I., M. and W. FILSELL

EXPLORATION LICENCE 2686
"PARATOO"

Annual report to 9 January 2001

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Adelaide
September 2001

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1. SUMMARY

Exploration during the period has comprised detailed field geology, rock-chip sampling and geophysical interpretation covering E.L. 2686 and adjacent tenements.

This work has highlighted the regional significance of mafic and felsic igneous activity in the genesis of known mineralisation and also the potential for previously unrecognised styles associated with intense magmatic sourced alteration. Geochemical sampling over some of the altered zones has produced significantly anomalous base and precious metal results which warrant follow up sampling and drilling.

2. LOCATION AND ACCESS

Exploration Licence 2686 is located 250 kilometres north-northeast of Adelaide (Figure 1) and covers an area dominated by Neoproterozoic and Cainozoic sediments. Access through the area is excellent on a network of station tracks.

3. TENEMENT STATUS

Exploration Licence 2686, held by I., M. and W. Filsell, originally covered 1426 square kilometres and was granted on 10 January 2000. The tenement was reduced to 595 square kilometres at the first anniversary (9 January 2001) and will expire on 9 January 2002.

4. PREVIOUS EXPLORATION

The region has been subject to sporadic gold and base metal exploration for many years, with major focus on historic small gold and copper mines. A summary of this work was included in the Annual Report on adjacent E.L. 2222 to 24 October 1997.

5. CURRENT PERIOD EXPLORATION

5.1 Geology

Detailed geological examination has been completed over much of the tenement, focused on the areas of strong alteration associated with magmatic activity. Results of this work have previously been reported (Annual Report E.L. 2222 to 24 October 2000).

5.2 Rock-chip sampling

In conjunction with geological mapping rock-chip samples have been collected and assayed for a range of elements. Sample location data and analyses are included as Appendix 1.

5.3 Geophysical interpretation

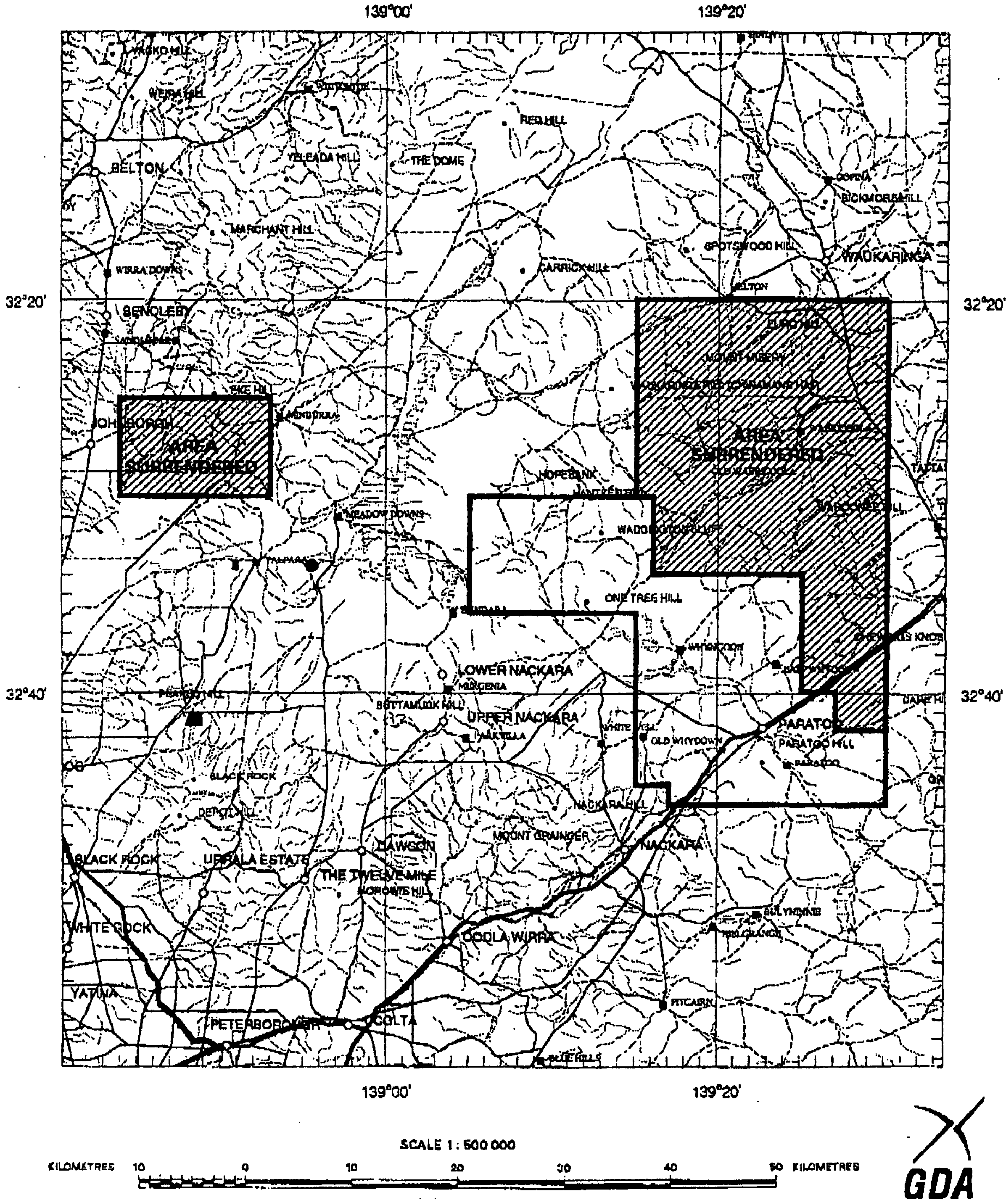
An interpretation of aeromagnetic data was completed by Anglogold, as part of a review of the project area. Their interpretation suggested that the area was cut by regionally extensive northwest dipping thrust faults and that magmatic activity and associated alteration were strongly focused by these structures.

