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Record
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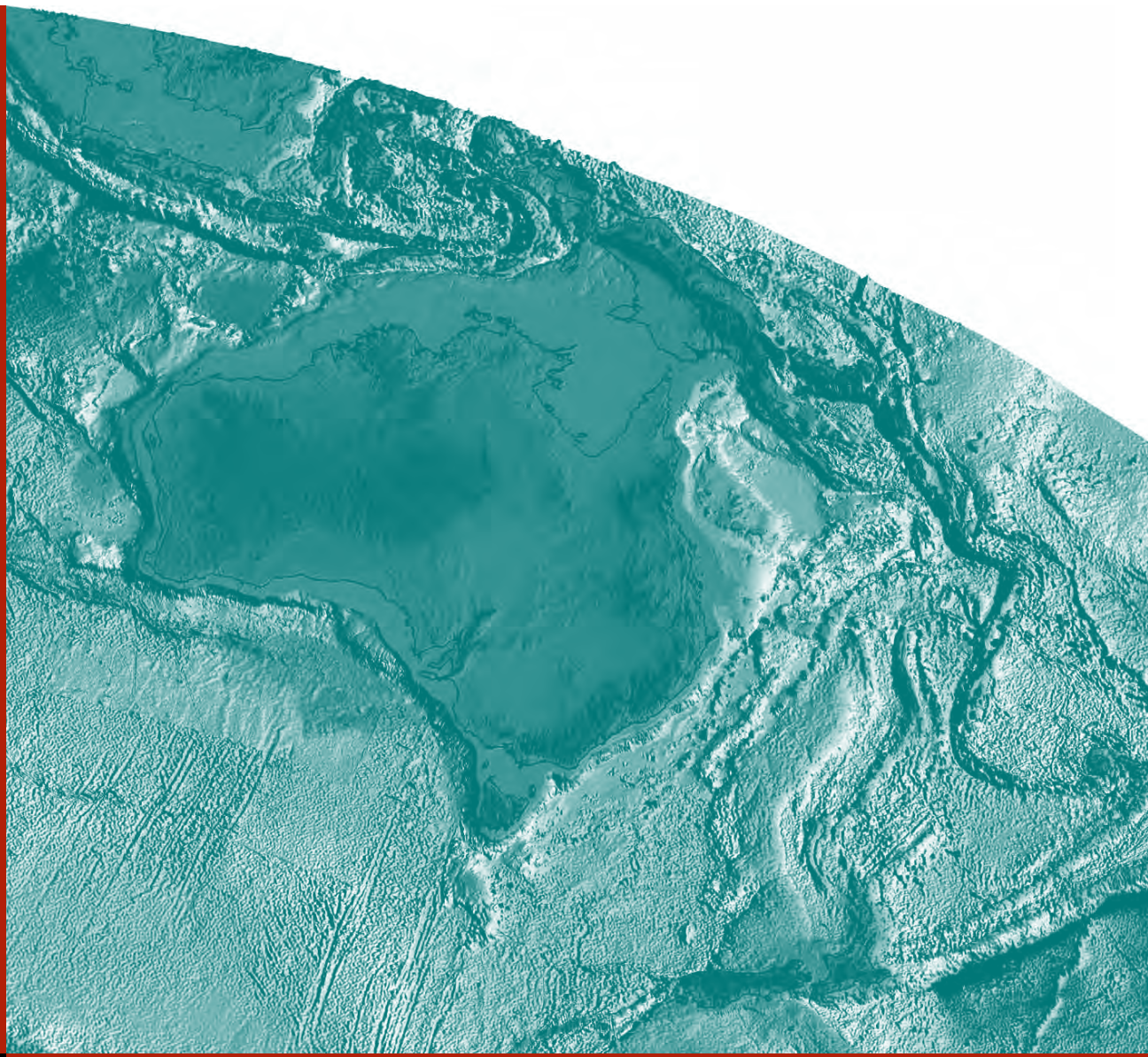
GeoCat #
70568



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GEOSCIENCE AUSTRALIA
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Department of Resources, Energy and Tourism
Minister for Resources and Energy: The Hon. Martin Ferguson, AM MP
Secretary: Mr Drew Clarke

Geoscience Australia
Chief Executive Officer: Dr Chris Pigram

ISSN 1448-2177
ISBN 978-1-921781-57-5 (Hardcopy)
ISBN 978-1-921781-58-2 (Web)

GeoCat # 70568

Bibliographic reference: Cross, A.J., Jaireth, S., Hore, S.B., Michaelsen, B.H. and Schofield, A., 2010. SHRIMP U-Pb detrital zircon results, Lake Frome region, South Australia. *Geoscience Australia, Record,* **2010/46.**

Contents

Introduction

OVERVIEW

This report presents SHRIMP U-Pb detrital zircon results for five sedimentary samples from the principal units of the Lake Frome region, South Australia. The Mesozoic to Cenozoic basins in this region contain some of the largest known sandstone-hosted uranium deposits in Australia which occur in units of different ages: Four Mile West in Cretaceous sediment (Stoian, 2010), Four Mile East, Honeymoon and Goulds Dam in the Paleogene Eyre Formation and the Beverley deposit in the Miocene Namba Formation (Wülser, 2009; Skirrow, 2009). The work was undertaken by Geoscience Australia (GA) as part of its Onshore Energy and Security Program in a joint on-going project with the Geological Survey of South Australia, within Primary Industries and Resources South Australia (PIRSA). A regional interpretation and synthesis of the results presented here, as well as further SHRIMP U-Pb detrital zircon studies of other units in the region carried out during 2010-2011, will be presented elsewhere.

ANALYTICAL PROCEDURES

Zircon separates were obtained using magnetic and density techniques from crushed samples. The zircons were then mounted in epoxy resin, together with the $^{206}Pb/^{238}U$ standard zircon TEMORA 2 (416.8 Ma; Black et al., 2004) and $^{207}Pb/^{206}Pb$ standard zircon OG1 (3465 Ma; Stern et al., 2009). The epoxy mount was polished to reveal zircon interiors, and photomicrographs were taken in transmitted and reflected light. Cathodoluminescence (CL) images were taken of the zircons to reveal their internal zoning. These images were obtained with a JEOL JSM-6490LV scanning electron microscope located at Geoscience Australia and operating at 15 kV with a working distance of 16 mm.

All isotopic analyses reported in this report were carried out using SHRIMP IIe which is located at Geoscience Australia and jointly owned by Geoscience Australia and Australian Scientific Instruments. Analytical procedures followed the methodology described by Compston et al. (1984), Williams and Cleason (1987) and Claoué–Long et al. (1995). The primary O_2^- beam had an intensity of between ~2.0 to 2.8 nA, which resulted in a spot diameter of ~25 to 35 µm. The ionised particles were extracted into the mass spectrometer with a 10 kV potential and counted with a single electron multiplier. Ions were focussed into the collector by a cyclic stepping of the magnet and each analysis represents the average of six scans through the different mass stations (Table 1). All analyses were carried out with a mass resolution of approximately 5000.

Table 1: Mass stations and count times for the SHRIMP U-Pb zircon analyses carried out during this study.

Mass Station	Isotope	Mass (amu)	Count time (s)	Delay for magnetic settling (s)
1	$^{196}Zr_2O$	195.804	2	7
2	^{204}Pb	203.973	20	2
3	Background	204.1	20	1
4	^{206}Pb	205.974	10	2
5	^{207}Pb	206.976	40	1
6	^{208}Pb	207.977	10	1
7	^{238}U	238.051	5	2
8	^{248}ThO	248.033	2	3
9	^{254}UO	254.046	2	3
10	$^{270}UO_2$	270.041	2	3

The Pb/U calibration standard was analysed every fourth analysis and the $^{207}Pb/^{206}Pb$ standard every eighth. Calibration of the $^{206}Pb/^{238}U$ ratios was by comparison to the zircon standard TEMORA 2 and the power law relationship of $^{206}Pb^{+}/^{238}U^{+}$ and $^{238}UO^{+}/^{238}U^{+}$ (Claoué–Long et al., 1995). U abundances were calculated with reference to SL13 (238 ppm) and are subject to an uncertainty of at least ±20%, this being the range of U abundance within that reference material. Th/U ratios were calculated using the linear relationship $^{232}Th/^{238}U = {}^{232}ThO^{+}/^{238}UO^{+}*[0.03446(UO^{+}/U^{+})+0.868]$. Data reduction was carried out using Squid2.50_r21, and Isoplot_r5 Microsoft Excel-based macros of Ludwig (2008; 2009) downloaded from the Sourceforge website (http://sourceforge.net/projects/squid2) and (http://sourceforge.net/projects/isoplot). Individual analyses in this report have uncertainties listed in the tables and plotted on Concordia diagrams as shaded ellipses at the 1σ level and unfilled ellipses represent compositions that are greater than 10% discordant. SHRIMP U-Pb analyses are also displayed as combined probability density distribution and histogram diagrams. The ages for the zircon populations were calculated from a weighted average of the ^{204}Pb corrected $^{207}Pb/^{206}Pb$ ages or $^{206}Pb/^{238}U$ ages using ISOPLOT 3 (Ludwig, 2008) and the final ages are given at the 95% confidence interval. During each experiment at least 60 SHRIMP U-Pb isotopic analyses were undertaken and no preference was given to target any particular zircon type for analysis. This is to ensure as much as possible, an unbiased age spectrum that in theory should capture 95% of the age components in the zircons from each sample (Dodson et al., 1988).

For all SHRIMP U-Pb isotopic ages reported here, zircons that are over 1000 Ma are reported as $^{207}Pb/^{206}Pb$ ages. For zircons younger than 1000 Ma, $^{206}Pb/^{238}U$ ratios have been used as the $^{207}Pb/^{206}Pb$ ratios become too imprecise to be of any use. Additionally, for zircons older than 1000 Ma, both the $^{207}Pb/^{206}Pb$ and $^{206}Pb/^{238}U$ ratios can be used to access the level of concordance of each analysis, and thereby determine the degree to which a given zircon has remained a closed system. In this report for zircons older than 1000 Ma, an arbitrary cut-off of 10% discordant has been used to exclude poor analyses from age considerations. However, for zircons younger than 1000 Ma, concordance cannot be properly determined because the $^{207}Pb/^{206}Pb$ ratios are too imprecise. Therefore, the degree of concordance cannot be used to identify and remove poor analyses.

Acknowledgements

We would like to acknowledge the meticulous care and professionalism taken with the crushing of samples, SHRIMP mount preparation, photography and SEM imaging of zircons undertaken by members of the Geoscience Australia Geochronology Laboratory: David DiBugnara, Emma Chisholm, Chris Foudoulis and Stephen Ridgeway. Patrick Burke ensured the SHRIMP was optimally tuned during all analytical sessions and Les Sullivan's readiness to assist with any computer related or data storage issues is much appreciated. Heathgate Resources Pty Ltd kindly provided access to core material from drill hole AKC130 (sample 2001026).

Samples Analysed

1987605 CRETACEOUS DIAMICTITE (DEAD TREE SECTION)

GA Sample ID:	**2009074002**
GA Sample Number:	**1987605**
Other Sample ID:	**DT006**
1:250,000 Sheet:	**COPLEY SH 54-9**
Region:	**Mount Painter Inlier, South Australia**
Grid Reference (MGA94 Zone 54):	**355848 mE, 6664831 mN**
Collector:	**Stephen B. Hore**
Collection Date:	**25/02/2009**
Formal Name:	***(Not defined)***
Informal Name:	***(Not defined)***
Lithology:	**Matrix supported Diamictite**
Geochronologist:	**A.J. Cross**
Mount ID:	**GA6107**
Instrument:	**SHRIMP IIe Geoscience Australia**
Acquisition Date-A:	**03–07/02/2010**
U-Pb Standard & reproducibility-A:	**TEMORA-2; 0.91 % (1σ) [45 of 45]**
^{207}Pb/^{206}Pb Standard-A:	**OG1 (3465.4 Ma)**
Measured Value (±95% confidence)-A:	**3467 ± 1.6 Ma [25 of 26]**
Acquisition Date B:	**21–22/02/2010**
U-Pb Standard & reproducibility-B:	**TEMORA-2; 0 % (1σ) [11 of 11]**
Measured Value (±95% confidence)-B:	**3466 ± 3.2 Ma [7 of 7]**
Interpreted Age:	**Zircon U-Pb age provenance spectrum**
IMF correction applied?	**No**

Sample information

This matrix supported diamictite sample was collected from the Dead Tree Section (Hore and Hill, 2009), which is exposed close to the Mount Painter Inlier range front in an upper tributary of Four Mile Creek. The diamictite matrix consists of fine-grained quartz particles supporting sub-rounded granitic, quartz and lithic clasts up to 10cm in diameter. Both the matrix and the clasts have been subjected to kaolinitic alteration (Fig. 1). Both matrix and clasts were included in the sample.

Zircons

The zircons recovered from 1987605 are generally clear to partly turbid with a purple hue, many containing randomly orientated acicular inclusions. While the proportion of intact to fragmented grains is about equal, almost all (>95%) have retained sharp crystal faces. Intact grains are generally large and blocky (~80 to ~120 µm in diameter), however, there are also grains with aspect ratios of up to 4. The grains range in luminescence from moderate to weak and generally well defined oscillatory growth zones predominate (Fig. 2).

