

# 148922: crystal–vitric tuff, Koonong Pool

## Location and sampling

EDMUND (SF 50-14), CAPRICORN (2251)  
MGA Zone 50, 493390E 7412000N

Sampled on 3 August 2001

The sample was taken at the foot of a cliff within a creek bed, 600 m north-northeast of the Anticline – Bali Hi Pb–Au–Ag prospect and 5.3 km south of Koonong Pool on the Ashburton River.

## Tectonic unit/relations

The sample is from a pale grey, fine-grained volcanoclastic rock from the upper part of the Ashburton Formation, Ashburton Basin (Thorne et al., 2002). It was sampled from the lowest 1.5 m of a 45 m-thick volcanic unit that is interbedded with siltstones and overlain unconformably by a 3 m-thick sandstone unit that forms the base of the Bywash Formation of the Capricorn Group, Blair Basin. The sample was collected to provide an age for the Ashburton Formation in the upper Wyloo Group.

## Petrographic description

The sample is a fine-grained crystal–vitric tuff with sparsely scattered angular chips of quartz (10 vol.%) up to 0.3 mm long, as well as abundant altered shards that were formerly glassy. Textural preservation is poor and abundance estimates are uncertain, although the shards can form as much as 35 vol.% of the rock. The sample contains quartz, sericite and chlorite alteration, very minor limonite after carbonate, and leucoxene partly after opaque oxide. Accessory minerals include apatite (trace), tourmaline (trace), and zircon (trace). Filaments of limonite are oriented parallel to the layering, whereas veins of quartz, with or without limonite, are oriented at a high angle to the layering. The angular and cusped outlines of the shards are visible throughout and are mostly less than 0.3 mm long. Alteration of shards and matrix is mainly to cryptocrystalline quartz, with variable but mostly minor amounts of sericite and chlorite. Irregular domains, typically 2 to 5 mm long, are rich in fine quartz, with or without sericite, or have chlorite as well as quartz and sericite. These domains have a common elongation direction, which represents a bedding-parallel foliation, with shreds of limonite in the same orientation, in poorly defined lenses up to 5 mm long. The shreds may have replaced filaments of low-temperature pyrite. There

are also patches of limonite, apparently after carbonate, to 0.6 mm in diameter with rhombic outlines. Small patches of variously diffuse to compact leucoxene occur, some of which have replaced opaque oxide grains. Patches very rich in chlorite, locally over 0.5 mm long, could represent lithic fragments. Apatite, tourmaline, and sparse rounded, clear crystals of zircon are accessory to rare heavy minerals. Narrow quartz veins, with or without limonite, occur mostly at a high angle to the possible bedding foliation.

## Zircon morphology

The zircons isolated from this sample are colourless, pale yellowish-brown or dark brown, and generally between  $20 \times 60 \mu\text{m}$  and  $100 \times 280 \mu\text{m}$  in size. They are commonly rod-shaped, subrounded or irregular fragments. Many grains lack internal zonation. Cathodoluminescence images of representative zircons are given in Figure 1.

## Analytical details

This sample was analysed on 16 April 2002. The counter deadtime was 32 ns. Ten analyses of the CZ3 standard indicated a Pb\*/U calibration uncertainty of 1.70% ( $1\sigma$ ). Common-Pb corrections were applied assuming Broken Hill common-Pb isotopic compositions for all analyses.

## Results

Twenty-five analyses were obtained from 25 zircons. Results are given in Table 1 and shown on a concordia plot in Figure 2.

## Interpretation

All analyses are concordant and have  $^{207}\text{Pb}/^{206}\text{Pb}$  ratios defining a single population indicating a weighted mean  $^{207}\text{Pb}/^{206}\text{Pb}$  date of  $1806 \pm 9 \text{ Ma}$  (chi-squared = 0.50).

The weighted mean  $^{207}\text{Pb}/^{206}\text{Pb}$  date of  $1806 \pm 9 \text{ Ma}$  indicated by all 25 analyses is interpreted as providing the age of igneous crystallization of the crystal–vitric tuff.

### Recommended reference for this publication:

NELSON, D. R., 2004, 148922: crystal-vitric tuff, Koonong Pool; Geochronology dataset 249; in Compilation of geochronology data, June 2006 update: Western Australia Geological Survey.

