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Division of Mines and Mineral Resources — Report 1990/16

Jane River Goldfield — Rock analyses and preliminary account of investigation

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Summary

The distribution of detrital gold in small creeks in the Jane River district suggests that bedrock mineralisation occupies a belt which is some 12 km long. Gold mineralisation is probably sporadically developed within the belt. Mercury is locally associated with the gold.

Strongly anomalous values of gold (0.02–0.19ppm) are widespread in a variety of rock types in the area around Reward Creek.

Free gold occurs in Scotchfire Metamorphics on the southwest side of Reward Creek along with other minerals (e.g. chromite, pyrite) which occur in the Reward Creek gravels.

Free gold occurs in quartz veins in the upper part of Reward Creek and in gossanous ironstone near DP182057.

INTRODUCTION

A short programme of geological mapping and sampling was carried out in the Jane River district by the Division of Mines and Mineral Resources during 1989. The aim of the programme was to determine if the alluvial gold in the district is related to bedrock mineralisation.

Work was carried out in an area from Warnes Lookout to Algonkian Creek and extending about 2 km to the north. This area included CML 21M/74 which has since been revoked. The principal alluvial deposit of the Jane River Goldfield is within the area, at Reward Creek.

SETTING

The area of interest occupies the southeastern corner of a region mapped by Wells (1955) for the Hydro-Electric Commission. Two of Wells' extensive geological units are present, namely the Jane Dolomite and the Scotchfire Metamorphics. The latter unit is of lower greenschist facies, and in the area of interest it consists of greenish, schistose, metamorphosed, fine-grained sandstone or siltstone and dark grey mudstone. Minor chert and micaceous quartzite occur in the northern part of the area of interest.

A Precambrian age is assigned to both the Jane Dolomite and the Scotchfire Metamorphics, and Wells (1955) regarded the units as conformable. Other Precambrian rocks of higher metamorphic grade occur on Algonkian Mountain, whilst a small unit of fossiliferous sandstone and conglomerate similar to the Owen Conglomerate of Cambro-Ordovician age occurs on Warnes Lookout.

Alluvial deposits of Quaternary age occupy tracts in some stream valleys and have been worked for detrital gold, notably in Reward Creek and Ridge Creek. No Tertiary deposits have been recognised in the area.

Blake (1936) described the gold-bearing gravels in Reward Creek and established the presence of sub-economic deposits of fine-grained gold in almost the whole of the Algonkian Rivulet watershed, and in small creeks flowing south into the Prince Rivulet, west of Gum Ridge. The latter gold occurrences are some 10 km SSW of Reward Creek. Detrital gold also occurs in small creeks (e.g. Burrows Creek) between Ridge Creek and the Jane River. It was identified in a small creek at DP190067, two kilometres north of Reward Creek, during the survey described here.

The occurrence of detrital gold in small creeks as distinct from the major drainage channels strongly suggests that the source of gold is local, that is, within the catchment of the creek. Thus, the various occurrences in the Jane River district indicate a belt of (?sporadically) mineralised bedrock about 12 km long.

HEAVY MINERALS

The heavy minerals in the gravels in Reward Creek include gold, chromite, pyrite as pentagonal dodecahedra, rutile, zircon and other oxides, hydroxides and silicates (Bottrill 1989). Cinnabar is present in nearby Cinnabar Creek.

Deeply weathered Scotchfire Metamorphics on the southwest bank of Reward Creek were physically disaggregated and panned in the field, and a heavy mineral concentrate was obtained. The component minerals are yet to be fully identified but included are chromite, pyrite as pentagonal dodecahedra, and sporadic gold. Cinnabar has been tentatively identified.

The chromite derived from the Scotchfire Metamorphics is like the chromite in the Reward Creek gravels in that the grains have rounded euhedral forms or are sharply angular. The rounded grains are an original detrital component of the metamorphosed siltstone and the angular grains appear to have been derived from them by breakage along tectonically-induced fractures. Gold grains in the metamorphics are completely angular ('crystalline') and are therefore regarded as epigenetic, as are the pristine pyrite crystals. The forms of these minerals in the gravels are very similar, with only minor shape modifications due to transport.

Given the similarity of the heavy minerals (studied so far) in the Reward Creek gravels and in the Scotchfire Metamorphics, it is concluded that the gravels were derived

largely through weathering and erosion of the Scotchfire Metamorphics. The presence of compound gold-quartz grains in the gravels indicates that at least part of the gold was derived from quartz veins, and such veins may have been present in the Jane Dolomite as well as the Scotchfire Metamorphics. Quartz veins which carry gold are present in the upper part of Reward Creek (D. Turner and R. Wolff, pers. comm.), close to a boundary between the two rock units. The age and overall distribution of the quartz veins in the Reward Creek area is yet to be determined.

