

EION CAMERON SPECIAL ISSUE OF GEEA MANUSCRIPT
BY CARITAT & COOPER (DECEMBER 2014)

Appendix 1. Summary statistics for total element content data from the National Geochemical Survey of Australia (parameters in italics deemed not fit for purpose) (Caritat & Cooper 2011b)

Element Method* Unit LLD [^]	Typ e#	N	N<LL D	%<LL D	Min	25%	Med	75%	Max
TOTAL									
<i>Ag ICP-MS mg/kg 0.03</i>	Tc	1190	1183	99%	<0.03	<0.03	<0.03	<0.03	0.84
	Tf	1187	1165	98%	<0.03	<0.03	<0.03	<0.03	1.95
	Bc	1190	1184	99%	<0.03	<0.03	<0.03	<0.03	0.71
	Bf	1190	1171	98%	<0.03	<0.03	<0.03	<0.03	11.88
<i>Al XRF mg/kg 26</i>	Tc	1190	0	0%	879	24219	42773	58783	148336
	Tf	1187	0	0%	1085	46896	58308	70283	137581
	Bc	1190	0	0%	778	30633	46920	61109	194624
	Bf	1190	0	0%	725	51496	64850	78024	188214
<i>As ICP-MS mg/kg 0.4</i>	Tc	1190	45	4%	<0.4	1.8	3.1	4.7	112.7
	Tf	1187	19	2%	<0.4	2.7	4.1	5.8	80.3
	Bc	1190	26	2%	<0.4	2.1	3.6	5.3	62.2
	Bf	1190	9	1%	<0.4	3.2	4.9	6.9	112.6
<i>Au FA mg/kg 0.001</i>	Tc	1186	171	14%	<0.001	0.001	0.001	0.002	0.087
	Tf	1137	92	8%	<0.001	0.001	0.002	0.002	0.175
	Bc	1189	148	12%	<0.001	0.001	0.001	0.002	0.109
	Bf	1124	54	5%	<0.001	0.001	0.002	0.003	0.116
<i>Ba ICP-MS mg/kg 0.5</i>	Tc	1190	0	0%	3.6	200	315	415	2577
	Tf	1187	0	0%	12.2	265	345	430	983
	Bc	1190	0	0%	5.6	200	326	424	2374
	Bf	1190	0	0%	5.6	271	367	461	3403
<i>Be ICP-MS mg/kg 1.1</i>	Tc	1190	516	43%	<1.1	<1.1	1.2	1.8	18.1
	Tf	1187	237	20%	<1.1	1.2	1.6	2.2	26.2
	Bc	1190	462	39%	<1.1	<1.1	1.3	1.9	7.5
	Bf	1190	174	15%	<1.1	1.3	1.8	2.3	11.1
<i>Bi ICP-MS mg/kg 0.02</i>	Tc	1190	54	5%	<0.02	0.11	0.18	0.28	31.90
	Tf	1187	39	3%	<0.02	0.19	0.28	0.37	44.77
	Bc	1190	45	4%	<0.02	0.12	0.19	0.28	7.90
	Bf	1190	35	3%	<0.02	0.20	0.28	0.38	9.65
<i>Ca XRF mg/kg 14</i>	Tc	1190	0	0%	229	1379	3238	6565	365619
	Tf	1187	0	0%	250	2487	4388	8280	346830
	Bc	1190	0	0%	214	1587	4067	9143	360102
	Bf	1190	0	0%	243	2646	5500	11902	340283
<i>Cd ICP-MS mg/kg 0.1</i>	Tc	1190	830	70%	<0.1	<0.1	<0.1	0.1	3.97
	Tf	1187	480	40%	<0.1	<0.1	0.1	0.2	4.54
	Bc	1190	883	74%	<0.1	<0.1	<0.1	0.1	1.24
	Bf	1190	589	49%	<0.1	<0.1	0.1	0.2	7.35
<i>Ce ICP-MS mg/kg 0.03</i>	Tc	1190	0	0%	0.87	23.64	42.11	57.20	252
	Tf	1187	0	0%	1.03	50.76	63.60	84.08	2680
	Bc	1190	0	0%	1.47	24.63	41.88	57.49	180
	Bf	1190	0	0%	1.24	52.40	65.73	85.69	1401
<i>Cl XRF mg/kg 10</i>	Tc	1190	11	1%	<10	38	53	92	53239
	Tf	1186	6	1%	<10	39	62	116	38350
	Bc	1190	3	0%	<10	42	75	576	32613
	Bf	1189	8	1%	<10	45	94	800	46680
<i>Co ICP-MS mg/kg</i>	Tc	1190	2	0%	<0.1	3.5	8.3	13.4	74.7