Figure 1. *Photo of hand sample of matrix supported Cretaceous diamictite (Dead Tree section 1987605).*

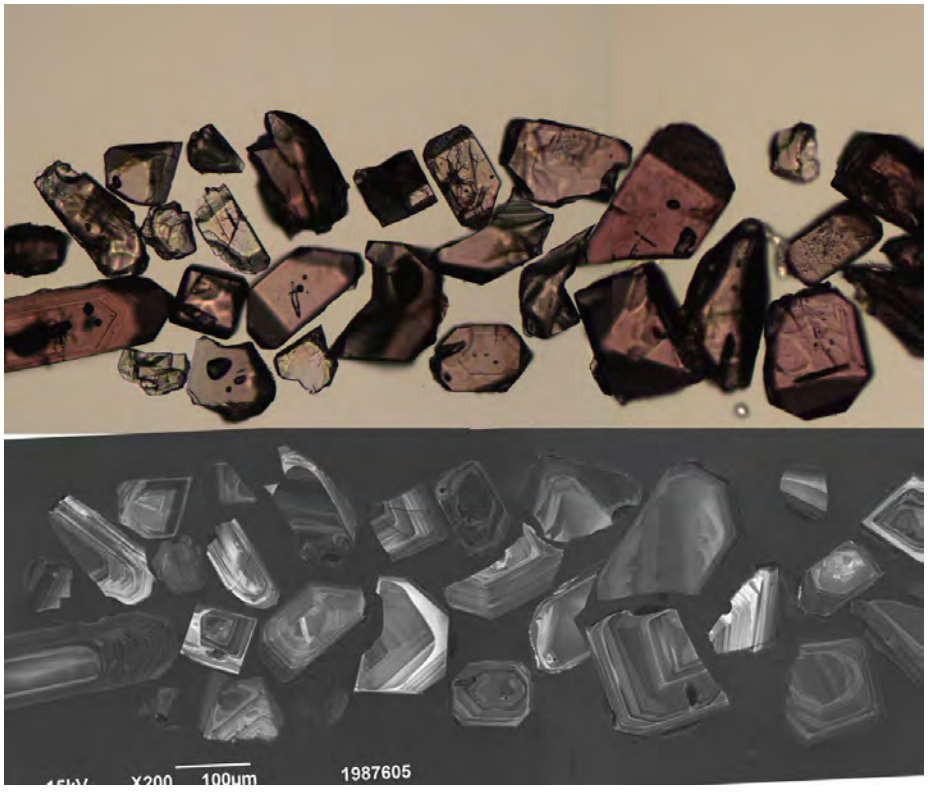

Figure 2. *Selected transmitted light (top) and cathodoluminescence (bottom) images of zircon grains from the Cretaceous diamictite (Dead Tree section, 1987605).*

U-Pb isotopic results

Sixty-six SHRIMP analyses were undertaken on 66 zircons from this sample (Figs. 3 and 4, Table 2). U contents are moderate (117—830 ppm) as well as Th/U ratios (0.22—0.64). Common ^{206}Pb contents are uniformly low (0—0.17% $^{204}f_{206}$). Most of the analyses are concordant to near concordant (~90%), and five grains that are more than 10% discordant are not considered further. The remaining 61 analyses scatter in radiogenic ^{207}Pb/^{206}Pb beyond that expected from their uncertainties (MSWD = 2.0). This scatter is removed by omitting one low analysis (605.Z.24.1.1) and two higher ones (605.Z.65.1.1, 605.Z.58.1.1). The remaining analyses all have the same ^{207}Pb/^{206}Pb within their assigned errors (MSWD = 1.2) and contribute to a weighted mean age of 1579 ± 3 Ma.

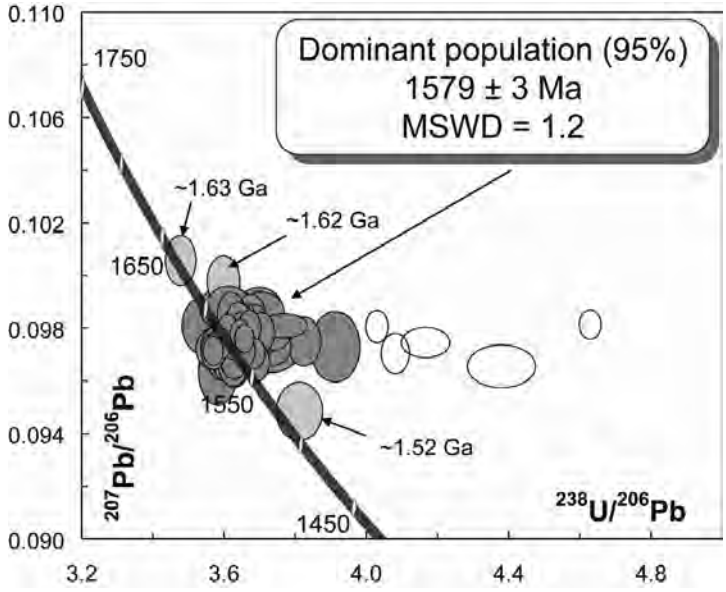

Figure 3. *Tera-Wasserburg concordia plot for U-Pb analyses from the Cretaceous diamictite (Dead Tree section, 1987605). Darker ellipses represent the dominant zircon population used in the age calculation.*

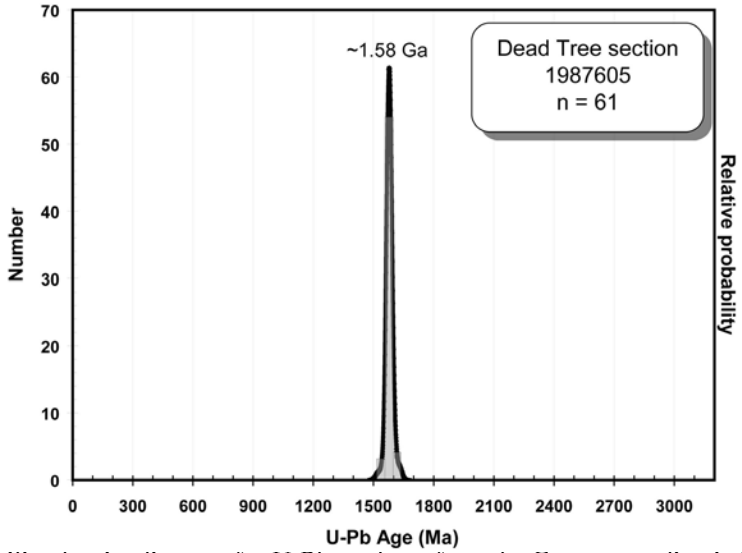

Figure 4. *Probability density diagram for U-Pb analyses from the Cretaceous diamictite (Dead Tree section, 1987605).*

Table 2. Zircon U-Pb isotopic data from the Cretaceous diamictite *(Dead Tree section, 1987605).*

Grain.area	$^{206}Pb_c$ (%)	U (ppm)	Th (ppm)	$^{232}Th/^{238}U$	$^{238}U/^{206}Pb^*$	± (%)	$^{207}Pb^*/^{206}Pb^*$	± (%)	$^{206}Pb/^{238}U$ Age (Ma)	± (1σ)	$^{207}Pb/^{206}Pb$ Age (Ma)	± (1σ)	Discordance %
Detrital zircons													
605.Z.24.1.1	0.01	310	76	0.25	3.8150	1.12	0.0948	0.77	1501	15.0	1525	14.5	2
605.Z.51.1.1	0.17	125	43	0.35	3.5860	0.99	0.0963	0.86	1586	13.9	1554	16.2	-2
605.Z.82.1.1	-0.02	274	64	0.24	3.6273	0.73	0.0966	0.55	1570	10.1	1559	10.3	-1
605.Z.50.1.1	0.05	213	95	0.46	3.6321	0.76	0.0966	0.60	1568	10.6	1560	11.2	-1
605.Z.71.1.1	0.02	322	130	0.42	3.6935	0.65	0.0967	0.50	1545	8.9	1561	9.5	1
605.Z.19.1.1	0.04	244	54	0.23	3.6191	1.17	0.0968	0.57	1573	16.3	1563	10.7	-1
605.Z.74.1.1	0.00	218	47	0.22	3.6109	0.76	0.0968	0.57	1576	10.7	1563	10.6	-1
605.Z.46.1.1	-0.01	242	99	0.42	3.6311	0.72	0.0969	0.55	1568	10.0	1565	10.2	0
605.Z.47.1.1	0.00	491	184	0.39	3.6868	0.52	0.0970	0.38	1547	7.1	1567	7.2	1
605.Z.52.1.1	0.01	561	167	0.31	3.6631	0.49	0.0971	0.36	1556	6.7	1569	6.7	1
605.Z.79.1.1	0.04	426	189	0.46	3.7312	1.44	0.0971	0.53	1531	19.6	1569	10.0	3
605.Z.23.1.1	0.03	343	156	0.47	3.6698	1.10	0.0971	0.47	1553	15.2	1569	8.8	1
605.Z.77.1.1	0.02	315	91	0.30	3.5728	0.64	0.0971	0.47	1591	9.1	1569	8.9	-2
605.Z.67.1.1	-0.02	525	152	0.30	3.5723	0.51	0.0971	0.38	1591	7.2	1570	7.0	-2
605.Z.48.1.1	0.08	145	50	0.36	3.6463	0.92	0.0971	0.74	1562	12.7	1570	13.9	1
605.Z.2.1.1	0.02	257	81	0.33	3.5896	1.19	0.0972	0.58	1584	16.7	1571	10.9	-1
605.Z.61.1.1	0.00	435	156	0.37	3.6621	0.55	0.0972	0.41	1556	7.7	1572	7.6	1
605.Z.13.1.1	0.03	324	122	0.39	3.7284	1.10	0.0973	0.48	1532	15.0	1572	9.0	3
605.Z.80.1.1	0.02	499	145	0.30	3.5824	0.58	0.0973	0.43	1587	8.1	1572	8.1	-1
605.Z.11.1.1	0.06	232	88	0.39	3.9141	1.17	0.0973	0.90	1467	15.3	1573	16.9	8
605.Z.14.1.1	0.01	367	169	0.48	3.6550	1.09	0.0973	0.45	1559	15.1	1573	8.3	1
605.Z.21.1.1	0.05	259	109	0.43	3.5995	1.16	0.0973	0.55	1580	16.2	1573	10.3	-1
605.Z.7.1.1	0.01	258	105	0.42	3.6942	1.15	0.0973	0.53	1544	15.8	1574	9.9	2
605.Z.12.1.1	0.06	230	71	0.32	3.7101	1.17	0.0974	0.57	1538	16.0	1574	10.8	3
605.Z.53.1.1	0.02	468	206	0.45	3.5941	0.52	0.0974	0.38	1582	7.4	1575	7.1	-1
605.Z.63.1.1	-0.02	446	128	0.30	3.6258	0.54	0.0974	0.40	1570	7.6	1575	7.5	0
605.Z.56.1.1	0.06	235	77	0.34	3.6049	0.73	0.0974	0.57	1578	10.2	1576	10.6	0
605.Z.1.1.1	0.00	620	188	0.31	3.6459	1.04	0.0975	0.36	1563	14.4	1576	6.8	1
605.Z.72.1.1	-0.01	183	71	0.40	3.8256	0.82	0.0975	0.63	1497	11.0	1576	11.8	6
605.Z.75.1.1	-0.04	150	41	0.29	3.6542	0.90	0.0975	0.69	1559	12.5	1577	13.0	1
605.Z.76.1.1	0.01	571	148	0.27	3.6591	0.48	0.0976	0.35	1558	6.7	1579	6.6	2
605.Z.18.1.1	0.04	137	55	0.41	3.7219	1.32	0.0976	0.74	1534	18.0	1579	13.9	3
605.Z.64.1.1	0.01	242	60	0.25	3.6742	0.73	0.0976	0.55	1552	10.1	1579	10.3	2
605.Z.8.1.1	-0.04	225	79	0.36	3.6381	1.18	0.0977	0.58	1565	16.4	1580	10.8	1
605.Z.55.1.1	-0.02	436	122	0.29	3.6164	0.55	0.0977	0.41	1574	7.7	1581	7.6	0
605.Z.6.1.1	0.00	357	160	0.46	3.7284	1.09	0.0977	0.44	1532	14.8	1581	8.1	4
605.Z.44.1.1	-0.01	510	151	0.31	3.6472	0.51	0.0978	0.37	1562	7.1	1582	7.0	1
605.Z.68.1.1	-0.02	295	131	0.46	3.7073	0.66	0.0978	0.50	1539	9.0	1583	9.4	3
605.Z.17.1.1	0.01	221	81	0.38	3.6371	1.18	0.0978	0.56	1566	16.4	1583	10.4	1
605.Z.4.1.1	0.00	480	210	0.45	3.6338	1.05	0.0978	0.38	1567	14.6	1583	7.2	1
605.Z.62.1.1	-0.02	267	118	0.46	3.6261	0.69	0.0979	0.52	1570	9.7	1584	9.7	1
605.Z.78.1.1	-0.01	445	138	0.32	3.6125	0.54	0.0979	0.40	1575	7.6	1584	7.5	1
605.Z.45.1.1	-0.03	376	95	0.26	3.6486	0.58	0.0979	0.45	1561	8.1	1584	8.4	2
605.Z.26.1.1	-0.02	204	73	0.37	3.6302	1.21	0.0979	0.61	1568	16.9	1585	11.4	1
605.Z.59.1.1	0.02	384	123	0.33	3.6740	0.58	0.0980	0.43	1552	8.0	1586	8.1	2
605.Z.9.1.1	0.00	695	200	0.30	3.6428	1.01	0.0980	0.32	1564	14.0	1587	5.9	2
605.Z.73.1.1	0.04	232	72	0.32	3.6872	0.74	0.0980	0.57	1547	10.2	1587	10.6	3
605.Z.69.1.1	0.01	559	171	0.32	3.6661	0.49	0.0980	0.59	1555	6.8	1587	11.1	2
605.Z.5.1.1	0.01	836	351	0.43	3.7717	1.14	0.0981	0.31	1516	15.4	1588	5.7	5
605.Z.10.1.1	0.03	117	33	0.29	3.5568	1.36	0.0981	0.77	1597	19.3	1588	14.5	-1
605.Z.49.1.1	-0.03	356	91	0.26	3.6509	0.59	0.0982	0.45	1561	8.2	1591	8.4	2
605.Z.57.1.1	-0.03	363	171	0.49	3.6413	0.60	0.0983	0.45	1564	8.3	1592	8.3	2
605.Z.16.1.1	-0.07	300	131	0.45	3.6522	1.39	0.0983	0.53	1560	19.3	1593	9.8	2
605.Z.81.1.1	0.04	241	72	0.31	3.6763	0.75	0.0984	0.57	1551	10.3	1594	10.7	3
605.Z.66.1.1	-0.08	244	93	0.39	3.6221	0.72	0.0985	0.57	1572	10.1	1595	10.6	2
605.Z.20.1.1	0.06	185	63	0.35	3.7008	1.23	0.0986	0.66	1542	16.9	1597	12.3	4
605.Z.15.1.1	0.01	261	103	0.41	3.7062	1.14	0.0986	0.52	1540	15.6	1597	9.7	4
605.Z.3.1.1	-0.04	286	95	0.34	3.5981	1.17	0.0987	0.55	1581	16.4	1600	10.3	1
605.Z.22.1.1	-0.01	298	94	0.32	3.6155	1.13	0.0988	0.50	1574	15.8	1602	9.3	2
605.Z.65.1.1	-0.05	180	79	0.46	3.6007	0.84	0.0997	0.64	1580	11.8	1619	12.0	3
605.Z.58.1.1	-0.07	191	88	0.48	3.4816	0.82	0.1005	0.62	1628	11.7	1634	11.6	0
greater than 10% discordant													
605.Z.60.1.1	-0.03	304	74	0.25	4.0828	0.65	0.0970	0.52	1412	8.2	1568	9.7	11
605.Z.70.2.1	-0.04	475	162	0.35	4.0306	0.52	0.0980	0.41	1429	6.7	1587	7.7	11
605.Z.54.1.1	0.04	564	347	0.64	4.1670	1.09	0.0974	0.38	1387	13.6	1576	7.2	13
605.Z.25.1.1	0.04	365	184	0.52	4.3790	1.44	0.0965	0.55	1326	17.3	1558	10.4	16
605.Z.70.1.1	0.04	635	227	0.37	4.6277	0.44	0.0981	0.37	1261	5.1	1589	7.0	23

1. %$^{206}Pb_c$ indicates the proportion of common ^{206}Pb in the total measured ^{206}Pb.