ROCK ANALYSES

Data

Samples were analysed at the Launceston Laboratories of the Division of Mines and Mineral Resources. Major and trace elements were determined by X-ray fluorescence spectroscopy. Gold was determined by fire assay and flame atomic absorption spectroscopy using 50 gram samples.

Analytical results are tabulated in Appendix 2. The rock types that were analysed are tabulated in Appendix 1. Sample localities and geology are shown in Figure 1, whilst gold assays and occurrences of free gold in rocks and detrital gold in alluvium are shown in Figure 2.

DISCUSSION

Gold assays of rocks from the area around Reward Creek commonly exceed 0.02 ppm (20 ppb) and range up to 0.19 ppm. None of the other trace metals shows a variation that is obviously correlatable with the variation in gold content. This indicates that the mineralising system carried gold as the only significant metal. However electron microprobe analyses of individual gold grains (Bottrill, 1989) show unusually high mercury contents of up to 14% and minor amounts of silver. Thus, mercury and silver were in the mineralising system but generally at levels below the threshold of the analytical technique employed in this study.

Gold values are independent of rock type, with relatively high values being returned from dolomite (e.g. 0.14 ppm), metamorphosed siltstone (e.g. 0.17 ppm), and gossanous ironstone (0.16 ppm). Compared with background values in other western Tasmanian rocks (Stolz and Large, 1988), these values are high. For example, the highest background is 0.028 ppm in high-titanium basalt whilst values of less than 0.001 ppm were obtained from Precambrian dolomite and metamorphosed sedimentary rocks on the Lyell Highway, 20 km north of Reward Creek. Thus, the rocks around Reward Creek are strongly anomalous in gold.

The mode of occurrence of the gold in the analysed samples is yet to be determined. Since there appears to be no alteration in the rocks apart from regional metamorphic effects, it is likely that the gold occurs in small veinlets in fractures. This is particularly likely given the known occurrence of gold in larger quartz veins.

CONCLUSIONS

The alluvial gold deposits in the Jane River district were derived from the underlying rocks which contain gold and minor mercury mineralisation. The mineralisation is at least partly related to quartz veins.

No bedrock mineralisation of ore grade was encountered but this study was not designed to test such a possibility. Higher analytical values of gold than those presented here were reported on the southwest side of Reward Creek, near Bibbys Hut, by D. Turner and party, prospectors for Tasmanian Restorations.

REFERENCES

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APPENDIX 1

Rock sample catalogue, Jane River rock samples

Number	Location	Rock Type
JR1	Reward Ck, C1, pit at S end	Deeply weathered metamorphics, 1 m depth
JR2 JR3 JR4 JR5	Reward Ck, C1, pit ~ 5 m N of track	Gravel: 3 m depth 2 m depth 1 m depth 4 m depth
JR6	Reward Ck, C1, N side of creek	Dolomite
JR7	Reward Ck, C1, pit on N side of creek	Gravel: 2 m depth
JR8	DP184058	Gossanous ironstone
JR9	DP184508	Gossanous ironstone
JR10	DP185058	Weathered, banded, mica phyllite
JR11	DP184509	Dark grey, mica phyllite
JR12	Reward Ck, adjacent dam lower settling pond	Green mica phyllite (?fuchsitic)
JR13	DP174046	Greenish, fine grained, mica schist
JR14	DP174047	Dolomite
JR15	DP171046	Very fine grained, mica schist
JR16	DP177072	Quartzite
JR17	DP177073	Sandstone
JR18		Not retained
JR19	DP181065	Dolomite
JR20	DP180056	Fine grained, green-grey schist
JR21	DP181048	Fine grained, green-grey schist with dark grey bands
JR22	DP180040	Fine grained, green-grey schist
JR23	DP180040	Crenulated schist
JR24	Reward Creek, Bibby's Hut	Dolomite
JR25	Reward Creek, Bibby's Hut	Dark grey phyllite (= JR38)
JR26A	DP188037	Dark grey phyllite
JR26B	DP187036	Fine grained, green-grey schist
JR27	DP186036	Quartzite or secondary quartz
JR28		Not retained
JR29	DP184033	Vuggy quartz rock — probably secondary
JR30	DP188038	Medium grey dolomite. Extensively veined.
JR31A	DP179047	Fawn siliceous rock — probably secondary
JR31B	DP177052	Dolomite
JR32	DP170051	Medium quartz sandstone with worm burrows
JR33		Not retained