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0.1									
	Tf	1187	1	0%	<0.1	8.0	11.3	15.5	71.9
	Bc	1190	3	0%	<0.1	4.3	8.5	13.6	74.5
	Bf	1190	0	0%	0.3	9.0	12.7	17.6	83.5
Cr ICP-MS mg/kg 0.5	Tc	1190	0	0%	4.8	32.0	47.9	65.8	2039
	Tf	1187	0	0%	4.2	52.4	65.9	90.7	1497
	Bc	1190	0	0%	4.1	34.2	49.9	68.0	7505
	Bf	1190	0	0%	3.5	57.1	69.4	94.4	7824
Cs ICP-MS mg/kg 0.1	Tc	1190	9	1%	<0.1	1.2	2.3	3.6	13.4
	Tf	1187	3	0%	<0.1	2.3	3.3	4.6	13.6
	Bc	1190	7	1%	<0.1	1.5	2.5	3.8	22.7
	Bf	1190	2	0%	<0.1	2.6	3.7	5.0	19.7
Cu ICP-MS mg/kg 0.2	Tc	1190	14	1%	<0.2	7.3	13.7	20.7	151
	Tf	1187	4	0%	<0.2	13.7	19.3	26.3	159
	Bc	1190	9	1%	<0.2	8.9	14.7	21.1	81.9
	Bf	1190	8	1%	<0.2	15.2	20.6	27.6	110
Dy ICP-MS mg/kg 0.1	Tc	1190	1	0%	<0.1	1.9	3.3	4.5	9.8
	Tf	1187	1	0%	<0.1	4.5	5.3	6.4	101
	Bc	1190	0	0%	0.1	1.9	3.3	4.4	9.8
	Bf	1190	0	0%	0.2	4.4	5.2	6.5	44.9
Er ICP-MS mg/kg 0.03	Tc	1190	1	0%	<0.03	1.13	1.99	2.69	6.45
	Tf	1187	1	0%	<0.03	2.85	3.35	4.05	49.7
	Bc	1190	0	0%	0.07	1.14	1.97	2.64	5.87
	Bf	1190	0	0%	0.09	2.77	3.27	4.09	35.1
Eu ICP-MS mg/kg 0.03	Tc	1190	13	1%	<0.03	0.37	0.75	1.07	2.92
	Tf	1187	2	0%	<0.03	0.93	1.14	1.36	29.3
	Bc	1190	13	1%	<0.03	0.41	0.75	1.07	3.17
	Bf	1190	1	0%	<0.03	0.95	1.18	1.40	9.00
F ISE mg/kg 20	Tc	1190	0	0%	20	120	200	300	13250
	Tf	1191	0	0%	40	180	240	340	3200
	Bc	1188	4	0%	<20	140	220	320	3360
	Bf	1190	1	0%	<20	200	280	400	2900
FeT XRF mg/kg 35	Tc	1190	0	0%	678	14277	22539	32149	229088
	Tf	1187	0	0%	574	22839	30207	39474	173122
	Bc	1190	0	0%	567	15695	24021	32790	228571
	Bf	1190	0	0%	336	25572	33068	42473	229319
Ga ICP-MS mg/kg 0.1	Tc	1190	3	0%	<0.1	5.5	10.0	13.3	29.9
	Tf	1187	2	0%	<0.1	10.2	13.3	16.2	29.2
	Bc	1190	1	0%	<0.1	6.8	10.6	14.1	42.8
	Bf	1190	1	0%	<0.1	11.2	14.7	18.2	42.3
Gd ICP-MS mg/kg 0.03	Tc	1190	0	0%	0.07	1.79	3.39	4.67	11.34
	Tf	1187	0	0%	0.07	4.41	5.37	6.56	135.9
	Bc	1190	0	0%	0.13	1.88	3.38	4.70	11.29
	Bf	1190	0	0%	0.15	4.44	5.37	6.69	62.6
Ge ICP-MS mg/kg 0.04	Tc	1190	20	2%	<0.04	0.40	0.50	0.60	1.91
	Tf	1187	15	1%	<0.04	0.50	0.57	0.65	2.20
	Bc	1190	13	1%	<0.04	0.40	0.50	0.60	1.60
	Bf	1190	20	2%	<0.04	0.50	0.60	0.70	1.80

