

118995: fine-grained arenite, Teague Ring Structure

Location and sampling

NABBERU (SG 51–5)

120°56'33"E, 25°53'11"S

Sampled on 3 May 1996

The sample was taken from a site near the centre of the Teague Ring Structure. An outcrop of arenite at this site has bedding striking 020° and dipping at 20°.

Tectonic unit/relations

The arenite is correlated with units of the Frere Formation of the Earaheddy Group.

Petrographic description

This sample is a fine-grained (0.2–0.25 mm) and well-sorted quartzite dominated by detrital quartz, with minor tourmaline and zircon grains, set within a quartz-rich cement. In thin section, the sample is massive and homogeneous and no evidence of sedimentary structures are observed. Quartz comprises 98–99 vol.% of the detrital grains observed. These grains are generally clear and show weakly undulose to straight extinction. Slightly smaller (0.05–0.10 mm), well-rounded to moderately rounded grains of green-brown pleochroic tourmaline and neutral to colourless zircon grains, also detrital in origin, comprise less than 0.5 vol.% of the rock. The latter often show evidence of fine-scale growth banding and/or complex internal zoning patterns. Lithic fragments are uncommon. Porosity in this grain-supported sandstone is, for the most part, occluded by quartz cement (10–15 vol.%). This occurs as overgrowths on detrital grains that meet along polygonal to serrated boundaries. Interstitial, low-birefringent clay minerals, Fe-hydroxides and rare vermicular chlorite (colourless, very low birefringence) and rare sericite fill the grain interstices.

Zircon morphology

The zircons extracted from this sample are generally rounded and pitted, consistent with a detrital origin. They range in size from less than $75 \times 50 \mu\text{m}$ to more than $250 \times 150 \mu\text{m}$. Clear, structureless grains and dark, strongly zoned grains are represented. Grain 21 is a $50 \times 70 \mu\text{m}$, irregular, colourless and structureless fragment.

Analytical details

This sample was analysed on 17 and 25 November 1996. The counter deadtime was 32 ns. For the first session, during which analyses 1.1 to 13.1 were obtained, four analyses of the CZ3 standard indicated a Pb*/U calibration error of 1.03 (1σ%). For the second session, during which analyses 14.1 to 20.2 were obtained, five analyses of the CZ3 standard indicated a Pb*/U calibration error of 1.39 (1σ%). Common-Pb corrections were made assuming Broken Hill common-Pb isotopic compositions for all unknown analyses with the exception of analyses 4.1, 9.1, 14.1, 15.1 and 25.1, for which isotopic compositions determined using the method of Cumming and Richards (1975) were assumed.

Results

Twenty-seven analyses were obtained from 25 zircons. Results are given in Table 26 and shown on a concordia plot in Figure 28.

