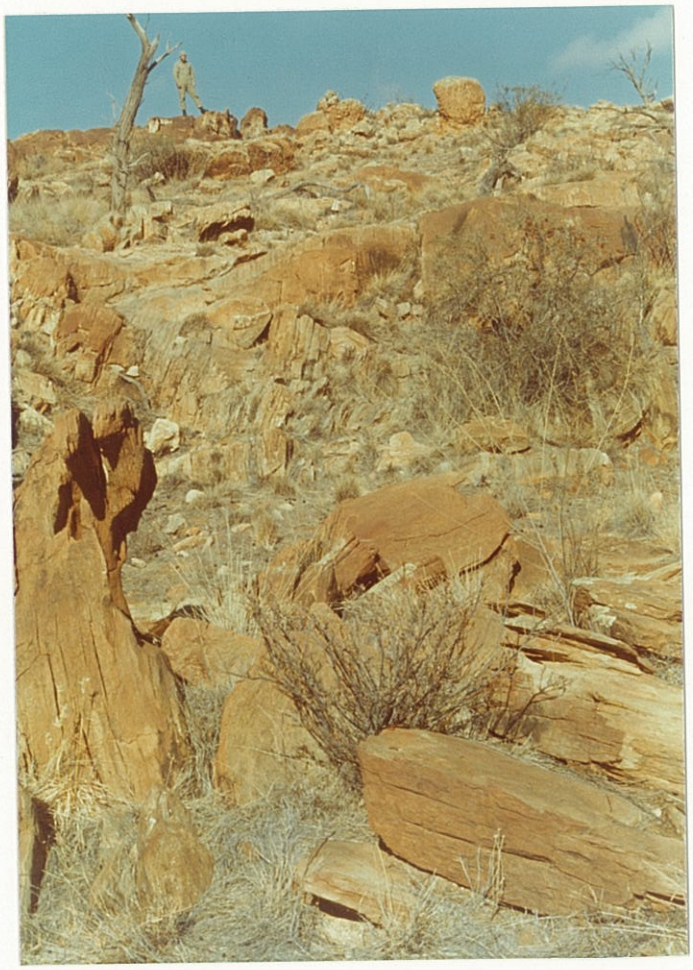


PLATE 1 29944

Drew Hill Albite-Quartz Gneiss (Sept, 1977)

Flaggy outcrop of albite-quartz gneiss
View to southwest along strike of steeply foliated
gneiss. Rounded outcrop of lens of pegmatite at top right
contrasts to flaggy gneiss.

of the composite sample and the range and calculated average for the 7 samples of gneiss on Line A from Appendix B are compared to theoretical pure albite in Table 1.

TABLE 1

Chemical Compositon (%)

	Composite Sample P727/77	Line A Range	Line A Average	Theoretical Albite
SiO_2	82.0	81.8-83.5	82.04	68.7
Al_2O_3	11.0	6.00-7.00	7.06	19.5
Na_2O	6.75	5.65-6.50	5.91	11.8
K_2O	0.18	0.03-0.47	0.22	nil
CaO	0.09	0.04-0.10	0.07	nil

The mineral norm of the composite sample is compared in Table 2 with the range and average mineral norm of the 7 gneiss samples calculated from Appendix B and visual estimates from Appendix A.

TABLE 2

Mineral Composition (%)

	Calculated Norm			Visual Estimate		
	Composite P272/77	Line A range	Line A average	Composite P272/77	Line A range	Line A average
Quartz	40	45-55	48	50	35-50	44
Albite	60	45-55	50	50	50-65	55
Others	nil	trace-5	2	nil	trace-5	trace

The two samples of pegmatite (P728/77 and P731/77) contain potash feldspar as microcline perthite.

The results of preliminary ceramic testing of 3 selected samples are detailed in Appendix C. The gneiss is comparatively

refractory being only partly fused at 1200°C and fires to a grey colour.