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Hf ICP-MS mg/kg 0.04	Tc	1190	0	0%	0.05	5.52	7.78	10.00	46.60
	Tf	1187	0	0%	0.06	11.73	17.89	27.92	433.5
	Bc	1190	0	0%	0.30	5.22	7.32	9.50	46.73
	Bf	1190	0	0%	0.27	10.05	15.19	24.05	757.0
Ho ICP-MS mg/kg 0.02	Tc	1190	7	1%	<0.02	0.36	0.66	0.92	2.18
	Tf	1187	2	0%	<0.02	0.94	1.12	1.36	18.83
	Bc	1190	6	1%	<0.02	0.37	0.66	0.90	2.03
	Bf	1190	0	0%	0.025	0.93	1.10	1.37	10.42
K XRF mg/kg 42	Tc	1190	2	0%	<42	5506	9879	14699	36499
	Tf	1187	0	0%	58	9090	13124	16499	41621
	Bc	1190	2	0%	<42	5670	10049	14407	34341
	Bf	1190	0	0%	100	9083	13004	16436	43912
La ICP-MS mg/kg 0.1	Tc	1190	0	0%	0.43	12.1	20.9	28.2	123
	Tf	1187	0	0%	0.54	25.5	31.9	41.8	1462
	Bc	1190	0	0%	0.7	12.8	21.1	28.6	88.5
	Bf	1190	0	0%	0.57	26.0	32.5	43.1	692
LOI Calc mg/kg N/A	Tc	1190	N/A	N/A	0	25387	54942	90795	460484
	Tf	1187	N/A	N/A	6429	59045	85536	117095	547172
	Bc	1190	N/A	N/A	0	28465	53112	86651	495322
	Bf	1190	N/A	N/A	404	61465	87438	125591	547363
Lu ICP-MS mg/kg 0.02	Tc	1190	32	3%	<0.02	0.15	0.29	0.39	1.07
	Tf	1187	5	0%	<0.02	0.43	0.54	0.68	7.73
	Bc	1190	34	3%	<0.02	0.16	0.28	0.38	0.97
	Bf	1190	2	0%	<0.02	0.41	0.51	0.66	8.75
Mg XRF mg/kg 60	Tc	1190	36	3%	<60	1037	2988	5435	54053
	Tf	1187	5	0%	<60	2518	4191	6919	74344
	Bc	1190	28	2%	<60	1580	3672	6440	74609
	Bf	1190	7	1%	<60	3150	5267	8997	88430
Mn XRF mg/kg 39	Tc	1190	62	5%	<39	132	333	565	5096
	Tf	1187	27	2%	<39	310	465	682	2595
	Bc	1190	90	8%	<39	124	294	519	3423
	Bf	1190	39	3%	<39	263	457	682	4252
Mo ICP-MS mg/kg 0.3	Tc	1190	211	18%	<0.3	0.3	0.5	0.8	18.7
	Tf	1187	164	14%	<0.3	0.4	0.6	1.0	21.4
	Bc	1190	119	10%	<0.3	0.4	0.6	0.9	26.9
	Bf	1190	77	6%	<0.3	0.5	0.8	1.3	18.5
Na XRF mg/kg 74	Tc	1190	31	3%	<74	833	2255	5132	42941
	Tf	1187	3	0%	<74	1554	3405	6043	32629
	Bc	1190	24	2%	<74	1187	3024	5861	28200
	Bf	1190	3	0%	<74	1926	4103	7137	35685
Nb ICP-MS mg/kg 0.03	Tc	1190	2	0%	<0.03	5.20	8.50	11.4	64.2
	Tf	1187	1	0%	<0.03	11.9	14.2	17.5	110
	Bc	1190	1	0%	<0.03	5.23	8.00	11.3	62.2
	Bf	1190	1	0%	<0.03	11.5	13.8	17.1	161
Nd ICP-MS mg/kg 0.1	Tc	1190	4	0%	<0.1	9.7	18.1	24.9	102
	Tf	1187	0	0%	0.98	22.7	28.1	35.5	1110
	Bc	1190	2	0%	<0.1	10.4	18.3	25.1	73.3
	Bf	1190	0	0%	0.72	22.8	28.6	36.5	587