Number	Location	Rock Type
JR34	DP179152	Foliated siliceous breccia (?fault)
JR35	Reward Creek, C1, P1, 1 m	Deeply weathered metamorphics. Panned (JM6)
JR36	Reward Creek, C2, P2, 2 m	Deeply weathered metamorphics. Panned (JM7, 8, 9)
JR37	Reward Creek, track near fuel dump	Deeply weathered metamorphics. Depth 1–1.5 m. Panned (JM10).
JR38	Reward Creek, Bibby's Hut	Dark grey phyllite (= JR25)
JR39	Reward Creek, Bibby's Hut	Deeply weathered dolomite. Panned (JM11)
JR40	Reward Creek, Bibby's Hut	Gossanous ironstone
JR41	Reward Creek, C2, P2, 5 m	Deeply weathered metamorphics.
JR42	C3, P3, 0–0.5 m	Deeply weathered metamorphics
JR43	C3, P3, 0.5–1.0 m	Deeply weathered metamorphics
JR44	C3, P3, 1.0–1.5 m	Deeply weathered metamorphics
JR45	C3, P3, 1.5–2.5 m	Deeply weathered metamorphics
JR46	C3, P3, 2.5–3.0 m	Deeply weathered metamorphics
JR47	C3, P3, 3.0–3.5 m	Deeply weathered metamorphics
JR48	C3, P3, 1.8 m	Deeply weathered metamorphics
JR49	Cinnabar Creek	Colloform quartz pebble, papery vein quartz
JR50	DP177048	Dark grey, medium grained schist
JR51	DP220060	Mica schist
JR52	DP208054	Schistose micaceous quartzite
JR53	DP183047	Silica flour
JR54	DP183047	Quartz vein fragments
JR55	DP192055	Greenish-grey to maroon, mica phyllite
JR56	DP189055	Strongly foliated, micaceous quartzite
JR57	DP189055	Fine grained, medium green schist
JR58	DP189056	Similar to JR55
JR59	DP187056	Medium green-grey, micaphyllite
JR60	DP190067	White, relatively massive, fine grained quartzite or chert
JR61	DP189067.5	Greenish-grey phyllite
JR62	DP186068	Schistose, white quartzite
JR63A	Reward Creek, C1, N bank	Dolomite
JR63B	Reward Creek, C1, N bank	Dolomite (?silicified)
JR64	Reward Creek, C1, track	Deeply weathered metamorphics
JR65	Reward Creek, fuel dump	Deeply weathered metamorphics
JR66	Reward Creek, 15 m SE of Bibby's	Deeply weathered metamorphics
JR67	Reward Creek, 50 m SE of Bibby's	Deeply weathered metamorphics
JR68	Reward Creek, Warnes Workings	Silicified, brecciated quartz vein

Number	Location	Rock Type
JR69	DP171051	Milky quartz, iron stained
JR70	DP171051	Flaggy quartz sandstone, iron stained
JR71	DP169051	Sandstone with gastropod moulds
JR72	DP171052.5	Hematitic quartz vein
JR73	DP174052	Leached, white quartz sandstone
JR74	DP175050	White quartz sandstone, close jointed
JR75	DP175049	Quartz breccia, no iron staining
JR76	DP173048	Milky vein quartz, iron stained
JR77	Cinnabar Creek	Pebbly, quartz conglomerate, strongly jointed
JR78	Reward Creek, C6, pits off S end	Quartz veins, depth 1.5 m, 5.7 pit
JR79	Reward Creek, C6, pits off S end	White puggy seam, depth 1.5 m, 5.7 pit
JR80	Reward Creek, C6, pits off S end	Fresher metamorphics, depth 1.5 m, 2nd pit — 3 m at 180°.
JR81	Reward Creek, C6, pits off S end	Boudinaged quartz veins, depth 1.5 m, 2nd pit — 3 m at 180°.

APPENDIX 2

Rock Analyses

SAMPLE GROUPS AND TYPES OF ANALYSES

JR1 (893876) — JR15 (893890)

Major elements
Trace elements (excluding Hg)
Gold

JR19 (894571) — JR59 (894602)

Major elements
Trace elements
Gold

JR60 (895312) — JR68 (895321)

Major elements
Trace elements
Gold

JR69 (895757) — JR76 (895763)

Gold

JR78 (896243) — JR81 (896246)

Gold

MAJOR ANALYSES, SAMPLES 893875–893890 (JR1–JR15)