Data obtained: 16/04/2002; Data released: 06/12/2004

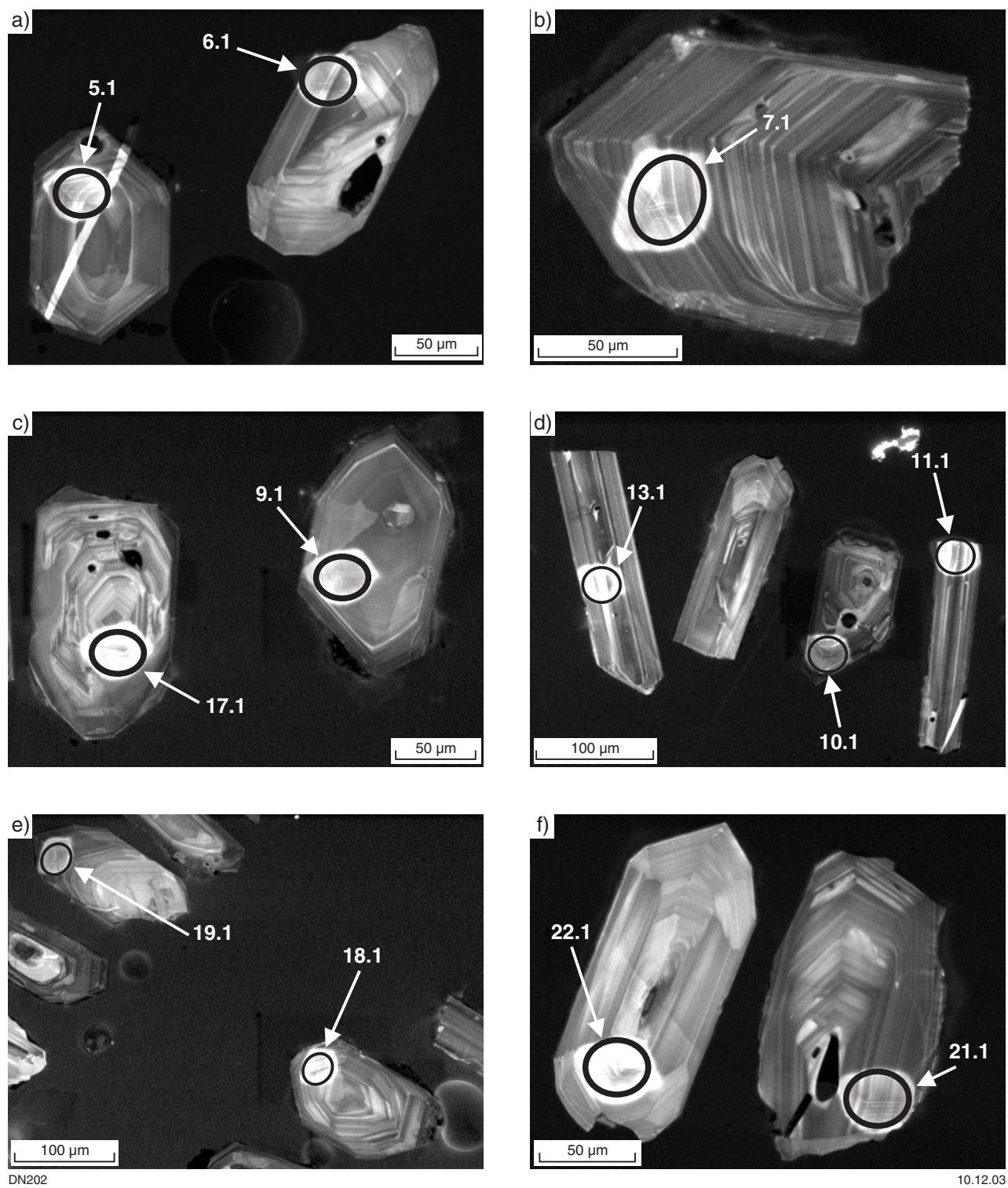


Figure 1. Cathodoluminescence images of representative zircons from sample 148922: crystal-vitric tuff, Koonong Pool