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Ni ICP-MS mg/kg 0.5	Tc	1190	4	0%	<0.5	9.5	15.3	22.3	227
	Tf	1187	4	0%	<0.5	14.5	20.0	28.7	424
	Bc	1190	4	0%	<0.5	11.3	17.0	23.9	605
	Bf	1190	4	0%	<0.5	16.9	22.9	32.4	748
P XRF mg/kg 22	Tc	1190	0	0%	52	161	266	410	2444
	Tf	1187	0	0%	57	275	380	519	2579
	Bc	1190	0	0%	48	140	209	323	1859
	Bf	1190	0	0%	57	218	305	423	1772
Pb ICP-MS mg/kg 0.1	Tc	1190	0	0%	0.5	8.4	12.9	17.4	1530
	Tf	1187	0	0%	0.7	13.5	17.0	21.2	1444
	Bc	1190	0	0%	0.5	8.9	13.1	16.9	153
	Bf	1190	0	0%	0.3	13.9	16.9	21.3	248
Pd FA mg/kg 0.001	Tc	1186	819	69%	<0.001	<0.001	<0.001	0.001	0.013
	Tf	1137	547	48%	<0.001	<0.001	0.001	0.001	0.018
	Bc	1189	715	60%	<0.001	<0.001	<0.001	0.001	0.015
	Bf	1124	389	35%	<0.001	<0.001	0.001	0.001	0.015
Pr ICP-MS mg/kg 0.02	Tc	1190	0	0%	0.10	2.63	4.71	6.37	28.0
	Tf	1187	0	0%	0.11	5.83	7.27	9.28	302
	Bc	1190	0	0%	0.19	2.77	4.77	6.44	20.0
	Bf	1190	0	0%	0.14	5.89	7.32	9.58	161
Pt FA mg/kg 0.0005	Tc	1186	802	68%	<0.0005	<0.0005	<0.0005	0.0005	0.0075
	Tf	1137	543	48%	<0.0005	<0.0005	0.0005	0.0007	0.0076
	Bc	1189	720	61%	<0.0005	<0.0005	<0.0005	0.0006	0.0120
	Bf	1124	418	37%	<0.0005	<0.0005	0.0005	0.0008	0.0103
Rb ICP-MS mg/kg 0.2	Tc	1190	3	0%	<0.2	30.3	51.2	77.7	269
	Tf	1187	1	0%	<0.2	49.7	69.4	93.3	267
	Bc	1190	4	0%	<0.2	33.2	52.5	80.9	249
	Bf	1190	1	0%	<0.2	51.7	72.0	98.1	299
S XRF mg/kg 10	Tc	1190	0	0%	19	91	150	263	151475
	Tf	1186	0	0%	40	126	199	365	140452
	Bc	1190	1	0%	<10	74	134	282	129638
	Bf	1189	0	0%	27	112	185	425	141889
Sb ICP-MS mg/kg 0.4	Tc	1190	848	71%	<0.4	<0.4	<0.4	0.9	14.5
	Tf	1187	720	61%	<0.4	<0.4	<0.4	1.0	28.9
	Bc	1190	856	72%	<0.4	<0.4	<0.4	0.9	21.4
	Bf	1190	717	60%	<0.4	<0.4	<0.4	1.0	27.6
Sc ICP-MS mg/kg 0.3	Tc	1190	5	0%	<0.3	4.4	7.6	10.6	30.6
	Tf	1187	1	0%	<0.3	10.4	12.5	14.8	94.6
	Bc	1190	2	0%	<0.3	5.0	7.9	10.7	33.6
	Bf	1190	1	0%	<0.3	11.0	13.0	15.3	180
Si XRF mg/kg 47	Tc	1190	0	0%	3506	323391	362299	408829	462661
	Tf	1187	0	0%	4552	289566	324876	353986	453556
	Bc	1190	0	0%	8296	321725	357612	394216	461413
	Bf	1190	0	0%	6464	268328	312539	344691	453228
Sm ICP-MS mg/kg 0.04	Tc	1190	53	4%	<0.04	1.90	3.75	5.30	19.6
	Tf	1187	4	0%	<0.04	4.87	6.09	7.58	206
	Bc	1190	41	3%	<0.04	2.09	3.83	5.38	13.9
	Bf	1190	5	0%	<0.04	4.91	6.15	7.74	113
Sn ICP-MS mg/kg 0.2	Tc	1190	43	4%	<0.2	0.7	1.3	1.9	406
	Tf	1187	9	1%	<0.2	1.6	2.0	2.6	533
	Bc	1190	27	2%	<0.2	0.9	1.3	1.9	85.0