	893876 JR 1	893877 JR 2	893878 JR 3	893879 JR 4	893880 JR 5	893881 JR 6	893882 JR 7	893883 JR 8	893884 JR 9
SiO2	71.74	98.01	96.99	89.34	93.18	26.29	96.59	*	*
TiO2	0.61	0.17	0.21	0.54	0.23	0.03	0.27	0.05	0.11
Al2O3	16.99	2.38	2.84	5.50	1.84	0.79	2.36	1.06	0.70
Fe2O3	0.21	0.10	0.10	0.63	<0.01	<0.01	0.06	83.82	81.98
FeO	0.65	0.18	0.18	0.18	0.19	0.18	0.19	0.43	1.19
MnO	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.13	0.13
MgO	<0.01	<0.01	0.04	0.36	<0.01	16.28	0.14	0.33	0.36
CaO	0.04	0.06	0.05	0.07	0.05	22.82	0.15	0.13	0.12
Na2O	0.44	0.47	0.49	0.50	0.47	0.54	0.45	1.33	1.31
K2O	0.23	0.30	0.58	1.38	0.27	0.07	0.41	0.15	0.14
P2O5	0.41	0.39	0.43	0.43	0.39	1.51	0.42	1.57	1.44
SO3	0.18	0.06	0.06	0.09	0.07	0.15	0.10	0.42	0.27
CO2	0.82	0.05	0.01	0.04	0.04	27.88	0.09	1.34	2.02
LOI	7.96	0.34	0.23	1.18	5.36	33.50	0.71	12.48	12.12
H2O+	7.21	0.31	0.24	1.16	5.34	5.64	0.64	11.19	10.23

* SiO2 not accurately determinable due to Fe2O3

	893885 JR 10	893886 JR11	893887 JR 12	893888 JR 13	893889 JR 14	893890 JR 15
SiO2	77.40	61.62	73.26	69.51	1.95	68.57
TiO2	0.76	0.58	0.84	0.87	0.02	0.71
Al2O3	9.42	13.07	16.25	12.81	0.60	11.32
Fe2O3	3.83	2.06	0.08	1.28	0.59	0.54
FeO	0.98	6.66	0.15	4.02	0.43	3.66
MnO	0.01	0.27	<0.01	0.03	<0.01	0.06
MgO	1.61	6.21	1.21	2.83	19.70	2.34
CaO	0.05	0.06	0.06	0.16	27.97	2.23
Na2O	0.57	0.60	0.55	2.34	0.71	2.49
K2O	2.76	2.82	4.07	2.36	0.09	2.28
P2O5	0.48	0.53	0.46	0.60	1.73	0.71
SO3	0.20	0.17	0.12	0.16	2.96	0.23
CO2	0.42	0.16	0.01	0.04	33.22	1.15
LOI	3.18	4.92	3.63	3.13	44.38	3.56
H2O+	2.87	5.50	3.37	3.54	9.53	2.50

TRACE ANALYSES, SAMPLES 893875–893890 (JR1–JR15)

	893876	893877	893878	893879	893880	893881	893882	893883	893884
	JR 1	JR 2	JR 3	JR 4	JR 5	JR 6	JR 7	JR 8	JR 9
Ag	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12
As	< 20	< 20	< 20	< 20	< 20	< 20	< 20	43	23
Ba	< 23	< 23	39	145	30	< 23	46	< 23	< 23
Bi	8	7	7	10	7	7	9	< 5	< 5
Ce	67	47	39	115	86	< 28	49	120	73
Co	21	64	98	67	110	< 8	93	87	< 8
Cr	390	170	90	94	64	15	100	130	100
Cu	21	15	16	28	15	< 5	18	< 5	< 5
Ga	24	< 5	< 5	6	< 5	< 5	< 5	7	7
La	< 26	< 26	< 26	< 26	< 26	< 26	< 26	< 26	< 26
Mo	< 5	8	9	5	6	< 5	8	5	< 5
Nb	7	< 5	< 5	7	5	< 5	5	< 5	< 5
Nd	45	24	< 23	33	< 23	35	< 23	85	81
Ni	140	16	11	22	16	5	24	33	12
Pb	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11	< 11
Rb	7	21	17	47	13	< 5	15	22	27
Sc	< 9	< 9	< 9	< 9	< 9	12	< 9	< 9	10
Sn	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9
Sr	< 5	< 5	< 5	< 5	< 5	41	< 5	< 5	< 5
Th	10	< 10	< 10	< 10	< 10	< 10	10	< 10	< 10
U	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12
V	23	8	11	35	8	< 5	12	80	76
W	120	570	950	670	940	68	900	18	20
Y	7	< 5	< 5	9	6	< 5	22	30	10
Zn	19	< 5	< 5	32	< 5	< 5	6	59	14
Zr	76	62	41	270	105	< 5	115	6	8