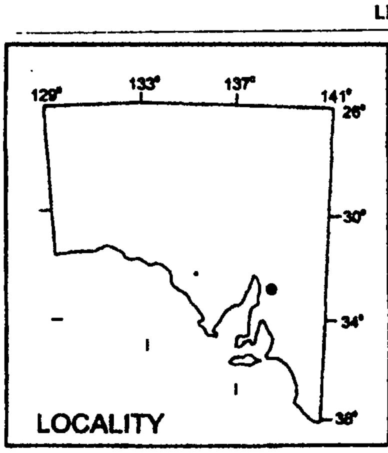
5.4 Petrology

Petrographic studies have focused on igneous suites and alteration assemblages. Results of this work (2 samples) are included as Appendix 2.

FUTURE EXPLORATION

Evidence of moderate to high temperature, high salinity alteration and location of both mafic and felsic intrusives, coupled with a range of chemically reactive host rocks (carbonaceous siltstones, carbonates) make this area highly prospective for intrusive related base and precious metal deposits. Future work on E.L.2686, using a range of geochemical and geological methods, will be directed at location of mineralised sites focused by structural zones proximal to areas of intense alteration and magmatic activity.





E.L.2686 - PARATOO	
LOCATION PLAN	
SCALE 1:500,000	SEPT. 2001
FIGURE 1	

APPENDIX 1: SAMPLE AND ASSAY DATA

E.L. 2686 - ROCK CHIP SAMPLING

Sample	AMG_E	AMG_N	Prospe	Location	Date	Notes	Au_ppm	Au_FA_ppm	Ag_ppm
BD-F027	341938	6381153	Paratoo			Diorite intrusive, more felsic phase adj. margins.Cu mineralisation	0.0190		<0.1
BT050	351080	6415000	Wyranie Hill				0.0010		
BT051	351080	6415000	Wyranie Hill				0.0150		
BT052	351080	6415000	Wyranie Hill				0.0010		
BT053	351080	6415000	Wyranie Hill				0.0010		
BT054	351080	6415000	Wyranie Hill				0.0040	0.006	
BT213	339898	6378230	Utah Au anom.		6/05/00	Contact metamorphosed quartzite, disseminated pyrite.	0.2150	0.197	
BT214	339898	6378230	Utah Au anom.		6/05/00	Quartz/siderite/pyrite veinlet crosscutting pyritic quartzite.	0.0050		
BT215	339898	6378230	Utah Au anom.		6/05/00	Quartz/siderite/specularite/pyrite in quartzite.	0.0020		
BT216	339726	6377912	Jasp		6/05/00	Silic breccia zone	0.0630		
BT217	339726	6377912	Jasp		6/05/00	S extension of silic breccia zone in BT216. More FeO here.	0.0100		
BT218	339870	6366352	Nackara Reward		7/05/00	Very thin quartz/specularite/sericite veins in quartzite	0.0380		
BT219	339870	6366352	Nackara Reward		7/05/00	As above, further S.	0.0020		
BT220	339870	6366352	Nackara Reward		7/05/00	Foliated green sericitequartzite from pit.	0.0070		
BT221	339870	6366352	Nackara Reward		7/05/00	Quartz/specularite/sericite+pyrite in selvage in quartzite.	0.0010	0.001	
BT222	341947	6381160	Dolerite quarry		7/05/00	Vuggy quartz/specularite+sericitearound intrusive.	0.0020		
BT223	341947	6381160	Dolerite quarry		7/05/00	As above.	0.0010		
BT224	341947	6381160	Dolerite quarry		7/05/00	Siderite stockwork+very coarse biotite just inside margin of intrus	0.0060		
BT312	339820	6378284	Paratoo			Fine grained quartzite,pyrite-sericite.	0.0230	0.027	
BT313	339820	6378284	Paratoo			Sericite rich breccia.	0.0650	0.061	
BT314	339820	6378284	Paratoo			Pyrite rich quartz.	0.0110	0.012	
BT315	339820	6378230	Paratoo			Stockwork quartz.	0.3100	0.27	
BT316	339820	6378230	Paratoo			Sheeted stockwork quartz.	0.0830	0.079	
BT317	339820	6378330	Paratoo			Silicified Fe rich sediment.	0.0040		
BT377	347814	6413420	Wyranie Hill		Oct-00	Weakly gossanous tillite from nose of Wyanie A/cline. Slightly se	0.0050		1
