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EL 2075 MOUNT IRWIN

FIRST AND FINAL REPORT FOR THE PERIOD
3/4/1995 TO 2/4/1996

Submitted by

Aberfoyle Resources Ltd.
1995

MINES AND ENERGY
SOUTH AUSTRALIA

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ENVELOPE 8931

TENEMENT: EL 2075, Mount Irwin

TENEMENT HOLDER: Aberfoyle Resources Ltd. Exploration Division

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[Note: Colour micofilm images of Pgs 46, 49, 51, 53, 55, 57, 60, 63, 65, 68, 71, 73 and 80, follow the plans on the microfiche].

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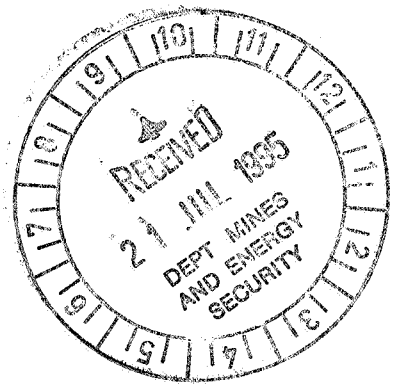
Aberfoyle Resources Limited

EXPLORATION DIVISION

EL 2075 "MT IRWIN"

MUSGRAVE BLOCK, SOUTH AUSTRALIA

FIRST AND FINAL REPORT ON EXPLORATION



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1. Introduction

EL 2075 of 1,305 square kilometres granted on 3 April 1994 straddles the South Australia - Northern Territory border (Fig. 1). The eastern part of the EL (east of longitude 133°30') lies within an SAEI area and hence this portion of the licence has double normal expenditure commitment; a reduction of this area by at least 30% by the end of the first year of tenure is required. The western margin of the EL abuts the Pitjantjatjara Lands.

The exploration target is "Broken Hill type" Pb Zn Ag mineralisation in the Birksgate Complex. Ferruginous, locally manganiferous quartzite reported in metamorphics to the east of the tenement, were considered potential hosts to, or lateral equivalents of, exhalative base metal mineralisation.

2. Work Completed

2.1 Airborne magnetics processing

Available airborne magnetics coverage was image-processed and merged by Pitt Research Pty Ltd (Fig. 2). Unfortunately the quality of data west of longitude 133°30' is rather poor, being 1.5 km line spacing. A central east-west zone of similar magnetic character could nevertheless be interpreted (Fig. 3); this narrows to the east, where mainly granitic to adamellitic intrusions (Kulgera Suite) at shallow depths are inferred. The magnetic character of this central zone extends west and includes areas where numerous occurrences of potentially prospective quartzites have been described (Eateringinna 1:100,000 sheet; Conor, 1978). A number of magnetic anomalies were selected for field checking as, conceivably, these might reflect concentrations of pyrrhotite or magnetite with accompanying base metals.

2.2 Field reconnaissance

Field checking of magnetic anomalies was carried out over approximately 8 days; it became evident that the abundance of large (>5 m thick) strongly magnetic basic doleritic dykes in the area, and the wide (1.5 km) line spacing of the airborne magnetic data of the earlier (western) survey was of little use in outlining pre-dyke structure and stratigraphy. Most of the interpreted prospective central zone referred to above, unfortunately, lies to the west of the recent (400 m line-spacing) ABMINGA (SAEI) survey. Results of this phase of fieldwork are summarised in Fig. 3; in Appendix 1 are listed sample descriptions and notes on observations in the vicinity of selected magnetic anomalies.

In a slightly elevated area, some 20-30 m above the surrounding sand plains, and lying between the Stuart Highway and the Tarcoola - Alice Springs Railway, magnetite, feldspar and garnet-bearing quartzites

were discovered. These lie approximately 40 kms east of previously reported quartzite occurrences (on the Eateringinna 1:10,000 map sheet area). Exposure is usually quite poor and is mainly subcrop/float. In most instances the exposure is only present because of the presence of very resistant quartz (± trace magnetite) veins (local sweats or segregations from the adjacent quartzites). These "veins" or segregations frequently follow primary layering (defined by variations in feldspar or magnetite content) but in some instances follow younger fracture planes, for example some are found to be parallel to local dolerite dyke orientations. The dykes typically overprint the quartzites and in only one instance was a dolerite dyke found to terminate against a quartzite/quartz vein subcrop - and in this case the contact was faulted.

Apart from these resistant glassy quartzites and dolerite dykes, exposure of other rock types in this area is rare. Where present, as subcrop adjacent outcropping dykes or quartzite occurrences, or as float amidst calcrete excavated by rabbits, it is usually granitic gneiss; some material is biotite-poor and not obviously foliated. Even within the quartzite/quartz vein subcrop areas, which may be up to 50 m or more in width (shown approximately to scale in Fig. 4), actual exposure is typically around 5 to 15%. In some areas it can be inferred that much of the remainder may be quartzo-feldspathic gneiss, but frequently there is little clue as to the nature of the unexposed lithology.

A veneer of sand covers most of this area, with variable development of calcrete beneath. It is anticipated that any significant base metals sulphide mineralisation would occur within a host comprised of a considerable proportion of Fe-Mn silicates and have relatively low quartz content, and hence would almost certainly not outcrop.

Within the above area of approximately 35 square kms, at least 17 strike kms of quartzite have been defined. These rocks contain, apart from almost ubiquitous magnetite (and extremely variable) feldspar, also garnet (trace to around 7%), biotite, finely disseminated sillimanite and spinel (mostly in association with and believed to be an exsolution product formed during granulite facies metamorphism of magnetite - see Appendix 3). A magnetite streaking lineation is commonly developed. At a few locations, small scale open upright folds are visible, and recumbent isoclinal folds are also discernible in unusually good outcrops.

Gossanous(?) material was only found at one locality (samples 773516, 773516B). Here a maximum rock-chip Cu value was obtained - 160 ppm. Not surprisingly the generally low iron oxide content of these quartzites (typically 1-2% Fe) is reflected in their low base metal contents. Manganese content is around 200-300 ppm, with a maximum of 500 ppm. Maximum Pb reported is just 4 ppm and 68 ppm Zn.

Quartzites lacking obvious gossanous material had a peak of 130 ppm Cu.

For the most part, the land to the east of this elevated area of quartzite occurrence is covered by sand, with minor large masses of granite gneiss and rare dolerite dykes. To the west, towards the Pitjantjatjara Lands, the outcrop of basic dykes and granitic gneiss (some garnetiferous) is more common. Thick calcrete (± porcellanite) profiles are locally developed.

Minor occurrences of quartzite were also found in the vicinity of magnetic anomaly ALB06A (see Fig. 3) about 8 kms west of the main quartzite area shown in Fig. 4. Bedrock exposure here is rare, however the occurrence confirms the presence of quartzites over an area of perhaps 100 square kilometres.

2.3 Ironstone lag (pisolite) sampling

During the first phase of reconnaissance, ironstone lag pebbles (both magnetic and non-magnetic) were collected. These produced a considerable range in base metal levels (see Appendix 2), however there is little consistency in the results - as to whether the magnetic or non-magnetic factions contain the highest or lowest levels of a particular metal. For comparison, a sample of lag from the Coober Pedy area (where the sources of lag are Mesozoic and Cainozoic sediments) was analysed. This (sample 773500) displays similar metal levels to approximate background in the Mt Irwin tenement. Here, an inherent complication with using lag geochemistry is likely to be the influx of Tertiary ferricretes from the east (Tieyon area) and possibly southwest (Sundown area). The technique requires further evaluation. In the elevated quartzite subcrop area, where lag may be mainly or entirely local, it is interesting that by far the highest manganese level recorded was from a sample (non-magnetic fraction) collected in the vicinity of quartzite occurrence (2.07% MnO reported).

2.4 Petrology/electron probe analysis

Petrology (Appendix 3) has identified disseminated magnetite, feldspar, sillimanite, biotite, amphibole and trace spinel in the quartzites. Electron microprobe on spinel and garnet in two samples has identified around 2.5-3% Zn in the spinel (most are considered to be exsolved from magnetite during metamorphism). Of particular interest is the garnet composition. This display significant variation from around 1% spessartine component in one sample, to 12% in the other. This variation potentially may be a useful exploration tool as base metal mineralisation is expected to be associated with a manganese halo.

3. Conclusions

The Musgrave Block as a Middle Proterozoic mobile belt has potential to host Broken Hill style Pb-Zn deposits. It is relatively poorly known but is approximately the right age and contains high grade metasediments/ volcanics with thin BIF, marbles etc elsewhere. No known base metal mineralisation has yet been located elsewhere in block.

Field reconnaissance of EL 2075 has shown that:

- outcrop is very poor;
- some glassy quartzites of interest have been located, but no "proximal meta-exhalites" or Pb-Zn mineralisation have been observed;
- magnetic dolerite dykes are abundant making aeromagnetic interpretation difficult;
- new detailed aeromagnetic surveys would be required on which to base follow-up vacuum/RAB geochemistry.

The area is remote from developed infrastructure, although the Stuart Highway and the railway cross western part of EL. Alice Springs is 250 km to the north.

Given the location, unconfirmed potential, lack of mineralisation or geological encouragement, the poor outcrop and the expensive and difficult follow-up required to upgrade the tenement (aeromags, airborne EM, vacuum/RAB geochem), no further work is recommended.

4. Expenditure

Expenditure on EL 2075 "Mt Irwin" from 3 April 1995 to the date of relinquishment was $34,675.04. A statement of expenditure appears on the following page.

EXPLORATION LICENCE 2075 "MT IRWIN"

SUMMARY OF TOTAL EXPENDITURE

	$
GEOLOGY	21,537.84
GEOPHYSICS	3,400.00
GEOCHEMISTRY	1,062.77
TENURE	4,111.75
OTHER SERVICES	438.33
INDIRECT COSTS	4,124.35
TOTAL	$34,675.04

APPENDIX 1

Sample list and observations in vicinity of selected magnetic anomalies

EL 2075 MT. IRWIN. OBSERVATIONS IN VICINITY OF SELECTED MAGNETIC ANOMALIES

Magnetic anomaly	AMG - coordinates of Observation point		N-Lts.
	E	N	
ALB01	335870	7110073	? Thin Sand cover No pisolites/lag
ALB02	331831	7110511	Sandy soil cover (prob. thin sand veneer over residual soil) No lag. Traverse for 850 m to 010° - same.
ALB03			gneissic granite outcrops only; rare thin dolerite
ALB04			transported cover > 1.5 m thick (clayey pebbly sand). No lag
ALB05			NE East end of anomaly subcrop, rare outcrop magnetic veined basic dykes with granite clasts. Exposure is +200 m x ~60 m, strike ~230°/~20° to trend of mag. anomaly)
ALB06	322272	7110324	Sand cover only. No pisolites/lag.
ALB07	323688	7110343	E extension of ALB06 Sandy cover, no lag.
ALB08	323598	7112278	Sand cover. no lag.
ALB09	317136	7111306	~100 m south of anomaly area (which is sand-covered). Here - basic dykes & trend similar to that of anomaly. Hybrid basic dyke/granite rock (as clasts) as rare S/C

Mag. Anomaly	E	N	Notes
ALB 0 GA	319683	7113830	Sparse subcrop magnetic basic dyke rock. About 400m to NW, quartz vein or quartzite ± fr. magnetite appears to almost coincide with anomaly position.
ALB 10	320 604	711 8108	immediately south of anomaly. 1 occas. low outcrops of Mg. unfoliated granite amidst sandy soil cover. Occas. basic dykes trending 250° ~ 20m to NE. Strike > 2
ALB 10	320500	7118300	Approx. centre of anomaly. Sandy soil cover. Minor pisolites. (? from mafic dyke source)
ALB 11	323700	7119350	sandy soil cover + calcrete float (from low rise 50–100m to N) No pisolites.
ALB 11	323776	7119360	calcrete, minor pisolites.
ALB 11	324115	7119612	calcrete, v. com. pisolites over ~30×30m area.
ALB 12	330 331	7118625	near centre of anomaly quartzite outcrop ± fr – fine % magnetite

	E	N	
ALB 12	330770 E	711 8886	common basic dykes, trend ~270° otherwise sand cover.
ALB05A			sand cover
ALB 13	3255100	7115000	Sand cover, Minor basic dyke o/c, tre ~240°. Cover is very coarse L'ller sand and occas. cg granite fragmen
ALB 14	327500	7113600	near ALB14 Sandy soil cover. Minor o/c basic dykes to west.
ALB 15	328500	7115300	soil covered.

EL 2075 MT. IRWIN

SAMPLE LIST

Sample No.	Type (P = pisolite/lag, R = rock chip)		AMG co-ords E	AMG co-ords N	Comments
773442	P		334824	7107537	Mesa with ferrug. capping ~500m to N
443	R	magnetite-bearing basic igneous	336201	7109532	subcrop
444	R	weathered ?granitoid, v. minor & ferruginous (?sl. gossanous) ?metasediment	334336	7110502	extensive silcrete float occas. subcrop of gneissic rock 10-15m wide trend 138°. Encloses kaolinised Kulgeran granite
445	R	magnetite-rich unfoliated basic dyke with granite clasts.			Exposure ~200m+ x 6
446	R	as above	317050	7111354	subcrop in vicinity of mag anomaly ALB09. Trend of this subcrop ~215° 75m wide, 100 plus strike
447	R	fractured quartz "vein". Local mg. ?Kspar, tr. magnetite Feldspar to 70% (rarely)	319903	7113942	?quartz vein or quartzite 1-2m wide, trend 225°. (dykes trend 255°)
448	P		320500	7118300	ALB10
449	P		320652	7118900	low rise with calcrete, minor pisolite near ALB10 rabbit warren
450	R	quartz-chlorite-sericite mod. ?altered granite ??	"	"	

Sample No.	Sample type	AMG co-ords E	AMG co-ords N	Comments
773451	P	320670	7119510	approx. centre of ~100m x100. calcrete area with minor lag.
773452	P	321291	7119335	calcrete rise with minor pisolite lag
453	R greenish mg-cg ?granite	"	"	minor m-cg granite from rubble warrens
454	P	321863	7119649	near western end of E-W calcrete "ridge": silcrete nodules. Minor pisolite (773454)
455	P	323776	7119360	calcrete "rise", minor lag, vic ALB 11
456	P	324115	7119612	calcrete float; v. common psol over ~30x30m area. (Rare ironstone pebbles to 8cms across) V.c. ALB 11
457	P	325356	7119185	Calcrete rise. Rare pisolites.
458	R gneiss	"	"	Trace fragment of gneiss on calcrete rise. Non-magnetic w ~10% maybe mineral (? tourma

Sample No	type	Co-ords E	Co-ords N	comments
773459	R pale green v. weath. ?bedrock	325170	7119273	on calcrete rise referred to above
460	R minor ?mafic gneiss amidst mg gneissic biotite-rich granitoid.	321244	7118534	on rabbit warren.
461	P	"	"	minor lag.
462	P	321425	7118057	abundant lag over ~15m diam. area. Minor quartz vein fragments (<1" to occas. ton scms. Fractured, no FeOx's
463	P	323913	7118480	large lag-rich area, traversed by Holyoake Well-Brousson Well track
464	R quartzite. minor magnetite, rare feldspathic layers.	330337	7118625	glassy; weak layering, common magnetite streaking lineation on ?bedding faces. Near anomaly AL-B12.
465	R q f bi intrude	"	"	just S-West of above
466	R quartzite; tr. magnetite	329880	7117510	80m to S is hill ~50×30m of quartzite o/c.
	No Samples	329835	7117432	Centre of hill above.