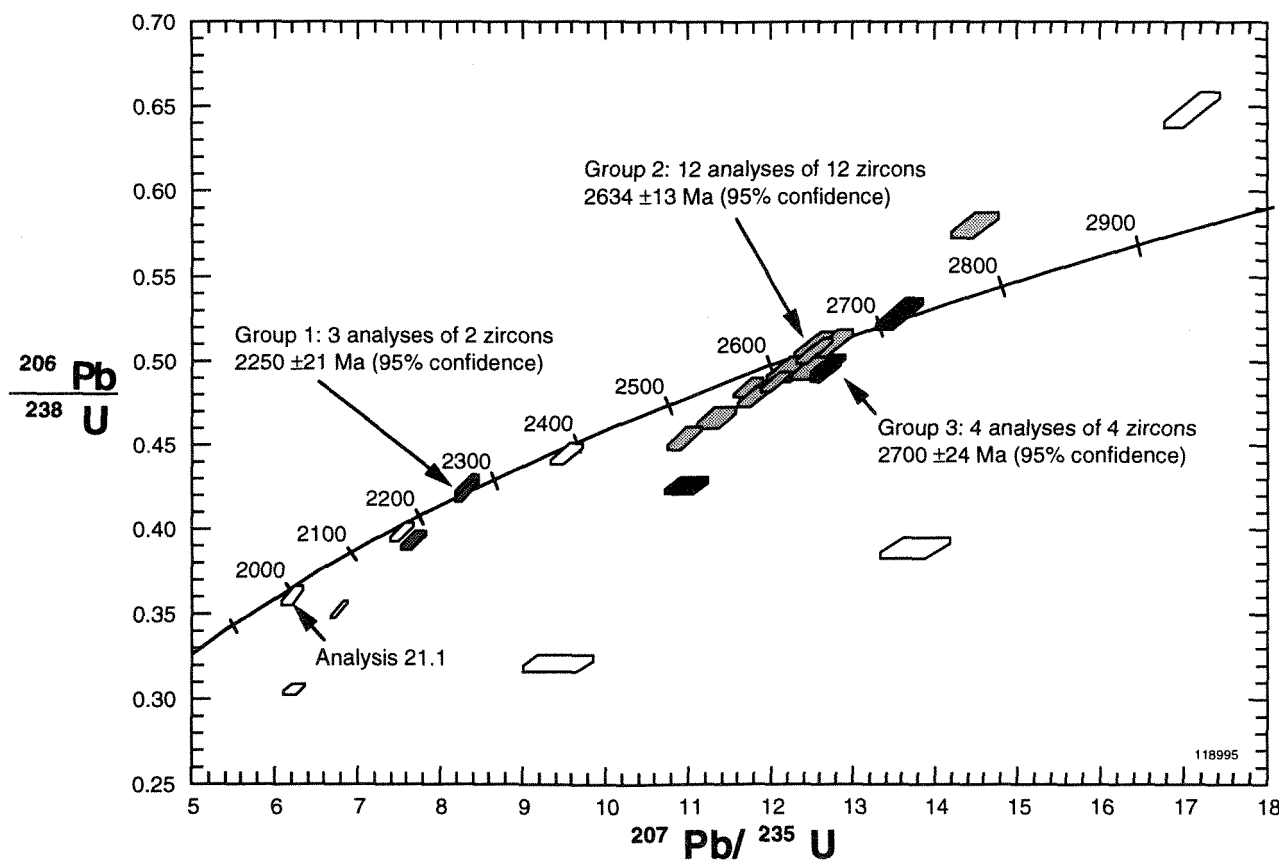


Figure 28. Concordia plot for sample 118995: fine-grained arenite, Teague Ring Structure

Table 26. Ion microprobe analytical results for sample 118995; fine-grained arenite, Teague Ring Structure