2. Pb isotopic ratios corrected for common Pb by reference to the measured ^{204}Pb.

3. All errors quoted as 1σ.

2001026 CRETACEOUS DIAMICTITE (AKC130 HOLE, FOUR MILE WEST)

GA Sample ID:	**2009074007**
GA Sample Number:	**2001026**
Other Sample ID:	
1:250,000 Sheet:	**COPLEY SH 54-9**
Region:	**Mount Painter Inlier, South Australia**
Grid Reference (MGA94 Zone 54):	**355272 mE, 6663362 mN**
Collector:	**B.H. Michaelsen, A.J. Cross & S. Jaireth**
Collection Date:	**23/07/2009**
Formal Name:	**(*Not defined*)**
Informal Name:	**Bulldog Shale equivalent**
Lithology:	**Sandy diamictite**
Geochronologist:	**A.J. Cross**
Mount ID:	**GA6107**
Instrument:	**SHRIMP IIe Geoscience Australia**
Acquisition Date:	**09 – 11/08/2009**
U-Pb Standard & reproducibility:	**TEMORA-2; 1.11 % (1σ) [36 of 36]**
^{207}Pb/^{206}Pb Standard:	**OG1 (3465.4 Ma)**
Measured Value (±95% confidence):	**3465.9 ± 2.0 Ma [18 of 18]**
Interpreted Age:	**Zircon U-Pb age provenance spectrum**
IMF correction applied?	**No**

Sample information

Sample 2001026 was half-core from within the Four Mile West uranium deposit (AKC130, 173.9—174 m). The sample was taken from a pale grey to cream sandy diamictite comprising a fine- to medium-grained (quartzose) sandy matrix with minor disseminated kaolinite. It was selected from a ~30 m thickness of diamictite containing minor framboidal pyrite (aggregates ~1–5 cm in diameter) and rare granitic lonestones to ~20 cm in diameter (Fig. 5). Palynology studies indicate these sediments are Early Cretaceous in age (late Aptian), equivalent in age to the marine Bulldog Shale (Stoian, 2010).

Zircons

Zircons recovered from 2001026 are clear, colourless, generally sub-rounded to well-rounded, variably cracked crystal fragments that range from ~30 to ~80 µm in diameter. While many have pitted surface textures, about 20% have retained some sharp crystal faces and a small proportion are euhedral. Intact grains mostly have aspect ratios of about 2, however, there is also a minor population of equant grains. The zircons range from strongly to weakly luminescent and oscillatory zoning predominates and some (<5%) have strongly luminescent thin rims (Fig. 6).

Figure 5. *Sandy diamictite zone from Four Mile West (drill hole AKC130, ~183—148 m). Note dark grey patches of framboidal pyrite (2001026).*

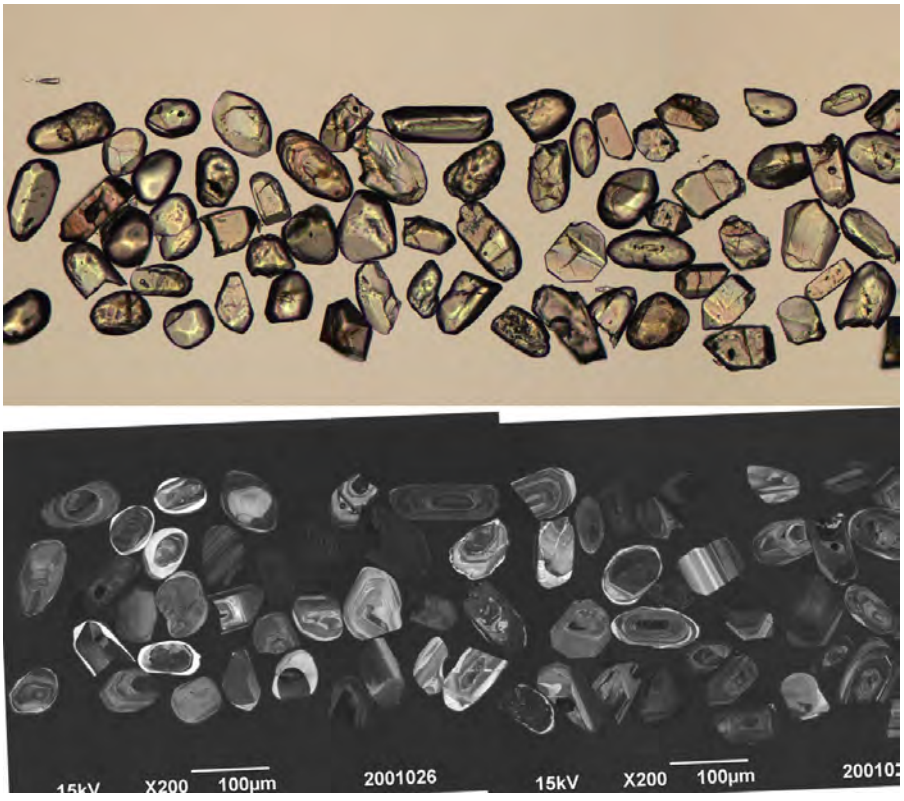

Figure 6. *Selected transmitted light (top) and cathodoluminescence (bottom) images of zircon grains from the Cretaceous sandy diamictite (AKC130, 2001026).*

U-Pb isotopic results

Eighty-four SHRIMP analyses were undertaken on 84 zircons from this sample (Figs. 7 and 8, Table 3). One analysis (026.Z.5.1.1) inadvertently overlapped onto a core and rim, is isotopically mixed and therefore removed from further consideration. U contents are low to moderate (16—935 ppm; median 232 ppm) and Th/U ratios range from low to high (0.01—2.15; median 0.53). The common ^{206}Pb contents of the grains range up to 3.20% $^{204}f_{206}$. However there is no correlation between common ^{206}Pb and either radiogenic ^{206}Pb/^{238}U or ^{207}Pb/^{206}Pb. Six analyses with the highest common Pb also have large uncertainties are also discordant and removed from further age considerations. Additionally there are eight other analyses with low common Pb proportions that are also greater than 10% discordant and also omitted from age assessment. A further analysis (026.Z.75.1.1) was rejected due to transient instrument instability. The remaining 69 concordant to near concordant grains range in age from ~2.76 Ga to ~570 Ma with three dominant age groupings at ~1.58 Ga, ~1.20 Ga and ~570 Ma. The oldest age cluster consists of 17 concordant to near concordant analyses that all have the same radiogenic ^{207}Pb/^{206}Pb within their analytical uncertainties (MSWD = 1.6) and combine to give an age of 1579 ± 5 Ma. There is also an age cluster at ~1.20 Ga, which comprises 8 analyses all of which have the same radiogenic ^{207}Pb/^{206}Pb (MSWD = 1.12) and combine to give an age of 1201 ± 11 Ma. The youngest age cluster consists of 17 grains at ~570 Ma, however, these analyses are significantly scattered in radiogenic ^{206}Pb/^{238}U (MSWD = 5.7). Omitting the youngest analysis (026.Z.52.1.1) reduces the scatter (MSWD = 4) but does not remove it. No other omissions are justified. The median age of the remaining 16 grains is 574.0 +11/-8 Ma. There is also a wide range of scattered grains that are older than ~570 Ma and extend to ~2.77 Ga.

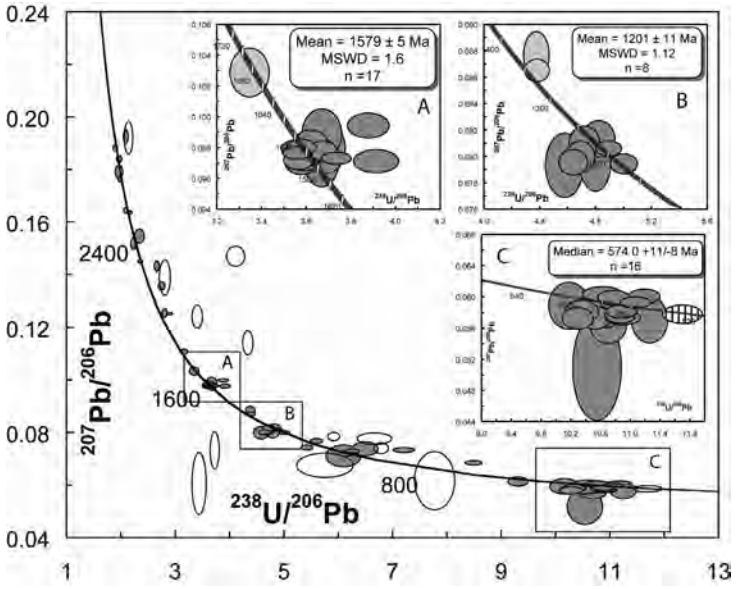

Figure 7. *Tera-Wasserburg concordia plot for U-Pb analyses from the Cretaceous sandy diamictite, Four Mile West (drill hole AKC130, 2001026). Darker ellipses in the figure insets (A, B, C) represent the analyses used in age calculations, while the striped ellipse in C was omitted from the age calculation.*

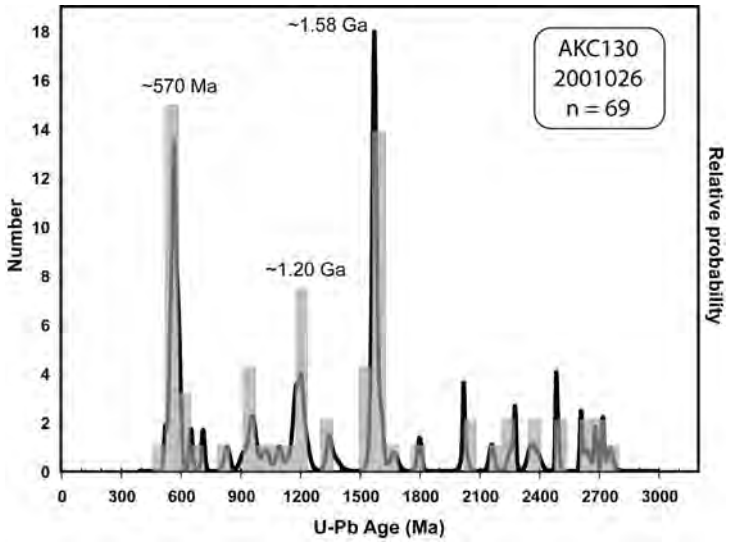

Figure 8. Probability density diagram for U-Pb analyses from the *Cretaceous sandy diamictite, Four Mile West (drill hole AKC130, 2001026).*

Table 3. Zircon U-Pb isotopic data from the Cretaceous sandy diamictite (AKC130, 2001026).