		E	N	
773467	R ? quartzite	330571	7119369	tr. mt, v. minor feldspar. exposure trend ~335°, ~30m wide for +150m to NW
	no samples	332993	7116568	quartzite → "quartz vein" ± dissem. f-mg feld. to ~10%; sinuous o/c.
468	Stream sediment sample	368625	7107800	re-sampling of CRAE stream sediment sample site 1623821
469	P	368798	7107844	few sqm. of well foliated granite o/c nearby.
470	R fg mt-bearing basic rock	369025	7108073	approx. centre of ~200 m diam. area of rare subcrop of fg magnetite-bearing basic with considerable weathered feldspar component.
471	P	"	"	pisolites. mainly restricted to areas of igneous rock float. Eroding area sand covered, with no lag.
472	P	369510	7108505	rabbit warren, exposing silcrete, calcrete, v. minor kaolinised mg. granite, v. minor pisolites. Rare

		E	N	
773473	R Amphibolite	362354	7107826	gneissosity in amphibolite has similar orientation to adjacent granite gneiss. Amphibolite body at least 13 metres thick; others to east. Appear to be interlayered with granite gneiss
474	P	"	"	rare lag, mainly in vic. of magnesium-rich sands, and probably sourced from rocks in immediate area. (They are usually sub-C'la
	no samples	362181	7108094	foliated granite o/c, minor o/c basic dykes (unfoliated)
476	R hybrid: basic dyke with granitoid clasts.	321459	7116784	widespread s/c. minor o/c pink m-cg granite (host?)
	no samples	327480	7113745	cg granular qtz "veins" (or quartzite) & local biotite clots to ~2 mm, rare magnetite dis (max to perv. ~20) Trends ~ 165-175
477		327494	7113766	"quartz" veins → "quartzite. Edis

		E	N	
773478	R magnetite quartzite	327462	7113896	?quartzite, dissem. mt, vague layering, mt lineat
479	P	"	"	
480	R magnetite quartzite	327533	7115112	quartzite/qtz vei.
481	P	"	"	
482	R magnetite quartzite	328608	7115005	quartzite→quar "vein". Rips ~ 20° South
483	R basic dyke with granitic clasts	310084	7116359	
484A	R garnet bearing granite gneiss	310771	7115067	
484B	R ?metapelite			about 50m east of above: float (coal) near fence track.
485	P	316402	7120577	common lag in calcrete rich area.
486	P	316171	7120240	v. minor lag near S-end of calcrete rise
487	R rare ?haematite bands in basic dyke	317440	7116677	granite outcrop 2m to south.
no sample	eg granite, minor vein quartz	317181	7117303	rabbit warren
no samples	occas. wk. foliated granite, minor milky vein quartz	317198	7117371	open o/c, o/c.
488	R granite/basic dyke	317440	7116677	just south of

		E	N	
773489	R "quartzite" with dissem. feldspar	327671	7117188	uncommon.
490	R "quartzite" with rare aggregates of magnetite + ?? garnet	327429	7117093	45 m to N u/c of these co-ords
491	" "	"	"	30 m to west of coords
492	"quartzite", dissem. magnetite	327805	7117166	glassy → "vein quartz" appearance superficially
493	" dissem. tr. magnetite, feldspar (minor)	"	"	vague banding
494	P	327860	7117155	rare lag. occurs o/c basic dyke
495	R "quartzite	"	"	10 m N of co-ords (main quartzite o/c) feldspathic
496	P	328034	7117131	rare lag. Patchy o/c qtz vein → "quartzite"
497	R "quartzite", minor feldspathic bands minor dis. mt, rare mt + ?? garnet aggregates	328570	7117140	
498	P	"	"	minor lag.
499	P	328765	7117132	minor lag amid "quartzite" s/c, fl.

		AMG co-ordinates E	N	
773501	R quartzite. Up to 5% green ?chlorite; ± minor fg. garnet	319832	7113923	10m SW of sample 773447
502	R quartz-mt-?spinel	319795	7113700	0.5m pit
503	R m-cg granitoid. unfoliated. Rare epidote	320120	7115242	pit for road construction.
504	R chloritized ?sheared granitoid.	320440	7115550	exposed by rabbits.
505	R quartzite, fg. magnetite ± garnet.	330626	7113368	outcrop
506	R quartzite, dis. mt, feld., gt, ?spinel	330642	7113282	outcrop
507	R ?garnet + magnetite rich v. feldspathic zone in quartzite	330642	7113282	about 2 8 m south of AMG co-ords.
508	R ?sheared quartzite			few m from 773501
510	R mg biotite bearing fractured, unfol granitoid	327460	7114355	about 15m west of co-ords.
511	R quartzite ± min. garnet, tr. ?spinel	328534	7115021	
512	R quartzite; minor feld, occas. rare gt?	329856	7114679	
513	R sl. fract. quartzite	329594	7115020	
514	R quartzite, dis. fg garnet?			about 10m N of #513
515	R quartzite., tr.-few % mt, rare gt ± ?spinel	329322	7115222	
516	R fract. quartzite ± ?gossanous patches	329120	7115720	~20m SW of co-ords
516B	"			~40 m east of #516

773517	R quartzite, diss. mt, fold (variable), gt (to 7%)	329015	7115957	fold. qtzite → "granulite gneiss" locally. rare outcrop
518	R sl ?Mn Oxide - stained quartzite, c̄ diss. fold, min. mt, ?gt	328850	7116099	
519	R quartzite, finely diss. ?gt, tr. mt, min. fold.	328693	711 6213	
520	R quartzite with dissem. gt.	328180	711 6170	common on N side of o/c
521	R "	328049	711 6225	west end of o/c.
522	R Fe, ?Mn oxide - stained fract. qtz in a quartzite c̄ dis. mt, min biot, com. fold.	333175	7116546	
523	R quartzite, diss. fold, tr ?mt.	333220	7116623	
524	R granitoid, c̄ tr. garnet?	334570	7117518	calcrete area, rare bedrock ex railway fill from pit on west side
525	R quartzite → qfbi gneiss	340 445	7119312	
526	R mafic gneiss	340 480	7119770	continuation of railway fill; pit immediately to west
527	R granite gneiss → "quartzite". minor dissem. mt.	328371	711 9290	rare float
528	R quartzite c̄ tr. ?py	330600	711 9452	
529	R quartzite; tr. gl (to few %)	330675	711 9470	
529B	R Feox-stained fract. ?qtzite	330705	711 9470	rare float

773530	R qfbi ± mt gneiss, occas. v. siliceous → "quartzite"	331 223	7119787	
531	R quartzite, dis. gt tr → 5% .	330770	7118070	about 65m N-west of co-ords.
532	R quartzite, dis. feld. common → feld. quartzite. Min. gnet.	330217	7117502	~13m to 035° from co-ords.
533	R quartzite, commonly tr. dis. gt (to few %)	330370	7117480	good outcrop. open folds; note recumbent isoclinal folds also.
534	R quartzite, var. folds pelitic			float, Fe ox - stained
535	R quartzite → qtz vein Fe ox - staining	330812	7117317	uncommon Fe ox - staining
536	R quartzite	330945	7117312	
537	R qfbi gneiss → feld. "quartzite"	319010	7114265	uncommon quartz-rich variant of granitic gneiss?
538	R ironstone	332430	7116688	rare float, subround Note float of subround silcrete pebbles locally.
539	R quartzite. blue-grey, minor amph. mt?	329926	7117359	
540	R quartzite, loc. v. feld.; zones of mt-rich quartzite.	327850	7117175	~80 m to WNW of co-ords
541	R ironstone	327211	7116697	rare float, subrounded

APPENDIX 2

Rock chip and pisolite analyses

N = non-magnetic fraction
M = magnetic fraction

FILE MT. IRWIN 26

amdel

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NATA

MINERAL CHEMISTRY

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STEVE TOMPF.
Mr ~~Chris Drown~~
Aberfoyle Resources Limited
37 Fullarton Road
KENT TOWN SA 5067

FINAL ANALYSIS REPORT

Your Order No: 9652

Our Job Number : 5AD1465

Sample rec'd : 20/04/95
No. of samples : 71
Results reported : 02/05/95
Report comprises a cover sheet and pages 1 to 4

This report relates specifically to the samples tested in so far that the samples as supplied are truly representative of the sample source.

Approved Signature:

for
Alan Ciplys
Manager - Mineral Chemistry
AMDEL LABORATORIES ADELAIDE

EM C Drown ADELAIDE

Report Codes:
N.A. - Not Available.
L.N.R. - Listed But Not Received.
I.S. - Insufficient Sample.

Distribution Codes:
CC - Carbon Copy
EM - Electronic Media
MM - Magnetic Media

amdel

Job: 5AD1465
O/N: 9652

inal

ANALYTICAL REPORT

SAMPLE	Ag	As	Co	Cu	Mn	Ni	Pb
773442M	1.0	49	5	380	160	61	48
773448M	1.0	23	<1	29	195	11	64
773449M	1.0	34	4	25	540	27	89
773451M	0.5	27	32	66	340	76	26
773452M	<0.5	15	37	1000	420	185	22
773454M	<0.5	12	22	43	240	60	18
773455M	0.5	51	<1	14	180	5	42
773456M	0.5	43	32	38	1400	44	46
773457M	1.0	36	6	37	720	25	66
773461M	0.5	23	1	27	340	21	88
773462M	<0.5	18	<1	13	55	8	59
773463M	<0.5	13	1	15	175	13	38
773469M	1.0	32	1	15	175	9	74
773471M	1.0	42	4	63	520	19	100
773472M	<0.5	32	2	20	480	15	88
773474M	<0.5	13	19	63	340	25	14
773481M	<0.5	13	24	15	220	75	14
773485M	1.0	71	20	63	800	30	38
773486M	1.0	47	62	200	2600	200	86
773494M	0.5	22	28	52	440	77	38
773496M	<0.5	21	2	17	420	11	46
773498M	<0.5	19	6	17	280	26	40
773499M	0.5	64	7	43	900	27	62
773500M	<0.5	42	9	93	620	34	40
773442N	<0.5	25	1	61	140	11	28
773448N	1.0	23	11	12	2100	10	58
773449N	<0.5	24	6	45	660	24	56
773451N	<0.5	37	6	45	780	21	54
773452N	<0.5	34	9	73	280	31	42
773454N	<0.5	44	6	51	660	20	55
773455N	<0.5	30	7	46	860	24	42
773456N	<0.5	38	8	48	460	23	28
773457N	<0.5	21	6	69	620	32	32
773461N	<0.5	11	2	18	240	18	65
773462N	<0.5	15	1	30	50	9	38
773463N	<0.5	13	5	48	200	21	38
773469N	<0.5	32	3	42	150	14	40
773471N	<0.5	37	7	51	380	15	40
773472N	<0.5	31	4	32	400	13	61
773474N	<0.5	13	6	39	280	22	32
773479N	<0.5	18	9	52	880	24	32
773481N	<0.5	16	1	28	280	8	24
773485N	<0.5	24	6	29	820	17	42
773486N	<0.5	16	9	39	680	32	50
773494N	<0.5	18	200	93	2.07%	47	46
UNITS	ppm	ppm	ppm	ppm	ppm	ppm	ppm
DET.LIM	0.5	1	1	1	5	1	3
SCHEME	IC2E	IC2E	IC2E	IC2E	IC2E	IC2E	IC2E
UPPER SCHEME					OA4		

amdel

Job: 5AD1465
O/N: 9652

inal

ANALYTICAL REPORT

SAMPLE	Ag	As	Co	Cu	Mn	Ni	Pb
773496N	<0.5	17	14	76	520	44	60
773498N	<0.5	24	9	55	720	18	58
773499N	<0.5	5	10	61	155	47	14
773500N	<0.5	40	<1	11	115	3	40
773443	<0.5	6	24	44	780	23	4
773444A	<0.5	13	12	260	820	21	36
773444B	<0.5	12	11	200	1100	17	46
773445	<0.5	3	29	99	940	63	4
773446	<0.5	2	18	50	680	33	6
773447	<0.5	<1	2	13	150	10	4
773450	<0.5	6	40	20	100	90	<3
773453	<0.5	7	3	16	135	10	10
773459	1.0	5	9	6	220	14	<3
773464	<0.5	<1	3	7	130	6	<3
773466	<0.5	<1	1	5	25	5	<3
773467	<0.5	<1	3	23	95	8	<3
773470	<0.5	4	16	71	580	10	4
773476	<0.5	3	17	38	860	21	12
773478	<0.5	2	2	9	65	8	<3
773480	<0.5	<1	4	12	80	11	<3
773482	<0.5	<1	3	7	55	6	<3
773483	<0.5	4	12	14	900	6	14
773488	<0.5	2	28	87	1200	140	<3
773492	<0.5	2	12	20	320	21	4
773495	<0.5	4	8	15	260	16	<3
773497	<0.5	<1	6	47	440	18	4
UNITS	ppm	ppm	ppm	ppm	ppm	ppm	ppm
DET.LIM	0.5	1	1	1	5	1	3
SCHEME	IC2E	IC2E	IC2E	IC2E	IC2E	IC2E	IC2E

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Job: 5AD1465
O/N: 9652

inal

ANALYTICAL REPORT

SAMPLE	Au	Zn	Fe
773442M	I.S.	75	56.7%
773448M	<0.02	34	38.7%
773449M	<0.02	52	51.8%
773451M	I.S.	100	61.4%
773452M	0.08	43	36.2%
773454M	<0.02	60	35.2%
773455M	<0.02	31	37.7%
773456M	I.S.	160	44.7%
773457M	I.S.	57	46.0%
773461M	<0.02	37	39.9%
773462M	<0.02	26	37.3%
773463M	<0.02	26	28.3%
773469M	<0.02	51	51.7%
773471M	I.S.	56	51.8%
773472M	<0.02	47	46.8%
773474M	<0.02	36	31.8%
773481M	<0.02	38	35.5%
773485M	I.S.	165	44.7%
773486M	I.S.	500	51.4%
773494M	0.05	69	50.2%
773496M	<0.02	46	32.8%
773498M	<0.02	38	30.8%
773499M	<0.02	75	38.5%
773500M	<0.02	64	33.7%
773442N	<0.02	35	33.2%
773448N	<0.02	37	36.6%
773449N	<0.02	46	32.5%
773451N	<0.02	55	34.1%
773452N	<0.02	86	41.3%
773454N	<0.02	61	37.7%
773455N	<0.02	48	31.7%
773456N	<0.02	69	32.2%
773457N	<0.02	64	27.1%
773461N	<0.02	29	28.2%
773462N	<0.02	23	29.3%
773463N	<0.02	35	25.4%
773469N	<0.02	74	39.5%
773471N	<0.02	59	33.3%
773472N	<0.02	64	35.5%
773474N	<0.02	31	28.1%
773479N	<0.02	44	29.6%
773481N	<0.02	35	26.1%
773485N	<0.02	64	33.9%
773486N	<0.02	72	25.4%
773494N	I.S.	82	29.1%
UNITS	ppm	ppm	ppm
DET.LIM	0.02	1	100
SCHEME	AA8	IC2E	IC2E
UPPER SCHEME			OA4

amdel

Job: 5AD1465
O/N: 9652

inal

ANALYTICAL REPORT

SAMPLE	Au	Zn	Fe
773496N	I.S.	120	29.6%
773498N	I.S.	85	35.9%
773499N	I.S.	34	29.3%
773500N	<0.02	21	28.1%
773443	<0.02	56	7.77%
773444A	<0.02	72	15.4%
773444B	<0.02	67	21.6%
773445	<0.02	46	5.74%
773446	<0.02	70	3.99%
773447	0.02	11	7300
773450	<0.02	125	2.14%
773453	<0.02	19	7.29%
773459	<0.02	46	8800
773464	<0.02	7	1.59%
773466	<0.02	3	6000
773467	<0.02	5	9200
773470	<0.02	39	3.34%
773476	<0.02	76	3.24%
773478	<0.02	9	1.90%
773480	<0.02	14	1.99%
773482	<0.02	14	9800
773483	<0.02	140	5.22%
773488	<0.02	26	4.03%
773492	<0.02	16	4.71%
773495	<0.02	18	3.88%
773497	<0.02	18	3.51%

