

169119: metasandstone, Fandango prospect

Location and sampling

RUDALL (SF 51-10), RUDALL (3352)

MGA Zone 51, 414920E 7495290N

Sampled on 3 May 2000.

The sample was taken from drillhole FAD001, depth interval 195–196 m, located about 0.5 km west-southwest of the Fandango prospect.

Tectonic unit/relations

This sample is a dark purple-grey, massive and recrystallized quartz sandstone from the Coolbro Sandstone of the Throssell Group, Yeneena Basin (Hickman and Clarke, 1994; Bagas et al., 2000).

Petrographic description

The principal minerals present in this sample are quartz (70 vol.%), sericite (20 vol.%), and microcline (10 vol.%), with accessory zircon (trace), leucoxene (trace), and tourmaline (trace). This is predominantly a schistose, microcline-bearing, inequigranular but medium- to coarse-grained quartzite, with an extensive matrix of microcrystalline quartz–sericite schist. A thin band or bed within the rock consists of fine quartz–sericite schist, hosting fine to very coarse sand (quartz > microcline vol%), with heavy mineral laminations containing fine leucoxene, tourmaline and zircon. The hand specimen shows an apparently strong schistosity, with planes that are rich in schistose sericite. There is a gradational contact between a homogeneous inequigranular quartzite, with an extremely fine schistose quartz–sericite matrix forming about 90 vol.% of the rock and a band about 10 mm thick of very fine quartz–sericite schist, that hosts minor sand-sized detritus. The quartzite has abundant inequigranular detrital quartz grains from 0.25 to rarely 2 mm long, with minor microcline grains, rare detrital muscovite, scattered polycrystalline quartz grains and cherty lithic grains. These grains form a loosely packed aggregate within a microcrystalline quartz micromosaic, incorporating fine schistose sericite, which commonly occurs as rims on the detrital grains and amalgamate to form a matrix. A sericite-rich layer has minor detrital quartz and microcline grains, to 2 mm, apparently resorbed by the extensive fine quartz–sericite schist matrix. Poorly defined heavy-mineral laminations with more abundant leucoxene and tourmaline are also locally rich in scattered crystals and fragments of zircon. This narrow schist layer has 70 vol.% sericite, 25–30 vol.% quartz and 2–3 vol.% microcline, with zircon in diffuse heavy mineral laminations. Metamorphism is of uncertain grade but the sericite may represent greenschist facies retrogression.

Zircon morphology

The zircons isolated from this sample are colourless to pale pink and dark pinkish brown, generally between 60 × 80 µm and 200 × 250 µm in size, and are subhedral, oval or irregular in shape. Most grains are internally structureless but a minority show traces of internal growth zoning and many are fractured. Fluid and mineral inclusions are common. Surface pitting, particularly around the grain terminations, is evident for many grains, consistent with detrital transport.

Table 19. Ion microprobe analytical results for sample 169119: metasandstone, Fandango prospect