BT467	339577	6383291	Grid rhyolite Nth		Oct-00	Flow banded rhyolite with Q-kspar and specularite banding. Sligh	0.0010		
BT468	339267	6382646	Grid rhyolite Sth		Oct-00	Siliceous sediment near rhyolite contact	0.0020		
BT469	340552	6383241	Grid rhyolite Sth		Oct-00	Strongly carbonated rhyolite	0.0030		
BT470	340492	6383149	Grid rhyolite E		Oct-00	Red hematitic SS adjacent to rhyolite contact	0.0010		
BT471	342958	6383569	Mine rhyolite		Nov-00	Pink rhyolite with abundant banded specularite	0.0010		
BT472	343883	6383019	BIF? Hill		Nov-00	Banded quartzite with disseminated pyrite	0.0040		
BT473	343888	6383023	BIF? Hill		Nov-00	Brecciated banded quartzite with MnO cement	0.0190		
BT474	343893	6383018	BIF? Hill		Nov-00	Brecciated banded quartzite with disseminated pyrite	0.0210		

E.L. 2686 - ROCK CHIP SAMPLING

Sample	As_ppm	Bi_ppm	Co_ppm	Cr_ppm	Cu_ppm	Fe_ppm	Mn_ppm	Mo_ppm	Ni_ppm	Pb_ppm	Sb_ppm	Sn_ppm	Te_ppm	W_ppm	Zn_ppm
BD-F027	11	1.38	866.3	<10	3280	23.34	1293	3.8	41	3	0.7	2.5	0.2	5.8	-10
BT050	39		10		12	139000	400		10						13
BT051	70		28		28	67000	1260		22						10
BT052	34		21		55	28000	820		16						7
BT053	14		14		59	39000	1390		19						10
BT054	30		27		49	94000	3540		25						13
BT213	36		23			42000		5	31		0.3				5
BT214	14		13			40500		1.6	14		0.1				10
BT215			20			142000		1.5	41		0.2				5
BT216			5			12900		5.9	10		3.4				32
BT217	89		50		122	139000		7.4	78	110	8.1				462
BT218			5			18800		4.7	6		0.8				34
BT219			5			14700		4.1	10		0.7				22
BT220			5			10800		5	10		0.4				19
BT221			5			28500		6.9	10		0.5				9
BT222			23		9	19000		2.9	9		0.5				14
BT223			6			10900		3.9	10		0.3				6
BT224			21		188	37000		0.3	25		0.1				7
BT312	43		32					5.2	13						8
BT313	185		5					5.4	10						5
BT314	33		5					8.7	11						5
BT315	37		37					5	21						15
BT316	45		43		12			3.3	32						9
BT317	12		17		9			2.4	22	24					27
BT377	175		26		150	191000	460	2	40	24					20
BT467	5		9		13	30700	450	2	9						4
BT468	1		2		1	17000	650	1	2						1
BT469	1		3		12	19500	750	1	8						2
BT470	2		5		21	23000	500	1	10						4
BT471	1		7		23	40700	800	1	13						6
BT472	1		2		75	53400	105	1	5						7
BT473	16		1050		2650	27600	32400	3	68	14					40
BT474	34		8		150	121000	100	3	41						10

APPENDIX 2: PETROGRAPHIC REPORTS

Terry Leach & Co

Exploration Geologists, Petrologists and Consultants

PETROGRAPHIC ANALYSES OF TWO OUTCROP SAMPLES FROM PARATOO SOUTH AUSTRALIA

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BY

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IN

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TABLE AND PHOTOGRAPHS

1. SUMMARY

1 The two samples P1 and P2 are identified as arkosic sandstones.

2 Four distinctive assemblages are recognised as replacement and /or deposition stages.
I) K-feldspar + biotite ± quartz (P1 + P2)
II) Sericite + clinozoisite + tourmaline ± k-feldspar (P1 + P2)
III) Calcite ± chlorite + opaques (P2)
IV) Supergene: smectite (P1) and limonite (P2).