	893885	893886	893887	893888	893889	893890
	JR 10	JR 11	JR 12	JR 13	JR 14	JR 15
Ag	< 12	< 12	< 12	< 12	< 12	< 12
As	< 20	39	< 20	< 20	< 20	< 20
Ba	260	390	280	410	< 23	390
Bi	11	6	6	7	5	< 5
Ce	105	130	105	140	< 28	110
Co	33	58	9	18	< 8	14
Cr	80	210	1350	135	16	105
Cu	22	155	20	22	< 5	16
Ga	10	15	14	17	< 5	14
La	< 26	< 26	59	64	< 26	45
Mo	6	< 5	< 5	< 5	< 5	< 5
Nb	9	6	10	12	< 5	10
Nd	52	69	72	84	33	72
Ni	24	115	36	31	< 5	25
Pb	40	46	16	< 11	< 11	< 11
Rb	82	75	93	95	< 5	88
Sc	15	32	20	13	16	10
Sn	< 9	< 9	< 9	< 9	< 9	< 9
Sr	7	< 5	20	22	51	73
Th	< 10	< 10	10	17	< 10	15
U	< 12	< 12	< 12	< 12	< 12	< 12
V	58	150	130	78	7	61
W	290	57	70	93	17	92
Y	14	45	22	28	< 5	28
Zn	86	240	25	72	< 5	49
Zr	145	57	160	320	< 5	280

ANALYSES OF Sb and Au, SAMPLES 893875–893890 (JR1–JR15), 895757–895763 (JR69–JR76) & 896243–896246 (JR78–JR81)

Registered Number	Sample	Au (g/t)	Sb (g/t)
893876	JR 1	0.09	<5
893877	JR 2	0.13	<5
893878	JR 3	<0.02	<5
893879	JR 4	<0.02	<5
893880	JR 5	0.36	<5
893881	JR 6	0.14	<5
893882	JR 7	0.05	<5
893883	JR 8	0.04	<5
893884	JR 9	0.09	<5
893885	JR 10	0.19	<5
893886	JR 11	0.06	<5
893887	JR12	0.04	<5
893888	JR 13	0.04	<5
893889	JR 14	0.12	<5
893890	JR 15	0.17	<5
895757	JR 69	0.02	
895758	JR 70	<0.02	
895759	JR 72	0.16	
895760	JR 73	0.03	
895761	JR 74	<0.02	
895762	JR 75	0.03	
895763	JR 76	<0.02	
896243	JR 78	<0.02	
896244	JR 79	0.05	
896245	JR 80	<0.02	
896246	JR 81	0.05	

MAJOR ANALYSES, SAMPLES 894571–894602 (JR19–JR59)