Grain .spot	U (ppm)	Th (ppm)	Pb (ppm)	f206%	$^{207}\text{Pb}/^{206}\text{Pb}$	$\pm 1\sigma$	$^{208}\text{Pb}/^{206}\text{Pb}$	$\pm 1\sigma$	$^{206}\text{Pb}/^{238}\text{U}$	$\pm 1\sigma$	$^{207}\text{Pb}/^{235}\text{U}$	$\pm 1\sigma$	% concordance	$^{207}\text{Pb}/^{206}\text{Pb}$ age	$\pm 1\sigma$
1.1	163	500	90	0.472	0.10861	0.00124	0.87151	0.00461	0.3214	0.0036	4.813	0.081	101	1 776	21
2.1	398	315	113	0.328	0.09637	0.00075	0.22221	0.00168	0.2467	0.0026	3.278	0.045	91	1 555	15
3.1	320	145	68	0.290	0.07873	0.00086	0.13600	0.00177	0.2009	0.0047	2.181	0.059	101	1 165	22
4.1	341	139	80	0.483	0.08363	0.00098	0.12717	0.00205	0.2221	0.0052	2.561	0.070	101	1 284	23
5.1	311	330	154	0.067	0.09394	0.00077	0.34590	0.00222	0.3992	0.0094	5.171	0.134	144	1 507	16
6.1	1 103	265	172	0.249	0.07234	0.00050	0.07273	0.00097	0.1571	0.0037	1.567	0.039	95	996	14
7.1	656	317	117	0.456	0.09147	0.00073	0.14505	0.00152	0.1649	0.0039	2.080	0.053	68	1 456	15
8.1	233	152	58	0.403	0.08565	0.00105	0.19581	0.00235	0.2219	0.0052	2.621	0.073	97	1 330	24
9.1	386	183	108	0.306	0.09076	0.00081	0.14250	0.00164	0.2607	0.0061	3.263	0.085	104	1 442	17
10.1	446	312	122	0.208	0.09458	0.00074	0.12164	0.00143	0.2588	0.0061	3.374	0.087	98	1 520	15
11.1	490	208	123	0.048	0.09170	0.00054	0.12470	0.00093	0.2404	0.0056	3.040	0.076	95	1 461	11
12.1	238	163	42	0.357	0.07778	0.00132	0.20150	0.00307	0.1601	0.0038	1.717	0.053	84	1 141	34
13.1	421	371	105	0.275	0.09004	0.00088	0.14718	0.00180	0.2316	0.0054	2.875	0.076	94	1 426	19
14.1	1 034	125	181	0.177	0.07565	0.00046	0.03495	0.00074	0.1818	0.0042	1.896	0.047	99	1 086	12
14.1	559	579	140	0.340	0.08354	0.00065	0.30379	0.00169	0.2082	0.0049	2.399	0.061	95	1 282	15
16.1	235	150	74	0.450	0.09476	0.00105	0.18510	0.00228	0.2814	0.0066	3.676	0.100	105	1 523	21
17.1	298	450	122	0.163	0.10938	0.00073	0.44684	0.00214	0.3044	0.0072	4.591	0.116	96	1 789	12
18.1	462	213	114	0.169	0.08895	0.00067	0.14714	0.00133	0.2306	0.0054	2.828	0.072	95	1 403	14
19.1	148	85	39	0.752	0.09076	0.00179	0.16054	0.00394	0.2405	0.0057	3.010	0.099	96	1 442	38
20.1	698	465	205	0.219	0.10875	0.00055	0.18899	0.00112	0.2604	0.0061	3.904	0.096	84	1 779	9
21.1	247	135	81	0.286	0.10582	0.00092	0.15781	0.00182	0.3004	0.0071	4.383	0.115	98	1 729	16
22.1	340	227	69	0.429	0.07676	0.00107	0.20109	0.00249	0.1821	0.0043	1.928	0.055	97	1 115	28
23.1	518	609	109	0.359	0.07585	0.00077	0.33705	0.00212	0.1705	0.0040	1.783	0.048	93	1 091	20
24.1	460	187	114	0.263	0.09081	0.00069	0.11758	0.00134	0.2371	0.0056	2.969	0.076	95	1 443	15
25.1	498	104	79	0.598	0.07902	0.00094	0.06730	0.00188	0.1583	0.0037	1.724	0.047	81	1 173	23
26.1	497	108	117	0.191	0.09158	0.00064	0.06787	0.00108	0.2344	0.0055	2.960	0.075	93	1 459	13
27.1	403	101	125	0.346	0.10829	0.00075	0.06539	0.00124	0.3032	0.0071	4.527	0.115	96	1 771	13
28.1	583	111	101	0.218	0.07843	0.00066	0.02582	0.00108	0.1802	0.0042	1.949	0.050	92	1 158	17
29.1	206	121	55	0.588	0.08992	0.00136	0.16593	0.00296	0.2417	0.0057	2.996	0.089	98	1 424	29
30.1	645	109	111	0.154	0.07664	0.00057	0.04624	0.00092	0.1771	0.0041	1.871	0.048	95	1 112	15
31.1	350	148	94	0.227	0.09132	0.00080	0.12080	0.00154	0.2568	0.0060	3.233	0.084	101	1 453	17
32.1	397	254	83	0.239	0.07927	0.00086	0.18636	0.00194	0.1914	0.0045	2.091	0.057	96	1 179	21
33.1	331	193	77	0.319	0.08399	0.00088	0.16774	0.00187	0.2136	0.0050	2.474	0.067	97	1 292	20
6.2	760	128	143	0.298	0.07580	0.00058	0.04518	0.00107	0.1936	0.0045	2.023	0.052	105	1 090	15
6.3	257	63	79	0.236	0.10320	0.00073	0.07110	0.00127	0.3009	0.0071	4.281	0.109	101	1 682	13

Analytical details

This sample was analysed on 30 April and 1 May 2001. The counter deadtime during both analysis sessions was 32 ns. During the first analysis session, only one analysis of the CZ3 standard could be obtained, and a calibration error of 1.0 (1 σ %) was applied to analyses of unknowns obtained during this analysis session. Analyses 1.1 and 2.1 were obtained during the first analysis session. During the second analysis session, eleven analyses of the CZ3 standard indicated a Pb*/U calibration error of 2.33 (1 σ %). Common-Pb corrections were applied assuming Broken Hill common-Pb isotopic compositions for all analyses.