3 It is recommended that 'arkosic' samples from localities where intrusive relationships are observed within mafic igneous bodies be submitted for petrographic study to compare with the samples of the current study.

2. INTRODUCTION

Two outcrop rock samples were submitted by the Filsell Bros. for petrological study. Both samples were prepared as thin sections.

A summary of the petrography is given in Table 1.

Petrographic reports and client data are included in Appendices I and III respectively.

Photomicrographs illustrating significant mineralogical and textural features are presented in Appendix II.

▪ ***Table 1: Summary Of Lithology And Alteration Of Two Outcrop Rocks From The Paratoo Area, South Australia.***

Sample No.	Lithology	Alteration Replacement	Deposition
P1	Variably coarse to fine-grained, arkosic sandstone with banded mudstone / siltstone / very fine-grained sandstone clasts	1. Bio+Ksp+Rt+?Hm 2. Ser+Clz±To 3. Sm	1. A) Ksp±Bio (veinlets) B) Bio (→Sm) (microveinlets)
P2	Medium to very coarse-grained, arkosic sandstone	1. Q+Ksp±Bio 2. Ct+Ch±Op 3. Lim	1. Bio±Op (inclusions in healed microfractures in some Q grains) 2. Ksp+To (→Ct+Op overprinting)(streak, microveinlet) 3. Ct (microcracks)

Mineral Abbreviations

Bio	Biotite
Ch	Chlorite
Clz	Clinozoisite
Ct	Calcite
Hm	Hematite
Ksp	K-feldspar
Lim	Limonite
Op	Opaques
Q	Quartz
Rt	Rutile
Ser	Sericite
Sm	Smectite
To	Tourmaline

3. COMMENTS

3.1 Lithology

The origin of the two lithologies is an enigmatic one. From previous observations, the rocks have been described as arkose sandstones but recent field relationships (Bob Burke, pers comm.) suggest the lithologies are intrusive in nature crosscutting other rocks including mafic bodies. However this study confirms the early observations that the two samples are sedimentary in origin based on the following observations:

1. subangular to subrounded detrital grains of calcic and potassic feldspar, biotite flakes and altered mafic minerals (P1) plus quartz (P2) matrix to clast-supported in a predominantly feldspathic clastic matrix. Most of the crystal grains have their primary margins altered by a combination of depositional processes and diagenetic and hydrothermal dissolution effects (eg Plate 4)

2. banded mudstone / siltstone / very fine-gained sandstone clasts within the arkose matrix of P1. The finer grained clasts are presumed to be the result of soft sediment deformation.

3. crystal grains are typically tightly packed rather than intergrown as would be expected if the lithologies were igneous in origin. Matrix feldspar however exhibits limited intergrowth textures as a result of recrystallisation inferred to be the result of elevated temperatures.

The microcline and perthite crystal components of the sandstones indicate the sediments were derived from an intrusive igneous or gneissic provenance. The textural immaturity of the rocks indicates limited transport of the detrital material.

3.2 Alteration

Four alteration / deposition stages characterised by distinctive mineral assemblages are recognised in the two samples.

Stage 1: A potassic assemblage consisting of biotite + k-feldspar + quartz. This assemblage is best preserved in P1. K-feldspar partly to strongly overprints calcic feldspar grains and together with biotite strongly replaces the fine grained sediment clasts and sandstone matrix in P1. Biotite and k-feldspar also seal a few veinlets in P1. In P2, biotite is mostly replaced by later alteration but persists as microinclusions within healed microfractures traversing quartz grains.

Stage 2: Sericite + clinozoisite + tourmaline ± k-feldspar. This assemblage partly replaces the potassic assemblage in the sediment clasts of P2; sericite also replaces mafic grains in the sandstone of P1 and weakly flecks k-feldspar in P2. In the latter sample, tourmaline accompanied by k-feldspar, is restricted within a narrow streak traversing the rock.

Stage 3: Calcite + chlorite ± opaques. This assemblage which occurs in P2 only is dominated by Fe-stained calcite. It strongly replaces the matrix and partly digests the boundaries of larger detrital grains (Plate 4). Accompanying chlorite is only in very minor amounts.

Stage 4 Smectite or Limonite. Smectite strongly replaces biotite and sericite in P1 and is common in the matrix of the arkose sandstone. Limonite typically stains calcite in P2 and is inferred to be derived from supergene replacement of opaques accompanying the calcite.

