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The gold content of gravel at the King River damsite

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Abstract

Sampling of gravel from several parts of the King River damsite indicates some anomalous gold (up to 0.017 g/t). The highest values occur near the junction with the Linda Creek, and this gold is probably sourced in the Mt Lyell area of mineralisation. Carbonaceous or wood-bearing gravels from near the Governor River junction are also enriched in gold. The bulk of the gravels are uneconomic to work for gold, but gravel mining operations in some of the areas should consider the economics of gold recovery as a by-product from particular parts of the deposits.

INTRODUCTION

The gravels at the King River damsite were sampled to determine the content of gold and other valuable minerals. The gravels are presently being processed for dam-fill and other purposes, and it was thought that it may be economic to recover gold as a by-product.

SAMPLING

Twenty samples of gravel were collected from several parts of the King River damsite, particularly from the Regency area (near the Governor River junction), the Linda Creek junction, and north of the Lyell Highway. Sample locations are given in Table 1, and sample descriptions in Appendix 1. Most samples were in the range of 15–20 kg mass. Only sample KG11 appeared to be from a basal gravel, most samples being essentially random gravel samples.

RESULTS

The twenty gravel samples collected were sized (see Appendix 2) and jig concentrated (see Table 2). Visible gold was detected in three samples and is described in Appendix 3. Nineteen grains, up to 280 μm in size, were seen and were predominantly flakey or elongate-rounded. The concentrates were examined under transmitted and reflected light, and are described in Appendix 4. The concentrates were dominated by quartz and lithic particles, and some have substantial amounts of pyroxene, ilmenite, hematite, garnet, limonite, magnetite, chromite, leucoxene, rutile, zircon or pyrite. Other sulphides detected include sphalerite, chalcopyrite, covellite, galena, and pyrrhotite. Scheelite was identified by UV fluorescence in samples C102046 and C102055–60.

The concentrates were assayed for gold by fire assay. The results are shown in Table 3, and range between 0.3 and 16.6 ppb Au. These results are suprisingly low, considering the abundance of gold in the Earth's crust averages 5 ppb (anon., *in* Berkmann and Ryall, 1982) and the frequency distribution indicates >1 ppb Au is anomalous in these samples (fig. 1).

DISCUSSION

Although the results are disappointing, it is notable that gold is present in anomalous amounts in some of the gravels. The samples near the Linda Creek junction are all anomalous, reflecting the drainage from the gold-rich ore bodies of Mt Lyell. The values of 8 and 4.5 ppb Au in the Regency area reflect the concentration of gold in carbonaceous horizons. These horizons are considerably deeper than most of the gravels.

Of the sulphides identified in some samples, pyrite, chalcopyrite and covellite may derive from the Mt Lyell ore bodies. Pyrrhotite, galena and sphalerite are rare in these deposits, and their presence in the concentrates must be viewed with suspicion. The scheelite has no obvious source and is somewhat tantalising but may also represent contamination.

SUMMARY

The gravels, as sampled, cannot be considered to represent a gold resource, although they are weakly anomalous in parts. It is possible that a more detailed study of some areas, such as the carbonaceous horizons and Linda Creek gravels or basal gravels ('deep leads') in the King River sediments, could delineate economic deposits. It would be difficult at present, however, to justify the churn drilling or excavation necessary.

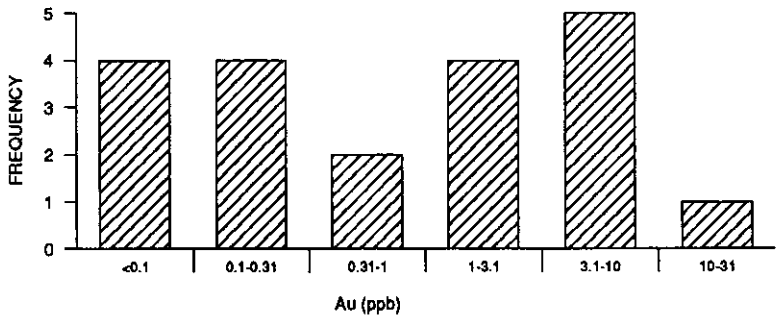

Figure 1. *Frequency distribution of gold analyses.*

If gravels from the above-mentioned areas were processed, it may be worth random testing for gold, as it may still prove a viable by-product in places.