Grain.area	$^{206}Pb_c$ (%)	U (ppm)	Th (ppm)	$^{232}Th/^{238}U$	$^{238}U/^{206}Pb^*$	± (%)	$^{207}Pb^*/^{206}Pb^*$	± (%)	$^{206}Pb/^{238}U$ Age (Ma)	± (1σ)	$^{207}Pb/^{206}Pb$ Age (Ma)	± (1σ)	Discordance %
Detrital zircons													
026.Z.52.1.1	0.08	461	147	0.33	11.7047	1.51	0.0579	1.35	528	7.7	525	29.5	-1
026.Z.39.1.1	0.42	188	301	1.65	11.2618	1.43	0.0571	3.39	548	7.5	496	74.8	-11
026.Z.53.1.1	-0.03	320	363	1.17	11.1866	1.26	0.0601	0.99	552	6.7	606	21.4	9
026.Z.23.1.1	-0.06	636	528	0.86	11.0718	1.20	0.0593	0.75	557	6.4	578	16.3	4
026.Z.24.1.1	0.15	454	283	0.64	10.8978	1.44	0.0574	1.01	566	7.8	507	22.2	-12
026.Z.59.1.1	0.17	477	151	0.33	10.8828	1.22	0.0582	1.00	567	6.6	538	21.8	-6
026.Z.64.1.1	0.17	378	2	0.01	10.8674	1.24	0.0577	1.11	567	6.8	518	24.4	-10
026.Z.63.1.1	0.09	210	75	0.37	10.8126	1.32	0.0595	1.34	570	7.2	586	29.0	3
026.Z.21.1.1	-0.03	278	6	0.02	10.7738	1.28	0.0599	1.02	572	7.0	600	22.2	5
026.Z.68.1.1	0.45	114	161	1.45	10.7033	1.49	0.0563	2.56	576	8.2	464	56.8	-25
026.Z.16.1.1	0.40	138	99	0.74	10.6561	1.45	0.0581	2.28	578	8.0	534	49.9	-9
026.Z.83.1.1	-0.04	261	254	1.01	10.6266	1.66	0.0603	1.05	580	9.2	616	22.7	6
026.Z.6.1.1	0.88	42	18	0.44	10.5527	2.05	0.0510	8.81	584	11.4	242	203.0	-148
026.Z.78.1.1	0.18	151	314	2.15	10.5194	1.40	0.0574	1.69	585	7.8	508	37.1	-16
026.Z.43.1.1	0.13	143	148	1.07	10.3488	1.42	0.0582	1.63	595	8.1	536	35.6	-12
026.Z.72.1.1	0.23	195	176	0.93	10.2919	1.34	0.0573	1.59	598	7.6	505	35.0	-19
026.Z.34.1.1	0.45	62	87	1.44	10.1719	1.77	0.0589	3.33	604	10.2	563	72.5	-8
026.Z.55.1.1	0.20	267	266	1.03	9.3199	1.30	0.0607	1.88	657	8.1	628	40.5	-5
026.Z.44.1.1	0.25	450	142	0.33	8.4967	1.22	0.0678	0.87	717	8.3	864	18.0	18
026.Z.12.1.1	-0.04	213	74	0.36	7.2058	1.83	0.0727	0.90	838	14.4	1006	18.3	18
026.Z.29.1.1	0.09	97	64	0.68	6.4968	2.34	0.0732	2.52	923	20.2	1020	51.0	10
026.Z.2.1.1	0.04	260	110	0.44	6.2551	1.30	0.0723	0.78	956	11.6	994	15.8	4
026.Z.18.1.1	0.09	218	85	0.40	6.1307	1.34	0.0712	0.91	974	12.1	964	18.5	-1
026.Z.14.1.1	0.06	343	433	1.31	6.0963	3.47	0.0704	3.96	979	31.5	941	81.1	-4
026.Z.28.1.1	0.15	204	131	0.66	5.4243	1.35	0.0737	0.91	1091	13.6	1034	18.3	-6
026.Z.3.1.1	0.04	228	150	0.68	5.5999	1.33	0.0761	0.77	1059	13.0	1099	15.4	4
026.Z.65.1.1	0.10	131	144	1.13	4.5755	1.98	0.0793	2.03	1274	22.9	1180	40.2	-9
026.Z.13.1.1	0.07	290	197	0.70	5.0015	1.28	0.0794	0.63	1175	13.7	1182	12.5	1
026.Z.6.2.1	0.10	106	51	0.50	4.7959	1.52	0.0794	1.74	1221	16.9	1183	34.3	-4
026.Z.1.1.1	-0.01	158	91	0.60	4.6377	1.45	0.0795	0.81	1259	16.5	1185	15.9	-7
026.Z.81.1.1	0.11	130	66	0.53	4.6895	1.45	0.0799	0.98	1246	16.5	1196	19.3	-5
026.Z.4.1.1	0.00	455	16	0.04	4.8919	1.23	0.0806	0.47	1199	13.4	1211	9.2	1
026.Z.58.1.1	0.04	111	116	1.08	4.7176	1.52	0.0811	0.99	1239	17.1	1223	19.4	-1
026.Z.41.1.1	0.03	494	17	0.03	4.8201	1.60	0.0813	1.13	1215	17.8	1229	22.1	1
026.Z.25.1.1	-0.07	217	103	0.49	4.3784	1.34	0.0865	0.66	1326	16.0	1349	12.7	2
026.Z.27.1.1	0.16	174	88	0.52	4.3730	1.37	0.0876	1.34	1328	16.5	1375	25.7	4
026.Z.48.1.1	0.12	179	50	0.29	3.6675	1.37	0.0970	1.06	1554	18.9	1567	19.9	1
026.Z.79.1.1	0.11	312	108	0.36	3.6811	1.27	0.0971	0.52	1549	17.4	1568	9.8	1
026.Z.30.1.1	0.13	377	189	0.52	3.9121	1.70	0.0971	0.51	1467	22.3	1569	9.6	7
026.Z.31.1.1	0.07	183	45	0.26	3.5763	1.37	0.0971	0.62	1589	19.3	1570	11.7	-1
026.Z.33.1.1	0.03	382	149	0.40	3.5643	1.24	0.0972	0.41	1594	17.5	1570	7.7	-2
026.Z.38.1.1	0.04	315	402	1.32	3.5941	1.27	0.0972	0.46	1582	17.9	1570	8.6	-1
026.Z.66.1.1	0.01	876	307	0.36	3.7340	1.17	0.0973	0.27	1530	16.0	1573	5.1	3
026.Z.70.1.1	0.00	327	70	0.22	3.5963	1.26	0.0974	0.44	1582	17.7	1575	8.3	0
026.Z.11.1.1	0.02	935	261	0.29	3.5571	1.17	0.0976	0.27	1597	16.6	1579	5.1	-1
026.Z.76.1.1	0.02	352	116	0.34	3.5951	1.25	0.0977	0.42	1582	17.5	1580	7.9	0
026.Z.49.1.1	0.06	415	188	0.47	3.6689	1.23	0.0978	0.41	1554	17.0	1582	7.6	2
026.Z.36.1.1	0.04	439	134	0.31	3.5545	1.23	0.0979	0.40	1598	17.4	1584	7.4	-1
026.Z.22.1.1	0.19	60	80	1.37	3.6750	1.77	0.0979	1.18	1552	24.4	1585	22.0	2
026.Z.35.1.1	-0.02	491	179	0.38	3.5776	1.22	0.0980	0.36	1589	17.1	1586	6.8	0
026.Z.77.1.1	0.03	318	79	0.26	3.6203	1.27	0.0984	0.46	1572	17.7	1595	8.5	2
026.Z.46.1.1	0.28	85	60	0.73	3.6691	1.59	0.0989	1.07	1554	22.0	1603	20.0	3
026.Z.54.1.1	0.18	377	258	0.71	3.8774	1.60	0.0994	0.53	1479	21.1	1613	9.9	9
026.Z.4.2.1	0.09	67	64	0.97	3.3446	1.73	0.1028	1.01	1686	25.6	1676	18.7	-1
026.Z.42.1.1	0.05	175	205	1.21	3.1561	1.38	0.1103	0.57	1774	21.3	1804	10.3	2
026.Z.57.1.1	0.02	502	385	0.79	2.8815	1.20	0.1248	0.28	1920	20.0	2026	5.0	6
026.Z.51.1.1	0.00	412	275	0.69	2.7933	1.22	0.1251	0.83	1973	20.8	2030	14.7	3
026.Z.9.1.1	0.14	83	3	0.04	2.7433	1.63	0.1352	0.75	2004	28.2	2167	13.0	9
026.Z.47.1.1	0.01	452	31	0.07	2.6473	1.22	0.1429	0.91	2066	21.6	2262	15.7	10
026.Z.17.1.1	0.04	266	162	0.63	2.3448	1.30	0.1447	0.35	2290	25.0	2284	6.0	0
026.Z.67.1.1	0.06	91	161	1.82	2.2203	1.57	0.1513	0.95	2397	31.4	2361	16.3	-2
026.Z.32.1.1	0.01	197	83	0.43	2.3344	2.52	0.1543	1.16	2298	48.8	2394	19.8	5
026.Z.40.1.1	-0.01	353	382	1.12	2.1555	1.25	0.1632	0.27	2457	25.6	2489	4.5	2
026.Z.69.1.1	0.03	141	84	0.61	2.0844	1.42	0.1641	0.40	2526	29.6	2498	6.8	-1
026.Z.82.1.1	0.05	174	125	0.74	1.9797	1.37	0.1759	0.36	2636	29.6	2614	6.0	-1
026.Z.73.1.1	0.21	29	18	0.67	1.9574	2.27	0.1789	0.93	2660	49.5	2643	15.4	-1
026.Z.80.1.1	0.07	100	78	0.81	1.9508	1.53	0.1838	0.47	2668	33.5	2687	7.8	1
026.Z.60.1.1	0.04	136	103	0.78	1.8883	1.44	0.1879	0.39	2740	32.2	2724	6.5	-1
026.Z.74.1.1	0.00	273	42	0.16	2.0787	1.28	0.1921	0.93	2532	26.8	2761	15.3	10
greater than 10% discordant													
026.Z.5.1.1	1.76	155	80	0.53	32.1194	1.49	0.0625	5.47	198	2.9	690	116.7	72
026.Z.10.1.1	1.78	800	183	0.24	3.7112	1.49	0.0731	6.37	1538	20.4	1017	129.0	-58
026.Z.20.1.1	1.94	728	79	0.11	5.9048	1.19	0.0783	1.27	1009	11.1	1155	25.2	14
026.Z.15.1.1	2.60	571	112	0.20	4.0922	2.68	0.1470	1.71	1409	34.0	2311	29.4	43
026.Z.7.1.1	2.66	16	11	0.70	7.7654	3.17	0.0615	11.94	781	23.3	657	256.0	-20
026.Z.8.1.1	3.21	149	87	0.61	3.4169	2.50	0.0604	12.90	1655	36.5	617	278.5	-192
026.Z.26.1.1	0.54	301	88	0.30	6.7800	1.28	0.0739	1.92	887	10.6	1038	38.8	16
026.Z.56.1.1	0.64	140	55	0.41	6.6537	3.22	0.0775	1.92	903	27.1	1135	38.3	22
026.Z.62.1.1	0.35	25	12	0.48	2.7869	2.43	0.1389	3.20	1977	41.3	2213	55.6	12
026.Z.61.1.1	0.16	236	85	0.37	3.3875	1.90	0.1242	2.29	1667	27.9	2017	40.6	20
026.Z.45.1.1	0.06	309	212	0.71	1.5444	1.26	0.3211	0.20	3219	32.0	3575	3.0	13
026.Z.71.1.1	0.05	144	56	0.40	2.1231	2.48	0.1923	2.17	2488	51.2	2762	35.7	12
026.Z.37.1.1	0.04	454	125	0.28	5.7389	6.03	0.0673	4.52	1035	57.7	848	94.1	-24
026.Z.19.1.1	-0.12	100	83	0.86	4.3179	1.55	0.1141	2.67	1343	18.8	1866	48.2	31
poor analysis													
026.Z.75.1.1	0.06	320	93	0.30	2.5311	5.99	0.1296	6.80	2146	109.4	2093	119.5	-3

1. $\%^{206}Pb_c$ indicates the proportion of common ^{206}Pb in the total measured ^{206}Pb.

2. Pb isotopic ratios corrected for common Pb by reference to the measured ^{204}Pb.

3. All errors quoted as 1σ.

1987606 EYRE FORMATION (DEAD TREE SECTION)

GA Sample ID:	**2009074003**
GA Sample Number:	**1987606**
Other Sample ID:	**DT013**
1:250,000 Sheet:	**COPLEY SH 54-9**
Region:	**Mount Painter Inlier, South Australia**
Grid Reference (MGA94 Zone 54):	**353942 mE, 6664801 mN**
Collector:	**Stephen B. Hore**
Collection Date:	**25/02/2009**
Formal Name:	**Eyre Formation**
Informal Name:	***(Not defined)***
Lithology:	**Coarse-grained sandstone**
Geochronologist:	**A.J. Cross**
Mount ID:	**GA6107**
Instrument:	**SHRIMP IIe Geoscience Australia**
Acquisition Date:	**09 – 11/08/2009**
U-Pb Standard & reproducibility:	**TEMORA-2; 1.11 % (1σ) [36 of 36]**
^{207}Pb/^{206}Pb Standard:	**OG1 (3465.4 Ma)**
Measured Value (±95% confidence):	**3465.9 ± 2.0 Ma [18 of 18]**
Interpreted Age:	**Zircon U-Pb age provenance spectrum**
IMF correction applied?	**No**

Sample Information

This sample of the Eyre Formation was collected from the Dead Tree Section (Hore and Hill, 2009), which is exposed close to the range front of the Mount Painter Inlier in an upper tributary of Four Mile Creek. Subangular to subrounded quartz pebbles are supported within a coarse-grained sandy matrix. Bedding, cross-laminations and “animal” burrows are evident in the immediate outcrop. Pervasive Fe mottling and kaolinitic alteration is evident (Fig. 9).

Zircons

The zircons recovered from 1987606 are clear and colourless mostly broken fragments, the majority with preserved crystal faces (~80%). About 5 to 10% of the population are subrounded to rounded with often faint pitting on the grain surfaces indicating sedimentary transport in a fluvial system. The grains generally have a weak to moderate luminescence, however, there is also a minor percentage of grains that are strongly luminescent. The majority of grains have well preserved oscillatory growth zones and there is also a lesser population of sector zoned crystals as well as those which are featureless in CL images (Fig. 10).