In comparison, the microcline perthite pegmatite (Sample P731/77) is highly fused at 1200°C.

RESERVES

Reserves of albite-bearing gneiss are large as the bed mapped extends for 2 km. Also, similar beds have been recorded elsewhere in the region.

Within the area mapped, albite-quartz gneiss below the magnetite rich zone is approximately 200 m long and 80 m wide. Based on a specific gravity of 2.5, inferred reserves to a depth of 10 m are 400 000 tonnes assuming the rejection of 10% of included pegmatite.

CONCLUSIONS

Drew Hill albite-quartz gneiss is a fine grained metamorphic rock in the Willyama Complex. Mineral composition approximates 55% albite and 45% quartz. Large reserves in excess of 450,000 tonnes, are available. Preliminary ceramic tests were not promising as the material requires a high firing temperature and the product is not white. Beneficiation to separate fine grained albite and quartz is not practicable.

Further exploration is required in the Willyama Complex to locate albite-rich gneiss free of contaminants and with less quartz and with firing characteristics suitable for ceramic and other purposes.

CHHC,RJH:AF

C.H.H. CONOR

R.J. HARRIS

REFERENCES

Conor, C.H.H., and Harris, R.J., 1980. Drew Hill Pegmatite, Olary Province. Bimbowrie Station. S. Aust. Dept. Mines. Report 80/119 (unpublished).

Forbes, B.G., and Pitt, G.M. The Geology of the Olary 1:250 000 sheet. S. Aust. Dept. Mines report (unpublished).

Olliver, J.G., 1973. Feldspar Deposits, north of Olary. S. Aust. Dept. Mines report 73/237 (unpublished).

Olliver, J.G., and Stevenson, B.G., 1980. Pegmatites north of Olary, a review of feldspar and beryl mining and the results of reconnaissance sampling of feldspar. S. Aust. Dept. Mines report 80/ (unpublished).

APPENDIX A

Visual estimates of mineralogy extracted from AMDEL Progress Report No. 8, Project 1/1/169

by Dr. B.G. STEVENSON

VISUAL ESTIMATED MODES (%)

Sample	Location	Quartz	Albite	Perthite	Others
P727/77	composite	50	50	-	musc, ops
P728/77	A10	15	70	10-15	musc
P729/77	A20	50	50	-	musc, bio, ops
P730/77	A30	35	60	-	ops, musc, bio
P731/77	A40	25	15	40	musc (20%)
P732/77	A40	40	55	-	bio (5%), chl
P733/77	A50	50	50	-	bio, ops
P734/77	A60	50	50	-	ops
P735/77	A70	35	65	-	bio, ops, clay
P736/77	A80	45	55	-	bio (2%), musc, ops

musc = muscovite
ops = opaques
bio = biotite
chl = chlorite

Note P728/77 and P731/7 are samples of pegmatite

APPENDIX B

Partial chemical analyses extracted from AMDEL Progress Report No. 8. Project 1/1/169

By Dr. B.G. STEVENSON

P-number/77	727 composite	728 A10	729 A20	730 A30	731 A40P	732 A40G	733 A50	734 A60	735 A70	736 A80
Analysis (wt %)										
SiO_2	82.0	76.3	81.8	81.8	76.9	81.8	83.5	81.8	81.8	81.8
Al_2O_3	11.0	10.4	6.95	6.85	9.25	6.00	7.80	7.35	7.20	7.30
Na_2O	6.75	5.25	5.75	5.65	2.80	5.75	6.50	6.15	5.80	5.80
K_2O	0.18	2.95	0.08	0.09	4.55	0.39	0.09	0.03	0.47	0.38
CaO	0.09	0.05	0.10	0.06	0.09	0.07	0.04	0.05	0.07	0.08
Total	100.0	94.9	94.7	94.5	93.6	94.0	97.9	95.4	95.3	95.3
Norms (approx)%										
Quartz	40	40	50	55		45	45	50	45	45
Albite	60	45	50	45		50	55	50	50	50
Others	-	>15	-	-		5	-	-	5	5