REFERENCE

BERKMAN, D. A.; RYALL, W. R. 1982. Field geologists manual. *Monogr. Ser. Aust. Inst. Min. Metall.* 9.

[30 June 1989]

Table 1. *Sample locations*

Registered sample no.	Field no.	AMG co-ordinates Easting	Northing	Location
C102041	KG1	387 692	5 330 835	Regency (Governor River) area
C102042	KG2	387 718	5 330 850	Regency (Governor River) area
C102043	KG3	387 756	5 330 855	Regency (Governor River) area
C102044	KG4	387 793	5 330 834	Regency (Governor River) area
C102045	KG5	387 710	5 330 980	Regency (Governor River) area
C102046	KG6	387 652	5 331 140	Regency (Governor River) area
C102047	KG7	387 678	5 331 133	Regency (Governor River) area
C102048	KG8	387 727	5 331 254	Regency (Governor River) area
C102049	KG9	387 948	5 331 300	Regency (Governor River) area
C102050	KG10	387 924	5 331 275	Regency (Governor River) area
C102051	KG11	387 350	5 340 655	Linda Creek junction
C102052	KG12	387 350	5 340 660	Linda Creek junction
C102053	KG13	387 405	5 340 605	Linda Creek junction
C102054	KG14	388 210	5 342 165	North of Lyell Highway
C102055	KG15	388 180	5 342 175	North of Lyell Highway
C102056	KG16	388 465	5 342 380	North of Lyell Highway
C102057	KG17	386 600	5 341 200	Linda treatment plant
C102058	KG18	386 600	5 341 200	Linda treatment plant
C102059	KG19	388 870	5 342 760	North of Lyell Highway
C102060	KG20	388 920	5 343 380	North of Lyell Highway

Table 2. *Results of heavy mineral separation, King River damsite*

Lab. No.	Reg. No.	Mass (kg)	% Mass +1.24 mm JC	-1.24 mm +472 µm JC		-472 µm TC	
874319	C102041	19.582*	0.010	0.071	occasional varied sulphides	0.090	various sulphides, spinel
875320	C102042	18.118	0.162	0.084	spinel	0.097	various sulphides, spinel
875321	C102043	18.683	0.043	0.026		0.094	pyrite
875322	C102044	16.655	0.040	0.028		0.050	pyrite, zircon
875323	C102045	16.442	0.075	0.030		0.078	galena
875324	C102046	5.237	0.006	0.038	scheelite	0.243	gold, zircon, ilmenite
875325	C102047	17.896	0.022	0.015	spinel	0.048	various sulphides
875326	C102048	16.877	0.066	0.012	gun metal pyrite	0.108	sulphides
875327	C102049	13.97	0.038	0.157		0.102	few sulphides
875328	C102050	16.143	0.064	0.051		0.100	few varied sulphides
875329	C102051	15.32	0.063	0.086		0.337	rutile?, zircon, gold
875330	C102052	16.302	0.131	0.060	sulphides, pyrite	0.201	zircon, pyrite
875331	C102053	10.199	0.195	0.034		0.304	zircon, gold
875332	C102054	13.681	0.092	0.040		0.092	zircon
875333	C102055	14.419	0.058	0.055		0.067	scheelite, zircon
875334	C102056	13.769	0.121	0.150		0.100	scheelite, zircon, galena
875335	C102057	14.238	0.117	0.218	scheelite, cassiterite?	0.111	scheelite, zircon
875336	C102058	18.134	0.068	0.085		0.100	scheelite, zircon
875337	C102059	19.033	0.054	0.045		0.055	scheelite, zircon
875338	C102060	18.205	0.034	0.044		0.069	scheelite, zircon

* Note sample 875319 was screened on a 2.41 mm screen prior to jigging. Jigging was then carried out on +2.41 mm and -2.41 mm +472 µm size fractions. The remaining samples were screened on a 1.24 mm screen.