Figure 9. *Photo of hand sample of coarse grained sandstone from the Eyre Formation (1987606).*

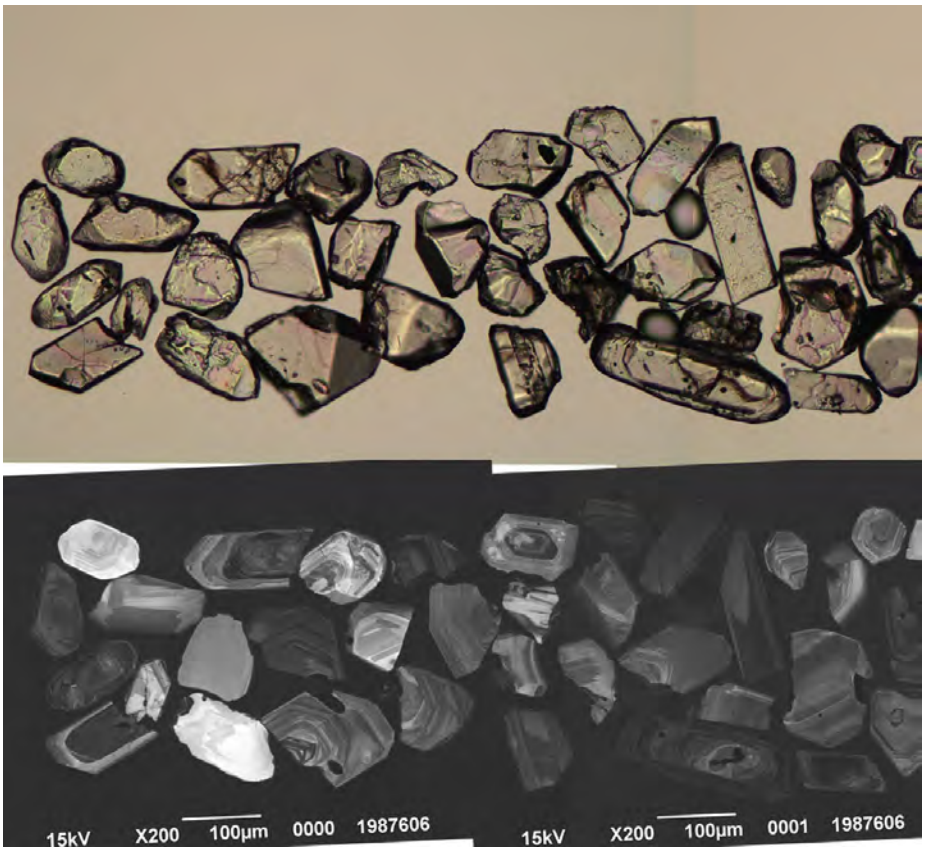

Figure 10. *Selected transmitted light (top) and cathodoluminescence (bottom) images of zircon grains from the Eyre Formation, coarse grained sandstone (Dead Tree section, 1987606).*

U-Pb isotopic results

Sixty-nine SHRIMP analyses were undertaken on 64 zircons from this sample (Figs. 11 and 12 and Table 4). U contents are low to moderate (38—1388 ppm; median 338 ppm) and Th/U ratios moderate with most analyses (95%) ranging from 0.24 to 1. Only three analyses have Th/U ratios greater than 1. Common ^{206}Pb concentrations are uniformly low and only one analysis (606.Z.48.1.1) is greater than 10% discordant and has been removed from further consideration. Although the data are spread between ~1.86 Ga and ~485 Ma, they are almost totally dominated by a group of analyses at ~1.58 Ga (80%). This group is well defined and made up of 54 analyses which all have the same radiogenic ^{207}Pb/^{206}Pb within their analytical uncertainties (MSWD = 1.4) and combine to give an age of 1580 ± 2 Ma. Other grains include a single zircon at ~1.86 Ga, a small grouping of four zircons at ~1.71 Ga, three crystals between ~1.52 to 1.46 Ga and single crystals at ~1.25 Ga, and ~1.10 Ga, as well as two grains at ~900 Ma and a single grain at ~485 Ma.

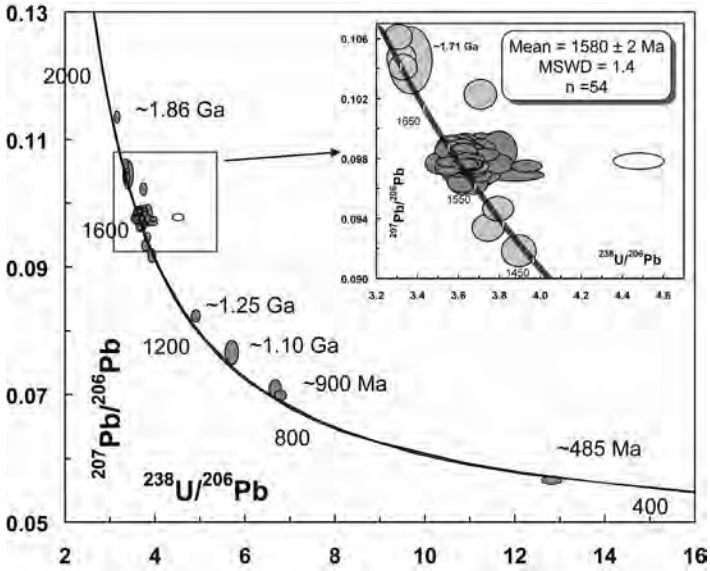

Figure 11. *Tera-Wasserburg concordia plot for U-Pb analyses from the Eyre Formation, coarse grained sandstone (Dead Tree section, 1987606). Darker ellipses in the figure inset represent analyses used in the age calculation.*

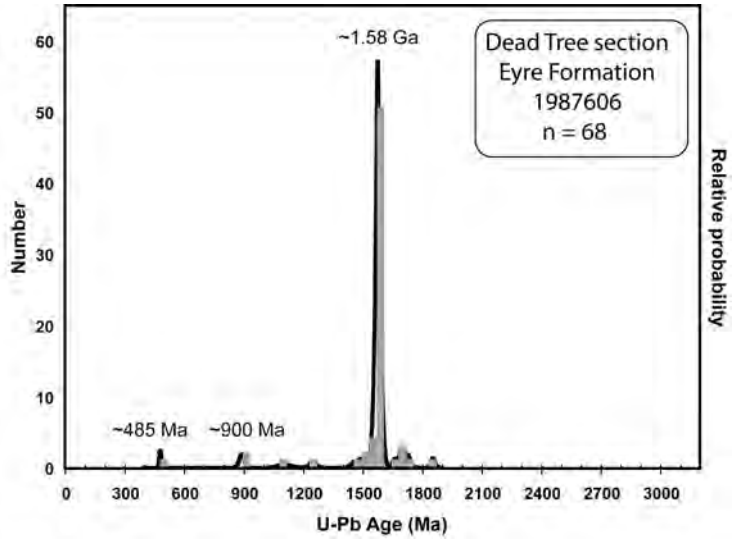

Figure 12. *Probability density diagram for U-Pb analyses from the Eyre Formation, coarse grained sandstone (Dead Tree section, 1987606).*

Table 4. Zircon U-Pb isotopic data from the Eyre Formation, coarse-grained sandstone (Dead Tree section, 1987606).

Grain.area	$^{206}Pb_c$ (%)	U (ppm)	Th (ppm)	$^{232}Th/^{238}U$	$^{238}U/^{206}Pb^*$	± (%)	$^{207}Pb^*/^{206}Pb^*$	± (%)	$^{206}Pb/^{238}U$ Age (Ma)	± (1σ)	$^{207}Pb/^{206}Pb$ Age (Ma)	± (1σ)	Discordance %
Detrital zircons													
606.Z.47.1.1	0.19	1388	417	0.31	12.8246	1.16	0.0563	0.74	484	5.4	465	16.4	-4
606.Z.19.2.1	0.09	308	224	0.75	6.7616	1.31	0.0697	0.80	889	10.9	918	16.4	3
606.Z.19.1.1	0.04	537	198	0.38	6.6477	1.40	0.0707	1.42	903	11.8	949	29.1	5
606.Z.36.1.1	0.15	64	87	1.39	5.6756	1.75	0.0765	1.62	1046	16.9	1107	32.3	6
606.Z.3.1.1	0.08	194	195	1.04	4.8715	1.38	0.0823	0.78	1204	15.1	1252	15.3	4
606.Z.58.1.1	0.07	137	73	0.55	3.8926	1.44	0.0918	0.77	1474	19.0	1463	14.7	-1
606.Z.55.1.1	0.05	190	179	0.98	3.7415	1.37	0.0934	0.64	1527	18.6	1495	12.2	-2
606.Z.55.2.1	0.02	226	195	0.89	3.7919	1.33	0.0946	0.57	1509	17.9	1521	10.7	1
606.Z.7.1.1	0.03	251	102	0.42	3.6700	1.31	0.0963	0.52	1553	18.1	1555	9.8	0
606.Z.54.1.1	0.07	373	147	0.41	3.6136	1.26	0.0964	0.46	1575	17.5	1555	8.6	-1
606.Z.61.1.1	0.14	136	56	0.42	3.6188	1.45	0.0967	0.78	1573	20.3	1562	14.5	-1
606.Z.13.1.1	0.01	169	40	0.24	3.6550	1.39	0.0967	0.62	1559	19.3	1562	11.5	0
606.Z.43.1.1	0.03	972	293	0.31	3.8743	2.43	0.0969	0.27	1480	32.1	1565	5.1	6
606.Z.15.1.1	0.00	174	49	0.29	3.6978	1.40	0.0970	0.62	1543	19.2	1566	11.7	2
606.Z.12.1.1	0.03	340	85	0.26	3.6910	1.27	0.0970	0.45	1546	17.4	1568	8.4	2
606.Z.18.1.1	0.05	247	153	0.64	3.7303	1.31	0.0971	0.53	1531	17.8	1569	10.0	3
606.Z.38.1.1	0.01	660	177	0.28	3.5855	1.20	0.0973	0.57	1586	16.8	1574	10.7	-1
606.Z.37.1.1	0.00	135	38	0.29	3.5834	1.45	0.0974	0.68	1587	20.4	1574	12.7	-1
606.Z.62.1.1	-0.01	570	201	0.36	3.5481	1.21	0.0974	0.34	1601	17.1	1574	6.3	-2
606.Z.9.1.1	0.02	389	147	0.39	3.6715	1.25	0.0974	0.41	1553	17.2	1575	7.7	2
606.Z.33.1.1	0.02	350	144	0.43	3.6026	1.26	0.0974	0.45	1579	17.7	1575	8.3	0
606.Z.45.1.1	0.00	560	164	0.30	3.6457	1.21	0.0974	0.35	1563	16.8	1575	6.5	1
606.Z.20.1.1	0.01	641	186	0.30	3.6788	1.20	0.0974	0.32	1550	16.5	1576	6.0	2
606.Z.35.1.1	0.04	356	106	0.31	3.6562	1.26	0.0974	0.45	1559	17.4	1576	8.3	1
606.Z.52.1.1	0.02	505	220	0.45	3.5937	1.69	0.0975	0.35	1583	23.7	1576	6.6	0
606.Z.10.1.1	0.01	364	107	0.30	3.6737	1.26	0.0975	0.42	1552	17.3	1576	7.9	2
606.Z.30.1.1	0.06	307	118	0.40	3.6725	1.28	0.0975	0.49	1552	17.6	1576	9.1	2
606.Z.4.2.1	0.05	1090	715	0.68	3.9313	1.25	0.0975	0.27	1461	16.4	1576	5.1	8
606.Z.40.1.1	-0.01	599	196	0.34	3.6354	1.20	0.0975	0.33	1567	16.7	1578	6.1	1
606.Z.51.1.1	0.08	208	71	0.35	3.6113	1.36	0.0975	0.64	1576	19.0	1578	11.9	0
606.Z.6.1.1	0.02	679	216	0.33	3.6641	1.20	0.0976	0.32	1556	16.5	1578	6.1	2
606.Z.32.1.1	0.02	779	210	0.28	3.6544	1.18	0.0976	0.29	1559	16.4	1579	5.4	1
606.Z.16.1.1	0.01	962	308	0.33	3.6264	1.17	0.0976	0.26	1570	16.4	1579	4.9	1
606.Z.60.1.1	0.06	576	223	0.40	3.7916	1.22	0.0976	0.44	1509	16.4	1580	8.2	5
606.Z.41.1.1	0.00	807	364	0.47	3.6506	1.18	0.0976	0.27	1561	16.3	1580	5.0	1
606.Z.57.1.1	0.02	275	137	0.51	3.5026	1.30	0.0977	0.49	1619	18.6	1580	9.1	-3
606.Z.29.1.1	0.01	555	175	0.33	3.6086	1.21	0.0977	0.58	1577	16.9	1580	10.8	0
606.Z.28.1.1	0.04	316	113	0.37	3.6664	1.27	0.0977	0.81	1555	17.5	1580	15.2	2
606.Z.27.1.1	0.01	487	167	0.35	3.6734	1.22	0.0978	0.38	1552	16.9	1582	7.1	2
606.Z.50.1.1	0.01	1249	491	0.41	3.5522	1.25	0.0978	0.22	1599	17.7	1582	4.1	-1
606.Z.1.1.1	0.03	471	197	0.43	3.6218	1.23	0.0978	0.38	1572	17.2	1582	7.2	1
606.Z.24.1.1	0.02	280	113	0.41	3.6685	1.29	0.0978	0.83	1554	17.9	1583	15.5	2
606.Z.59.1.1	-0.01	325	149	0.47	3.6112	1.27	0.0979	0.45	1576	17.7	1584	8.5	1
606.Z.8.1.1	0.01	810	246	0.31	3.6582	1.18	0.0979	0.28	1558	16.4	1585	5.2	2
606.Z.21.1.1	0.01	800	364	0.47	3.6380	1.18	0.0980	0.28	1566	16.4	1586	5.2	1
606.Z.22.1.1	0.01	674	183	0.28	3.6026	1.19	0.0980	0.31	1579	16.7	1587	5.9	1
606.Z.31.1.1	0.05	103	40	0.40	3.6067	1.56	0.0981	0.84	1578	21.8	1587	15.7	1
606.Z.48.1.1	0.03	259	113	0.45	3.6331	1.31	0.0981	0.52	1567	18.2	1588	9.6	1
606.Z.34.1.1	0.04	489	150	0.32	3.6303	1.22	0.0981	0.38	1568	17.0	1589	7.1	1
606.Z.25.1.1	0.03	126	35	0.29	3.7052	1.50	0.0981	0.80	1540	20.6	1589	14.9	3
606.Z.52.2.1	-0.01	396	177	0.46	3.6437	1.24	0.0981	0.42	1563	17.3	1589	7.9	2
606.Z.47.2.1	0.02	229	145	0.65	3.6557	1.33	0.0982	0.57	1559	18.4	1590	10.7	2
606.Z.4.1.1	0.00	774	329	0.44	3.7250	1.29	0.0983	0.29	1533	17.6	1591	5.4	4
606.Z.14.1.1	0.05	88	69	0.81	3.7081	1.62	0.0984	0.89	1539	22.1	1594	16.6	4
606.Z.64.1.1	-0.02	209	69	0.34	3.6193	1.36	0.0984	0.59	1573	19.0	1594	10.9	2
606.Z.53.1.1	-0.03	110	49	0.46	3.6079	1.53	0.0985	0.78	1577	21.4	1595	14.6	1
606.Z.49.1.1	-0.01	536	160	0.31	3.6209	1.21	0.0985	0.36	1572	16.9	1596	6.6	2
606.Z.11.1.1	-0.07	109	40	0.38	3.6280	1.54	0.0985	0.80	1569	21.4	1596	15.0	2
606.Z.2.1.1	0.02	127	71	0.58	3.7945	1.57	0.0985	0.89	1508	21.1	1596	16.6	6
606.Z.26.1.1	0.00	348	244	0.72	3.5486	1.26	0.0986	0.42	1600	17.9	1597	7.9	0
606.Z.17.1.1	0.01	338	106	0.32	3.6111	1.27	0.0987	0.44	1576	17.7	1599	8.3	2
606.Z.56.1.1	-0.04	203	72	0.37	3.5604	1.35	0.0987	0.58	1596	19.1	1599	10.9	0
606.Z.39.1.1	0.04	150	133	0.92	3.7043	1.41	0.1023	0.64	1541	19.4	1666	11.9	8
606.Z.23.1.1	0.01	191	88	0.48	3.3240	1.38	0.1041	0.55	1695	20.6	1699	10.2	0
606.Z.5.1.1	0.21	38	30	0.84	3.3601	2.10	0.1046	1.42	1679	31.1	1707	26.1	2
606.Z.44.1.1	0.06	159	169	1.10	3.3173	1.42	0.1047	0.61	1699	21.1	1710	11.3	1
606.Z.46.1.1	0.04	218	162	0.77	3.3029	1.34	0.1062	0.52	1705	20.1	1734	9.6	2
606.Z.63.1.1	-0.02	176	92	0.54	3.1113	1.39	0.1137	0.55	1797	21.9	1859	9.9	4
greater than 10% discordant													
606.Z.42.1.1	0.08	746	1502	2.08	4.4809	1.83	0.0978	0.36	1299	21.5	1583	6.8	20

1. % $^{206}Pb_c$ indicates the proportion of common ^{206}Pb in the total measured ^{206}Pb.