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	Bf	1190	8	1%	<0.2	1.6	2.1	2.8	181
Sr ICP-MS mg/kg 0.2	Tc	1190	0	0%	1.1	38.7	68.4	114	6459
	Tf	1187	0	0%	2.5	60.5	91.4	141	15840
	Bc	1190	1	0%	<0.2	42.7	76.2	134	5444
	Bf	1190	0	0%	1.9	64.4	102	169	5803
Ta ICP-MS mg/kg 0.02	Tc	1190	12	1%	<0.02	0.40	0.67	0.95	3.4
	Tf	1187	5	0%	<0.02	0.88	1.15	1.51	9.36
	Bc	1190	13	1%	<0.02	0.40	0.64	0.95	3.42
	Bf	1190	4	0%	<0.02	0.85	1.10	1.45	11.6
Tb ICP-MS mg/kg 0.02	Tc	1190	29	2%	<0.02	0.28	0.55	0.79	1.78
	Tf	1187	1	0%	<0.02	0.76	0.94	1.13	21.0
	Bc	1190	19	2%	<0.02	0.29	0.56	0.77	2.11
	Bf	1190	2	0%	<0.02	0.75	0.92	1.16	7.81
Th ICP-MS mg/kg 0.02	Tc	1190	0	0%	0.18	5.47	7.89	11.2	84.2
	Tf	1187	0	0%	0.21	10.3	13.6	19.3	463
	Bc	1190	0	0%	0.13	5.75	8.08	11.5	59.1
	Bf	1190	0	0%	0.20	10.1	13.6	18.9	490
Ti XRF mg/kg 30	Tc	1190	0	0%	108	2035	3497	4782	30690
	Tf	1187	0	0%	108	4845	5651	6670	42406
	Bc	1190	0	0%	90	2110	3410	4704	30175
	Bf	1190	0	0%	78	4782	5526	6486	75458
U ICP-MS mg/kg 0.02	Tc	1190	0	0%	0.12	1.15	1.75	2.51	37.4
	Tf	1187	0	0%	0.18	2.38	3.15	4.71	79.3
	Bc	1190	0	0%	0.20	1.23	1.83	2.58	18.6
	Bf	1190	0	0%	0.17	2.34	3.17	4.83	42.3
V ICP-MS mg/kg 0.1	Tc	1190	1	0%	<0.1	31.4	55.2	83.0	586
	Tf	1187	0	0%	0.9	61.8	81.7	102	287
	Bc	1190	1	0%	<0.1	37.1	61.5	87.8	529
	Bf	1190	1	0%	<0.1	70.2	90.8	112	511
W ICP-MS mg/kg 0.1	Tc	1190	53	4%	<0.1	0.6	1.0	1.5	327
	Tf	1187	10	1%	<0.1	1.3	1.6	2.1	643
	Bc	1190	56	5%	<0.1	0.6	1.0	1.5	33.7
	Bf	1190	10	1%	<0.1	1.3	1.7	2.2	103
Y ICP-MS mg/kg 0.05	Tc	1190	0	0%	0.70	12.2	21.1	29.0	66.7
	Tf	1187	0	0%	0.70	29.6	35.4	42.8	584
	Bc	1190	0	0%	1.30	12.4	20.8	28.4	64.9
	Bf	1190	0	0%	1.50	28.9	34.2	42.7	349
Yb ICP-MS mg/kg 0.04	Tc	1190	1	0%	<0.04	1.26	2.11	2.78	7.23
	Tf	1187	0	0%	0.04	3.09	3.70	4.55	50.7
	Bc	1190	0	0%	0.05	1.26	2.06	2.75	6.42
	Bf	1190	0	0%	0.07	2.96	3.56	4.46	49.3
Zn ICP-MS mg/kg 0.9	Tc	1190	24	2%	<0.9	13.4	31.4	52.4	210
	Tf	1187	5	0%	<0.9	31.9	49.2	67.3	289
	Bc	1190	29	2%	<0.9	14.8	30.9	50.3	216
	Bf	1190	6	1%	<0.9	31.6	49.3	67.2	191
Zr ICP-MS mg/kg 0.2	Tc	1190	0	0%	4.1	214	304	393	1778
	Tf	1187	0	0%	4.5	458	710	1115	17288
	Bc	1190	0	0%	19.7	200	283	372	1889

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	Bf	1190	0	0%	17.8	386	595	950	31518
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*Method: Calc: Calculated (and verified by Gravimetry); FA: Fire Assay; ICP-MS: Inductively Coupled Plasma-Mass Spectrometry; ISE: Ion Selective Electrode; XRF: X-Ray Fluorescence (see Methods for more details)

^LLD: Lower Limit of Detection

#Type: Bc: Bottom Outlet Sediment coarse (< 2 mm); Bf: Bottom Outlet Sediment fine (< 75 µm); Tc: Top Outlet Sediment coarse (< 2 mm); Tf: Top Outlet Sediment fine (< 75 µm)