UNITS	ppm	ppm	ppm
DET.LIM	0.02	1	100
SCHEME	AA8	IC2E	IC2E
UPPER SCHEME			OA4

ANALABS Pty Ltd

0030

Dr S Toteff
Aberfoyle Resources Ltd
37 Fullarton Road
Kent Town

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Analabs Pty Ltd
ACN 004 591 664
16 Sunbeam Road
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Ph: (08) 336-5099
Fax: (08) 336-5564

Date Received : 22/05/95
Date Reported : 24/05/95

Job Number : AD013025
Order Number : 9679

Number of Samples: 23

Report Comprising: Cover Sheet
Pages 1 to 2

Authorised on behalf of:

Keith Hand
Manager
ANALABS

Analabs Adelaide ANALABS Pty Ltd ACN 004 591 664

< Job : AD013025 Preliminary Date : 24/05/95
Order No. : 9679 Page : 1 of 1

Element	Cu	Pb	Zn	Mn	Fe	Fe:1	Ag
773502	4	<3	32	375	2.75%	--	<1
773505	8	<3	6	104	1.08%	--	<1
773507	6	4	68	421	>5.00%	8.32%	<1
773508	18	9	62	262	>5.00%	6.68%	<1
773511	4	<3	14	108	9900	--	<1
773513	8	<3	8	172	1.61%	--	<1
773516	76	5	8	252	4.30%	--	<1
773516-B	160	<3	8	175	>5.00%	6.44%	<1
773518	8	<3	12	385	9800	--	<1
773520	12	<3	22	196	1.25%	--	<1
773522	10	<3	8	500	1.47%	--	<1
773523	22	<3	36	265	2.18%	--	<1
773529	14	<3	12	340	1.66%	--	<1
773529-B	44	<3	24	152	2.49%	--	<1
773531	24	<3	14	344	1.83%	--	<1
773532	8	<3	16	258	2.02%	--	<1
773534	14	<3	10	173	1.86%	--	<1
773535	18	<3	12	147	1.57%	--	<1
773536	130	<3	46	174	2.74%	--	<1
773538	62	67	34	252	>5.00%	52.8%	<1
773539	20	<3	8	134	1.18%	--	<1
773540	24	<3	30	296	3.12%	--	<1
773541	104	4	92	210	>5.00%	47.4%	<1

Method	GA140	GA140	GA140	GA140	GA140	GA140	GA140
Units	ppm	ppm	ppm	ppm	ppm	ppm	ppm
Detection Limit	2	3	2	3	5	5	1

APPENDIX 3

Petrology and electron probe analyses

Pontifex & Associates Pty. Ltd.

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SOUTH AUSTRALIA 5071

MINERALOGICAL REPORT NO. 6845

May 4, 1995

TO : Aberfoyle Resources Pty Ltd
37 Fullarton Road
KENT TOWN SA 5067

Attention : Dr Steven Toteff

YOUR REFERENCE : Order No. 9647

MATERIAL : Rock Samples

IDENTIFICATION : 773444A to 773497

WORK REQUESTED : Thin section preparation, petrographic description.

SAMPLES & SECTIONS : Returned to you with this report.

PONTIFEX & ASSOCIATES PTY. LTD.

INTRODUCTION

Twenty thin sections, numbered between 773444A and 773497 are described in this report. The thin section examinations are supplemented by staining he offcuts with sodium cobalti nitrite to highlight the distribution and abundance of k-spar.

The suite as a whole represents high grade (upper amphibolite to granulite facies, probable metasediments, some sheared/brecciated. Sample 773484B is possibly a metabronzitite. Each (descriptive) rock name/classification from the head of the individual descriptions is listed below to constitute a summary, and these include mention of the minor and accessory minerals reported to be of particular interest, which are :

* sillimanite, variably 5-15%, in many of the coarse quartzites, and in felspathic (mostly microcline-rich) quartzose gneisses
* opaque oxides, variably <1% to 5%, which according to binocular microscope study and their weak 'magnetism' appear to be predominantly martitised magnetite in the sillimanite-felspathic-quartz gneisses, but possibly ilmenite in some calc-silicate-bearing gneisses.
* dark green spinel, sparse grains, generally <0.5mm composite with several magnetite grains in 773480, 773492, 773495B and 773497. Probe or SEM analysis is required to confirm this identification, but pleonaste seems likely.
* garnets occur in several samples, probably Fe-rich in the quartzofelspathic gneisses, but Ca-rich in at least one calc-silicate-bearing rock (773458).

Selected photomicrographs are appended.

Following this petrological investigation, Steve Toteff requested an electron microprobe analysis of green spinel and garnets seen in the thin sections of samples numbers 773480, 773492, 773497. New polished thin sections were made for this purpose, and the probe analysis undertaken at Adelaide University Centre for Electron Microscopy (in the presence of Pontifex). The results of this work are appended to this report.

SUMMARY

773444A (Mica) felspar quartz gneiss with original probable micas and more abundant felspars completely weathered to clay-limonite. [High quartz content (50%) suggests a metasediment.] No diagnostic accessories.

773444B Fine layered (mica) felspar quartz gneiss, with all non-quartzose components almost completely weathered to clay-limonite. Minor small scattered limonite boxwork may be after garnets.

773447 Massive to weakly layered coarse to very coarse quartzite incorporating minor microcline, plagioclase (partly retrograded to epidote), rarer chloritised biotite, small oxide grains. Probably a metamorphosed (?felspathic) quartz-rich sediment.

773458 Weakly layered, medium granulose, plagioclase-rich, sphene-hedenbergite-garnet (calc-silicate) gneiss. Possible meta Fe-rich, quartz-diorite, or a meta-sediment. Accessory apatite > zircon.

773459 "Calcrete" with at least two generations of supergene carbonate. Incorporates minor, randomly scattered grains of quartz, plagioclase, hematite, also abundant small biotite flakes; all as apparent 'residuals'.

773460 Fine to medium grained, massive (quartz)-plagioclase pyroxene rock, lesser scattered biotite > hornblende > opaque oxides. Probably upper amphibolite to granulite facies metamorphosed possible mafic-quartz-diorite (?or plagioclase-rich calc-silicate metasediment).

773464 Massive to weakly layered coarse to very coarse quartzite, incorporates minor, random very fine sillimanite, k-spar, rarer opaque oxides. Probably upper amphibolite to granulite facies metamorphosed, weakly clay-bearing, quartz sandstone.

773465 (Biotite)-quartz-k-spar-plagioclase, fine-granular schist (with an apparent shear-foliation). Minor fine magnetite, along the foliation.
[Relatively low abundance and the distribution of quartz suggests a metafine granitoid (?or possible volcanic)].

773467 Weakly (gneissic) layered, microcline bearing coarse to very coarse quartzite; accessory fine biotite and opaque oxide grains. Probably a high-grade metamorphosed (felspathic) quartzose sediment.

773473 Massive to weakly layered (clinopyroxene)-hornblende plagioclase granulite, minor magnetite rarer apatite. Gross dioritic composition, probably upper amphibolite to granulite facies grade.

773475 Fine granulose, shear-foliated, biotite quartz-plagioclase, k-spar schist or microgneiss, th minor fine magnetite (along the foliation).

Essentially the same as 773465 but with scattered coarse crystals of sphene, and rare very coarse plagioclase. [Metamorphosed and sheared possible ex-granitoid.]

773477 Massive to weakly layered, coarse to very coarse quartzite incorporating minor kspar and plagioclase, accessory random biotite, garnet, opaque oxides cf. 773467.
Probable high grade meta, impure, quartzose sediment.

773478 Massive coarse to very coarse quartzite with superimposed close spaced fractures. Minor randomly scattered very small sillimanite crystals, accessory biotite, garnet and hematite.
High grade in pure quartzose metasediment, cf. 773464.

773480	Layered coarse to very coarse quartzite, incorporating minor (schistose) sillimanite, a k-spar-rich layer (as in 773478, 773464). Also local coarse garnet and accessory magnetite accompanied by rare garnet and dark green spinel (?pleonaste). Granulite facies meta impure quartz sediment.
773484B	Crudely layered (biotite, hornblende, plagioclase) orthopyroxene granulite. Possible meta, plagioclase-bearing bronzitite.
773491	Massive coarse quartzite (cf. several quartzite samples above). Extensive random networks of fractures, micro-brecciation, comminution. Minor inclusions of altered perthitic k-spar, lesser hematite probably martitised magnetite.
773492	Layered sillimanite-quartz-k-spar gneiss, accessory opaque oxide grains rarely with sparse associated dark green spinel (?pleonaste). [Granulite facies metamorphosed muscovite-rich quartz sediment.]
773495A	Stressed, quartz-plagioclase 'granulite', minor grains of martitised magnetite and loosely associated crystals of zircon. [Possibly a meta-igneous rock.]
773495B	Weakly foliated, sillimanite, k-spar, quartz gneiss. Accessory opaque oxides (probably martitised magnetite) some with trace dark green spinel (?pleonaste).
773497	Massive very k-spar-rich granulite, incorporating minor scattered quartz > plagioclase, biotite, garnet, magnetite. Rare dark green spinel (?pleonaste) accompanies some magnetite.

APPENDIX I

Electron microprobe analysis of spinels and garnets, samples 773480, 773492, 773497. The analytical data produced by the Electron Optical Centre, Adelaide University, follows, with the identification key at the head of each anaysis as follows :

SPINELS

Sample No.	**773480**	**773492**	**773497**
ID on data sheet	**480C1**	**492C1**	**492C2**
Hercynite	63.1	52.0	51.6
Spinel	26.6	39.0	39.3
Gahnite	7.5	6.9	6.7
Magnetite	2.8	1.6	2.0
Galaxite	-	0.5	0.3

GARNETS

Sample No.	**773480**	**773480**	**773497**
ID on data sheet	**480C2**	**480C3**	**497C1**
Almandine	68.2	68.1	54.2
Pyrope	29.0	29.1	30.3
Spessartite	1.2	1.0	12.6
Grossular	1.7	1.8	2.9

The spinel in these rocks appear to have been exsolved from magnetite. To estimate end member abundance the spinel analyses were recalculated to 18 cations and 24 oxygens. The FeO was then recalculated to Fe_2O_3 and FeO contents, indicating about 2-3% of magnetite in solid solution in these spinels and thus a low temperature of exsolution. During exsolution, all of the zinc formerly in the magnetite will migrate into the spinel and in similar but magmatic spinels analysed for Zn, similar contents of ZnO were obtained (about 2-3 wt%).

The garnets were recalculated to 15 cations and are quite magnesian, suggesting granulite facies conditions. Note that garnet in sample 773497 is much more manganese rich than that in 773480.

point n : 1 x= -5391 y= -15611 z= 161
480 c1
Analysis no. 1 within miscspin
miscellaneo. cations on 32. <o> basis

Wt.%		Cations	
SiO2	0.0000	Si 0.0000	0.0000
TiO2	0.1128	Ti 0.0676	0.0195
Al2O3	57.7159	Al 30.5468	15.6143
Cr2O3	0.0574	Cr 0.0393	0.0104
MgO	6.2658	Mg 3.7790	2.1438
CaO	0.0000	Ca 0.0000	0.0000
MnO	0.0569	Mn 0.0440	0.0111
FeO	30.0240	Fe 23.3381	5.7636
ZnO	3.5725	Zn 2.8700	0.6055
total	97.8052		24.1682

Ratio (Fe+Mn)/(Fe+Mn+Mg) = 72.93

point n : 2 x= -12734 y= -30724 z= 145
480 c2
Analysis no. 1 within miscgn
miscellaneo. cations on 24. <o,f,cl> basis

Wt.%		Cations	
SiO2	38.6306	Si 18.0577	6.0273
TiO2	0.0179	Ti 0.0107	0.0021
Al2O3	21.5081	Al 11.3834	3.9550
V2O3	0.0191	V 0.0130	0.0024
Cr2O3	0.0000	Cr 0.0000	0.0000
MgO	7.4706	Mg 4.5056	1.7373
CaO	0.5972	Ca 0.4268	0.0998
MnO	0.5425	Mn 0.4202	0.0717
FeO	31.3610	Fe 24.3774	4.0920
Na2O	0.0206	Na 0.0153	0.0062
K2O	0.0000	K 0.0000	0.0000
F	0.0000		
Cl	0.0076		
total	100.1752		15.9940
o = F	0.0000		
o = Cl	-0.0017		
total	100.1735		

Ratio (Fe+Mn)/(Fe+Mn+Mg) = 70.56

point n : 3 x= -15181 y= -28282 z= 140
480 c3
Analysis no. 2 within miscgn
miscellaneo. cations on 24. <o,f,cl> basis

Wt.%		Cations	
SiO2	38.4213	Si 17.9599	6.0101
TiO2	0.0112	Ti 0.0067	0.0013
Al2O3	21.3364	Al 11.2925	3.9336
V2O3	0.0000	V 0.0000	0.0000
Cr2O3	0.0509	Cr 0.0348	0.0063
MgO	7.5214	Mg 4.5362	1.7537
CaO	0.6441	Ca 0.4603	0.1079
MnO	0.4680	Mn 0.3624	0.0620
FeO	31.4329	Fe 24.4333	4.1120
Na2O	0.0000	Na 0.0000	0.0000
K2O	0.0109	K 0.0090	0.0022
F	0.1201		
Cl	0.0076		
total	100.0248		15.9890
o = F	-0.0506		
o = Cl	-0.0017		

point n : 4 x= 21260 y= -15825 z= 162
492 c1
Analysis no. 2 within miscspin
miscellaneo. cations on 32. <o> basis

Wt.%	Cations			
SiO2	0.0033	Si	0.0015	0.0007
TiO2	0.0000	Ti	0.0000	0.0000
Al2O3	59.6585	Al	31.5749	15.7791
Cr2O3	0.1797	Cr	0.1229	0.0319
MgO	9.3547	Mg	5.6419	3.1291
CaO	0.0000	Ca	0.0000	0.0000
MnO	0.1994	Mn	0.1545	0.0379
FeO	24.2884	Fe	18.8798	4.5584
ZnO	3.3591	Zn	2.6986	0.5566
total	97.0431			24.0938

Ratio (Fe+Mn)/(Fe+Mn+Mg) = 59.50

point n : 5 x= 20085 y= -15661 z= 166
492 c2
Analysis no. 3 within miscspin
miscellaneo. cations on 32. <o> basis

Wt.%	Cations			
SiO2	0.0000	Si	0.0000	0.0000
TiO2	0.0257	Ti	0.0154	0.0043
Al2O3	59.8875	Al	31.6961	15.7445
Cr2O3	0.1356	Cr	0.0927	0.0239
MgO	9.4837	Mg	5.7197	3.1532
CaO	0.0091	Ca	0.0065	0.0022
MnO	0.1352	Mn	0.1047	0.0255
FeO	24.7577	Fe	19.2446	4.6185
ZnO	3.2744	Zn	2.6306	0.5394
total	97.7090			24.1115

Ratio (Fe+Mn)/(Fe+Mn+Mg) = 59.56

point n : 6 x= 9442 y= -27661 z= 176
492 c5
Analysis no. 4 within miscspin
miscellaneo. cations on 32. <o> basis

Wt.%	Cations			
SiO2	36.9511	Si	17.2726	6.4180
TiO2	0.0336	Ti	0.0202	0.0044
Al2O3	61.8167	Al	32.7172	12.6542
Cr2O3	0.0409	Cr	0.0280	0.0056
MgO	0.0125	Mg	0.0075	0.0032
CaO	0.0000	Ca	0.0000	0.0000
MnO	0.0000	Mn	0.0000	0.0000
FeO	1.1170	Fe	0.8683	0.1623
ZnO	0.0000	Zn	0.0000	0.0000
total	99.9719			19.2477

Ratio (Fe+Mn)/(Fe+Mn+Mg) = 98.04

point n : 7 x= 18571 y= 9895 z= 176
497 c1
Analysis no. 3 within miscgn
miscellaneo. cations on 24. <o,f,cl> basis

Wt.%	Cations			
SiO2	37.9324	Si	17.7313	6.0238
TiO2	0.0314	Ti	0.0188	0.0038
Al2O3	20.9405	Al	11.0830	3.9193
V2O3	0.0000	V	0.0000	0.0000
Cr2O3	0.0185	Cr	0.0126	0.0023
MgO	7.7477	Mg	4.6727	1.8339
CaO	1.0370	Ca	0.7411	0.1764
MnO	5.6551	Mn	4.3797	0.7607
FeO	24.7167	Fe	19.2127	3.2825
Na2O	0.0191	Na	0.0141	0.0059
K2O	0.0000	K	0.0000	0.0000
F	0.0240			
total	98.1223			16.0085
o = F	-0.0101			
total	98.1122			

Ratio (Fe+Mn)/(Fe+Mn+Mg) = 68.80

773444a **(Mica) felspar quartz gneiss with original probable micas and more abundant felspars completely weathered to clay-limonite. [High quartz content (50%) suggests a metasediment.] No diagnostic accessories.**

This rock is largely weathered to clay-limonite, but it has a layering/banding consistent with a gneissic structure. It consists os somewhat irregular metamorphic granulose quartz (50% of the whole sample), on a scale of <1mm to 2mm, as individuals and irregular aggregates, with a more or less layered distribution.