Results

Thirty-five analyses were obtained from 33 zircons. Results are given in Table 19 and shown on concordia and Gaussian-summation probability density plots in Figures 29 and 30.

Interpretation

Most analyses (with the exception of analyses 5.1, 7.1, and 20.1) are concordant to slightly discordant, with the discordance pattern consistent mostly with the recent loss of radiogenic Pb. Analysis 5.1 was highly reversely discordant, which was attributed to instability in the primary beam intensity during this analysis. The analyses indicate a range of $^{207}\text{Pb}/^{206}\text{Pb}$ dates of c. 1000 to 1820 Ma. Six analyses of six zircons (6.2, 12.1, 14.1, 22.1, 23.1 and 30.1), assigned to Group 1, have $^{207}\text{Pb}/^{206}\text{Pb}$ ratios defining a single population and indicating a weighted mean $^{207}\text{Pb}/^{206}\text{Pb}$ date of 1097 ± 18 Ma (chi-squared = 0.73). Discordant analysis 6.1 indicates a slightly younger $^{207}\text{Pb}/^{206}\text{Pb}$

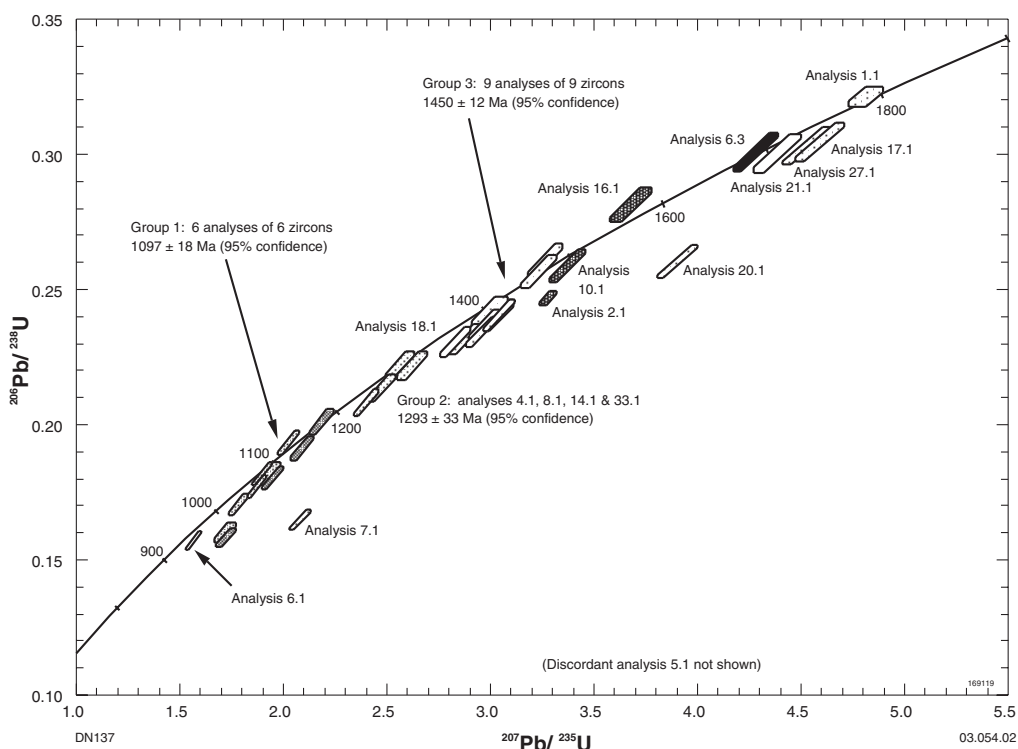


Figure 29. Concordia plot for sample 169119: metasandstone, Fandango prospect

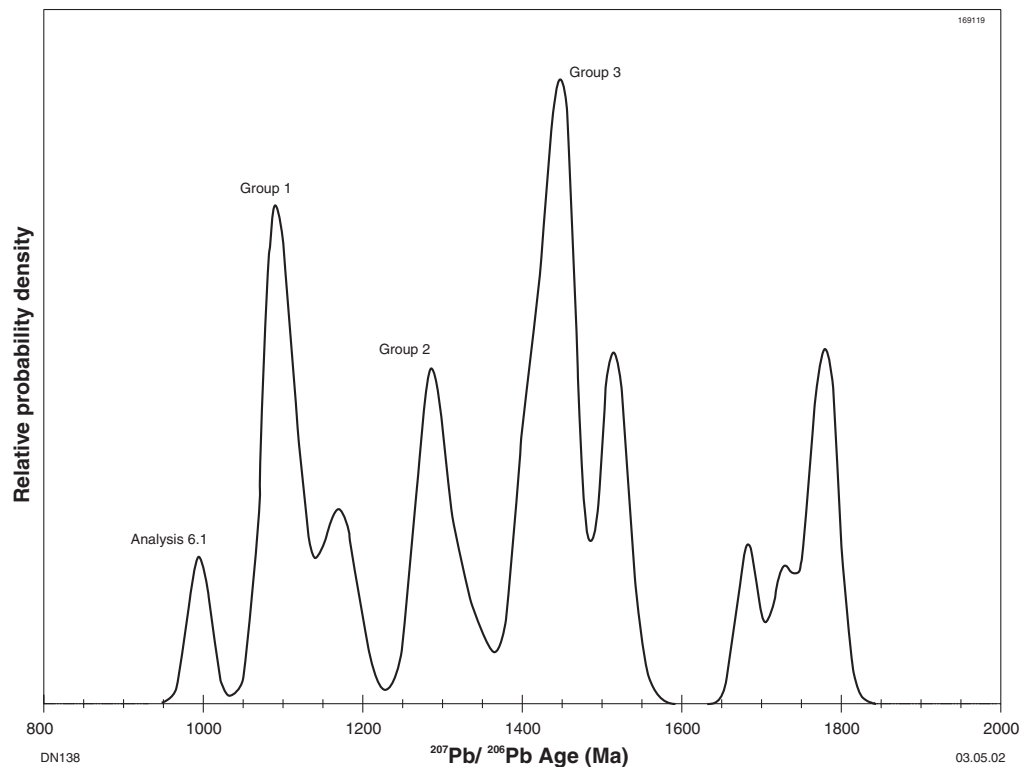


Figure 30. Gaussian-summation probability density plot for sample 169119: metasandstone, Fandango prospect

date of 996 ± 14 Ma (1σ error). However, analysis 6.2 (from the same grain) belongs with Group 1, suggesting that the younger $^{207}\text{Pb}/^{206}\text{Pb}$ date indicated by analysis 6.1 may be due to ancient radiogenic-Pb loss. Analyses 4.1, 8.1, 14.1 and 33.1, assigned to Group 2, have $^{207}\text{Pb}/^{206}\text{Pb}$ ratios defining a single population and indicating a weighted mean $^{207}\text{Pb}/^{206}\text{Pb}$ date of 1293 ± 33 Ma (chi-squared = 0.87). Nine analyses of nine zircons (7.1, 9.1, 11.1, 13.1, 19.1, 24.1, 26.1, 29.1 and 