**Table 1. Ion microprobe analytical results for sample 148922: crystal–vitric tuff, Koonong Pool**

<i>Grain .spot</i>	<i>U (ppm)</i>	<i>Th (ppm)</i>	<i>Pb (ppm)</i>	<i>f206%</i>	<i><sup>207</sup>Pb/<sup>206</sup>Pb</i>	<i>±1σ</i>	<i><sup>208</sup>Pb/<sup>206</sup>Pb</i>	<i>±1σ</i>	<i><sup>206</sup>Pb/<sup>238</sup>U</i>	<i>±1σ</i>	<i><sup>207</sup>Pb/<sup>235</sup>U</i>	<i>±1σ</i>	<i>% concordance</i>	<i><sup>207</sup>Pb/<sup>206</sup>Pb Age</i>	<i>±1σ</i>
1.1	163	156	63	0.145	0.11135	0.00131	0.27524	0.00300	0.3245	0.0058	4.982	0.112	99	1 822	21
2.1	158	134	59	0.182	0.11177	0.00127	0.24486	0.00277	0.3202	0.0057	4.935	0.110	98	1 828	21
3.1	292	386	119	0.241	0.10961	0.00095	0.37984	0.00251	0.3141	0.0055	4.748	0.097	98	1 793	16
4.1	178	181	72	0.289	0.11099	0.00149	0.28716	0.00347	0.3317	0.0059	5.075	0.120	102	1 816	24
5.1	94	112	38	0.445	0.11098	0.00193	0.34416	0.00476	0.3222	0.0059	4.930	0.132	99	1 816	32
6.1	134	205	59	0.360	0.10895	0.00169	0.42441	0.00451	0.3298	0.0060	4.954	0.125	103	1 782	28
7.1	254	215	95	0.167	0.11004	0.00103	0.24417	0.00227	0.3182	0.0056	4.828	0.101	99	1 800	17
8.1	119	140	48	0.404	0.11122	0.00182	0.33746	0.00443	0.3211	0.0058	4.924	0.127	99	1 819	30
9.1	169	98	62	0.242	0.10979	0.00137	0.16196	0.00274	0.3340	0.0059	5.056	0.116	103	1 796	23
10.1	404	364	154	0.141	0.10995	0.00075	0.26088	0.00168	0.3213	0.0056	4.871	0.094	100	1 799	12
11.1	182	306	82	0.204	0.10953	0.00126	0.48281	0.00365	0.3262	0.0058	4.926	0.110	102	1 792	21
12.1	150	217	64	0.352	0.11206	0.00146	0.40681	0.00386	0.3214	0.0057	4.966	0.116	98	1 833	24
13.1	100	146	44	0.572	0.10906	0.00222	0.41166	0.00569	0.3261	0.0060	4.904	0.142	102	1 784	37
14.1	124	172	53	0.236	0.11213	0.00161	0.39848	0.00422	0.3255	0.0059	5.032	0.123	99	1 834	26
15.1	133	196	58	0.124	0.11057	0.00138	0.42062	0.00382	0.3301	0.0059	5.033	0.116	102	1 809	23
16.1	135	127	53	0.456	0.11012	0.00169	0.26474	0.00384	0.3255	0.0058	4.942	0.123	101	1 801	28
17.1	71	68	29	0.835	0.11067	0.00278	0.27330	0.00641	0.3286	0.0061	5.014	0.166	101	1 810	46
18.1	97	93	38	0.642	0.10682	0.00227	0.26658	0.00523	0.3280	0.0060	4.831	0.144	105	1 746	39
19.1	320	333	126	0.136	0.11009	0.00083	0.30007	0.00198	0.3242	0.0056	4.922	0.098	101	1 801	14
20.1	222	241	87	0.215	0.11005	0.00131	0.31377	0.00314	0.3169	0.0056	4.808	0.108	99	1 800	22
21.1	159	227	68	0.225	0.10873	0.00138	0.40690	0.00370	0.3272	0.0058	4.906	0.113	103	1 778	23
22.1	59	66	25	0.366	0.11182	0.00253	0.32968	0.00612	0.3349	0.0064	5.164	0.162	102	1 829	41
23.1	269	286	106	0.107	0.11168	0.00087	0.30169	0.00206	0.3231	0.0056	4.976	0.099	99	1 827	14
24.1	89	179	42	0.503	0.11021	0.00243	0.57730	0.00692	0.3193	0.0059	4.853	0.148	99	1 803	40
25.1	150	205	65	0.084	0.11110	0.00143	0.38778	0.00384	0.3312	0.0060	5.074	0.119	101	1 817	23