Poorly defined areas between the more quartz-rich layers, also replicas of original minerals aggregated with the quartz, consist of clay-limonite. Commonly, these have the morphology and vague internal relict textures to suggest original felspar, including minor small patches of micro-myrmekitic quartz. Other areas of supergene material have poorly defined replica textures after micas, including dusting by extremely fine 'leucoxene' to suggest former biotite. Kaolinite and locally altered 'vermiculite' are included within the clay-limonite areas.

There are no distinctive or diagnostic accessory minerals.

773444B

Fine layered (mica) felspar quartz gneiss, with all non-quartzose components almost completely weathered to clay-limonite. Minor small scattered limonite boxwork may be after garnets.

This rock is similar to 773444A, in its degree of weathering and weakly layered distribution of apparent metamorphic-granulose quartz, but this quartz is somewhat less abundant (35-40%) and individual grains are slightly finer. This quartz is distributed in greater and lesser amounts through clay-limonite, and as in 773444A, this supergene material appears to be dominantly after felspar. Indeed, there are minor relicts of 'fresh' felspar (stained on the offcut by sodium cobaltinitrite).

This weathered felspar commonly shows an emphasised fine scale single cleavage microtexture, which resembles microcline in fresher quartzo-felspathic gneisses described below, and in completely altered areas, this is difficult to distinguish from former micas. Several small (1-3mm) equant patches of limonitic boxwork are seen in handspecimen and in the thin section, scattered to form about 7% of the rock. It seems highly likely that these are after garnet crystals although this is not conclusive.

773447

Massive to weakly layered coarse to very coarse quartzite incorporating minor microcline, plagioclase (partly retrograded to epidote), rarer chloritised biotite, small oxide grains. Probably a metamorphosed (?felspathic) quartz-rich sediment.

At least 75% of this rock consists of a massive mosaic of coarse irregularly granoblastic quartz, with some grains optically continuous over 8mm, apparently due to exaggerated grain growth during metamorphic crystallisation.

Minor minerals include k-spar (10-15%), seen stained yellow on the offcut. This k-spar is skeletal/more or less intergranular to the quartz, and tends to be more abundant in vague layers to 15mm thick, than in others.

Plagioclase (10%) locally accompanies the k-spar with a similar mode of occurrence as the k-spar, and is generally partly retrograded to epidote. Lesser ex-biotite (and possibly fine amphibole), commonly near the felspars, is mostly altered to chlorite. There are accessory small grains of opaque oxide and rutile.

773458

Weakly layered, medium granulose, plagioclase-rich, sphene-hedenbergite-garnet (calc-silicate) gneiss. Possible meta Fe-rich, quartz-diorite, or a meta-sediment. Accessory apatite > zircon.

This is a fairly homogeneous, medium grained (1 to 2mm) metamorphic rock with the dominant plagioclase (55%), and minor quartz (10%), having a reasonably well developed granuloblastic texture. This rock is also moderately layered, mainly due to the distribution of the minor to subordinate darker minerals through the plagioclase aggregate, which are :

* dark green clinopyroxene (hedenbergite?) to 3mm size.
* reddish-brown (cinnamon-coloured) garnet, probably Ca-rich, also to 3mm size, tends to be 'skeletal' rather than euhedral.
* lesser, smaller subhedral grains of sphene generally <1mm
* accessory, small (<0.5mm) apatite, rarer/smaller zircons.

This rock is broadly identified as a plagioclase-rich, iron-rich calc-silicate. It could be interpreted as :

(1) a metamorphically reconstituted (Fe-rich) quartz-diorite
(2) possibly a metamorphosed, altered sediment.

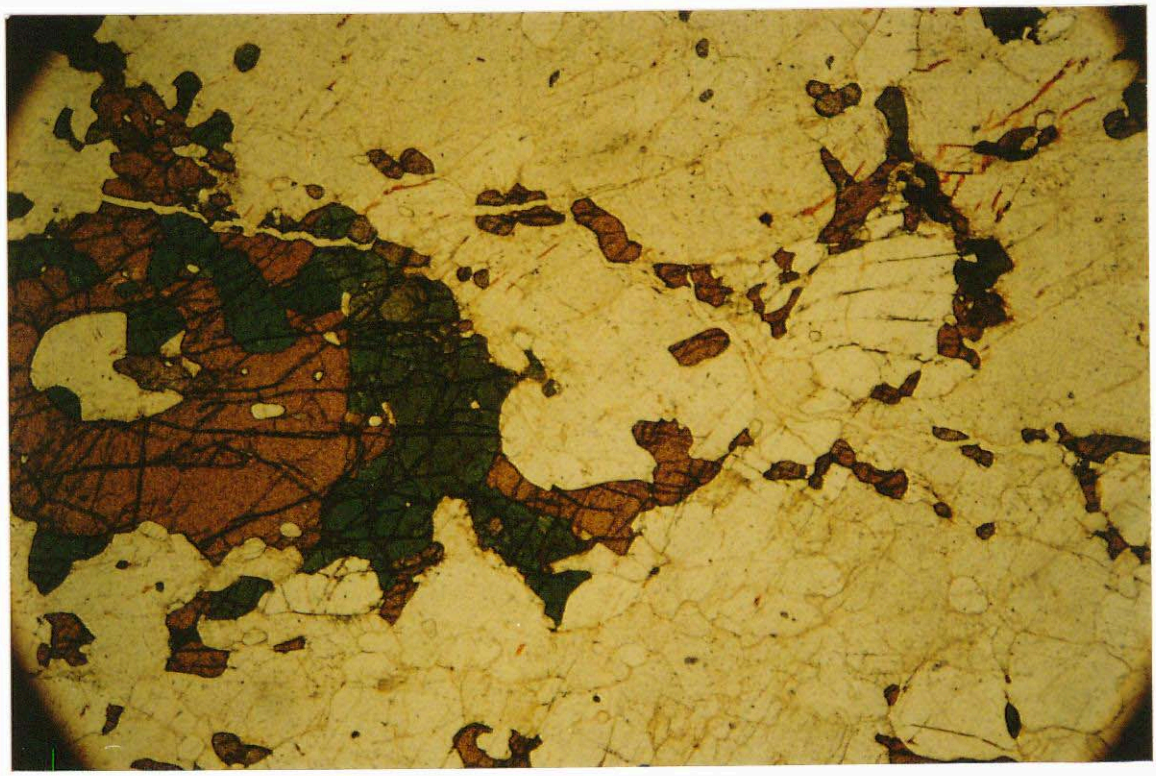


Fig 1 **773458** **Scale : 10mm represents 0.32mm**
Plane polarised light (PPL), darkish orange brown garnet and green hedenbergite (accessory smaller clear apatite crystals) in plagioclase-rich gneiss.

Fig 2 **773458** **Scale : 10mm represents 0.32mm**
Xnicols equivalent of fig 1 to highlight textures in plagioclase.

773459 **"Calcrete" with at least two generations of supergene carbonate. Incorporates minor, randomly scattered grains of quartz, plagioclase, hematite, also abundant small biotite flakes; all as apparent 'residuals'.**

At least 65% of this rock consists of massive cryptocrystalline to microcrystalline (microsparry) supergene carbonate (calcrete). The coarser sparry calcite tends to line/fill irregular and sometimes interconnecting voids, suggesting at least two generations of calcrete development, (and even a local, third generation of dark clouded ultrafine calcrete in full incorporating fine sand).

Minor grains of residual minerals are randomly scattered and consist of:

* quartz grains, 10% mostly as individuals, 0.1mm to 1mm, irregularly subrounded to partly angular and fractured, probably metamorphic.
* lesser plagioclase grains (7-10%), generally smaller and more angular than quartz, some composite (with other plagioclase), and with opaque oxide grains, rarely with quartz.
* opaque-oxide grains, (5-7%), hematite (probably martitised magnetite), some fractured, some loosely associated with plagioclase (rarely quartz).
* biotite (?15%) as small (<1mm) irregular flakes with a completely random distribution without any specific association, pale coloured and apparently gradational to phlogopite. [It is possible that this biotite derives from a lamprophyre-related source.]

773460

Fine to medium grained, massive (quartz)-plagioclase pyroxene rock, lesser scattered biotite > hornblende > opaque oxides. Probably upper amphibolite to granulite facies metamorphosed possible mafic-quartz-diorite (?or plagioclase-rich calc-silicate metasediment).

This is a fairly homogeneous, massive to weakly layered, fine to medium grained metamorphic rock composed of :

quartz	10%
plagioclase	35%
orthopyroxene ('hypersthene')	25%
clinopyroxene ('diopside')	?10%
brown biotite	7-10%
green hornblende	<5%
black opaque oxide (probably ilmenite)	<5%

Randomly interlocking crystals of plagioclase, incorporate more irregularly distributed slightly coarser 'patchy' grains of quartz. Some finer quartz in plagioclase is blebby however. The other 'coloured' minerals tend to accompany each other and occur as a vague but discontinuous network throughout the plagioclase aggregate.

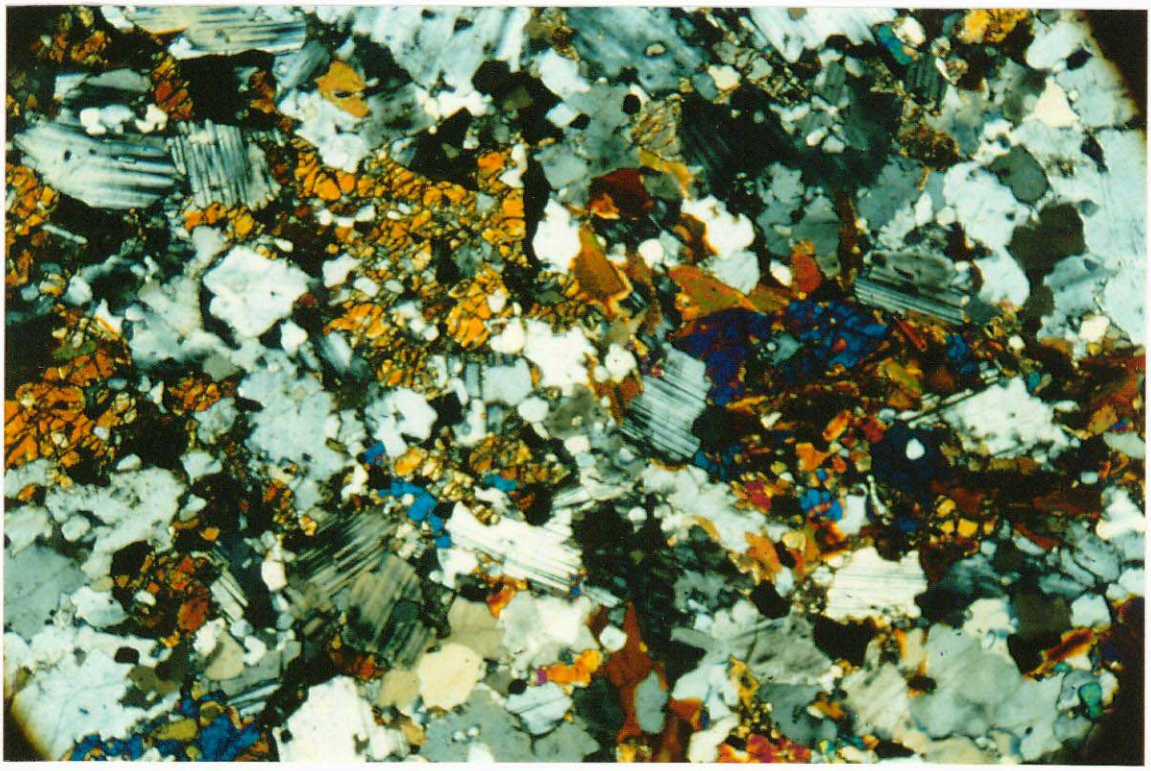


Fig 3 **773460** **Scale : 10mm represents 0.32mm**

Xnic, calc-silicate crystals and small clusters trough massive plagioclase-rich rock.

773464

Massive to weakly layered coarse to very coarse quartzite, incorporates minor, random very fine sillimanite, k-spar, rarer opaque oxides. Probably upper amphibolite to granulite facies metamorphosed, weakly clay-bearing, quartz sandstone.

This is a massive to weakly, broadly layered coarse quartzite. In thin section, at least 85% of it is seen to consist of a massive mosaic of highly irregular quartz grains some optically continuous for >5mm, apparently the result of exaggerated metamorphic grain growth.

Sillimanite is randomly disposed to form about 10% of the rock, as small prisms <1mm long and with cross sections about 0.15mm. Minor small (<1mm) amoeboidal grains of k-spar (5-7%) and accessory small opaque oxide grains (2%) are scattered, partly enclosed in quartz, partly intergranular to the quartz aggregate.