3.3 Discussion

The intrusive relationships of the arkose sandstones with adjacent rock remain enigmatic. In some cases I may be explained by disruption of soft sediment beds but the observation that they appear to cut mafic intrusive bodies (B. Burke, pers. comm.) highlights a significant problem yet to be resolved. Petrographic study of samples from the latter localities is suggested to see if these rocks are similar at microscopic scale to the samples of the present study.

APPENDIX I: PETROGRAPHIC DESCRIPTIONS

Sample Number: P1

Paratoo

Rock Name:

A potassic-altered (biotite, k-feldspar, rutile) arkosic sandstone with banded mudstone/ very fine-grained sandstone / coarse siltstone clasts overprinted by clinozoisite-sericite-tourmaline and supergene smectite.

Hand Specimen Description:

A pale pink feldspathic sandstone separates several coarse to medium-grained dark biotite-altered, or pale pink, fractured, banded mudstone/ siltstone clasts. The dark clasts progressively alter to a pink colour (loss of biotite) near clast boundaries. The clasts are cut by pale clay microveinlets / and microfractures.

Thin Section Description - Lithology, Textures And Minerals:

Sixty per cent of the section is composed of two large sediment clasts, which are set within a variably fine to coarse-grained sandstone. The clasts consisting of regular mudstone bands to 8mm wide alternating with very fine-grained sandstone / coarse siltstone bands to 4mm wide. The mudstone is composed of microcrystalline alteration minerals. The very fine-grained sandstone/ coarse siltstone bands are composed of scattered subangular microcline grains and less common plagioclase grains in a fine ?recrystallised altered feldspathic matrix. One of the clasts is fractured with some dislocation of the fragments.

The host sandstone is composed of common subangular to less common subrounded grain to matrix-supported crystal fragments (0.1 to 0.5mm diameter dominated by microcline and orthoclase with less common multiply-twinned plagioclase (relict), minor elongate detrital biotite flakes and altered mafic crystals set in a fine granular recrystallised altered feldspathic matrix. A few zircon microprisms and altered ?Fe Ti oxide grains are present in matrix.

The sandstone is identified as an arkose on the basis of the predominant clastic feldspar component.

Alteration:

Alteration Intensity: Variably weak to strong

Replacement Mineralogy

1. <u>Clast</u>

A) Mudstone bands → altered to 1) microcrystalline <u>K-feldspar + Biotite + Rutile</u> micrograins (dark in HS) or 2) microcrystalline <u>K-feldspar ± Sericite + Clinozoisite ± Tourmaline + Rutile</u> (pink in HS). Assemblage 2 appears to be a replacement of assemblage 1 at the expense of biotite, which is relict. <u>Smectite</u> overprints both assemblages.

B) Very fine-grained sandstone / coarse siltstone bands → as for mudstone but alteration minerals are relatively coarser grained reflecting primary mineral size. Primary k-feldspar grains are typically unaltered. Clinozoisite is developed typically as small, elongated crystals with normal interference colours. Tourmaline is pleochroic olive green to colourless.

2. <u>Sandstone</u>

Plagioclase → unaltered to partly to strongly replaced by secondary <u>K-feldspar</u> ± <u>Biotite</u> → partly to completely replaced by <u>Smectite</u>.

Mafic crystals → replaced by <u>Biotite</u> aggregates → partly to completely overprinted by <u>Sericite</u> or <u>Smectite</u>.

Primary k-feldspar → unaltered or weakly overprinted by <u>Clinozoisite</u> and /or <u>Smectite</u>.

Detrital biotite → locally replaced by <u>Sericite</u> or <u>Smectite</u>.

Matrix → composed of fine anhedral granular secondary <u>K-feldspar + Biotite flakes + Rutile</u> micrograins + occasional fine-grained opaques (<u>Hematite</u>) → partly to strongly overprinted by <u>Smectite</u>. Some of the more elongate biotite flakes are possibly detrital in origin.

Secondary k-feldspar is dusted by cryptocrystalline Fe oxides, which confer the pink colour in hand specimen.

Replacement Mineral Abundances

K-feldspar (60-70%) Biotite (15-20%), Smectite (10-15%), Sericite (5-7%), Clinozoisite (3-5%), Tourmaline (0.1-0.3%), Rutile (0.3-0.5%), Opaques (0.01-0.03%)

Deposition:

Sequences Of Deposition

1) A) A few discontinuous veinlets cut both clast and sandstone host (0.3-0.5%) → sealed with fine granular K-feldspar ± trace Biotite

B) Discontinuous microveinlets cutting clasts and host (1-2%) → sealed with Smectite after Biotite (minor to sparse within smectite).