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	92	89	57	0.123	0.18429	0.00166	0.26434	0.00304	0.4976	0.0063	12.645	0.208	97	2 692	15
2.1	120	99	71	0.234	0.17857	0.00137	0.22358	0.00241	0.4874	0.0059	12.001	0.182	97	2 640	13
3.1	48	23	27	0.342	0.18255	0.00265	0.13178	0.00470	0.4959	0.0073	12.481	0.273	97	2 676	24
4.1	190	648	113	6.613	0.18638	0.00338	0.11311	0.00718	0.4257	0.0050	10.940	0.250	84	2 710	30
5.1	165	227	110	0.173	0.18541	0.00120	0.37416	0.00253	0.4939	0.0058	12.625	0.178	96	2 702	11
6.1	139	74	77	0.230	0.17499	0.00133	0.14244	0.00221	0.4840	0.0058	11.679	0.174	98	2 606	13
8.1	86	125	56	0.358	0.17756	0.00186	0.39368	0.00411	0.4809	0.0062	11.772	0.208	96	2 630	17
9.1	954	578	511	13.230	0.14771	0.00227	0.20061	0.00504	0.3058	0.0033	6.229	0.124	74	2 320	26
10.1	78	100	59	1.058	0.18027	0.00226	0.28970	0.00473	0.5803	0.0076	14.423	0.277	111	2 655	21
11.1	40	84	30	0.269	0.17877	0.00269	0.57126	0.00690	0.4947	0.0076	12.193	0.278	98	2 641	25
12.1	88	119	57	0.342	0.17804	0.00176	0.37281	0.00378	0.4784	0.0062	11.744	0.203	96	2 635	16
13.1	98	111	58	0.313	0.17575	0.00255	0.27282	0.00509	0.4664	0.0059	11.303	0.231	94	2 613	24
14.1	273	644	311	26.293	0.25561	0.00625	0.42323	0.01397	0.3889	0.0060	13.706	0.417	66	3 220	39
15.1	159	618	149	26.749	0.21210	0.00861	0.45578	0.01938	0.3214	0.0053	9.398	0.429	61	2 922	66
16.1	71	38	53	0.223	0.19050	0.00183	0.13310	0.00298	0.6485	0.0104	17.034	0.336	117	2 746	16
17.1	142	122	89	0.383	0.17905	0.00128	0.23215	0.00234	0.5060	0.0076	12.492	0.217	100	2 644	12
18.1	86	99	57	0.409	0.18049	0.00182	0.30257	0.00372	0.5105	0.0081	12.703	0.252	100	2 657	17
19.1	135	118	74	0.829	0.15485	0.00161	0.23606	0.00334	0.4451	0.0066	9.502	0.182	99	2 400	18
20.1	209	60	93	0.060	0.14255	0.00088	0.07999	0.00115	0.4226	0.0062	8.306	0.138	101	2 258	11
21.1	132	124	57	0.790	0.12485	0.00164	0.24730	0.00361	0.3604	0.0054	6.204	0.132	98	2 027	23
22.1	185	133	82	0.923	0.14130	0.00148	0.12862	0.00294	0.3928	0.0058	7.653	0.146	95	2 243	18
23.1	190	39	80	0.677	0.13664	0.00131	0.06385	0.00242	0.3981	0.0058	7.500	0.139	99	2 185	17
24.1	48	65	33	0.263	0.17876	0.00275	0.35704	0.00602	0.5091	0.0087	12.548	0.306	100	2 641	26
25.1	289	152	169	3.427	0.17416	0.00192	0.15790	0.00403	0.4544	0.0066	10.911	0.210	93	2 598	18
26.1	46	40	30	0.020	0.18566	0.00200	0.24192	0.00337	0.5280	0.0090	13.515	0.287	101	2 704	18
22.2	142	59	66	0.284	0.14140	0.00100	0.11298	0.00173	0.4262	0.0062	8.309	0.141	102	2 244	12
20.2	248	178	92	0.291	0.13901	0.00073	0.07288	0.00119	0.3529	0.0050	6.763	0.107	88	2 215	9

Interpretation

Three analyses (20.1, 22.1 and 22.2), assigned to Group 1, have $^{207}\text{Pb}/^{206}\text{Pb}$ ratios corresponding to an age of 2250 ± 21 Ma (chi-squared = 0.34). A further twelve analyses (2.1, 3.1, 6.1, 8.1, 10.1, 11.1, 12.1, 13.1, 17.1, 18.1, 24.1 and 25.1), assigned to Group 2 and displaying varying degrees of discordance, have $^{207}\text{Pb}/^{206}\text{Pb}$ ratios corresponding to an age of 2634 ± 13 Ma (chi-squared = 1.40). Four analyses (1.1, 14.1, 15.1 and 16.1), assigned to Group 3, have $^{207}\text{Pb}/^{206}\text{Pb}$ ratios corresponding to an age of 2700 ± 24 Ma (chi-squared = 0.14). The zircons belonging to the latter two groups may have been derived from the Yilgarn Craton. Near-concordant analysis 21.1, on a zircon of detrital origin, has a $^{207}\text{Pb}/^{206}\text{Pb}$ age of 2027 ± 23 Ma (1σ error) and provides a maximum age for deposition of the sedimentary precursor to the arenite. The remaining analyses indicated ages between c. 2180 and 2800 Ma.

STRATIGRAPHIC REFERENCE:

PIRAJNO, F., 2002, Geology of the Shoemaker impact structure: Western Australia Geological Survey, Report 82.

Recommended reference for this publication:

NELSON, D. R., 1997, 118995: fine-grained arenite, Teague Ring Structure; in Compilation of SHRIMP U–Pb zircon geochronology data, 1996: Western Australia Geological Survey, Record 1997/2, p. 114–117.

OR

NELSON, D. R., 1997, 118995: fine-grained arenite, Teague Ring Structure; Geochronology dataset 437; in Compilation of geochronology data, June 2006 update: Western Australia Geological Survey.

Data obtained: 25/11/1996; Data released: 21/08/1997