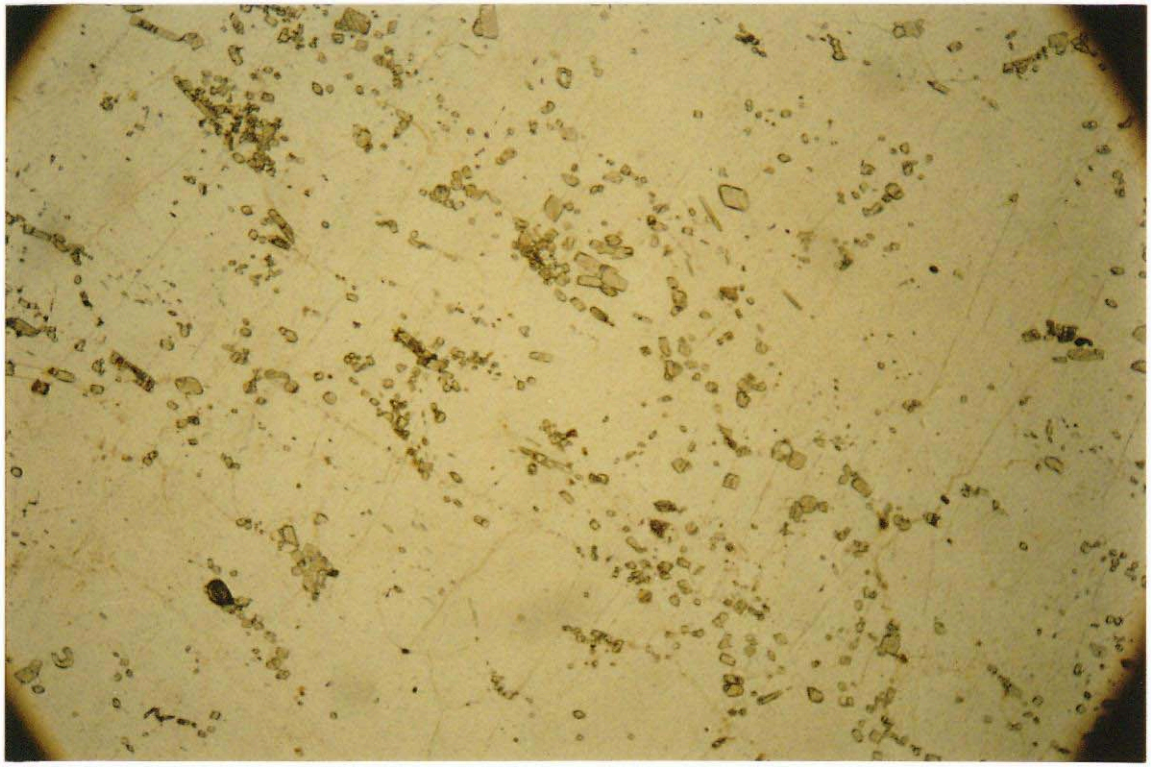


Fig 4 **773464** **Scale : 10mm represents 0.32mm**
PPL, fine crystals of sillimanite through massive to weakly layered coarse quartzite.

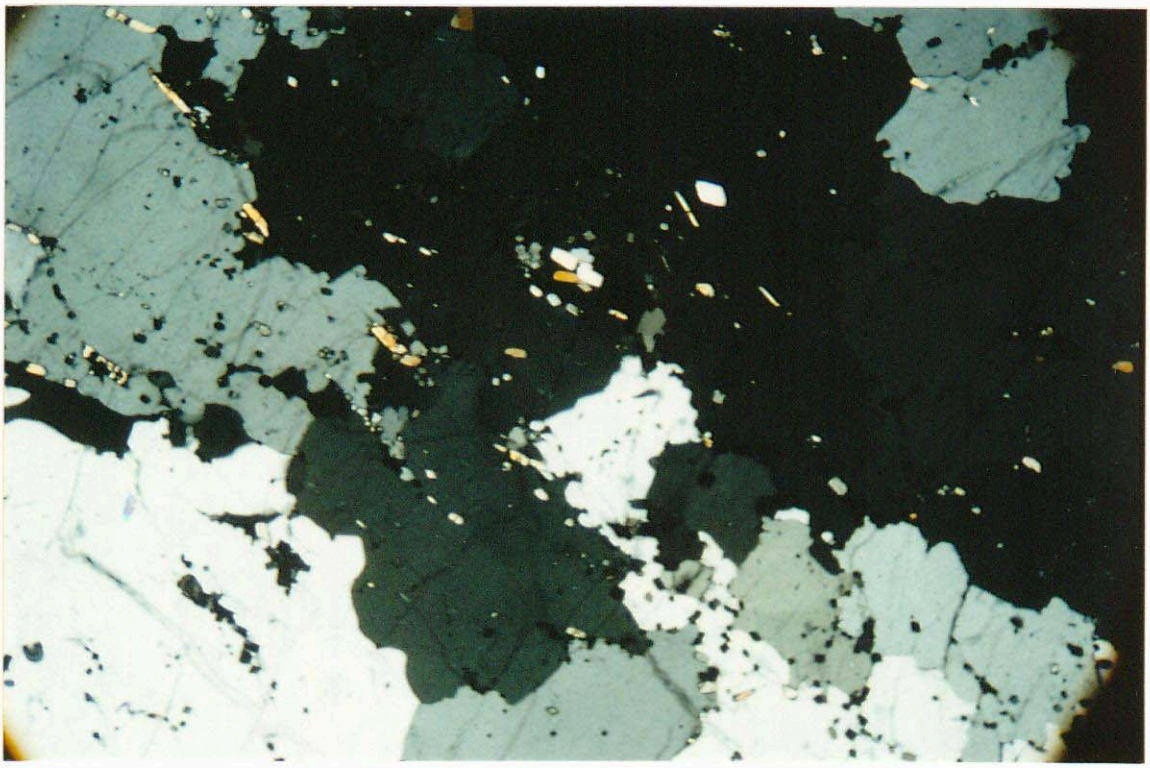


Fig 5 **773464** **Scale : 10mm represents 0.32mm**
Xnicols (Xnic) equivalent of Fig 4, to highlight coarse exaggerated grain growth texture of quartzite.

773465

(Biotite)-quartz-k-spar-plagioclase, fine-granular schist (with an apparent shear-foliation). Minor fine magnetite, along the foliation.
[Relatively low abundance and the distribution of quartz suggests a metafine granitoid (?or possible volcanic)].

Macroscopically, this rock is seen to have a strong shear foliation/schistose fabric.

Petrographically, at least 55% of it is seen to consist of a generally fine granulose metamorphic mosaic (0.5mm scale) of k-spar slightly greater than plagioclase, with individual crystals/grains randomly oriented to weakly elongated.

Abundant, incipiently ribbon-like lenses of quartz (30%) from 0.3mm x 1.5mm, to 1mm x 12mm, occur throughout this fine granulose felspar mosaic, all aligned along the shear foliation. Variably continuous and quite closely spaced foliae of biotite (7) occur more sparsely but in the same plane as the quartz lenses, to contribute to the foliation fabric.

Small (<0.5mm) opaque oxide grains (3-5%) tend to be elongated and occur sporadically along the foliation. These appear to be mostly magnetite, since the sample attracts a suspended magnet. Rarer minute grains of zircon and apatite are present.

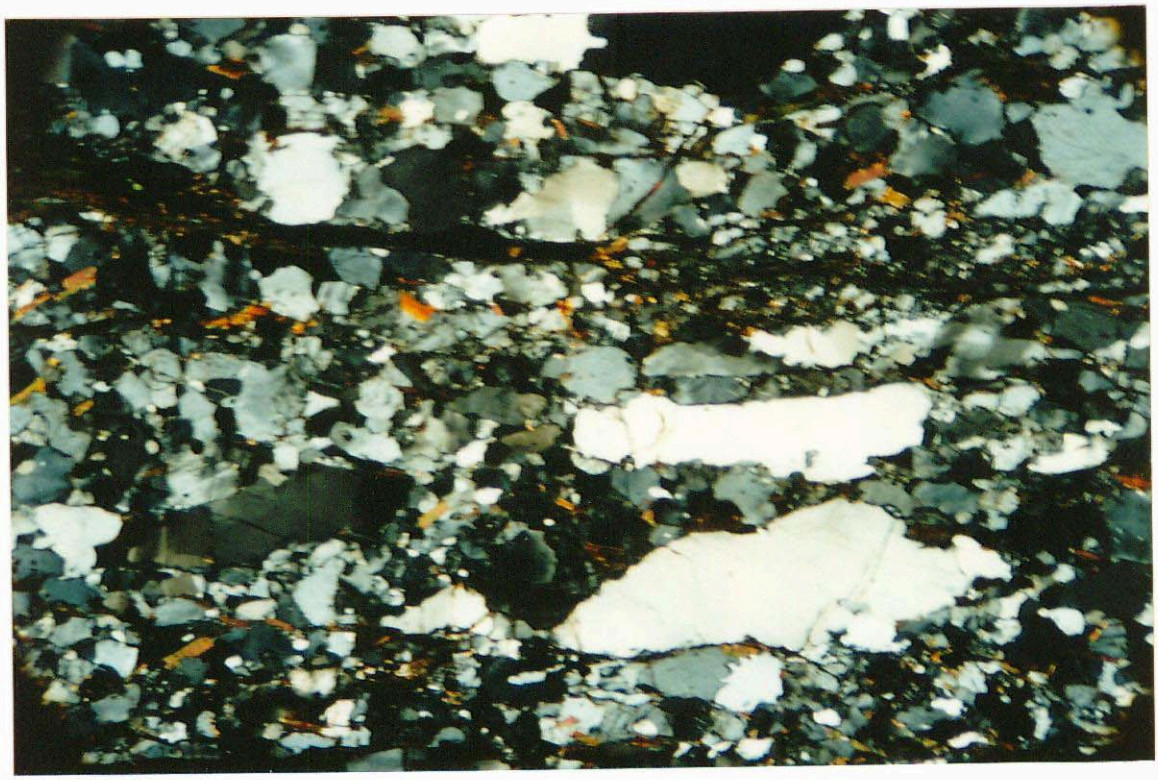


Fig 6 **77465** **Scale : 10mm represents 0.32mm**
Xnic, layered fine granular schist (or microgneiss) showing elongation of quartz grains which may in fact be protomylonitic. Very fine dark magnetite occurs along the foliation in this rock.

773467

Weakly (gneissic) layered, microcline bearing coarse to very coarse quartzite; accessory fine biotite and opaque oxide grains. Probably a high-grade metamorphosed (felspathic) quartzose sediment.

About 65% of this rock consists of irregular, ragged-lenticular (elongated) quartz grains, stressed and optically continuous up to dimensions of 2mm wide and 6mm long. These are similarly oriented and intricately interlocked to form a weakly layered gneissic/quartzitic aggregate. Minor small blebby grains of quartz occur in this coarse mosaic.

Much smaller (1-2mm) but similarly lenticular and commonly elongated grains of microcline (20-25%) and accessory blebby microcline, have an overall weakly layered distribution, as inclsuions within the coarser quartz, and/or more or less interstitial to within the gneissic quartzose mosaic.

Accessory, small scattered flakes of biotite lie along the weak foliation; accessory small opaque oxide grains are scattered, and appear to be martitised magnetite. Rarer minute zircons are present.

This rock lacks the sillimanite which is seen in otherwise similar microcline quartz gneisses described below.

Fig 7 **773467** **Scale : 10mm represents 0.32mm**

Xnic, very coarse stressed quartz, incorporating an irregular lens of finer (?recrystallised) microcline.

773473

Massive to weakly layered (clinopyroxene)-hornblende plagioclase granulite, minor magnetite rarer apatite. Gross dioritic composition, probably upper amphibolite to granulite facies grade.

This is a homogeneous, weakly layered to massive, medium grained granulitic rock composed of :

plagioclase	65%
khaki to green hornblende	25-30%
clinopyroxene (?rare orthopyroxene)	5-7%
opaque oxides (magnetite)	5-7%
apatite (and rarer sphene)	3%

Quartz appears to be absent.

The dominant plagioclase aggregate has a more or less polygonal granuloblastic texture, size range mostly 1 to 2mm. Some of the plagioclase is untwinned.

The hornblende and clinopyroxene are commonly associated, have a more irregular grain shape, vaguely intergranular to and layered through the plagioclase aggregate. The grains of opaque oxide are magnetite, and these, plus the apatite, also tend to accompany the hornblende.

This rock does not compare with any others in this suite.

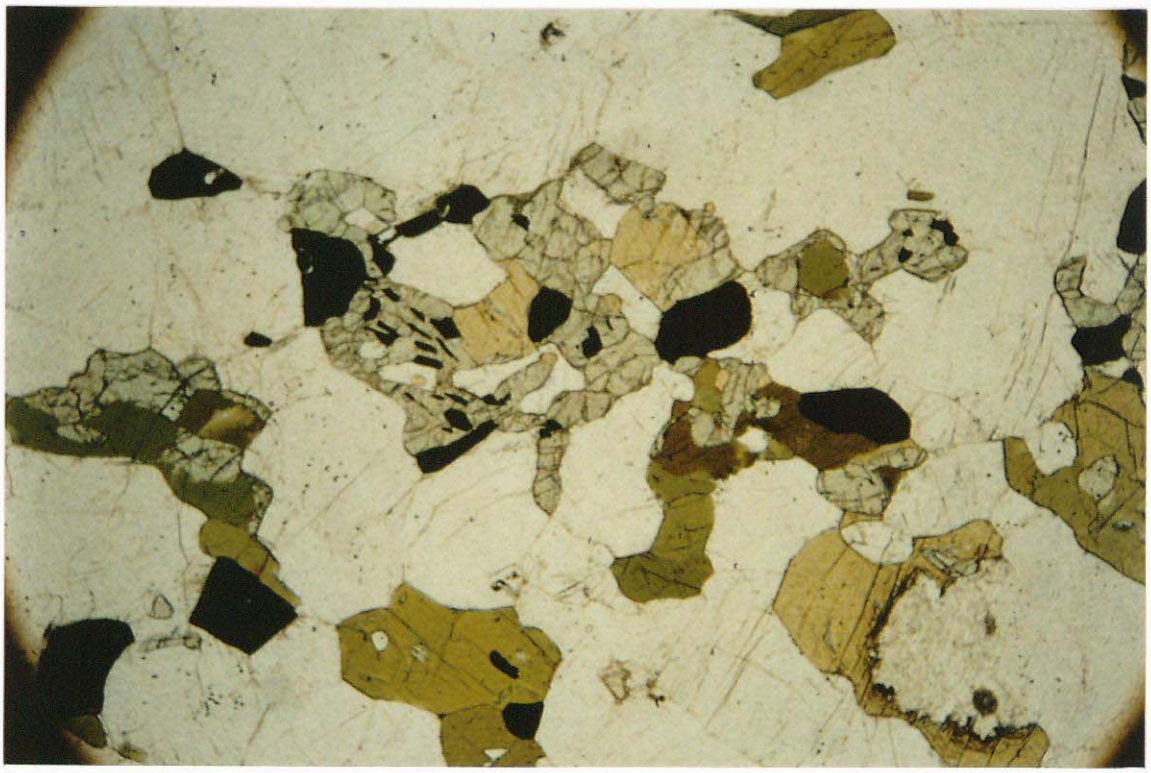


Fig 8 **773473** **Scale : 10mm represents 0.32mm**
PPL, massive plagioclase-rich granulite, with pale clinopyroxene, coloured hornblende, minor opaque oxides.

Fig 9 **773473** **Scale : 10mm represents 0.32mm**
Xnic equivalent of Fig 8.

773475

Fine granulose, shear-foliated, biotite quartz-plagioclase, k-spar schist or microgneiss, th minor fine magnetite (along the foliation).

Essentially the same as 773465 but with scattered coarse crystals of sphene, and rare very coarse plagioclase. [Metamorphosed and sheared possible ex-granitoid.]

This sample viewed by binocular microscope, particularly the offcut treated with sodium cobalti-nitrite, is seen to be essentially the same as for sample 773465 described above.

The petrography confirms this close similarity, except for the presence of quite numerous, coarse (to 1.5mm) subhedral grains of sphene, randomly scattered to form about 7% of the rock. There are also one or two anomalously coarse (to 3mm) equant plagioclase crystals/grains not seen in 773465, and the overall fabric seems slightly more stressed, even incipiently recrystallised, than in 773465.

Basically therefore, the rock consists of a fine granulose mosaic of k-spar > plagioclase, incorporating ribbon-like lenses of quartz and closely spaced, braided fine foliae of biotite. Minor, fine magnetite, occurs along a shear foliation. Minor coarse sphene, rarer much finer grains of zircon and apatite, and rare but coarse plagioclase have a random distribution.

773477

Massive to weakly layered, coarse to very coarse quartzite incorporating minor kspar and plagioclase, accessory random biotite, garnet, opaque oxides cf. 773467.
Probable high grade meta, impure, quartzose sediment.