Comments:

A potassic-altered (biotite, k-feldspar, rutile) arkosic sandstone with banded mudstone/ very fine-grained sandstone / coarse siltstone clasts overprinted by clinozoisite-sericite-tourmaline and supergene smectite. The clastic component of the sediment clasts is similar to the host sandstone; i.e. primary k-feldspar-rich with detrital quartz absent. The fracturing of the clasts suggests rupturing occurred when sediment was relatively brittle. Microcline which is developed in intrusive and gneissic rocks is a common clastic component of the sandstone and thus rules out the possibility that the sediment is volcaniclastic in origin.

Paragenesis

1. Potassic alteration; biotite + k-feldspar + rutile + ? hematite; k-feldspar or biotite veinlet / microfracture-fill
2. Overprint; sericite + clinozoisite ± tourmaline
3. Supergene overprint; smectite

Sample Number: P2

Paratoo

Rock Name:

A potassic-altered (quartz, k-feldspar, biotite) immature, poorly sorted medium to very coarse arkosic sandstone (feldspar component > 50%) cut by k-feldspar-tourmaline veinlet and strongly overprinted by late Limonite-stained calcite ± chlorite.

Hand Specimen Description:

A poorly sorted, pink coloured k-feldspar-altered fine to coarse-grained arkosic sandstone with common quartz eyes subequant to 4mm across and pink k-feldspar crystals to 4mm, cut by a thin dark streak (tourmaline) and overprinted by brown-orange coloured calcite (fizzes strongly in dilute HCl).

Thin Section Description - Lithology, Textures And Minerals:

A medium to fine-grained clast-supported sandstone lithology. The clastic component of the rock is comprised of;

- subequant subhedral to irregular / anhedral shaped subangular quartz crystals to 4mm across (30-35% of section); is host to occasional perthite, biotite and rare zircon and opaque crystals. The quartz margins are typically scalloped due to mechanical abrasion or partial resorption.
- subequant to anhedral subangular k-feldspar-altered grains inferred to be mainly after plagioclase (ghosted twinning observed in some crystals (30-35%)
- rectangular to anhedral subangular to rarely subrounded microcline to 4mm (15-20%)
- subangular perthite to 4mm (5-7%)
- detrital elongate biotite flakes to 2mm (2-3%) with a rough preferred orientation
- zircon microprisms (<0.005%)

The larger grains are enclosed in clast-supported, k-feldspar-altered grains inferred to be after plagioclase. Some lithic grains are composed of quartz and intergrown with finer grained k-feldspar / altered plagioclase. The finer grained quartz-feldspathic component, which forms a matrix to the larger grains, tends not to occur as intergrowths but as tightly fitted grains though it does locally occur possibly due to recrystallisation or as primary clastic intrusive component.

Alteration:

Alteration Intensity: Variably weak to strong

Replacement Mineralogy

Plagioclase → replaced by secondary K-feldspar dusted with cryptocrystalline Hematite conferring pink colour to HS.

K-feldspar → locally rimmed by secondary k-feldspar and rarely flecked with Sericite.

Biotite → silicified to Quartz

Inferred rare Fe Ti oxides → replaced by aggregates of Rutile micrograins ± Quartz.

Fine grained Quartz locally seals interstitial space between grains.

Limonite–stained well crystalline Calcite ± sparse weathered Opaques and associated trace well crystalline Chlorite weakly to strongly replace primary and secondary k-feldspar grains both within the crystals and along rims commonly forming a matrix to the clastic component.

Replacement Mineral Abundances

K-feldspar (35-40%), Calcite (25-30%), Quartz (5-7%), Sericite (0.7-1%), Opaques (→ Limonite, 0.7-1%), Chlorite (0.1-0.3%)

Deposition:

Sequences Of Deposition

1) Healed microfractures in some quartz grains are locally host to trains of secondary Biotite ± Opaque microinclusions.
2) An irregular discontinuous streak /?microveinlet (to 2mm wide, 2-3%, dark streak in HS)) traverses the quartz-feldspar host grains → composed of microcrystalline K-feldspar + abundant microcrystalline olive green Tourmaline. This assemblage is strongly overprinted by Limonite-stained Calcite ± weathered Opaques, which also overprint the host lithology.
3) Microcracks in grains (0.3-0.5%) → sealed with Calcite.