Table 3. *Assay results*

Reg. No.	Lab. No.	Field No.	Au Assay (g/t)
C102041	875319	KG 1	0.0003
C102042	875320	KG 2	0.0020
C102043	875321	KG 3	0.0014
C102044	875322	KG 4	0.0032
C102045	875323	KG 5	0.0013
C102046	875324	KG 6	0.0080
C102047	875325	KG 7	0.0016
C102048	875326	KG 8	0.0002
C102049	875327	KG 9	0.0045
C102050	875328	KG10	0.0007
C102051	875329	KG11	0.0166
C102052	875330	KG12	0.0072
C102053	875331	KG13	0.0085
C102054	875332	KG14	0.0001
C102055	875333	KG15	<0.0001
C102056	875334	KG16	<0.0001
C102057	875335	KG17	<0.0001
C102058	875336	KG18	0.0008
C102059	875337	KG19	0.0002
C102060	875338	KG20	<0.0001

APPENDIX 1

Sample descriptions

REGENCY AREA

KG 1—more sandy layer in gravels, ≈1.5 m above floor. Large clasts removed.

KG 2—prominent sandy layer at top of gravel bed with strong imbrication. Sandy layer ≈100-200 mm thick, 2 m above floor, possibly 2 m below peat.

KG 3—at corner of embayment in big face; coarse sand mixed with fine gravel just below a prominent sandy bed 400 mm thick near top of face, ≈2.5 m above floor.

KG 4—bottom of channel-fill of upper sandy alluvium cut in gravels. Bedding follows form of channel side. Channel is ≈1.5 m deep. Lots of pieces of rotten yellow wood in sand.

KG 5—pebbly gravel in coarse sand matrix, just north of conveyor cut.

KG 6—cut at 'Scientific Site', near river end, in oldest gravel unit with carbon-wood fragments and rotted dolerite, and carbon 'dykes'.

KG 7—also in 'Scientific Site' cut, just above basal grey gravel, in coarse bouldery unit up to 400 mm above top at grey unit and about one metre below prominent sandy horizon.

KG 8—cobble gravel, brown, above boulder level, close to river.

KG 9—dark pebbly stuff just above boulders.

KG 10—similar, further on.

LINDA CREEK MOUTH AREA.

KG 11—pebbly gravel on top of grey clay unit with charcoal fragments, south bank of Linda Creek ≈50 m from junction with King River.

KG 12—sand from creek bed at this point.

KG 13—brown reworked gravel from King River bank ≈80 m downstream of junction with Linda Creek. Pieces of coarse unit.

KG 14—upstream of Lyell Highway bridge, end of first side road. Recent sand lens on river bed.

KG 15—same locality, 60 m to south, on current-eroded crescent groove in gravel.

KG 16—next side road north.

KG 17—Linda treatment plant—pile on north side of separation plant.

KG 18—Linda treatment plant—pile on north-east side.

KG 19—further up King River—reworked gravel with sandy patches at end of side road.

KG 20—further up King River, inside big loop, above Comstock Creek.

APPENDIX 2

Sizings analyses of gravel samples

875319 KG-1

Sieve size	*Mass (%)*	*Mass cum. (%)*
+19.05 mm	14.36	14.36
+9.53 mm	25.28	39.64
+4.75 mm	9.96	49.60
+2.36 mm	2.63	52.23
+1.18 mm	2.17	54.40
+600 µm	4.64	59.04
+300 µm	24.93	83.97
+150 µm	10.48	94.45
+75 µm	2.32	96.77
+38 µm	1.22	97.99
-38 µm	2.01	100.00

875320 KG-2

+38.1 mm	0.43	0.43
+19.05 mm	9.71	10.14
+9.53 mm	15.84	25.98
+4.75 mm	8.28	34.26
+2.36 mm	6.36	40.62
+1.18 mm	6.76	47.38
+600 µm	17.78	65.16
+300 µm	29.58	94.75
+150 µm	2.98	97.73
+75 µm	0.77	98.49
+38 µm	0.61	99.11
-38 µm	0.89	100.00

875321 KG-3

+19.05 mm	8.87	8.87
+9.53 mm	27.12	35.99
+4.75 mm	18.71	54.70
+2.36 mm	10.68	65.39
+1.18 mm	13.73	79.12
+600 µm	12.61	91.73
+300 µm	5.23	96.97
+150 µm	1.14	98.11
+75 µm	0.87	98.97
+38 µm	0.61	99.58
-38 µm	0.42	100.00