This rock is very similar to 773467, except that it contains minor plagioclase as well as microcline, also there are minor scattered small garnets.

At least 65% of the rock consists of a mosaic of a coarse (commonly 5mm) irregularly anhedral metamorphic quartz grains, internally stressed and commonly with sutured intergranular contacts. There are subrounded/subhedral grains of microcline (10%), generally about 1mm in size, locally as small composites, and similar size grains of plagioclase (7%) alone or composite with k-spar. These all have a fairly even, vaguely layered distribution throughout, variably as occur in inclusions in quartz, less commonly intergranular to the coarse quartz. Rare micro-myrmekite accompanies some of this felspar.

Accessory small flakes of biotite (1-2%) and of garnet crystals (2-3%) to 0.8mm, and opaque oxide grains (1-2%) are randomly scattered.

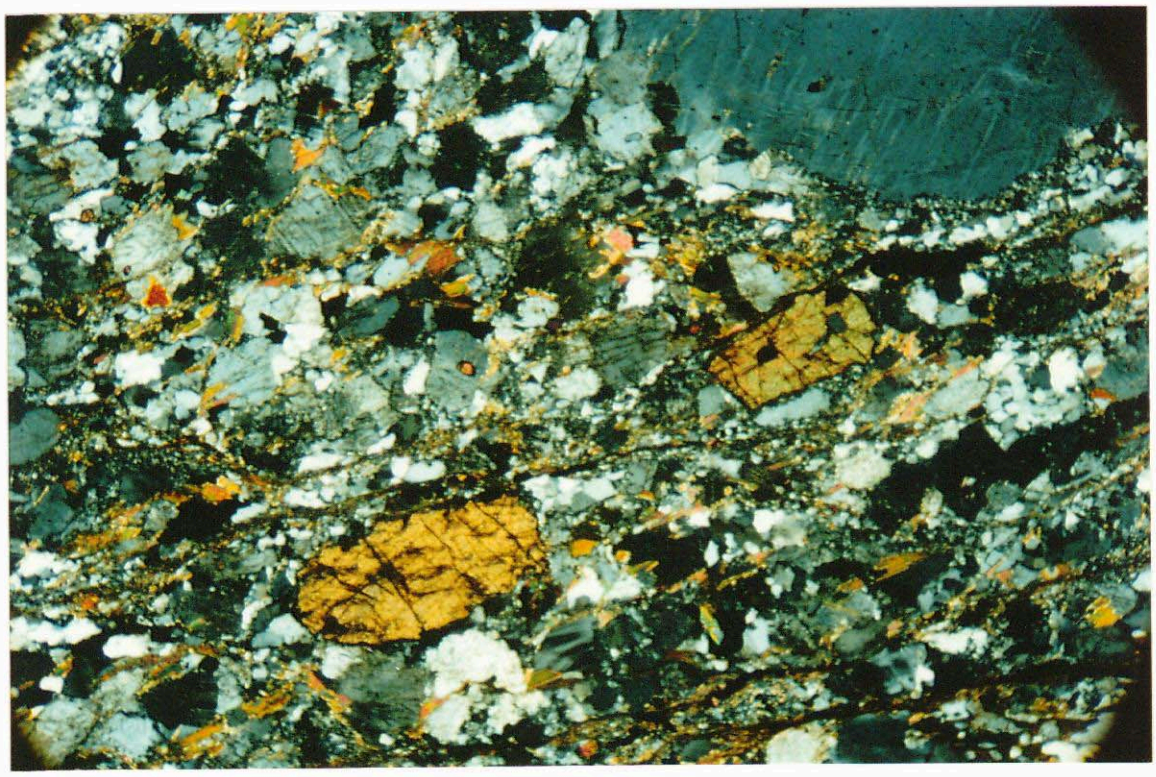


Fig 10 **773475** **Scale : 10mm represents 0.32mm**
Xnic, essentially the same as 773465, but with abnormally coarse sphene, and a single coarse microcline.

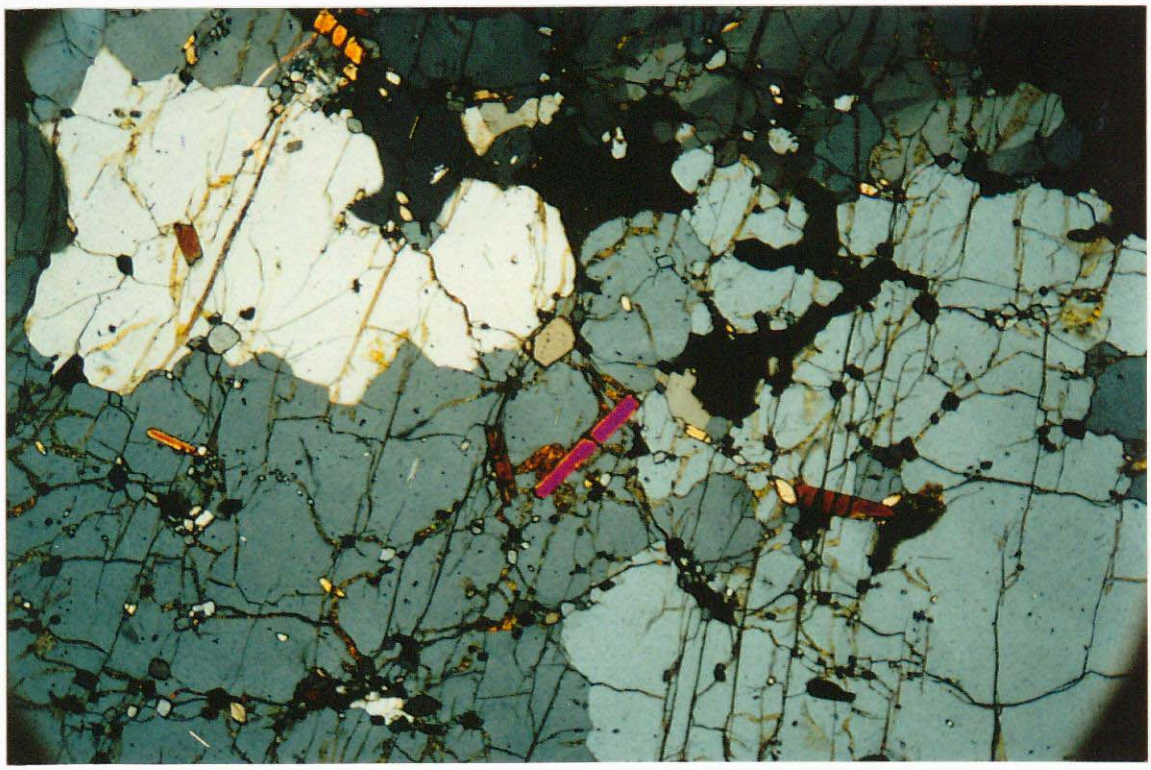


Fig 11 **773478** **Scale : 10mm represents 0.32mm**
Xnic, very coarse quartzite with sillimanite.

773478 **Massive coarse to very coarse quartzite with superimposed close spaced fractures. Minor randomly scattered very small sillimanite crystals, accessory biotite, garnet and hematite.**
High grade in pure quartzose metasediment, cf. 773464.

At least 85% of the sample consists of a mosaic of coarse to very coarse metamorphic mosaic, of irregularly anhedral quartz grains, commonly >5mm in size. These are stressed and have more or less sutured intergranular contacts : similar to the other coarse quartzites described above (with exaggerated grain growth).

Very small, generally individual prisms of sillimanite, generally <1mm long and with a cross section about 0.1mm are randomly disposed to form 7-10% of the whole rock. Several irregular garnet crystals, to 2mm, mostly occur in a local loose cluster. Accessory small grains of hematite, (probably martitised magnetite) are scattered.

Numerous subparallel closely spaced fractures cut across the entire metamorphic fabric.

773480 **Layered coarse to very coarse quartzite, incorporating minor (schistose) sillimanite, a k-spar-rich layer (as in 773478, 773464). Also local coarse garnet and accessory magnetite accompanied by rare garnet and dark green spinel (?pleonaste). Granulite facies meta impure quartz sediment.**

At least 80% of this rock consists of weakly layered coarse to very coarse (exaggerated grain growth) quartzite similar to others described above (773478, 464). One poorly defined layer to 5mm thick is characterised by the presence of small perthitic k-spar grains (see stained offcut), scattered within the quartz, similar to the same phenomenon in 773467 and 773477.

Sillimanite prisms (10-12%) are slightly larger (rarely to 2mm), and commonly aligned along the layering (which is different to the sillimanite in basically the same rocks 478, 464).

Coarse poikiloblastic to skeletal garnet to 1 x 5mm occur locally. This garnet is stained by loimonite along abundant internal microfissures. Also it incorporates abundant extrmeley fine (fibrolitic) sillimanite.

There are accessory scattered opaque oxide grains, which are moderately magnetic thus indicating magnetite. The largest magnetite is accompanied by much smaller grains of garnet and by sparse small (<1mm) grains of dark green spinel, presumably the Fe-spinel (pleonaste).

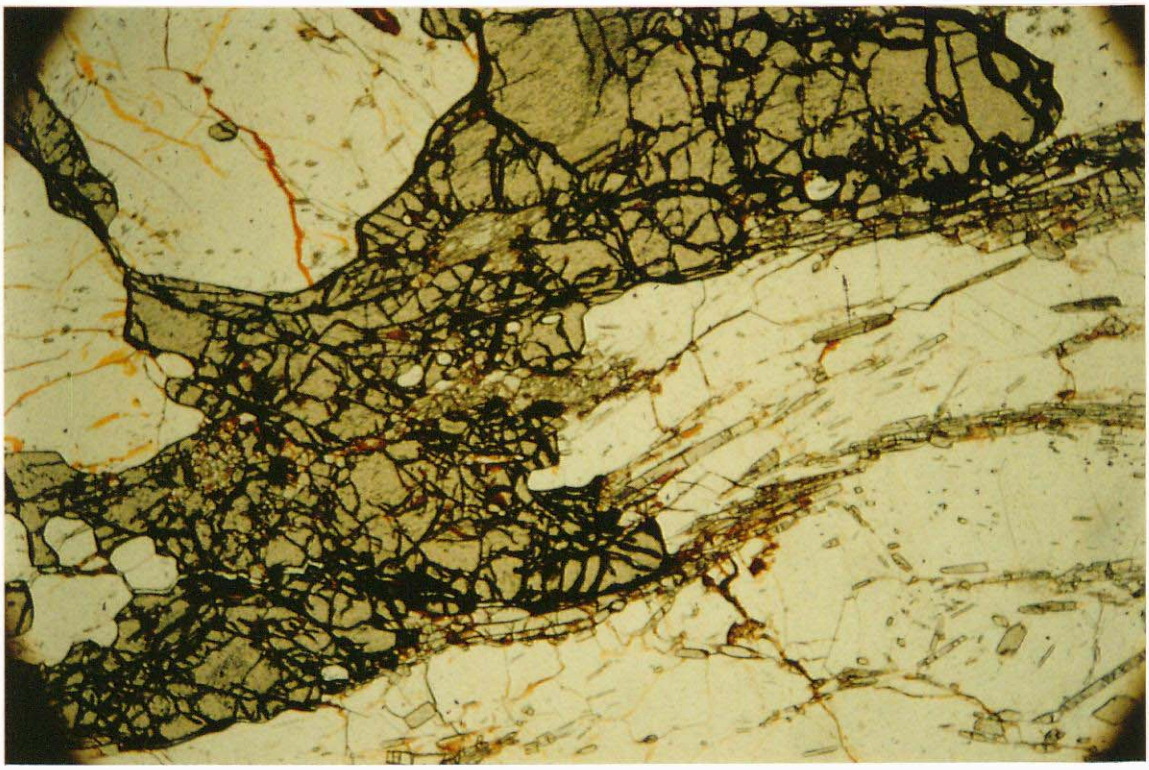


Fig12 **773480** **Scale : 10mm represents 0.32mm**
PPL. Coarse skeletal garnet, and weak foliae of sillimanite in quartzite. (Accessory small grains of green spinel accompany some of this garnet, but not shown here).

773484B **Crudely layered (biotite, hornblende, plagioclase) orthopyroxene granulite. Possible meta, plagioclase-bearing bronzitite.**

This weakly layered, medium grained granulitic rock has a fairly complex composition and texture. It consists essentially of :

plagioclase	12%
clinopyroxene	?5%
~~orthoclase~~ orthopyroxene?	50-60%
biotite	7-10%
hornblende	10-15%

Poorly defined layers to about 5mm thick are dominated by coarse, (to 6mm) somewhat poikiloblastic blocky prisms of orthopyroxene. This pyroxene commonly incorporates very small patchy inclusions of pale hornblende, lesser biotite. the biotite is similarly oriented/schistose. Intergranular areas and irregularities in grain margins of the orthopyroxene are occupied by a 'matrix' of plagioclase, which is often optically continuous over dimensions similar to the size of the pyroxenes.

This assemblage is interpreted as a granulite facies, metamorphosed plagioclase-bearing ultramafic, of approximate bronzitite composition, (which according to Alan Purvis, is similar to meta-bronzitite recently reported by MESA at Skuse Hill, Gawler Craton and described by Purvis).

Fig 13 **773484B** **Scale : 10mm represents 0.32mm**

PPL. Crudely layered orthopyroxene granulite; showing pale chalcopyrite, clear plagioclase, orange-brown biotite.

clinopyroxene?

773491 **Massive coarse quartzite (cf. several quartzite samples above). Extensive random networks of fractures, micro-brecciation, comminution. Minor inclusions of altered perthitic k-spar, lesser hematite probably martitised magnetite.**

This sample consists of massive coarse to very coarse quartz, with an essential exaggerated grain growth texture basically the same as in several similar samples above. The metamorphic texture however is superimposed upon by extensive random networks of microfracture, at variable scale, together with local tracts of microbrecciation, some with vague chevron pattern fracturing and comminution.

This quartz incorporates minor scattered grains to 2mm size of perthitic k-spar (5%) partly oxidised/sericitised. Lesser subhedral to euhedral crystals of hematite appear to be martitised magnetite. A single small limonite replica with one of the magnetites may be after sulphide.

These inclusions and the basic metamorphic texture allows comparisons with some of the coarser quartzites described above.

773492 **Layered sillimanite-quartz-k-spar gneiss, accessory opaque oxide grains rarely with sparse associated dark green spinel (?pleonaste). [Granulite facies metamorphosed muscovite-rich quartz sediment.]**

A metamorphic layering through this rock is manifest as a weak common elongation of coarser quartz, which tends to form lenses up to 2mm wide x 10mm long, also a common alignment of sillimanite prisms, and very thin layers/foliae of these, in the same plane. Some coarser felspar is also weakly elongate, finer felspar mosaic tends to be random.

There is more sillimanite in this sample than in any other in this suite. The overall approximate modal abundance is :

quartz	35%
k-spar	40-45%
plagioclase	5%
sillimanite	10-15%
opaque oxide	3%
dark green spinel	<1%

The k-spar is microperthitic and is quite coarse (1 to 5mm) partly elongate grains dominate most layers. Quartz, as the next most abundant mineral is similarly coarse, but more elongate, more or less aggregated with k-spar but also dominates its own lenticular layers with sillimanite. Indeed, sillimanite is most abundant in layers with least k-spar, it occurs as quite coarse prisms along the layering to produce a foliation.

A finer polygonal metamorphic mosaic of microcline > quartz > sillimanite and rare plagioclase is more or less intergranular to these same coarser minerals, and may represent a second episode of crystallisation.

Several opaque oxide grains (<1mm) are sparsely scattered along the layering/foliation, and one or two of the coarser of these are composite with very small grains (0.5mm) of dark green spinel - as seen in 773480 (in a 'similar' host rock type but far more quartzose, far less k-spar and with garnet.)