Note P728/77 and P731/77 are samples of pegmatite

APPENDIX C

Preliminary ceramic tests extracted from AMDEL Progress Report No. 9. Project 1/1/169

By Dr. W.G. SPENCER

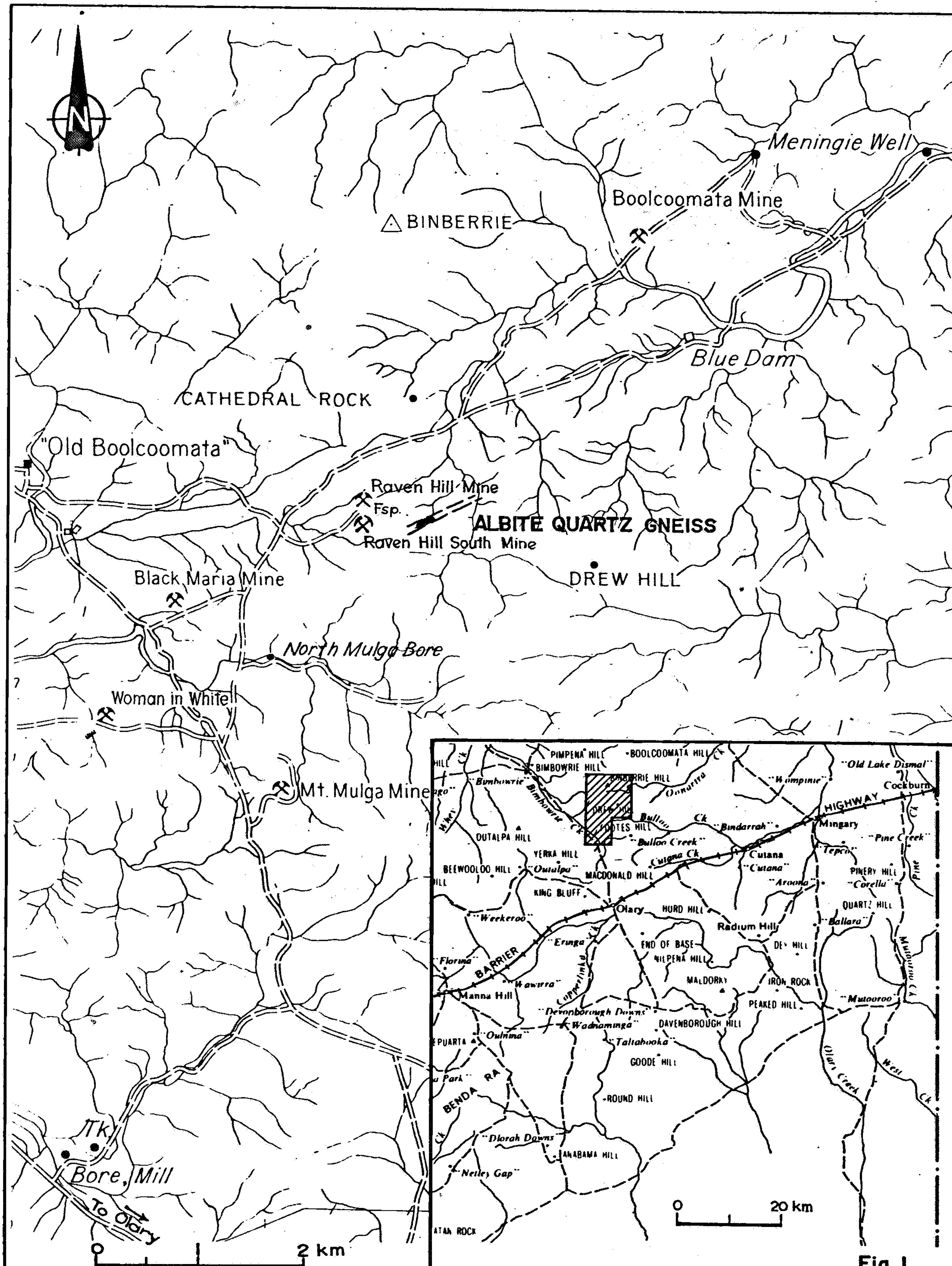
Notes on Fired Samples, Colour and Degree of Fusion