31.1), assigned to Group 3, have $^{207}\text{Pb}/^{206}\text{Pb}$ ratios defining a single population and indicating a weighted mean $^{207}\text{Pb}/^{206}\text{Pb}$ date of 1450 ± 12 Ma (chi-squared = 0.52). The remaining analyses indicated $^{207}\text{Pb}/^{206}\text{Pb}$ dates between c. 1100 and 1820 Ma but cannot be confidently assigned to discrete groups.

The weighted mean $^{207}\text{Pb}/^{206}\text{Pb}$ date of 1097 ± 18 Ma indicated by the six analyses of Group 1 is interpreted as a maximum age for deposition of the sandstone precursor to the quartzite. Source rocks within the western part of Australia having ages similar to those of the zircons within this sample include the Rudall (Nelson, 1995, 1996), Arunta (Williams et al., 1996 and references cited therein), Gascoyne (Nelson, 1997, 1998, 1999, 2000, 2001b, this volume) and Musgrave (White et al., 1999 and references cited therein) complexes and the Albany–Fraser Orogen (Nelson et al., 1995).

STRATIGRAPHIC REFERENCE:

BAGAS, L., WILLIAMS, I. R., and HICKMAN, A. H., 2000, Rudall, W.A. (2nd edition): Western Australia Geological Survey, 1:250 000 Geological Series Explanatory Notes, 50p.

HICKMAN, A. H., and CLARKE, G. L., 1994, Geology of the Broadhurst 1:100 000 sheet: Western Australia Geological Survey, 1:100 000 Geological Series Explanatory Notes, 40p.

Recommended reference for this publication:

NELSON, D. R., 2002, 169119: metasandstone, Fandango Prospect; in *Compilation of geochronology data, 2001*: Western Australia Geological Survey, Record 2002/2, p. 80–83.

OR

NELSON, D. R., 2002, 169119: metasandstone, Fandango Prospect; Geochronology dataset 91; in *Compilation of geochronology data, June 2006 update*: Western Australia Geological Survey.

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