2. Pb isotopic ratios corrected for common Pb by reference to the measured ^{204}Pb.

3. All errors quoted as 1σ.

1987604 NAMBA FORMATION (DEAD TREE SECTION)

GA Sample ID:	**2009074001**
GA Sample Number:	**1987604**
Other Sample ID:	**DT005**
1:250,000 Sheet:	**COPLEY SH 54-9**
Region:	**Mount Painter Inlier, South Australia**
Grid Reference (MGA94 Zone 54):	**354225 mE, 6664669 mN**
Collector:	**Stephen B. Hore**
Collection Date:	**25/02/2009**
Formal Name:	**Namba Formation**
Informal Name:	***(Not defined)***
Lithology:	**Coarse-grained sandstone**
Geochronologist:	**A.J. Cross**
Mount ID:	**GA6107**
Instrument:	**SHRIMP IIe Geoscience Australia**
Acquisition Date:	**03–07/02/2010**
U-Pb Standard & reproducibility:	**TEMORA-2; 0.91 % (1σ) [45 of 45]**
^{207}Pb/^{206}Pb Standard-A:	**OG1 (3465.4 Ma)**
Measured Value (±95% confidence):	**3467 ± 1.6 Ma [25 of 26]**
Interpreted Age:	**Zircon U-Pb age provenance spectrum**
IMF correction applied?	**No**

Sample Information

This sample of the Namba Formation was collected from the Dead Tree Section (Hore and Hill, 2009), which is exposed close to the Mount Painter Inlier range front in an upper tributary of Four Mile Creek. Angular to subrounded quartz clasts up to 2cm diameter are supported within an angular coarse-grained sandy matrix. Strong Fe alteration has permeated the matrix which is also affected by kaolinitic alteration (Fig. 13). Both matrix and clasts were included in the sample.

Zircons

Zircons recovered from 1987604 are turbid to clear, rounded to well rounded grains with a range of shapes and sizes (~40—100 µm in diameter) consistent with a derivation from a wide range of sources. Many have numerous fractures and are pitted, while < 5% of the grains have retained some crystal faces. The zircons range in luminescence from strong to weak but most have a moderate luminescence. There is a wide range of internal zoning patterns, the majority have thin well defined growth zones however, there are other grains with broad growth banding, convoluted zoning, as well as sector zoned crystals (Fig. 14).

Figure 13. *Photo of hand sample of coarse-grained sandstone from the Namba Formation (1987604).*

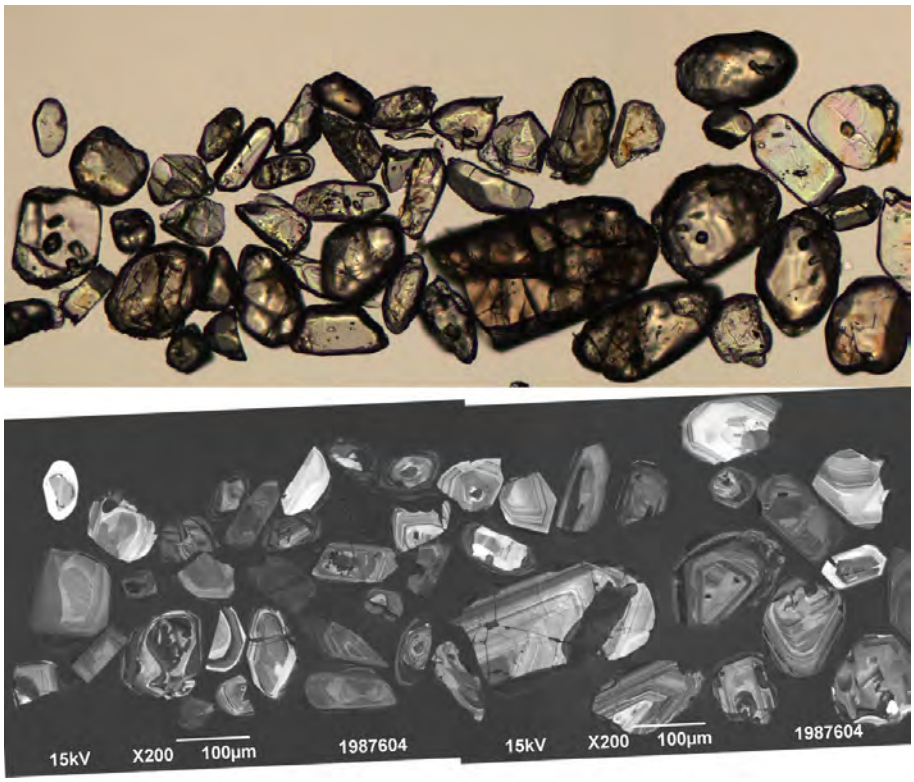

Figure 14. *Selected transmitted light (top) and cathodoluminescence (bottom) images of zircon grains from the Namba Formation, coarse-grained sandstone (Dead Tree section, 1987604).*

U-Pb isotopic results

Seventy SHRIMP analyses were undertaken on 70 zircons from this sample (Fig. 15 and 16, Table 5). There is a wide range of U contents (40—1212 ppm), however the majority have moderate to low concentration of 213 ppm (median value). Th/U ratios are also spread over a wide range (0.05—2.76) with a median value of 0.68 and common ^{206}Pb contents are uniformly low. Six analyses are greater than 10% discordant and two others (604.Z.36.1.1 and 604.Z.29.1.1) are poor analyses with very large uncertainties, these analyses have been removed from age considerations. The remaining 62 concordant to near-concordant zircons have a range in ^{207}Pb/^{206}Pb age of ~2.55 to ~1.54 Ga, but are principally concentrated as a continuous spread of ages between ~1.88 to ~1.54 Ga (90%). There are also three grains at ~2.40 Ga and single grains at ~2.48 Ga, ~2.52 Ga and ~2.55 Ga. The dominant age clusters within the main population of zircons between ~1.88 and ~1.54 Ga can be seen when the data is displayed on a probability density diagram (Fig. 16). The data in Fig. 16 shows that there are peaks in the age spectrum at ~1.58 Ga, ~1.62 Ga, ~1.68 Ga, ~1.73 Ga and ~1.77 Ga. The dominant grouping (40% of grains) contains 24 analyses which have identical radiogenic ^{207}Pb/^{206}Pb within their uncertainties (MSWD = 1.3) and combine to give an age of 1576 ± 5 Ma. There are also four older coherent age groupings at 1622 ± 10 Ma (n = 7, MSWD = 0.66); 1683 ± 11 Ma (n = 9, MSWD = 1.7); 1729 ± 8 Ma (n = 8, MSWD = 0.79) and; 1770 ± 9 Ma (n = 4, MSWD = 0.78).

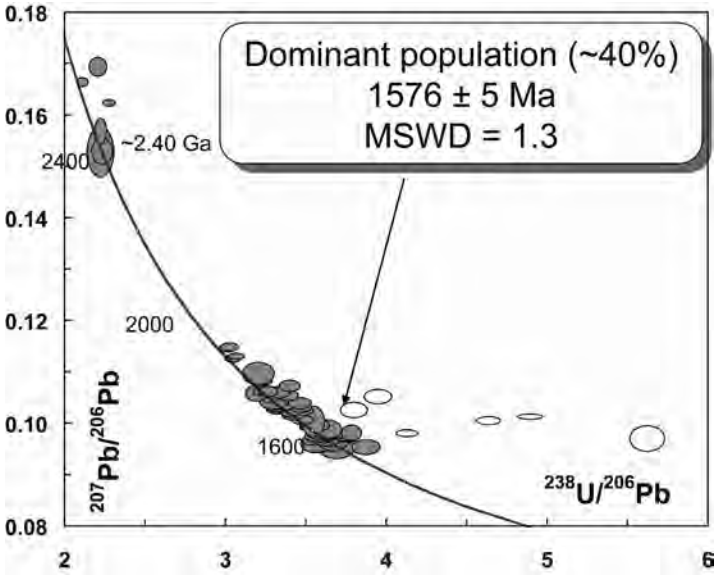

Figure 15. *Tera-Wasserburg concordia plot for U-Pb analyses from the Namba Formation, coarse-grained sandstone (Dead Tree section, 1987604).*

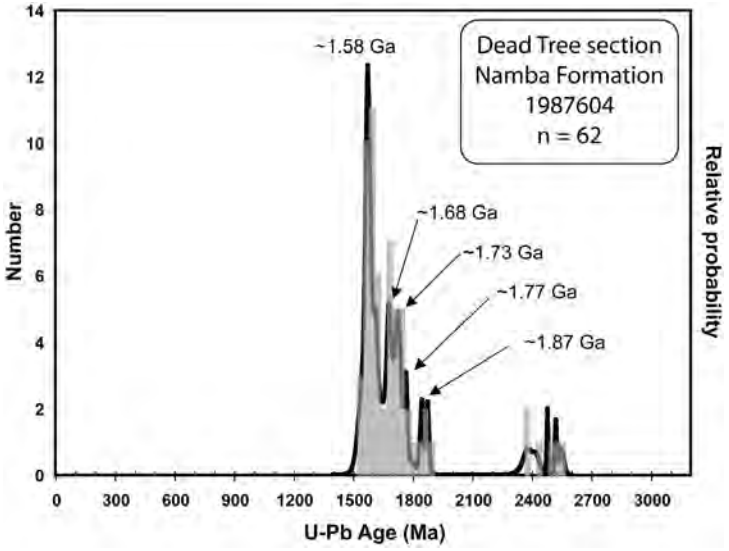

Figure 16. *Probability density diagram for U-Pb analyses from the Namba Formation, coarse grained sandstone (Dead Tree section, 1987604).*

Table 5. Zircon U-Pb isotopic data from the Namba Formation, coarse-grained sandstone (Dead Tree section, 1987604).