875322 KG-4

+38.1 mm	0.67	0.67
+19.05 mm	3.27	3.94
+9.53 mm	10.27	14.21
+4.75 mm	14.47	28.68
+2.36 mm	10.09	38.77
+1.18 mm	17.99	56.76
+600 µm	26.82	83.58
+300 µm	10.42	94.00
+150 µm	2.81	96.81
+75 µm	1.57	98.38
+38 µm	0.76	99.14
-38 µm	0.86	100.00

875323 KG-5

Sieve size	*Mass (%)*	*Mass cum. (%)*
+19.05 mm	9.37	9.37
+9.53 mm	28.10	37.48
+4.75 mm	16.91	54.39
+2.36 mm	8.81	63.19
+1.18 mm	11.40	74.59
+600 µm	14.77	89.36
+300 µm	8.77	98.13
+150 µm	1.23	99.36
+75 µm	0.28	99.65
+38 µm	0.15	99.80
-38 µm	0.20	100.00

875324 KG-6

+19.05 mm	12.95	12.95
+9.53 mm	14.32	27.27
+4.75 mm	6.89	34.16
+2.36 mm	7.69	41.85
+1.18 mm	6.53	48.38
+600 µm	6.62	55.01
+300 µm	6.96	61.97
+150 µm	6.84	68.81
+75 µm	5.77	74.58
+38 µm	4.28	78.86
-38 µm	21.14	100.00

875325 KG-7

+19.05 mm	11.62	11.62
+9.53 mm	20.83	32.45
+4.75 mm	17.56	50.02
+2.36 mm	14.11	64.13
+1.18 mm	13.00	77.13
+600 µm	9.34	86.47
+300 µm	5.58	92.05
+150 µm	2.95	95.00
+75 µm	1.93	96.93
+38 µm	1.09	98.02
-38 µm	1.98	100.00

875326 KG-8

+19.05 mm	3.60	3.60
+9.53 mm	11.62	15.22
+4.75 mm	15.10	30.31
+2.36 mm	24.01	54.32
+1.18 mm	26.62	80.95
+600 µm	8.15	89.09
+300 µm	4.02	93.12
+150 µm	2.58	95.70
+75 µm	1.56	97.26
+38 µm	0.97	98.23
-38 µm	1.77	100.00

875327 KG-9

Sieve size	*Mass (%)*	*Mass cum. (%)*
+19.05 mm	2.06	2.06
+9.53 mm	16.82	18.88
+4.75 mm	14.62	33.50
+2.36 mm	8.96	42.46
+1.18 mm	9.08	51.54
+600 µm	18.91	70.46
+300 µm	20.85	91.31
+150 µm	4.04	95.35
+75 µm	2.03	97.38
+38 µm	1.24	98.62
-38 µm	1.38	100.00

875328 KG-10

+19.05 mm	4.76	4.76
+9.53 mm	26.90	31.65
+4.75 mm	16.38	48.04
+2.36 mm	7.79	55.83
+1.18 mm	7.69	63.52
+600 µm	13.26	76.77
+300 µm	17.82	94.59
+150 µm	2.32	96.92
+75 µm	1.24	98.16
+38 µm	0.82	98.98
-38 µm	1.02	100.00

875329 KG-11

+19.05 mm	6.66	6.66
+9.53 mm	21.80	28.46
+4.75 mm	18.42	46.88
+2.36 mm	9.78	56.66
+1.18 mm	8.60	65.27
+600 µm	6.11	71.38
+300 µm	11.43	82.81
+150 µm	10.76	93.57
+75 µm	3.60	97.17
+38 µm	1.26	98.43
-38 µm	1.57	100.00

875330 KG-12

+38.1 mm	1.36	1.36
+19.05 mm	1.83	3.19
+9.53 mm	5.59	8.78
+4.75 mm	15.15	23.94
+2.36 mm	22.86	46.79
+1.18 mm	28.38	75.17
+600 µm	18.29	93.46
+300 µm	5.54	99.00
+150 µm	0.71	99.71
+75 µm	0.13	99.84
+38 µm	0.04	99.89
-38 µm	0.11	100.00