This rock is interpreted as a granulite facies, metamorphosed, muscovite-rich quartzose sediment: [muscovite + quartz → sillimanite + k-spar].

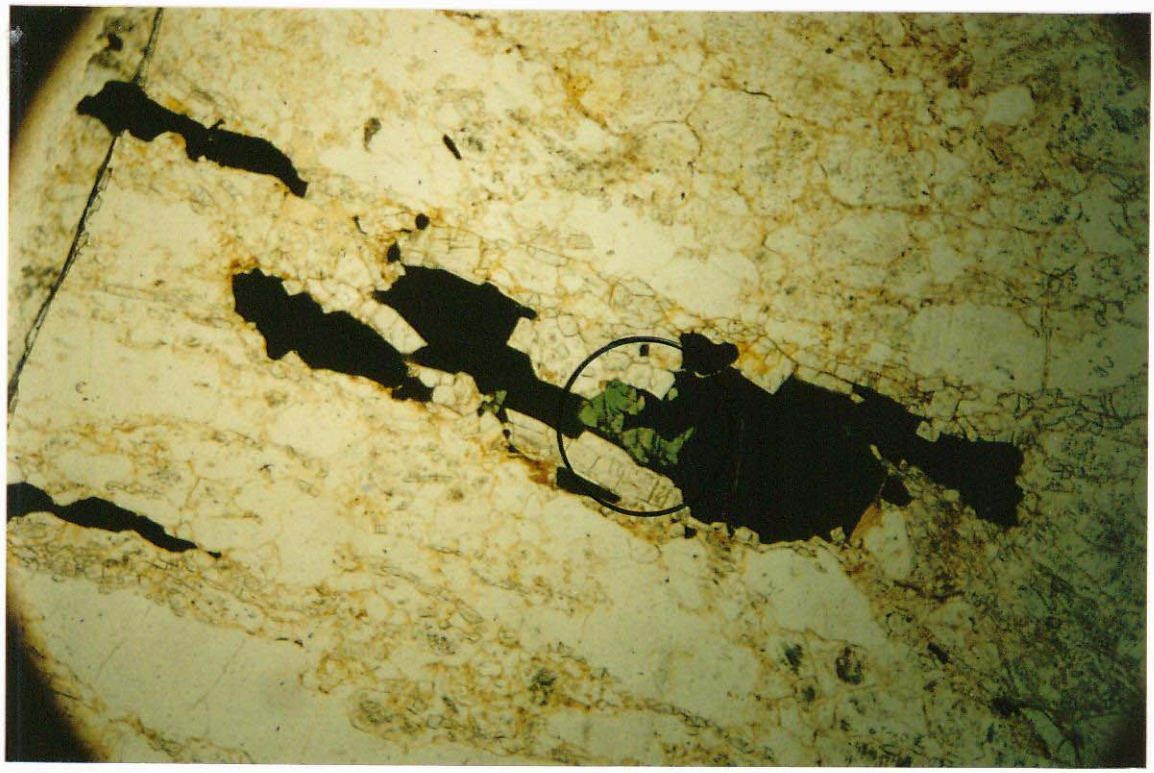


Fig 14 **773492** **Scale : 10mm represents 0.32mm**

PPL. Layered sillimanite quartz k-spar gneiss. Shown here are opaque oxide grains along the layering with accessory associated green spinel (circled). Prisms of sillimanite also accompany the oxide.

773495A **Stressed, quartz-plagioclase 'granulite', minor grains of martitised magnetite and loosely associated crystals of zircon. [Possibly a meta-igneous rock.]**

Thin very small rock chip consists of a coarse (1mm to 6mm) irregularly granuloblastic aggregate of :

quartz	~50%
plagioclase	~50%
opaque oxide (martitised magnetite)	5%
zircon crystals	1%

The quartz forming about half of this rock compares with coarse metamorphic quartz in other samples described above, it is strongly stressed, clouded by minute fluid inclusions and has superimposed extremely fine scale microfracture networks, locally with microscopic comminution. Plagioclase shows less evidence of stress, but it is microfissured and partly altered, with trace associated biotite.

Opaque oxide is basically hematite, but very weakly magnetic, probably martitised magnetite. The presence of numerous zircon crystals, mostly about 0.3mm size, is distinctive in this suite, as well as the dominance of plagioclase with nil k-spar. The zircons are generally loosely clustered near (rarely in) opaque oxides and/or plagioclase. [They may indicate an igneous precursor.]

773495B **Weakly foliated, sillimanite, k-spar, quartz gneiss. Accessory opaque oxides (probably martitised magnetite) some with trace dark green spinel (?pleonaste).**

This sample marks a return to the k-spar-rich, sillimanite quartzitic gneiss which compares with several samples above 773492, partly 773480; also 773477, 773467.

It is relatively sillimanite-rich (next to 773492) with an overall composition of :

quartz	50-60%
k-spar	25-30%
sillimanite	10%
opaque oxide (probably martitised-magnetite)	3%
dark green spinel	<1%

The dominant quartz is coarse to very coarse, as a 'loose' aggregate of irregularly granuloblastic grains to 6mm. These are stressed and microfractured.

K-spar is perthitic, generally much smaller than quartz, as more or less polygonal to elongated grains enclosed in quartz and commonly forming a mosaic between the quartz.

Sillimanite occurs as prisms, generally <2mm long, with cross sections 0.02 to 0.3mm across. These are seen as individuals also grouped into lenses, all similarly oriented between coarse quartz to produce a weak foliation. Some sillimanite is more randomly clustered, loosely accompanying felspar.

Opaque oxide grains, 0.2mm to 1mm, probably martitised magnetite, have a sporadic distribution along the foliation, some more or less selectively within sillimanite. One or two of these grains have rare very small grains (0.3mm) of dark green spinel on their margins, as in 773492 and 773480.

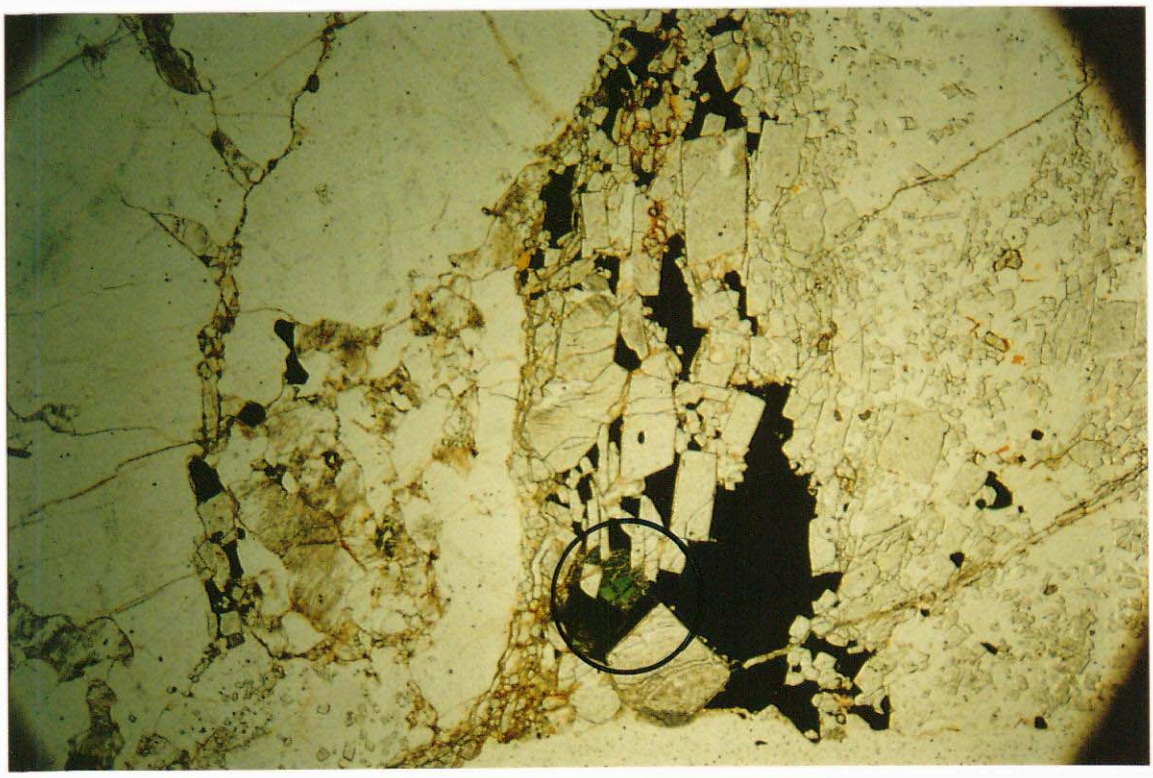


Fig 15 **773495B** **Scale : 10mm represents 0.32mm**

PPL, weakly foliated sillimanite, kspar, quartz gneiss, (sillimanite as block prisms). Opaque oxide with trace associated green spinel (circled).

773497

Massive very k-spar-rich granulite, incorporating minor scattered quartz > plagioclase, biotite, garnet, magnetite. Rare dark green spinel (?pleonaste) accompanies some magnetite.

This rock consists of a massive irregularly coarse granoblastic/granuloblastic aggregate of :

k-spar (microcline)	60-65%
quartz	10-15%
plagioclase	5-7%
biotite	5%
garnet	7%
opaque oxides (magnetite)	5%
spinel (dark green ?pleonaste)	<1%
zircon	trace

Amoeboidal shaped quartz grains to 7mm and the minor smaller plagioclase crystals are randomly disposed through the dominant k-spar mosaic. Several subhedral to euhedral garnet crystals, about 1mm in size, also have a random distribution. The minor biotite occurs as flakes loosely clustered commonly near plagioclase, locally with garnet. Microfracture networks occur throughout this aggregate.

The opaque oxide grains are 'magnetic' and therefore apparently magnetite. These have a size of about 0.02mm to 1mm and tend to occur in several loose clusters. Several of these enclose, or partly enclose, grains of dark green spinel (probably pleonaste?), maximum size 0.3mm. Trace minute zircon grains rarely accompany magnetite.

The anomalously very high k-spar content in this rock makes genetic interpretation difficult, but it is probably a high grade metasediment.

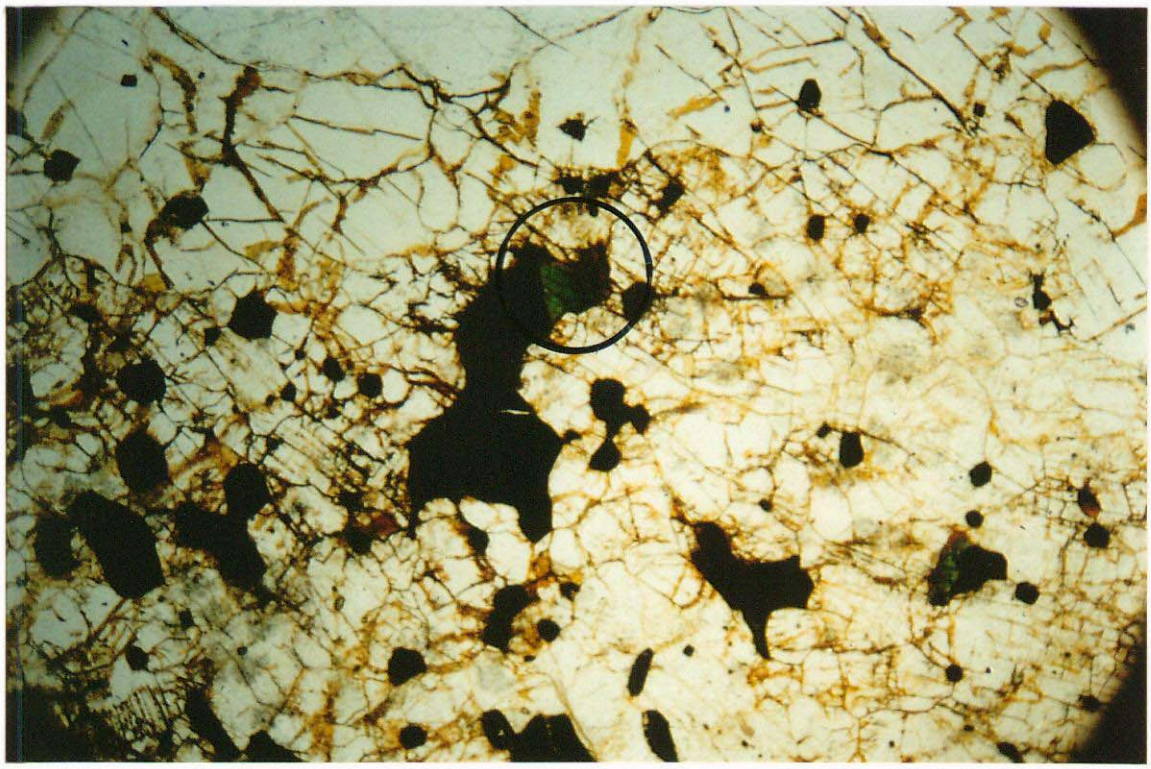


Fig 16 **773497** **Scale : 10mm represents 0.32mm**
PPL. Massive k-spar rich granulite. Minor opaque oxides locally accompanied by small crystals of green spinel (circled).

Pontifex & Associates Pty. Ltd

332 6744
062
26 KENSINGTON ROAD, ...
SOUTH AUSTRALIA ...
A.C.N. 007 ... 084

MINERALOGICAL REPORT No. ...

by A.C. Purvis, PhD

May

TO: Aberfoyle Resources Pty Ltd
37 Fullarton Road
KENT TOWN SA 50..

Attention Dr Stephen ...

YOUR REFERENCE: Order No. 9678

MATERIAL: Rock samples

IDENTIFICATION: ...

WORK REQUESTED: Thin section preparation, petrographic description and comments, as discussed with Alan Purvis

SAMPLES & SECTIONS: Returned to you with this report

PONTIFEX & ASSOCIATES PTY. LTD

Quartzite with ...
sphene, also disse...
derived from ...

...is sample is coarse quartz with a grainsize of up ... suggest ...
...th as rare rounded zircon grains in this sample are about 100 μm long sug...
...ained sandstone as the most probable protolith. Scattered patches of ep... are
either as single crystals or as aggregates, locally with minor chlorite, and ... in
...osing vein-like masses to 5 mm wide, with finer, mo... quartz ... ...
...ne. Sphene occurs locally as grains to 1 mm long, locally ... opaque ...

...eation

...quartz-rich sandstone with retrograde calc-silicate minerals and ...
...his sample may have been of higher metamorphic grade ... shale ... and
...absence of exaggerated grain growth.

Anorthosite to ...
biotite hornblende ...

...rmediate plagioclase (An... ...

...ere are ferromagnesian minerals disseminated ... diffuse bu...
...otite abundant in some areas, and either clinopyroxene or hornblende ...
...he hornblende is sparsely poikilitic, and optically continuous over areas to ... mm
... but the biotite and clinopyroxene are more commonly granular ... aded ...
...te are present as accessories. There is rare fine granular to micrographic quar... the
...l mineralogy is as follows

Plagioclase	85-90%
Biotite	3-4%
Hornblende	...%
Clinopyroxene	3%
Magnetite	2%
Quartz	...%
Apatite	...%

Interpretation

... may therefore be an anorthosite or "diorite" anorthosite but ...
... The weak layering and foliation may be of primary origin ...