Grain.area	$^{206}Pb_c$ (%)	U (ppm)	Th (ppm)	$^{232}Th/^{238}U$	$^{238}U/^{206}Pb^*$	± (%)	$^{207}Pb^*/^{206}Pb^*$	± (%)	$^{206}Pb/^{238}U$ Age (Ma)	± (1σ)	$^{207}Pb/^{206}Pb$ Age (Ma)	± (1σ)	Discordance %
Detrital zircons													
604.Z.26.1.1	0.08	42	41	1.01	3.6995	1.95	0.0954	1.41	1542	26.7	1535	26.5	-1
604.Z.53.1.1	0.04	93	147	1.63	3.8817	1.51	0.0955	1.00	1478	20.0	1539	18.7	4
604.Z.70.1.1	0.07	146	88	0.63	3.5921	1.36	0.0957	0.79	1583	19.1	1541	14.9	-3
604.Z.14.1.1	0.10	73	82	1.16	3.5651	1.60	0.0961	1.11	1594	22.6	1550	20.8	-3
604.Z.43.1.1	0.01	212	68	0.33	3.6620	1.22	0.0968	0.61	1556	16.8	1563	11.4	0
604.Z.27.1.1	0.18	56	115	2.13	3.6739	1.76	0.0968	1.34	1552	24.3	1563	25.1	1
604.Z.1.1.1	0.07	207	71	0.36	3.5444	1.19	0.0968	0.61	1602	16.8	1564	11.4	-3
604.Z.15.1.1	0.08	102	153	1.54	3.6378	1.53	0.0970	0.90	1566	21.2	1568	16.9	0
604.Z.7.1.1	0.03	690	150	0.22	3.7618	1.01	0.0970	0.33	1520	13.7	1568	6.2	3
604.Z.38.1.1	0.01	265	117	0.45	3.6150	1.16	0.0972	0.55	1574	16.2	1572	10.3	0
604.Z.35.1.1	0.01	888	287	0.33	3.6065	1.00	0.0974	0.28	1578	14.0	1576	5.3	0
604.Z.24.1.1	0.00	367	180	0.50	3.5836	1.09	0.0975	0.44	1587	15.3	1576	8.2	-1
604.Z.23.1.1	-0.02	152	111	0.75	3.5711	1.30	0.0976	0.70	1591	18.3	1580	13.0	-1
604.Z.25.1.1	0.01	373	122	0.34	3.7158	1.09	0.0977	0.46	1536	14.9	1580	8.6	3
604.Z.11.1.1	0.04	268	154	0.59	3.5960	1.15	0.0979	0.54	1582	16.1	1584	10.1	0
604.Z.39.1.1	-0.01	226	183	0.83	3.6751	1.20	0.0979	0.58	1551	16.5	1584	10.9	2
604.Z.46.1.1	-0.08	121	183	1.55	3.7604	1.39	0.0979	0.84	1520	18.8	1584	15.7	5
604.Z.52.1.1	-0.03	194	141	0.75	3.6452	1.24	0.0979	0.64	1563	17.3	1585	12.1	2
604.Z.57.1.1	0.00	165	120	0.75	3.6308	1.30	0.0980	0.69	1568	18.0	1586	12.8	1
604.Z.9.1.1	0.01	549	160	0.30	3.7144	1.03	0.0981	0.36	1537	14.1	1588	6.6	4
604.Z.6.1.1	0.01	493	169	0.35	3.7172	1.05	0.0982	0.66	1536	14.3	1591	12.3	4
604.Z.50.1.1	-0.04	390	237	0.63	3.7922	1.10	0.0983	0.98	1509	14.9	1592	18.3	6
604.Z.33.1.1	-0.08	89	67	0.78	3.5863	1.53	0.0986	0.97	1585	21.4	1597	18.1	1
604.Z.59.1.1	0.15	64	78	1.26	3.6353	1.75	0.0990	1.27	1567	24.4	1605	23.7	3
604.Z.19.1.1	0.01	254	247	1.01	3.5330	1.16	0.0995	0.53	1607	16.5	1615	9.9	1
604.Z.3.1.1	-0.03	211	257	1.26	3.5307	1.18	0.0996	0.56	1608	16.8	1616	10.4	1
604.Z.69.1.1	-0.07	165	189	1.18	3.5839	1.31	0.0998	0.75	1586	18.5	1620	14.0	2
604.Z.54.1.1	0.03	262	183	0.72	3.5416	1.17	0.0998	0.55	1603	16.6	1621	10.3	1
604.Z.13.1.1	0.09	142	118	0.86	3.5499	1.31	0.1001	1.20	1600	18.6	1626	22.2	2
604.Z.16.1.1	0.01	132	121	0.95	3.5511	1.34	0.1006	1.97	1599	18.9	1635	36.7	2
604.Z.49.1.1	0.04	214	110	0.53	3.4864	1.22	0.1009	0.59	1626	17.5	1641	11.0	1
604.Z.2.1.1	0.02	184	159	0.89	3.4247	1.23	0.1017	0.60	1651	17.9	1655	11.2	0
604.Z.17.1.1	0.05	222	196	0.91	3.4892	1.18	0.1027	0.58	1625	16.9	1674	10.8	3
604.Z.63.1.1	0.00	174	154	0.91	3.3270	1.30	0.1029	0.64	1694	19.4	1678	11.9	-1
604.Z.66.1.1	-0.05	171	262	1.58	3.4095	1.30	0.1030	1.04	1658	19.0	1679	19.2	1
604.Z.31.1.1	-0.03	367	153	0.43	3.3330	1.35	0.1032	0.47	1691	20.1	1682	8.8	-1
604.Z.42.1.1	-0.05	202	104	0.53	3.4799	1.24	0.1033	0.64	1628	17.8	1685	11.8	4
604.Z.20.1.1	-0.02	286	272	0.98	3.3800	1.13	0.1036	0.48	1671	16.7	1689	8.8	1
604.Z.58.1.1	0.01	153	96	0.65	3.4728	1.33	0.1041	0.70	1631	19.1	1698	12.9	4
604.Z.21.1.1	0.04	203	160	0.82	3.3130	1.21	0.1044	0.56	1700	18.0	1704	10.4	0
604.Z.18.1.1	-0.03	52	67	1.33	3.3090	1.80	0.1046	1.11	1702	27.0	1707	20.4	0
604.Z.28.1.1	0.04	267	139	0.54	3.2764	1.15	0.1051	0.49	1717	17.3	1716	8.9	0
604.Z.55.1.1	0.00	171	77	0.46	3.3939	1.29	0.1056	0.63	1665	18.9	1725	11.6	4
604.Z.64.1.1	-0.02	367	979	2.76	3.2039	1.11	0.1058	0.43	1751	17.1	1728	7.9	-2
604.Z.51.1.1	0.31	120	88	0.76	3.2042	1.46	0.1061	0.98	1751	22.4	1733	18.1	-1
604.Z.48.1.1	-0.05	143	133	0.96	3.3390	1.34	0.1062	0.69	1689	19.9	1736	12.7	3
604.Z.47.1.1	0.01	267	165	0.64	3.2376	1.17	0.1064	0.49	1735	17.8	1738	9.0	0
604.Z.56.1.1	-0.05	187	111	0.61	3.2732	1.25	0.1064	0.61	1719	18.9	1738	11.2	1
604.Z.22.1.1	-0.06	155	87	0.58	3.4073	1.29	0.1075	0.67	1659	18.8	1758	12.3	6
604.Z.8.1.1	0.04	320	120	0.39	3.2379	1.10	0.1082	0.43	1735	16.7	1770	7.9	2
604.Z.65.1.1	-0.01	425	135	0.33	3.2458	1.09	0.1084	0.40	1731	16.5	1772	7.3	3
604.Z.12.1.1	-0.08	40	17	0.44	3.2115	2.01	0.1098	1.31	1747	30.7	1797	23.8	3
604.Z.34.1.1	0.00	314	158	0.52	3.0554	1.12	0.1128	0.43	1825	17.8	1845	7.8	1
604.Z.44.1.1	0.01	469	527	1.16	3.0741	1.07	0.1133	0.35	1816	16.9	1853	6.3	2
604.Z.5.1.1	-0.02	288	149	0.53	3.0219	1.12	0.1148	0.43	1843	18.0	1877	7.8	2
604.Z.10.1.1	0.00	240	123	0.53	3.0319	1.16	0.1150	0.46	1838	18.5	1880	8.3	3
604.Z.32.1.1	0.01	753	34	0.05	2.2306	2.45	0.1530	2.10	2388	48.9	2380	35.9	0
604.Z.40.1.1	0.00	454	29	0.07	2.2408	1.89	0.1532	1.09	2379	37.6	2382	18.6	0
604.Z.67.1.1	-0.01	340	190	0.58	2.2318	1.12	0.1572	1.06	2387	22.4	2425	17.9	2
604.Z.68.1.1	-0.01	512	138	0.28	2.2826	1.06	0.1626	0.27	2342	20.9	2483	4.5	7
604.Z.30.1.1	-0.01	330	157	0.49	2.1186	1.11	0.1667	0.33	2492	22.9	2525	5.5	2
604.Z.4.1.1	0.00	209	46	0.23	2.2148	1.67	0.1697	0.70	2402	33.5	2554	11.7	7
greater than 10% discordant													
604.Z.60.1.1	0.09	161	111	0.71	5.6313	1.28	0.0972	1.70	1054	12.5	1571	31.9	36
604.Z.37.1.1	0.09	548	983	1.85	4.1378	1.04	0.0982	0.41	1395	13.1	1591	7.7	14
604.Z.41.1.1	0.06	467	968	2.14	4.6442	1.07	0.1007	0.50	1257	12.2	1636	9.3	25
604.Z.62.1.1	0.18	1084	1819	1.73	4.9036	1.00	0.1015	0.34	1196	10.9	1651	6.4	30
604.Z.45.1.1	0.09	98	145	1.53	3.8050	1.46	0.1027	0.95	1504	19.6	1674	17.5	11
604.Z.61.1.1	0.02	113	176	1.61	3.9567	1.43	0.1054	0.90	1453	18.5	1721	16.5	17
poor analyses													
604.Z.36.1.1	0.03	369	233	0.65	3.9758	1.14	0.0724	22.34	1446	14.8	998	453.8	-50
604.Z.29.1.1	0.00	1212	186	0.16	2.3671	4.64	0.1565	9.00	2272	88.8	2419	152.7	7

1. $\%^{206}Pb_c$ indicates the proportion of common ^{206}Pb in the total measured ^{206}Pb.

2. Pb isotopic ratios corrected for common Pb by reference to the measured ^{204}Pb.

3. All errors quoted as 1σ.

1999106 BEVERLEY SANDS (NAMBA FORMATION)

GA Sample ID:	**2009073001**
GA Sample Number:	**1999106**
Other Sample ID:	
1:250,000 Sheet:	**FROME SH 54-10**
Region:	**Mount Painter Inlier, South Australia**
Grid Reference (MGA94 Zone 54):	**364916 mE, 6658366 mN**
Collector:	**A.J. Cross, S. Jaireth and B.H. Michaelsen**
Collection Date:	**28/04/2009**
Formal Name:	**Namba Formation**
Informal Name:	**Beverley sands**
Lithology:	**Uncemented quartzose sand**
Geochronologist:	**A.J. Cross**
Mount ID:	**GA6107**
Instrument:	**SHRIMP IIe Geoscience Australia**
Acquisition Date:	**03–07/02/2010**
U-Pb Standard & reproducibility:	**TEMORA-2; 0.91 % (1σ) [45 of 45]**
$^{207}Pb/^{206}Pb$ Standard-A:	**OG1 (3465.4 Ma)**
Measured Value (±95% confidence):	**3467 ± 1.6 Ma [25 of 26]**
Interpreted Age:	**Zircon U-Pb age provenance spectrum**
IMF correction applied?	**No**

Sample Information

Sample 1999106 was a section of half core from the Beverley uranium deposit, sampled from the PIRSA core library (drill hole WC2, 121.72—123.02 m). It is a white, fine-grained, well sorted, uncemented quartzose sand from the Beverley sands of the Namba Formation (Fig.17). The Beverley sand unit of the upper Namba Formation (Oligocene to Miocene) is the principal host to U mineralisation at the Beverley uranium deposit. The Beverley sand unit is a confined aquifer and occurs between two clay units, the Beverley Clay (upper) and Alpha mudstone (lower; Brunt, 2005; McConachy et al., 2006).

Zircons

Zircons recovered from 1999106 are either clear, colourless, euhedral grains and their broken equivalents (~70% of population) or, rounded to well rounded grains with pitted surface textures (~30%). Many of the euhedral grains are in pristine condition. They are ~20 to ~70 µm in diameter and range from those with equant forms to others with aspect ratios of up to 4. They typically have a moderate luminescence and normal oscillatory growth zoning predominates. The rounded, pitted zircon population is also distinctive from the euhedral grains by their larger size (~50 to ~110 µm in diameter). They are strongly to weakly luminescent with a wide range of internal zoning patterns (Fig. 18).

Figure 17. *Beverley sands within the Namba Formation (drill hole WC2, 1999106).*

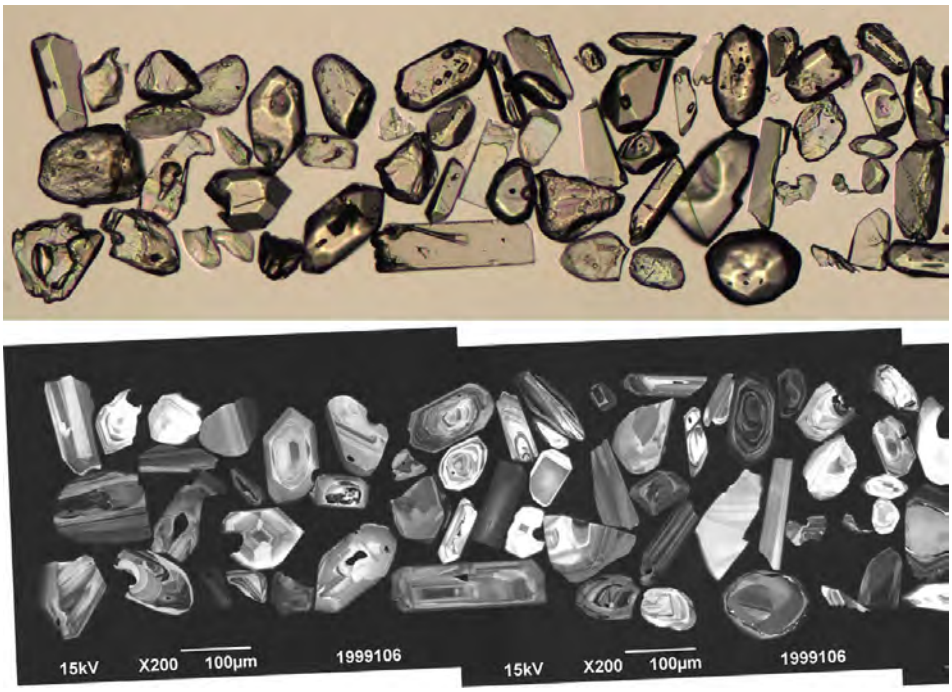

Figure 18. *Selected transmitted light (top) and cathodoluminescence (bottom) images of zircon grains from the Beverley sands (drill hole WC2, 1999106).*

U-Pb isotopic results

Seventy-two analyses were conducted on 72 zircons from this sample (Figs. 19 and 20, Table 6). U contents are low to moderate (31—1021 ppm; median = 172) and there is a wide range in Th/U ratios (0.18—2.01) however, the median for the sample is 0.70. Common ^{206}Pb concentrations are uniformly low (<1% $^{204}f_{206}$) and three analyses are well over 10% discordant and removed from further age considerations. The zircons range in age between ~2.71 Ga to ~100 Ma. There is also a marked relationship between the U-Pb ages of the zircons and their morphology. All of the well rounded zircons are older than ~600 to ~500 Ma, whereas the euhedral grains are all younger than ~500 Ma. The oldest zircons in the sample are single grains at ~2.71 Ga and ~2.32 Ga. There are also five younger grains which form a coherent group within their analytical uncertainties (MSWD = 2.5) and combine to give a ^{207}Pb/^{206}Pb age of 1548 ± 28 Ma. Six younger Mesoproterozoic grains do not form coherent clusters but are spread between ~1.46 and ~1.20 Ga.

The majority of zircons in the sample are euhedral, Phanerozoic in age (~70%) and dominated by two age peaks at ~425 Ma and ~285 Ma (Fig. 20). The older of these groups consists of 11 grains which all have the same radiogenic ^{206}Pb/^{238}U within their analytical uncertainties (MSWD = 0.49) and combine to give an age of 423.7 ± 3.1 Ma. While the younger cluster comprises 10 grains and also forms a statistically coherent grouping within uncertainty (MSWD = 1.8) and an age of 286.6 ± 3.4 Ma. There is also a poorly defined cluster of six grains (MSWD = 4.3) with a median age of 134.4 +5.6/- 4.3 Ma, and minor groupings of between three to four zircons at 470 ± 11 Ma (MSWD = 1.6, n = 4) and 256.1 ± 3.7 Ma (MSWD = 0.60, n = 3). The youngest zircons in the sample are three grains between ~110 to 100 Ma.