875331 KG-13

+19.05 mm	2.83	2.83
+9.53 mm	29.89	32.72
+4.75 mm	20.71	53.43
+2.36 mm	15.61	69.04
+1.18 mm	11.04	80.07
+600 µm	7.01	87.09
+300 µm	5.17	92.25
+150 µm	4.15	96.40
+75 µm	1.86	98.26
+38 µm	0.68	98.94
-38 µm	1.06	100.00

875332 KG-14

Sieve size	*Mass (%)*	*Mass cum. (%)*
+19.05 mm	2.35	2.35
+9.53 mm	10.36	12.71
+4.75 mm	16.10	28.81
+2.36 mm	23.12	51.92
+1.18 mm	30.44	82.36
+600 µm	11.26	93.63
+300 µm	2.41	96.03
+150 µm	2.20	98.23
+75 µm	0.92	99.16
+38 µm	0.38	99.54
-38 µm	0.46	100.00

875333 KG-15

+19.05 mm	2.64	2.64
+9.53 mm	14.96	17.59
+4.75 mm	15.81	33.41
+2.36 mm	15.91	49.31
+1.18 mm	21.00	70.31
+600 µm	17.52	87.83
+300 µm	10.04	97.88
+150 µm	1.64	99.51
+75 µm	0.26	99.78
+38 µm	0.10	99.88
-38 µm	0.12	100.00

875334 KG-16

+19.05 mm	5.05	5.05
+9.53 mm	17.71	22.76
+4.75 mm	11.77	34.53
+2.36 mm	7.59	42.12
+1.18 mm	11.47	53.60
+600 µm	15.46	69.06
+300 µm	16.27	85.32
+150 µm	7.31	92.64
+75 µm	3.18	95.81
+38 µm	1.59	97.40
-38 µm	2.60	100.00

875335 KG-17

+9.53 mm	1.69	1.69
+4.75 mm	13.32	15.02
+2.36 mm	11.20	26.22
+1.18 mm	15.19	41.41
+600 µm	21.89	63.30
+300 µm	23.53	86.83
+150 µm	7.36	94.19
+75 µm	2.65	96.84
+38 µm	1.29	98.13
-38 µm	1.87	100.00

875336 KG-18

+9.53 mm	5.12	5.12
+4.75 mm	26.95	32.07
+2.36 mm	17.78	49.86
+1.18 mm	19.18	69.04
+600 µm	14.34	83.38
+300 µm	10.18	93.56
+150 µm	3.64	97.20
+75 µm	1.28	98.48
+38 µm	0.61	99.09
-38 µm	0.91	100.00

875337 KG-19

Sieve size	*Mass (%)*	*Mass cum. (%)*
+19.05 mm	8.33	8.33
+9.53 mm	17.64	25.97
+4.75 mm	18.97	44.94
+2.36 mm	12.28	57.22
+1.18 mm	12.03	69.25
+600 µm	9.31	78.57
+300 µm	9.58	88.15
+150 µm	7.87	96.02
+75 µm	2.23	98.25
+38 µm	0.81	99.06
-38 µm	0.94	100.00

875338 KG-20

Sieve size	*Mass (%)*	*Mass cum. (%)*
+19.05 mm	4.04	4.04
+9.53 mm	9.02	13.06
+4.75 mm	19.44	32.50
+2.36 mm	17.13	49.63
+1.18 mm	24.39	74.02
+600 µm	14.61	88.63
+300 µm	9.34	97.97
+150 µm	1.60	99.57
+75 µm	0.23	99.80
+38 µm	0.08	99.88
-38 µm	0.12	100.00

The second decimal place in these results is not significant but has been included in the computer print-out to reduce errors due to rounding off.