%	SiO2	TiO2	Al2O3	Fe2O3	FeO	MnO	MgO	CaO	Na2O	K2O	P2O5	SO3	CO2	H2O+	LOI
894571															
JR 19	0.65	0.02	*	0.08	0.17	0.02	20.81	30.07	0.25	0.04	0.42	0.08	40.95	5.27	46.23
894572															
JR 20	64.95	0.79	15.32	1.18	3.03	0.05	2.75	0.50	1.76	4.45	0.25	0.06	0.77	3.05	3.51
894573															
JR 21	67.32	0.70	13.78	0.97	4.00	0.06	2.80	0.31	1.72	3.66	0.30	0.07	0.29	2.79	2.66
894574															
JR 22	80.55	0.40	9.76	0.49	1.28	0.03	1.19	0.08	0.26	3.01	0.20	0.05	0.20	1.89	1.97
894575															
JR 23	80.31	0.25	7.60	0.34	1.17	*	5.11	0.13	0.26	1.22	0.14	0.06	0.34	2.61	2.84
894576															
JR 24	0.52	*	*	0.26	0.17	0.03	21.59	30.39	0.25	0.03	0.43	0.09	40.83	5.49	46.34
894577															
JR 26A	86.41	0.29	3.88	0.99	2.16	0.23	2.30	0.06	0.26	1.00	0.13	0.33	0.42	1.35	1.66
894578															
JR 26B	62.14	0.55	13.93	1.35	5.77	0.13	6.03	0.48	1.71	1.61	0.20	0.08	0.46	4.54	4.39
894579															
JR 27	97.04	0.01	*	1.80	0.17	0.12	0.14	0.13	0.21	0.01	0.15	0.02	0.40	0.20	0.59
894580															
JR 29	96.23	0.01	0.09	0.03	0.23	0.01	0.21	0.25	0.24	0.01	0.12	0.02	0.37	0.21	0.56
894581															
JR 30	0.44	0.02	*	0.04	0.99	0.11	20.45	30.18	0.26	0.01	0.42	0.15	39.69	7.22	46.86
894582															
JR 31A	96.95	0.01	*	0.66	0.23	0.02	0.16	0.17	0.19	0.01	0.15	0.03	0.42	0.15	0.56
894583															
JR 31B	0.94	*	*	*	0.11	0.01	21.84	30.22	0.25	0.02	0.45	0.07	39.29	6.59	45.90
894584															
JR 34	98.78	0.03	*	0.15	0.06	0.02	0.10	0.02	0.22	0.03	0.10	0.03	0.27	0.23	0.51
894585															
JR 38	73.11	1.00	11.58	0.56	2.33	0.11	1.22	0.05	0.25	3.86	0.17	3.88	0.83	3.51	5.63
894586															
JR 40	5.26	*	0.14	16.31	16.00	24.85	0.54	2.34	0.44	0.06	0.40	0.18	23.64	5.66	27.60
894587															
JR 41	65.37	1.31	14.23	7.80	0.58	0.02	1.28	0.01	0.27	3.71	0.23	0.12	0.18	4.31	4.47
894588															
JR 42	79.64	0.68	7.46	*	0.58	0.04	0.53	0.04	0.22	1.26	0.13	0.13	1.50	7.76	9.25
894589															
JR 43	81.38	0.50	8.49	0.24	0.87	0.01	0.57	0.05	0.23	1.52	0.17	0.09	1.30	4.19	5.43
894590															
JR 44	74.47	0.77	12.25	1.93	0.58	0.01	0.81	0.03	0.24	2.29	0.22	0.07	1.07	3.90	4.93
894591															
JR 45	67.64	1.19	16.31	3.41	0.52	0.01	1.34	0.01	0.25	3.71	0.21	0.05	0.37	4.52	4.85
894592															
JR 46	69.50	1.25	15.82	2.63	0.41	0.01	1.29	0.01	0.26	3.58	0.16	0.03	0.19	4.27	4.43
894593															
JR 47	67.85	1.14	14.92	5.42	0.35	0.02	1.24	0.01	0.26	3.34	0.21	0.03	0.37	4.37	4.71
894594															
JR 48	67.37	1.48	17.62	1.19	0.93	0.02	1.35	0.01	0.24	4.05	0.12	0.03	0.40	4.74	5.05
894595															
JR 50	61.70	0.78	19.35	1.81	2.97	0.07	1.79	0.20	1.40	4.62	0.24	0.03	0.80	4.10	4.58
894596															
JR 51	74.25	0.29	14.08	1.37	1.11	0.04	1.00	0.04	1.03	3.71	0.20	0.03	0.50	2.39	2.78
894597															
JR 52	94.10	0.04	1.79	0.07	0.52	0.01	2.14	0.03	0.22	0.13	0.11	0.01	0.16	0.79	0.90
894598															
JR 53	99.39	0.02	*	*	0.09	*	0.05	0.02	0.20	0.02	0.12	0.02	0.05	*	*
894599															
JR 55	70.98	0.92	10.82	4.23	2.68	0.05	3.47	0.01	0.29	2.93	0.12	0.04	0.10	3.19	3.01
894600															
JR 57	64.22	0.45	11.35	2.67	5.65	0.06	7.11	0.07	0.26	1.58	0.13	0.07	0.60	5.01	5.01
894601															
JR 58	66.96	0.67	10.33	1.81	5.89	0.07	7.26	0.01	0.26	1.55	0.11	0.08	0.20	4.61	4.19
894602															
JR 59	65.41	0.94	12.69	2.39	4.60	0.05	5.51	0.01	0.28	3.10	0.14	0.06	0.17	4.32	4.00

* = <0.01

TRACE ANALYSES (g/t), SAMPLES 894571–894590 (JR19–JR44)

	894571 JR 19	894572 JR 20	894573 JR 21	894574 JR 22	894575 JR 23	894576 JR 24	894577 JR 26A	894578 JR 26B	894579 JR 27	894580 JR 29
Ag	< 12	< 12	17	16	< 12	< 12	< 12	< 12	< 12	< 12
As	< 20	< 20	< 20	22	21	< 20	< 20	< 20	< 20	< 20
Ba	< 23	950	650	410	135	< 23	195	340	38	< 23
Bi	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ce	< 28	63	115	86	87	< 28	57	89	< 28	< 28
Co	< 8	11	10	< 8	20	< 8	19	33	15	< 8
Cr	6	88	92	84	36	10	210	330	93	125
Cu	< 5	20	28	22	19	< 5	27	29	13	14
Ga	< 5	21	18	11	12	< 5	6	14	< 5	< 5
Hg	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
La	< 26	< 26	28	28	30	< 26	< 26	26	< 26	< 26
Mo	< 5	< 5	< 5	12	13	< 5	< 5	< 5	< 5	< 5
Nb	< 5	9	9	< 5	< 5	< 5	7	9	< 5	< 5
Nd	< 23	32	47	< 23	29	< 23	< 23	36	< 23	< 23
Ni	7	28	32	30	21	12	34	145	35	16
Pb	< 11	18	14	< 11	< 11	< 11	15	11	< 11	< 11
Rb	< 5	160	140	95	37	6	26	65	< 5	< 5
Sb	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Sc	< 9	15	11	< 9	< 9	9	< 9	23	< 9	< 9
Sn	< 9	< 9	< 9	< 9	< 9	11	13	< 9	< 9	< 9
Sr	38	26	19	8	< 5	53	8	29	< 5	< 5
Th	12	18	10	14	14	< 10	< 10	10	< 10	< 10
U	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12
V	< 5	95	84	46	21	< 5	33	130	16	< 5
W	61	38	23	< 10	10	< 10	10	10	< 10	< 10
Y	< 5	23	19	17	26	< 5	7	20	< 5	< 5
Zn	8	77	94	23	10	18	67	105	41	< 5
Zr	< 5	240	230	240	240	< 5	49	170	< 5	< 5
Au	<0.02	0.02	0.04	0.05	0.03	<0.02	<0.02	<0.02	0.03	<0.02