	1050°C	1100°C	1150°C	1200°C
P731/77	orange very slight	orange slight	grey part	grey high
P734/77	pinkish buff very slight	buff slight	grey slight	grey part
P736/77	pinkish grey very slight	pinkish grey slight	pale grey slight	pale grey part

Note P731/77 is a sample of pegmatite.

Terms for degree of fusion are

nil	no change in shape or volume
very slight	weakly sintered
slight	sintered
part	some melting, outline preserved
high	almost complete melting, outline just visible
full	complete melting, globule produced.


N
Meningie Well
Boolcoomata Mine
BINBERRIE
Blue Dam
CATHEDRAL ROCK
"Old Boolcoomata"
Raven Hill Mine
Fsp.
ALBITE QUARTZ GNEISS
Raven Hill South Mine
DREW HILL
Black Maria Mine
North Mulga Bore
Woman in White
Mt. Mulga Mine
Tk.
Bore, Mill
To Olary
0
2 km
PIMPENA HILL
BOOLCOOMATA HILL
BIMBOWRIE HILL
"Bimbowrie"
"Old Lake Dismal"
Cockburn
HIGHWAY
Mingary
"Bindarrah"
"Bulloo Creek"
Cutana
"Cutana"
"Pine Creek"
OUTALPA HILL
YERKA HILL
"Outalpa"
BEEWOOLOO HILL
MACDONALD HILL
KING BLUFF
Olary
HURD HILL
Radium Hill
"Weekeroo"
"Eringa"
END OF BASE
NILPENA HILL
BARRIER
MALDORKY
IRON ROCK
"Florina"
"Wawirra"
Manna Hill
PEAKED HILL
"Mutooroo"
"Devonborough Downs"
Wadnaminga
DAVENBOROUGH HILL
"Oulnina"
"Taltabooka"
GOODE HILL
BENDA RA
ROUND HILL
"Dlorah Downs"
ANABAMA HILL
"Netley Gap"
0
20 km
Fig. 1

	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE: 1:50 000
COMPILED C.H.H.C.	DREW HILL ALBITE-QUARTZ GNEISS OLARY LOCALITY PLAN	DATE: MARCH 1978
DRN A.F. | CKD		PLAN NUMBER S13328
16/10/80		