APPENDIX 3

Description of gold grains in concentrates

Sample No.	*Description*
C102046	One flake, about 80 µm diameter
C102051	One rounded grain, 280 µm diameter One rounded elongate 'teardrop' about 200×80 µm One rounded equant grain, about 60 µm diameter One irregular flake, about 140 µm diameter
C102053	One rounded, elongate iron-stained grain, 250×80 µm Six irregular grains, about 40 µm diameter One flake, about 80 µm diameter Three flakes, 50–60 µm diameter Three rounded elongate grains, 40–60 µm long

In total nineteen grains were seen. All were quite yellow, indicating a low silver content.

APPENDIX 4

Mineralogy of heavy mineral concentrates

Location Sample No. Lab. No.	King River damsite C102041 875319	King River damsite C102042 875320	King River damsite C102043 875321	King River damsite C102044 875322	King River damsite C102045 875323
Pyrite	T	T	T	T	
Rutile	T	T	T	T	T
Leucoxene	T	T	T	T	T
Ilmenite	A	A	A	A	T
Hematite	A	A	T		T
Magnetite		T		A	T
Chromite		T	T	T	T
Zircon	T	T		A	T
Tourmaline	T	A		T	T
Pyroxene	M	M	M	M	M
Garnet	T	T			
Limonite		T	A	T	
Monazite	T		T		
Other (tr)		Sph, Bt		Gn	CO_3
Quartz	A	M	M	M	M
Lithics	A	M	M	M	M

Location Sample No. Lab. No.	King River damsite C102046 875324	King River damsite C102047 875325	King River damsite C102048 875326	King River damsite C102049 875327	King River damsite C102050 875328
Pyrite	A	T	T		
Rutile	A	A	T	T	A
Leucoxene	A	T	A	T	
Ilmenite	M	A	T	A	A
Hematite		T	A		T
Magnetite	T	T	T		T
Chromite	T	T	A	T	T
Zircon	A	A	A	A	T
Tourmaline	A	T	A	T	
Pyroxene	T	M	A	M	M
Garnet	A	T	A		T
Limonite		T	T		
Monazite	T	T			
Chlorite		T	T		
Sphalerite		T	T		
Other (tr)	Srp		Bt, Gn, Sph, Ep		CO_3
Quartz	M	M	M	M	M
Lithics	M	M	M	M	M

Abbreviations: T=trace (<1%); A=accessory (<10%); M=major (>10%);
Sph=sphene; Bt=biotite; Gn=galena; CO_3=carbonate; Srp=serpentine;
Ep=epidote; Po=pyrrhotite; Chl=chlorite; Hbd=hornblende

Location Sample No. Lab. No.	King River damsite C102051 875329	King River damsite C102052 875330	King River damsite C102053 875331	King River damsite C102054 875332	King River damsite C102055 875333
Pyrite	T	M	T	T	T
Rutile	A	A	T	T	T
Leucoxene	A		T	T	T
Ilmenite		A	T	T	T
Hematite	M	M	M	A	T
Magnetite	T		T		T
Chromite	A	A	A	A	
Zircon	M	T	A	T	T
Tourmaline	A		A	T	
Pyroxene	A	A	A	M	M
Garnet				T	
Limonite	A	A			T
Monazite		T	T		
Sphene			T	T	
Chalcopyrite	T	T			T
Quartz	M	M	M	M	M
Lithics	M	M	M	M	M

Location Sample No. Lab. No.	King River damsite C102056 875334	King River damsite C102057 875335	King River damsite C102058 875336	King River damsite C102059 875337	King River damsite C102060 875338
Pyrite			T	T	T
Rutile	A	A	A	T	T
Leucoxene	A	A	T	T	T
Ilmenite	A	T	A	A	T
Hematite	A	T	M	A	A
Magnetite	A	T	T	T	T
Chromite	A	T	T	T	T
Zircon	A	A	A	A	A
Tourmaline	T	T	T	T	T
Pyroxene	M	M	M	M	M
Garnet			T		
Limonite		T	T	T	T
Monazite	T				
Other (tr)		Cv		Po, Chl	Hbd
Quartz	M	M	M	M	M
Lithics	A	M	M	M	M

Abbreviations: T=trace (<1%); A=accessory (<10%); M=major (>10%);
Sph=sphene; Bt=biotite; Gn=galena; CO_3=carbonate; Srp=serpentine;
Ep=epidote; Po=pyrrhotite; Chl=chlorite; Hbd=hornblende