	894581 JR 30	894582 JR 31A	894583 JR 31B	894584 JR 34	894585 JR 38	894586 JR 40	894587 JR 41	894588 JR 42	894589 JR 43	894590 JR 44
Ag	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12
As	< 20	23	< 20	< 20	48	75	26	< 20	< 20	< 20
Ba	< 23	< 23	< 23	< 23	320	79	450	185	185	320
Bi	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ce	< 28	30	< 28	< 28	75	< 28	82	120	220	120
Co	< 8	< 8	< 8	< 8	33	320	18	< 8	< 8	8
Cr	8	66	10	85	150	46	260	135	165	175
Cu	< 5	20	< 5	11	44	< 5	61	21	39	51
Ga	< 5	< 5	< 5	< 5	17	< 5	21	9	13	14
Hg	< 10	< 10	< 10	< 10	< 10	25	< 10	< 10	< 10	< 10
La	< 26	< 26	< 26	< 26	< 26	< 26	26	57	100	34
Mo	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Nb	< 5	< 5	< 5	< 5	11	< 5	11	8	7	10
Nd	< 23	< 23	< 23	< 23	< 23	95	29	42	79	36
Ni	11	31	6	14	86	440	63	50	54	72
Pb	< 11	< 11	< 11	< 11	< 11	< 11	< 11	11	18	< 11
Rb	6	< 5	6	< 5	100	20	105	43	46	79
Sb	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Sc	11	< 9	9	< 9	12	11	27	< 9	< 9	14
Sn	< 9	< 9	< 9	10	< 9	< 9	23	29	< 9	18
Sr	70	< 5	36	< 5	6	< 5	< 5	6	10	6
Th	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	13	10
U	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12
V	< 5	< 5	< 5	< 5	125	79	155	51	64	98
W	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Y	< 5	< 5	< 5	< 5	13	37	15	11	13	12
Zn	22	< 5	< 5	< 5	115	580	75	22	27	50
Zr	< 5	< 5	< 5	< 5	170	5	190	140	100	165
Au	<0.02	<0.02	0.02	<0.02	<0.02	0.02	<0.02	<0.02	0.02	<0.02

TRACE ANALYSES (g/t), SAMPLES 894591–894602 (JR45–JR59)

	894591 JR 45	894592 JR 46	894593 JR 47	894594 JR 48	894595 JR 50	894596 JR 51	894597 JR 52	894598 JR 53	894599 JR 55	894600 JR 57
Ag	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12
As	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	29	< 20
Ba	410	320	310	500	940	770	< 23	< 23	230	170
Bi	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ce	78	83	130	91	93	120	50	< 28	54	105
Co	< 8	< 8	< 8	< 8	< 8	8	< 8	< 8	16	19
Cr	220	230	210	160	94	77	64	75	100	61
Cu	48	37	38	34	14	24	10	12	25	25
Ga	20	21	21	22	25	20	< 5	< 5	15	14
Hg	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
La	< 26	< 26	28	< 26	47	43	< 26	< 26	< 26	< 26
Mo	< 5	< 5	< 5	< 5	6	< 5	7	< 5	< 5	< 5
Nb	14	13	12	14	21	19	< 5	< 5	6	< 5
Nd	24	< 23	33	< 23	29	33	< 23	< 23	< 23	34
Ni	67	68	74	53	27	27	14	12	31	36
Pb	< 11	< 11	< 11	< 11	20	47	< 11	< 11	< 11	53
Rb	115	110	105	120	230	185	< 5	< 5	86	50
Sb	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Sc	22	21	21	21	18	< 9	< 9	< 9	15	< 9
Sn	< 9	< 9	< 9	< 9	< 9	9	9	14	< 9	10
Sr	< 5	< 5	< 5	< 5	79	85	< 5	< 5	7	< 5
Th	11	14	10	< 10	20	21	< 10	< 10	< 10	< 10
U	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12
V	150	145	140	140	97	33	7	< 5	92	56
W	< 10	< 10	< 10	< 10	< 10	< 10	135	< 10	< 10	< 10
Y	19	17	22	15	25	23	8	< 5	6	9
Zn	48	24	40	36	105	65	5	< 5	58	130
Zr	250	220	230	220	200	145	77	14	145	260
Au	<0.02	<0.02	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02