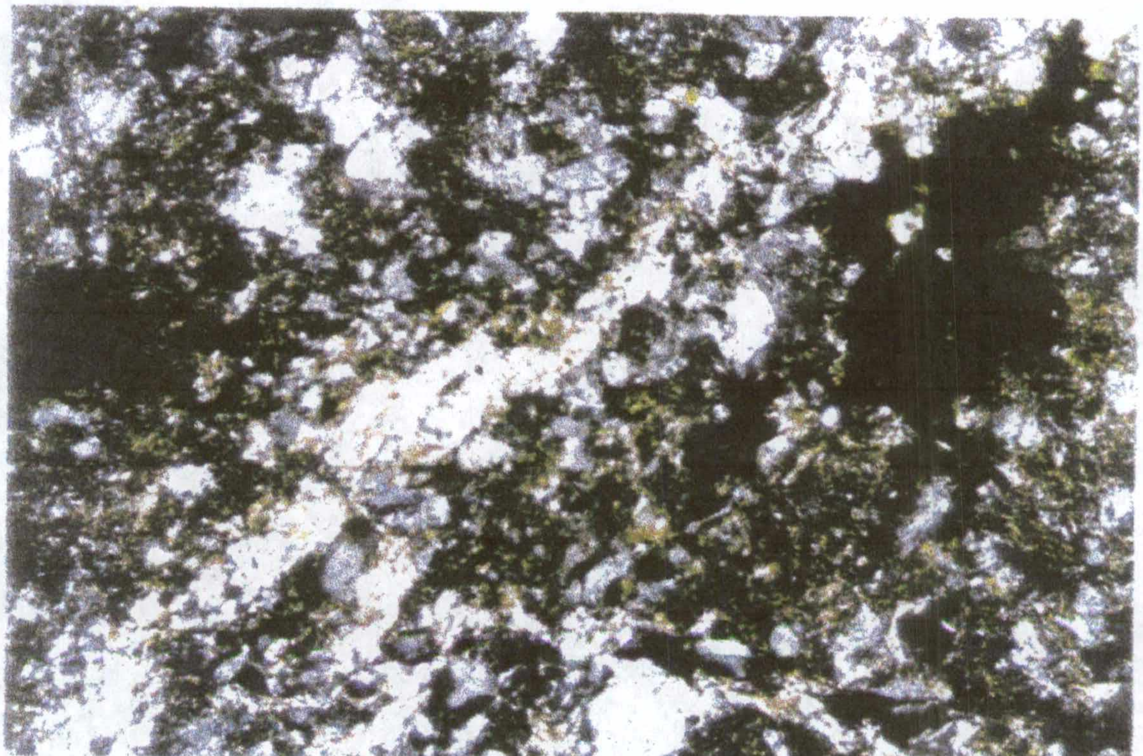
Comments:

A potassic-altered (quartz, k-feldspar, biotite) immature poorly sorted medium to very coarse arkosic sandstone (feldspar component > 50%) cut by a k-feldspar-tourmaline veinlet with late strong overprint of limonite-stained calcite ± chlorite. The limonite staining of calcite is derived from weathering of associated opaques.

Paragenesis

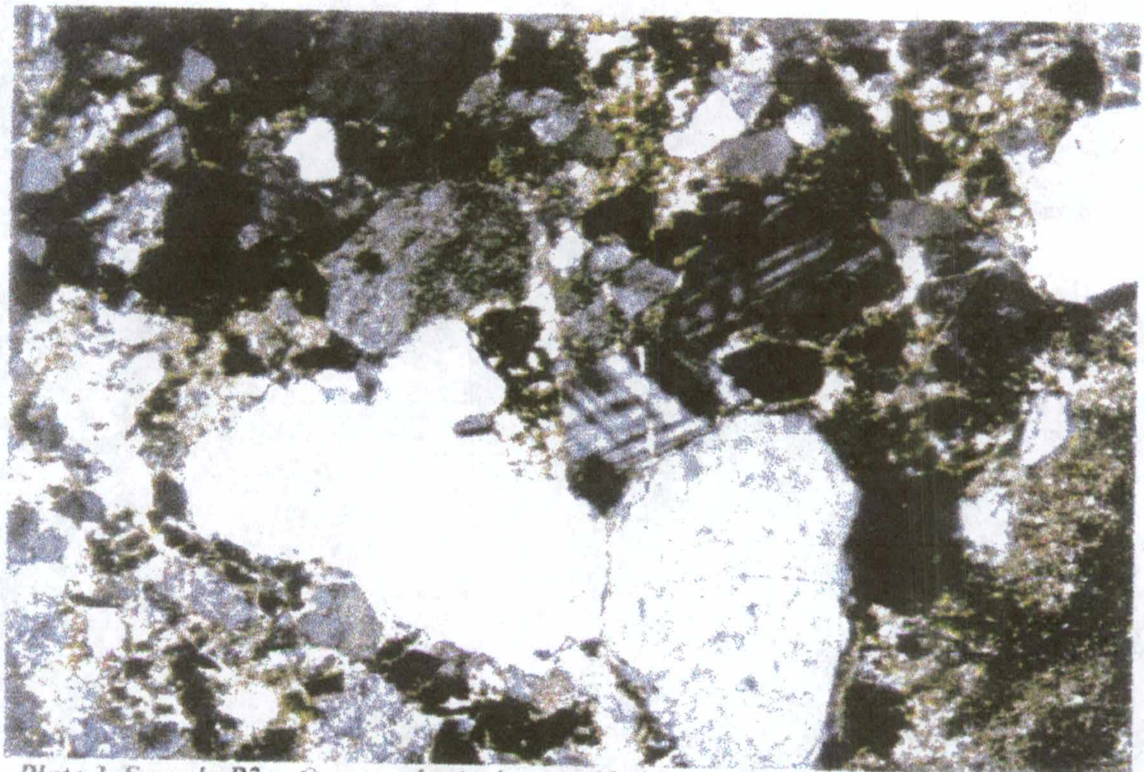
1. Potassic alteration; quartz + k-feldspar ± biotite
2. Veinlet; k-feldspar + tourmaline
3. Overprint; calcite + chlorite ± opaques.
4. Supergene overprint; limonite