592

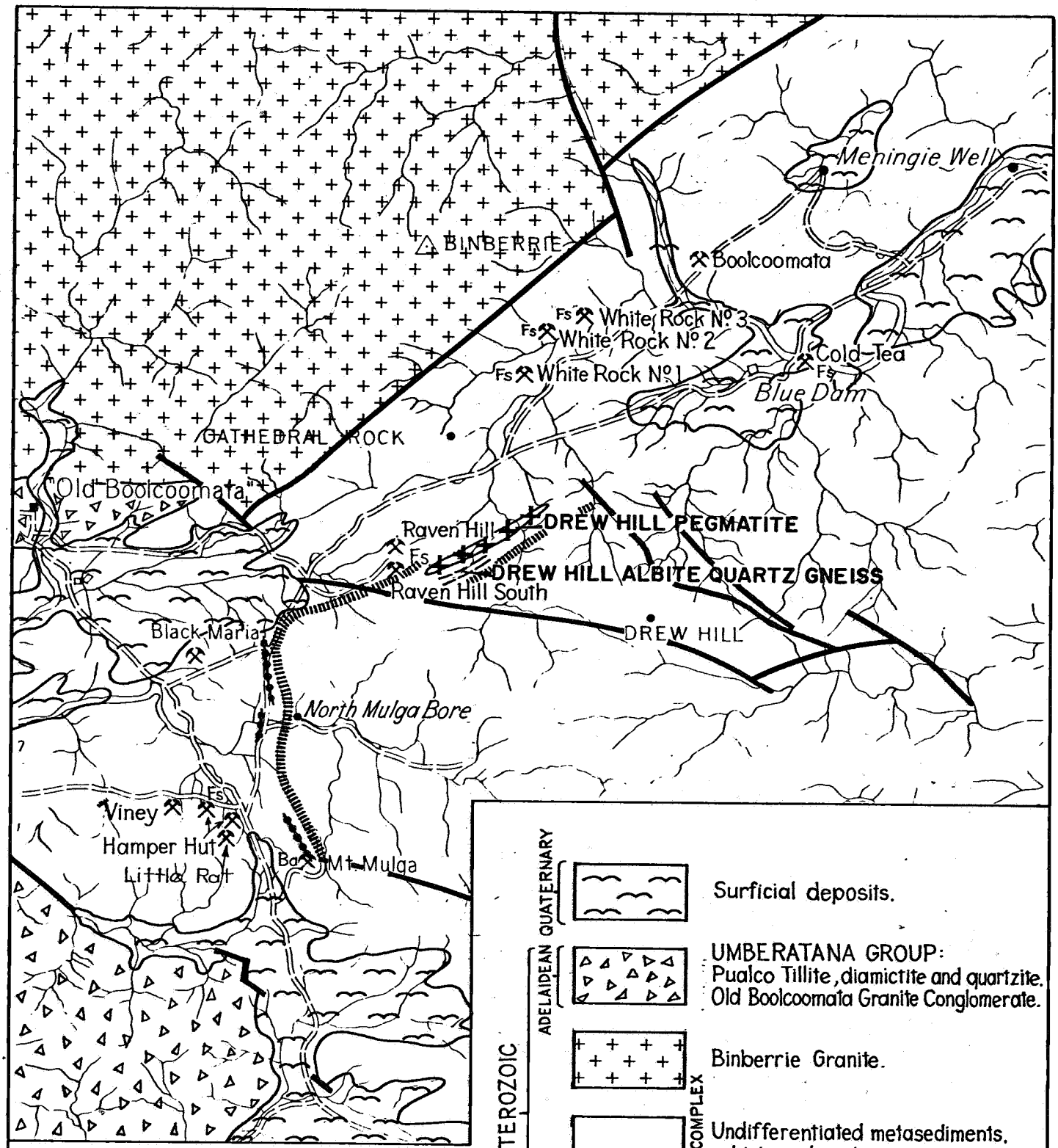
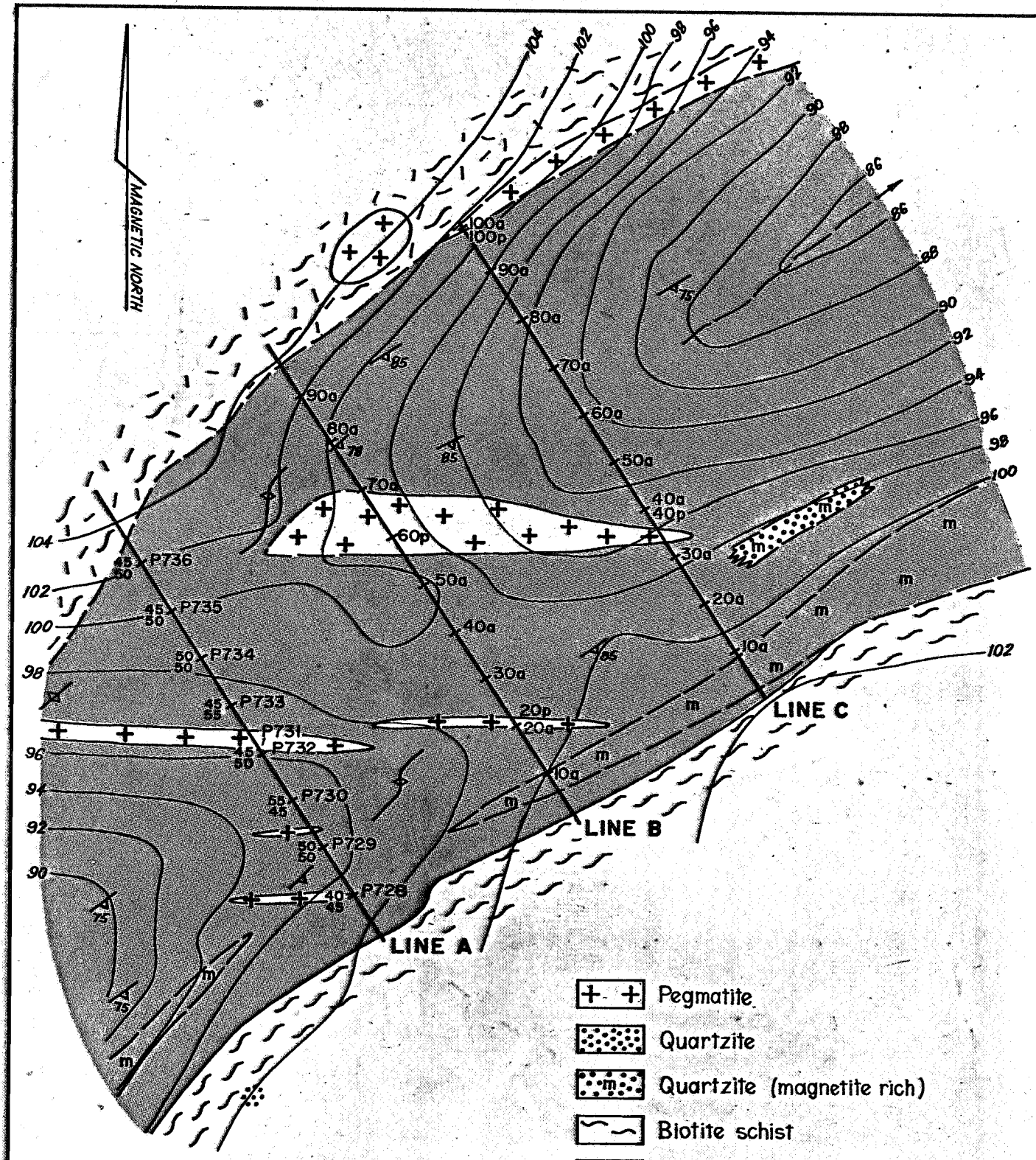


FIG. 2

	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE: 1:50 000
COMPILED: C.H.H.C.	DREW HILL ALBITE-QUARTZ GNEISS OLARY REGIONAL GEOLOGY	DATE: APRIL 1980
DRN: A.F. CKD		PLAN NUMBER S15125
for C.D.O. 16/10/80		

592



Line A

Analytical values (%) Quartz 45 / Albite 50 — P731 Rock chip sample number (1977)

Lines B & C

90a.... Albite gneiss.

90p.... Pegmatite.

Stadia survey by R. Harris S.F.B. 573 Arbitrary Datum

Fig.3

	DEPARTMENT OF MINES AND ENERGY SOUTH AUSTRALIA	SCALE: 1:1000
COMPILED: C.H.H.C.	DREW HILL ALBITE-QUARTZ GNEISS OLARY GEOLOGICAL PLAN	DATE: MARCH.1978
DRN: A.F. CKD:		PLAN NUMBER S13329
16/10/80		

592