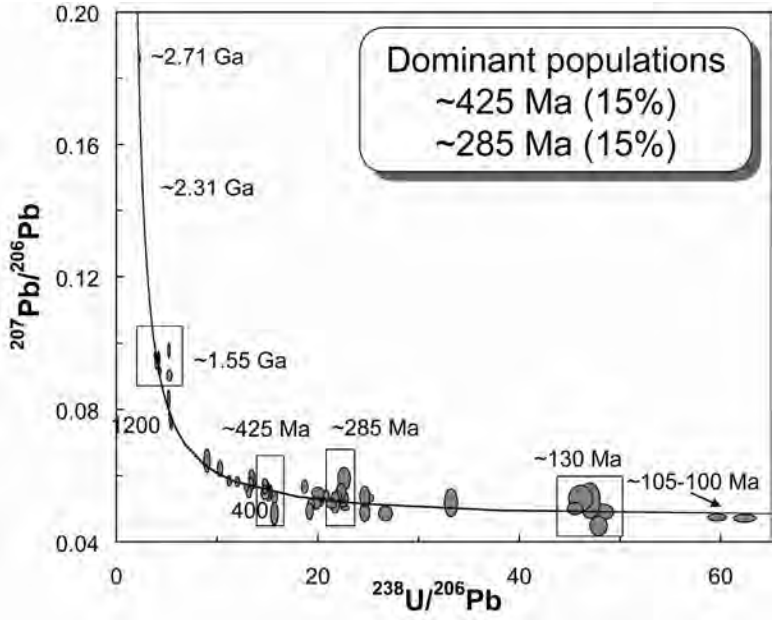

Figure 19. *Tera-Wasserburg concordia plot for U-Pb analyses from the Beverley sands (drill hole WC2, 1999106).*

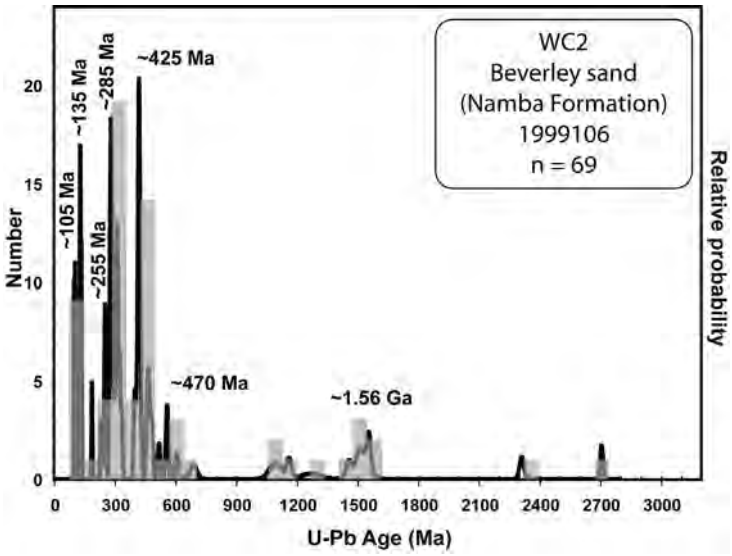

Figure 20. *Probability density diagram for U-Pb analyses from the Beverley sands (drill hole WC2, 1999106).*

Table 6. Zircon U-Pb isotopic data from Beverley sands (WC2, 1999106).

Grain.area	$^{206}Pb_c$ (%)	U (ppm)	Th (ppm)	$^{232}Th/^{238}U$	$^{238}U/^{206}Pb^*$	± (%)	$^{207}Pb^*/^{206}Pb^*$	± (%)	$^{206}Pb/^{238}U$ Age (Ma)	± (1σ)	$^{207}Pb/^{206}Pb$ Age (Ma)	± (1σ)	Discordance %
Detrital zircons													
106.Z.71.1.1	0.09	1021	692	0.70	62.4807	1.14	0.0471	1.68	102	1.2	56	40.0	-82
106.Z.30.1.1	0.00	677	975	1.49	59.7157	1.01	0.0474	1.52	107	1.1	71	36.2	-51
106.Z.16.1.1	0.53	137	98	0.74	57.7782	1.94	0.0427	6.83	111	2.1	-184	170.6	162
106.Z.61.1.1	0.99	132	138	1.08	49.0381	1.40	0.0405	9.75	130	1.8	-318	250.2	142
106.Z.50.1.1	-0.27	260	209	0.83	48.0302	1.88	0.0490	3.42	133	2.5	148	80.1	10
106.Z.22.1.1	0.32	185	128	0.72	47.8921	1.17	0.0448	4.36	133	1.5	-69	106.4	297
106.Z.47.1.1	-0.38	121	102	0.87	47.0528	1.34	0.0525	6.81	136	1.8	308	155.1	57
106.Z.25.1.1	-0.61	163	126	0.80	46.1295	1.72	0.0532	4.90	138	2.3	339	110.9	60
106.Z.63.1.1	0.00	273	219	0.83	45.5664	1.13	0.0500	2.47	140	1.6	194	57.3	28
106.Z.41.1.1	0.98	160	135	0.87	33.1696	1.26	0.0518	5.41	191	2.4	278	123.8	32
106.Z.23.1.1	0.41	219	142	0.67	26.6141	1.69	0.0486	3.06	238	3.9	127	72.0	-88
106.Z.65.1.1	-0.17	446	173	0.40	24.9572	1.29	0.0532	1.63	253	3.2	337	37.0	25
106.Z.27.1.1	0.40	127	124	1.00	24.5292	1.27	0.0489	3.74	258	3.2	145	87.8	-79
106.Z.8.1.1	-0.32	94	87	0.96	24.5263	1.35	0.0538	3.72	258	3.4	364	83.8	30
106.Z.14.1.1	0.03	573	330	0.60	22.5038	1.27	0.0503	1.05	280	3.5	208	24.4	-35
106.Z.62.1.1	-1.01	175	49	0.29	22.4494	1.85	0.0591	3.98	281	5.1	570	86.6	52
106.Z.46.1.1	0.00	86	72	0.87	22.3554	1.50	0.0528	2.87	282	4.1	322	65.2	13
106.Z.53.1.1	-0.06	345	313	0.94	22.1990	1.09	0.0527	1.53	284	3.0	316	34.8	10
106.Z.29.1.1	-0.29	130	51	0.40	22.1810	1.26	0.0552	2.90	284	3.5	421	64.8	33
106.Z.57.1.1	-0.05	455	459	1.04	21.9001	1.04	0.0542	1.28	288	2.9	378	28.7	24
106.Z.6.1.1	-0.09	298	167	0.58	21.8199	1.10	0.0522	1.55	289	3.1	296	35.4	3
106.Z.37.1.1	0.05	550	257	0.48	21.6365	1.35	0.0526	1.11	291	3.8	311	25.3	6
106.Z.28.1.1	-0.35	77	47	0.63	21.5926	1.45	0.0519	4.10	292	4.1	283	93.9	-3
106.Z.26.1.1	0.14	262	205	0.81	21.2075	1.58	0.0516	1.82	297	4.6	268	41.7	-11
106.Z.44.1.1	-0.13	260	226	0.90	20.6562	1.11	0.0540	1.72	305	3.3	373	38.6	19
106.Z.68.1.1	0.10	295	311	1.09	20.0656	1.12	0.0521	1.76	314	3.4	288	40.2	-9
106.Z.56.1.1	0.02	864	584	0.70	19.9400	0.99	0.0525	0.88	315	3.0	305	20.0	-3
106.Z.1.1.1	-0.06	129	93	0.74	19.8783	2.09	0.0548	2.05	316	6.5	406	45.8	23
106.Z.17.1.1	0.16	267	112	0.43	19.7191	1.10	0.0512	1.81	319	3.4	251	41.6	-28
106.Z.3.1.1	0.12	128	85	0.69	19.7116	1.24	0.0518	2.32	319	3.8	276	53.2	-16
106.Z.11.1.1	0.13	242	116	0.50	19.2016	1.11	0.0516	1.81	327	3.5	269	41.4	-22
106.Z.40.1.1	0.59	180	93	0.53	19.0022	1.20	0.0493	3.34	331	3.9	162	78.1	-107
106.Z.13.1.1	-0.31	169	93	0.57	18.5231	1.18	0.0567	2.29	339	3.9	479	50.6	30
106.Z.9.1.1	0.15	127	91	0.74	15.5091	1.26	0.0535	2.24	403	4.9	350	50.6	-15
106.Z.67.1.1	0.62	91	106	1.20	15.4766	1.48	0.0486	4.66	404	5.8	129	109.5	-220
106.Z.12.1.1	-0.11	104	81	0.81	14.9664	1.30	0.0556	2.13	417	5.3	437	47.4	5
106.Z.38.1.1	0.36	171	188	1.14	14.9020	1.20	0.0544	2.46	419	4.9	389	55.2	-8
106.Z.42.1.1	-0.04	181	94	0.53	14.7744	1.18	0.0568	1.52	422	4.8	483	33.5	13
106.Z.60.1.1	-0.06	116	45	0.40	14.7592	1.37	0.0560	2.11	423	5.6	453	46.8	7
106.Z.51.1.1	0.02	317	174	0.57	14.6988	1.10	0.0556	1.24	424	4.5	436	27.6	3
106.Z.69.1.1	0.04	207	246	1.23	14.6962	1.21	0.0549	1.81	424	5.0	408	40.4	-4
106.Z.48.1.1	-0.03	252	313	1.28	14.6781	1.77	0.0555	1.31	425	7.3	433	29.2	2
106.Z.5.1.1	0.06	183	81	0.46	14.6683	1.14	0.0563	1.52	425	4.7	463	33.7	8
106.Z.35.1.1	0.22	141	90	0.66	14.5793	1.79	0.0546	2.22	428	7.4	396	49.9	-8
106.Z.45.1.1	-0.04	152	153	1.04	14.5700	1.22	0.0578	1.65	428	5.1	521	36.2	19
106.Z.33.1.1	0.06	209	205	1.01	14.5627	1.15	0.0559	1.48	428	4.8	447	32.9	4
106.Z.49.1.1	-0.18	330	209	0.65	13.4212	1.09	0.0573	1.31	463	4.9	502	28.8	8
106.Z.58.1.1	-0.42	125	85	0.70	13.2331	1.33	0.0596	2.60	470	6.0	589	56.4	21
106.Z.21.1.1	0.16	289	194	0.69	13.1767	1.08	0.0574	2.43	472	4.9	505	53.5	7
106.Z.7.1.1	0.18	116	25	0.22	12.9381	1.27	0.0550	2.09	480	5.9	412	46.7	-17
106.Z.59.1.1	0.00	361	245	0.70	12.6796	1.08	0.0564	1.04	489	5.1	469	22.9	-5
106.Z.19.1.1	0.04	103	46	0.47	11.8234	1.32	0.0582	1.73	523	6.6	537	37.8	3
106.Z.20.1.1	0.08	157	95	0.63	11.0122	1.19	0.0583	1.43	560	6.4	540	31.3	-4
106.Z.34.1.1	-0.05	527	274	0.54	10.9216	1.01	0.0594	0.75	565	5.5	582	16.4	3
106.Z.43.1.1	-0.22	57	59	1.08	10.0710	1.59	0.0622	2.55	610	9.3	681	54.5	11
106.Z.39.1.1	-0.12	62	20	0.32	8.7947	2.51	0.0646	3.67	694	16.5	762	77.4	9
106.Z.72.1.1	0.00	80	45	0.57	5.2301	1.52	0.0755	1.21	1128	15.7	1082	24.2	-5
106.Z.32.1.1	0.05	76	79	1.07	5.1345	1.45	0.0768	1.24	1147	15.3	1117	24.7	-3
106.Z.54.1.1	-0.01	293	56	0.20	5.0254	1.11	0.0788	0.62	1170	11.9	1166	12.3	0
106.Z.10.1.1	-0.42	31	33	1.07	4.9520	1.95	0.0831	2.30	1186	21.2	1271	44.9	7
106.Z.18.1.1	0.02	118	85	0.75	4.0410	1.90	0.0917	0.74	1425	24.2	1461	14.1	3
106.Z.66.1.1	-0.50	41	27	0.68	3.9542	1.91	0.0953	1.82	1453	24.9	1533	34.3	6
106.Z.4.1.1	-0.06	108	61	0.58	3.8626	1.29	0.0942	0.77	1484	17.2	1512	14.5	2
106.Z.36.1.1	-0.02	239	50	0.21	3.7502	2.27	0.0946	1.62	1524	30.9	1521	30.5	0
106.Z.31.1.1	0.05	92	61	0.68	3.6241	1.37	0.0961	0.84	1571	19.1	1549	15.8	-2
106.Z.52.1.1	0.01	333	59	0.18	3.5729	1.09	0.0967	0.45	1591	15.4	1562	8.4	-2
106.Z.15.1.1	0.00	61	120	2.01	2.3043	1.52	0.1474	0.62	2324	29.7	2316	10.7	0
106.Z.70.1.1	0.01	129	59	0.47	2.0326	1.31	0.1865	0.42	2579	27.8	2711	7.0	6
greater than 10% discordant													
106.Z.24.1.1	-0.18	78	54	0.72	5.0260	3.50	0.0904	1.17	1170	37.4	1435	22.3	20
106.Z.2.1.1	-0.05	194	139	0.74	5.0006	1.15	0.0980	1.48	1175	12.3	1587	27.7	28
106.Z.55.1.1	0.00	469	337	0.74	1.9366	1.25	0.3041	1.24	2684	27.5	3491	19.2	28
poor analyses													
106.Z.64.1.1	0.05	227	159	0.72	6.6026	11.19	0.0733	13.14	909	94.8	1021	266.0	12

1. $\%^{206}Pb_c$ indicates the proportion of common ^{206}Pb in the total measured ^{206}Pb.

2. Pb isotopic ratios corrected for common Pb by reference to the measured ^{204}Pb.

3. All errors quoted as 1σ.

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