APPENDIX II: PHOTOMICROGRAPHS

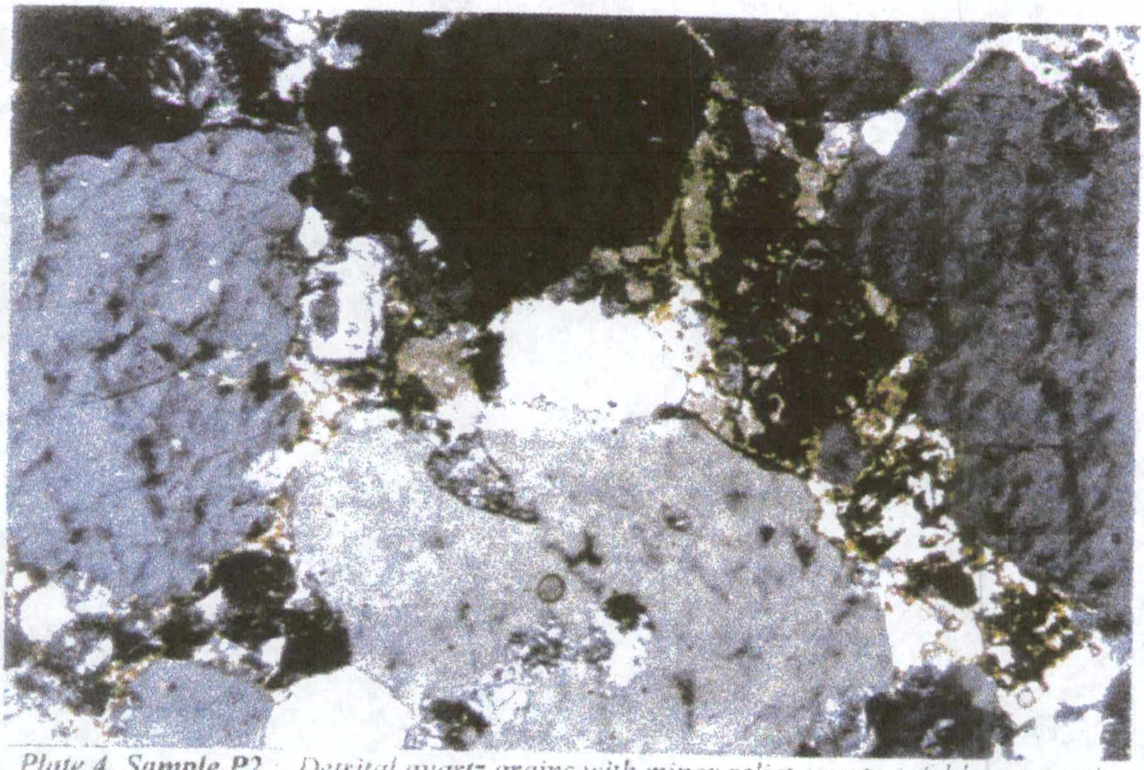


- ***Plate 1, Sample P1 :*** *Relict biotite in veinlet traversing biotite-k-feldspar-smectite-altered sediment clast. Field of view 2.0 mm (XPL).*

- ***Plate 2,*** *Sample P2 : Arkose sandstone with common plagioclase fragments partly replaced by k-feldspar in a matrix of smectite alteration possibly after secondary biotite. Field of view 2.0mm (XPL).*



- ***Plate 3, Sample P2 :*** *Quartz, plagioclase and k-feldspar detrital grains in a calcite replacement matrix. Field of view 2.0mm (XPL).*



- ***Plate 4, Sample P2 :*** *Detrital quartz grains with minor relict quartz + feldspar matrix strongly replaced by limonitic calcite. Field of view 2.0mm (XPL).*