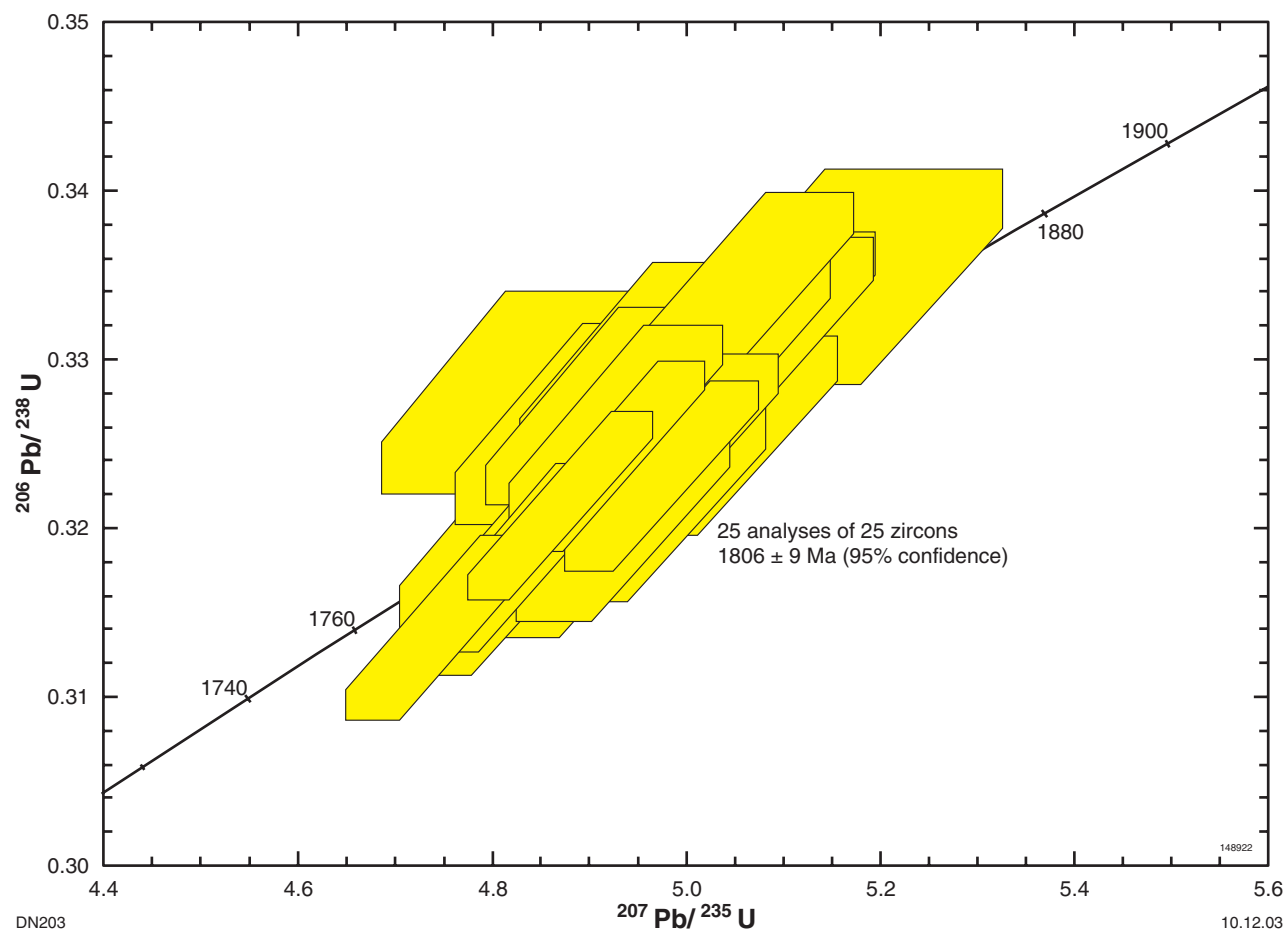


Figure 2. Concordia plot for sample 148922: crystal-vitric tuff, Koonong Pool