	894601 JR 58	894602 JR 59
Ag	< 12	< 12
As	< 20	< 20
Ba	160	400
Bi	< 5	< 5
Ce	92	70
Co	25	23
Cr	79	105
Cu	10	13
Ga	14	18
Hg	< 10	< 10
La	< 26	< 26
Mo	< 5	< 5
Nb	10	11
Nd	31	< 23
Ni	44	39
Pb	< 11	< 11
Rb	58	115
Sb	< 10	< 10
Sc	11	18
Sn	15	< 9
Sr	6	< 5
Th	< 10	< 10
U	< 12	< 12
V	66	105
W	< 10	< 10
Y	14	14
Zn	135	86
Zr	155	160
Au	<0·02	<0·02

MAJOR &TRACE ANALYSES, SAMPLES 895312–895321 (JR60–JR68)

%	SiO2	TiO2	Al2O3	Fe2O3	FeO	MnO	MgO	CaO	Na2O	K2O	P2O5	SO3	CO2	H2O+	LOI
895312 JR 60	99.71	0.03	0.09	*	0.23	*	0.18	*	0.22	0.01	0.13	0.03	0.05	*	0.04
895313 JR 61	65.41	0.70	15.68	1.72	2.33	0.01	4.63	*	0.31	4.06	0.16	1.23	0.11	3.43	3.77
895314 JR 62	99.27	0.03	0.51	*	0.17	*	0.05	*	0.17	0.13	0.11	0.02	0.07	0.11	0.17
895315 JR 63A	0.09	0.04	*	0.09	0.23	0.02	19.38	33.30	0.21	*	0.37	0.11	42.97	3.00	45.99
895316 JR 63B	0.03	0.02	0.02	0.13	0.35	0.03	20.84	31.00	0.22	*	0.36	0.10	42.99	2.86	45.85
895317 JR 64	73.11	1.22	14.13	0.70	0.58	0.01	1.58	*	0.25	4.77	0.10	0.04	0.31	2.47	2.73
895318 JR 65	66.66	1.08	16.15	2.71	0.70	0.01	1.72	*	0.24	4.58	0.12	0.04	1.00	3.71	4.65
895319 JR 66	65.54	1.11	14.64	7.39	0.41	0.18	1.25	*	0.22	3.24	0.21	0.05	0.11	4.72	4.80
895320 JR 67	67.32	0.84	17.82	1.21	0.70	0.01	1.45	*	0.21	3.82	0.16	0.05	0.60	4.87	5.41
895321 JR 68	96.97	0.01	*	*	0.29	*	0.41	0.46	0.19	*	0.14	0.02	0.84	0.14	0.96

* = <0.01

g/t	895312	895313	895314	895315	895316	895317	895318	895319	895320	895321
								<12		
Ag	< 12	< 12	< 12	< 12	< 12	< 12	< 12	*	< 12	< 12
As	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Au	*	*	*	*	*	*	*	*	*	*
Ba	< 23	400	< 23	< 23	< 23	540	600	660	790	< 23
Bi	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Ce	28	125	52	< 28	< 28	62	58	270	105	< 28
Co	< 8	14	< 8	< 8	< 8	< 8	< 8	40	< 8	< 8
Cr	155	100	99	6	9	165	210	240	100	89
Cu	16	10	< 5	< 5	< 5	7	< 5	34	6	5
Ga	< 5	20	< 5	< 5	< 5	18	21	18	21	< 5
La	< 26	49	45	< 26	< 26	< 26	< 26	< 26	42	< 26
Mo	6	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Nb	< 5	14	< 5	< 5	< 5	12	13	11	14	< 5
Nd	< 23	57	< 23	< 23	< 23	35	< 23	43	46	< 23
Pb	< 11	< 11	< 11	< 11	< 11	< 11	< 11	21	< 11	< 11
Rb	< 5	140	< 5	5	6	120	130	105	165	< 5
Sc	< 9	14	< 9	12	11	20	16	20	15	< 9
Sn	14	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9	< 9
Sr	< 5	9	< 5	48	43	6	< 5	< 5	< 5	< 5
Th	< 10	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	15
U	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12	< 12
V	5	83	5	< 5	< 5	115	110	110	86	< 5
W	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Y	< 5	21	< 5	< 5	< 5	< 5	10	7	< 5	< 5
Zn	< 5	11	< 5	< 5	8	10	15	47	22	< 5
Zr	67	175	81	< 5	< 5	210	280	210	230	< 5

Sb all <10