Report 0564

quartz with grains possibly
with some disseminated oxidised
low angle incident light, it seems that there were two phases
There are also some clay-limonite-quartz-altered possible
s have been fractured to fragmented and veined by
no obvious detrital heavy minerals and the origin of this sample is not clea

may represent an iron-poor cherty
especially if there was some
Ranges, for example, and this sample

layered complex

as well as layers and

mary minerals include coarse garnet

orthoclase, magnetite and deep green hercynite

seen in granulite facies rocks is common and

hercynite grains

and consistent with

hercynite, which has lamellae

esting primary spinel

some possible zircon or

occurs with the sillimanite

are seen, in that

plagioclase and cordierite

by possible cordierite

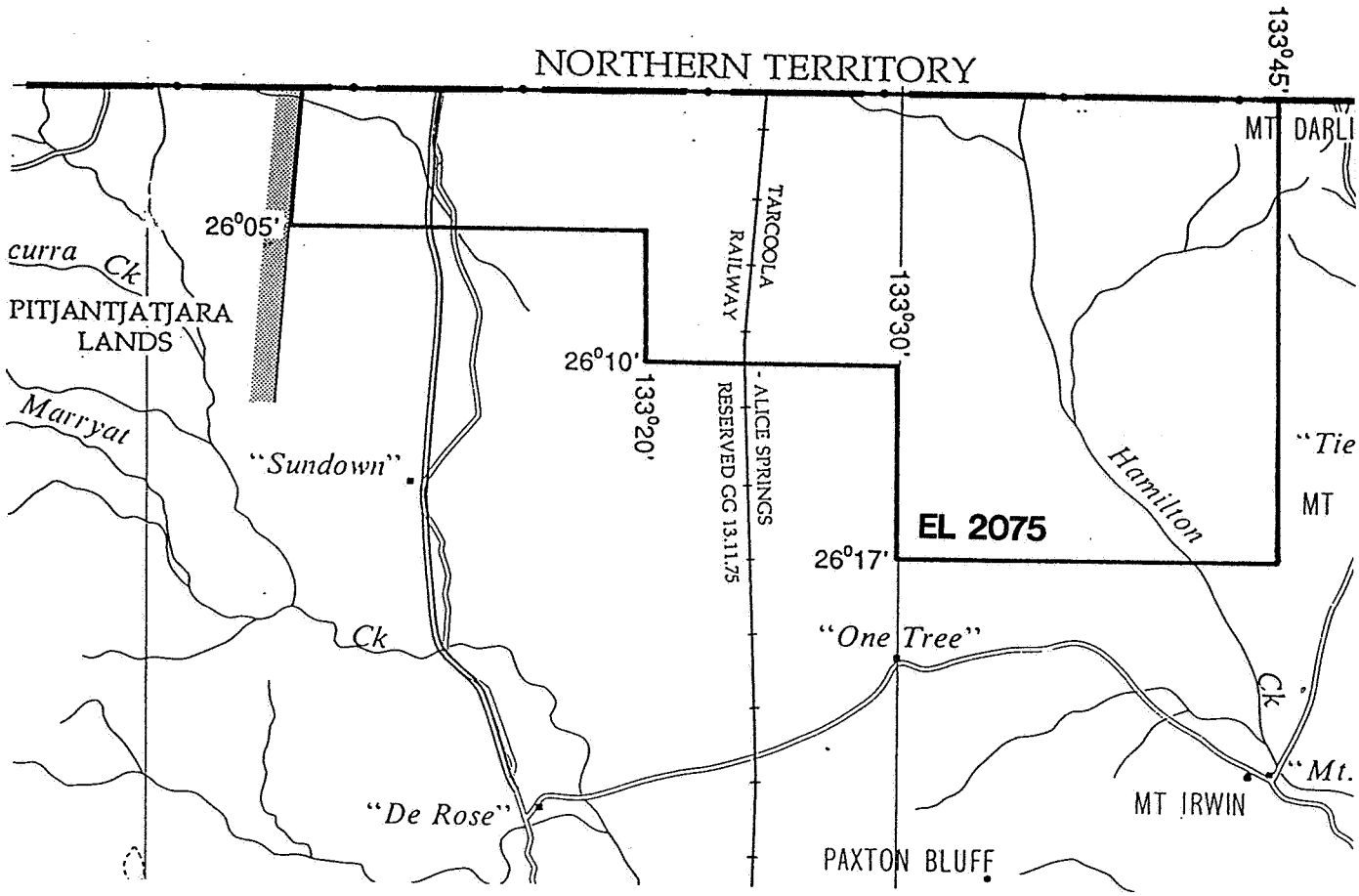
seen in this sample

orthoclase

possibly 900°C to lower

to be

and calcic plag



SCALE 1 : 500 000

10 0 10 20 30 40 50

KILOMETRES

Aberfoyle Resources Limited

EXPLORATION DIVISION

FIGURE 1

REVISIONS			
Init.	Date	Init.	Date
Location Code :			

SOUTH AUSTRALIA

EL 2075 - MT IRWIN

LOCALITY PLAN

Scale : 1:500,000 | Date : MAY 1995

Compiled : ST

Drawn :

Traced :

Checked :

Plate No. : **MTI 1**

1511

FIGURE 2

Aeromagnetic Pixel Map
Colour Scaled TMI with relief shading
and highlights from 315°.
1:250,000
(Pitt Research Pty Ltd)

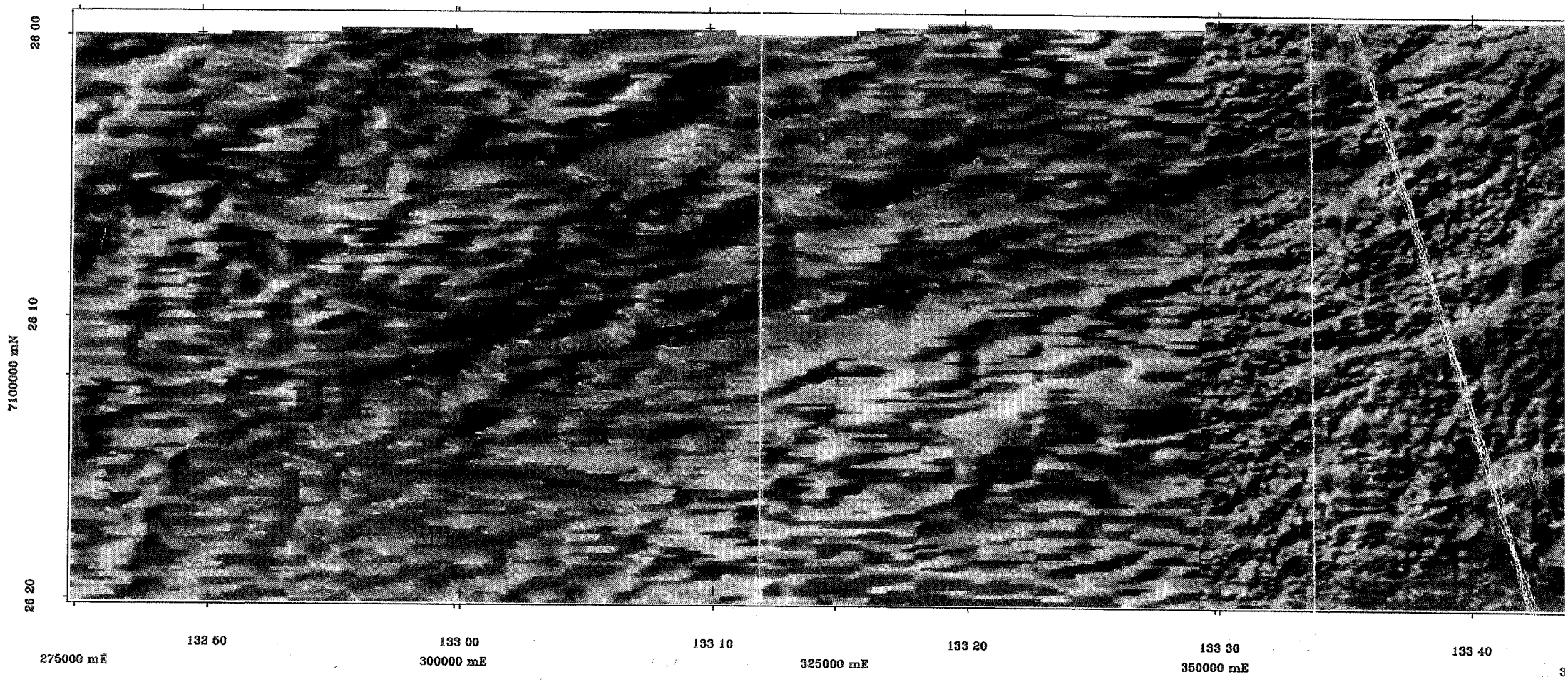


FIGURE 2

ALBERGA MAGNETIC SURVEY (1·5 Km Line spacing) → ABMINGA MAGNETIC SURVEY (400m Line spacing)

SOUTHERN AYERS RANGE FAULT ZONE

(MAINLY GRANITOID)

GRANITOID

(MAINLY GRANITOID)

LOCATION OF 1:20,000 PLAN

LANDS

MARRYAT FAULT ZONE

GOSSES LINEAMENT

ALCURRA CREEK ELA.

PITJANTJATJARA

MARRYAT LINEAMENT

(MAINLY

EL 2075 MT IRWIN

LEGEND

'Glassy magnetite quartzites' after Conor (1978) - WITJUTI 1:50,000 Geological map

Magnetic anomalies selected for field checking

Basic Dyke

* Rock chip sample
○ Pisolite sample
⊕ Rock chip and Pisolite sample
⊕ Granite subcrop
*s Stream sediment sample
773442 Sample number

TN MN

SCALE 1:100,000

KMS 10 0 20 40 60 80 100 KMS

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FIGURE 3

REVISIONS			
Init	Date	Init.	Date

SOUTH AUSTRALIA
EL 2075 - MT IRWIN MUSGRAVE BLOCK
RECONNAISSANCE SUMMARY

Compiled :
Drawn : S.T.
Traced : N.B.
Checked :
Location Code :
Scale : 1:100,000
Date : MAY 1995
Plate No. MTI 2

8931-1

325000mE 326000mE 327000mE 328000mE 329000mE 330000mE 331000mE 332000mE 333000mE 334000mE 335000mE 336000mE

7120000mN
7119000mN
7118000mN
7117000mN
7116000mN
7115000mN
7114000mN

Calcrete S/C
sand
calcrete s/c rare gf bi gneiss ft
calcrete, rare s/c qf ± mt gneiss, occas v siliceous 773550
granitic gneiss
Loc fract, tr py ? in qtze 773528
V sparse o/c Q qtze
fl ferrug Qor qtze (fractured ?) 773529B
tr - few % gf in qtze 773529
qvn min qtze dis mt min feld 773467
rare fl granite gneiss occ v silic ± mt com basic dykes 773527
rare o/c qf bi gneiss com calcrete float
(+) warren qfeld bi granitoid
sand cover
wk layered quartzite, dis mt, feld bands 773464
f g qf bi mt rock 773465
open S - plunging folds
fl subcrop mostly qtz vns
v sparse o/c qtze
rare qtze with f g dis gt (~ 5%) 773531
com Qvn
rare fl qf gneiss
?qtzite
m g granite (warren)
?qtze
qtze min gt 773532
open folds, plunge 30°→170° also isoclinal folds with S-W dipping limbs
mn gt in qtze 773533
qtze 773466 tr mt
qtze s/c
qtze ± min gt
qtze/Qvn tr mt feld
qtze Q dis mt
773539
fold qtze 773534
qtze Q s/c
s/c Qt mt (tr) fl fe ox stained mt
Fe ox stg 773535
773536
mg qf(bi) gneiss min gt
qtze s/c
qtze screen
qtze gt + mt seg sr in qtze
Qvn, qtze to few % dis mt feld 773489
mt qtze 773489
773493 (dis gt feld)
773540
773495 feld, mt, qtze
773494
qtze tr mt open ? folds
773496
coarser Q min mt feld
773499
dec o/c (mainly Q)
small o/c mt qtze, feld bands 773497 (o/c), 773498 (float), min gt + mt
Qvn tr mt
rare ? qtze
dev qtze (mainly Q)
inc o/c
rare s/c
Qvn s/c, min qtze
N.B mirror coarse mt + gt aggregates
relict clash of qtze in dyke rock
sand cover s/c qtze
7m width in s/c cg Q qtze with dis mt, gt
warren calcrete, min qf(bi) gneiss
13m dyke in (rare s/c)
10m dyke qf gneiss
qf bi gneiss min gt
sand cover
Qvn min qtze with dis mt feld, tr ? gt
poor s/c qtze, Qvn (<15% exp)
v poor Qvn min fold qtze
mg qtze dis feld trmt 773523
v rare o/c Qvn tr qtze
warren cg fract qtze ? with com feld min bi tr mt Fe stained 773522
rare ironstone fl 772553
Qvn v min qtze
rare s/c
qtze dis f mg feld tr → 10% mt to 3%
? Q ? qtze
? F
2m wide o/c qtze, dis mt feld
Qvn v min feld qtze v poor o/c
calcrete + minor granitoid, tr gt ? 773524
sand cover & occ basic dykes
rare ironstone fl 773541
qtze Qvn s/c
sand cover
min dis gt in qtze 773521
com gt bearing qtze 773520
Qvn min qtze
poor o/c Qvn min qtze
mainly Qvn, tr mt 773519
qtze dis ? gt
Qvn/qtze
rare sl ? MnO stained qtze with dis feld, min mt ? gt 773518
qtze, occas with mt (tr to 10%), feld (→ granite gneiss), gt (tr to 5%) 773517
v poor o/c
margin of exposure
rare gas patches over 1 sqm (poor o/c) 773516
Qvn/qtze poor s/c
com feld qtze
Qvn
qtze, min gt 773515
fl 773516B
poor o/c Qvn min qtze
rare Qvn s/c
20 loc com qtze
qtze s/c
rare qtze
sand cover
qtze dis mt ± gt, feld
qtze Qvn ± ? granite
? fs mt feld
cover
open folding
s/c Qvn/qtze
min qtze with few % mt rare gt, fg ? spinel 773515 feld to 15%, tr 1% biotite
qtze, dis mt, gt 773514
qtze with feld mt tr ? spinel 773511
Qvn min qtze 773482 tr dis mt (to few %)
dyke truncated against Qvn margin (faulted contact) no Q veining in dyke
fract qtze 773513
glassy qtze mt fe few % tr bio, min feld
qtze, min feld, rare gt 773512
qtze 773480 Qvn dis mt
773481
fld
mainly Qvn
(v poor o/c)
Qvn/qtze poor o/c
Qvn/qtze common v feld qtze → qf bi gneiss
Qvn s/c tr mt
qtze feld tr if ? % ± dis mt sand
cg Q min dis mt (± qtze)
qtze Qvn
qtze, Qvn dis mt
773478
773479
fr feld 773477
v sparse s/c Qvn (? min qtze) basic dykes
v poor s/c Qvn
granite gneiss, isoclinal recumbent folds ax planes ~ 25 - 30° → 240°
milky Qvn
improving o/c
poor s/c Qvn, rare qtze
Qvn qtze min - tr mt feld
qtze, ± mt, gt 773505
? gt mt rich v feld zone in qtze 773507 adj ? sz (773508)
773506 tr spinel ? in qtze
? sz
cover

- LEGEND -

773523 •	Crude chip sample location
773749 x	Lag (pisolite) sample location
20 / 30	Orientation of layering in glassy quartzite, with magnetite streaking lineation
qtze	Quartzite
Qvn	Quartz vein
mt	Magnetite
gt	Garnet

SCALE 1:20,000

METRES 500 0 500 1000 1500 METRES

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EXPLORATION DIVISION

REVISIONS			
Init.	Date	Init.	Date
Location Code :			

SOUTH AUSTRALIA
EL 2075 - MT IRWIN
SURFACE DISTRIBUTION OF BIRKSGATE COMPLEX QUARTZITES

Scale : 1:20,000 | Date : MAY 1995

Compiled :
Drawn : ST
Traced : NB
Checked :
Plate No : MTI 3

8931-2